

FLTK 1.3.8 Programming Manual



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November 20, 2021

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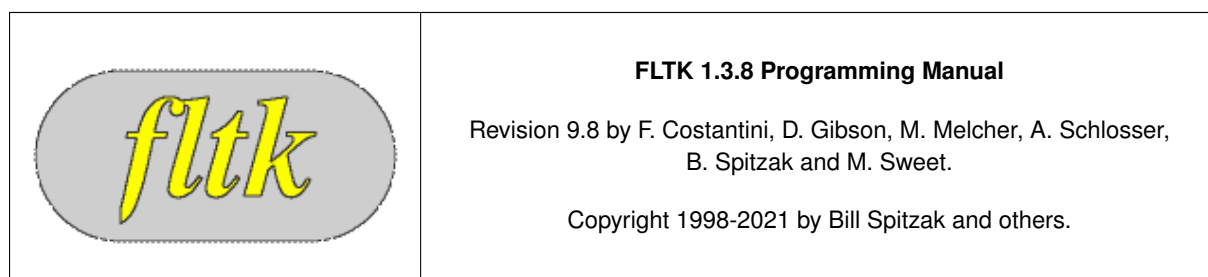
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Chapter 1

FLTK Programming Manual



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<p>Preface Introduction to FLTK FLTK Basics Common Widgets and Attributes</p> <ul style="list-style-type: none">• Colors• Box Types• Labels and Label Types• Drawing Images <p>Designing a Simple Text Editor Drawing Things in FLTK Handling Events</p> <ul style="list-style-type: none">• Fl::event_*() methods• Event Propagation <p>Adding and Extending Widgets Using OpenGL Programming with FLUID</p> <ul style="list-style-type: none">• GUI Attributes• Selecting and Moving Widgets• Image Labels	<p>Advanced FLTK Unicode and UTF-8 Support</p> <p>Appendices:</p> <ul style="list-style-type: none">• FLTK Enumerations• GLUT Compatibility<ul style="list-style-type: none">– class Fl_Glut_Window• Forms Compatibility• Operating System Issues• Migrating Code from FLTK 1.0 to 1.1• Migrating Code from FLTK 1.1 to 1.3• Developer Information• Software License• Example Source Code• FAQ (Frequently Asked Questions)
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Chapter 2

Preface

This manual describes the Fast Light Tool Kit ("FLTK") version 1.3.8, a C++ Graphical User Interface ("GUI") toolkit for UNIX, Microsoft Windows and Apple OS X.

Each of the chapters in this manual is designed as a tutorial for using FLTK, while the appendices provide a convenient reference for all FLTK widgets, functions, and operating system interfaces.

This manual may be printed, modified, and/or used under the terms of the FLTK license provided in [Software License](#).

2.1 Organization

This manual is organized into the following chapters and appendices:

- [Introduction to FLTK](#)
- [FLTK Basics](#)
- [Common Widgets and Attributes](#)
- [Designing a Simple Text Editor](#)
- [Drawing Things in FLTK](#)
- [Handling Events](#)
- [Adding and Extending Widgets](#)
- [Using OpenGL](#)
- [Programming with FLUID](#)
- [Advanced FLTK](#)
- [Unicode and UTF-8 Support](#)
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- [Operating System Issues](#)
- [Migrating Code from FLTK 1.0 to 1.1](#)
- [Migrating Code from FLTK 1.1 to 1.3](#)
- [Developer Information](#)
- [Software License](#)
- [Example Source Code](#)

2.2 Conventions

This manual was generated using Doxygen (see <http://www.doxygen.org/>) to process the source code itself, special comments in the code, and additional documentation files. In general, Doxygen recognizes and denotes the following entities as shown:

- classes, such as `Fl_Widget`,
- methods, such as `Fl_Widget::callback(Fl_Callback* cb, void* p)`,
- functions, such as `fl_draw(const char *str, int x, int y)`,
- internal links, such as [Conventions](#),
- external links, such as <http://www.stack.nl/~dimitri/doxygen/>

Other code samples and commands are shown in regular courier type.

2.3 Abbreviations

The following abbreviations are used in this manual:

X11

The X Window System version 11.

Xlib

The X Window System interface library.

MS Windows, WIN32

The Microsoft Windows Application Programmer's Interface for Windows 2000, Windows XP, Windows Vista, and Windows 7. FLTK uses the preprocessor definition `WIN32` for the 32 bit and 64 bit MS Windows API.

OS X, APPLE

The Apple desktop operating system OS X 10.0 and later. MacOS 8 and 9 support was dropped after FLTK 1.0.10. FLTK uses the preprocessor definition `APPLE` for OS X.

2.4 Copyrights and Trademarks

FLTK is Copyright 1998-2021 by Bill Spitzak and others. Use and distribution of FLTK is governed by the GNU Library General Public License with 4 exceptions, located in [Software License](#).

UNIX is a registered trademark of the X Open Group, Inc. Microsoft and Windows are registered trademarks of Microsoft Corporation. OpenGL is a registered trademark of Silicon Graphics, Inc. Apple, Macintosh, MacOS, and Mac OS X are registered trademarks of Apple Computer, Inc.

Chapter 3

Introduction to FLTK

The Fast Light Tool Kit ("FLTK", pronounced "fulltick") is a cross-platform C++ GUI toolkit for UNIX®/Linux® (X11), Microsoft® Windows®, and Apple® OS X®.

FLTK provides modern GUI functionality without the bloat and supports 3D graphics via OpenGL® and its built-in GLUT emulation. It was originally developed by Mr. Bill Spitzak and is currently maintained by a small group of developers across the world with a central repository in the US.

3.1 History of FLTK

It has always been Bill's belief that the GUI API of all modern systems is much too high level. Toolkits (even FLTK) are *not* what should be provided and documented as part of an operating system. The system only has to provide arbitrary shaped but featureless windows, a powerful set of graphics drawing calls, and a simple *unalterable* method of delivering events to the owners of the windows. NeXT (if you ignored NextStep) provided this, but they chose to hide it and tried to push their own baroque toolkit instead.

Many of the ideas in FLTK were developed on a NeXT (but *not* using NextStep) in 1987 in a C toolkit Bill called "views". Here he came up with passing events downward in the tree and having the handle routine return a value indicating whether it used the event, and the table-driven menus. In general he was trying to prove that complex UI ideas could be entirely implemented in a user space toolkit, with no knowledge or support by the system.

After going to film school for a few years, Bill worked at Sun Microsystems on the (doomed) NeWS project. Here he found an even better and cleaner windowing system, and he reimplemented "views" atop that. NeWS did have an unnecessarily complex method of delivering events which hurt it. But the designers did admit that perhaps the user could write just as good of a button as they could, and officially exposed the lower level interface.

With the death of NeWS Bill realized that he would have to live with X. The biggest problem with X is the "window manager", which means that the toolkit can no longer control the window borders or drag the window around.

At Digital Domain Bill discovered another toolkit, "Forms". Forms was similar to his work, but provided many more widgets, since it was used in many real applications, rather than as theoretical work. He decided to use Forms, except he integrated his table-driven menus into it. Several very large programs were created using this version of Forms.

The need to switch to OpenGL and GLX, portability, and a desire to use C++ subclassing required a rewrite of Forms. This produced the first version of FLTK. The conversion to C++ required so many changes it made it impossible to recompile any Forms objects. Since it was incompatible anyway, Bill decided to incorporate his older ideas as much as possible by simplifying the lower level interface and the event passing mechanism.

Bill received permission to release it for free on the Internet, with the GNU general public license. Response from Internet users indicated that the Linux market dwarfed the SGI and high-speed GL market, so he rewrote it to use X for all drawing, greatly speeding it up on these machines. That is the version you have now.

Digital Domain has since withdrawn support for FLTK. While Bill is no longer able to actively develop it, he still contributes to FLTK in his free time and is a part of the FLTK development team.

3.2 Features

FLTK was designed to be statically linked. This was done by splitting it into many small objects and designing it so that functions that are not used do not have pointers to them in the parts that are used, and thus do not get linked in. This allows you to make an easy-to-install program or to modify FLTK to the exact requirements of your application without worrying about bloat. FLTK works fine as a shared library, though, and is now included with several Linux distributions.

Here are some of the core features unique to FLTK:

- `sizeof(FI_Widget) == 64 to 92`.
- The "core" (the "hello" program compiled & linked with a static FLTK library using gcc on a 486 and then stripped) is 114K.
- The FLUID program (which includes every widget) is 538k.
- Written directly atop core libraries (Xlib, WIN32 or Cocoa) for maximum speed, and carefully optimized for code size and performance.
- Precise low-level compatibility between the X11, WIN32 and MacOS versions - only about 10% of the code is different.
- Interactive user interface builder program. Output is human-readable and editable C++ source code.
- Support for overlay hardware, with emulation if none is available.
- Very small & fast portable 2-D drawing library to hide Xlib, WIN32, or QuickDraw.
- OpenGL/Mesa drawing area widget.
- Support for OpenGL overlay hardware on both X11 and WIN32, with emulation if none is available.
- Text widgets with cut & paste, undo, and support for Unicode text and international input methods.
- Compatibility header file for the GLUT library.
- Compatibility header file for the XForms library.

3.3 Licensing

FLTK comes with complete free source code. FLTK is available under the terms of the [GNU Library General Public License](#) with exceptions that allow for static linking. Contrary to popular belief, it can be used in commercial software - even Bill Gates could use it!

3.4 What Does "FLTK" Mean?

FLTK was originally designed to be compatible with the Forms Library written for SGI machines. In that library all the functions and structures started with "fl_". This naming was extended to all new methods and widgets in the C++ library, and this prefix was taken as the name of the library. It is almost impossible to search for "FL" on the Internet, due to the fact that it is also the abbreviation for Florida. After much debating and searching for a new name for the toolkit, which was already in use by several people, Bill came up with "FLTK", including a bogus excuse that it stands for "The Fast Light Toolkit".

3.5 Building and Installing FLTK Under UNIX and Apple OS X

In most cases you can just type "make". This will run configure with the default of no options and then compile everything.

For OS X, Xcode 3 project files can be found in the 'ide' directory.

FLTK uses GNU autoconf to configure itself for your UNIX platform. The main things that the configure script will look for are the X11 and OpenGL (or Mesa) header and library files. If these cannot be found in the standard include/library locations you'll need to define the CFLAGS, CXXFLAGS, and LDFLAGS environment variables. For the Bourne and Korn shells you'd use:

```
CFLAGS=-Iincludedir; export CFLAGS
CXXFLAGS=-Iincludedir; export CXXFLAGS
LDFLAGS=-Llibdir; export LDFLAGS
```

For C shell and tcsh, use:

```
setenv CFLAGS "-Iincludedir"
setenv CXXFLAGS "-Iincludedir"
setenv LDFLAGS "-Llibdir"
```

By default configure will look for a C++ compiler named CC, c++, g++, or gcc in that order. To use another compiler you need to set the CXX environment variable:

```
CXX=x1C; export CXX
setenv CXX "x1C"
```

The CC environment variable can also be used to override the default C compiler (cc or gcc), which is used for a few FLTK source files.

You can run configure yourself to get the exact setup you need. Type "./configure <options>", where options are:

-enable-cygwin

Enable the Cygwin libraries under WIN32

-enable-debug

Enable debugging code & symbols

-disable-gl

Disable OpenGL support

-enable-shared

Enable generation of shared libraries

-enable-threads

Enable multithreading support

-enable-xdbe

Enable the X double-buffer extension

-enable-xft

Enable the Xft library for anti-aliased fonts under X11

-enable-x11

When targeting cygwin, build with X11 GUI instead of windows GDI

-enable-cp936

Under X11, enable use of the GB2312 locale

-bindir=/path

Set the location for executables [default = \$prefix/bin]

-datadir=/path

Set the location for data files. [default = \$prefix/share]

-libdir=/path

Set the location for libraries [default = \$prefix/lib]

-includedir=/path

Set the location for include files. [default = \$prefix/include]

-mandir=/path

Set the location for man pages. [default = \$prefix/man]

-prefix=/dir

Set the directory prefix for files [default = /usr/local]

When the configure script is done you can just run the "make" command. This will build the library, FLUID tool, and all of the test programs.

To install the library, become root and type "make install". This will copy the "fluid" executable to "bindir", the header files to "includedir", and the library files to "libdir".

3.6 Building FLTK Under Microsoft Windows

NOTE: This documentation section is currently under review. More up-to-date information for this release may be available in the file "README.MSWindows.txt" and you should read that file to determine if there are changes that may be applicable to your build environment.

FLTK 1.3 is officially supported on Windows (2000,) 2003, XP, and later. Older Windows versions prior to Windows 2000 are not officially supported, but may still work. The main reason is that the OS version needs to support UTF-8. FLTK 1.3 is known to work on recent versions of Windows such as Windows 7, Windows 8/8.1 and Windows 10 and has been reported to work in both 32-bit and 64-bit versions of these.

FLTK currently supports the following development environments on the Windows platform:

CAUTION: Libraries built by any one of these build environments can not be mixed with object files from any of the other environments! (They use incompatible C++ conventions internally.)

Free Microsoft Visual C++ 2008 Express and Visual C++ 2010 Express or later versions using the supplied workspace and project files. Older versions, and the commercial versions, can be used as well, if they can open the project files. Be sure to get your service packs!

The project files can be found in the "ide/" directory. Please read "ide/README.IDE" for more info about this.

3.6.1 GNU toolsets (Cygwin or MinGW) hosted on Windows

If using Cygwin with the Cygwin shell, or MinGW with the Msys shell, these build environments behave very much like a Unix or OS X build and the notes above in the section on *Building and Installing FLTK Under UNIX and Apple OS X* apply, in particular the descriptions of using the "configure" script and its related options.

In general for a build using these tools, e.g. for the Msys shell with MinGW, it should suffice to "cd" into the directory where you have extracted the fltk tarball and type:

```
./configure
make
```

This will build the fltk libraries and they can then be utilised directly from the build location. NOTE: this may be simpler than "installing" them in many cases as different tool chains on Windows have different ideas about where the files should be "installed" to.

For example, if you "install" the libraries using Msys/MinGW with the following command:

```
make install
```

Then Msys will "install" the libraries to where it thinks the path "/usr/local/" leads to. If you only ever build code from within the Msys environment this works well, but the actual "Windows path" these files are located in will be something like "C:\msys\1.0\local\lib", depending on where your Msys installation is rooted, which may not be useful to other tools.

If you want to install your built fltk libraries in a non-standard location you may do:

```
sh configure --prefix=C:/FLTK
make
```

Where the value passed to "prefix" is the path at which you would like fltk to be installed.

A subsequent invocation of "make install" will then place the fltk libraries and header files into that path.

The other options to "configure" may also be used to tailor the build to suit your environment.

3.6.2 Using the Visual C++ DLL Library

The "fltkdll.dsp" project file builds a DLL-version of the FLTK library. Because of name mangling differences between PC compilers (even between different versions of Visual C++!) you can only use the DLL that is generated with the same version compiler that you built it with.

When compiling an application or DLL that uses the FLTK DLL, you will need to define the `FL_DLL` preprocessor symbol to get the correct linkage commands embedded within the FLTK header files.

3.7 Internet Resources

FLTK is available on the 'net in a bunch of locations:

WWW

<http://www.fltk.org/>
<http://www.fltk.org/str.php> [for reporting bugs]
<https://www.fltk.org/software.php> [source code]
<http://www.fltk.org/newsgroups.php> [newsgroup/forums]

NNTP Newsgroups

<https://groups.google.com/forum/#!forum/fltkgeneral> [Google Groups interface]
<news://fltk.org:1024/> [NNTP interface]
<http://fltk.org/newsgroups.php> [web interface]

3.8 Reporting Bugs

To report a bug in FLTK, or for feature requests, please use the form at <http://www.fltk.org/str.php>, and click on "Submit Bug or Feature Request".

You'll be prompted for the FLTK version, operating system & version, and compiler that you are using. We will be unable to provide any kind of help without that basic information.

For general support and questions, please use the fltk.general newsgroup (see above, "NNTP Newsgroups") or the web interface to the newsgroups at <http://fltk.org/newsgroups.php>.

Chapter 4

FLTK Basics

This chapter teaches you the basics of compiling programs that use FLTK.

4.1 Writing Your First FLTK Program

All programs must include the file `<FL/Fl.H>`. In addition the program must include a header file for each FLTK class it uses. Listing 1 shows a simple "Hello, World!" program that uses FLTK to display the window.

Listing 1 - "hello.cxx"

```
#include <FL/Fl.H>
#include <FL/Fl_Window.H>
#include <FL/Fl_Box.H>
int main(int argc, char **argv) {
    Fl_Window *window = new Fl_Window(340,180);
    Fl_Box *box = new Fl_Box(20,40,300,100,"Hello, World!");
    box->box(FL_UP_BOX);
    box->labelfont(FL_BOLD+FL_ITALIC);
    box->labelsize(36);
    box->labeltype(FL_SHADOW_LABEL);
    window->end();
    window->show(argc, argv);
    return Fl::run();
}
```

After including the required header files, the program then creates a window. All following widgets will automatically be children of this window.

```
Fl_Window *window = new Fl_Window(340,180);
```

Then we create a box with the "Hello, World!" string in it. FLTK automatically adds the new box to window, the current grouping widget.

```
Fl_Box *box = new Fl_Box(20,40,300,100,"Hello, World!");
```

Next, we set the type of box and the font, size, and style of the label:

```
box->box(FL_UP_BOX);
box->labelfont(FL_BOLD+FL_ITALIC);
box->labelsize(36);
box->labeltype(FL_SHADOW_LABEL);
```

We tell FLTK that we will not add any more widgets to window.

```
window->end();
```

Finally, we show the window and enter the FLTK event loop:

```
window->show(argc, argv);
return Fl::run();
```

The resulting program will display the window in Figure 4.1. You can quit the program by closing the window or pressing the `ESCAPE` key.



Figure 4.1 The Hello, World! Window

4.1.1 Creating the Widgets

The widgets are created using the C++ `new` operator. For most widgets the arguments to the constructor are:
`Fl_Widget(x, y, width, height, label)`

The `x` and `y` parameters determine where the widget or window is placed on the screen. In FLTK the top left corner of the window or screen is the origin (i.e. `x = 0`, `y = 0`) and the units are in pixels.

The `width` and `height` parameters determine the size of the widget or window in pixels. The maximum widget size is typically governed by the underlying window system or hardware.

`label` is a pointer to a character string to label the widget with or `NULL`. If not specified the label defaults to `NULL`. The label string must be in static storage such as a string constant because FLTK does not make a copy of it - it just uses the pointer.

4.1.2 Creating Widget hierarchies

Widgets are commonly ordered into functional groups, which in turn may be grouped again, creating a hierarchy of widgets. FLTK makes it easy to fill groups by automatically adding all widgets that are created between a `myGroup->begin()` and `myGroup->end()`. In this example, `myGroup` would be the *current* group.

Newly created groups and their derived widgets implicitly call `begin()` in the constructor, effectively adding all subsequently created widgets to itself until `end()` is called.

Setting the current group to `NULL` will stop automatic hierarchies. New widgets can now be added manually using `Fl_Group::add(...)` and `Fl_Group::insert(...)`.

4.1.3 Get/Set Methods

`box->box(FL_UP_BOX)` sets the type of box the `Fl_Box` draws, changing it from the default of `FL_NO_BOX`, which means that no box is drawn. In our "Hello, World!" example we use `FL_UP_BOX`, which means that a raised button border will be drawn around the widget. More details are available in the [Box Types](#) section.

You could examine the `boxtype` in by doing `box->box()`. FLTK uses method name overloading to make short names for get/set methods. A "set" method is always of the form "void name(type)", and a "get" method is always of the form "type name() const".

4.1.4 Redrawing After Changing Attributes

Almost all of the set/get pairs are very fast, short inline functions and thus very efficient. However, *the "set" methods do not call `redraw()`* - you have to call it yourself. This greatly reduces code size and execution time. The only common exceptions are `value()` which calls `redraw()` and `label()` which calls `redraw_label()` if necessary.

4.1.5 Labels

All widgets support labels. In the case of window widgets, the label is used for the label in the title bar. Our example program calls the `labelfont()`, `labelsize()`, and `labeltype()` methods.

The `labelfont()` method sets the typeface and style that is used for the label, which for this example we are using `FL_BOLD` and `FL_ITALIC`. You can also specify typefaces directly.

The `labelsize()` method sets the height of the font in pixels.

The `labeltype()` method sets the type of label. FLTK supports normal, embossed, and shadowed labels internally, and more types can be added as desired.

A complete list of all label options can be found in the section on [Labels and Label Types](#).

4.1.6 Showing the Window

The `show()` method shows the widget or window. For windows you can also provide the command-line arguments to allow users to customize the appearance, size, and position of your windows.

4.1.7 The Main Event Loop

All FLTK applications (and most GUI applications in general) are based on a simple event processing model. User actions such as mouse movement, button clicks, and keyboard activity generate events that are sent to an application. The application may then ignore the events or respond to the user, typically by redrawing a button in the "down" position, adding the text to an input field, and so forth.

FLTK also supports idle, timer, and file pseudo-events that cause a function to be called when they occur. Idle functions are called when no user input is present and no timers or files need to be handled - in short, when the application is not doing anything. Idle callbacks are often used to update a 3D display or do other background processing.

Timer functions are called after a specific amount of time has expired. They can be used to pop up a progress dialog after a certain amount of time or do other things that need to happen at more-or-less regular intervals. FLTK timers are not 100% accurate, so they should not be used to measure time intervals, for example.

File functions are called when data is ready to read or write, or when an error condition occurs on a file. They are most often used to monitor network connections (sockets) for data-driven displays.

FLTK applications must periodically check (`Fl::check()`) or wait (`Fl::wait()`) for events or use the `Fl::run()` method to enter a standard event processing loop. Calling `Fl::run()` is equivalent to the following code:

```
while (Fl::wait());
```

`Fl::run()` does not return until all of the windows under FLTK control are closed by the user or your program.

4.2 Compiling Programs with Standard Compilers

Under UNIX (and under Microsoft Windows when using the GNU development tools) you will probably need to tell the compiler where to find the header files. This is usually done using the `-I` option:

```
CC -I/usr/local/include ...
gcc -I/usr/local/include ...
```

The `fltk-config` script included with FLTK can be used to get the options that are required by your compiler:

```
CC `fltk-config --cxxflags` ...
```

Similarly, when linking your application you will need to tell the compiler to use the FLTK library:

```
CC ... -L/usr/local/lib -lfltk -lXext -lX11 -lm
gcc ... -L/usr/local/lib -lfltk -lXext -lX11 -lm
```

Aside from the "fltk" library, there is also a "fltk_forms" library for the XForms compatibility classes, "fltk_gl" for the OpenGL and GLUT classes, and "fltk_images" for the image file classes, [Fl_Help_Dialog](#) widget, and system icon support.

Note

The libraries are named "fltk.lib", "fltkgl.lib", "fltkforms.lib", and "fltkimages.lib", respectively under Windows.

As before, the `fltk-config` script included with FLTK can be used to get the options that are required by your linker:

```
CC ... `fltk-config --ldflags`
```

The forms, GL, and images libraries are included with the "--use-foo" options, as follows:

```
CC ... `fltk-config --use-forms --ldflags`
CC ... `fltk-config --use-gl --ldflags`
CC ... `fltk-config --use-images --ldflags`
CC ... `fltk-config --use-forms --use-gl --use-images --ldflags`
```

Finally, you can use the `fltk-config` script to compile a single source file as a FLTK program:

```
fltk-config --compile filename.cpp
fltk-config --use-forms --compile filename.cpp
fltk-config --use-gl --compile filename.cpp
fltk-config --use-images --compile filename.cpp
fltk-config --use-forms --use-gl --use-images --compile filename.cpp
```

Any of these will create an executable named `filename`.

4.3 Compiling Programs with Makefiles

The previous section described how to use `fltk-config` to build a program consisting of a single source file from the command line, and this is very convenient for small test programs. But `fltk-config` can also be used to set the compiler and linker options as variables within a Makefile that can be used to build programs out of multiple source files:

```
CXX      = $(shell fltk-config --cxx)
DEBUG    = -g
CXXFLAGS = $(shell fltk-config --use-gl --use-images --cxxflags ) -I.
LDLAGS   = $(shell fltk-config --use-gl --use-images --ldflags )
LDSTATIC = $(shell fltk-config --use-gl --use-images --ldstaticflags )
LINK     = $(CXX)
TARGET   = cube
OBJS     = CubeMain.o CubeView.o CubeViewUI.o
SRCS     = CubeMain.cxx CubeView.cxx CubeViewUI.cxx
.SUFFIXES: .o .cxx
%.o: %.cxx
        $(CXX) $(CXXFLAGS) $(DEBUG) -c $<
all: $(TARGET)
        $(LINK) -o $(TARGET) $(OBJS) $(LDSTATIC)
$(TARGET): $(OBJS)
CubeMain.o: CubeMain.cxx CubeViewUI.h
CubeView.o: CubeView.cxx CubeView.h CubeViewUI.h
CubeViewUI.o: CubeViewUI.cxx CubeView.h
clean: $(TARGET) $(OBJS)
        rm -f *.o 2> /dev/null
        rm -f $(TARGET) 2> /dev/null
```

4.4 Compiling Programs with Microsoft Visual C++

In Visual C++ you will need to tell the compiler where to find the FLTK header files. This can be done by selecting "Settings" from the "Project" menu and then changing the "Preprocessor" settings under the "C/C++" tab. You will also need to add the FLTK (`FLTK.LIB` or `FLTKD.LIB`) and the Windows Common Controls (`COMCTL32.LIB`) libraries to the "Link" settings. You must also define `WIN32`.

More information can be found in `README.MSWindows.txt`.

You can build your Microsoft Windows applications as Console or Desktop applications. If you want to use the standard `C main()` function as the entry point, FLTK includes a `WinMain()` function that will call your `main()` function for you.

4.5 Naming

All public symbols in FLTK start with the characters 'F' and 'L':

- Functions are either `Fl::foo()` or `fl_foo()`.
- Class and type names are capitalized: `Fl_Foo`.
- [Constants and enumerations](#) are uppercase: `FL_FOO`.
- All header files start with `<FL/...>`.

4.6 Header Files

The proper way to include FLTK header files is:

```
#include <FL/Fl_xyz.H>
```

Note

Case *is* significant on many operating systems, and the C standard uses the forward slash (/) to separate directories. *Do not use any of the following include lines:*

```
#include <FL\Fl_xyz.H>  
#include <fl/fl_xyz.h>  
#include <Fl/fl_xyz.h>
```


Chapter 5

Common Widgets and Attributes

This chapter describes many of the widgets that are provided with FLTK and covers how to query and set the standard attributes.

5.1 Buttons

FLTK provides many types of buttons:

- [Fl_Button](#) - A standard push button.
- [Fl_Check_Button](#) - A button with a check box.
- [Fl_Light_Button](#) - A push button with a light.
- [Fl_Repeat_Button](#) - A push button that repeats when held.
- [Fl_Return_Button](#) - A push button that is activated by the `Enter` key.
- [Fl_Round_Button](#) - A button with a radio circle.

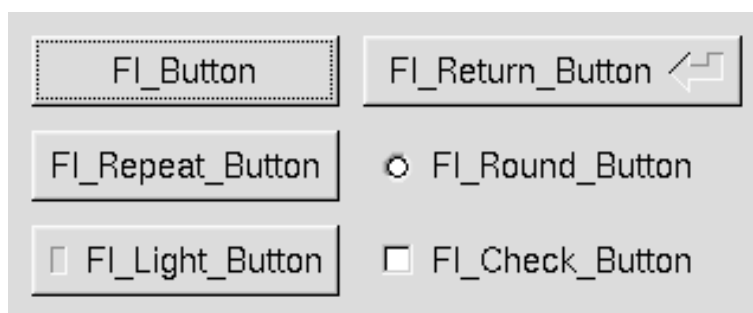


Figure 5.1 FLTK Button Widgets

All of these buttons just need the corresponding `<FL/Fl_xyz_Button.H>` header file. The constructor takes the bounding box of the button and optionally a label string:

```
Fl_Button *button = new Fl_Button(x, y, width, height, "label");
Fl_Light_Button *lbutton = new Fl_Light_Button(x, y, width, height);
Fl_Round_Button *rbutton = new Fl_Round_Button(x, y, width, height, "label");
```

Each button has an associated `type()` which allows it to behave as a push button, toggle button, or radio button:

```
button->type(FL_NORMAL_BUTTON);
lbutton->type(FL_TOGGLE_BUTTON);
rbutton->type(FL_RADIO_BUTTON);
```

For toggle and radio buttons, the `value()` method returns the current button state (0 = off, 1 = on). The `set()` and `clear()` methods can be used on toggle buttons to turn a toggle button on or off, respectively. Radio buttons can be turned on with the `setonly()` method; this will also turn off other radio buttons in the same group.

5.2 Text

FLTK provides several text widgets for displaying and receiving text:

- [Fl_Input](#) - A one-line text input field.
- [Fl_Output](#) - A one-line text output field.
- [Fl_Multiline_Input](#) - A multi-line text input field.
- [Fl_Multiline_Output](#) - A multi-line text output field.
- [Fl_Text_Display](#) - A multi-line text display widget.
- [Fl_Text_Editor](#) - A multi-line text editing widget.
- [Fl_Help_View](#) - A HTML text display widget.

The [Fl_Output](#) and [Fl_Multiline_Output](#) widgets allow the user to copy text from the output field but not change it.

The `value()` method is used to get or set the string that is displayed:

```
Fl_Input *input = new Fl_Input(x, y, width, height, "label");
input->value("Now is the time for all good men...");
```

The string is copied to the widget's own storage when you set the `value()` of the widget.

The [Fl_Text_Display](#) and [Fl_Text_Editor](#) widgets use an associated [Fl_Text_Buffer](#) class for the value, instead of a simple string.

5.3 Valuators

Unlike text widgets, valuators keep track of numbers instead of strings. FLTK provides the following valuators:

- [Fl_Counter](#) - A widget with arrow buttons that shows the current value.
- [Fl_Dial](#) - A round knob.
- [Fl_Roller](#) - An SGI-like dolly widget.
- [Fl_Scrollbar](#) - A standard scrollbar widget.
- [Fl_Slider](#) - A scrollbar with a knob.
- [Fl_Value_Slider](#) - A slider that shows the current value.

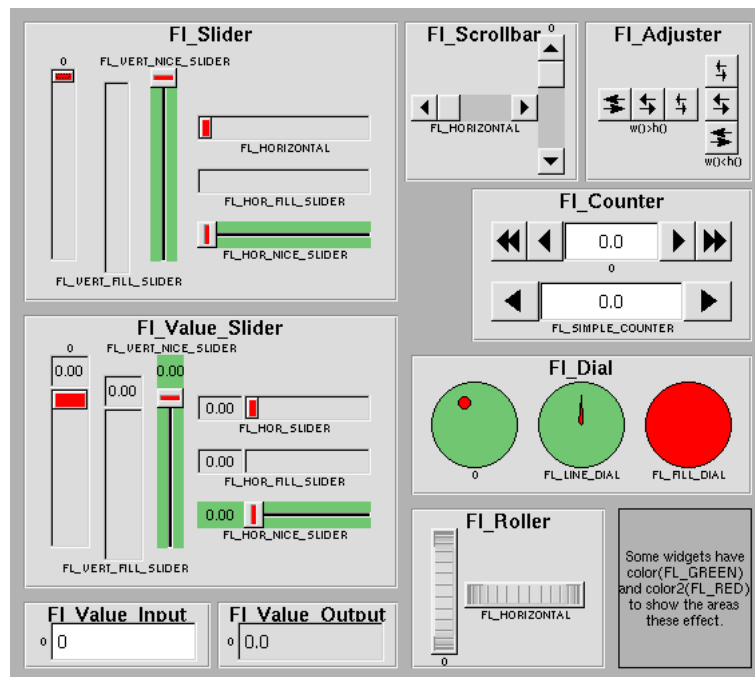


Figure 5.2 FLTK valuator widgets

The `value()` method gets and sets the current value of the widget. The `minimum()` and `maximum()` methods set the range of values that are reported by the widget.

5.4 Groups

The `FL_Group` widget class is used as a general purpose "container" widget. Besides grouping radio buttons, the groups are used to encapsulate windows, tabs, and scrolled windows. The following group classes are available with FLTK:

- `FL_Double_Window` - A double-buffered window on the screen.
- `FL_Gl_Window` - An OpenGL window on the screen.
- `FL_Group` - The base container class; can be used to group any widgets together.
- `FL_Pack` - A collection of widgets that are packed into the group area.
- `FL_Scroll` - A scrolled window area.
- `FL_Tabs` - Displays child widgets as tabs.
- `FL_Tile` - A tiled window area.
- `FL_Window` - A window on the screen.
- `FL_Wizard` - Displays one group of widgets at a time.

5.5 Setting the Size and Position of Widgets

The size and position of widgets is usually set when you create them. You can access them with the `x()`, `y()`, `w()`, and `h()` methods.

You can change the size and position by using the `position()`, `resize()`, and `size()` methods:

```
button->position(x, y);
group->resize(x, y, width, height);
window->size(width, height);
```

If you change a widget's size or position after it is displayed you will have to call `redraw()` on the widget's parent.

5.6 Colors

FLTK stores the colors of widgets as an 32-bit unsigned number that is either an index into a color palette of 256 colors or a 24-bit RGB color. The color palette is *not* the X or MS Windows colormap, but instead is an internal table with fixed contents.

See the [Colors](#) section of [Drawing Things in FLTK](#) for implementation details.

There are symbols for naming some of the more common colors:

- `FL_BLACK`
- `FL_RED`
- `FL_GREEN`
- `FL_YELLOW`
- `FL_BLUE`
- `FL_MAGENTA`
- `FL_CYAN`
- `FL_WHITE`
- `FL_WHITE`

Other symbols are used as the default colors for all FLTK widgets.

- `FL_FOREGROUND_COLOR`
- `FL_BACKGROUND_COLOR`
- `FL_INACTIVE_COLOR`
- `FL_SELECTION_COLOR`

The full list of named color values can be found in [FLTK Enumerations](#).

A color value can be created from its RGB components by using the `fl_rgb_color()` function, and decomposed again with `Fl::get_color()`:

```
Fl_Color c = fl_rgb_color(85, 170, 255); // RGB to Fl_Color
Fl::get_color(c, r, g, b); // Fl_Color to RGB
```

The widget color is set using the `color()` method:

```
button->color(FL_RED); // set color using named value
```

Similarly, the label color is set using the `labelcolor()` method:

```
button->labelcolor(FL_WHITE);
```

The `Fl_Color` encoding maps to a 32-bit unsigned integer representing RGBI, so it is also possible to specify a color using a hex constant as a color map index:

```
button->color(0x000000ff); // colormap index #255 (FL_WHITE)
```

or specify a color using a hex constant for the RGB components:

```
button->color(0xff000000); // RGB: red
button->color(0x00ff0000); // RGB: green
button->color(0x0000ff00); // RGB: blue
button->color(0xffffffff); // RGB: white
```

Note

If TrueColor is not available, any RGB colors will be set to the nearest entry in the colormap.

5.7 Box Types

The type `Fl_Boxtype` stored and returned in `Fl_Widget::box()` is an enumeration defined in [Enumerations.H](#).

Figure 3-3 shows the standard box types included with FLTK.

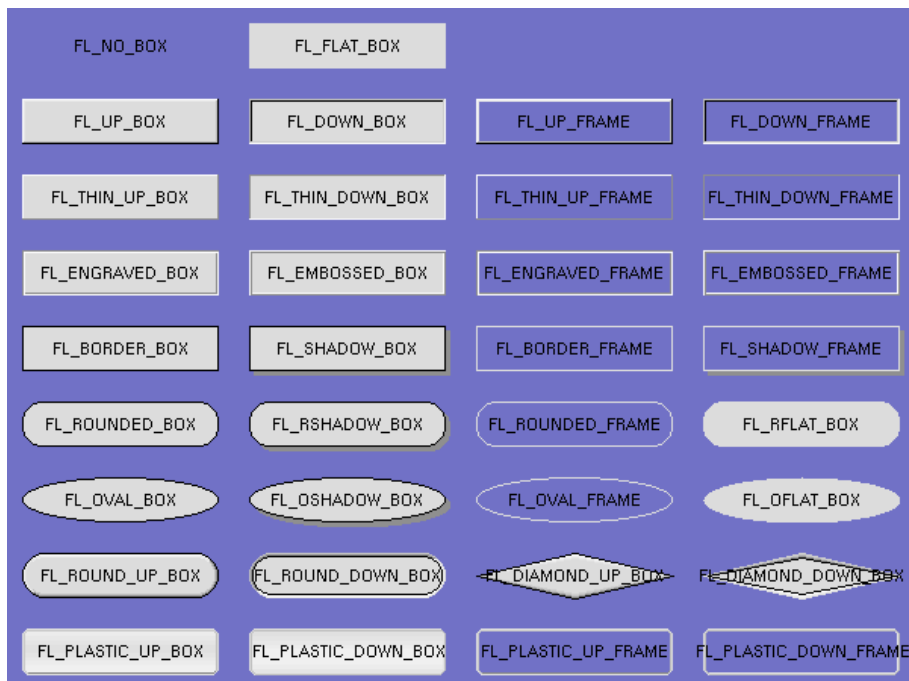


Figure 5.3 FLTK box types

`FL_NO_BOX` means nothing is drawn at all, so whatever is already on the screen remains. The `FL_..._FRAME` types only draw their edges, leaving the interior unchanged. The blue color in Figure 3-3 is the area that is not drawn by the frame types.

5.7.1 Making Your Own Boxtypes

You can define your own boxtypes by making a small function that draws the box and adding it to the table of boxtypes.

The Drawing Function

The drawing function is passed the bounding box and background color for the widget:

```
void xyz_draw(int x, int y, int w, int h, Fl_Color c) {
    ...
}
```

A simple drawing function might fill a rectangle with the given color and then draw a black outline:

```
void xyz_draw(int x, int y, int w, int h, Fl_Color c) {
    fl_color(c);
    fl_rectf(x, y, w, h);
    fl_color(FL_BLACK);
    fl_rect(x, y, w, h);
}
```

Fl_Boxtype fl_down(Fl_Boxtype b)

[fl_down\(\)](#) returns the "pressed" or "down" version of a box. If no "down" version of a given box exists, the behavior of this function is undefined and some random box or frame is returned. See [Drawing Functions](#) for more details.

Fl_Boxtype fl_frame(Fl_Boxtype b)

[fl_frame\(\)](#) returns the unfilled, frame-only version of a box. If no frame version of a given box exists, the behavior of this function is undefined and some random box or frame is returned. See [Drawing Functions](#) for more details.

Fl_Boxtype fl_box(Fl_Boxtype b)

[fl_box\(\)](#) returns the filled version of a frame. If no filled version of a given frame exists, the behavior of this function is undefined and some random box or frame is returned. See [Drawing Functions](#) for more details.

Adding Your Box Type

The [Fl::set_boxtype\(\)](#) method adds or replaces the specified box type:

```
#define XYZ_BOX FL_FREE_BOXTYPE
Fl::set_boxtype(XYZ_BOX, xyz_draw, 1, 1, 2, 2);
```

The last 4 arguments to [Fl::set_boxtype\(\)](#) are the offsets for the `x`, `y`, `width`, and `height` values that should be subtracted when drawing the label inside the box.

A complete box design contains four box types in this order: a filled, neutral box (`UP_BOX`), a filled, depressed box (`DOWN_BOX`), and the same as outlines only (`UP_FRAME` and `DOWN_FRAME`). The function [fl_down\(Fl_Boxtype\)](#) expects the neutral design on a boxtype with a numerical value evenly dividable by two. [fl_frame\(Fl_Boxtype\)](#) expects the `UP_BOX` design at a value dividable by four.

5.8 Labels and Label Types

The `label()`, `align()`, `labelfont()`, `labelsize()`, `labeltype()`, `image()`, and `deimage()` methods control the labeling of widgets.

`label()`

The `label()` method sets the string that is displayed for the label. Symbols can be included with the label string by escaping them using the "@" symbol - "@@" displays a single at sign. Figure 3-4 shows the available symbols.



Figure 5.4 FLTK label symbols

The @ sign may also be followed by the following optional "formatting" characters, in this order:

- '#' forces square scaling, rather than distortion to the widget's shape.
- '+[1-9] or -[1-9] tweaks the scaling a little bigger or smaller.
- '\$' flips the symbol horizontally, '%' flips it vertically.
- '[0-9] - rotates by a multiple of 45 degrees. '5' and '6' do no rotation while the others point in the direction of that key on a numeric keypad. '0', followed by four more digits rotates the symbol by that amount in degrees.

Thus, to show a very large arrow pointing downward you would use the label string "@+92->".

align()

The `align()` method positions the label. The following constants are defined and may be OR'd together as needed:

- `FL_ALIGN_CENTER` - center the label in the widget.
- `FL_ALIGN_TOP` - align the label at the top of the widget.
- `FL_ALIGN_BOTTOM` - align the label at the bottom of the widget.
- `FL_ALIGN_LEFT` - align the label to the left of the widget.
- `FL_ALIGN_RIGHT` - align the label to the right of the widget.
- `FL_ALIGN_LEFT_TOP` - The label appears to the left of the widget, aligned at the top. Outside labels only.
- `FL_ALIGN_RIGHT_TOP` - The label appears to the right of the widget, aligned at the top. Outside labels only.
- `FL_ALIGN_LEFT_BOTTOM` - The label appears to the left of the widget, aligned at the bottom. Outside labels only.
- `FL_ALIGN_RIGHT_BOTTOM` - The label appears to the right of the widget, aligned at the bottom. Outside labels only.
- `FL_ALIGN_INSIDE` - align the label inside the widget.
- `FL_ALIGN_CLIP` - clip the label to the widget's bounding box.
- `FL_ALIGN_WRAP` - wrap the label text as needed.
- `FL_ALIGN_TEXT_OVER_IMAGE` - show the label text over the image.
- `FL_ALIGN_IMAGE_OVER_TEXT` - show the label image over the text (default).
- `FL_ALIGN_IMAGE_NEXT_TO_TEXT` - The image will appear to the left of the text.
- `FL_ALIGN_TEXT_NEXT_TO_IMAGE` - The image will appear to the right of the text.
- `FL_ALIGN_IMAGE_BACKDROP` - The image will be used as a background for the widget.

labeltype()

The `labeltype()` method sets the type of the label. The following standard label types are included:

- `FL_NORMAL_LABEL` - draws the text.
- `FL_NO_LABEL` - does nothing.
- `FL_SHADOW_LABEL` - draws a drop shadow under the text.
- `FL_ENGRAVED_LABEL` - draws edges as though the text is engraved.
- `FL_EMBOSSED_LABEL` - draws edges as though the text is raised.
- `FL_ICON_LABEL` - draws the icon associated with the text.

image() and deimage()

The `image()` and `deimage()` methods set an image that will be displayed with the widget. The `deimage()` method sets the image that is shown when the widget is inactive, while the `image()` method sets the image that is shown when the widget is active.

To make an image you use a subclass of `Fl_Image`.

Making Your Own Label Types

Label types are actually indexes into a table of functions that draw them. The primary purpose of this is to use this to draw the labels in ways inaccessible through the `fl_font()` mechanism (e.g. `FL_ENGRAVED_LABEL`) or with program-generated letters or symbology.

Label Type Functions

To setup your own label type you will need to write two functions: one to draw and one to measure the label. The draw function is called with a pointer to a `Fl_Label` structure containing the label information, the bounding box for the label, and the label alignment:

```
void xyz_draw(const Fl_Label *label, int x, int y, int w, int h, Fl_Align align) {
    ...
}
```

The label should be drawn *inside* this bounding box, even if `FL_ALIGN_INSIDE` is not enabled. The function is not called if the label value is `NULL`.

The measure function is called with a pointer to a `Fl_Label` structure and references to the width and height:

```
void xyz_measure(const Fl_Label *label, int &w, int &h) {
    ...
}
```

The function should measure the size of the label and set `w` and `h` to the size it will occupy.

Adding Your Label Type

The `Fl::set_labeltype()` method creates a label type using your draw and measure functions:

```
#define XYZ_LABEL FL_FREE_LABELTYPE
Fl::set_labeltype(XYZ_LABEL, xyz_draw, xyz_measure);
```

The label type number `n` can be any integer value starting at the constant `FL_FREE_LABELTYPE`. Once you have added the label type you can use the `labeltype()` method to select your label type.

The `Fl::set_labeltype()` method can also be used to overload an existing label type such as `FL_NORMAL_LABEL`.

Making your own symbols

It is also possible to define your own drawings and add them to the symbol list, so they can be rendered as part of any label.

To create a new symbol, you implement a drawing function `void drawit(Fl_Color c)` which typically uses the functions described in [Drawing Complex Shapes](#) to generate a vector shape inside a two-by-two units sized box around the origin. This function is then linked into the symbols table using `fl_add_symbol()`:

```
int fl_add_symbol(const char *name, void (*drawit)(Fl_Color), int scalable)
```

`name` is the name of the symbol without the "@"; `scalable` must be set to 1 if the symbol is generated using scalable vector drawing functions.

```
int fl_draw_symbol(const char *name, int x, int y, int w, int h, Fl_Color col)
```

This function draws a named symbol fitting the given rectangle.

5.9 Callbacks

Callbacks are functions that are called when the value of a widget changes. A callback function is sent a `Fl_Widget` pointer of the widget that changed and a pointer to data that you provide:

```
void xyz_callback(Fl_Widget *w, void *data) {
    ...
}
```

The `callback()` method sets the callback function for a widget. You can optionally pass a pointer to some data needed for the callback:

```
int xyz_data;
button->callback(xyz_callback, &xyz_data);
```

Normally callbacks are performed only when the value of the widget changes. You can change this using the `Fl_Widget::when()` method:

```
button->when(FL_WHEN_NEVER);
button->when(FL_WHEN_CHANGED);
button->when(FL_WHEN_RELEASE);
button->when(FL_WHEN_RELEASE_ALWAYS);
button->when(FL_WHEN_ENTER_KEY);
button->when(FL_WHEN_ENTER_KEY_ALWAYS);
button->when(FL_WHEN_CHANGED | FL_WHEN_NOT_CHANGED);
```

Note:

You cannot delete a widget inside a callback, as the widget may still be accessed by FLTK after your callback is completed. Instead, use the `Fl::delete_widget()` method to mark your widget for deletion when it is safe to do so.

Hint:

Many programmers new to FLTK or C++ try to use a non-static class method instead of a static class method or function for their callback. Since callbacks are done outside a C++ class, the `this` pointer is not initialized for class methods.

To work around this problem, define a static method in your class that accepts a pointer to the class, and then have the static method call the class method(s) as needed. The data pointer you provide to the `callback()` method of the widget can be a pointer to the instance of your class.

```
class Foo {
    void my_callback(Fl_Widget *w);
    static void my_static_callback(Fl_Widget *w, void *f) { ((Foo *)f)->my_callback(w); }
    ...
}
...
w->callback(my_static_callback, (void *)this);
```

5.10 Shortcuts

Shortcuts are key sequences that activate widgets such as buttons or menu items. The `shortcut()` method sets the shortcut for a widget:

```
button->shortcut(FL_Enter);
button->shortcut(FL_SHIFT + 'b');
button->shortcut(FL_CTRL + 'b');
button->shortcut(FL_ALT + 'b');
button->shortcut(FL_CTRL + FL_ALT + 'b');
button->shortcut(0); // no shortcut
```

The shortcut value is the key event value - the ASCII value or one of the special keys described in `Fl::event_key() Values` combined with any modifiers like `Shift`, `Alt`, and `Control`.

Chapter 6

Designing a Simple Text Editor

This chapter takes you through the design of a simple FLTK-based text editor.

6.1 Determining the Goals of the Text Editor

Since this will be the first big project you'll be doing with FLTK, let's define what we want our text editor to do:

1. Provide a menubar/menus for all functions.
2. Edit a single text file, possibly with multiple views.
3. Load from a file.
4. Save to a file.
5. Cut/copy/delete/paste functions.
6. Search and replace functions.
7. Keep track of when the file has been changed.

6.2 Designing the Main Window

Now that we've outlined the goals for our editor, we can begin with the design of our GUI. Obviously the first thing that we need is a window, which we'll place inside a class called `EditorWindow`:

```
class EditorWindow : public Fl_Double_Window {
public:
    EditorWindow(int w, int h, const char* t);
    ~EditorWindow();
    Fl_Window      *replace_dlg;
    Fl_Input       *replace_find;
    Fl_Input       *replace_with;
    Fl_Button      *replace_all;
    Fl_Return_Button *replace_next;
    Fl_Button      *replace_cancel;
    Fl_Text_Editor *editor;
    char           search[256];
};
```

6.3 Variables

Our text editor will need some global variables to keep track of things:

```
int          changed = 0;
char        filename[256] = "";
Fl_Text_Buffer *textbuf;
```

The `textbuf` variable is the text editor buffer for our window class described previously. We'll cover the other variables as we build the application.

6.4 Menubars and Menus

The first goal requires us to use a menubar and menus that define each function the editor needs to perform. The `Fl_Menu_Item` structure is used to define the menus and items in a menubar:

```
Fl_Menu_Item menuitems[] = {
  { "&File", 0, 0, 0, FL_SUBMENU },
  { "&New File", 0, (Fl_Callback *)new_cb },
  { "&Open File...", FL_COMMAND + 'o', (Fl_Callback *)open_cb },
  { "&Insert File...", FL_COMMAND + 'i', (Fl_Callback *)insert_cb, 0, FL_MENU_DIVIDER },
  { "&Save File", FL_COMMAND + 's', (Fl_Callback *)save_cb },
  { "Save File &As...", FL_COMMAND + FL_SHIFT + 's', (Fl_Callback *)saveas_cb, 0, FL_MENU_DIVIDER },
  { "New &View", FL_ALT + 'v', (Fl_Callback *)view_cb, 0 },
  { "&Close View", FL_COMMAND + 'w', (Fl_Callback *)close_cb, 0, FL_MENU_DIVIDER },
  { "E&xit", FL_COMMAND + 'q', (Fl_Callback *)quit_cb, 0 },
  { 0 },
  { "&Edit", 0, 0, 0, FL_SUBMENU },
  { "&Undo", FL_COMMAND + 'z', (Fl_Callback *)undo_cb, 0, FL_MENU_DIVIDER },
  { "Cu&t", FL_COMMAND + 'x', (Fl_Callback *)cut_cb },
  { "&Copy", FL_COMMAND + 'c', (Fl_Callback *)copy_cb },
  { "&Paste", FL_COMMAND + 'v', (Fl_Callback *)paste_cb },
  { "&Delete", 0, (Fl_Callback *)delete_cb },
  { 0 },
  { "&Search", 0, 0, 0, FL_SUBMENU },
  { "&Find...", FL_COMMAND + 'f', (Fl_Callback *)find_cb },
  { "F&ind Again", FL_COMMAND + 'g', find2_cb },
  { "&Replace...", FL_COMMAND + 'r', replace_cb },
  { "Re&place Again", FL_COMMAND + 't', replace2_cb },
  { 0 },
  { 0 }
};
```

Once we have the menus defined we can create the `Fl_Menu_Bar` widget and assign the menus to it with:

```
Fl_Menu_Bar *m = new Fl_Menu_Bar(0, 0, 640, 30);
m->copy(menuitems);
```

We'll define the callback functions later.

6.5 Editing the Text

To keep things simple our text editor will use the `Fl_Text_Editor` widget to edit the text:

```
w->editor = new Fl_Text_Editor(0, 30, 640, 370);
w->editor->buffer(textbuf);
```

So that we can keep track of changes to the file, we also want to add a "modify" callback:

```
textbuf->add_modify_callback(changed_cb, w);
textbuf->call_modify_callbacks();
```

Finally, we want to use a mono-spaced font like `FL_COURIER`:

```
w->editor->textfont(FL_COURIER);
```

6.6 The Replace Dialog

We can use the FLTK convenience functions for many of the editor's dialogs, however the replace dialog needs its own custom window. To keep things simple we will have a "find" string, a "replace" string, and "replace all", "replace next", and "cancel" buttons. The strings are just `Fl_Input` widgets, the "replace all" and "cancel" buttons are `Fl_Button` widgets, and the "replace next" button is a `Fl_Return_Button` widget:

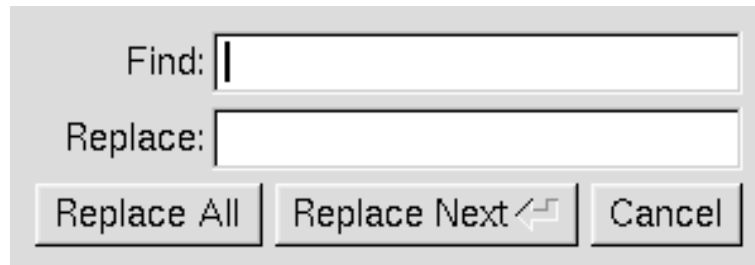


Figure 6.1 The search and replace dialog

```
Fl_Window *replace_dlg = new Fl_Window(300, 105, "Replace");
Fl_Input *replace_find = new Fl_Input(70, 10, 200, 25, "Find:");
Fl_Input *replace_with = new Fl_Input(70, 40, 200, 25, "Replace:");
Fl_Button *replace_all = new Fl_Button(10, 70, 90, 25, "Replace All");
Fl_Button *replace_next = new Fl_Button(105, 70, 120, 25, "Replace Next");
Fl_Button *replace_cancel = new Fl_Button(230, 70, 60, 25, "Cancel");
```

6.7 Callbacks

Now that we've defined the GUI components of our editor, we need to define our callback functions.

6.7.1 changed_cb()

This function will be called whenever the user changes any text in the `editor` widget:

```
void changed_cb(int, int nInserted, int nDeleted, int, const char*, void* v) {
    if ((nInserted || nDeleted) && !loading) changed = 1;
    EditorWindow *w = (EditorWindow *)v;
    set_title(w);
    if (loading) w->editor->show_insert_position();
}
```

The `set_title()` function is one that we will write to set the changed status on the current file. We're doing it this way because we want to show the changed status in the window's title bar.

6.7.2 copy_cb()

This callback function will call `Fl_Text_Editor::kf_copy()` to copy the currently selected text to the clipboard:

```
void copy_cb(Fl_Widget*, void* v) {
    EditorWindow* e = (EditorWindow*)v;
    Fl_Text_Editor::kf_copy(0, e->editor);
}
```

6.7.3 cut_cb()

This callback function will call `Fl_Text_Editor::kf_cut()` to cut the currently selected text to the clipboard:

```
void cut_cb(Fl_Widget*, void* v) {
    EditorWindow* e = (EditorWindow*)v;
    Fl_Text_Editor::kf_cut(0, e->editor);
}
```

6.7.4 delete_cb()

This callback function will call `FL_Text_Buffer::remove_selection()` to delete the currently selected text to the clipboard:

```
void delete_cb(FL_Widget*, void* v) {
    textbuf->remove_selection();
}
```

6.7.5 find_cb()

This callback function asks for a search string using the `fl_input()` convenience function and then calls the `find2←_cb()` function to find the string:

```
void find_cb(FL_Widget* w, void* v) {
    EditorWindow* e = (EditorWindow*)v;
    const char *val;
    val = fl_input("Search String:", e->search);
    if (val != NULL) {
        // User entered a string - go find it!
        strcpy(e->search, val);
        find2_cb(w, v);
    }
}
```

6.7.6 find2_cb()

This function will find the next occurrence of the search string. If the search string is blank then we want to pop up the search dialog:

```
void find2_cb(FL_Widget* w, void* v) {
    EditorWindow* e = (EditorWindow*)v;
    if (e->search[0] == '\0') {
        // Search string is blank; get a new one...
        find_cb(w, v);
        return;
    }
    int pos = e->editor->insert_position();
    int found = textbuf->search_forward(pos, e->search, &pos);
    if (found) {
        // Found a match; select and update the position...
        textbuf->select(pos, pos+strlen(e->search));
        e->editor->insert_position(pos+strlen(e->search));
        e->editor->show_insert_position();
    }
    else fl_alert("No occurrences of \'%s\' found!", e->search);
}
```

If the search string cannot be found we use the `fl_alert()` convenience function to display a message to that effect.

6.7.7 new_cb()

This callback function will clear the editor widget and current filename. It also calls the `check_save()` function to give the user the opportunity to save the current file first as needed:

```
void new_cb(FL_Widget*, void*) {
    if (!check_save()) return;
    filename[0] = '\0';
    textbuf->select(0, textbuf->length());
    textbuf->remove_selection();
    changed = 0;
    textbuf->call_modify_callbacks();
}
```

6.7.8 open_cb()

This callback function will ask the user for a filename and then load the specified file into the input widget and current filename. It also calls the `check_save()` function to give the user the opportunity to save the current file first as needed:

```
void open_cb(Fl_Widget*, void*) {
    if (!check_save()) return;
    char *newfile = fl_file_chooser("Open File?", "*", filename);
    if (newfile != NULL) load_file(newfile, -1);
}
```

We call the `load_file()` function to actually load the file.

6.7.9 paste_cb()

This callback function will call `Fl_Text_Editor::kf_paste()` to paste the clipboard at the current position:

```
void paste_cb(Fl_Widget*, void* v) {
    EditorWindow* e = (EditorWindow*)v;
    Fl_Text_Editor::kf_paste(0, e->editor);
}
```

6.7.10 quit_cb()

The quit callback will first see if the current file has been modified, and if so give the user a chance to save it. It then exits from the program:

```
void quit_cb(Fl_Widget*, void*) {
    if (changed && !check_save())
        return;
    exit(0);
}
```

6.7.11 replace_cb()

The replace callback just shows the replace dialog:

```
void replace_cb(Fl_Widget*, void* v) {
    EditorWindow* e = (EditorWindow*)v;
    e->replace_dlg->show();
}
```

6.7.12 replace2_cb()

This callback will replace the next occurrence of the replacement string. If nothing has been entered for the replacement string, then the replace dialog is displayed instead:

```
void replace2_cb(Fl_Widget*, void* v) {
    EditorWindow* e = (EditorWindow*)v;
    const char *find = e->replace_find->value();
    const char *replace = e->replace_with->value();
    if (find[0] == '\0') {
        // Search string is blank; get a new one...
        e->replace_dlg->show();
        return;
    }
    e->replace_dlg->hide();
    int pos = e->editor->insert_position();
    int found = textbuf->search_forward(pos, find, &pos);
    if (found) {
        // Found a match; update the position and replace text...
        textbuf->select(pos, pos+strlen(find));
        textbuf->remove_selection();
        textbuf->insert(pos, replace);
        textbuf->select(pos, pos+strlen(replace));
        e->editor->insert_position(pos+strlen(replace));
        e->editor->show_insert_position();
    }
    else fl_alert("No occurrences of \'%s\' found!", find);
}
```

6.7.13 replall_cb()

This callback will replace all occurrences of the search string in the file:

```
void replall_cb(Fl_Widget*, void* v) {
    EditorWindow* e = (EditorWindow*)v;
    const char *find = e->replace_find->value();
    const char *replace = e->replace_with->value();
    find = e->replace_find->value();
    if (find[0] == '\\0') {
        // Search string is blank; get a new one...
        e->replace_dlg->show();
        return;
    }
    e->replace_dlg->hide();
    e->editor->insert_position(0);
    int times = 0;
    // Loop through the whole string
    for (int found = 1; found;) {
        int pos = e->editor->insert_position();
        found = textbuf->search_forward(pos, find, &pos);
        if (found) {
            // Found a match; update the position and replace text...
            textbuf->select(pos, pos+strlen(find));
            textbuf->remove_selection();
            textbuf->insert(pos, replace);
            e->editor->insert_position(pos+strlen(replace));
            e->editor->show_insert_position();
            times++;
        }
    }
    if (times) fl_message("Replaced %d occurrences.", times);
    else fl_alert("No occurrences of '\\%s\\' found!", find);
}
```

6.7.14 replcan_cb()

This callback just hides the replace dialog:

```
void replcan_cb(Fl_Widget*, void* v) {
    EditorWindow* e = (EditorWindow*)v;
    e->replace_dlg->hide();
}
```

6.7.15 save_cb()

This callback saves the current file. If the current filename is blank it calls the "save as" callback:

```
void save_cb(void) {
    if (filename[0] == '\\0') {
        // No filename - get one!
        saveas_cb();
        return;
    }
    else save_file(filename);
}
```

The `save_file()` function saves the current file to the specified filename.

6.7.16 saveas_cb()

This callback asks the user for a filename and saves the current file:

```
void saveas_cb(void) {
    char *newfile;
    newfile = fl_file_chooser("Save File As?", "*", filename);
    if (newfile != NULL) save_file(newfile);
}
```

The `save_file()` function saves the current file to the specified filename.

6.8 Other Functions

Now that we've defined the callback functions, we need our support functions to make it all work:

6.8.1 check_save()

This function checks to see if the current file needs to be saved. If so, it asks the user if they want to save it:

```
int check_save(void) {
    if (!changed) return 1;
    int r = fl_choice("The current file has not been saved.\n"
                    "Would you like to save it now?",
                    "Cancel", "Save", "Discard");

    if (r == 1) {
        save_cb(); // Save the file...
        return !changed;
    }
    return (r == 2) ? 1 : 0;
}
```

6.8.2 load_file()

This function loads the specified file into the `textbuf` variable:

```
int loading = 0;
void load_file(char *newfile, int ipos) {
    loading = 1;
    int insert = (ipos != -1);
    changed = insert;
    if (!insert) strcpy(filename, "");
    int r;
    if (!insert) r = textbuf->loadfile(newfile);
    else r = textbuf->insertfile(newfile, ipos);
    if (r)
        fl_alert("Error reading from file '%s':\n%s.", newfile, strerror(errno));
    else
        if (!insert) strcpy(filename, newfile);
    loading = 0;
    textbuf->call_modify_callbacks();
}
```

When loading the file we use the `Fl_Text_Buffer::loadfile()` method to "replace" the text in the buffer, or the `Fl_Text_Buffer::insertfile()` method to insert text in the buffer from the named file.

6.8.3 save_file()

This function saves the current buffer to the specified file:

```
void save_file(char *newfile) {
    if (textbuf->savefile(newfile))
        fl_alert("Error writing to file '%s':\n%s.", newfile, strerror(errno));
    else
        strcpy(filename, newfile);
    changed = 0;
    textbuf->call_modify_callbacks();
}
```

6.8.4 set_title()

This function checks the `changed` variable and updates the window label accordingly:

```
void set_title(Fl_Window* w) {
    if (filename[0] == '\0') strcpy(title, "Untitled");
    else {
        char *slash;
        slash = strrchr(filename, '/');
#ifdef WIN32
        if (slash == NULL) slash = strrchr(filename, '\\');
#endif
        if (slash != NULL) strcpy(title, slash + 1);
        else strcpy(title, filename);
    }
    if (changed) strcat(title, " (modified)");
    w->label(title);
}
```

6.9 The main() Function

Once we've created all of the support functions, the only thing left is to tie them all together with the `main()` function. The `main()` function creates a new text buffer, creates a new view (window) for the text, shows the window, loads the file on the command-line (if any), and then enters the FLTK event loop:

```
int main(int argc, char **argv) {
    textbuf = new Fl_Text_Buffer;
    Fl_Window* window = new_view();
    window->show(1, argv);
    if (argc > 1) load_file(argv[1], -1);
    return Fl::run();
}
```

6.10 Compiling the Editor

The complete source for our text editor can be found in the `test/editor.cxx` source file. Both the Makefile and Visual C++ workspace include the necessary rules to build the editor. You can also compile it using a standard compiler with:

```
CC -o editor editor.cxx -lfltk -lXext -lX11 -lm
```

or by using the `fltk-config` script with:

```
fltk-config --compile editor.cxx
```

As noted in [Compiling Programs with Standard Compilers](#), you may need to include compiler and linker options to tell them where to find the FLTK library. Also, the `CC` command may also be called `gcc` or `c++` on your system.

Congratulations, you've just built your own text editor!

6.11 The Final Product

The final editor window should look like the image in Figure 4-2.

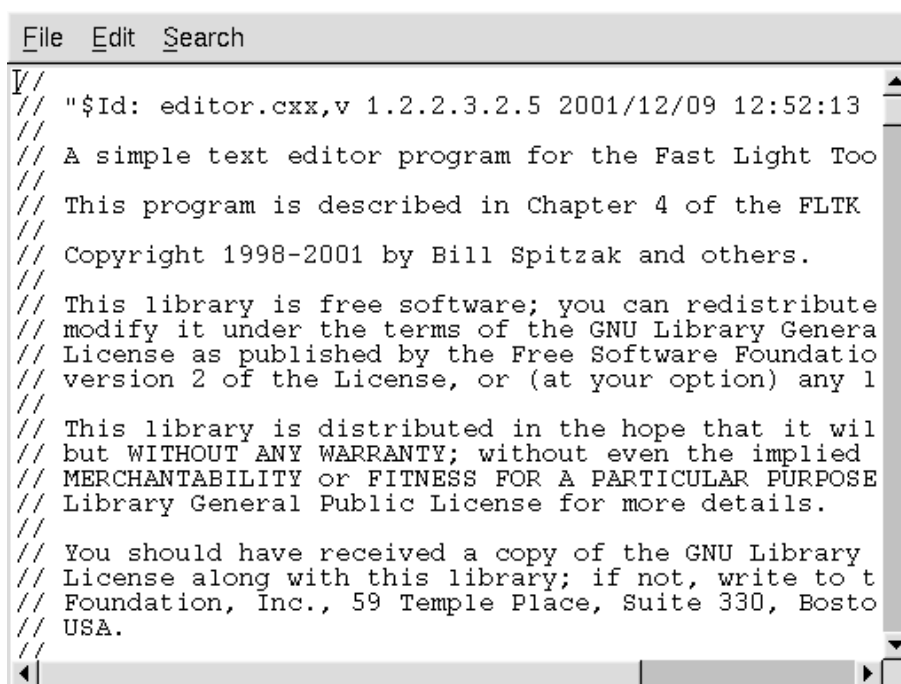


Figure 6.2 The completed editor window

6.12 Advanced Features

Now that we've implemented the basic functionality, it is time to show off some of the advanced features of the `Fl_Text_Editor` widget.

6.12.1 Syntax Highlighting

The `Fl_Text_Editor` widget supports highlighting of text with different fonts, colors, and sizes. The implementation is based on the excellent `NEdit` text editor core, from <http://www.nedit.org/>, which uses a parallel "style" buffer which tracks the font, color, and size of the text that is drawn.

Styles are defined using the `Fl_Text_Display::Style_Table_Entry` structure defined in `<FL/Fl_Text_Display.H>`←

```
:
struct Style_Table_Entry {
    Fl_Color color;
    Fl_Font font;
    int size;
    unsigned attr;
};
```

The `color` member sets the color for the text, the `font` member sets the FLTK font index to use, and the `size` member sets the pixel size of the text. The `attr` member is currently not used.

For our text editor we'll define 7 styles for plain code, comments, keywords, and preprocessor directives:

```
Fl_Text_Display::Style_Table_Entry styletable[] = { // Style table
    { FL_BLACK, FL_COURIER, FL_NORMAL_SIZE }, // A - Plain
    { FL_DARK_GREEN, FL_COURIER_ITALIC, FL_NORMAL_SIZE }, // B - Line comments
    { FL_DARK_GREEN, FL_COURIER_ITALIC, FL_NORMAL_SIZE }, // C - Block comments
    { FL_BLUE, FL_COURIER, FL_NORMAL_SIZE }, // D - Strings
    { FL_DARK_RED, FL_COURIER, FL_NORMAL_SIZE }, // E - Directives
    { FL_DARK_RED, FL_COURIER_BOLD, FL_NORMAL_SIZE }, // F - Types
    { FL_BLUE, FL_COURIER_BOLD, FL_NORMAL_SIZE } // G - Keywords
};
```

You'll notice that the comments show a letter next to each style - each style in the style buffer is referenced using a character starting with the letter 'A'.

You call the `highlight_data()` method to associate the style data and buffer with the text editor widget:

```
Fl_Text_Buffer *stylebuf;
w->editor->highlight_data(stylebuf, styletable,
    sizeof(styletable) / sizeof(styletable[0]),
    'A', style_unfinished_cb, 0);
```

Finally, you need to add a callback to the main text buffer so that changes to the text buffer are mirrored in the style buffer:

```
textbuf->add_modify_callback(style_update, w->editor);
```

The `style_update()` function, like the `change_cb()` function described earlier, is called whenever text is added or removed from the text buffer. It mirrors the changes in the style buffer and then updates the style data as necessary:

```
//
// 'style_update()' - Update the style buffer...
//
void
style_update(int pos, // I - Position of update
             int nInserted, // I - Number of inserted chars
             int nDeleted, // I - Number of deleted chars
             int nRestyled, // I - Number of restyled chars
             const char *deletedText, // I - Text that was deleted
             void *cbArg) { // I - Callback data
    int start, // Start of text
        end; // End of text
    char last, // Last style on line
        *style, // Style data
        *text; // Text data
    // If this is just a selection change, just unselect the style buffer...
    if (nInserted == 0 && nDeleted == 0) {
        stylebuf->unselect();
        return;
    }
```

```

}
// Track changes in the text buffer...
if (nInserted > 0) {
    // Insert characters into the style buffer...
    style = new char[nInserted + 1];
    memset(style, 'A', nInserted);
    style[nInserted] = '\0';
    stylebuf->replace(pos, pos + nDeleted, style);
    delete[] style;
} else {
    // Just delete characters in the style buffer...
    stylebuf->remove(pos, pos + nDeleted);
}
// Select the area that was just updated to avoid unnecessary
// callbacks...
stylebuf->select(pos, pos + nInserted - nDeleted);
// Re-parse the changed region; we do this by parsing from the
// beginning of the line of the changed region to the end of
// the line of the changed region... Then we check the last
// style character and keep updating if we have a multi-line
// comment character...
start = textbuf->line_start(pos);
end = textbuf->line_end(pos + nInserted - nDeleted);
text = textbuf->text_range(start, end);
style = stylebuf->text_range(start, end);
last = style[end - start - 1];
style_parse(text, style, end - start);
stylebuf->replace(start, end, style);
((Fl_Text_Editor *)cbArg)->redisplay_range(start, end);
if (last != style[end - start - 1]) {
    // The last character on the line changed styles, so reparse the
    // remainder of the buffer...
    free(text);
    free(style);
    end = textbuf->length();
    text = textbuf->text_range(start, end);
    style = stylebuf->text_range(start, end);
    style_parse(text, style, end - start);
    stylebuf->replace(start, end, style);
    ((Fl_Text_Editor *)cbArg)->redisplay_range(start, end);
}
free(text);
free(style);
}

```

The `style_parse()` function scans a copy of the text in the buffer and generates the necessary style characters for display. It assumes that parsing begins at the start of a line:

```

//
// 'style_parse()' - Parse text and produce style data.
//
void
style_parse(const char *text,
            char *style,
            int length) {
    char current;
    int col;
    int last;
    char buf[255],
        *bufptr;
    const char *temp;
    for (current = *style, col = 0, last = 0; length > 0; length --, text ++ ) {
        if (current == 'A') {
            // Check for directives, comments, strings, and keywords...
            if (col == 0 && *text == '#') {
                // Set style to directive
                current = 'E';
            } else if (strncmp(text, "//", 2) == 0) {
                current = 'B';
            } else if (strncmp(text, "/*", 2) == 0) {
                current = 'C';
            } else if (strncmp(text, "\\\"", 2) == 0) {
                // Quoted quote...
                *style++ = current;
                *style++ = current;
                text ++;
                length --;
                col += 2;
                continue;
            } else if (*text == '\\') {
                current = 'D';
            } else if (!last && islower(*text)) {
                // Might be a keyword...
                for (temp = text, bufptr = buf;
                     islower(*temp) && bufptr < (buf + sizeof(buf) - 1);
                     *bufptr++ = *temp++);
                if (!islower(*temp)) {

```

```

*bufptr = '\0';
bufptr = buf;
if (bsearch(&bufptr, code_types,
           sizeof(code_types) / sizeof(code_types[0]),
           sizeof(code_types[0]), compare_keywords)) {
    while (text < temp) {
        *style++ = 'F';
        text ++;
        length --;
        col ++;
    }
    text --;
    length ++;
    last = 1;
    continue;
} else if (bsearch(&bufptr, code_keywords,
                 sizeof(code_keywords) / sizeof(code_keywords[0]),
                 sizeof(code_keywords[0]), compare_keywords)) {
    while (text < temp) {
        *style++ = 'G';
        text ++;
        length --;
        col ++;
    }
    text --;
    length ++;
    last = 1;
    continue;
}
}
} else if (current == 'C' && strcmp(text, "*/", 2) == 0) {
    // Close a C comment...
    *style++ = current;
    *style++ = current;
    text ++;
    length --;
    current = 'A';
    col += 2;
    continue;
} else if (current == 'D') {
    // Continuing in string...
    if (strcmp(text, "\\\"", 2) == 0) {
        // Quoted end quote...
        *style++ = current;
        *style++ = current;
        text ++;
        length --;
        col += 2;
        continue;
    } else if (*text == '\\') {
        // End quote...
        *style++ = current;
        col ++;
        current = 'A';
        continue;
    }
}
// Copy style info...
if (current == 'A' && (*text == '{' || *text == '}')) *style++ = 'G';
else *style++ = current;
col ++;
last = isalnum(*text) || *text == '.';
if (*text == '\n') {
    // Reset column and possibly reset the style
    col = 0;
    if (current == 'B' || current == 'E') current = 'A';
}
}
}
}

```


Chapter 7

Drawing Things in FLTK

This chapter covers the drawing functions that are provided with FLTK.

7.1 When Can You Draw Things in FLTK?

There are only certain places you can execute FLTK code that draws to the computer's display. Calling these functions at other places will result in undefined behavior!

- The most common place is inside the virtual `Fl_Widget::draw()` method. To write code here, you must subclass one of the existing `Fl_Widget` classes and implement your own version of `draw()`.
- You can also create custom `boxtypes` and `labeltypes`. These involve writing small procedures that can be called by existing `Fl_Widget::draw()` methods. These "types" are identified by an 8-bit index that is stored in the widget's `box()`, `labeltype()`, and possibly other properties.
- You can call `Fl_Window::make_current()` to do incremental update of a widget. Use `Fl_Widget::window()` to find the window.

In contrast, code that draws to other drawing surfaces than the display (i.e., instances of derived classes of the `Fl_Surface_Device` class, except `Fl_Display_Device`, such as `Fl_Printer` and `Fl_Copy_Surface`) can be executed at any time as follows:

1. Memorize what is the current drawing surface calling `Fl_Surface_Device::surface()`, and make your surface the new current drawing surface calling the surface's `set_current()` function;
2. Make a series of calls to any of the drawing functions described below; these will operate on the new current drawing surface;
3. Set the current drawing surface back to its previous state calling the previous surface's `set_current()`.

7.1.1 What Drawing Unit do FLTK drawing functions use?

When drawing to the display or to instances of `Fl_Copy_Surface` and `Fl_Image_Surface`, the unit of drawing functions corresponds generally to one pixel. The so-called 'retina' displays of some recent Apple computers are an exception to this rule: one drawing unit corresponds to the width or the height of 2 display pixels on a retina display.

When drawing to surfaces that are instances of `Fl_Paged_Device` derived classes (i.e., `Fl_Printer` or `Fl_PostScript_File_Device`), the drawing unit is initially one point, that is, 1/72 of an inch. But this unit is changed after calls to `Fl_Paged_Device::scale()`.

7.2 Drawing Functions

To use the drawing functions you must first include the `<FL/fl_draw.H>` header file. FLTK provides the following types of drawing functions:

- [Boxes](#)
- [Clipping](#)
- [Colors](#)
- [Line Dashes and Thickness](#)
- [Drawing Fast Shapes](#)
- [Drawing Complex Shapes](#)
- [Drawing Text](#)
- [Fonts](#)
- [Character Encoding](#)
- [Drawing Overlays](#)
- [Drawing Images](#)
- [Direct Image Drawing](#)
- [Direct Image Reading](#)
- [Image Classes](#)
- [Offscreen Drawing](#)

7.2.1 Boxes

FLTK provides three functions that can be used to draw boxes for buttons and other UI controls. Each function uses the supplied upper-lefthand corner and width and height to determine where to draw the box.

```
void fl_draw_box(FL_Boxtype b, int x, int y, int w, int h, FL_Color c)
```

The `fl_draw_box()` function draws a standard boxtype `b` in the specified color `c`.

```
void fl_frame(const char *s, int x, int y, int w, int h)
void fl_frame2(const char *s, int x, int y, int w, int h)
```

The `fl_frame()` and `fl_frame2()` functions draw a series of line segments around the given box. The string `s` must contain groups of 4 letters which specify one of 24 standard grayscale values, where 'A' is black and 'X' is white. The results of calling these functions with a string that is not a multiple of 4 characters in length are undefined.

The only difference between `fl_frame()` and `fl_frame2()` is the order of the line segments:

- For `fl_frame()` the order of each set of 4 characters is: top, left, bottom, right.
- For `fl_frame2()` the order of each set of 4 characters is: bottom, right, top, left.

Note that `fl_frame(FL_Boxtype b)` is described in the [Box Types](#) section.

7.2.2 Clipping

You can limit all your drawing to a rectangular region by calling `fl_push_clip()`, and put the drawings back by using `fl_pop_clip()`. This rectangle is measured in pixels and is unaffected by the current transformation matrix.

In addition, the system may provide clipping when updating windows which may be more complex than a simple rectangle.

```
void fl_push_clip(int x, int y, int w, int h)
void fl_clip(int x, int y, int w, int h)
```

Intersect the current clip region with a rectangle and push this new region onto the stack.

The `fl_clip()` version is deprecated and will be removed from future releases.

```
void fl_push_no_clip()
```

Pushes an empty clip region on the stack so nothing will be clipped.

```
void fl_pop_clip()
```

Restore the previous clip region.

Note: You must call `fl_pop_clip()` once for every time you call `fl_push_clip()`. If you return to FLTK with the clip stack not empty unpredictable results occur.

```
int fl_not_clipped(int x, int y, int w, int h)
```

Returns non-zero if any of the rectangle intersects the current clip region. If this returns 0 you don't have to draw the object.

Note: Under X this returns 2 if the rectangle is partially clipped, and 1 if it is entirely inside the clip region.

```
int fl_clip_box(int x, int y, int w, int h, int &X, int &Y, int &W, int &H)
```

Intersect the rectangle `x, y, w, h` with the current clip region and returns the bounding box of the result in `X, Y, W, H`. Returns non-zero if the resulting rectangle is different than the original. This can be used to limit the necessary drawing to a rectangle. `W` and `H` are set to zero if the rectangle is completely outside the region.

```
void fl_clip_region(FL_Region r)
FL_Region fl_clip_region()
```

Replace the top of the clip stack with a clipping region of any shape. `FL_Region` is an operating system specific type. The second form returns the current clipping region.

7.3 Colors

FLTK manages colors as 32-bit unsigned integers, encoded as RGBA. When the "RGB" bytes are non-zero, the value is treated as RGB. If these bytes are zero, the "A" byte will be used as an index into the colormap. Colors with both "RGB" set and an "A" >0 are reserved for special use.

Values from 0 to 255, i.e. the "A" index value, represent colors from the FLTK 1.3.x standard colormap and are allocated as needed on screens without TrueColor support. The `Fl_Color` enumeration type defines the standard colors and color cube for the first 256 colors. All of these are named with symbols in `<FL/Enumerations.H>`. Example:

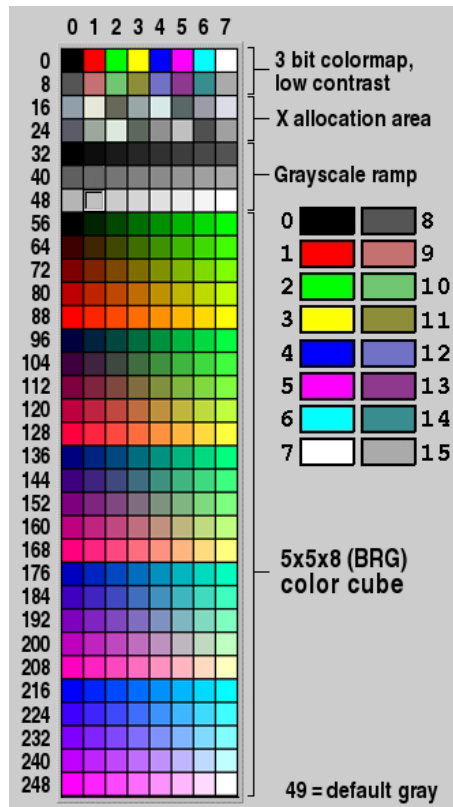


Figure 7.1 FLTK default colormap (`Fl_Color 0x00 - 0xff`)

Color values greater than 255 are treated as 24-bit RGB values. These are mapped to the closest color supported by the screen, either from one of the 256 colors in the FLTK 1.3.x colormap or a direct RGB value on TrueColor screens.

```
Fl_Color fl_rgb_color(uchar r, uchar g, uchar b)
Fl_Color fl_rgb_color(uchar grayscale)
```

Generate `Fl_Color` out of specified 8-bit RGB values or one 8-bit grayscale value.

```
void fl_color(Fl_Color c)
void fl_color(int c)
```

Sets the color for all subsequent drawing operations. Please use the first form: the second form is only provided for back compatibility.

For colormapped displays, a color cell will be allocated out of `fl_colormap` the first time you use a color. If the colormap fills up then a least-squares algorithm is used to find the closest color.

`FI_Color fl_color()`

Returns the last color that was set using `fl_color()`. This can be used for state save/restore.

`void fl_color(uchar r, uchar g, uchar b)`

Set the color for all subsequent drawing operations. The closest possible match to the RGB color is used. The RGB color is used directly on TrueColor displays. For colormap visuals the nearest index in the gray ramp or color cube is used.

`unsigned FI::get_color(FI_Color i)`

`void FI::get_color(FI_Color i, uchar &red, uchar &green, uchar &blue)`

Generate RGB values from a colormap index value `i`. The first returns the RGB as a 32-bit unsigned integer, and the second decomposes the RGB into three 8-bit values.

`FI::get_system_colors()`

`FI::foreground()`

`FI::background()`

`FI::background2()`

The first gets color values from the user preferences or the system, and the other routines are used to apply those values.

`FI::own_colormap()`

`FI::free_color(FI_Color i, int overlay)`

`FI::set_color(FI_Color i, unsigned c)`

`FI::own_colormap()` is used to install a local colormap [X11 only].

`FI::free_color()` and `FI::set_color()` are used to remove and replace entries from the colormap.

There are two predefined graphical interfaces for choosing colors. The function `fl_show_colormap()` shows a table of colors and returns an `FI_Color` index value. The `FI_Color_Chooser` widget provides a standard RGB color chooser.

As the `FI_Color` encoding maps to a 32-bit unsigned integer representing RGBI, it is also possible to specify a color using a hex constant as a color map index:

```
// COLOR MAP INDEX
color(0x000000II)
    ----- |
    | |
    | | Color map index (8 bits)
    | | Must be zero

button->color(0x000000ff); // colormap index #255 (FL_WHITE)
```

or specify a color using a hex constant for the RGB components:

```
// RGB COLOR ASSIGNMENTS
color(0xRRGGBB00)
    | | | |
    | | | Must be zero
    | | Blue (8 bits)
    | Green (8 bits)
    Red (8 bits)

button->color(0xff000000); // RGB: red
button->color(0x00ff0000); // RGB: green
button->color(0x0000ff00); // RGB: blue
button->color(0xffff0000); // RGB: white
```

Note

If TrueColor is not available, any RGB colors will be set to the nearest entry in the colormap.

7.3.1 Line Dashes and Thickness

FLTK supports drawing of lines with different styles and widths. Full functionality is not available under Windows 95, 98, and Me due to the reduced drawing functionality these operating systems provide.

void `fl_line_style(int style, int width, char* dashes)`

Set how to draw lines (the "pen"). If you change this it is your responsibility to set it back to the default with `fl_line_style(0)`.

Note: Because of how line styles are implemented on MS Windows systems, you *must* set the line style *after* setting the drawing color. If you set the color after the line style you will lose the line style settings!

`style` is a bitmask which is a bitwise-OR of the following values. If you don't specify a dash type you will get a solid line. If you don't specify a cap or join type you will get a system-defined default of whatever value is fastest.

- FL_SOLID -----
- FL_DASH - - - - -
- FL_DOT
- FL_DASHDOT - . - .
- FL_DASHDOTDOT - . . -
- FL_CAP_FLAT
- FL_CAP_ROUND
- FL_CAP_SQUARE (extends past end point 1/2 line width)
- FL_JOIN_MITER (pointed)
- FL_JOIN_ROUND
- FL_JOIN_BEVEL (flat)

`width` is the number of pixels thick to draw the lines. Zero results in the system-defined default, which on both X and Windows is somewhat different and nicer than 1.

`dashes` is a pointer to an array of dash lengths, measured in pixels. The first location is how long to draw a solid portion, the next is how long to draw the gap, then the solid, etc. It is terminated with a zero-length entry. A `NULL` pointer or a zero-length array results in a solid line. Odd array sizes are not supported and result in undefined behavior.

Note: The dashes array does not work under Windows 95, 98, or Me, since those operating systems do not support complex line styles.

7.3.2 Drawing Fast Shapes

These functions are used to draw almost all the FLTK widgets. They draw on exact pixel boundaries and are as fast as possible. Their behavior is duplicated exactly on all platforms FLTK is ported. It is undefined whether these are affected by the [transformation matrix](#), so you should only call these while the matrix is set to the identity matrix (the default).

```
void fl_point(int x, int y)
```

Draw a single pixel at the given coordinates.

```
void fl_rectf(int x, int y, int w, int h)
void fl_rectf(int x, int y, int w, int h, FL_Color c)
```

Color a rectangle that exactly fills the given bounding box.

```
void fl_rectf(int x, int y, int w, int h, uchar r, uchar g, uchar b)
```

Color a rectangle with "exactly" the passed r, g, b color. On screens with less than 24 bits of color this is done by drawing a solid-colored block using `fl_draw_image()` so that the correct color shade is produced.

```
void fl_rect(int x, int y, int w, int h)
void fl_rect(int x, int y, int w, int h, FL_Color c)
```

Draw a 1-pixel border *inside* this bounding box.

```
void fl_line(int x, int y, int x1, int y1)
void fl_line(int x, int y, int x1, int y1, int x2, int y2)
```

Draw one or two lines between the given points.

```
void fl_loop(int x, int y, int x1, int y1, int x2, int y2)
void fl_loop(int x, int y, int x1, int y1, int x2, int y2, int x3, int y3)
```

Outline a 3 or 4-sided polygon with lines.

```
void fl_polygon(int x, int y, int x1, int y1, int x2, int y2)
void fl_polygon(int x, int y, int x1, int y1, int x2, int y2, int x3, int y3)
```

Fill a 3 or 4-sided polygon. The polygon must be convex.

```
void fl_xyline(int x, int y, int x1)
void fl_xyline(int x, int y, int x1, int y2)
void fl_xyline(int x, int y, int x1, int y2, int x3)
```

Draw horizontal and vertical lines. A horizontal line is drawn first, then a vertical, then a horizontal.

```
void fl_yxline(int x, int y, int y1)
void fl_yxline(int x, int y, int y1, int x2)
void fl_yxline(int x, int y, int y1, int x2, int y3)
```

Draw vertical and horizontal lines. A vertical line is drawn first, then a horizontal, then a vertical.

```
void fl_arc(int x, int y, int w, int h, double a1, double a2)
void fl_pie(int x, int y, int w, int h, double a1, double a2)
```

Draw ellipse sections using integer coordinates. These functions match the rather limited circle drawing code provided by X and MS Windows. The advantage over using `fl_arc()` with floating point coordinates is that they are faster because they often use the hardware, and they draw much nicer small circles, since the small sizes are often hard-coded bitmaps.

If a complete circle is drawn it will fit inside the passed bounding box. The two angles are measured in degrees counter-clockwise from 3'o'clock and are the starting and ending angle of the arc, `a2` must be greater or equal to `a1`.

`fl_arc()` draws a series of lines to approximate the arc. Notice that the integer version of `fl_arc()` has a different number of arguments to the other `fl_arc()` function described later in this chapter.

`fl_pie()` draws a filled-in pie slice. This slice may extend outside the line drawn by `fl_arc()`; to avoid this use `w-1` and `h-1`.

Todo add an `Fl_Draw_Area_Cb` typedef to allow `fl_scroll(...)` to be doxygenated?

```
void fl_scroll(int X, int Y, int W, int H, int dx, int dy, void (draw_area)(void, int,int,int,int), void* data)
```

Scroll a rectangle and draw the newly exposed portions. The contents of the rectangular area is first shifted by `dx` and `dy` pixels. The callback is then called for every newly exposed rectangular area,

7.3.3 Drawing Complex Shapes

The complex drawing functions let you draw arbitrary shapes with 2-D linear transformations. The functionality matches that found in the Adobe® PostScript™ language. The exact pixels that are filled are less defined than for the fast drawing functions so that FLTK can take advantage of drawing hardware. On both X and MS Windows the transformed vertices are rounded to integers before drawing the line segments: this severely limits the accuracy of these functions for complex graphics, so use OpenGL when greater accuracy and/or performance is required.

```
void fl_push_matrix()
void fl_pop_matrix()
```

Save and restore the current transformation. The maximum depth of the stack is 32 entries.

```
void fl_scale(double x,double y)
void fl_scale(double x)
void fl_translate(double x,double y)
void fl_rotate(double d)
void fl_mult_matrix(double a,double b,double c,double d,double x,double y)
```

Concatenate another transformation onto the current one. The rotation angle is in degrees (not radians) and is counter-clockwise.

```
double fl_transform_x(double x, double y)
double fl_transform_y(double x, double y)
double fl_transform_dx(double x, double y)
double fl_transform_dy(double x, double y)
void fl_transformed_vertex(double xf, double yf)
```

Transform a coordinate or a distance using the current transformation matrix. After transforming a coordinate pair, it can be added to the vertex list without any further translations using `fl_transformed_vertex()`.

```
void fl_begin_points()
void fl_end_points()
```

Start and end drawing a list of points. Points are added to the list with `fl_vertex()`.

```
void fl_begin_line()
void fl_end_line()
```

Start and end drawing lines.

```
void fl_begin_loop()
void fl_end_loop()
```

Start and end drawing a closed sequence of lines.

```
void fl_begin_polygon()
void fl_end_polygon()
```

Start and end drawing a convex filled polygon.

```
void fl_begin_complex_polygon()
void fl_gap()
void fl_end_complex_polygon()
```

Start and end drawing a complex filled polygon. This polygon may be concave, may have holes in it, or may be several disconnected pieces. Call `fl_gap()` to separate loops of the path. It is unnecessary but harmless to call `fl_gap()` before the first vertex, after the last one, or several times in a row.

`fl_gap()` should only be called between `fl_begin_complex_polygon()` and `fl_end_complex_polygon()`. To outline the polygon, use `fl_begin_loop()` and replace each `fl_gap()` with a `fl_end_loop();fl_begin_loop()` pair.

Note: For portability, you should only draw polygons that appear the same whether "even/odd" or "non-zero" winding rules are used to fill them. Holes should be drawn in the opposite direction of the outside loop.

```
void fl_vertex(double x,double y)
```


Add a single vertex to the current path.

```
void fl_curve(double X0, double Y0, double X1, double Y1, double X2, double Y2, double X3, double Y3)
```

Add a series of points on a Bezier curve to the path. The curve ends (and two of the points are) at `X0, Y0` and `X3, Y3`.

```
void fl_arc(double x, double y, double r, double start, double end)
```

Add a series of points to the current path on the arc of a circle; you can get elliptical paths by using `scale` and `rotate` before calling `fl_arc()`. The center of the circle is given by `x` and `y`, and `r` is its radius. `fl_arc()` takes `start` and `end` angles that are measured in degrees counter-clockwise from 3 o'clock. If `end` is less than `start` then it draws the arc in a clockwise direction.

```
void fl_circle(double x, double y, double r)
```

`fl_circle(...)` is equivalent to `fl_arc(..., 0, 360)` but may be faster. It must be the *only* thing in the path: if you want a circle as part of a complex polygon you must use `fl_arc()`.

Note: `fl_circle()` draws incorrectly if the transformation is both rotated and non-square scaled.

7.3.4 Drawing Text

All text is drawn in the [current font](#). It is undefined whether this location or the characters are modified by the current transformation.

```
void fl_draw(const char *, int x, int y)
void fl_draw(const char *, int n, int x, int y)
```

Draw a nul-terminated string or an array of `n` characters starting at the given location. Text is aligned to the left and to the baseline of the font. To align to the bottom, subtract `fl_descent()` from `y`. To align to the top, subtract `fl_descent()` and add `fl_height()`. This version of `fl_draw()` provides direct access to the text drawing function of the underlying OS. It does not apply any special handling to control characters.

```
void fl_draw(const char* str, int x, int y, int w, int h, FL_Align align, FL_Image* img, int draw_symbols)
```

Fancy string drawing function which is used to draw all the labels. The string is formatted and aligned inside the passed box. Handles `'t'` and `'n'`, expands all other control characters to `^X`, and aligns inside or against the edges of the box described by `x`, `y`, `w` and `h`. See [FL_Widget::align\(\)](#) for values for `align`. The value `FL_ALIGN_INSIDE` is ignored, as this function always prints inside the box.

If `img` is provided and is not `NULL`, the image is drawn above or below the text as specified by the `align` value.

The `draw_symbols` argument specifies whether or not to look for symbol names starting with the "@" character.

void `fl_measure(const char *str, int& w, int& h, int draw_symbols)`

Measure how wide and tall the string will be when printed by the `fl_draw(...align)` function. This includes leading/trailing white space in the string, kerning, etc.

If the incoming `w` is non-zero it will wrap to that width.

This will probably give unexpected values unless you have called `fl_font()` explicitly in your own code. Refer to the full documentation for `fl_measure()` for details on usage and how to avoid common pitfalls.

See also

`fl_text_extents()` – measure the 'inked' area of a string

`fl_width()` – measure the pixel width of a string or single character

`fl_height()` – measure the pixel height of the [current font](#)

`fl_descent()` – the height of the descender for the [current font](#)

int `fl_height()`

Recommended minimum line spacing for the [current font](#). You can also just use the value of `size` passed to `fl_font()`.

See also

`fl_text_extents()`, `fl_measure()`, `fl_width()`, `fl_descent()`

int `fl_descent()`

Recommended distance above the bottom of a `fl_height()` tall box to draw the text at so it looks centered vertically in that box.

double `fl_width(const char* txt)`

double `fl_width(const char* txt, int n)`

double `fl_width(unsigned int unicode_char)`

Return the pixel width of a nul-terminated string, a sequence of `n` characters, or a single character in the [current font](#).

See also

[fl_measure\(\)](#), [fl_text_extents\(\)](#), [fl_height\(\)](#), [fl_descent\(\)](#)

```
void fl_text_extents(const char* txt, int& dx, int& dy, int& w, int& h)
```

Determines the minimum pixel dimensions of a nul-terminated string, ie. the 'inked area'.

Given a string "txt" drawn using `fl_draw(txt, x, y)` you would determine its pixel extents on the display using `fl_text_extents(txt, dx, dy, wo, ho)` such that a bounding box that exactly fits around the inked area of the text could be drawn with `fl_rect(x+dx, y+dy, wo, ho)`.

Refer to the full documentation for [fl_text_extents\(\)](#) for details on usage.

See also

[fl_measure\(\)](#), [fl_width\(\)](#), [fl_height\(\)](#), [fl_descent\(\)](#)

```
const char* fl_shortcut_label(int shortcut)
```

Unparse a shortcut value as used by [Fl_Button](#) or [Fl_Menu_Item](#) into a human-readable string like "Alt+N". This only works if the shortcut is a character key or a numbered function key. If the shortcut is zero an empty string is returned. The return value points at a static buffer that is overwritten with each call.

7.3.5 Fonts

FLTK supports a set of standard fonts based on the Times, Helvetica/Arial, Courier, and Symbol typefaces, as well as custom fonts that your application may load. Each font is accessed by an index into a font table.

Initially only the first 16 faces are filled in. There are symbolic names for them: `FL_HELVETICA`, `FL_TIMES`, `FL_COURIER`, and modifier values `FL_BOLD` and `FL_ITALIC` which can be added to these, and `FL_SYMBOL` and `FL_ZAPF_DINGBATS`. Faces greater than 255 cannot be used in [Fl_Widget](#) labels, since [Fl_Widget](#) stores the index as a byte.

One important thing to note about 'current font' is that there are so many paths through the GUI event handling code as widgets are partially or completely hidden, exposed and then re-drawn and therefore you can not guarantee that 'current font' contains the same value that you set on the other side of the event loop. Your value may have been superseded when a widget was redrawn. You are strongly advised to set the font explicitly before you draw any text or query the width and height of text strings, etc.

```
void fl_font(int face, int size)
```

Set the current font, which is then used by the routines described above. You may call this outside a draw context if necessary to call `fl_width()`, but on X this will open the display.

The font is identified by a `face` and a `size`. The size of the font is measured in `pixels` and not "points". Lines should be spaced `size` pixels apart or more.

```
int fl_font()
int fl_size()
```

Returns the face and size set by the most recent call to `fl_font(a,b)`. This can be used to save/restore the font.

7.3.6 Character Encoding

FLTK 1.3 expects all text in Unicode UTF-8 encoding. UTF-8 is ASCII compatible for the first 128 characters. International characters are encoded in multibyte sequences.

FLTK expects individual characters, characters that are not part of a string, in UCS-4 encoding, which is also ASCII compatible, but requires 4 bytes to store a Unicode character.

For more information about character encodings, see the chapter on [Unicode and UTF-8 Support](#).

7.3.7 Drawing Overlays

These functions allow you to draw interactive selection rectangles without using the overlay hardware. FLTK will XOR a single rectangle outline over a window.

```
void fl_overlay_rect(int x, int y, int w, int h)
void fl_overlay_clear()
```

`fl_overlay_rect()` draws a selection rectangle, erasing any previous rectangle by XOR'ing it first. `fl_overlay_clear()` will erase the rectangle without drawing a new one.

Using these functions is tricky. You should make a widget with both a `handle()` and `draw()` method. `draw()` should call `fl_overlay_clear()` before doing anything else. Your `handle()` method should call `window()->make_current()` and then `fl_overlay_rect()` after `FL_DRAG` events, and should call `fl_overlay_clear()` after a `FL_RELEASE` event.

7.4 Drawing Images

To draw images, you can either do it directly from data in your memory, or you can create a [FL_Image](#) object. The advantage of drawing directly is that it is more intuitive, and it is faster if the image data changes more often than it is redrawn. The advantage of using the object is that FLTK will cache translated forms of the image (on X it uses a server pixmap) and thus redrawing is *much* faster.

7.4.1 Direct Image Drawing

The behavior when drawing images when the current transformation matrix is not the identity is not defined, so you should only draw images when the matrix is set to the identity.

```
void fl_draw_image(const uchar *buf,int X,int Y,int W,int H,int D,int L)
void fl_draw_image_mono(const uchar *buf,int X,int Y,int W,int H,int D,int L)
```

Draw an 8-bit per color RGB or luminance image. The pointer points at the "r" data of the top-left pixel. Color data must be in *r, g, b* order. The top left corner is given by *X* and *Y* and the size of the image is given by *W* and *H*. *D* is the delta to add to the pointer between pixels, it may be any value greater or equal to 3, or it can be negative to flip the image horizontally. *L* is the delta to add to the pointer between lines (if 0 is passed it uses *W*D*), and may be larger than *W*D* to crop data, or negative to flip the image vertically.

It is highly recommended that you put the following code before the first `show()` of *any* window in your program to get rid of the dithering if possible:

```
Fl::visual (FL_RGB) ;
```

Gray scale (1-channel) images may be drawn. This is done if `abs(D)` is less than 3, or by calling `fl_↔draw_image_mono()`. Only one 8-bit sample is used for each pixel, and on screens with different numbers of bits for red, green, and blue only gray colors are used. Setting *D* greater than 1 will let you display one channel of a color image.

Note: The X version does not support all possible visuals. If FLTK cannot draw the image in the current visual it will abort. FLTK supports any visual of 8 bits or less, and all common TrueColor visuals up to 32 bits.

```
typedef void (*Fl_Draw_Image_Cb)(void *data,int x,int y,int w,uchar *buf)
void fl_draw_image(Fl_Draw_Image_Cb cb,void *data,int X,int Y,int W,int H,int D)
void fl_draw_image_mono(Fl_Draw_Image_Cb cb,void *data,int X,int Y,int W,int H,int D)
```

Call the passed function to provide each scan line of the image. This lets you generate the image as it is being drawn, or do arbitrary decompression of stored data, provided it can be decompressed to individual scan lines easily.

The callback is called with the `void*` user data pointer which can be used to point at a structure of information about the image, and the *x*, *y*, and *w* of the scan line desired from the image. 0,0 is the upper-left corner of the image, *not* *X*, *Y*. A pointer to a buffer to put the data into is passed. You must copy *w* pixels from scanline *y*, starting at pixel *x*, to this buffer.

Due to cropping, less than the whole image may be requested. So *x* may be greater than zero, the first *y* may be greater than zero, and *w* may be less than *W*. The buffer is long enough to store the entire *W*D* pixels, this is for convenience with some decompression schemes where you must decompress the entire line at once: decompress it into the buffer, and then if *x* is not zero, copy the data over so the *x*'*th* pixel is at the start of the buffer.

You can assume the `y`'s will be consecutive, except the first one may be greater than zero.

If `D` is 4 or more, you must fill in the unused bytes with zero.

```
int fl_draw_pixmap(char* const* data, int x, int y, FI_Color bg)
int fl_draw_pixmap(const char* const* cdata, int x, int y, FI_Color bg)
```

Draws XPM image data, with the top-left corner at the given position. The image is dithered on 8-bit displays so you won't lose color space for programs displaying both images and pixmaps. This function returns zero if there was any error decoding the XPM data.

To use an XPM, do:

```
#include "foo.xpm"
...
fl_draw_pixmap(foo, X, Y);
```

Transparent colors are replaced by the optional `FI_Color` argument. To draw with true transparency you must use the `FI_Pixmap` class.

```
int fl_measure_pixmap(char* const* data, int &w, int &h)
int fl_measure_pixmap(const char* const* cdata, int &w, int &h)
```

An XPM image contains the dimensions in its data. This function finds and returns the width and height. The return value is non-zero if the dimensions were parsed ok and zero if there was any problem.

7.4.2 Direct Image Reading

FLTK provides a single function for reading from the current window or off-screen buffer into a RGB(A) image buffer.

```
uchar* fl_read_image(uchar *p, int X, int Y, int W, int H, int alpha)
```

Read a RGB(A) image from the current window or off-screen buffer. The `p` argument points to a buffer that can hold the image and must be at least `W*H*3` bytes when reading RGB images and `W*H*4` bytes when reading RGBA images. If `NULL`, `fl_read_image()` will create an array of the proper size which can be freed using `delete[]`.

The `alpha` parameter controls whether an alpha channel is created and the value that is placed in the alpha channel. If 0, no alpha channel is generated.

7.4.3 Image Classes

FLTK provides a base image class called [FL_Image](#) which supports creating, copying, and drawing images of various kinds, along with some basic color operations. Images can be used as labels for widgets using the `image()` and `deimage()` methods or drawn directly.

The [FL_Image](#) class does almost nothing by itself, but is instead supported by three basic image types:

- [FL_Bitmap](#)
- [FL_Pixmap](#)
- [FL_RGB_Image](#)

The [FL_Bitmap](#) class encapsulates a mono-color bitmap image. The `draw()` method draws the image using the current drawing color.

The [FL_Pixmap](#) class encapsulates a colormapped image. The `draw()` method draws the image using the colors in the file, and masks off any transparent colors automatically.

The [FL_RGB_Image](#) class encapsulates a full-color (or grayscale) image with 1 to 4 color components. Images with an even number of components are assumed to contain an alpha channel that is used for transparency. The transparency provided by the `draw()` method is either a 24-bit blend against the existing window contents or a "screen door" transparency mask, depending on the platform and screen color depth.

char [fl_can_do_alpha_blending\(\)](#)

`fl_can_do_alpha_blending()` will return 1, if your platform supports true alpha blending for RGBA images, or 0, if FLTK will use screen door transparency.

FLTK also provides several image classes based on the three standard image types for common file formats:

- [FL_GIF_Image](#)
- [FL_JPEG_Image](#)
- [FL_PNG_Image](#)
- [FL_PNM_Image](#)
- [FL_XBM_Image](#)
- [FL_XPM_Image](#)

Each of these image classes loads a named file of the corresponding format. The [FL_Shared_Image](#) class can be used to load any type of image file - the class examines the file and constructs an image of the appropriate type. It can also be used to scale an image to a certain size in drawing units, independently from its size in pixels (see [FL_Shared_Image::scale\(\)](#)).

Finally, FLTK provides a special image class called [FL_Tiled_Image](#) to tile another image object in the specified area. This class can be used to tile a background image in a [FL_Group](#) widget, for example.

```
virtual void FL\_Image::copy\(\)  
virtual FL\_Image\* FL\_Image::copy\(int w, int h\)
```

The `copy()` method creates a copy of the image. The second form specifies the new size of the image - the image is resized using the nearest-neighbor algorithm (this is the default).

Note

As of FLTK 1.3.3 the image resizing algorithm can be changed. See [FI_Image::RGB_scaling\(FI_RGB_Scaling method\)](#)

virtual void [FI_Image::draw\(int x, int y, int w, int h, int ox, int oy\)](#)

The `draw()` method draws the image object. `x, y, w, h` indicates the destination rectangle. `ox, oy, w, h` is the source rectangle. This source rectangle is copied to the destination. The source rectangle may extend outside the image, i.e. `ox` and `oy` may be negative and `w` and `h` may be bigger than the image, and this area is left unchanged.

Note

See exceptions for [FI_Tiled_Image::draw\(\)](#) regarding arguments `ox`, `oy`, `w`, and `h`.

virtual void [FI_Image::draw\(int x, int y\)](#)

Draws the image with the upper-left corner at `x, y`. This is the same as doing `img->draw(x, y, img->w(), img->h(), 0, 0)` where `img` is a pointer to any [FI_Image](#) type.

7.4.4 Offscreen Drawing

Sometimes it can be very useful to generate a complex drawing in memory first and copy it to the screen at a later point in time. This technique can significantly reduce the amount of repeated drawing. Offscreen drawing functions are declared in `<FL/x.H>`.

[FI_Double_Window](#) uses offscreen rendering to avoid flickering on systems that don't support double-buffering natively.

FLTK can draw into an offscreen buffer at any time. There is no need to wait for an [FI_Widget::draw\(\)](#) to occur.

Note

The X11 platform requires an open display for offscreen drawing, i.e. you may need to call `fl_open_display()` prior to creating and using offscreen buffers, particularly if no window has been shown yet.

Note

In FLTK 1.3.x and earlier versions all offscreen drawing functions described below are implemented as macros and create certain temporary variables to save context information. You may need to create local scope blocks with curly braces { ... } if you use offscreen functions more than once in a function or method.

Example:

```
fl_open_display(); // necessary before showing the first window
Fl_Offscreen oscr = fl_create_offscreen(120, 120);
{ // begin block
    fl_begin_offscreen(oscr);
    fl_color(FL_WHITE);
    fl_rectf(0, 0, 120, 120);
    fl_end_offscreen();
} // end block
// other code here
{ // begin block
    fl_begin_offscreen(oscr);
    fl_color(FL_BLACK);
    fl_rectf(10, 10, 100, 100);
    fl_end_offscreen();
} // end block
// other code here
fl_delete_offscreen(oscr);
```

Note

In FLTK 1.4.0 and later neither calling `fl_open_display()` nor using local blocks is necessary since the offscreen functions described below are real functions (not macros as in 1.3.x).

`Fl_Offscreen fl_create_offscreen(int w, int h)`

Create an RGB offscreen buffer with `w*h` pixels.

`void fl_delete_offscreen(Fl_Offscreen)`

Delete a previously created offscreen buffer. All drawings are lost.

`void fl_begin_offscreen(Fl_Offscreen)`

Send all subsequent drawing commands to this offscreen buffer.

`void fl_end_offscreen()`

Quit sending drawing commands to this offscreen buffer.

`void fl_copy_offscreen(int x, int y, int w, int h, Fl_Offscreen osrc, int srcx, int srcy)`

Copy a rectangular area of the size `w*h` from `srcx,srcy` in the offscreen buffer into the current buffer at `x,y`.

Chapter 8

Handling Events

This chapter discusses the FLTK event model and how to handle events in your program or widget.

8.1 The FLTK Event Model

Every time a user moves the mouse pointer, clicks a button, or presses a key, an event is generated and sent to your application. Events can also come from other programs like the window manager.

Events are identified by the integer argument passed to a `handle()` method that overrides the `FL_Widget::handle()` virtual method. Other information about the most recent event is stored in static locations and acquired by calling the `FL::event_*` methods. This static information remains valid until the next event is read from the window system, so it is ok to look at it outside of the `handle()` method.

Event numbers can be converted to their actual names using the `fl_eventnames[]` array defined in `#include <FL/names.h>`; see next chapter for details.

In the next chapter, the `MyClass::handle()` example shows how to override the `FL_Widget::handle()` method to accept and process specific events.

8.2 Mouse Events

8.2.1 FL_PUSH

A mouse button has gone down with the mouse pointing at this widget. You can find out what button by calling `FL::event_button()`. You find out the mouse position by calling `FL::event_x()` and `FL::event_y()`.

A widget indicates that it "wants" the mouse click by returning non-zero from its `handle()` method, as in the `MyClass::handle()` example. It will then become the `FL::pushed()` widget and will get `FL_DRAG` and the matching `FL_RELEASE` events. If `handle()` returns zero then FLTK will try sending the `FL_PUSH` to another widget.

8.2.2 FL_DRAG

The mouse has moved with a button held down. The current button state is in `FL::event_state()`. The mouse position is in `FL::event_x()` and `FL::event_y()`.

In order to receive `FL_DRAG` events, the widget must return non-zero when handling `FL_PUSH`.

8.2.3 FL_RELEASE

A mouse button has been released. You can find out what button by calling `Fl::event_button()`.

In order to receive the `FL_RELEASE` event, the widget must return non-zero when handling `FL_PUSH`.

8.2.4 FL_MOVE

The mouse has moved without any mouse buttons held down. This event is sent to the `Fl::belowmouse()` widget.

In order to receive `FL_MOVE` events, the widget must return non-zero when handling `FL_ENTER`.

8.2.5 FL_MOUSEWHEEL

The user has moved the mouse wheel. The `Fl::event_dx()` and `Fl::event_dy()` methods can be used to find the amount to scroll horizontally and vertically.

8.3 Focus Events

8.3.1 FL_ENTER

The mouse has been moved to point at this widget. This can be used for highlighting feedback. If a widget wants to highlight or otherwise track the mouse, it indicates this by returning non-zero from its `handle()` method. It then becomes the `Fl::belowmouse()` widget and will receive `FL_MOVE` and `FL_LEAVE` events.

8.3.2 FL_LEAVE

The mouse has moved out of the widget.

In order to receive the `FL_LEAVE` event, the widget must return non-zero when handling `FL_ENTER`.

8.3.3 FL_FOCUS

This indicates an *attempt* to give a widget the keyboard focus.

If a widget wants the focus, it should change itself to display the fact that it has the focus, and return non-zero from its `handle()` method. It then becomes the `Fl::focus()` widget and gets `FL_KEYDOWN`, `FL_KEYUP`, and `FL_UNFOCUS` events.

The focus will change either because the window manager changed which window gets the focus, or because the user tried to navigate using tab, arrows, or other keys. You can check `Fl::event_key()` to figure out why it moved. For navigation it will be the key pressed and for interaction with the window manager it will be zero.

8.3.4 FL_UNFOCUS

This event is sent to the previous `Fl::focus()` widget when another widget gets the focus or the window loses focus.

8.4 Keyboard Events

8.4.1 FL_KEYBOARD, FL_KEYDOWN, FL_KEYUP

A key was pressed (FL_KEYDOWN) or released (FL_KEYUP). FL_KEYBOARD is a synonym for FL_KEYDOWN, and both names are used interchangeably in this documentation.

The key can be found in [Fl::event_key\(\)](#). The text that the key should insert can be found with [Fl::event_text\(\)](#) and its length is in [Fl::event_length\(\)](#).

If you use the key, then `handle()` should return 1. If you return zero then FLTK assumes you ignored the key and will then attempt to send it to a parent widget. If none of them want it, it will change the event into a FL_SHORTCUT event. FL_KEYBOARD events are also generated by the character palette/map.

To receive FL_KEYBOARD events you must also respond to the FL_FOCUS and FL_UNFOCUS events by returning 1. This way FLTK knows whether to bother sending your widget keyboard events. (Some widgets don't need them, e.g. [Fl_Box](#).)

If you are writing a text-editing widget you may also want to call the [Fl::compose\(\)](#) function to translate individual keystrokes into characters.

FL_KEYUP events are sent to the widget that currently has focus. This is not necessarily the same widget that received the corresponding FL_KEYDOWN event because focus may have changed between events.

Todo Add details on how to detect repeating keys, since on some X servers a repeating key will generate both FL_KEYUP and FL_KEYDOWN, such that to tell if a key is held, you need [Fl::event_key\(int\)](#) to detect if the key is being held down during FL_KEYUP or not.

8.4.2 FL_SHORTCUT

If the [Fl::focus\(\)](#) widget is zero or ignores an FL_KEYBOARD event then FLTK tries sending this event to every widget it can, until one of them returns non-zero. FL_SHORTCUT is first sent to the [Fl::belowmouse\(\)](#) widget, then its parents and siblings, and eventually to every widget in the window, trying to find an object that returns non-zero. FLTK tries really hard to not to ignore any keystrokes!

You can also make "global" shortcuts by using [Fl::add_handler\(\)](#). A global shortcut will work no matter what windows are displayed or which one has the focus.

8.5 Widget Events

8.5.1 FL_DEACTIVATE

This widget is no longer active, due to [deactivate\(\)](#) being called on it or one of its parents. Please note that although [active\(\)](#) may still return true for this widget after receiving this event, it is only truly active if [active\(\)](#) is true for both it and all of its parents. (You can use [active_r\(\)](#) to check this).

8.5.2 FL_ACTIVATE

This widget is now active, due to [activate\(\)](#) being called on it or one of its parents.

8.5.3 FL_HIDE

This widget is no longer visible, due to `hide()` being called on it or one of its parents, or due to a parent window being minimized. Please note that although `visible()` may still return true for this widget after receiving this event, it is only truly visible if `visible()` is true for both it and all of its parents. (You can use `visible_r()` to check this).

8.5.4 FL_SHOW

This widget is visible again, due to `show()` being called on it or one of its parents, or due to a parent window being restored. *A child `Fl_Window` will respond to this by actually creating the window if not done already, so if you subclass a window, be sure to pass `FL_SHOW` to the base class `handle()` method!*

Note

The events in this chapter ("Widget Events"), i.e. `FL_ACTIVATE`, `FL_DEACTIVATE`, `FL_SHOW`, and `FL_HIDE`, are the only events deactivated and invisible widgets can usually get, depending on their states. Under certain circumstances, there may also be `FL_LEAVE` or `FL_UNFOCUS` events delivered to deactivated or hidden widgets.

8.6 Clipboard Events

8.6.1 FL_PASTE

You should get this event some time after you call `Fl::paste()`. The contents of `Fl::event_text()` is the text to insert and the number of characters is in `Fl::event_length()`.

8.6.2 FL_SELECTIONCLEAR

The `Fl::selection_owner()` will get this event before the selection is moved to another widget. This indicates that some other widget or program has claimed the selection. Motif programs used this to clear the selection indication. Most modern programs ignore this.

8.7 Drag and Drop Events

FLTK supports drag and drop of text and files from any application on the desktop to an FLTK widget. Text is transferred using UTF-8 encoding. Files are received as a list of full path and file names, separated by newline.

On some X11 platforms, files are received as a URL-encoded UTF-8 string, that is, non-ASCII bytes (and a few others such as space and %) are replaced by the 3 bytes "%XY" where XY are the byte's hexadecimal value. The `fl_decode_uri()` function can be used to transform in-place the received string into a proper UTF-8 string. On these platforms, strings corresponding to dropped files are further prepended by `file://` (or other prefixes such as `computer://`).

See `Fl::dnd()` for drag and drop from an FLTK widget.

The drag and drop data is available in `Fl::event_text()` at the concluding `FL_PASTE`. On some platforms, the event text is also available for the `FL_DND_*` events, however application must not depend on that behavior because it depends on the protocol used on each platform.

`FL_DND_*` events cannot be used in widgets derived from `Fl_Group` or `Fl_Window`.

8.7.1 FL_DND_ENTER

The mouse has been moved to point at this widget. A widget that is interested in receiving drag'n'drop data must return 1 to receive `FL_DND_DRAG`, `FL_DND_LEAVE` and `FL_DND_RELEASE` events.

8.7.2 FL_DND_DRAG

The mouse has been moved inside a widget while dragging data. A widget that is interested in receiving drag'n'drop data should indicate the possible drop position.

8.7.3 FL_DND_LEAVE

The mouse has moved out of the widget.

8.7.4 FL_DND_RELEASE

The user has released the mouse button dropping data into the widget. If the widget returns 1, it will receive the data in the immediately following `FL_PASTE` event.

8.8 Other events

8.8.1 FL_SCREEN_CONFIGURATION_CHANGED

Sent whenever the screen configuration changes (a screen is added/removed, a screen resolution is changed, screens are moved). Use [Fl::add_handler\(\)](#) to be notified of this event.

8.8.2 FL_FULLSCREEN

The application window has been changed from normal to fullscreen, or from fullscreen to normal. If you are using a X window manager which supports Extended Window Manager Hints, this event will not be delivered until the change has actually happened.

8.9 Fl::event_*() methods

FLTK keeps the information about the most recent event in static storage. This information is good until the next event is processed. Thus it is valid inside `handle()` and `callback()` methods.

These are all trivial inline functions and thus very fast and small:

- [Fl::event_button\(\)](#)
- [Fl::event_clicks\(\)](#)
- [Fl::event_dx\(\)](#)
- [Fl::event_dy\(\)](#)
- [Fl::event_inside\(\)](#)
- [Fl::event_is_click\(\)](#)
- [Fl::event_key\(\)](#)
- [Fl::event_length\(\)](#)
- [Fl::event_state\(\)](#)
- [Fl::event_text\(\)](#)
- [Fl::event_x\(\)](#)
- [Fl::event_x_root\(\)](#)
- [Fl::event_y\(\)](#)
- [Fl::event_y_root\(\)](#)
- [Fl::get_key\(\)](#)
- [Fl::get_mouse\(\)](#)
- [Fl::test_shortcut\(\)](#)

8.10 Event Propagation

Widgets receive events via the virtual `handle()` function. The argument indicates the type of event that can be handled. The widget must indicate if it handled the event by returning 1. FLTK will then remove the event and wait for further events from the host. If the widget's handle function returns 0, FLTK may redistribute the event based on a few rules.

Most events are sent directly to the `handle()` method of the [Fl_Window](#) that the window system says they belong to. The window (actually the [Fl_Group](#) that [Fl_Window](#) is a subclass of) is responsible for sending the events on to any child widgets. To make the [Fl_Group](#) code somewhat easier, FLTK sends some events (`FL_DRAG`, `FL_RELEASE`, `FL_KEYBOARD`, `FL_SHORTCUT`, `FL_UNFOCUS`, and `FL_LEAVE`) directly to leaf widgets. These procedures control those leaf widgets:

- [Fl::add_handler\(\)](#)
- [Fl::belowmouse\(\)](#)
- [Fl::focus\(\)](#)

- [Fl::grab\(\)](#)
- [Fl::modal\(\)](#)
- [Fl::pushed\(\)](#)
- [Fl::release\(\)](#) (deprecated, see [Fl::grab\(0\)](#))
- [Fl_Widget::take_focus\(\)](#)

FLTK propagates events along the widget hierarchy depending on the kind of event and the status of the UI. Some events are injected directly into the widgets, others may be resent as new events to a different group of receivers.

Mouse click events are first sent to the window that caused them. The window then forwards the event down the hierarchy until it reaches the widget that is below the click position. If that widget uses the given event, the widget is marked "pushed" and will receive all following mouse motion (`FL_DRAG`) events until the mouse button is released.

Mouse motion (`FL_MOVE`) events are sent to the [Fl::belowmouse\(\)](#) widget, i.e. the widget that returned 1 on the last `FL_ENTER` event.

Mouse wheel events are sent to the window that caused the event. The window propagates the event down the tree, first to the widget that is below the mouse pointer, and if that does not succeed, to all other widgets in the group. This ensures that scroll widgets work as expected with the widget furthest down in the hierarchy getting the first opportunity to use the wheel event, but also giving scroll bars, that are not directly below the mouse a chance.

Keyboard events are sent directly to the widget that has keyboard focus. If the focused widget rejects the event, it is resent as a shortcut event, first to the top-most window, then to the widget below the mouse pointer, propagating up the hierarchy to all its parents. Those send the event also to all widgets that are not below the mouse pointer. Now if that did not work out, the shortcut is sent to all registered shortcut handlers.

If we are still unsuccessful, the event handler flips the case of the shortcut letter and starts over. Finally, if the key is "escape", FLTK sends a close event to the top-most window.

All other events are pretty much sent right away to the window that created the event.

Widgets can "grab" events. The grabbing window gets all events exclusively, but usually by the same rules as described above.

Windows can also request exclusivity in event handling by making the window modal.

8.11 FLTK Compose-Character Sequences

The character composition done by [Fl_Input](#) widget requires that you call the [Fl::compose\(\)](#) function if you are writing your own text editor widget.

Currently, all characters made by single key strokes with or without modifier keys, or by system-defined character compose sequences (that can involve dead keys or a compose key) can be input. You should call [Fl::compose\(\)](#) in case any enhancements to this processing are done in the future. The interface has been designed to handle arbitrary UTF-8 encoded text.

The following methods are provided for character composition:

- [Fl::compose\(\)](#)
- [Fl::compose_reset\(\)](#)

Under Mac OS X, FLTK "previews" partially composed sequences.

Chapter 9

Adding and Extending Widgets

This chapter describes how to add your own widgets or extend existing widgets in FLTK.

9.1 Subclassing

New widgets are created by *subclassing* an existing FLTK widget, typically [Fl_Widget](#) for controls and [Fl_Group](#) for composite widgets.

A control widget typically interacts with the user to receive and/or display a value of some sort.

A composite widget holds a list of child widgets and handles moving, sizing, showing, or hiding them as needed. [Fl_Group](#) is the main composite widget class in FLTK, and all of the other composite widgets ([Fl_Pack](#), [Fl_Scroll](#), [Fl_Tabs](#), [Fl_Tile](#), and [Fl_Window](#)) are subclasses of it.

You can also subclass other existing widgets to provide a different look or user-interface. For example, the button widgets are all subclasses of [Fl_Button](#) since they all interact with the user via a mouse button click. The only difference is the code that draws the face of the button.

9.2 Making a Subclass of Fl_Widget

Your subclasses can directly descend from [Fl_Widget](#) or any subclass of [Fl_Widget](#). [Fl_Widget](#) has only four virtual methods, and overriding some or all of these may be necessary.

9.3 The Constructor

The constructor should have the following arguments:

```
MyClass(int x, int y, int w, int h, const char *label = 0);
```

This will allow the class to be used in [FLUID](#) without problems.

The constructor must call the constructor for the base class and pass the same arguments:

```
MyClass::MyClass(int x, int y, int w, int h, const char *label)
: Fl_Widget(x, y, w, h, label) {
// do initialization stuff...
}
```

`Fl_Widget`'s protected constructor sets `x()`, `y()`, `w()`, `h()`, and `label()` to the passed values and initializes the other instance variables to:

```
type(0);
box(FL_NO_BOX);
color(FL_BACKGROUND_COLOR);
selection_color(FL_BACKGROUND_COLOR);
labeltype(FL_NORMAL_LABEL);
labelstyle(FL_NORMAL_STYLE);
labelsize(FL_NORMAL_SIZE);
labelcolor(FL_FOREGROUND_COLOR);
align(FL_ALIGN_CENTER);
callback(default_callback, 0);
flags(ACTIVE|VISIBLE);
image(0);
deimage(0);
```

9.4 Protected Methods of `Fl_Widget`

The following methods are provided for subclasses to use:

- `clear_visible()`
- `damage()`
- `draw_box()`
- `draw_focus()`
- `draw_label()`
- `set_flag()`
- `set_visible()`
- `test_shortcut()`
- `type()`

```
void Fl_Widget::damage(uchar mask)
void Fl_Widget::damage(uchar mask, int x, int y, int w, int h)
uchar Fl_Widget::damage()
```

The first form indicates that a partial update of the object is needed. The bits in `mask` are OR'd into `damage()`. Your `draw()` routine can examine these bits to limit what it is drawing. The public method `Fl_Widget::redraw()` simply does `Fl_Widget::damage(FL_DAMAGE_ALL)`, but the implementation of your widget can call the public `damage(n)`.

The second form indicates that a region is damaged. If only these calls are done in a window (no calls to `damage(n)`) then FLTK will clip to the union of all these calls before drawing anything. This can greatly speed up incremental displays. The mask bits are OR'd into `damage()` unless this is a `Fl_Window` widget.

The third form returns the bitwise-OR of all `damage(n)` calls done since the last `draw()`.

When redrawing your widgets you should look at the damage bits to see what parts of your widget need redrawing. The `handle()` method can then set individual damage bits to limit the amount of drawing that needs to be done:

```
MyClass::handle(int event) {
    ...
    if (change_to_part1) damage(1);
    if (change_to_part2) damage(2);
    if (change_to_part3) damage(4);
}
MyClass::draw() {
    if (damage() & FL_DAMAGE_ALL) {
        ... draw frame/box and other static stuff ...
    }
    if (damage() & (FL_DAMAGE_ALL | 1)) draw_part1();
    if (damage() & (FL_DAMAGE_ALL | 2)) draw_part2();
    if (damage() & (FL_DAMAGE_ALL | 4)) draw_part3();
}
```

Todo Clarify `Fl_Window::damage(uchar)` handling - seems confused/wrong? ORing value doesn't match setting behaviour in `Fl_Widget.H!`

```
void Fl_Widget::draw_box() const
void Fl_Widget::draw_box(Fl_Boxtype t, Fl_Color c) const
```

The first form draws this widget's `box()`, using the dimensions of the widget. The second form uses `t` as the box type and `c` as the color for the box.

```
void Fl_Widget::draw_focus()
void Fl_Widget::draw_focus(Fl_Boxtype t, int x, int y, int w, int h) const
```

Draws a focus box inside the widget's bounding box. The second form allows you to specify a different bounding box.

```
void Fl_Widget::draw_label() const
void Fl_Widget::draw_label(int x, int y, int w, int h) const
void Fl_Widget::draw_label(int x, int y, int w, int h, Fl_Align align) const
```

The first form is the usual function for a `draw()` method to call to draw the widget's label. It does not draw the label if it is supposed to be outside the box (on the assumption that the enclosing group will draw those labels).

The second form uses the passed bounding box instead of the widget's bounding box. This is useful so "centered" labels are aligned with some feature, like a moving slider.

The third form draws the label anywhere. It acts as though `FL_ALIGN_INSIDE` has been forced on so the label will appear inside the passed bounding box. This is designed for parent groups to draw labels with.

```
void Fl_Widget::set_flag(int c)
```

Calling `set_flag(SHORTCUT_LABEL)` modifies the behavior of `draw_label()` so that '&' characters cause an underscore to be printed under the next letter.

```
void FI_Widget::set_visible()
void FI_Widget::clear_visible()
```

Fast inline versions of `FI_Widget::hide()` and `FI_Widget::show()`. These do not send the `FL_HIDE` and `FL_↔_SHOW` events to the widget.

```
int FI_Widget::test_shortcut()
static int FI_Widget::test_shortcut(const char *s)
```

The first version tests `FI_Widget::label()` against the current event (which should be a `FL_SHORTCUT` event). If the label contains a '&' character and the character after it matches the keypress, this returns true. This returns false if the `SHORTCUT_LABEL` flag is off, if the label is `NULL`, or does not have a '&' character in it, or if the keypress does not match the character.

The second version lets you do this test against an arbitrary string.

Todo Clarify `FI_Widget::test_shortcut()` explanations. `FI_Widget.h` says Internal Use only, but subclassing chapter gives details!

```
uchar FI_Widget::type() const
void FI_Widget::type(uchar t)
```

The property `FI_Widget::type()` can return an arbitrary 8-bit identifier, and can be set with the protected method `type(uchar t)`. This value had to be provided for Forms compatibility, but you can use it for any purpose you want. Try to keep the value less than 100 to not interfere with reserved values.

FLTK does not use RTTI (Run Time Typing Information) to enhance portability. But this may change in the near future if RTTI becomes standard everywhere.

If you don't have RTTI you can use the clumsy FLTK mechanism, by having `type()` use a unique value. These unique values must be greater than the symbol `FL_RESERVED_TYPE` (which is 100) and less than `FL_WINDOW` (unless you make a subclass of `FI_Window`). Look through the header files for `FL_↔_RESERVED_TYPE` to find an unused number. If you make a subclass of `FI_Window` you must use `FL_↔_WINDOW + n` (where `n` must be in the range 1 to 7).

9.5 Handling Events

The virtual method `Fl_Widget::handle(int event)` is called to handle each event passed to the widget. It can:

- Change the state of the widget.
- Call `Fl_Widget::redraw()` if the widget needs to be redisplayed.
- Call `Fl_Widget::damage(uchar c)` if the widget needs a partial-update (assuming you provide support for this in your `draw()` method).
- Call `Fl_Widget::do_callback()` if a callback should be generated.
- Call `Fl_Widget::handle()` on child widgets.

Events are identified by the integer argument. Other information about the most recent event is stored in static locations and acquired by calling the `Fl::event_*` methods. This information remains valid until another event is handled.

Here is a sample `handle()` method for a widget that acts as a pushbutton and also accepts the keystroke 'x' to cause the callback:

```
int MyClass::handle(int event) {
    switch(event) {
        case FL_PUSH:
            highlight = 1;
            redraw();
            return 1;
        case FL_DRAG: {
            int t = Fl::event_inside(this);
            if (t != highlight) {
                highlight = t;
                redraw();
            }
        }
        return 1;
        case FL_RELEASE:
            if (highlight) {
                highlight = 0;
                redraw();
                do_callback();
                // never do anything after a callback, as the callback
                // may delete the widget!
            }
            return 1;
        case FL_SHORTCUT:
            if (Fl::event_key() == 'x') {
                do_callback();
                return 1;
            }
            return 0;
        default:
            return Fl_Widget::handle(event);
    }
}
```

You must return non-zero if your `handle()` method uses the event. If you return zero, the parent widget will try sending the event to another widget.

For debugging purposes, event numbers can be printed as their actual event names using the `fl_eventnames[]` array, e.g.:

```
#include <FL/names.h> // defines fl_eventnames[]
[...
int MyClass::handle(int e) {
    printf("Event was %s (%d)\n", fl_eventnames[e], e); // e.g. "Event was FL_PUSH (1)"
    [...
}
```

9.6 Drawing the Widget

The `draw()` virtual method is called when FLTK wants you to redraw your widget. It will be called if and only if `damage()` is non-zero, and `damage()` will be cleared to zero after it returns. The `draw()` method should be declared protected so that it can't be called from non-drawing code.

The `damage()` value contains the bitwise-OR of all the `damage(n)` calls to this widget since it was last drawn. This can be used for minimal update, by only redrawing the parts whose bits are set. FLTK will turn on the `FL_DAMAGE_ALL` bit if it thinks the entire widget must be redrawn, e.g. for an expose event.

Expose events (and the `damage(mask,x,y,w,h)` function described above) will cause `draw()` to be called with FLTK's clipping turned on. You can greatly speed up redrawing in some cases by testing `fl_not_clipped(x, y, w, h)` or `fl_clip_box()` and skipping invisible parts.

Besides the protected methods described above, FLTK provides a large number of basic drawing functions, which are described in the chapter [Drawing Things in FLTK](#).

9.7 Resizing the Widget

The `resize(x, y, w, h)` method is called when the widget is being resized or moved. The arguments are the new position, width, and height. `x()`, `y()`, `w()`, and `h()` still remain the old size. You must call `resize()` on your base class with the same arguments to get the widget size to actually change.

This should *not* call `redraw()`, at least if only the `x()` and `y()` change. This is because composite widgets like [FL_Scroll](#) may have a more efficient way of drawing the new position.

9.8 Making a Composite Widget

A "composite" widget contains one or more "child" widgets. To make a composite widget you should subclass [FL_Group](#). It is possible to make a composite object that is not a subclass of [FL_Group](#), but you'll have to duplicate the code in [FL_Group](#) anyways.

Instances of the child widgets may be included in the parent:

```
class MyClass : public FL_Group {
    FL_Button the_button;
    FL_Slider the_slider;
    ...
};
```

The constructor has to initialize these instances. They are automatically added to the group, since the [FL_Group](#) constructor does [FL_Group::begin\(\)](#). *Don't forget to call [FL_Group::end\(\)](#) or use the [FL_End](#) pseudo-class:*

```
MyClass::MyClass(int x, int y, int w, int h) :
    FL_Group(x, y, w, h),
    the_button(x + 5, y + 5, 100, 20),
    the_slider(x, y + 50, w, 20)
{
    ... (you could add dynamically created child widgets here) ...
    end(); // don't forget to do this!
}
```

The child widgets need callbacks. These will be called with a pointer to the children, but the widget itself may be found in the `parent()` pointer of the child. Usually these callbacks can be static private methods, with a matching private method:

```
void MyClass::static_slider_cb(FL_Widget* v, void *) { // static method
    ((MyClass*) (v->parent()))->slider_cb();
}
void MyClass::slider_cb() { // normal method
    use(the_slider->value());
}
```


If you make the `handle()` method, you can quickly pass all the events to the children using the `Fl_Group::handle()` method. You don't need to override `handle()` if your composite widget does nothing other than pass events to the children:

```
int MyClass::handle(int event) {
    if (Fl_Group::handle(event)) return 1;
    ... handle events that children don't want ...
}
```

If you override `draw()` you need to draw all the children. If `redraw()` or `damage()` is called on a child, `damage(FL_DAMAGE_CHILD)` is done to the group, so this bit of `damage()` can be used to indicate that a child needs to be drawn. It is fastest if you avoid drawing anything else in this case:

```
int MyClass::draw() {
    Fl_Widget *const*a = array();
    if (damage() == FL_DAMAGE_CHILD) { // only redraw some children
        for (int i = children(); i --; a++) update_child(**a);
    } else { // total redraw
        ... draw background graphics ...
        // now draw all the children atop the background:
        for (int i = children_; i --; a++) {
            draw_child(**a);
            draw_outside_label(**a); // you may not need to do this
        }
    }
}
```

`Fl_Group` provides some protected methods to make drawing easier:

- [draw_child\(\)](#)
- [draw_children\(\)](#)
- [draw_outside_label\(\)](#)
- [update_child\(\)](#)

void [Fl_Group::draw_child\(Fl_Widget &widget\) const](#)

This will force the child's `damage()` bits all to one and call `draw()` on it, then clear the `damage()`. You should call this on all children if a total redraw of your widget is requested, or if you draw something (like a background box) that damages the child. Nothing is done if the child is not `visible()` or if it is clipped.

void [Fl_Group::draw_children\(\)](#)

A convenience function that draws all children of the group. This is useful if you derived a widget from `Fl_Group` and want to draw a special border or background. You can call `draw_children()` from the derived `draw()` method after drawing the box, border, or background.

void [Fl_Group::draw_outside_label\(const Fl_Widget &widget\) const](#)

Draw the labels that are *not* drawn by [draw_label\(\)](#). If you want more control over the label positions you might want to call `child->draw_label(x, y, w, h, a)`.

void [Fl_Group::update_child\(Fl_Widget& widget\) const](#)

Draws the child only if its `damage()` is non-zero. You should call this on all the children if your own `damage` is equal to `FL_DAMAGE_CHILD`. Nothing is done if the child is not `visible()` or if it is clipped.

9.9 Cut and Paste Support

FLTK provides routines to cut and paste UTF-8 encoded text between applications:

- [Fl::copy\(\)](#)
- [Fl::paste\(\)](#)
- [Fl::selection\(\)](#)
- [Fl::selection_owner\(\)](#)

It is also possible to copy and paste image data between applications:

- [Fl_Copy_Surface](#)
- [Fl::clipboard_contains\(\)](#)
- [Fl::paste\(\)](#)

It may be possible to cut/paste other kinds of data by using [Fl::add_handler\(\)](#). Note that handling events beyond those provided by FLTK may be operating system specific. See [Operating System Issues](#) for more details.

9.10 Drag And Drop Support

FLTK provides routines to drag and drop UTF-8 encoded text between applications:

Drag'n'drop operations are initiated by copying data to the clipboard and calling the function [Fl::dnd\(\)](#).

Drop attempts are handled via the following events, already described under [Drag and Drop Events](#) in a previous chapter:

- `FL_DND_ENTER`
- `FL_DND_DRAG`
- `FL_DND_LEAVE`
- `FL_DND_RELEASE`
- `FL_PASTE`

9.11 Making a subclass of Fl_Window

You may want your widget to be a subclass of [Fl_Window](#), [Fl_Double_Window](#), or [Fl_Gl_Window](#). This can be useful if your widget wants to occupy an entire window, and can also be used to take advantage of system-provided clipping, or to work with a library that expects a system window ID to indicate where to draw.

Subclassing [Fl_Window](#) is almost exactly like subclassing [Fl_Group](#), and in fact you can easily switch a subclass back and forth. Watch out for the following differences:

1. [Fl_Window](#) is a subclass of [Fl_Group](#) so *make sure your constructor calls* `end()` unless you actually want children added to your window.
2. When handling events and drawing, the upper-left corner is at 0,0, not `x(), y()` as in other [Fl_Widget](#)'s. For instance, to draw a box around the widget, call `draw_box(0, 0, w(), h())`, rather than `draw_box(x(), y(), w(), h())`.

You may also want to subclass [Fl_Window](#) in order to get access to different visuals or to change other attributes of the windows. See the [Operating System Issues](#) chapter for more information.

Chapter 10

Using OpenGL

This chapter discusses using FLTK for your OpenGL applications.

10.1 Using OpenGL in FLTK

The easiest way to make an OpenGL display is to subclass `Fl_Gl_Window`. Your subclass must implement a `draw()` method which uses OpenGL calls to draw the display. Your main program should call `redraw()` when the display needs to change, and (somewhat later) FLTK will call `draw()`.

With a bit of care you can also use OpenGL to draw into normal FLTK windows. This allows you to use Gouraud shading for drawing your widgets. To do this you use the `gl_start()` and `gl_finish()` functions around your OpenGL code.

You must include FLTK's `<FL/gl.h>` header file. It will include the file `<GL/gl.h>`, define some extra drawing functions provided by FLTK, and include the `<windows.h>` header file needed by WIN32 applications.

Some simple coding rules (see [OpenGL and 'retina' displays](#)) allow to write cross-platform code that will draw high resolution OpenGL graphics if run on 'retina' displays with Mac OS X.

10.2 Making a Subclass of `Fl_Gl_Window`

To make a subclass of `Fl_Gl_Window`, you must provide:

- A class definition.
- A `draw()` method.
- A `handle()` method if you need to receive input from the user.

If your subclass provides static controls in the window, they must be redrawn whenever the `FL_DAMAGE_ALL` bit is set in the value returned by `damage()`. For double-buffered windows you will need to surround the drawing code with the following code to make sure that both buffers are redrawn:

```
#ifndef MESA
glDrawBuffer(GL_FRONT_AND_BACK);
#endif // !MESA
... draw stuff here ...
#ifndef MESA
glDrawBuffer(GL_BACK);
#endif // !MESA
```

Note:

If you are using the Mesa graphics library, the call to `glDrawBuffer()` is not required and will slow down drawing considerably. The preprocessor instructions shown above will optimize your code based upon the graphics library used.

10.2.1 Defining the Subclass

To define the subclass you just subclass the `Fl_Gl_Window` class:

```
class MyWindow : public Fl_Gl_Window {
    void draw();
    int handle(int);
public:
    MyWindow(int X, int Y, int W, int H, const char *L)
        : Fl_Gl_Window(X, Y, W, H, L) {}
};
```

The `draw()` and `handle()` methods are described below. Like any widget, you can include additional private and public data in your class (such as scene graph information, etc.)

10.2.2 The draw() Method

The `draw()` method is where you actually do your OpenGL drawing:

```
void MyWindow::draw() {
    if (!valid()) {
        ... set up projection, viewport, etc ...
        ... window size is in w() and h().
        ... valid() is turned on by FLTK after draw() returns
    }
    ... draw ...
}
```

10.2.3 The handle() Method

The `handle()` method handles mouse and keyboard events for the window:

```
int MyWindow::handle(int event) {
    switch(event) {
    case FL_PUSH:
        ... mouse down event ...
        ... position in Fl::event_x() and Fl::event_y()
        return 1;
    case FL_DRAG:
        ... mouse moved while down event ...
        return 1;
    case FL_RELEASE:
        ... mouse up event ...
        return 1;
    case FL_FOCUS :
    case FL_UNFOCUS :
        ... Return 1 if you want keyboard events, 0 otherwise
        return 1;
    case FL_KEYBOARD:
        ... keypress, key is in Fl::event_key(), ascii in Fl::event_text()
        ... Return 1 if you understand/use the keyboard event, 0 otherwise...
        return 1;
    case FL_SHORTCUT:
        ... shortcut, key is in Fl::event_key(), ascii in Fl::event_text()
        ... Return 1 if you understand/use the shortcut event, 0 otherwise...
        return 1;
    default:
        // pass other events to the base class...
        return Fl_Gl_Window::handle(event);
    }
}
```

When `handle()` is called, the OpenGL context is not set up! If your display changes, you should call `redraw()` and let `draw()` do the work. Don't call any OpenGL drawing functions from inside `handle()`!

You can call *some* OpenGL stuff like hit detection and texture loading functions by doing:

```
case FL_PUSH:
    make_current();    // make OpenGL context current
    if (!valid()) {
        ... set up projection exactly the same as draw ...
        valid(1);     // stop it from doing this next time
    }
    ... ok to call NON-DRAWING OpenGL code here, such as hit
    detection, loading textures, etc...
```

Your main program can now create one of your windows by doing `new MyWindow(...)`.

You can also use your new window class in FLUID by:

1. Putting your class definition in a `MyWindow.H` file.
2. Creating a `Fl_Box` widget in FLUID.
3. In the widget panel fill in the "class" field with `MyWindow`. This will make FLUID produce constructors for your new class.
4. In the "Extra Code" field put `#include "MyWindow.H"`, so that the FLUID output file will compile.

You must put `glwindow->show()` in your main code after calling `show()` on the window containing the OpenGL window.

10.3 Using OpenGL in Normal FLTK Windows

You can put OpenGL code into the `draw()` method, as described in [Drawing the Widget](#) in the previous chapter, or into the code for a `boxtype` or other places with some care.

Most importantly, before you show *any* windows, including those that don't have OpenGL drawing, you **must** initialize FLTK so that it knows it is going to use OpenGL. You may use any of the symbols described for `Fl_Gl_Window::mode()` to describe how you intend to use OpenGL:

```
Fl::gl_visual(FL_RGB);
```

You can then put OpenGL drawing code anywhere you can draw normally by surrounding it with `gl_start()` and `gl_finish()` to set up, and later release, an OpenGL context with an orthographic projection so that 0,0 is the lower-left corner of the window and each pixel is one unit. The current clipping is reproduced with OpenGL `glScissor()` commands. These functions also synchronize the OpenGL graphics stream with the drawing done by other X, WIN32, or FLTK functions.

```
gl_start();
... put your OpenGL code here ...
gl_finish();
```

The same context is reused each time. If your code changes the projection transformation or anything else you should use `glPushMatrix()` and `glPopMatrix()` functions to put the state back before calling `gl_finish()`.

You may want to use `Fl_Window::current()->h()` to get the drawable height so that you can flip the Y coordinates.

Unfortunately, there are a bunch of limitations you must adhere to for maximum portability:

- You must choose a default visual with `Fl::gl_visual()`.
- You cannot pass `FL_DOUBLE` to `Fl::gl_visual()`.
- You cannot use `Fl_Double_Window` or `Fl_Overlay_Window`.

Do *not* call `gl_start()` or `gl_finish()` when drawing into an `Fl_Gl_Window`!

10.4 OpenGL Drawing Functions

FLTK provides some useful OpenGL drawing functions. They can be freely mixed with any OpenGL calls, and are defined by including `<FL/gl.h>` which you should include instead of the OpenGL header `<GL/gl.h>`.

```
void gl_color(FL_Color)
```

Sets the current OpenGL color to a FLTK color. *For color-index modes it will use `fl_xpixel(c)`, which is only right if this window uses the default colormap!*

```
void gl_rect(int x, int y, int w, int h)
```

```
void gl_rectf(int x, int y, int w, int h)
```

Outlines or fills a rectangle with the current color. If `FL_GL_Window::ortho()` has been called, then the rectangle will exactly fill the pixel rectangle passed.

```
void gl_font(FL_Font fontid, int size)
```

Sets the current OpenGL font to the same font you get by calling `fl_font()`.

```
int gl_height()
```

```
int gl_descent()
```

```
float gl_width(const char *s)
```

```
float gl_width(const char *s, int n)
```

```
float gl_width(uchar c)
```

Returns information about the current OpenGL font.

```
void gl_draw(const char *s)
```

```
void gl_draw(const char *s, int n)
```

Draws a nul-terminated string or an array of `n` characters in the current OpenGL font at the current raster position.

```
void gl_draw(const char *s, int x, int y)
```

```
void gl_draw(const char *s, int n, int x, int y)
```

```
void gl_draw(const char *s, float x, float y)
```

```
void gl_draw(const char *s, int n, float x, float y)
```

Draws a nul-terminated string or an array of `n` characters in the current OpenGL font at the given position.

```
void gl_draw(const char *s, int x, int y, int w, int h, FL_Align)
```

Draws a string formatted into a box, with newlines and tabs expanded, other control characters changed to `^X`, and aligned with the edges or center. Exactly the same output as `fl_draw()`.

10.5 Speeding up OpenGL

Performance of [Fl_Gl_Window](#) may be improved on some types of OpenGL implementations, in particular MESA and other software emulators, by setting the `GL_SWAP_TYPE` environment variable. This variable declares what is in the backbuffer after you do a `swapbuffers`.

- `setenv GL_SWAP_TYPE COPY`

This indicates that the back buffer is copied to the front buffer, and still contains its old data. This is true of many hardware implementations. Setting this will speed up emulation of overlays, and widgets that can do partial update can take advantage of this as `damage()` will not be cleared to -1.

- `setenv GL_SWAP_TYPE NODAMAGE`

This indicates that nothing changes the back buffer except drawing into it. This is true of MESA and Win32 software emulation and perhaps some hardware emulation on systems with lots of memory.

- All other values for `GL_SWAP_TYPE`, and not setting the variable, cause FLTK to assume that the back buffer must be completely redrawn after a swap.

This is easily tested by running the [gl_overlay](#) demo program and seeing if the display is correct when you drag another window over it or if you drag the window off the screen and back on. You have to exit and run the program again for it to see any changes to the environment variable.

10.6 Using OpenGL Optimizer with FLTK

[OpenGL Optimizer](#) is a scene graph toolkit for OpenGL available from Silicon Graphics for IRIX and Microsoft Windows. It allows you to view large scenes without writing a lot of OpenGL code.

OptimizerWindow Class Definition

To use [OpenGL Optimizer](#) with FLTK you'll need to create a subclass of `Fl_Gl_Widget` that includes several state variables:

```
class OptimizerWindow : public Fl_Gl_Window {
  csContext *context_; // Initialized to 0 and set by draw()...
  csDrawAction *draw_action_; // Draw action...
  csGroup *scene_; // Scene to draw...
  csCamera *camera_; // Viewport for scene...
  void draw();
public:
  OptimizerWindow(int X, int Y, int W, int H, const char *L)
    : Fl_Gl_Window(X, Y, W, H, L) {
    context_ = (csContext *)0;
    draw_action_ = (csDrawAction *)0;
    scene_ = (csGroup *)0;
    camera_ = (csCamera *)0;
  }
  void scene(csGroup *g) { scene_ = g; redraw(); }
  void camera(csCamera *c) {
    camera_ = c;
    if (context_) {
      draw_action_->setCamera(camera_);
      camera_>draw(draw_action_);
      redraw();
    }
  }
};
```

The camera() Method

The `camera()` method sets the camera (projection and viewpoint) to use when drawing the scene. The scene is redrawn after this call.

The draw() Method

The `draw()` method performs the needed initialization and does the actual drawing:

```
void OptimizerWindow::draw() {
    if (!context_) {
        // This is the first time we've been asked to draw; create the
        // Optimizer context for the scene...
#ifdef WIN32
        context_ = new csContext((HDC)fl_getHDC());
        context_>ref();
        context_>makeCurrent((HDC)fl_getHDC());
#else
        context_ = new csContext(fl_display, fl_visual);
        context_>ref();
        context_>makeCurrent(fl_display, fl_window);
#endif // WIN32
        ... perform other context setup as desired ...
        // Then create the draw action to handle drawing things...
        draw_action_ = new csDrawAction;
        if (camera_) {
            draw_action_>setCamera(camera_);
            camera_>draw(draw_action_);
        }
    } else {
#ifdef WIN32
        context_>makeCurrent((HDC)fl_getHDC());
#else
        context_>makeCurrent(fl_display, fl_window);
#endif // WIN32
    }
    if (!valid()) {
        // Update the viewport for this context...
        context_>setViewport(0, 0, w(), h());
    }
    // Clear the window...
    context_>clear(csContext::COLOR_CLEAR | csContext::DEPTH_CLEAR,
                 0.0f,          // Red
                 0.0f,          // Green
                 0.0f,          // Blue
                 1.0f);         // Alpha
    // Then draw the scene (if any)...
    if (scene_)
        draw_action_>apply(scene_);
}
```

The scene() Method

The `scene()` method sets the scene to be drawn. The scene is a collection of 3D objects in a `csGroup`. The scene is redrawn after this call.

10.7 Using OpenGL 3.0 (or higher versions)

The examples subdirectory contains `OpenGL3test.cxx`, a toy program showing how to use OpenGL 3.0 (or higher versions) with FLTK in a cross-platform fashion. It contains also `OpenGL3-glut-test.cxx` which shows how to use FLTK's GLUT compatibility and OpenGL 3.

To access OpenGL 3.0 (or higher versions), use the `FL_OPENGL3` flag when calling `FL_Gl_Window::mode(int a)` or `glutInitDisplayMode()`.

On the Windows and Unix/Linux platforms, FLTK creates contexts implementing the highest OpenGL version supported by the hardware. Such contexts may also be compatible with lower OpenGL versions. Access to functions from OpenGL versions above 1.1 requires to load function pointers at runtime on these platforms. FLTK recommends to use the GLEW library to perform this. It is therefore necessary to install the GLEW library (see below).

On the macOS platform, MacOS 10.7 or above is required; GLEW is possible but not necessary. FLTK creates contexts for OpenGL versions 1 and 2 without the `FL_OPENGL3` flag and for OpenGL versions 3.2 and above with it.

GLEW installation (Unix/Linux and MSWindows platforms)

GLEW is available as a package for most Linux distributions and in source form at <http://glew.sourceforge.net/>. For the MSWindows platform, a Visual Studio static library (`glew32.lib`) can be downloaded from the same web site; a MinGW-style static library (`libglew32.a`) can be built from source with the make command.

Source-level changes for OpenGL 3:

- Put this in all OpenGL-using source files (instead of `#include <FL/gl.h>`, and before `#include <FL/glut.h>` if you use GLUT):

```
#if defined(__APPLE__)
#   include <OpenGL/gl3.h> // defines OpenGL 3.0+ functions
#else
#   if defined(WIN32)
#       define GLEW_STATIC 1
#   endif
#   include <GL/glew.h>
#endif
```

- Add the `FL_OPENGL3` flag when calling `FL_Gl_Window::mode(int a)` or `glutInitDisplayMode()`.
- Put this in the `handle(int event)` member function of the first to be created among your `FL_Gl_Window`-derived classes:

```
#ifndef __APPLE__
    static int first = 1;
    if (first && event == FL_SHOW && shown()) {
        first = 0;
        make_current();
        glewInit(); // defines pters to functions of OpenGL V 1.2 and above
    }
#endif
```

- Alternatively, if you use GLUT, put

```
#ifndef __APPLE__
    glewInit(); // defines pters to functions of OpenGL V 1.2 and above
#endif
```

after the first `glutCreateWindow()` call.

If GLEW is installed on the Mac OS development platform, it is possible to use the same code for all platforms, with one exception: put

```
#ifndef __APPLE__
    glewExperimental = GL_TRUE;
#endif
```

before the `glewInit()` call.

Changes in the build process

Link with `libGLEW.so` (on Unix/Linux), `libglew32.a` (with MinGW) or `glew32.lib` (with MS Visual Studio); no change is needed on the Mac OS platform.

Chapter 11

Programming with FLUID

This chapter shows how to use the Fast Light User-Interface Designer ("FLUID") to create your GUIs.

Subchapters:

- [What is FLUID?](#)
- [Running FLUID Under UNIX](#)
- [Running FLUID Under Microsoft Windows](#)
- [Compiling .fl files](#)
- [A Short Tutorial](#)
- [FLUID Reference](#)
- [Internationalization with FLUID](#)
- [Known limitations](#)

11.1 What is FLUID?

The Fast Light User Interface Designer, or FLUID, is a graphical editor that is used to produce FLTK source code. FLUID edits and saves its state in `.fl` files. These files are text, and you can (with care) edit them in a text editor, perhaps to get some special effects.

FLUID can "compile" the `.fl` file into a `.cxx` and a `.h` file. The `.cxx` file defines all the objects from the `.fl` file and the `.h` file declares all the global ones. FLUID also supports localization ([Internationalization](#)) of label strings using message files and the GNU gettext or POSIX catgets interfaces.

A simple program can be made by putting all your code (including a `main()` function) into the `.fl` file and thus making the `.cxx` file a single source file to compile. Most programs are more complex than this, so you write other `.cxx` files that call the FLUID functions. These `.cxx` files must `#include` the `.h` file or they can `#include` the `.cxx` file so it still appears to be a single source file.

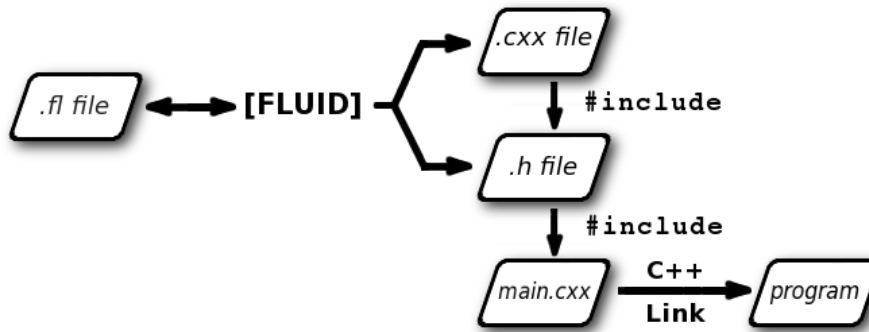


Figure 11.1 FLUID organization

Normally the FLUID file defines one or more functions or classes which output C++ code. Each function defines one or more FLTK windows, and all the widgets that go inside those windows.

Widgets created by FLUID are either "named", "complex named" or "unnamed". A named widget has a legal C++ variable identifier as its name (i.e. only alphanumeric and underscore). In this case FLUID defines a global variable or class member that will point at the widget after the function defining it is called. A complex named object has punctuation such as ' . ' or ' -> ' or any other symbols in its name. In this case FLUID assigns a pointer to the widget to the name, but does not attempt to declare it. This can be used to get the widgets into structures. An unnamed widget has a blank name and no pointer is stored.

Widgets may either call a named callback function that you write in another source file, or you can supply a small piece of C++ source and FLUID will write a private callback function into the .cxx file.

11.2 Running FLUID Under UNIX

To run FLUID under UNIX, type:

```
fluid filename.fl &
```

to edit the .fl file filename.fl. If the file does not exist you will get an error pop-up, but if you dismiss it you will be editing a blank file of that name. You can run FLUID without any name, in which case you will be editing an unnamed blank setup (but you can use save-as to write it to a file).

You can provide any of the standard FLTK switches before the filename:

```
-display host:n.n
-geometry WxH+X+Y
-title windowtitle
-name classname
-iconic
-fg color
-bg color
-bg2 color
-scheme schemename
```

Changing the colors may be useful to see what your interface will look at if the user calls it with the same switches. Similarly, using "-scheme plastic" will show how the interface will look using the "plastic" scheme.

In the current version, if you don't put FLUID into the background with ' & ' then you will be able to abort FLUID by typing CTRL-C on the terminal. It will exit immediately, losing any changes.

11.3 Running FLUID Under Microsoft Windows

To run FLUID under WIN32, double-click on the *FLUID.exe* file. You can also run FLUID from the Command Prompt window. FLUID always runs in the background under WIN32.

11.4 Compiling .fl files

FLUID can also be called as a command-line "compiler" to create the .cxx and .h file from a .fl file. To do this type:

```
fluid -c filename.fl
```

This is the same as the menu 'File/Write Code...'. It will read the `filename.fl` file and write `filename.cxx` and `filename.h`. Any leading directory on `filename.fl` will be stripped, so they are always written to the current directory. If there are any errors reading or writing the files, FLUID will print the error and exit with a non-zero code. You can use the following lines in a makefile to automate the creation of the source and header files:

```
my_panels.h my_panels.cxx: my_panels.fl
    fluid -c my_panels.fl
```

Most versions of make support rules that cause .fl files to be compiled:

```
.SUFFIXES: .fl .cxx .h
.fl.h .fl.cxx:
    fluid -c $<
```

If you use

```
fluid -cs filename.fl
```

FLUID will also write the "strings" for internationalization in file 'filename.txt' (menu: 'File/Write Strings...').

Finally there is another option which is useful for program developers who have many .fl files and want to upgrade them to the current FLUID version. FLUID will read the `filename.fl` file, save it, and exit immediately. This writes the file with current syntax and options and the current FLTK version in the header of the file. Use

```
fluid -u filename.fl
```

to 'upgrade' `filename.fl`. You may combine this with '-c' or '-cs'.

Note

All these commands overwrite existing files w/o warning. You should particularly take care when running 'fluid -u' since this overwrites the original .fl source file.

11.5 A Short Tutorial

FLUID is an amazingly powerful little program. However, this power comes at a price as it is not always obvious how to accomplish seemingly simple tasks with it. This tutorial will show you how to generate a complete user interface class with FLUID that is used for the CubeView program provided with FLTK.

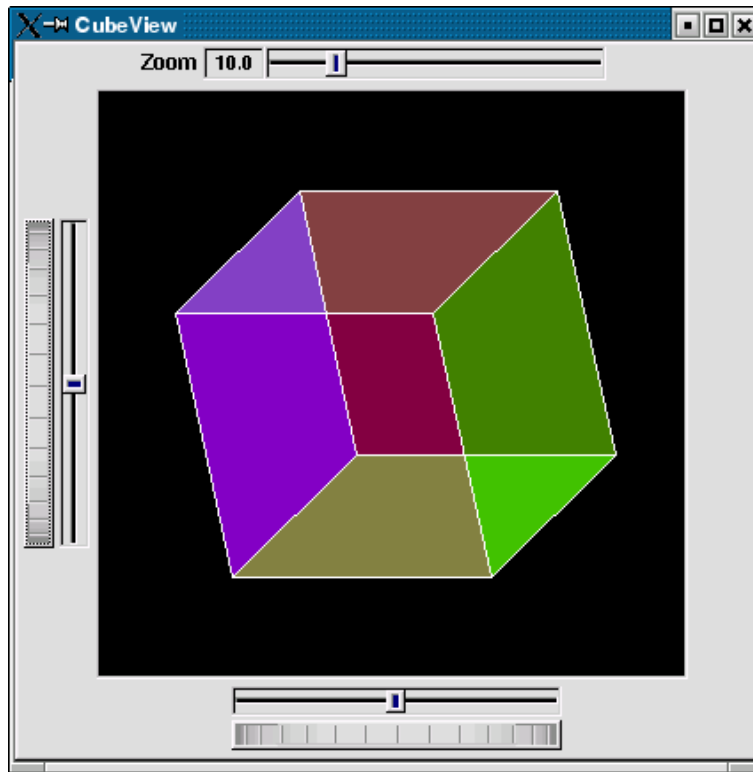


Figure 11.2 CubeView demo

The window is of class `CubeViewUI`, and is completely generated by FLUID, including class member functions. The central display of the cube is a separate subclass of `FI_GI_Window` called `CubeView`. `CubeViewUI` manages `CubeView` using callbacks from the various sliders and rollers to manipulate the viewing angle and zoom of `CubeView`.

At the completion of this tutorial you will (hopefully) understand how to:

1. Use FLUID to create a complete user interface class, including constructor and any member functions necessary.
2. Use FLUID to set callbacks member functions of a custom widget classes.
3. Subclass an `FI_GI_Window` to suit your purposes.

11.5.1 The CubeView Class

The `CubeView` class is a subclass of `FI_GI_Window`. It has methods for setting the zoom, the x and y pan, and the rotation angle about the x and y axes.

You can safely skip this section as long as you realize that `CubeView` is a subclass of `FI_GI_Window` and will respond to calls from `CubeViewUI`, generated by FLUID.

The CubeView Class Definition

Here is the CubeView class definition, as given by its header file "test/CubeView.h":

```
class CubeView : public Fl_Gl_Window {
public:
    CubeView(int x,int y,int w,int h,const char *l=0);
    // this value determines the scaling factor used to draw the cube.
    double size;
    /* Set the rotation about the vertical ( y ) axis.
     *
     * This function is called by the horizontal roller in CubeViewUI
     * and the initialize button in CubeViewUI.
     */
    void v_angle(float angle){vAng=angle;};
    // Return the rotation about the vertical ( y ) axis.
    float v_angle(){return vAng;};
    /* Set the rotation about the horizontal ( x ) axis.
     *
     * This function is called by the vertical roller in CubeViewUI
     * and the
     * initialize button in CubeViewUI.
     */
    void h_angle(float angle){hAng=angle;};
    // the rotation about the horizontal ( x ) axis.
    float h_angle(){return hAng;};
    /* Sets the x shift of the cube view camera.
     *
     * This function is called by the slider in CubeViewUI and the
     * initialize button in CubeViewUI.
     */
    void panx(float x){xshift=x;};
    /* Sets the y shift of the cube view camera.
     *
     * This function is called by the slider in CubeViewUI and the
     * initialize button in CubeViewUI.
     */
    void pany(float y){yshift=y;};
    /* The widget class draw() override.
     * The draw() function initialize Gl for another round of
     * drawing then calls specialized functions for drawing each
     * of the entities displayed in the cube view.
     */
    void draw();
private:
    /* Draw the cube boundaries
     * Draw the faces of the cube using the boxv[] vertices, using
     * GL_LINE_LOOP for the faces. The color is #defined by
     * CUBECOLOR.
     */
    void drawCube();

    float vAng,hAng; float xshift,yshift;
    float boxv0[3];float boxv1[3]; float boxv2[3];float boxv3[3];
    float boxv4[3];float boxv5[3]; float boxv6[3];float boxv7[3];
};
```

The CubeView Class Implementation

Here is the CubeView implementation. It is very similar to the "cube" demo included with FLTK.

```
#include "CubeView.h"
#include <math.h>
CubeView::CubeView(int x,int y,int w,int h,const char *l)
    : Fl_Gl_Window(x,y,w,h,l)
{
    vAng = 0.0; hAng=0.0; size=10.0;
    /* The cube definition. These are the vertices of a unit cube
     * centered on the origin.*/
    boxv0[0] = -0.5; boxv0[1] = -0.5; boxv0[2] = -0.5; boxv1[0] = 0.5;
    boxv1[1] = -0.5; boxv1[2] = -0.5; boxv2[0] = 0.5; boxv2[1] = 0.5;
    boxv2[2] = -0.5; boxv3[0] = -0.5; boxv3[1] = 0.5; boxv3[2] = -0.5;
    boxv4[0] = -0.5; boxv4[1] = -0.5; boxv4[2] = 0.5; boxv5[0] = 0.5;
    boxv5[1] = -0.5; boxv5[2] = 0.5; boxv6[0] = 0.5; boxv6[1] = 0.5;
    boxv6[2] = 0.5; boxv7[0] = -0.5; boxv7[1] = 0.5; boxv7[2] = 0.5;
};
// The color used for the edges of the bounding cube.
#define CUBECOLOR 255,255,255,255
void CubeView::drawCube() {
```

```

/* Draw a colored cube */
#define ALPHA 0.5
glShadeModel(GL_FLAT);
glBegin(GL_QUADS);
    glColor4f(0.0, 0.0, 1.0, ALPHA);
    glVertex3fv(boxv0);
    glVertex3fv(boxv1);
    glVertex3fv(boxv2);
    glVertex3fv(boxv3);
    glColor4f(1.0, 1.0, 0.0, ALPHA);
    glVertex3fv(boxv0);
    glVertex3fv(boxv4);
    glVertex3fv(boxv5);
    glVertex3fv(boxv1);
    glVertex3fv(boxv2);
    glColor4f(0.0, 1.0, 1.0, ALPHA);
    glVertex3fv(boxv2);
    glVertex3fv(boxv6);
    glVertex3fv(boxv7);
    glVertex3fv(boxv3);
    glColor4f(1.0, 0.0, 0.0, ALPHA);
    glVertex3fv(boxv4);
    glVertex3fv(boxv5);
    glVertex3fv(boxv6);
    glVertex3fv(boxv7);
    glColor4f(1.0, 0.0, 1.0, ALPHA);
    glVertex3fv(boxv0);
    glVertex3fv(boxv3);
    glVertex3fv(boxv7);
    glVertex3fv(boxv4);
    glColor4f(0.0, 1.0, 0.0, ALPHA);
    glVertex3fv(boxv1);
    glVertex3fv(boxv5);
    glVertex3fv(boxv6);
    glVertex3fv(boxv2);
glEnd();
glColor3f(1.0, 1.0, 1.0);
glBegin(GL_LINES);
    glVertex3fv(boxv0);
    glVertex3fv(boxv1);
    glVertex3fv(boxv1);
    glVertex3fv(boxv2);
    glVertex3fv(boxv2);
    glVertex3fv(boxv3);
    glVertex3fv(boxv3);
    glVertex3fv(boxv0);
    glVertex3fv(boxv4);
    glVertex3fv(boxv5);
    glVertex3fv(boxv5);
    glVertex3fv(boxv6);
    glVertex3fv(boxv6);
    glVertex3fv(boxv7);
    glVertex3fv(boxv7);
    glVertex3fv(boxv4);
    glVertex3fv(boxv0);
    glVertex3fv(boxv4);
    glVertex3fv(boxv1);
    glVertex3fv(boxv5);
    glVertex3fv(boxv2);
    glVertex3fv(boxv6);
    glVertex3fv(boxv3);
    glVertex3fv(boxv7);
glEnd();
}; //drawCube
void CubeView::draw() {
    if (!valid()) {
        glLoadIdentity(); glViewport(0,0,w(),h());
        glOrtho(-10,10,-10,10,-20000,10000); glEnable(GL_BLEND);
        glBlendFunc(GL_SRC_ALPHA, GL_ONE_MINUS_SRC_ALPHA);
    }
    glClear(GL_COLOR_BUFFER_BIT | GL_DEPTH_BUFFER_BIT);
    glPushMatrix(); glTranslatef(xshift, yshift, 0);
    glRotatef(hAng,0,1,0); glRotatef(vAng,1,0,0);
    glScalef(float(size),float(size),float(size)); drawCube();
    glPopMatrix();
};

```

11.5.2 The CubeViewUI Class

We will completely construct a window to display and control the CubeView defined in the previous section using FLUID.

Defining the CubeViewUI Class

Once you have started FLUID, the first step in defining a class is to create a new class within FLUID using the **New->Code->Class** menu item. Name the class "CubeViewUI" and leave the subclass blank. We do not need any inheritance for this window. You should see the new class declaration in the FLUID browser window.

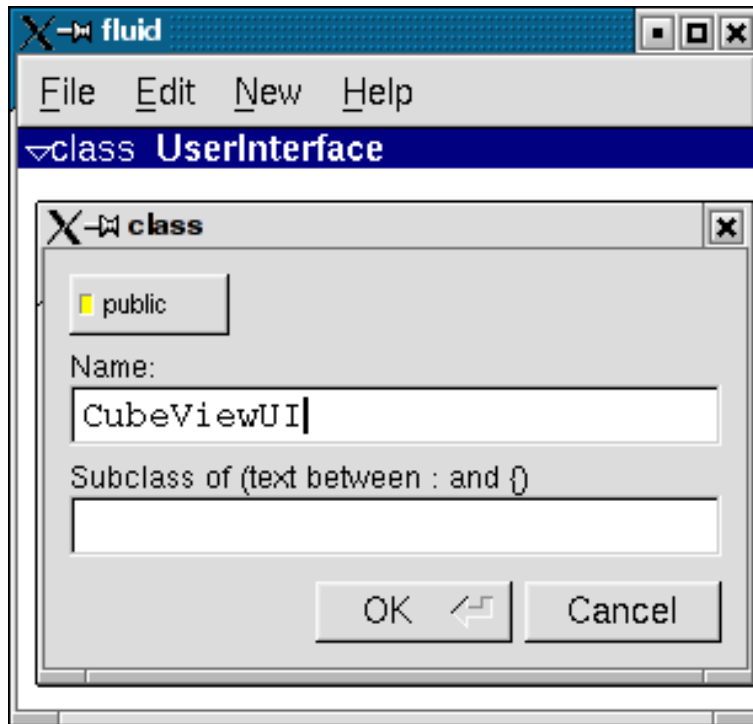


Figure 11.3 FLUID file for CubeView

Adding the Class Constructor

Click on the CubeViewUI class in the FLUID window and add a new method by selecting **New->Code->Function/Method**. The name of the function will also be CubeViewUI. FLUID will understand that this will be the constructor for the class and will generate the appropriate code. Make sure you declare the constructor public.

Then add a window to the CubeViewUI class. Highlight the name of the constructor in the FLUID browser window and click on **New->Group->Window**. In a similar manner add the following to the CubeViewUI constructor:

- A horizontal roller named `hrot`
- A vertical roller named `vrot`
- A horizontal slider named `xpan`
- A vertical slider named `ypan`
- A horizontal value slider named `zoom`

None of these additions need be public. And they shouldn't be unless you plan to expose them as part of the interface for CubeViewUI.

When you are finished you should have something like this:

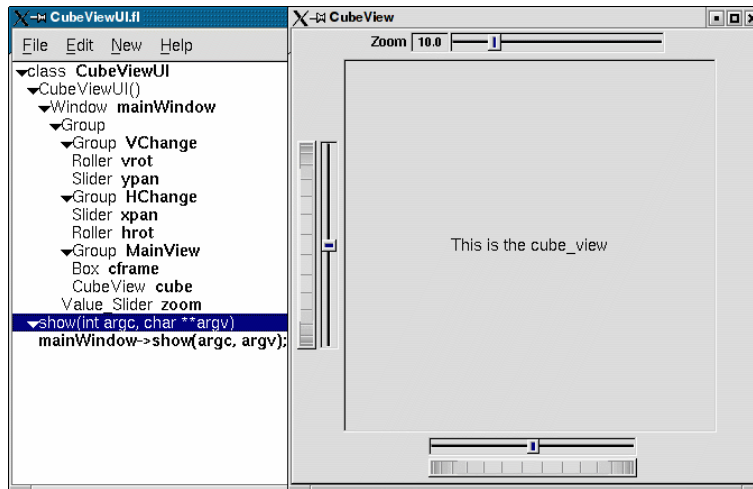


Figure 11.4 FLUID window containing CubeView demo

We will talk about the `show()` method that is highlighted shortly.

Adding the CubeView Widget

What we have is nice, but does little to show our cube. We have already defined the `CubeView` class and we would like to show it within the `CubeViewUI`.

The `CubeView` class inherits the `FI_GI_Window` class, which is created in the same way as a `FI_Box` widget. Use **New->Other->Box** to add a square box to the main window. This will be no ordinary box, however.

The Box properties window will appear. The key to letting `CubeViewUI` display `CubeView` is to enter `CubeView` in the **Class:** text entry box. This tells FLUID that it is not an `FI_Box`, but a similar widget with the same constructor.

In the **Extra Code:** field enter `#include "CubeView.h"`

This `#include` is important, as we have just included `CubeView` as a member of `CubeViewUI`, so any public `CubeView` methods are now available to `CubeViewUI`.

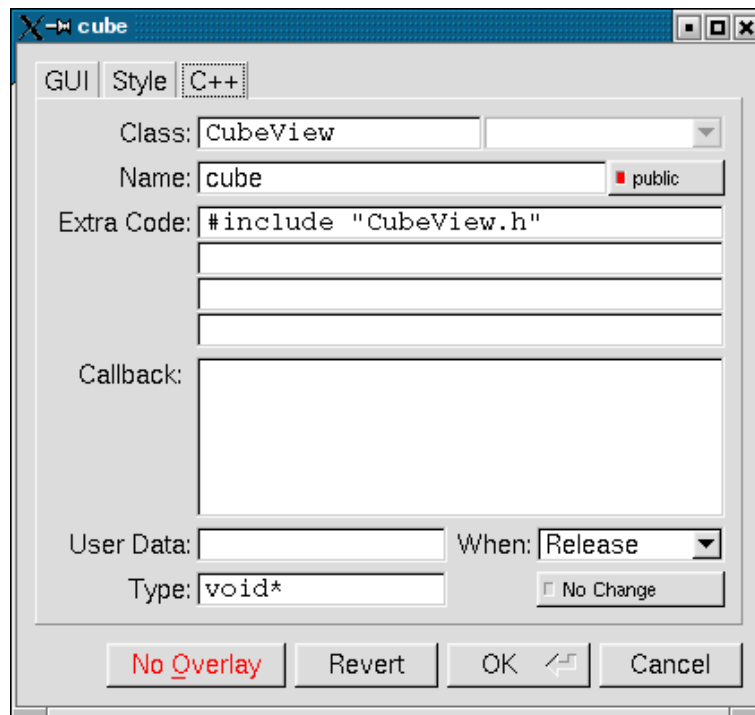


Figure 11.5 CubeView methods

Defining the Callbacks

Each of the widgets we defined before adding CubeView can have callbacks that call CubeView methods. You can call an external function or put in a short amount of code in the **Callback** field of the widget panel. For example, the callback for the `ypan` slider is:

```
cube->pany(((Fl_Slider *)o)->value());
cube->redraw();
```

We call `cube->redraw()` after changing the value to update the CubeView window. CubeView could easily be modified to do this, but it is nice to keep this exposed. In the case where you may want to do more than one view change only redrawing once saves a lot of time.

There is no reason to wait until after you have added CubeView to enter these callbacks. FLUID assumes you are smart enough not to refer to members or functions that don't exist.

Adding a Class Method

You can add class methods within FLUID that have nothing to do with the GUI. As an example add a `show` function so that CubeViewUI can actually appear on the screen.

Make sure the top level CubeViewUI is selected and select **New->Code->Function/Method**. Just use the name `show()`. We don't need a return value here, and since we will not be adding any widgets to this method FLUID will assign it a return type of `void`.

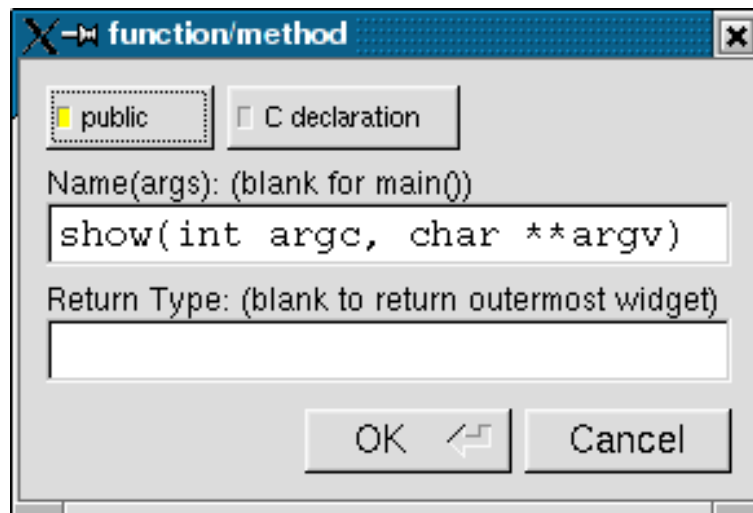


Figure 11.6 CubeView constructor

Once the new method has been added, highlight its name and select **New->Code->Code**. Enter the method's code in the code window.

11.5.3 Adding Constructor Initialization Code

If you need to add code to initialize a class, for example setting initial values of the horizontal and vertical angles in the CubeView, you can simply highlight the constructor and select **New->Code->Code**. Add any required code.

11.5.4 Generating the Code

Now that we have completely defined the CubeViewUI, we have to generate the code. There is one last trick to ensure this all works. Open the preferences dialog from **Edit->Preferences**.

At the bottom of the preferences dialog box is the key: **"Include Header from Code"**. Select that option and set your desired file extensions and you are in business. You can include the CubeViewUI.h (or whatever extension you prefer) as you would any other C++ class.

11.6 FLUID Reference

The following sections describe each of the windows in FLUID.

11.6.1 The Widget Browser

The main window shows a menu bar and a scrolling browser of all the defined widgets. The name of the `.fl` file being edited is shown in the window title.

The widgets are stored in a hierarchy. You can open and close a level by clicking the "triangle" at the left of a widget. The leftmost widgets are the *parents*, and all the widgets listed below them are their *children*. Parents don't have to have any children.

The top level of the hierarchy is composed of *functions* and *classes*. Each of these will produce a single C++ public function or class in the output `.cxx` file. Calling the function or instantiating the class will create all of the child widgets.

The second level of the hierarchy contains the *windows*. Each of these produces an instance of class `FI_Window`.

Below that are either *widgets* (subclasses of `FI_Widget`) or *groups* of widgets (including other groups). Plain groups are for layout, navigation, and resize purposes. *Tab groups* provide the well-known file-card tab interface.

Widgets are shown in the browser by either their *name* (such as "main_panel" in the example), or by their *type* and *label* (such as "Button "the green"").

You *select* widgets by clicking on their names, which highlights them (you can also select widgets from any displayed window). You can select many widgets by dragging the mouse across them, or by using Shift+Click to toggle them on and off. To select no widgets, click in the blank area under the last widget. Note that hidden children may be selected even when there is no visual indication of this.

You *open* widgets by double-clicking on them, or (to open several widgets you have picked) by typing the F1 key. A control panel will appear so you can change the widget(s).

11.6.2 Menu Items

The menu bar at the top is duplicated as a pop-up menu on any displayed window. The shortcuts for all the menu items work in any window. The menu items are:

File/Open... (Ctrl+o)

Discards the current editing session and reads in a different `.fl` file. You are asked for confirmation if you have changed the current file.

FLUID can also read `.fd` files produced by the Forms and XForms "fdesign" programs. It is best to File/↔ Merge them instead of opening them. FLUID does not understand everything in a `.fd` file, and will print a warning message on the controlling terminal for all data it does not understand. You will probably need to edit the resulting setup to fix these errors. Be careful not to save the file without changing the name, as FLUID will write over the `.fd` file with its own format, which fdesign cannot read!

File/Insert... (Ctrl+i)

Inserts the contents of another `.fl` file, without changing the name of the current `.fl` file. All the functions (even if they have the same names as the current ones) are added, and you will have to use cut/paste to put the widgets where you want.

File/Save (Ctrl+s)

Writes the current data to the `.fl` file. If the file is unnamed then FLUID will ask for a filename.

File/Save As... (Ctrl+Shift+S)

Asks for a new filename and saves the file.

File/Write Code (Ctrl+Shift+C)

"Compiles" the data into a `.cxx` and `.h` file. These are exactly the same as the files you get when you run FLUID with the `-c` switch.

The output file names are the same as the `.fl` file, with the leading directory and trailing ".fl" stripped, and ".h" or ".cxx" appended.

File/Write Strings (Ctrl+Shift+W)

Writes a message file for all of the text labels defined in the current file.

The output file name is the same as the `.fl` file, with the leading directory and trailing ".fl" stripped, and ".txt", ".po", or ".msg" appended depending on the [Internationalization Mode](#).

File/Quit (Ctrl+q)

Exits FLUID. You are asked for confirmation if you have changed the current file.

Edit/Undo (Ctrl+z)

This isn't implemented yet. You should do save often so you can recover from any mistakes you make.

Edit/Cut (Ctrl+x)

Deletes the selected widgets and all of their children. These are saved to a "clipboard" file and can be pasted back into any FLUID window.

Edit/Copy (Ctrl+c)

Copies the selected widgets and all of their children to the "clipboard" file.

Edit/Paste (Ctrl+v)

Pastes the widgets from the clipboard file.

If the widget is a window, it is added to whatever function is selected, or contained in the current selection.

If the widget is a normal widget, it is added to whatever window or group is selected. If none is, it is added to the window or group that is the parent of the current selection.

To avoid confusion, it is best to select exactly one widget before doing a paste.

Cut/paste is the only way to change the parent of a widget.

Edit/Select All (Ctrl+a)

Selects all widgets in the same group as the current selection.

If they are all selected already then this selects all widgets in that group's parent. Repeatedly typing Ctrl+a will select larger and larger groups of widgets until everything is selected.

Edit/Open... (F1 or double click)

Displays the current widget in the attributes panel. If the widget is a window and it is not visible then the window is shown instead.

Edit/Sort

Sorts the selected widgets into left to right, top to bottom order. You need to do this to make navigation keys in FLTK work correctly. You may then fine-tune the sorting with "Earlier" and "Later". This does not affect the positions of windows or functions.

Edit/Earlier (F2)

Moves all of the selected widgets one earlier in order among the children of their parent (if possible). This will affect navigation order, and if the widgets overlap it will affect how they draw, as the later widget is drawn on top of the earlier one. You can also use this to reorder functions, classes, and windows within functions.

Edit/Later (F3)

Moves all of the selected widgets one later in order among the children of their parent (if possible).

Edit/Group (F7)

Creates a new [FL_Group](#) and make all the currently selected widgets children of it.

Edit/Ungroup (F8)

Deletes the parent group if all the children of a group are selected.

Edit/Overlays on/off (Ctrl+Shift+O)

Toggles the display of the red overlays off, without changing the selection. This makes it easier to see box borders and how the layout looks. The overlays will be forced back on if you change the selection.

Edit/Project Settings... (Alt+p)

Displays the project settings panel.

Under the "Output" tab you control the extensions or names of the files that are generated by FLUID. If you check the "Include Header from Code" button the code file will include the header file automatically.

Under the "Internationalization" tab are the [internationalization](#) options, described later in this chapter.

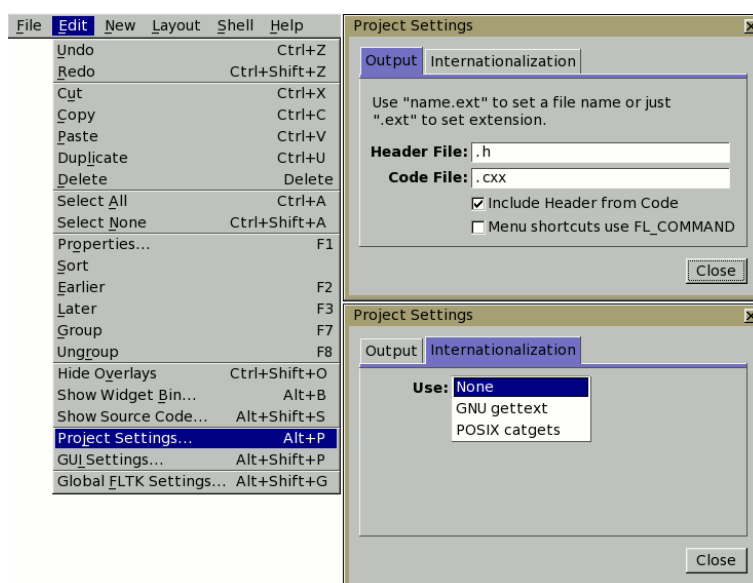


Figure 11.7 FLUID Project Settings Window

Edit/GUI Settings... (Shift+Alt+p)

Displays the GUI Settings panel, used to control the user interface settings.

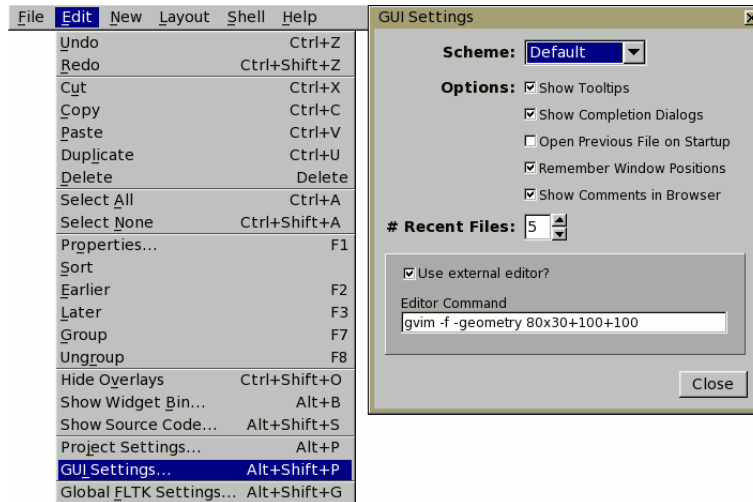


Figure 11.8 FLUID GUI Settings Window

Edit/Global FLTK Settings... (Shift+Alt+g)

Displays the FLTK Global Settings ("Preferences") panel, used to control fluid's user specific and/or system wide settings.

Tooltips provide descriptions of each option.

At the lower-right, "User Settings" causes changes to only affect the current user, "System Settings" causes changes to be applied to all users on the current machine.

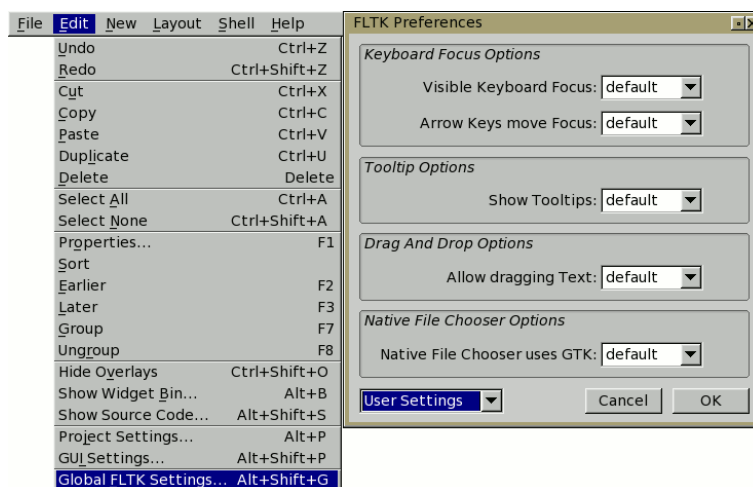


Figure 11.9 FLUID Global Settings Window

New/Code/Function

Creates a new C function. You will be asked for a name for the function. This name should be a legal C++ function template, without the return type. You can pass arguments which can be referred to by code you type into the individual widgets.

If the function contains any unnamed windows, it will be declared as returning a [Fl_Window](#) pointer. The unnamed window will be returned from it (more than one unnamed window is useless). If the function contains only named windows, it will be declared as returning nothing (`void`).

It is possible to make the `.cxx` output be a self-contained program that can be compiled and executed. This is done by deleting the function name so `main(argc, argv)` is used. The function will call `show()` on all the windows it creates and then call `Fl::run()`. This can also be used to test resize behavior or other parts of the user interface.

You can change the function name by double-clicking on the function.

New/Window

Creates a new [Fl_Window](#) widget. The window is added to the currently selected function, or to the function containing the currently selected item. The window will appear, sized to 100x100. You can resize it to whatever size you require.

The widget panel will also appear and is described later in this chapter.

New/...

All other items on the New menu are subclasses of [Fl_Widget](#). Creating them will add them to the currently selected group or window, or the group or window containing the currently selected widget. The initial dimensions and position are chosen by copying the current widget, if possible.

When you create the widget you will get the widget's control panel, which is described later in this chapter.

Layout/Align/...

Align all selected widgets to the first widget in the selection.

Layout/Space Evenly/...

Space all selected widgets evenly inside the selected space. Widgets will be sorted from first to last.

Layout/Make Same Size/...

Make all selected widgets the same size as the first selected widget.

Layout/Center in Group/...

Center all selected widgets relative to their parent widget

Layout/Grid and Size Settings... (Ctrl+g)

Displays the grid settings panel.

This panel controls the grid that all widgets snap to when you move and resize them, and for the "snap" which is how far a widget has to be dragged from its original position to actually change.

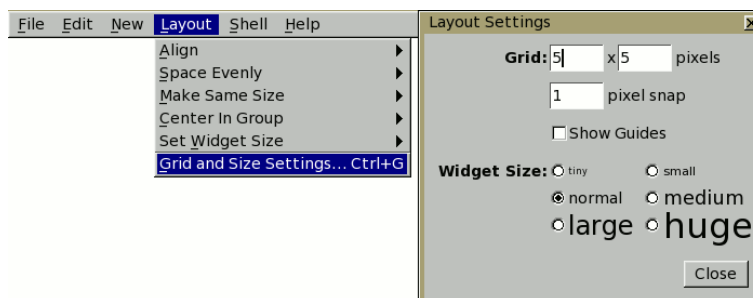


Figure 11.10 FLUID Layout/Grid Settings Window

Shell/Execute Command... (Alt+x)

Displays the shell command panel. The shell command is commonly used to run a 'make' script to compile the FLTK output.

Shell/Execute Again (Alt+g)

Run the shell command again.

Help/About FLUID

Pops up a panel showing the version of FLUID.

Help/On FLUID

Shows this chapter of the manual.

Help/Manual

Shows the contents page of the manual

11.6.3 The Widget Panel

When you double-click on a widget or a set of widgets you will get the "widget attribute panel".

When you change attributes using this panel, the changes are reflected immediately in the window. It is useful to hit the "no overlay" button (or type Ctrl+Shift+O) to hide the red overlay so you can see the widgets more accurately, especially when setting the box type.

If you have several widgets selected, they may have different values for the fields. In this case the value for *one* of the widgets is shown. But if you change this value, *all* of the selected widgets are changed to the new value.

Hitting "OK" makes the changes permanent. Selecting a different widget also makes the changes permanent. FLUID checks for simple syntax errors such as mismatched parenthesis in any code before saving any text.

"Revert" or "Cancel" put everything back to when you last brought up the panel or hit OK. However in the current version of FLUID, changes to "visible" attributes (such as the color, label, box) are not undone by revert or cancel. Changes to code like the callbacks are undone, however.

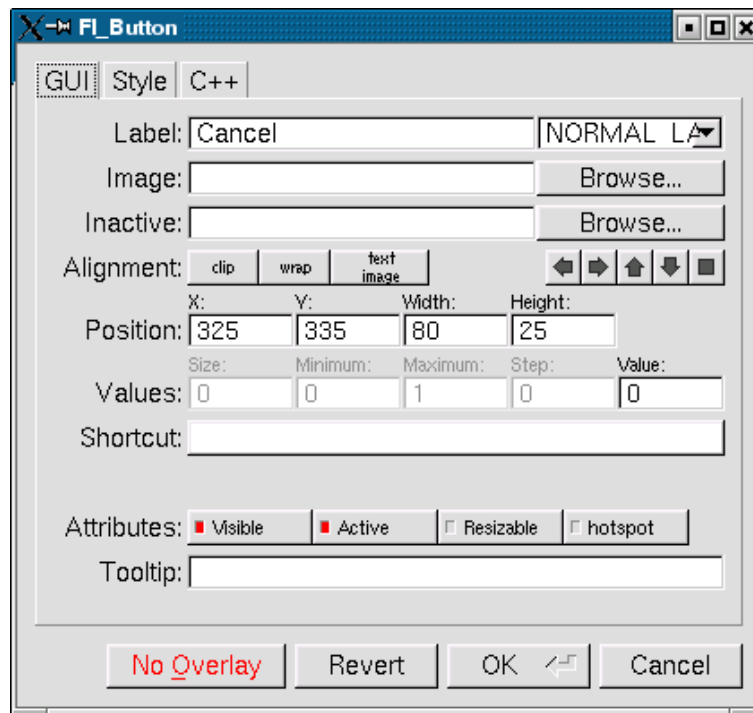


Figure 11.11 The FLUID widget GUI attributes

11.7 GUI Attributes

Label (text field)

String to print next to or inside the button. You can put newlines into the string to make multiple lines. The easiest way is by typing Ctrl+j.

[Symbols](#) can be added to the label using the at sign ("@").

Label (pull down menu)

How to draw the label. Normal, shadowed, engraved, and embossed change the appearance of the text.

Image

The active image for the widget. Click on the **Browse...** button to pick an image file using the file chooser.

Inactive

The inactive image for the widget. Click on the **Browse...** button to pick an image file using the file chooser.

Alignment (buttons)

Where to draw the label. The arrows put it on that side of the widget, you can combine them to put it in the corner. The "box" button puts the label inside the widget, rather than outside.

The **clip** button clips the label to the widget box, the **wrap** button wraps any text in the label, and the **text image** button puts the text over the image instead of under the image.

Position (text fields)

The position fields show the current position and size of the widget box. Enter new values to move and/or resize a widget.

Values (text fields)

The values and limits of the current widget. Depending on the type of widget, some or all of these fields may be inactive.

Shortcut

The shortcut key to activate the widget. Click on the shortcut button and press any key sequence to set the shortcut.

Attributes (buttons)

The **Visible** button controls whether the widget is visible (on) or hidden (off) initially. Don't change this for windows or for the immediate children of a Tabs group.

The **Active** button controls whether the widget is activated (on) or deactivated (off) initially. Most widgets appear greyed out when deactivated.

The **Resizable** button controls whether the window is resizable. In addition all the size changes of a window or group will go "into" the resizable child. If you have a large data display surrounded by buttons, you probably want that data area to be resizable. You can get more complex behavior by making invisible boxes the resizable widget, or by using hierarchies of groups. Unfortunately the only way to test it is to compile the program. Resizing the FLUID window is *not* the same as what will happen in the user program.

The **Hotspot** button causes the parent window to be positioned with that widget centered on the mouse. This position is determined *when the FLUID function is called*, so you should call it immediately before showing the window. If you want the window to hide and then reappear at a new position, you should have your program set the hotspot itself just before `show()`.

The **Border** button turns the window manager border on or off. On most window managers you will have to close the window and reopen it to see the effect.

X Class (text field)

The string typed into here is passed to the X window manager as the class. This can change the icon or window decorations. On most (all?) window managers you will have to close the window and reopen it to see the effect.

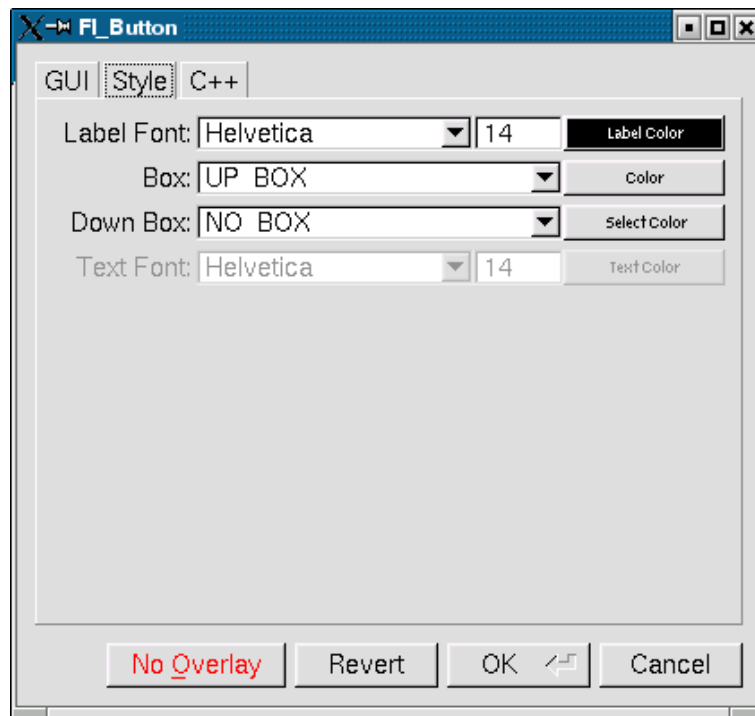


Figure 11.12 The FLUID widget Style attributes

11.7.1 Style Attributes

Label Font (pulldown menu)

Font to draw the label in. Ignored by symbols, bitmaps, and pixmaps. Your program can change the actual font used by these "slots" in case you want some font other than the 16 provided.

Label Size (pulldown menu)

Pixel size (height) for the font to draw the label in. Ignored by symbols, bitmaps, and pixmaps. To see the result without dismissing the panel, type the new number and then Tab.

Label Color (button)

Color to draw the label. Ignored by pixmaps (bitmaps, however, do use this color as the foreground color).

Box (pulldown menu)

The boxtype to draw as a background for the widget.

Many widgets will work, and draw faster, with a "frame" instead of a "box". A frame does not draw the colored interior, leaving whatever was already there visible. Be careful, as FLUID may draw this ok but the real program may leave unwanted stuff inside the widget.

If a window is filled with child widgets, you can speed up redrawing by changing the window's box type to "NO_BOX". FLUID will display a checkerboard for any areas that are not colored in by boxes. Note that this checkerboard is not drawn by the resulting program. Instead random garbage will be displayed.

Down Box (pulldown menu)

The boxtype to draw when a button is pressed or for some parts of other widgets like scrollbars and valuator.

Color (button)

The color to draw the box with.

Select Color (button)

Some widgets will use this color for certain parts. FLUID does not always show the result of this: this is the color buttons draw in when pushed down, and the color of input fields when they have the focus.

Text Font, Size, and Color

Some widgets display text, such as input fields, pull-down menus, and browsers.

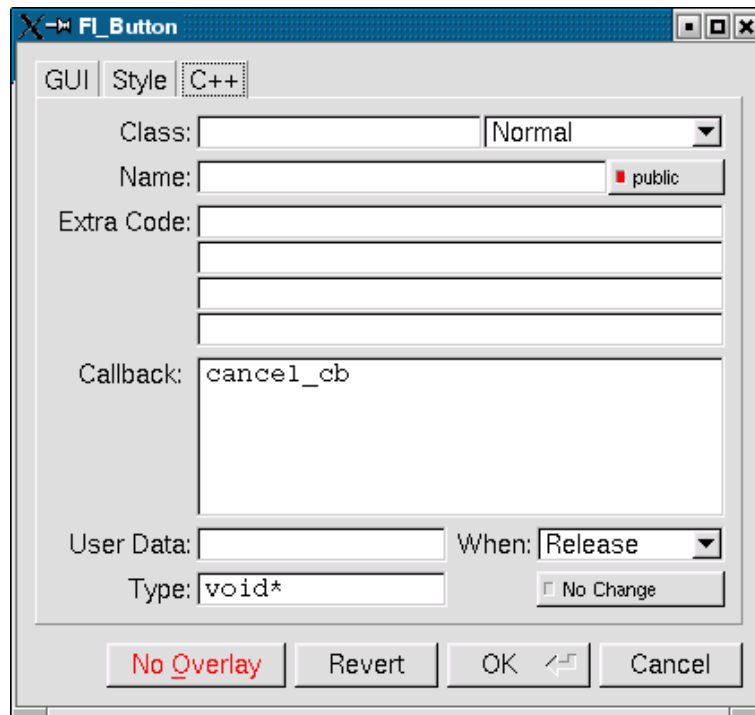


Figure 11.13 The FLUID widget C++ attributes

11.7.2 C++ Attributes

Class

This is how you use your own subclasses of `Fl_Widget`. Whatever identifier you type in here will be the class that is instantiated.

In addition, no `#include` header file is put in the `.h` file. You must provide a `#include` line as the first line of the "Extra Code" which declares your subclass.

The class must be similar to the class you are spoofing. It does not have to be a subclass. It is sometimes useful to change this to another FLTK class. Currently the only way to get a double-buffered window is to change this field for the window to "Fl_Double_Window" and to add

```
#include <FL/Fl_Double_Window.h>
```

to the extra code.

Type (upper-right pulldown menu)

Some classes have subtypes that modify their appearance or behavior. You pick the subtype off of this menu.

Name (text field)

Name of a variable to declare, and to store a pointer to this widget into. This variable will be of type "`<class>*`". If the name is blank then no variable is created.

You can name several widgets with "name[0]", "name[1]", "name[2]", etc. This will cause FLUID to declare an array of pointers. The array is big enough that the highest number found can be stored. All widgets in the array must be the same type.

Public (button)

Controls whether the widget is publicly accessible. When embedding widgets in a C++ class, this controls whether the widget is `public` or `private` in the class. Otherwise it controls whether the widget is declared `static` or `global` (`extern`).

Extra Code (text fields)

These four fields let you type in literal lines of code to dump into the `.h` or `.cxx` files.

If the text starts with a `#` or the word `extern` then FLUID thinks this is an "include" line, and it is written to the `.h` file. If the same include line occurs several times then only one copy is written.

All other lines are "code" lines. The current widget is pointed to by the local variable `o`. The window being constructed is pointed to by the local variable `w`. You can also access any arguments passed to the function here, and any named widgets that are before this one.

FLUID will check for matching parenthesis, braces, and quotes, but does not do much other error checking. Be careful here, as it may be hard to figure out what widget is producing an error in the compiler. If you need more than four lines you probably should call a function in your own `.cxx` code.

Callback (text field)

This can either be the name of a function, or a small snippet of code. If you enter anything other than letters, numbers, and the underscore then FLUID treats it as code.

A name refers to a function in your own code. It must be declared as `void name(<class>*, void*)`.

A code snippet is inserted into a static function in the `.cxx` output file. The function prototype is `void name(class *o, void *v)` so that you can refer to the widget as `o` and the `user_data()` as `v`. FLUID will check for matching parenthesis, braces, and quotes, but does not do much other error checking. Be careful here, as it may be hard to figure out what widget is producing an error in the compiler.

If the callback is blank then no callback is set.

User Data (text field)

This is a value for the `user_data()` of the widget. If blank the default value of zero is used. This can be any piece of C code that can be cast to a `void` pointer.

Type (text field)

The `void*` in the callback function prototypes is replaced with this. You may want to use `long` for old XForms code. Be warned that anything other than `void*` is not guaranteed to work! However on most architectures other pointer types are ok, and `long` is usually ok, too.

When (pulldown menu)

When to do the callback. This can be **Never**, **Changed**, **Release**, or **Enter Key**. The value of **Enter Key** is only useful for text input fields.

There are other rare but useful values for the `when()` field that are not in the menu. You should use the extra code fields to put these values in.

No Change (button)

The **No Change** button means the callback is done on the matching event even if the data is not changed.

11.8 Selecting and Moving Widgets

Double-clicking a window name in the browser will display it, if not displayed yet. From this display you can select widgets, sets of widgets, and move or resize them. To close a window either double-click it or type `ESC`.

To select a widget, click it. To select several widgets drag a rectangle around them. Holding down shift will toggle the selection of the widgets instead.

You cannot pick hidden widgets. You also cannot choose some widgets if they are completely overlapped by later widgets. Use the browser to select these widgets.

The selected widgets are shown with a red "overlay" line around them. You can move the widgets by dragging this box. Or you can resize them by dragging the outer edges and corners. Hold down the Alt key while dragging the mouse to defeat the snap-to-grid effect for fine positioning.

If there is a tab box displayed you can change which child is visible by clicking on the file tabs. The child you pick is selected.

The arrow, tab, and shift+tab keys "navigate" the selection. Left, right, tab, or shift+tab move to the next or previous widgets in the hierarchy. Hit the right arrow enough and you will select every widget in the window. Up/down widgets move to the previous/next widgets that overlap horizontally. If the navigation does not seem to work you probably need to "Sort" the widgets. This is important if you have input fields, as FLTK uses the same rules when using arrow keys to move between input fields.

To "open" a widget, double click it. To open several widgets select them and then type F1 or pick "Edit/Open" off the pop-up menu.

Type `Ctrl+o` to temporarily toggle the overlay off without changing the selection, so you can see the widget borders.

You can resize the window by using the window manager border controls. FLTK will attempt to round the window size to the nearest multiple of the grid size and makes it big enough to contain all the widgets (it does this using illegal X methods, so it is possible it will barf with some window managers!). Notice that the actual window in your program may not be resizable, and if it is, the effect on child widgets may be different.

The panel for the window (which you get by double-clicking it) is almost identical to the panel for any other [Fl_Widget](#). There are three extra items:

11.9 Image Labels

The *contents* of the image files in the **Image** and **Inactive** text fields are written to the `.cxx` file. If many widgets share the same image then only one copy is written. Since the image data is embedded in the generated source code, you need only distribute the C++ code and not the image files themselves.

However, the *filenames* are stored in the `.fl` file so you will need the image files as well to read the `.fl` file. Filenames are relative to the location of the `.fl` file and not necessarily the current directory. We recommend you either put the images in the same directory as the `.fl` file, or use absolute path names.

Notes for All Image Types

FLUID runs using the default visual of your X server. This may be 8 bits, which will give you dithered images. You may get better results in your actual program by adding the code "Fl::visual(FL_RGB)" to your code right before the first window is displayed.

All widgets with the same image on them share the same code and source X pixmap. Thus once you have put an image on a widget, it is nearly free to put the same image on many other widgets.

If you edit an image at the same time you are using it in FLUID, the only way to convince FLUID to read the image file again is to remove the image from all widgets that are using it or re-load the `.fl` file.

Don't rely on how FLTK crops images that are outside the widget, as this may change in future versions! The cropping of inside labels will probably be unchanged.

To more accurately place images, make a new "box" widget and put the image in that as the label.

XBM (X Bitmap) Files

FLUID reads X bitmap files which use C source code to define a bitmap. Sometimes they are stored with the ".h" or ".bm" extension rather than the standard ".xpm" extension.

FLUID writes code to construct an [Fl_Bitmap](#) image and use it to label the widget. The '1' bits in the bitmap are drawn using the label color of the widget. You can change this color in the FLUID widget attributes panel. The '0' bits are transparent.

The program "bitmap" on the X distribution does an adequate job of editing bitmaps.

XPM (X Pixmap) Files

FLUID reads X pixmap files as used by the `libxpm` library. These files use C source code to define a pixmap. The filenames usually have the ".xpm" extension.

FLUID writes code to construct an [FL_Pixmap](#) image and use it to label the widget. The label color of the widget is ignored, even for 2-color images that could be a bitmap. XPM files can mark a single color as being transparent, and FLTK uses this information to generate a transparency mask for the image.

We have not found any good editors for small iconic pictures. For pixmaps we have used [XPaint](#) and the KDE icon editor.

BMP Files

FLUID reads Windows BMP image files which are often used in WIN32 applications for icons. FLUID converts BMP files into (modified) XPM format and uses a [FL_BMP_Image](#) image to label the widget. Transparency is handled the same as for XPM files. All image data is uncompressed when written to the source file, so the code may be much bigger than the `.bmp` file.

GIF Files

FLUID reads GIF image files which are often used in HTML documents to make icons. FLUID converts GIF files into (modified) XPM format and uses a [FL_GIF_Image](#) image to label the widget. Transparency is handled the same as for XPM files. All image data is uncompressed when written to the source file, so the code may be much bigger than the `.gif` file. Only the first image of an animated GIF file is used.

JPEG Files

If FLTK is compiled with JPEG support, FLUID can read JPEG image files which are often used for digital photos. FLUID uses a [FL_JPEG_Image](#) image to label the widget, and writes uncompressed RGB or grayscale data to the source file.

PNG (Portable Network Graphics) Files

If FLTK is compiled with PNG support, FLUID can read PNG image files which are often used in HTML documents. FLUID uses a [FL_PNG_Image](#) image to label the widget, and writes uncompressed RGB or grayscale data to the source file. PNG images can provide a full alpha channel for partial transparency, and FLTK supports this as best as possible on each platform.

11.10 Internationalization with FLUID

FLUID supports internationalization (I18N for short) of label strings used by widgets. The preferences window (Ctrl+p) provides access to the I18N options.

11.10.1 I18N Methods

FLUID supports three methods of I18N: use none, use GNU gettext, and use POSIX catgets. The "use none" method is the default and just passes the label strings as-is to the widget constructors.

The "GNU gettext" method uses GNU gettext (or a similar text-based I18N library) to retrieve a localized string before calling the widget constructor.

The "POSIX catgets" method uses the POSIX catgets function to retrieve a numbered message from a message catalog before calling the widget constructor.

11.10.2 Using GNU gettext for I18N

FLUID's code support for GNU gettext is limited to calling a function or macro to retrieve the localized label; you still need to call `setlocale()` and `textdomain()` or `bindtextdomain()` to select the appropriate language and message file.

To use GNU gettext for I18N, open the preferences window and choose "GNU gettext" from the **Use:** chooser. Two new input fields will then appear to control the include file and function/macro name to use when retrieving the localized label strings.

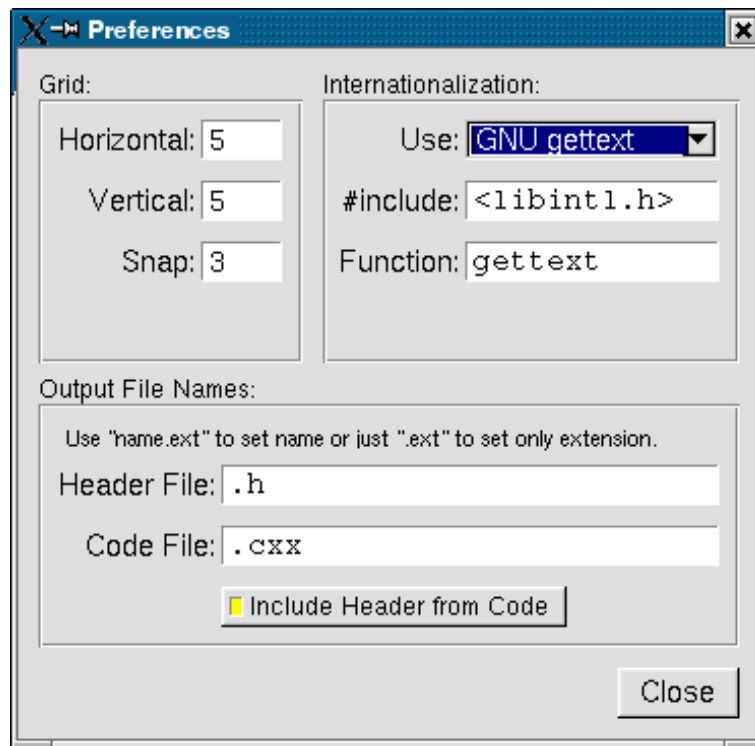


Figure 11.14 Internationalization using GNU gettext

The **#include** field controls the header file to include for I18N; by default this is `<libintl.h>`, the standard I18N file for GNU gettext.

The **Function:** field controls the function (or macro) that will retrieve the localized message; by default the `gettext` function will be called.

11.10.3 Using POSIX catgets for I18N

FLUID's code support for POSIX catgets allows you to use a global message file for all interfaces or a file specific to each `.fl` file; you still need to call `setlocale()` to select the appropriate language.

To use POSIX catgets for I18N, open the preferences window and choose "POSIX catgets" from the **Use:** chooser. Three new input fields will then appear to control the include file, catalog file, and set number for retrieving the localized label strings.

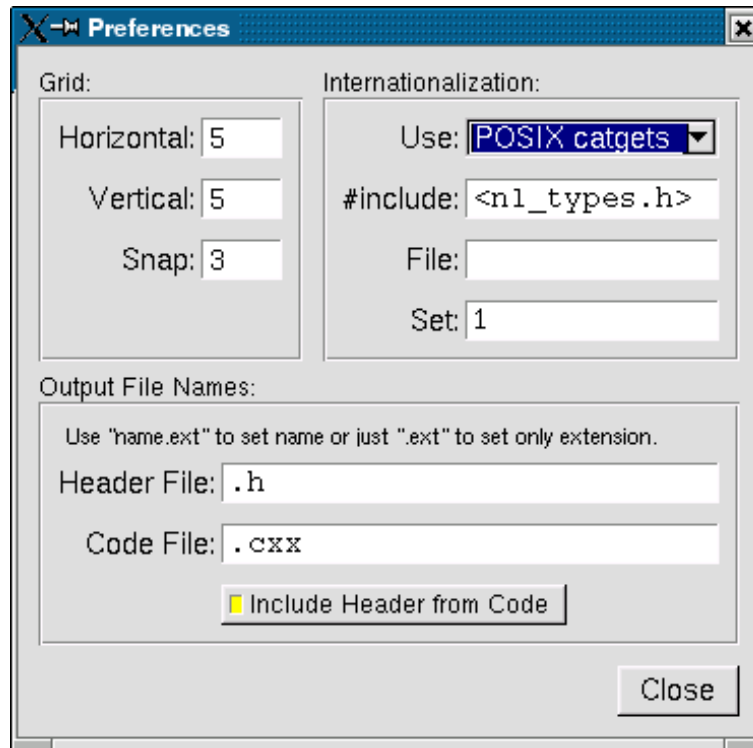


Figure 11.15 Internationalization using POSIX catgets

The **#include** field controls the header file to include for I18N; by default this is `<nl_types.h>`, the standard I18N file for POSIX catgets.

The **File:** field controls the name of the catalog file variable to use when retrieving localized messages; by default the file field is empty which forces a local (static) catalog file to be used for all of the windows defined in your `.fl` file.

The **Set:** field controls the set number in the catalog file. The default set is 1 and rarely needs to be changed.

11.11 Known limitations

Declaration Blocks can be used to temporarily block out already designed code using `#if 0` and `#endif` type construction. This will effectively avoid compilation of blocks of code. However, static code and data generated by this segment (menu items, images, include statements, etc.) will still be generated and likely cause compile-time warnings.

Chapter 12

Advanced FLTK

This chapter explains advanced programming and design topics that will help you to get the most out of FLTK.

12.1 Multithreading

FLTK can be used to implement a GUI for a multithreaded application but, as with multithreaded programming generally, there are some concepts and caveats that must be kept in mind.

Key amongst these is that, for many of the target platforms on which FLTK is supported, only the `main()` thread of the process is permitted to handle system events, create or destroy windows and open or close windows. Further, only the `main()` thread of the process can safely write to the display.

To support this in a portable way, all FLTK `draw()` methods are executed in the `main()` thread. A worker thread may update the state of an existing widget, but it may not do any rendering directly, nor create or destroy a window. (**NOTE:** A special case exists for [FL_Gl_Window](#) where it can, with suitable precautions, be possible to safely render to an existing GL context from a worker thread.)

Creating portable threads

We do not provide a threading interface as part of the library. A simple example showing how threads can be implemented, for all supported platforms, can be found in `test/threads.h` and `test/threads.cxx`.

FLTK has been used with a variety of thread interfaces, so if the simple example shown in `test/threads.cxx` does not cover your needs, you might want to select a third-party library that provides the features you require.

12.2 FLTK multithread locking - `Fl::lock()` and `Fl::unlock()`

In a multithreaded program, drawing of widgets (in the `main()` thread) happens asynchronously to widgets being updated by worker threads, so no drawing can occur safely whilst a widget is being modified (and no widget should be modified whilst drawing is in progress).

FLTK supports multithreaded applications using a locking mechanism internally. This allows a worker thread to lock the rendering context, preventing any drawing from taking place, whilst it changes the value of its widget.

Note

The converse is also true; whilst a worker thread holds the lock, the `main()` thread may not be able to process any drawing requests, nor service any events. So a worker thread that holds the FLTK lock **must** contrive to do so for the shortest time possible or it could impair operation of the application.

The lock operates broadly as follows.

Using the FLTK library, the `main()` thread holds the lock whenever it is processing events or redrawing the display. It acquires (locks) and releases (unlocks) the FLTK lock automatically and no "user intervention" is required. Indeed, a function that runs in the context of the `main()` thread ideally should **not** acquire / release the FLTK lock explicitly. (Though note that the lock calls are recursive, so calling `Fl::lock()` from a thread that already holds the lock, including the `main()` thread, is benign. The only constraint is that every call to `Fl::lock()` **must** be balanced by a corresponding call to `Fl::unlock()` to ensure the lock count is preserved.)

The `main()` thread **must** call `Fl::lock()` **once** before any windows are shown, to enable the internal lock (it is "off" by default since it is not useful in single-threaded applications) but thereafter the `main()` thread lock is managed by the library internally.

A worker thread, when it wants to alter the value of a widget, can acquire the lock using `Fl::lock()`, update the widget, then release the lock using `Fl::unlock()`. Acquiring the lock ensures that the worker thread can update the widget, without any risk that the `main()` thread will attempt to redraw the widget whilst it is being updated.

Note that acquiring the lock is a blocking action; the worker thread will stall for as long as it takes to acquire the lock. If the `main()` thread is engaged in some complex drawing operation this may block the worker thread for a long time, effectively serializing what ought to be parallel operations. (This frequently comes as a surprise to coders less familiar with multithreaded programming issues; see the discussion of "lockless programming" later for strategies for managing this.)

To incorporate the locking mechanism in the library, FLTK must be compiled with `-enable-threads` set during the `configure` process. IDE-based versions of FLTK are automatically compiled with the locking mechanism incorporated if possible. Since version 1.3, the `configure` script that builds the FLTK library also sets `-enable-threads` by default.

12.3 Simple multithreaded examples using `Fl::lock`

In `main()`, call `Fl::lock()` once before `Fl::run()` or `Fl::wait()` to enable the lock and start the runtime multithreading support for your program. All callbacks and derived functions like `handle()` and `draw()` will now be properly locked.

This might look something like this:

```
int main(int argc, char **argv) {
    /* Create your windows and widgets here */
    Fl::lock(); /* "start" the FLTK lock mechanism */
    /* show your window */
    main_win->show(argc, argv);
    /* start your worker threads */
    ... start threads ...
    /* Run the FLTK main loop */
    int result = Fl::run();
    /* terminate any pending worker threads */
    ... stop threads ...
    return result;
}
```

You can start as many threads as you like. From within a thread (other than the `main()` thread) FLTK calls must be wrapped with calls to `Fl::lock()` and `Fl::unlock()`:

```
void my_thread(void) {
    while (thread_still_running) {
        /* do thread work */
        ...
        /* compute new values for widgets */
        ...
        Fl::lock(); // acquire the lock
        my_widget->update(values);
        Fl::unlock(); // release the lock; allow other threads to access FLTK again
        Fl::awake(); // use Fl::awake() to signal main thread to refresh the GUI
    }
}
```

Note

To trigger a refresh of the GUI from a worker thread, the worker code should call `Fl::awake()`

Using `Fl::awake` thread messages

You can send messages from worker threads to the `main()` thread using `Fl::awake(void* message)`. If using this thread message interface, your `main()` might look like this:

```
int main(int argc, char **argv) {
    /* Create your windows and widgets here */
    Fl::lock(); /* "start" the FLTK lock mechanism */
    /* show your window */
    main_win->show(argc, argv);
    /* start your worker threads */
    ... start threads ...
    /* Run the FLTK loop and process thread messages */
    while (Fl::wait() > 0) {
        if ((next_message = Fl::thread_message()) != NULL) {
            /* process your data, update widgets, etc. */
            ...
        }
    }
    /* terminate any pending worker threads */
    ... stop threads ...
    return 0;
}
```

Your worker threads can send messages to the `main()` thread using `Fl::awake(void* message)`:

```
void *msg; /* "msg" is a pointer to your message
Fl::awake(msg); /* send "msg" to main thread
```

A message can be anything you like. The `main()` thread can retrieve the message by calling `Fl::thread_message()`.

Using `Fl::awake` callback messages

You can also request that the `main()` thread call a function on behalf of the worker thread by using `Fl::awake(Fl_Awake_Handler cb, void* userdata)`.

The `main()` thread will execute the callback "as soon as possible" when next processing the pending events. This can be used by a worker thread to perform operations (for example showing or hiding windows) that are prohibited in a worker thread.

```
void do_something_cb(void *userdata) {
    /* Will run in the context of the main thread
    ... do_stuff ...
}
// running in worker thread
void *data; /* "data" is a pointer to your user data
Fl::awake(do_something_cb, data); /* call to execute cb in main thread
```

Note

The `main()` thread will execute the `Fl_Awake_Handler` callback `do_something_cb` asynchronously to the worker thread, at some short but indeterminate time after the worker thread registers the request. When it executes the `Fl_Awake_Handler` callback, the `main()` thread will use the contents of `*userdata` **at the time of execution**, not necessarily the contents that `*userdata` had at the time that the worker thread posted the callback request. The worker thread should therefore contrive **not** to alter the contents of `*userdata` once it posts the callback, since the worker thread does not know when the `main()` thread will consume that data. It is often useful that `userdata` point to a struct, one member of which the `main()` thread can modify to indicate that it has consumed the data, thereby allowing the worker thread to re-use or update `userdata`.

Warning

The mechanisms used to deliver `Fl::awake(void* message)` and `Fl::awake(Fl_Awake_Handler cb, void* userdata)` events to the `main()` thread can interact in unexpected ways on some platforms. Therefore, for reliable operation, it is advised that a program use either `Fl::awake(Fl_Awake_Handler cb, void* userdata)` or `Fl::awake(void* message)`, but that they never be intermixed. Calling `Fl::awake()` with no parameters should be safe in either case.

If you have to choose between using the `Fl::awake(void* message)` and `Fl::awake(Fl_Awake_Handler cb, void* userdata)` mechanisms and don't know which to choose, then try the `Fl::awake(Fl_Awake_Handler cb, void* userdata)` method first as it tends to be more powerful in general.

12.4 FLTK multithreaded "lockless programming"

The simple multithreaded examples shown above, using the FLTK lock, work well for many cases where multiple threads are required. However, when that model is extended to more complex programs, it often produces results that the developer did not anticipate.

A typical case might go something like this. A developer creates a program to process a huge data set. The program has a `main()` thread and 7 worker threads and is targeted to run on an 8-core computer. When it runs, the program divides the data between the 7 worker threads, and as they process their share of the data, each thread updates its portion of the GUI with the results, locking and unlocking as they do so.

But when this program runs, it is much slower than expected and the developer finds that only one of the eight CPU cores seems to be utilised, despite there being 8 threads in the program. What happened?

The threads in the program all run as expected, but they end up being serialized (that is, not able to run in parallel) because they all depend on the single FLTK lock. Acquiring (and releasing) that lock has an associated cost, and is a **blocking** action if the lock is already held by any other worker thread or by the `main()` thread.

If the worker threads are acquiring the lock "too often", then the lock will **always** be held **somewhere** and every attempt by any other thread (even `main()`) to lock will cause that other thread (including `main()`) to block. And blocking `main()` also blocks event handling, display refresh...

As a result, only one thread will be running at any given time, and the multithreaded program is effectively reduced to being a (complicated and somewhat less efficient) single thread program.

A "solution" is for the worker threads to lock "less often", such that they do not block each other or the `main()` thread. But judging what constitutes locking "too often" for any given configuration, and hence will block, is a very tricky question. What works well on one machine, with a given graphics card and CPU configuration may behave very differently on another target machine.

There are "interesting" variations on this theme, too: for example it is possible that a "faulty" multithreaded program such as described above will work adequately on a single-core machine (where all threads are inherently serialized anyway and so are less likely to block each other) but then stall or even deadlock in unexpected ways on a multicore machine when the threads do interfere with each other. (I have seen this - it really happens.)

The "better" solution is to avoid using the FLTK lock so far as possible. Instead, the code should be designed so that the worker threads do not update the GUI themselves and therefore never need to acquire the FLTK lock. This would be FLTK multithreaded "lockless programming".

There are a number of ways this can be achieved (or at least approximated) in practice but the most direct approach is for the worker threads to make use of the `Fl::awake(Fl_Awake_Handler cb, void* userdata)` method so that GUI updates can all run in the context of the `main()` thread, alleviating the need for the worker thread to ever lock. The onus is then on the worker threads to manage the `userdata` so that it is delivered safely to the `main()` thread, but there are many ways that can be done.

Note

Using `Fl::awake` is not, strictly speaking, entirely "lockless" since the awake handler mechanism incorporates resource locking internally to protect the queue of pending awake messages. These resource locks are held transiently and generally do not trigger the pathological blocking issues described here.

However, aside from using `Fl::awake`, there are many other ways that a "lockless" design can be implemented, including message passing, various forms of IPC, etc.

If you need high performing multithreaded programming, then take some time to study the options and understand the advantages and disadvantages of each; we can't even begin to scratch the surface of this huge topic here!

And of course occasional, sparse, use of the FLTK lock from worker threads will do no harm; it is "excessive" locking (whatever that might be) that triggers the failing behaviour.

It is always a Good Idea to update the GUI at the lowest rate that is acceptable when processing bulk data (or indeed, in all cases!) Updating at a few frames per second is probably adequate for providing feedback during a long calculation. At the upper limit, anything faster than the frame rate of your monitor and the updates will never even be displayed; why waste CPU computing pixels that you will never show?

12.5 FLTK multithreaded Constraints

FLTK supports multiple platforms, some of which allow only the `main()` thread to handle system events and open or close windows. The safe thing to do is to adhere to the following rules for threads on all operating systems:

- Don't `show()` or `hide()` anything that contains `Fl_Window` based widgets from a worker thread. This includes any windows, dialogs, file choosers, subwindows or widgets using `Fl_Gl_Window`. Note that this constraint also applies to non-window widgets that have tooltips, since the tooltip will contain a `Fl_Window` object. The safe and portable approach is **never** to call `show()` or `hide()` on any widget from the context of a worker thread. Instead you can use the `Fl_Awake_Handler` variant of `Fl::awake()` to request the `main()` thread to create, destroy, show or hide the widget on behalf of the worker thread.
- Don't call `Fl::run()`, `Fl::wait()`, `Fl::flush()`, `Fl::check()` or any related methods that will handle system messages from a worker thread
- Don't intermix use of `Fl::awake(Fl_Awake_Handler cb, void* userdata)` and `Fl::awake(void* message)` calls in the same program as they may interact unpredictably on some platforms; choose one or other style of `Fl::awake(<thing>)` mechanism and use that. (Intermixing calls to `Fl::awake()` should be safe with either however.)
- Don't start or cancel timers from a worker thread
- Don't change window decorations or titles from a worker thread
- The `make_current()` method will probably not work well for regular windows, but should always work for a `Fl_Gl_Window` to allow for high speed rendering on graphics cards with multiple pipelines. Managing thread-safe access to the GL pipelines is left as an exercise for the reader! (And may be target specific...)

See also: `Fl::lock()`, `Fl::unlock()`, `Fl::awake()`, `Fl::awake(Fl_Awake_Handler cb, void* userdata)`, `Fl::awake(void* message)`, `Fl::thread_message()`.

Chapter 13

Unicode and UTF-8 Support

This chapter explains how FLTK handles international text via Unicode and UTF-8.

Unicode support was only recently added to FLTK and is still incomplete. This chapter is Work in Progress, reflecting the current state of Unicode support.

13.1 About Unicode, ISO 10646 and UTF-8

The summary of Unicode, ISO 10646 and UTF-8 given below is deliberately brief and provides just enough information for the rest of this chapter.

For further information, please see:

- <http://www.unicode.org>
- <http://www.iso.org>
- <http://en.wikipedia.org/wiki/Unicode>
- <http://www.cl.cam.ac.uk/~mgk25/unicode.html>
- <http://www.apps.ietf.org/rfc/rfc3629.html>

The Unicode Standard

The Unicode Standard was originally developed by a consortium of mainly US computer manufacturers and developers of multi-lingual software. It has now become a defacto standard for character encoding and is supported by most of the major computing companies in the world.

Before Unicode, many different systems, on different platforms, had been developed for encoding characters for different languages, but no single encoding could satisfy all languages. Unicode provides access to over 100,000 characters used in all the major languages written today, and is independent of platform and language.

Unicode also provides higher-level concepts needed for text processing and typographic publishing systems, such as algorithms for sorting and comparing text, composite character and text rendering, right-to-left and bi-directional text handling.

Note

There are currently no plans to add this extra functionality to FLTK.

ISO 10646

The International Organisation for Standardization (ISO) had also been trying to develop a single unified character set. Although both ISO and the Unicode Consortium continue to publish their own standards, they have agreed to coordinate their work so that specific versions of the Unicode and ISO 10646 standards are compatible with each other.

The international standard ISO 10646 defines the **Universal Character Set** (UCS) which contains the characters required for almost all known languages. The standard also defines three different implementation levels specifying how these characters can be combined.

Note

There are currently no plans for handling the different implementation levels or the combining characters in FLTK.

In UCS, characters have a unique numerical code and an official name, and are usually shown using 'U+' and the code in hexadecimal, e.g. U+0041 is the "Latin capital letter A". The UCS characters U+0000 to U+007F correspond to US-ASCII, and U+0000 to U+00FF correspond to ISO 8859-1 (Latin1).

ISO 10646 was originally designed to handle a 31-bit character set from U+00000000 to U+7FFFFFFF, but the current idea is that 21 bits will be sufficient for all future needs, giving characters up to U+10FFFF. The complete character set is sub-divided into *planes*. *Plane 0*, also known as the **Basic Multilingual Plane** (BMP), ranges from U+0000 to U+FFFF and consists of the most commonly used characters from previous encoding standards. Other planes contain characters for specialist applications.

Todo Do we need this info about planes?

The UCS also defines various methods of encoding characters as a sequence of bytes. UCS-2 encodes Unicode characters into two bytes, which is wasteful if you are only dealing with ASCII or Latin1 text, and insufficient if you need characters above U+00FFFF. UCS-4 uses four bytes, which lets it handle higher characters, but this is even more wasteful for ASCII or Latin1.

UTF-8

The Unicode standard defines various UCS Transformation Formats (UTF). UTF-16 and UTF-32 are based on units of two and four bytes. UCS characters requiring more than 16 bits are encoded using "surrogate pairs" in UTF-16.

UTF-8 encodes all Unicode characters into variable length sequences of bytes. Unicode characters in the 7-bit ASCII range map to the same value and are represented as a single byte, making the transformation to Unicode quick and easy.

All UCS characters above U+007F are encoded as a sequence of several bytes. The top bits of the first byte are set to show the length of the byte sequence, and subsequent bytes are always in the range 0x80 to 0xBF. This combination provides some level of synchronisation and error detection.

Unicode range	Byte sequences
U+00000000 - U+0000007F	0xxxxxxx
U+00000080 - U+000007FF	110xxxxx 10xxxxxx
U+00000800 - U+0000FFFF	1110xxxx 10xxxxxx 10xxxxxx
U+00010000 - U+001FFFFF	11110xxx 10xxxxxx 10xxxxxx 10xxxxxx
U+00200000 - U+03FFFFFF	111110xx 10xxxxxx 10xxxxxx 10xxxxxx 10xxxxxx
U+04000000 - U+7FFFFFFF	1111110x 10xxxxxx 10xxxxxx 10xxxxxx 10xxxxxx 10xxxxxx

Moving from ASCII encoding to Unicode will allow all new FLTK applications to be easily internationalized and used all over the world. By choosing UTF-8 encoding, FLTK remains largely source-code compatible to previous iterations of the library.

13.2 Unicode in FLTK

Todo Work through the code and this documentation to harmonize the `[OksiD]` and `[fltk2]` functions.

FLTK will be entirely converted to Unicode using UTF-8 encoding. If a different encoding is required by the underlying operating system, FLTK will convert the string as needed.

It is important to note that the initial implementation of Unicode and UTF-8 in FLTK involves three important areas:

- provision of Unicode character tables and some simple related functions;
- conversion of `char*` variables and function parameters from single byte per character representation to UTF-8 variable length sequences;
- modifications to the display font interface to accept general Unicode character or UCS code numbers instead of just ASCII or Latin1 characters.

The current implementation of Unicode / UTF-8 in FLTK will impose the following limitations:

- An implementation note in the `[OksiD]` code says that all functions are LIMITED to 24 bit Unicode values, but also says that only 16 bits are really used under linux and win32. **[Can we verify this?]**
- The `[fltk2]` `fl_utf8encode()` and `fl_utf8decode()` functions are designed to handle Unicode characters in the range U+000000 to U+10FFFF inclusive, which covers all UTF-16 characters, as specified in RFC 3629. *Note that the user must first convert UTF-16 surrogate pairs to UCS.*
- FLTK will only handle single characters, so composed characters consisting of a base character and floating accent characters will be treated as multiple characters.
- FLTK will only compare or sort strings on a byte by byte basis and not on a general Unicode character basis.
- FLTK will not handle right-to-left or bi-directional text.

Todo Verify 16/24 bit Unicode limit for different character sets? OksiD's code appears limited to 16-bit whereas the FLTK2 code appears to handle a wider set. What about illegal characters? See comments in `fl_utf8fromwc()` and `fl_utf8toUtf16()`.

13.3 Illegal Unicode and UTF-8 Sequences

Three pre-processor variables are defined in the source code [1] that determine how `fl_utf8decode()` handles illegal UTF-8 sequences:

- if `ERRORS_TO_CP1252` is set to 1 (the default), `fl_utf8decode()` will assume that a byte sequence starting with a byte in the range 0x80 to 0x9f represents a Microsoft CP1252 character, and will return the value of an equivalent UCS character. Otherwise, it will be processed as an illegal byte value as described below.
- if `STRICT_RFC3629` is set to 1 (not the default!) then UTF-8 sequences that correspond to illegal UCS values are treated as errors. Illegal UCS values include those above U+10FFFF, or corresponding to UTF-16 surrogate pairs. Illegal byte values are handled as described below.
- if `ERRORS_TO_ISO8859_1` is set to 1 (the default), the illegal byte value is returned unchanged, otherwise 0xFFFD, the Unicode REPLACEMENT CHARACTER, is returned instead.

[1] Since FLTK 1.3.4 you may set these three pre-processor variables on your compile command line with `-D"variable=value"` (value: 0 or 1) to avoid editing the source code.

`fl_utf8encode()` is less strict, and only generates the UTF-8 sequence for 0xFFFD, the Unicode REPLACEMENT CHARACTER, if it is asked to encode a UCS value above U+10FFFF.

Many of the `[fltk2]` functions below use `fl_utf8decode()` and `fl_utf8encode()` in their own implementation, and are therefore somewhat protected from bad UTF-8 sequences.

The `[OksiD]` `fl_utf8len()` function assumes that the byte it is passed is the first byte in a UTF-8 sequence, and returns the length of the sequence. Trailing bytes in a UTF-8 sequence will return -1.

- **WARNING:** `fl_utf8len()` can not distinguish between single bytes representing Microsoft CP1252 characters 0x80-0x9f and those forming part of a valid UTF-8 sequence. You are strongly advised not to use `fl_utf8len()` in your own code unless you know that the byte sequence contains only valid UTF-8 sequences.
- **WARNING:** Some of the `[OksiD]` functions below still use `fl_utf8len()` in their implementations. These may need further validation.

Please see the individual function description for further details about error handling and return values.

13.4 FLTK Unicode and UTF-8 Functions

This section currently provides a brief overview of the functions. For more details, consult the main text for each function via its link.

`int fl_utf8locale()` **FLTK2**

`fl_utf8locale()` returns true if the "locale" seems to indicate that UTF-8 encoding is used.

It is highly recommended that you change your system so this does return true!

`int fl_utf8test(const char *src, unsigned len)` **FLTK2**

`fl_utf8test()` examines the first `len` bytes of `src`. It returns 0 if there are any illegal UTF-8 sequences; 1 if `src` contains plain ASCII or if `len` is zero; or 2, 3 or 4 to indicate the range of Unicode characters found.

`int fl_utf_nb_char(const unsigned char *buf, int len)` **OksiD**

Returns the number of UTF-8 characters in the first `len` bytes of `buf`.

`int fl_unichar_to_utf8_size(Fl_Unichar)`
`int fl_utf8bytes(unsigned ucs)`

Returns the number of bytes needed to encode `ucs` in UTF-8.

`int fl_utf8len(char c)` **OksiD**

If `c` is a valid first byte of a UTF-8 encoded character sequence, `fl_utf8len()` will return the number of bytes in that sequence. It returns -1 if `c` is not a valid first byte.

`unsigned int fl_nonspacing(unsigned int ucs)` **OksiD**

Returns true if `ucs` is a non-spacing character.

`const char* fl_utf8back(const char *p, const char *start, const char *end)` **FLTK2**
`const char* fl_utf8fwd(const char *p, const char *start, const char *end)` **FLTK2**

If `p` already points to the start of a UTF-8 character sequence, these functions will return `p`. Otherwise `fl_utf8back()` searches backwards from `p` and `fl_utf8fwd()` searches forwards from `p`, within the `start` and `end` limits, looking for the start of a UTF-8 character.

`unsigned int fl_utf8decode(const char *p, const char *end, int *len)` **FLTK2**
`int fl_utf8encode(unsigned ucs, char *buf)` **FLTK2**

`fl_utf8decode()` attempts to decode the UTF-8 character that starts at `p` and may not extend past `end`. It returns the Unicode value, and the length of the UTF-8 character sequence is returned via the `len` argument. `fl_utf8encode()` writes the UTF-8 encoding of `ucs` into `buf` and returns the number of bytes in the sequence. See the main documentation for the treatment of illegal Unicode and UTF-8 sequences.

unsigned int `fl_utf8froma(char *dst, unsigned dstlen, const char *src, unsigned srclen)` **FLTK2**

unsigned int `fl_utf8toa(const char *src, unsigned srclen, char *dst, unsigned dstlen)` **FLTK2**

`fl_utf8froma()` converts a character string containing single bytes per character (i.e. ASCII or ISO-8859-1) into UTF-8. If the `src` string contains only ASCII characters, the return value will be the same as `srclen`.

`fl_utf8toa()` converts a string containing UTF-8 characters into single byte characters. UTF-8 characters that do not correspond to ASCII or ISO-8859-1 characters below 0xFF are replaced with '?'.

Both functions return the number of bytes that would be written, not counting the null terminator. `dstlen` provides a means of limiting the number of bytes written, so setting `dstlen` to zero is a means of measuring how much storage would be needed before doing the real conversion.

char* `fl_utf2mbs(const char *src)` **OksiD**

converts a UTF-8 string to a local multi-byte character string. **[More info required here!]**

unsigned int `fl_utf8fromwc(char *dst, unsigned dstlen, const wchar_t *src, unsigned srclen)` **FLTK2**

unsigned int `fl_utf8towc(const char *src, unsigned srclen, wchar_t *dst, unsigned dstlen)` **FLTK2**

unsigned int `fl_utf8toUtf16(const char *src, unsigned srclen, unsigned short *dst, unsigned dstlen)` **FLTK2**

These routines convert between UTF-8 and `wchar_t` or "wide character" strings. The difficulty lies in the fact that `sizeof(wchar_t)` is 2 on Windows and 4 on Linux and most other systems. Therefore some "wide characters" on Windows may be represented as "surrogate pairs" of more than one `wchar_t`.

`fl_utf8fromwc()` converts from a "wide character" string to UTF-8. Note that `srclen` is the number of `wchar_t` elements in the source string and on Windows this might be larger than the number of characters. `dstlen` specifies the maximum number of **bytes** to copy, including the null terminator.

`fl_utf8towc()` converts a UTF-8 string into a "wide character" string. Note that on Windows, some "wide characters" might result in "surrogate pairs" and therefore the return value might be more than the number of characters. `dstlen` specifies the maximum number of **wchar_t** elements to copy, including a zero terminating element. **[Is this all worded correctly?]**

`fl_utf8toUtf16()` converts a UTF-8 string into a "wide character" string using UTF-16 encoding to handle the "surrogate pairs" on Windows. `dstlen` specifies the maximum number of `wchar_t` elements to copy, including a zero terminating element. **[Is this all worded correctly?]**

These routines all return the number of elements that would be required for a full conversion of the `src` string, including the zero terminator. Therefore setting `dstlen` to zero is a way of measuring how much storage would be needed before doing the real conversion.

```
unsigned int fl_utf8from_mb(char *dst, unsigned dstlen, const char *src, unsigned srclen) FLTK2  
unsigned int fl_utf8to_mb(const char *src, unsigned srclen, char *dst, unsigned dstlen) FLTK2
```

These functions convert between UTF-8 and the locale-specific multi-byte encodings used on some systems for filenames, etc. If `fl_utf8locale()` returns true, these functions don't do anything useful. **[Is this all worded correctly?]**

```
int fl_tolower(unsigned int ucs) OksiD  
int fl_toupper(unsigned int ucs) OksiD  
int fl_utf_tolower(const unsigned char *str, int len, char *buf) OksiD  
int fl_utf_toupper(const unsigned char *str, int len, char *buf) OksiD
```

`fl_tolower()` and `fl_toupper()` convert a single Unicode character from upper to lower case, and vice versa. `fl_utf_tolower()` and `fl_utf_toupper()` convert a string of bytes, some of which may be multi-byte UTF-8 encodings of Unicode characters, from upper to lower case, and vice versa.

Warning: to be safe, `buf` length must be at least `3*len` [for 16-bit Unicode]

```
int fl_utf_strcasecmp(const char *s1, const char *s2) OksiD  
int fl_utf_strncasecmp(const char *s1, const char *s2, int n) OksiD
```

`fl_utf_strcasecmp()` is a UTF-8 aware string comparison function that converts the strings to lower case Unicode as part of the comparison. `fl_utf_strncasecmp()` only compares the first `n` characters [bytes?]

13.5 FLTK Unicode Versions of System Calls

- `int fl_access(const char* f, int mode)` **OksiD**
- `int fl_chmod(const char* f, int mode)` **OksiD**
- `int fl_execvp(const char* file, char* const* argv)` **OksiD**
- `FILE* fl_fopen(const char* f, const char* mode)` **OksiD**
- `char* fl_getcwd(char* buf, int maxlen)` **OksiD**
- `char* fl_getenv(const char* name)` **OksiD**
- `char fl_make_path(const char* path)` - returns char ? **OksiD**
- `void fl_make_path_for_file(const char* path)` **OksiD**
- `int fl_mkdir(const char* f, int mode)` **OksiD**
- `int fl_open(const char* f, int o, ...)` **OksiD**
- `int fl_rename(const char* f, const char* t)` **OksiD**
- `int fl_rmdir(const char* f)` **OksiD**
- `int fl_stat(const char* path, struct stat* buffer)` **OksiD**
- `int fl_system(const char* f)` **OksiD**
- `int fl_unlink(const char* f)` **OksiD**

TODO:

- more doc on unicode, add links
- write something about filename encoding on OS X...
- explain the `fl_utf8_...` commands
- explain issues with [FL_Preferences](#)
- why FLTK has no `FL_String` class

Chapter 14

FLTK Enumerations

Note

This file is not actively maintained any more, but is left here as a reference, until the doxygen documentation is completed.

See also

[FL/Enumerations.H](#).

This appendix lists the enumerations provided in the [<FL/Enumerations.H>](#) header file, organized by section. Constants whose value are zero are marked with "(0)", this is often useful to know when programming.

14.1 Version Numbers

The FLTK version number is stored in a number of compile-time constants:

- `FL_MAJOR_VERSION` - The major release number, currently 1
- `FL_MINOR_VERSION` - The minor release number, currently 3
- `FL_PATCH_VERSION` - The patch release number, currently 6
- `FL_VERSION` - [Deprecated] A combined floating-point version number for the major, minor, and patch release numbers, currently 1.0306
- `FL_API_VERSION` - A combined integer version number for the major, minor, and patch release numbers, currently 10306 (use this instead of `FL_VERSION`, if possible)
- `FL_ABI_VERSION` - A combined integer version number for the application binary interface (ABI) major, minor, and patch release numbers, currently 10300 (default)

Note

The ABI version (`FL_ABI_VERSION`) is usually constant throughout one major/minor release version, for instance 10300 if `FL_API_VERSION` is 10305. Hence the ABI is constant if only the patch version is changed. You can change this with `configure` or `CMake` though if you want the latest enhancements (called "ABI features", see `CHANGES`).

14.2 Events

Events are identified by an [FL_Event](#) enumeration value. The following events are currently defined:

- FL_NO_EVENT - No event (or an event fltk does not understand) occurred (0).
- FL_PUSH - A mouse button was pushed.
- FL_RELEASE - A mouse button was released.
- FL_ENTER - The mouse pointer entered a widget.
- FL_LEAVE - The mouse pointer left a widget.
- FL_DRAG - The mouse pointer was moved with a button pressed.
- FL_FOCUS - A widget should receive keyboard focus.
- FL_UNFOCUS - A widget loses keyboard focus.
- FL_KEYBOARD - A key was pressed.
- FL_CLOSE - A window was closed.
- FL_MOVE - The mouse pointer was moved with no buttons pressed.
- FL_SHORTCUT - The user pressed a shortcut key.
- FL_DEACTIVATE - The widget has been deactivated.
- FL_ACTIVATE - The widget has been activated.
- FL_HIDE - The widget has been hidden.
- FL_SHOW - The widget has been shown.
- FL_PASTE - The widget should paste the contents of the clipboard.
- FL_SELECTIONCLEAR - The widget should clear any selections made for the clipboard.
- FL_MOUSEWHEEL - The horizontal or vertical mousewheel was turned.
- FL_DND_ENTER - The mouse pointer entered a widget dragging data.
- FL_DND_DRAG - The mouse pointer was moved dragging data.
- FL_DND_LEAVE - The mouse pointer left a widget still dragging data.
- FL_DND_RELEASE - Dragged data is about to be dropped.
- FL_SCREEN_CONFIGURATION_CHANGED - The screen configuration (number, positions) was changed.
- FL_FULLSCREEN - The fullscreen state of the window has changed.

14.3 Callback "When" Conditions

The following constants determine when a callback is performed:

- `FL_WHEN_NEVER` - Never call the callback (0).
- `FL_WHEN_CHANGED` - Do the callback only when the widget value changes.
- `FL_WHEN_NOT_CHANGED` - Do the callback whenever the user interacts with the widget.
- `FL_WHEN_RELEASE` - Do the callback when the button or key is released and the value changes.
- `FL_WHEN_ENTER_KEY` - Do the callback when the user presses the ENTER key and the value changes.
- `FL_WHEN_RELEASE_ALWAYS` - Do the callback when the button or key is released, even if the value doesn't change.
- `FL_WHEN_ENTER_KEY_ALWAYS` - Do the callback when the user presses the ENTER key, even if the value doesn't change.

14.4 Fl::event_button() Values

The following constants define the button numbers for `FL_PUSH` and `FL_RELEASE` events:

- `FL_LEFT_MOUSE` - the left mouse button
- `FL_MIDDLE_MOUSE` - the middle mouse button
- `FL_RIGHT_MOUSE` - the right mouse button

14.5 Fl::event_key() Values

The following constants define the non-ASCII keys on the keyboard for `FL_KEYBOARD` and `FL_SHORTCUT` events:

- `FL_Button` - A mouse button; use `Fl_Button + n` for mouse button `n`.
- `FL_BackSpace` - The backspace key.
- `FL_Tab` - The tab key.
- `FL_Enter` - The enter key.
- `FL_Pause` - The pause key.
- `FL_Scroll_Lock` - The scroll lock key.
- `FL_Escape` - The escape key.
- `FL_Home` - The home key.
- `FL_Left` - The left arrow key.
- `FL_Up` - The up arrow key.
- `FL_Right` - The right arrow key.

- `FL_Down` - The down arrow key.
- `FL_Page_Up` - The page-up key.
- `FL_Page_Down` - The page-down key.
- `FL_End` - The end key.
- `FL_Print` - The print (or print-screen) key.
- `FL_Insert` - The insert key.
- `FL_Menu` - The menu key.
- `FL_Num_Lock` - The num lock key.
- `FL_KP` - One of the keypad numbers; use `FL_KP + n` for number `n`.
- `FL_KP_Enter` - The enter key on the keypad.
- `FL_F` - One of the function keys; use `FL_F + n` for function key `n`.
- `FL_Shift_L` - The lefthand shift key.
- `FL_Shift_R` - The righthand shift key.
- `FL_Control_L` - The lefthand control key.
- `FL_Control_R` - The righthand control key.
- `FL_Caps_Lock` - The caps lock key.
- `FL_Meta_L` - The left meta/Windows key.
- `FL_Meta_R` - The right meta/Windows key.
- `FL_Alt_L` - The left alt key.
- `FL_Alt_R` - The right alt key.
- `FL_Delete` - The delete key.

14.6 Fl::event_state() Values

The following constants define bits in the `Fl::event_state()` value:

- `FL_SHIFT` - One of the shift keys is down.
- `FL_CAPS_LOCK` - The caps lock is on.
- `FL_CTRL` - One of the ctrl keys is down.
- `FL_ALT` - One of the alt keys is down.
- `FL_NUM_LOCK` - The num lock is on.
- `FL_META` - One of the meta/Windows keys is down.
- `FL_COMMAND` - An alias for `FL_CTRL` on WIN32 and X11, or `FL_META` on MacOS X.
- `FL_SCROLL_LOCK` - The scroll lock is on.
- `FL_BUTTON1` - Mouse button 1 is pushed.
- `FL_BUTTON2` - Mouse button 2 is pushed.
- `FL_BUTTON3` - Mouse button 3 is pushed.
- `FL_BUTTONS` - Any mouse button is pushed.
- `FL_BUTTON(n)` - Mouse button `n` (where `n > 0`) is pushed.

14.7 Alignment Values

The following constants define bits that can be used with `FL_Widget::align()` to control the positioning of the label:

- `FL_ALIGN_CENTER` - The label is centered (0).
- `FL_ALIGN_TOP` - The label is top-aligned.
- `FL_ALIGN_BOTTOM` - The label is bottom-aligned.
- `FL_ALIGN_LEFT` - The label is left-aligned.
- `FL_ALIGN_RIGHT` - The label is right-aligned.
- `FL_ALIGN_CLIP` - The label is clipped to the widget.
- `FL_ALIGN_WRAP` - The label text is wrapped as needed.
- `FL_ALIGN_TOP_LEFT` - The label appears at the top of the widget, aligned to the left.
- `FL_ALIGN_TOP_RIGHT` - The label appears at the top of the widget, aligned to the right.
- `FL_ALIGN_BOTTOM_LEFT` - The label appears at the bottom of the widget, aligned to the left.
- `FL_ALIGN_BOTTOM_RIGHT` - The label appears at the bottom of the widget, aligned to the right.
- `FL_ALIGN_LEFT_TOP` - The label appears to the left of the widget, aligned at the top. Outside labels only.
- `FL_ALIGN_RIGHT_TOP` - The label appears to the right of the widget, aligned at the top. Outside labels only.
- `FL_ALIGN_LEFT_BOTTOM` - The label appears to the left of the widget, aligned at the bottom. Outside labels only.
- `FL_ALIGN_RIGHT_BOTTOM` - The label appears to the right of the widget, aligned at the bottom. Outside labels only.
- `FL_ALIGN_INSIDE` - 'or' this with other values to put label inside the widget.
- `FL_ALIGN_TEXT_OVER_IMAGE` - Label text will appear above the image.
- `FL_ALIGN_IMAGE_OVER_TEXT` - Label text will be below the image.
- `FL_ALIGN_IMAGE_NEXT_TO_TEXT` - The image will appear to the left of the text.
- `FL_ALIGN_TEXT_NEXT_TO_IMAGE` - The image will appear to the right of the text.
- `FL_ALIGN_IMAGE_BACKDROP` - The image will be used as a background for the widget.

14.8 Fonts

The following constants define the standard FLTK fonts:

- `FL_HELVETICA` - Helvetica (or Arial) normal (0).
- `FL_HELVETICA_BOLD` - Helvetica (or Arial) bold.
- `FL_HELVETICA_ITALIC` - Helvetica (or Arial) oblique.
- `FL_HELVETICA_BOLD_ITALIC` - Helvetica (or Arial) bold-oblique.
- `FL_COURIER` - Courier normal.

- FL_COURIER_BOLD - Courier bold.
- FL_COURIER_ITALIC - Courier italic.
- FL_COURIER_BOLD_ITALIC - Courier bold-italic.
- FL_TIMES - Times roman.
- FL_TIMES_BOLD - Times bold.
- FL_TIMES_ITALIC - Times italic.
- FL_TIMES_BOLD_ITALIC - Times bold-italic.
- FL_SYMBOL - Standard symbol font.
- FL_SCREEN - Default monospaced screen font.
- FL_SCREEN_BOLD - Default monospaced bold screen font.
- FL_ZAPF_DINGBATS - Zapf-dingbats font.

14.9 Colors

The FL_Color enumeration type holds a FLTK color value. Colors are either 8-bit indexes into a [virtual colormap](#) or 24-bit RGB color values. Color indices occupy the lower 8 bits of the value, while RGB colors occupy the upper 24 bits, for a byte organization of RGBI.

14.9.1 Color Constants

Constants are defined for the user-defined foreground and background colors, as well as specific colors and the start of the grayscale ramp and color cube in the [virtual colormap](#). Inline functions are provided to retrieve specific grayscale, color cube, or RGB color values.

The following color constants can be used to access the user-defined colors:

- FL_BACKGROUND_COLOR - the default background color
- FL_BACKGROUND2_COLOR - the default background color for text, list, and valuator widgets
- FL_FOREGROUND_COLOR - the default foreground color (0) used for labels and text
- FL_INACTIVE_COLOR - the inactive foreground color
- FL_SELECTION_COLOR - the default selection/highlight color

The following color constants can be used to access the colors from the FLTK standard color cube:

- FL_BLACK
- FL_BLUE
- FL_CYAN
- FL_DARK_BLUE
- FL_DARK_CYAN

- FL_DARK_GREEN
- FL_DARK_MAGENTA
- FL_DARK_RED
- FL_DARK_YELLOW
- FL_GREEN
- FL_MAGENTA
- FL_RED
- FL_WHITE
- FL_YELLOW

The following are named values within the standard grayscale:

- FL_GRAY0
- FL_DARK3
- FL_DARK2
- FL_DARK1
- FL_LIGHT1
- FL_LIGHT2
- FL_LIGHT3

The inline methods for getting a grayscale, color cube, or RGB color value are described in the [Colors](#) section of the [Drawing Things in FLTK](#) chapter.

14.10 Cursors

The following constants define the mouse cursors that are available in FLTK. The double-headed arrows are bitmaps provided by FLTK on X, the others are provided by system-defined cursors.

- FL_CURSOR_DEFAULT - the default cursor, usually an arrow (0)
- FL_CURSOR_ARROW - an arrow pointer
- FL_CURSOR_CROSS - crosshair
- FL_CURSOR_WAIT - watch or hourglass
- FL_CURSOR_INSERT - I-beam
- FL_CURSOR_HAND - hand (uparrow on MSWindows)
- FL_CURSOR_HELP - question mark
- FL_CURSOR_MOVE - 4-pointed arrow
- FL_CURSOR_NS - up/down arrow
- FL_CURSOR_WE - left/right arrow
- FL_CURSOR_NWSE - diagonal arrow
- FL_CURSOR_NESW - diagonal arrow
- FL_CURSOR_NONE - invisible

14.11 FD "When" Conditions

- `FL_READ` - Call the callback when there is data to be read.
- `FL_WRITE` - Call the callback when data can be written without blocking.
- `FL_EXCEPT` - Call the callback if an exception occurs on the file.

14.12 Damage Masks

The following damage mask bits are used by the standard FLTK widgets:

- `FL_DAMAGE_CHILD` - A child needs to be redrawn.
- `FL_DAMAGE_EXPOSE` - The window was exposed.
- `FL_DAMAGE_SCROLL` - The [Fl_Scroll](#) widget was scrolled.
- `FL_DAMAGE_OVERLAY` - The overlay planes need to be redrawn.
- `FL_DAMAGE_USER1` - First user-defined damage bit.
- `FL_DAMAGE_USER2` - Second user-defined damage bit.
- `FL_DAMAGE_ALL` - Everything needs to be redrawn.

Chapter 15

GLUT Compatibility

This appendix describes the GLUT compatibility header file supplied with FLTK.

FLTK's GLUT compatibility is based on the original GLUT 3.7 and the follow-on FreeGLUT 2.4.0 libraries.

15.1 Using the GLUT Compatibility Header File

You should be able to compile existing GLUT source code by including `<FL/glut.H>` instead of `<GL/glut.h>`. This can be done by editing the source, by changing the `-I` switches to the compiler, or by providing a symbolic link from `GL/glut.h` to `FL/glut.H`.

All files calling GLUT procedures must be compiled with C++. You may have to alter them slightly to get them to compile without warnings, and you may have to rename them to get make to use the C++ compiler.

You must link with the FLTK library. Most of `FL/glut.H` is inline functions. You should take a look at it (and maybe at `test/glpuzzle.cxx` in the FLTK source) if you are having trouble porting your GLUT program.

This has been tested with most of the demo programs that come with the GLUT and FreeGLUT distributions.

15.2 Known Problems

The following functions and/or arguments to functions are missing, and you will have to replace them or comment them out for your code to compile:

- `glutGet (GLUT_ELAPSED_TIME)`
- `glutGet (GLUT_SCREEN_HEIGHT_MM)`
- `glutGet (GLUT_SCREEN_WIDTH_MM)`
- `glutGet (GLUT_WINDOW_NUM_CHILDREN)`
- `glutInitDisplayMode (GLUT_LUMINANCE)`
- `glutKeyboardUpFunc(void(*callback)(unsigned char key, int x, int y))`
- `glutLayerGet (GLUT_HAS_OVERLAY)`

- `glutLayerGet (GLUT_LAYER_IN_USE)`
- `glutPushWindow ()`
- `glutSetColor (), glutGetColor (), glutCopyColormap ()`
- `glutVideoResize ()` missing.
- `glutWarpPointer ()`
- `glutWindowStatusFunc ()`
- Spaceball, buttonbox, dials, and tablet functions

Most of the symbols/enumerations have different values than GLUT uses. This will break code that relies on the actual values. The only symbols guaranteed to have the same values are true/false pairs like `GLUT_DOWN` and `GLUT_UP`, mouse buttons `GLUT_LEFT_BUTTON`, `GLUT_MIDDLE_BUTTON`, `GLUT_RIGHT_BUTTON`, and `GLUT_KEY_F1` thru `GLUT_KEY_F12`.

The strings passed as menu labels are not copied.

`glutPostRedisplay ()` does not work if called from inside a display function. You must use `glutIdleFunc ()` if you want your display to update continuously.

`glutSwapBuffers ()` does not work from inside a display function. This is on purpose, because FLTK swaps the buffers for you.

`glutUseLayer ()` does not work well, and should only be used to initialize transformations inside a resize callback. You should redraw overlays by using `glutOverlayDisplayFunc ()`.

Overlays are cleared before the overlay display function is called. `glutLayerGet (GLUT_OVERLAY_DAMAGED)` always returns true for compatibility with some GLUT overlay programs. You must rewrite your code so that `gl_color ()` is used to choose colors in an overlay, or you will get random overlay colors.

`glutSetCursor (GLUT_CURSOR_FULL_CROSSHAIR)` just results in a small crosshair.

The fonts used by `glutBitmapCharacter ()` and `glutBitmapWidth ()` may be different.

`glutInit (argc, argv)` will consume different switches than GLUT does. It accepts the switches recognized by `Fl::args()`, and will accept any abbreviation of these switches (such as `"-di"` for `"-display"`).

15.3 Mixing GLUT and FLTK Code

You can make your GLUT window a child of a `Fl_Window` with the following scheme. The biggest trick is that GLUT insists on a call to `show ()` the window at the point it is created, which means the `Fl_Window` parent window must already be shown.

- Don't call `glutInit ()`.
- Create your `Fl_Window`, and any FLTK widgets. Leave a blank area in the window for your GLUT window.
- `show ()` the `Fl_Window`. Perhaps call `show (argc, argv)`.
- Call `window->begin ()` so that the GLUT window will be automatically added to it.
- Use `glutInitWindowSize ()` and `glutInitWindowPosition ()` to set the location in the parent window to put the GLUT window.
- Put your GLUT code next. It probably does not need many changes. Call `window->end ()` immediately after the `glutCreateWindow ()` !
- You can call either `glutMainLoop ()`, `Fl::run()`, or loop calling `Fl::wait()` to run the program.

15.4 class Fl_Glut_Window

15.4.1 Class Hierarchy

```
Fl_Gl_Window
|
+----Fl_Glut_Window
```

15.4.2 Include Files

```
#include <FL/glut.H>
```

15.4.3 Description

Each GLUT window is an instance of this class. You may find it useful to manipulate instances directly rather than use GLUT window id's. These may be created without opening the display, and thus can fit better into FLTK's method of creating windows.

The current GLUT window is available in the global variable `glut_window`.

`new Fl_Glut_Window(...)` is the same as `glutCreateWindow()` except it does not `show()` the window or make the window current.

`window->make_current()` is the same as `glutSetWindow(number)`. If the window has not had `show()` called on it yet, some functions that assume an OpenGL context will not work. If you do `show()` the window, call `make_current()` again to set the context.

`~Fl_Glut_Window()` is the same as `glutDestroyWindow()`.

15.4.4 Members

The `Fl_Glut_Window` class contains several public members that can be altered directly:

member	description
<code>display</code>	A pointer to the function to call to draw the normal planes.
<code>entry</code>	A pointer to the function to call when the mouse moves into or out of the window.
<code>keyboard</code>	A pointer to the function to call when a regular key is pressed.
<code>menu[3]</code>	The menu to post when one of the mouse buttons is pressed.
<code>mouse</code>	A pointer to the function to call when a button is pressed or released.
<code>motion</code>	A pointer to the function to call when the mouse is moved with a button down.
<code>overlaydisplay</code>	A pointer to the function to call to draw the overlay planes.
<code>passivemotion</code>	A pointer to the function to call when the mouse is moved with no buttons down.
<code>reshape</code>	A pointer to the function to call when the window is resized.
<code>special</code>	A pointer to the function to call when a special key is pressed.
<code>visibility</code>	A pointer to the function to call when the window is iconified or restored (made visible.)

15.4.5 Methods

```
FI_Glut_Window::FI_Glut_Window(int x, int y, int w, int h, const char *title = 0)  
FI_Glut_Window::FI_Glut_Window(int w, int h, const char *title = 0)
```

The first constructor takes 4 int arguments to create the window with a preset position and size. The second constructor with 2 arguments will create the window with a preset size, but the window manager will choose the position according to its own whims.

```
virtual FI_Glut_Window::~FI_Glut_Window()
```

Destroys the GLUT window.

```
void FI_Glut_Window::make_current()
```

Switches all drawing functions to the GLUT window.

Chapter 16

Forms Compatibility

This appendix describes the Forms compatibility included with FLTK.

Warning: The Forms compatibility is deprecated and no longer maintained in FLTK 1.3, and is likely to be removed completely in FLTK 1.4

16.1 Importing Forms Layout Files

FLUID can read the `.fd` files put out by all versions of Forms and XForms fdesign. However, it will mangle them a bit, but it prints a warning message about anything it does not understand. FLUID cannot write fdesign files, so you should save to a new name so you don't write over the old one.

You will need to edit your main code considerably to get it to link with the output from FLUID. If you are not interested in this you may have more immediate luck with the forms compatibility header, `<FL/forms.H>`.

16.2 Using the Compatibility Header File

You should be able to compile existing Forms or XForms source code by changing the include directory switch to your compiler so that the `forms.h` file supplied with FLTK is included. The `forms.h` file simply pulls in `<FL/forms.H>` so you don't need to change your source code. Take a look at `<FL/forms.H>` to see how it works, but the basic trick is lots of inline functions. Most of the XForms demo programs work without changes.

You will also have to compile your Forms or XForms program using a C++ compiler. The FLTK library does not provide C bindings or header files.

Although FLTK was designed to be compatible with the GL Forms library (version 0.3 or so), XForms has bloated severely and its interface is X-specific. Therefore, XForms compatibility is no longer a goal of FLTK. Compatibility was limited to things that were free, or that would add code that would not be linked in if the feature is unused, or that was not X-specific.

To use any new features of FLTK, you should rewrite your code to not use the inline functions and instead use "pure" FLTK. This will make it a lot cleaner and make it easier to figure out how to call the FLTK functions. Unfortunately this conversion is harder than expected and even Digital Domain's inhouse code still uses `forms.H` a lot.

16.3 Problems You Will Encounter

Many parts of XForms use X-specific structures like `XEvent` in their interface. I did not emulate these! Unfortunately these features (such as the "canvas" widget) are needed by most large programs. You will need to rewrite these to use FLTK subclasses.

`Fl_Free` widgets emulate the *old* Forms "free" widget. It may be useful for porting programs that change the `handle()` function on widgets, but you will still need to rewrite things.

`Fl_Timer` widgets are provided to emulate the XForms timer. These work, but are quite inefficient and inaccurate compared to using `Fl::add_timeout()`.

All instance variables are hidden. If you directly refer to the `x`, `y`, `w`, `h`, `label`, or other fields of your Forms widgets you will have to add empty parenthesis after each reference. The easiest way to do this is to globally replace `"->x"` with `"->x()"`, etc. Replace `"boxtype"` with `"box()"`.

`const char *` arguments to most FLTK methods are simply stored, while Forms would `strdup()` the passed string. This is most noticeable with the label of widgets. Your program must always pass static data such as a string constant or malloc'd buffer to `label()`. If you are using labels to display program output you may want to try the `Fl_Output` widget.

The default fonts and sizes are matched to the older GL version of Forms, so all labels will draw somewhat larger than an XForms program does.

`fdesign` outputs a setting of a "fdui" instance variable to the main window. I did not emulate this because I wanted all instance variables to be hidden. You can store the same information in the `user_data()` field of a window. To do this, search through the `fdesign` output for all occurrences of `"->fdui"` and edit to use `"->user_data()"` instead. This will require casts and is not trivial.

The prototype for the functions passed to `fl_add_timeout()` and `fl_set_idle_callback()` callback are different.

All the following XForms calls are missing:

- `FL_REVISION, fl_library_version()`
- `FL_RETURN_DBLCLICK` (use `Fl::event_clicks()`)
- `fl_add_signal_callback()`
- `fl_set_form_atactivate()` `fl_set_form_atdeactivate()`
- `fl_set_form_property()`
- `fl_set_app_mainform()`, `fl_get_app_mainform()`
- `fl_set_form_minsize()`, `fl_set_form_maxsize()`
- `fl_set_form_event_cmask()`, `fl_get_form_event_cmask()`
- `fl_set_form_dblbuffer()`, `fl_set_object_dblbuffer()` (use an `Fl_Double_Window` instead)
- `fl_adjust_form_size()`
- `fl_register_raw_callback()`
- `fl_set_object_bw()`, `fl_set_border_width()`
- `fl_set_object_resize()`, `fl_set_object_gravity()`
- `fl_set_object_shortcutkey()`

- `fl_set_object_automatic()`
- `fl_get_object_bbox()` (maybe FLTK should do this)
- `fl_set_object_prehandler()`, `fl_set_object_posthandler()`
- `fl_enumerate_fonts()`
- Most drawing functions
- `fl_set_coordunit()` (FLTK uses pixels all the time)
- `fl_ringbell()`
- `fl_gettime()`
- `fl_win*()` (all these functions)
- `fl_initialize(argc, argv, x, y, z)` ignores last 3 arguments
- `fl_read_bitmapfile()`, `fl_read_pixmapfile()`
- `fl_addto_browser_chars()`
- `FL_MENU_BUTTON` just draws normally
- `fl_set_bitmapbutton_file()`, `fl_set_pixmapbutton_file()`
- `FL_CANVAS` objects
- `FL_DIGITAL_CLOCK` (comes out analog)
- `fl_create_bitmap_cursor()`, `fl_set_cursor_color()`
- `fl_set_dial_angles()`
- `fl_show_oneliner()`
- `fl_set_choice_shortcut(a, b, c)`
- command log
- Only some of file selector is emulated
- `FL_DATE_INPUT`
- `fl_pup*()` (all these functions)
- textbox object (should be easy but I had no sample programs)
- xyplot object

16.4 Additional Notes

These notes were written for porting programs written with the older IRISGL version of Forms. Most of these problems are the same ones encountered when going from old Forms to XForms:

Does Not Run In Background

The IRISGL library always forked when you created the first window, unless `foreground()` was called. FLTK acts like `foreground()` is called all the time. If you really want the fork behavior do `if (fork()) exit(0)` right at the start of your program.

You Cannot Use IRISGL Windows or fl_queue

If a Forms (not XForms) program if you wanted your own window for displaying things you would create a IRISGL window and draw in it, periodically calling Forms to check if the user hit buttons on the panels. If the user did things to the IRISGL window, you would find this out by having the value `FL_EVENT` returned from the call to Forms.

None of this works with FLTK. Nor will it compile, the necessary calls are not in the interface.

You have to make a subclass of `Fl_Gl_Window` and write a `draw()` method and `handle()` method. This may require anywhere from a trivial to a major rewrite.

If you draw into the overlay planes you will have to also write a `draw_overlay()` method and call `redraw_↔overlay()` on the OpenGL window.

One easy way to hack your program so it works is to make the `draw()` and `handle()` methods on your window set some static variables, storing what event happened. Then in the main loop of your program, call `Fl::wait()` and then check these variables, acting on them as though they are events read from `fl_queue`.

You Must Use OpenGL to Draw Everything

The file `<FL/gl.h>` defines replacements for a lot of IRISGL calls, translating them to OpenGL. There are much better translators available that you might want to investigate.

You Cannot Make Forms Subclasses

Programs that call `fl_make_object` or directly setting the handle routine will not compile. You have to rewrite them to use a subclass of `Fl_Widget`. It is important to note that the `handle()` method is not exactly the same as the `handle()` function of Forms. Where a Forms `handle()` returned non-zero, your `handle()` must call `do_callback()`. And your `handle()` must return non-zero if it "understood" the event.

An attempt has been made to emulate the "free" widget. This appears to work quite well. It may be quicker to modify your subclass into a "free" widget, since the "handle" functions match.

If your subclass draws into the overlay you are in trouble and will have to rewrite things a lot.

You Cannot Use `<device.h>`

If you have written your own "free" widgets you will probably get a lot of errors about "getvaluator". You should substitute:

Forms	FLTK
MOUSE_X	<code>Fl::event_x_root()</code>
MOUSE_Y	<code>Fl::event_y_root()</code>
LEFTSHIFTKEY,RIGHTSHIFTKEY	<code>Fl::event_shift()</code>
CAPSLCKKEY	<code>Fl::event_capslock()</code>
LEFTCTRLKEY,RIGHTCTRLKEY	<code>Fl::event_ctrl()</code>
LEFTALTKEY,RIGHTALTKEY	<code>Fl::event_alt()</code>
MOUSE1,RIGHTMOUSE	<code>Fl::event_state()</code>
MOUSE2,MIDDLEMOUSE	<code>Fl::event_state()</code>
MOUSE3,LEFTMOUSE	<code>Fl::event_state()</code>

Anything else in `getvaluator` and you are on your own...

Font Numbers Are Different

The "style" numbers have been changed because I wanted to insert bold-italic versions of the normal fonts. If you use Times, Courier, or Bookman to display any text you will get a different font out of FLTK. If you are really desperate to fix this use the following code:

```
fl_font_name(3, "*courier-medium-r-no*");  
fl_font_name(4, "*courier-bold-r-no*");  
fl_font_name(5, "*courier-medium-o-no*");  
fl_font_name(6, "*times-medium-r-no*");  
fl_font_name(7, "*times-bold-r-no*");  
fl_font_name(8, "*times-medium-i-no*");  
fl_font_name(9, "*bookman-light-r-no*");  
fl_font_name(10, "*bookman-demi-r-no*");  
fl_font_name(11, "*bookman-light-i-no*");
```


Chapter 17

Operating System Issues

This appendix describes the operating system specific interfaces in FLTK:

- [Accessing the OS Interfaces](#)
- [The UNIX \(X11\) Interface](#)
- [The Windows \(WIN32\) Interface](#)
- [The Apple OS X Interface](#)

17.1 Accessing the OS Interfaces

All programs that need to access the operating system specific interfaces must include the following header file:

```
#include <FL/x.H>
```

Despite the name, this header file will define the appropriate interface for your environment.

Note

This header file name "x.H" is changed in FLTK 1.4.0 to the better name "platform.H". Since FLTK 1.3.5 there is a compatibility header file [FL/platform.H](#) that includes [FL/x.H](#) to help you move to FLTK 1.4.0. If your code is targeted at FLTK 1.3.5 or higher you can safely change it to include [FL/platform.H](#) instead. FLTK 1.4.x will keep the file "x.H" for a few releases for backwards compatibility.

The pages that follow describe the functionality that is provided for each operating system.

WARNING:

The interfaces provided by this header file may change radically in new FLTK releases. Use them only when an existing generic FLTK interface is not sufficient.

17.2 The UNIX (X11) Interface

The UNIX interface provides access to the X Window System state information and data structures.

17.2.1 Handling Other X Events

void [Fl::add_handler](#)(int (*f)(int))

Installs a function to parse unrecognized events. If FLTK cannot figure out what to do with an event, it calls each of these functions (most recent first) until one of them returns non-zero. If none of them returns non-zero then the event is ignored.

FLTK calls this for any X events it does not recognize, or X events with a window ID that FLTK does not recognize. You can look at the X event in the `fl_xevent` variable.

The argument is the FLTK event type that was not handled, or zero for unrecognized X events. These handlers are also called for global shortcuts and some other events that the widget they were passed to did not handle, for example `FL_SHORTCUT`.

extern XEvent *fl_xevent

This variable contains the most recent X event.

extern ulong fl_event_time

This variable contains the time stamp from the most recent X event that reported it; not all events do. Many X calls like cut and paste need this value.

Window fl_xid(const Fl_Window *)

Returns the XID for a window, or zero if not `shown()`.

[Fl_Window](#) *fl_find(ulong xid)

Returns the [Fl_Window](#) that corresponds to the given XID, or `NULL` if not found. This function uses a cache so it is slightly faster than iterating through the windows yourself.

int fl_handle(const XEvent &)

This call allows you to supply the X events to FLTK, which may allow FLTK to cooperate with another toolkit or library. The return value is non-zero if FLTK understood the event. If the window does not belong to FLTK and the `add_handler()` functions all return 0, this function will return false.

Besides feeding events your code should call [Fl::flush\(\)](#) periodically so that FLTK redraws its windows.

This function will call the callback functions. It will not return until they complete. In particular, if a callback pops up a modal window by calling [fl_ask\(\)](#), for instance, it will not return until the modal function returns.

17.2.2 Drawing using Xlib

The following global variables are set before `FL_Widget::draw()` is called, or by `FL_Window::make_current()`:

```
extern Display *fl_display;
extern Window fl_window;
extern GC fl_gc;
extern int fl_screen;
extern XVisualInfo *fl_visual;
extern Colormap fl_colormap;
```

You must use them to produce Xlib calls. Don't attempt to change them. A typical X drawing call is written like this:

```
XDrawSomething(fl_display, fl_window, fl_gc, ...);
```

Other information such as the position or size of the X window can be found by looking at `FL_Window::current()`, which returns a pointer to the `FL_Window` being drawn.

```
unsigned long fl_xpixel(FL_Color i)
unsigned long fl_xpixel(uchar r, uchar g, uchar b)
```

Returns the X pixel number used to draw the given FLTK color index or RGB color. This is the X pixel that `fl_color()` would use.

```
int fl_parse_color(const char* p, uchar& r, uchar& g, uchar& b)
```

Convert a name into the red, green, and blue values of a color by parsing the X11 color names. On other systems, `fl_parse_color()` can only convert names in hexadecimal encoding, for example `#ff8083`.

```
extern XFontStruct *fl_xfont
```

Points to the font selected by the most recent `fl_font()`. This is not necessarily the current font of `fl_gc`, which is not set until `fl_draw()` is called. If FLTK was compiled with Xft support, `fl_xfont` will usually be 0 and `fl_xfont` will contain a pointer to the `XftFont` structure instead.

```
extern void *fl_xffont
```

If FLTK was compiled with Xft support enabled, `fl_xffont` points to the xft font selected by the most recent `fl_font()`. Otherwise it will be 0. `fl_xffont` should be cast to `XftFont*`.

17.2.3 Changing the Display, Screen, or X Visual

FLTK uses only a single display, screen, X visual, and X colormap. This greatly simplifies its internal structure and makes it much smaller and faster. You can change which it uses by setting global variables *before the first `FL_Window::show()` is called*. You may also want to call `Fl::visual()`, which is a portable interface to get a full color and/or double buffered visual.

```
int Fl::display(const char *)
```

Set which X display to use. This actually does `putenv("DISPLAY=...")` so that child programs will display on the same screen if called with `exec()`. This must be done before the display is opened. This call is provided under MacOS and WIN32 but it has no effect.

```
extern Display *fl_display
```

The open X display. This is needed as an argument to most Xlib calls. Don't attempt to change it! This is `NULL` before the display is opened.

```
void fl_open_display()
```

Opens the display. Does nothing if it is already open. This will make sure `fl_display` is non-zero. You should call this if you wish to do X calls and there is a chance that your code will be called before the first `show()` of a window.

This may call `Fl::abort()` if there is an error opening the display.

```
void fl_close_display()
```

This closes the X connection. You do *not* need to call this to exit, and in fact it is faster to not do so! It may be useful to call this if you want your program to continue without the X connection. You cannot open the display again, and probably cannot call any FLTK functions.

```
extern int fl_screen
```

Which screen number to use. This is set by `fl_open_display()` to the default screen. You can change it by setting this to a different value immediately afterwards. It can also be set by changing the last number in the `Fl::display()` string to "host:0.#".

```
extern XVisualInfo *fl_visual
extern Colormap fl_colormap
```

The visual and colormap that FLTK will use for all windows. These are set by `fl_open_display()` to the default visual and colormap. You can change them before calling `show()` on the first window. Typical code for changing the default visual is:

```
Fl::args(argc, argv); // do this first so $DISPLAY is set
fl_open_display();
fl_visual = find_a_good_visual(fl_display, fl_screen);
if (!fl_visual) Fl::abort("No good visual");
fl_colormap = make_a_colormap(fl_display, fl_visual->visual, fl_visual->depth);
// it is now ok to show() windows:
window->show(argc, argv);
```

17.2.4 Using a Subclass of `Fl_Window` for Special X Stuff

FLTK can manage an X window on a different screen, visual and/or colormap, you just can't use FLTK's drawing routines to draw into it. But you can write your own `draw()` method that uses Xlib (and/or OpenGL) calls only.

FLTK can also manage XID's provided by other libraries or programs, and call those libraries when the window needs to be redrawn.

To do this, you need to make a subclass of `Fl_Window` and override some of these virtual functions:

virtual void `Fl_Window::show()`

If the window is already `shown()` this must cause it to be raised, this can usually be done by calling `Fl_Window::show()`. If not `shown()` your implementation must call either `Fl_X::set_xid()` or `Fl_X::make_xid()`.

An example:

```
void MyWindow::show() {
    if (shown()) {Fl_Window::show(); return;} // you must do this!
    fl_open_display(); // necessary if this is first window
    // we only calculate the necessary visual colormap once:
    static XVisualInfo *visual;
    static Colormap colormap;
    if (!visual) {
        visual = figure_out_visual();
        colormap = XCreateColormap(fl_display, RootWindow(fl_display, fl_screen),
                                   vis->visual, AllocNone);
    }
    Fl_X::make_xid(this, visual, colormap);
}
```

```
Fl_X *Fl_X::set_xid(Fl_Window*, Window xid)
```

Allocate a hidden class called an `Fl_X`, put the XID into it, and set a pointer to it from the `Fl_Window`. This causes `Fl_Window::shown()` to return true.

```
void Fl_X::make_xid(Fl_Window*, XVisualInfo* = fl_visual, Colormap = fl_colormap)
```

This static method does the most onerous parts of creating an X window, including setting the label, resize limitations, etc. It then does `Fl_X::set_xid()` with this new window and maps the window.

virtual void `Fl_Window::flush()`

This virtual function is called by `Fl::flush()` to update the window. For FLTK's own windows it does this by setting the global variables `fl_window` and `fl_gc` and then calling the `draw()` method. For your own windows you might just want to put all the drawing code in here.

The X region that is a combination of all `damage()` calls done so far is in `Fl_X::i(this)->region`. If `NULL` then you should redraw the entire window. The undocumented function `fl_clip_region()` (`XRegion`) will initialize the FLTK clip stack with a region or `NULL` for no clipping. You must set region to `NULL` afterwards as `fl_clip_region()` will own and delete it when done.

If `damage()` & `FL_DAMAGE_EXPOSE` then only X expose events have happened. This may be useful if you have an undamaged image (such as a backing buffer) around.

Here is a sample where an undamaged image is kept somewhere:

```
void MyWindow::flush() {
    fl_clip_region(Fl_X::i(this)->region);
    Fl_X::i(this)->region = 0;
    if (damage() != 2) {... draw things into backing store ...}
    ... copy backing store to window ...
}
```

virtual void `Fl_Window::hide()`

Destroy the window server copy of the window. Usually you will destroy contexts, pixmaps, or other resources used by the window, and then call `Fl_Window::hide()` to get rid of the main window identified by `xid()`. If you override this, you must also override the destructor as shown:

```
void MyWindow::hide() {
    if (mypixmap) {
        XFreePixmap(fl_display, mypixmap);
        mypixmap = 0;
    }
    Fl_Window::hide(); // you must call this
}
```

virtual void `Fl_Window::~Fl_Window()`

Because of the way C++ works, if you override `hide()` you *must* override the destructor as well (otherwise only the base class `hide()` is called):

```
MyWindow::~MyWindow() {
    hide();
}
```

Note

Access to the `Fl_X` hidden class requires to `#define FL_INTERNALS` before compilation.

17.2.5 Setting the Icon of a Window

FLTK currently supports setting a window's icon **before** it is shown using the `Fl_Window::icon()` method.

void `Fl_Window::icon(const void *)`

Sets the icon for the window to the passed pointer. You will need to cast the icon `Pixmap` to a `char*` when calling this method. To set a monochrome icon using a bitmap compiled with your application use:

```
#include "icon.xbm"
fl_open_display(); // needed if display has not been previously opened
Pixmap p = XCreateBitmapFromData(fl_display, DefaultRootWindow(fl_display),
                                icon_bits, icon_width, icon_height);
window->icon((const void*)p);
```

To use a multi-colored icon, the XPM format and library should be used as follows:

```
#include <X11/xpm.h>
#include "icon.xpm"
fl_open_display(); // needed if display has not been previously opened
Pixmap p, mask;
XpmCreatePixmapFromData(fl_display, DefaultRootWindow(fl_display),
                        icon_xpm, &p, &mask, NULL);
window->icon((const void *)p);
```

When using the Xpm library, be sure to include it in the list of libraries that are used to link the application (usually `-lXpm`).

NOTE:

You must call `FL_Window::show(int argc, char** argv)` for the icon to be used. The `FL_Window::show()` method does not bind the icon to the window.

17.2.6 X Resources

When the `FL_Window::show(int argc, char** argv)` method is called, FLTK looks for the following X resources:

- `background` - The default background color for widgets (color).
- `dndTextOps` - The default setting for drag and drop text operations (boolean).
- `foreground` - The default foreground (label) color for widgets (color).
- `scheme` - The default scheme to use (string).
- `selectBackground` - The default selection color for menus, etc. (color).
- `Text.background` - The default background color for text fields (color).
- `tooltips` - The default setting for tooltips (boolean).
- `visibleFocus` - The default setting for visible keyboard focus on non-text widgets (boolean).

Resources associated with the first window's `FL_Window::xclass()` string are queried first, or if no class has been specified then the class `"fltk"` is used (e.g. `fltk.background`). If no match is found, a global search is done (e.g. `*background`).

17.3 The Windows (WIN32) Interface

The Windows interface provides access to the WIN32 GDI state information and data structures.

17.3.1 Using filenames with non-ASCII characters

In FLTK, all strings, including filenames, are UTF-8 encoded. The utility functions `fl_fopen()` and `fl_open()` allow to open files potentially having non-ASCII names in a cross-platform fashion, whereas the standard `fopen()/open()` functions fail to do so.

17.3.2 Responding to WM_QUIT

FLTK will intercept WM_QUIT messages that are directed towards the thread that runs the main loop. These are converted to SIGTERM signals via `raise()`. This allows you to deal with outside termination requests with the same code on both Windows and UNIX systems. Other processes can send this message via `PostThreadMessage()` in order to request, rather than force your application to terminate.

17.3.3 Handling Other WIN32 Messages

By default a single WNDCLASSEX called "FLTK" is created. All `Fl_Window`'s are of this class unless you use `Fl_Window::xclass()`. The window class is created the first time `Fl_Window::show()` is called.

You can probably combine FLTK with other libraries that make their own WIN32 window classes. The easiest way is to call `Fl::wait()`, as it will call `DispatchMessage()` for all messages to the other windows. If necessary you can let the other library take over as long as it calls `DispatchMessage()`, but you will have to arrange for the function `Fl::flush()` to be called regularly so that widgets are updated, timeouts are handled, and the idle functions are called.

```
extern MSG fl_msg
```

This variable contains the most recent message read by `GetMessage()`, which is called by `Fl::wait()`. This may not be the most recent message sent to an FLTK window, because silly WIN32 calls the handle procedures directly for some events (sigh).

```
void Fl::add_handler(int (*f)(int))
```

Installs a function to parse unrecognized messages sent to FLTK windows. If FLTK cannot figure out what to do with a message, it calls each of these functions (most recent first) until one of them returns non-zero. The argument passed to the functions is the FLTK event that was not handled or zero for unknown messages. If all the handlers return zero then FLTK calls `DefWindowProc()`.

```
HWND fl_xid(const Fl_Window *)
```

Returns the window handle for a `Fl_Window`, or zero if not `shown()`.

```
Fl_Window *fl_find(HWND xid)
```

Returns the `Fl_Window` that corresponds to the given window handle, or `NULL` if not found. This function uses a cache so it is slightly faster than iterating through the windows yourself.

17.3.4 Drawing Things Using the WIN32 GDI

When the virtual function `FL_Widget::draw()` is called, FLTK stores all the extra arguments you need to make a proper GDI call in some global variables:

```
extern HINSTANCE fl_display;
extern HWND fl_window;
extern HDC fl_gc;
COLORREF fl_RGB();
HPEN fl_pen();
HBRUSH fl_brush();
```

These global variables are set before `FL_Widget::draw()` is called, or by `FL_Window::make_current()`. You can refer to them when needed to produce GDI calls, but don't attempt to change them. The functions return GDI objects for the current color set by `fl_color()` and are created as needed and cached. A typical GDI drawing call is written like this:

```
DrawSomething(fl_gc, ..., fl_brush());
```

It may also be useful to refer to `FL_Window::current()` to get the window's size or position.

17.3.5 Setting the Icon of a Window

FLTK currently supports setting a window's icon *before* it is shown using the `FL_Window::icon()` method.

```
void FL_Window::icon(const void *)
```

Sets the icon for the window to the passed pointer. You will need to cast the `HICON` handle to a `char*` when calling this method. To set the icon using an icon resource compiled with your application use:

```
window->icon((const void *)LoadIcon(fl_display, MAKEINTRESOURCE(IDI_ICON)));
```

You can also use the `LoadImage()` and related functions to load specific resolutions or create the icon from bitmap data.

NOTE:

You must call `FL_Window::show(int argc, char** argv)` for the icon to be used. The `FL_Window::show()` method does not bind the icon to the window.

17.3.6 How to Not Get a MSDOS Console Window

WIN32 has a really stupid mode switch stored in the executables that controls whether or not to make a console window.

To always get a console window you simply create a console application (the `"/SUBSYSTEM:CONSOLE"` option for the linker). For a GUI-only application create a WIN32 application (the `"/SUBSYSTEM:WINDOWS"` option for the linker).

FLTK includes a `WinMain()` function that calls the ANSI standard `main()` entry point for you. *This function creates a console window when you use the debug version of the library.*

WIN32 applications without a console cannot write to `stdout` or `stderr`, even if they are run from a console window. Any output is silently thrown away. Additionally, WIN32 applications are run in the background by the console, although you can use `"start /wait program"` to run them in the foreground.

17.3.7 Known WIN32 Bugs and Problems

The following is a list of known bugs and problems in the WIN32 version of FLTK:

- If a program is deactivated, `Fl::wait()` does not return until it is activated again, even though many events are delivered to the program. This can cause idle background processes to stop unexpectedly. This also happens while the user is dragging or resizing windows or otherwise holding the mouse down. We were forced to remove most of the efficiency FLTK uses for redrawing in order to get windows to update while being moved. This is a design error in WIN32 and probably impossible to get around.
- `Fl_Gl_Window::can_do_overlay()` returns true until the first time it attempts to draw an overlay, and then correctly returns whether or not there is overlay hardware.
- `SetCapture` (used by `Fl::grab()`) doesn't work, and the main window title bar turns gray while menus are popped up.
- Compilation with `gcc 3.4.4` and `-Os` exposes an optimisation bug in `gcc`. The symptom is that when drawing filled circles only the perimeter is drawn. This can for instance be seen in the symbols demo. Other optimisation options such as `-O2` and `-O3` seem to work OK. More details can be found in STR#1656

17.4 The Apple OS X Interface

FLTK supports Apple OS X using the Apple Cocoa library. Older versions of MacOS are no longer supported.

Control, Option, and Command Modifier Keys

FLTK maps the Mac 'control' key to `FL_CTRL`, the 'option' key to `FL_ALT` and the 'Apple' key to `FL_META`. Furthermore, `FL_COMMAND` designates the 'Apple' key on Mac OS X and the 'control' key on other platforms. Keyboard events return the key name in `Fl::event_key()` and the keystroke translation in `Fl::event_text()`. For example, typing Option-Y on a Mac US keyboard will set `FL_ALT` in `Fl::event_state()`, set `Fl::event_key()` to 'y' and return the Yen symbol in `Fl::event_text()`.

Right Click simulation with Ctrl Click

The Apple HIG guidelines indicate applications should support 'Ctrl Click' to simulate 'Right Click' for e.g. context menus, so users with one-button mice and one-click trackpads can still access right-click features. However, paraphrasing [Manolo's comment on the fltk.coredev newsgroup](#):

- *FLTK does /not/ support Ctrl-Click == Right Click itself because Mac OS X event processing doesn't support this at the system level: the system reports left-clicks with the ctrl modifier when the user ctrl-clicks, and OS X system preferences don't allow changing this behavior. Therefore, applications must handle simulation of Right Click with Ctrl Click in the application code.*

Ian MacArthur provided the following `handle()` method code snippet showing an example of how to do this:

```

case FL_PUSH:
{
    int btn = Fl::event_button();
#ifdef __APPLE__
    int ev_state = Fl::event_state();
#endif
    //
    // Context menu can be called up in one of two ways: -
    // 1 - right click, as normally used on Windows and Linux
    // 2 - Ctrl + left click, as sometimes used on Mac
    //
#ifdef __APPLE__
    // On apple, check right click, and ctrl+left click
    if ((btn == FL_RIGHT_MOUSE) || (ev_state == (FL_CTRL | FL_BUTTON1)))
#else
    // On other platforms, only check right click as ctrl+left is used for selections
    if (btn == FL_RIGHT_MOUSE)
#endif
    {
        // Did we right click on the object?..
    }
}

```

There is a thread about this subject on `fltk.coredev` (Aug 1-14, 2014) entitled "[RFC] Right click emulation for one button mouse on Mac".

Apple "Quit" Event

When the user presses `Cmd-Q` or requests a termination of the application, FLTK reacts sending an `FL_CLOSE` event to all open windows. If any window remains open, the termination request aborts, and the app continues. If all windows close, FLTK default behaviour is to terminate the application immediately, without letting `Fl::run()` return. Consequently, potential cleanup code placed after the `Fl::run()` call does not run, and potential global destructors that would run after `main()` would return do not run. All code that should run so the app cleanly terminates must therefore be placed in window callbacks (which run when windows are closed) or in `atexit()` functions. Alternatively, FLTK can be directed to just terminate the event loop and therefore let potential cleanup code placed after return from `Fl::run()` and from `main()` execute. This is obtained setting global variable `fl_mac_quit_early` to 0.

Apple "Open" Event

Whenever the user drops a file onto an application icon, OS X generates an Apple Event of the type "Open". You can have FLTK notify you of an Open event by calling the `fl_open_callback` function.

`void fl_open_display()`

Opens the display. Does nothing if it is already open. You should call this if you wish to do Cocoa or Quartz calls and there is a chance that your code will be called before the first `show()` of a window.

Window `fl_xid(const Fl_Window *)`

Returns the window reference for an `Fl_Window`, or `NULL` if the window has not been shown. This reference is a pointer to an instance of the subclass `FLWindow` of Cocoa's `NSWindow` class.

`Fl_Window *fl_find(Window xid)`

Returns the `FL_Window` that corresponds to the given window reference, or `NULL` if not found.

void `fl_mac_set_about(FL_Callback *cb, void *user_data, int shortcut)`

Attaches the callback `cb` to the "About myprog" item of the system application menu. `cb` will be called with `NULL` first argument and `user_data` second argument.

`FL_Sys_Menu_Bar` class

The `FL_Sys_Menu_Bar` class allows to build menu bars that, on Mac OS X, are placed in the system menu bar (at top-left of display), and, on other platforms, at a user-chosen location of a user-chosen window.

17.4.1 Setting the icon of an application

- First, create a `.icns` file containing several copies of your icon of decreasing sizes. This can be done using the Preview application or the Icon Composer application available in "Graphics Tools for Xcode". To create a high resolution icon file, it is necessary to use the `iconutil` command-line utility.
- Put your `.icns` file in the Resources subdirectory of your application bundle.
- Add these two lines to the `Info.plist` file of your application bundle

```
<key>CFBundleIconFile</key>
<string>foo.icns</string>
```

replacing `foo` by your application name. If you use Xcode, just add your `.icns` file to your application target.

17.4.2 Drawing Things Using Quartz

All code inside `FL_Widget::draw()` is expected to call Quartz drawing functions. The Quartz coordinate system is flipped to match FLTK's coordinate system. The origin for all drawing is in the top left corner of the enclosing `FL_Window`. The global variable `fl_gc` (of type `CGContextRef`) is the appropriate Quartz 2D drawing environment. Include `FL/x.H` to declare the `fl_gc` variable.

17.4.3 Internationalization

All FLTK programs contain an application menu with, e.g., the About xxx, Hide xxx, and Quit xxx items. This menu can be internationalized/localized by any of two means.

- using the `FL_Mac_App_Menu` class.
- using the standard Mac OS X localization procedure. Create a language-specific `.lproj` directory (e.g., `German.lproj`) in the Resources subdirectory of the application bundle. Create therein a `Localizable.strings` file that translates all menu items to this language. The German `Localizable.strings` file, for example, contains:

```
"About %@" = "Über %@";
"Print Front Window"="Frontfenster drucken";
"Services" = "Dienste";
"Hide %@"="%% ausblenden";
"Hide Others"="Andere ausblenden";
"Show All"="Alle einblenden";
"Quit %@"="%% beenden";
```

Set `"Print Front Window" = ""`; therein so the application menu doesn't show a "Print Front Window" item. To localize the application name itself, create a file `InfoPlist.strings` in each `.lproj` directory and put `CFBundleName = "localized name"`; in each such file.

17.4.4 OpenGL and 'retina' displays

It is possible to have OpenGL produce graphics at the high pixel resolution allowed by the so-called 'retina' displays present on recent Apple hardware. For this, call

```
Fl::use_high_res_GL(1);
```

before any `Fl_Gl_Window` is shown. Also, adapt your `Fl_Gl_Window::draw()` and `Fl_Gl_Window::draw_overlay()` methods replacing

```
glViewport(0, 0, w(), h());
```

by

```
glViewport(0, 0, pixel_w(), pixel_h());
```

making use of the `Fl_Gl_Window::pixel_w()` and `Fl_Gl_Window::pixel_h()` methods that return the width and height of the GL scene in pixels: if the `Fl_Gl_Window` is mapped on a retina display, these methods return twice as much as reported by `Fl_Widget::w()` and `Fl_Widget::h()`; if it's mapped on a regular display, they return the same values as `w()` and `h()`. These methods dynamically change their values if the window is moved into/out from a retina display. If `Fl::use_high_res_GL(1)` is not called, all `Fl_Gl_Window` 's are drawn at low resolution. These methods are synonyms of `w()` and `h()` on non-Mac OS X platforms, so the source code remains cross-platform.

The `Fl_Gl_Window::pixels_per_unit()` method is useful when the OpenGL code depends on the pixel dimension of the GL scene. This occurs, e.g., if a window's `handle()` method uses `Fl::event_x()` and `Fl::event_y()` whose returned values should be multiplied by `Fl_Gl_Window::pixels_per_unit()` to obtain the adequate pixel units. This method may also be useful, for example, to adjust the width of a line in a high resolution GL scene.

17.4.5 Fl_Double_Window

OS X double-buffers all windows automatically. On OS X, `Fl_Window` and `Fl_Double_Window` are handled internally in the same way.

17.4.6 Mac File System Specifics

Resource Forks

FLTK does not access the resource fork of an application. However, a minimal resource fork must be created for OS X applications. Starting with OS X 10.6, resource forks are no longer needed.

Caution (OS X 10.2 and older):

When using UNIX commands to copy or move executables, OS X will NOT copy any resource forks! For copying and moving use `CpMac` and `MvMac` respectively. For creating a tar archive, all executables need to be stripped from their Resource Fork before packing, e.g. `"DeRez fluid > fluid.r"`. After unpacking the Resource Fork needs to be reattached, e.g. `"Rez fluid.r -o fluid"`.

It is advisable to use the Finder for moving and copying and Mac archiving tools like Sit for distribution as they will handle the Resource Fork correctly.

Mac File Paths

FLTK uses UTF-8-encoded UNIX-style filenames and paths.

See also

[Mac OS X-specific symbols](#)

Chapter 18

Migrating Code from FLTK 1.0 to 1.1

This appendix describes the differences between the FLTK 1.0.x and FLTK 1.1.x functions and classes.

18.1 Color Values

Color values are now stored in a 32-bit unsigned integer instead of the unsigned character in 1.0.x. This allows for the specification of 24-bit RGB values or 8-bit FLTK color indices.

`FL_BLACK` and `FL_WHITE` now remain black and white, even if the base color of the gray ramp is changed using `Fl::background()`. `FL_DARK3` and `FL_LIGHT3` can be used instead to draw a very dark or a very bright background hue.

Widgets use the new color symbols `FL_FOREGROUND_COLOR`, `FL_BACKGROUND_COLOR`, `FL_BACKGROUND2_COLOR`, `FL_INACTIVE_COLOR`, and `FL_SELECTION_COLOR`. More details can be found in the chapter [FLTK Enumerations](#).

18.2 Cut and Paste Support

The FLTK clipboard is now broken into two parts - a local selection value and a cut-and-paste value. This allows FLTK to support things like highlighting and replacing text that was previously cut or copied, which makes FLTK applications behave like traditional GUI applications.

18.3 File Chooser

The file chooser in FLTK 1.1.x is significantly different than the one supplied with FLTK 1.0.x. Any code that directly references the old `FCB` class or members will need to be ported to the new [Fl_File_Chooser](#) class.

18.4 Function Names

Some function names have changed from FLTK 1.0.x to 1.1.x in order to avoid name space collisions. You can still use the old function names by defining the `FLTK_1_0_COMPAT` symbol on the command-line when you compile (`-DFLTK_1_0_COMPAT`) or in your source, e.g.:

```
#define FLTK_1_0_COMPAT
#include <FL/Fl.H>
#include <FL/Enumerations.H>
#include <FL/filename.H>
```

The following table shows the old and new function names:

Old 1.0.x Name	New 1.1.x Name
contrast()	fl_contrast()
down()	fl_down()
filename_absolute()	fl_filename_absolute()
filename_expand()	fl_filename_expand()
filename_ext()	fl_filename_ext()
filename_isdir()	fl_filename_isdir()
filename_list()	fl_filename_list()
filename_match()	fl_filename_match()
filename_name()	fl_filename_name()
filename_relative()	fl_filename_relative()
filename_settext()	fl_filename_settext()
frame()	fl_frame()
inactive()	fl_inactive()
numeric_sort()	fl_numeric_sort()

18.5 Image Support

Image support in FLTK has been significantly revamped in 1.1.x. The [Fl_Image](#) class is now a proper base class, with the core image drawing functionality in the [Fl_Bitmap](#), [Fl_Pixmap](#), and [Fl_RGB_Image](#) classes.

BMP, GIF, JPEG, PNG, XBM, and XPM image files can now be loaded using the appropriate image classes, and the [Fl_Shared_Image](#) class can be used to cache images in memory.

Image labels are no longer provided as an add-on label type. If you use the old `label()` methods on an image, the widget's `image()` method is called to set the image as the label.

Image labels in menu items must still use the old `labeltype` mechanism to preserve source compatibility.

18.6 Keyboard Navigation

FLTK 1.1.x now supports keyboard navigation and control with all widgets. To restore the old FLTK 1.0.x behavior so that only text widgets get keyboard focus, call the [Fl::visible_focus\(\)](#) method to disable it:

```
Fl::visible_focus(0);
```

Chapter 19

Migrating Code from FLTK 1.1 to 1.3

This appendix describes the differences between the FLTK 1.1.x and FLTK 1.3.x functions and classes.

19.1 Migrating From FLTK 1.0

If you want to migrate your code from FLTK 1.0 to FLTK 1.3, then you should first consult [Appendix Migrating Code from FLTK 1.0 to 1.1](#).

19.2 FI_Scroll Widget

`FI_Scroll::scroll_to(int x, int y)` replaces `FI_Scroll::position(int x, int y)`.

This change was needed because `FI_Scroll::position(int,int)` redefined `FI_Widget::position(int,int)`, but with a completely different function (moving the scrollbars instead of moving the widget).

Please be aware that you need to change your application's code for all `FI_Scroll`-derived widgets, if you used `FI_Scroll::position(int x, int y)` to position **the scrollbars** (not the widget itself).

The compiler will not detect any errors, because your calls to `position(int x, int y)` will be calling `FI_Widget::position(int x, int y)`.

19.3 Unicode (UTF-8)

FLTK 1.3 uses Unicode (UTF-8) encoding internally. If you are only using characters in the ASCII range (32-127), there is a high probability that you don't need to modify your code. However, if you use international characters (128-255), encoded as e.g. Windows codepage 1252, ISO-8859-1, ISO-8859-15 or any other encoding, then you will need to update your character string constants and widget input data accordingly.

Please refer to the [Unicode and UTF-8 Support](#) chapter for more details.

Note

It is important that, although your software uses only ASCII characters for input to FLTK widgets, the user may enter non-ASCII characters, and FLTK will return these characters with UTF-8 encoding to your application, e.g. via `FI_Input::value()`. You **will** need to re-encode them to **your** (non-UTF-8) encoding, otherwise you might see or print garbage in your data.

19.4 Widget Coordinate Representation

FLTK 1.3 changed all Widget coordinate variables and methods, e.g. `Fl_Widget::x()`, `Fl_Widget::y()`, `Fl_Widget::w()`, `Fl_Widget::h()`, from short (16-bit) to int (32-bit) representation. This should not affect any existing code, but makes it possible to use bigger scroll areas (e.g. `Fl_Scroll` widget).

Chapter 20

Developer Information

This chapter describes FLTK development and documentation.

Example

```
/** \file
    Fl_Clock, Fl_Clock_Output widgets. */

/**
    \class Fl_Clock_Output
    \brief This widget can be used to display a program-supplied time.

    The time shown on the clock is not updated. To display the current time,
    use Fl_Clock instead.

    \image html clock.png
    \image latex clock.png "" width=10cm
    \image html round_clock.png
    \image latex clock.png "" width=10cm
    \image html round_clock.png "" width=10cm */

/**
    Returns the displayed time.
    Returns the time in seconds since the UNIX epoch (January 1, 1970).
    \see value(ulong)
    */
ulong value() const {return value_;}

/**
    Set the displayed time.
    Set the time in seconds since the UNIX epoch (January 1, 1970).
    \param[in] v seconds since epoch
    \see value()
    */
void Fl_Clock_Output::value(ulong v) {
    [...]
}

/**
    Create an Fl_Clock widget using the given position, size, and label string.
    The default boxtype is \c FL_NO_BOX.
    \param[in] X, Y, W, H position and size of the widget
    \param[in] L widget label, default is no label
    */
Fl_Clock::Fl_Clock(int X, int Y, int W, int H, const char *L)
    : Fl_Clock_Output(X, Y, W, H, L) {}

/**
```

```

    Create an Fl_Clock widget using the given boxtype, position, size, and
    label string.
    \param[in] t boxtype
    \param[in] X, Y, W, H position and size of the widget
    \param[in] L widget label, default is no label
    */
Fl_Clock::Fl_Clock(uchar t, int X, int Y, int W, int H, const char *L)
    : Fl_Clock_Output(X, Y, W, H, L) {
    type(t);
    box(t==FL_ROUND_CLOCK ? FL_NO_BOX : FL_UP_BOX);
}

```

Note

From Duncan: (will be removed later, just for now as a reminder)

I've just added comments for the `fl_color_chooser()` functions, and in order to keep them and the general Function Reference information for them together, I created a new doxygen group, and used `\ingroup` in the three comment blocks. This creates a new Modules page (which may not be what we want) with links to it from the File Members and `Fl_Color_Chooser.H` pages. It needs a bit more experimentation on my part unless someone already knows how this should be handled. (Maybe we can add it to a `functions.dox` file that defines a functions group and do that for all of the function documentation?)

Update: the trick is not to create duplicate entries in a new group, but to move the function information into the doxygen comments for the class, and use the navigation links provided. Simply using `\relatesalso` as the first doxygen command in the function's comment puts it in the appropriate place. There is no need to have `\defgroup` and `\ingroup` as well, and indeed they don't work. So, to summarize:

```

Gizmo.H
/** \class Gizmo
    A gizmo that does everything
    */
class Gizmo {
    etc
};
extern int popup_gizmo(...);

Gizmo.cxx:
/** \relatesalso Gizmo
    Pops up a gizmo dialog with a Gizmo in it
    */
int popup_gizmo(...);

```

Comments Within Doxygen Comment Blocks

You can use HTML comment statements to embed comments in doxygen comment blocks. These comments will not be visible in the generated document.

```

The following text is a developer comment.
<!-- *** This *** is *** invisible *** -->
This will be visible again.

```

will be shown as:

```

The following text is a developer comment.
<!-- *** This *** is *** invisible *** -->
This will be visible again.

```

Different Headlines

You can use HTML tags `<H1> ... <H4>` for headlines with different sizes. As of doxygen 1.8.x there must not be more than three spaces at the beginning of the line for this to work. Currently (doxygen 1.8.6) there seems to be no difference in the font sizes of `<H3>` and `<H4>` in the pdf output, whereas the html output uses different font sizes.

```
<H1>Headline in big text (H1)</H1>
<H2>Headline in big text (H2)</H2>
<H3>Headline in big text (H3)</H3>
<H4>Headline in big text (H4)</H4>
```

Headline in big text (H1)

Headline in big text (H2)

Headline in big text (H3)

Headline in big text (H4)

20.1 Non-ASCII Characters

Doxygen understands many HTML quoting characters like `"`, `ü`, `ç`, `Ç`, but not all HTML quoting characters.

This will appear in the document:

```
Doxygen understands many HTML quoting characters like
&quot;, &uuml;, &ccedil;, &Ccedil;, but not all HTML quoting characters.
```

For further informations about HTML quoting characters see

<http://www.doxygen.org/htmlcmds.html>

Alternatively you can use **UTF-8** encoding within Doxygen comments.

20.2 Document Structure

- `\page` creates a named page
- `\section` creates a named section within that page
- `\subsection` creates a named subsection within the current section
- `\subsubsection` creates a named subsubsection within the current subsection

All these statements take a "name" as their first argument, and a title as their second argument. The title can contain spaces.

The page, section, and subsection titles are formatted in blue color and a size like "<H1>", "<H2>", and "<H3>", and "<H4>", respectively.

By **FLTK documentation convention**, a file like this one with a doxygen documentation chapter has the name "<chapter>.dox". The `\page` statement at the top of the page is "`\page <chapter> This is the title`". Sections within a documentation page must be called "<chapter>_<section>", where "<chapter>" is the name part of the file, and "<section>" is a unique section name within the page that can be referenced in links. The same for subsections and subsubsections.

These doxygen page and section commands work only in special documentation chapters, not within normal source or header documentation blocks. However, links **from** normal (e.g. class) documentation **to** documentation sections **do work**.

This page has

```
\page development I - Developer Information
```

at its top.

This section is

```
\section development_structure Document Structure
```

The following section is

```
\section development_links Creating Links
```

20.3 Creating Links

Links to other documents and external links can be embedded with

- doxygen `\ref` links to other doxygen `\page`, `\section`, `\subsection` and `\anchor` locations
- HTML links without markup - doxygen creates "`http://...`" links automatically
- standard, non-Doxygen, HTML links

```
- see chapter \ref unicode creates a link to the named chapter
  unicode that has been created with a \page statement.
- For further informations about quoting see
  http://www.doxygen.org/htmlcmds.html
- see <a href="http://www.nedit.org/">Nedit</a> creates
  a standard HTML link
```

appears as:

- see chapter [Unicode and UTF-8 Support](#) creates a link to the named chapter unicode that has been created with a `\page` statement.
- For further informations about quoting see <http://www.doxygen.org/htmlcmds.html>
- see [Nedit](#) creates a standard HTML link

20.4 Paragraph Layout

There is no real need to use HTML `<P>` and `</P>` tags within the text to tell doxygen to start or stop a paragraph. In most cases, when doxygen encounters a blank line or some, but not all, `\commands` in the text it knows that it has reached the start or end of a paragraph. Doxygen also offers the `\par` command for special paragraph handling. It can be used to provide a paragraph title and also to indent a paragraph. Unfortunately `\par` won't do what you expect if you want to have doxygen links and sometimes html tags don't work either.

```
\par Normal Paragraph with title

This paragraph will have a title, but because there is a blank line
between the \par and the text, it will have the normal layout.

\par Indented Paragraph with title
This paragraph will also have a title, but because there is no blank
line between the \par and the text, it will be indented.

\par
It is also possible to have an indented paragraph without title.
This is how you indent subsequent paragraphs.

\par No link to Fl_Widget::draw()
Note that the paragraph title is treated as plain text.
Doxygen type links will not work.
HTML characters and tags may or may not work.

Fl_Widget::draw() links and "html" tags work<br>
\par
Use a single line ending with <br> for complicated paragraph titles.
```

The above code produces the following paragraphs:

Normal Paragraph with title

This paragraph will have a title, but because there is a blank line between the `\par` and the text, it will have the normal layout.

Indented Paragraph with title

This paragraph will also have a title, but because there is no blank line between the `\par` and the text, it will be indented.

It is also possible to have an indented paragraph without title. This is how you indent subsequent paragraphs.

No link to `Fl_Widget::draw()`

Note that the paragraph title is treated as plain text. Doxygen type links will not work. HTML characters and tags may or may not work.

[Fl_Widget::draw\(\)](#) links and "html" tags work

Use a single line ending with `
` for complicated paragraph titles.

20.5 Navigation Elements

Each introduction (tutorial) page ends with navigation elements. These elements must only be included in the html documentation, therefore they must be separated with `\htmlonly` and `\endhtmlonly`.

The following code gives the navigation bar at the bottom of this page:

```
\htmlonly
<hr>
<table summary="navigation bar" width="100%" border="0">
<tr>
  <td width="45%" align="LEFT">
    <a class="el" href="migration_1_3.html">
      [Prev]
      Migrating Code from FLTK 1.1 to 1.3
    </a>
  </td>
  <td width="10%" align="CENTER">
    <a class="el" href="index.html">[Index]</a>
  </td>
  <td width="45%" align="RIGHT">
    <a class="el" href="license.html">
      Software License
      [Next]
    </a>
  </td>
</tr>
</table>
\endhtmlonly
```

Chapter 21

Software License

December 11, 2001

The FLTK library and included programs are provided under the terms of the GNU Library General Public License (LGPL) with the following exceptions:

1. Modifications to the FLTK configure script, config header file, and makefiles by themselves to support a specific platform do not constitute a modified or derivative work.

The authors do request that such modifications be contributed to the FLTK project - send all contributions through the "Software Trouble Report" on the following page: <http://www.fltk.org/str.php>

2. Widgets that are subclassed from FLTK widgets do not constitute a derivative work.
3. Static linking of applications and widgets to the FLTK library does not constitute a derivative work and does not require the author to provide source code for the application or widget, use the shared FLTK libraries, or link their applications or widgets against a user-supplied version of FLTK.

If you link the application or widget to a modified version of FLTK, then the changes to FLTK must be provided under the terms of the LGPL in sections 1, 2, and 4.

4. You do not have to provide a copy of the FLTK license with programs that are linked to the FLTK library, nor do you have to identify the FLTK license in your program or documentation as required by section 6 of the LGPL.

However, programs must still identify their use of FLTK. The following example statement can be included in user documentation to satisfy this requirement:

[program/widget] is based in part on the work of the FLTK project (<http://www.fltk.org>).

GNU LIBRARY GENERAL PUBLIC LICENSE

Version 2, June 1991

Copyright (C) 1991 Free Software Foundation, Inc.

59 Temple Place - Suite 330, Boston, MA 02111-1307, USA

Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed. [This is the first released version of the library GPL. It is numbered 2 because it goes with version 2 of the ordinary GPL.]

Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public Licenses are intended to guarantee your freedom to share and change free software—to make sure the software is free for all its users.

This license, the Library General Public License, applies to some specially designated Free Software Foundation software, and to any other libraries whose authors decide to use it. You can use it for your libraries, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs; and that you know you can do these things.

To protect your rights, we need to make restrictions that forbid anyone to deny you these rights or to ask you to surrender the rights. These restrictions translate to certain responsibilities for you if you distribute copies of the library, or if you modify it.

For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link a program with the library, you must provide complete object files to the recipients so that they can relink them with the library, after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

Our method of protecting your rights has two steps: (1) copyright the library, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the library.

Also, for each distributor's protection, we want to make certain that everyone understands that there is no warranty for this free library. If the library is modified by someone else and passed on, we want its recipients to know that what they have is not the original version, so that any problems introduced by others will not reflect on the original authors' reputations.

Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that companies distributing free software will individually obtain patent licenses, thus in effect transforming the program into proprietary software. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License, which was designed for utility programs. This license, the GNU Library General Public License, applies to certain designated libraries. This license is quite different from the ordinary one; be sure to read it in full, and don't assume that anything in it is the same as in the ordinary license.

The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only works together with the library.

Note that it is possible for a library to be covered by the ordinary General Public License rather than by this special one.

TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

0. This License Agreement applies to any software library which contains a notice placed by the copyright holder or other authorized party saying it may be distributed under the terms of this Library General Public License (also called "this License"). Each licensee is addressed as "you".

A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

a) The modified work must itself be a software library.

b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

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Chapter 22

Example Source Code

The FLTK distribution contains over 60 sample applications written in, or ported to, FLTK.

If the FLTK archive you received does not contain either an 'examples' or 'test' directory, you can download the complete FLTK distribution from <http://fltk.org/software.php>.

Most of the example programs were created while testing a group of widgets. They are not meant to be great achievements in clean C++ programming, but merely a test platform to verify the functionality of the FLTK library.

Note that extra example programs are also available in an additional 'examples' directory, but these are **NOT** built automatically when you build FLTK, unlike those in the 'test' directory shown below.

22.1 Example Applications

adjuster	arc	ask	bitmap	blocks	boxtype
browser	button	buttons	checkers	clock	colbrowser
color_chooser	cube	CubeView	cursor	curve	demo
device	doublebuffer	editor	fast_slow	file_chooser	fluid
fonts	forms	fractals	fullscreen	gl_overlay	glpuzzle
hello	help	iconize	image	inactive	input
input_choice	keyboard	label	line_style	list_visuals	mandelbrot
menubar	message	minimum	navigation	output	overlay
pack	pixmap_browser	pixmap	preferences	radio	resizebox
resize	scroll	shape	subwindow	sudoku	symbols
tabs	threads	tile	tiled_image	unittests	utf8
valuators					

22.1.1 adjuster

`adjuster` shows a nifty little widget for quickly setting values in a great range.

22.1.2 arc

The `arc` demo explains how to derive your own widget to generate some custom drawings. The sample drawings use the matrix based arc drawing for some fun effects.

22.1.3 ask

`ask` shows some of FLTK's standard dialog boxes. Click the correct answers or you may end up in a loop, or you may end up in a loop, or you... .

22.1.4 bitmap

This simple test shows the use of a single color bitmap as a label for a box widget. Bitmaps are stored in the X11 '.bmp' file format and can be part of the source code.

22.1.5 blocks

A wonderful and addictive game that shows the usage of FLTK timers, graphics, and how to implement sound on all platforms. `blocks` is also a good example for the Mac OS X specific bundle format.

22.1.6 boxtype

`boxtype` gives an overview of readily available boxes and frames in FLTK. More types can be added by the application programmer. When using themes, FLTK shuffles boxtypes around to give your program a new look.

22.1.7 browser

`browser` shows the capabilities of the [FI_Browser](#) widget. Important features tested are loading of files, line formatting, and correct positioning of the browser data window.

22.1.8 button

The `button` test is a simple demo of push-buttons and callbacks.

22.1.9 buttons

`buttons` shows a sample of FLTK button types.

22.1.10 checkers

Written by Steve Poulsen in early 1979, `checkers` shows how to convert a VT100 text-terminal based program into a neat application with a graphical UI. Check out the code that drags the pieces, and how the pieces are drawn by layering. Then tell me how to beat the computer at Checkers.

22.1.11 clock

The `clock` demo shows two analog clocks. The innards of the [FI_Clock](#) widget are pretty interesting, explaining the use of timeouts and matrix based drawing.

22.1.12 colbrowser

`colbrowser` runs only on X11 systems. It reads `/usr/lib/X11/rgb.txt` to show the color representation of every text entry in the file. This is beautiful, but only moderately useful unless your UI is written in *Motif*.

22.1.13 color_chooser

The `color_chooser` gives a short demo of FLTK's palette based color chooser and of the RGB based color wheel.

22.1.14 cube

The `cube` demo shows the speed of OpenGL. It also tests the ability to render two OpenGL buffers into a single window, and shows OpenGL text.

22.1.15 CubeView

`CubeView` shows how to create a UI containing OpenGL with Fluid.

22.1.16 cursor

The `cursor` demo shows all mouse cursor shapes that come standard with FLTK. The `fgcolor` and `bgcolor` sliders work only on few systems (some version of Irix for example).

22.1.17 curve

`curve` draws a nice Bezier curve into a custom widget. The `points` option for splines is not supported on all platforms.

22.1.18 demo

This tool allows quick access to all programs in the `test` directory. `demo` is based on the visuals of the IrixGL demo program. The menu tree can be changed by editing `test/demo.menu`.

22.1.19 device

Exercises the `FI_Image_Surface`, `FI_Copy_Surface`, and `FI_Printer` classes to draw to an `FI_Image` object, copy graphical data to the clipboard, and for print support.

Note

The `clipboard.cxx` program of the 'examples' directory is a clipboard watching application that continuously displays the textual or graphical content of the system clipboard (a.k.a pasteboard on Mac OS X) exercising `FI::paste()`.

22.1.20 doublebuffer

The `doublebuffer` demo shows the difference between a single buffered window, which may flicker during a slow redraw, and a double buffered window, which never flickers, but uses twice the amount of RAM. Some modern OS's double buffer all windows automatically to allow transparency and shadows on the desktop. FLTK is smart enough to not tripple buffer a window in that case.

22.1.21 editor

FLTK has two very different text input widgets. `FI_Input` and derived classes are rather light weight, however `FI_Text_Editor` is a complete port of `nedit` (with permission). The `editor` test is almost a full application, showing custom syntax highlighting and dialog creation.

22.1.22 fast_slow

`fast_slow` shows how an application can use the `Fl_Widget::when()` setting to receive different kinds of callbacks.

22.1.23 file_chooser

The standard FLTK `file_chooser` is the result of many iterations, trying to find a middle ground between a complex browser and a fast light implementation.

22.1.24 fonts

`fonts` shows all available text fonts on the host system. If your machine still has some pixmap based fonts, the supported sizes will be shown in bold face. Only the first 256 fonts will be listed.

22.1.25 forms

`forms` is an XForms program with very few changes. Search for "fltk" to find all changes necessary to port to fltk. This demo shows the different boxtypes. Note that some boxtypes are not appropriate for some objects.

22.1.26 fractals

`fractals` shows how to mix OpenGL, Glut and FLTK code. FLTK supports a rather large subset of Glut, so that many Glut applications compile just fine.

22.1.27 fullscreen

This demo shows how to do many of the window manipulations that are popular for games. You can toggle the border on/off, switch between single- and double-buffered rendering, and take over the entire screen. More information in the source code.

22.1.28 gl_overlay

`gl_overlay` shows OpenGL overlay plane rendering. If no hardware overlay plane is available, FLTK will simulate it for you.

22.1.29 glpuzzle

The `glpuzzle` test shows how most Glut source code compiles easily under FLTK.

22.1.30 hello

`hello`: Hello, World. Need I say more? Well, maybe. This tiny demo shows how little is needed to get a functioning application running with FLTK. Quite impressive, I'd say.

22.1.31 help

`help` displays the built-in FLTK help browser. The `Fl_Help_Dialog` understands a subset of html and renders various image formats. This widget makes it easy to provide help pages to the user without depending on the operating system's html browser.

22.1.32 iconize

`iconize` demonstrates the effect of the window functions `hide()`, `iconize()`, and `show()`.

22.1.33 image

The `image` demo shows how an image can be created on the fly. This generated image contains an alpha (transparency) channel which lets previous renderings 'shine through', either via true transparency or by using screen door transparency (pixelation).

22.1.34 inactive

`inactive` tests the correct rendering of inactive widgets. To see the inactive version of images, you can check out the `pixmap` or `image` test.

22.1.35 input

This tool shows and tests different types of text input fields based on `FL_Input_`. The `input` program also tests various settings of `FL_Input::when()`.

22.1.36 input_choice

`input_choice` tests the latest addition to FLTK1, a text input field with an attached pulldown menu. Windows users will recognize similarities to the 'ComboBox'. `input_choice` starts up in 'plastic' scheme, but the traditional scheme is also supported.

22.1.37 keyboard

FLTK unifies keyboard events for all platforms. The `keyboard` test can be used to check the return values of `Fl::event_key()` and `Fl::event_text()`. It is also great to see the modifier buttons and the scroll wheel at work. Quit this application by closing the window. The ESC key will not work.

22.1.38 label

Every FLTK widget can have a label attached to it. The `label` demo shows alignment, clipping, and wrapping of text labels. Labels can contain symbols at the start and end of the text, like `@FLTK` or `@circle uh-huh @square`.

22.1.39 line_style

Advanced line drawing can be tested with `line_style`. Not all platforms support all line styles.

22.1.40 list_visuals

This little app finds all available pixel formats for the current X11 screen. But since you are now an FLTK user, you don't have to worry about any of this.

22.1.41 mandelbrot

`mandelbrot` shows two advanced topics in one test. It creates grayscale images on the fly, updating them via the `idle` callback system. This is one of the few occasions where the `idle` callback is very useful by giving all available processor time to the application without blocking the UI or other apps.

22.1.42 menubar

The `menubar` tests many aspects of FLTK's popup menu system. Among the features are radio buttons, menus taller than the screen, arbitrary sub menu depth, and global shortcuts.

22.1.43 message

`message` pops up a few of FLTK's standard message boxes.

22.1.44 minimum

The `minimum` test program verifies that the update regions are set correctly. In a real life application, the trail would be avoided by choosing a smaller label or by setting label clipping differently.

22.1.45 navigation

`navigation` demonstrates how the text cursor moves from text field to text field when using the arrow keys, tab, and shift-tab.

22.1.46 output

`output` shows the difference between the single line and multi line mode of the [FI_Output](#) widget. Fonts can be selected from the FLTK standard list of fonts.

22.1.47 overlay

The `overlay` test app shows how easy an FLTK window can be layered to display cursor and manipulator style elements. This example derives a new class from [FI_Overlay_Window](#) and provides a new function to draw custom overlays.

22.1.48 pack

The `pack` test program demonstrates the resizing and repositioning of children of the [FI_Pack](#) group. Putting an [FI_Pack](#) into an [FI_Scroll](#) is a useful way to create a browser for large sets of data.

22.1.49 pixmap_browser

`pixmap_browser` tests the shared-image interface. When using the same image multiple times, [FI_Shared_Image](#) will keep it only once in memory.

22.1.50 pixmap

This simple test shows the use of a LUT based pixmap as a label for a box widget. Pixmapes are stored in the X11 `!xpm` file format and can be part of the source code. Pixmapes support one transparent color.

22.1.51 preferences

I do have my `preferences` in the morning, but sometimes I just can't remember a thing. This is where the [FI_Preferences](#) come in handy. They remember any kind of data between program launches.

22.1.52 radio

The `radio` tool was created entirely with *fluid*. It shows some of the available button types and tests radio button behavior.

22.1.53 resizebox

`resizebox` shows some possible ways of FLTK's automatic resize behavior.

22.1.54 resize

The `resize` demo tests size and position functions with the given window manager.

22.1.55 scroll

`scroll` shows how to scroll an area of widgets, one of them being a slow custom drawing. [FI_Scroll](#) uses clipping and smart window area copying to improve redraw speed. The buttons at the bottom of the window control decoration rendering and updates.

22.1.56 shape

`shape` is a very minimal demo that shows how to create your own OpenGL rendering widget. Now that you know that, go ahead and write that flight simulator you always dreamt of.

22.1.57 subwindow

The `subwindow` demo tests messaging and drawing between the main window and 'true' sub windows. A sub window is different to a group by resetting the FLTK coordinate system to 0, 0 in the top left corner. On Win32 and X11, subwindows have their own operating system specific handle.

22.1.58 sudoku

Another highly addictive game - don't play it, I warned you. The implementation shows how to create application icons, how to deal with OS specifics, and how to generate sound.

22.1.59 symbols

`symbols` are a speciality of FLTK. These little vector drawings can be integrated into labels. They scale and rotate, and with a little patience, you can define your own. The rotation number refers to 45 degree rotations if you were looking at a numeric keypad (2 is down, 6 is right, etc.).

22.1.60 tabs

The `tabs` tool was created with *fluid*. It tests correct hiding and redisplaying of tabs, navigation across tabs, resize behavior, and no unneeded redrawing of invisible widgets.

The `tabs` application shows the [FI_Tabs](#) widget on the left and the [FI_Wizard](#) widget on the right side for direct comparison of these two panel management widgets.

22.1.61 threads

FLTK can be used in a multithreading environment. There are some limitations, mostly due to the underlying operating system. `threads` shows how to use `Fl::lock()`, `Fl::unlock()`, and `Fl::awake()` in secondary threads to keep FLTK happy. Although locking works on all platforms, this demo is not available on every machine.

22.1.62 tile

The `tile` tool shows a nice way of using `Fl_Tile`. To test correct resizing of subwindows, the widget for region 1 is created from an `Fl_Window` class.

22.1.63 tiled_image

The `tiled_image` demo uses an image as the background for a window by repeating it over the full size of the widget. The window is resizable and shows how the image gets repeated.

22.1.64 unittests

`unittests` exercises all of FLTK's drawing features (e.g., text, lines, circles, images), as well as scrollbars and schemes.

22.1.65 utf8

`utf8` shows all fonts available to the platform that runs it, and how each font draws each of the Unicode code points ranging between U+0020 and U+FFFF.

22.1.66 valuator

`valuator` shows all of FLTK's nifty widgets to change numeric values.

22.1.67 fluid

`fluid` is not only a big test program, but also a very useful visual UI designer. Many parts of `fluid` were created using `fluid`. See the [Fluid Tutorial](#) for more details.

Chapter 23

FAQ (Frequently Asked Questions)

A list of frequently asked questions about FLTK.

This appendix describes various frequently asked questions regarding FLTK.

- [Where do I start learning FLTK?](#)
- [How do I make a box with text?](#)
- [Can I use FLTK to make closed-source commercial applications?](#)
- [Hitting the 'Escape' key closes windows - how do I prevent this?](#)

23.1 Where do I start learning FLTK?

It is assumed you know C++, which is the language all FLTK programs are written in, including FLTK itself.

If you like reading manuals to work your way into things, a good start is the FLTK documentation's [Introduction to FLTK](#). Under the [FLTK Basics](#) section there's an example 'hello world' program that includes a line-by-line description.

If you like looking at simple code first to pique your interest, and then read up from there, start with the example programs in the `test/` and `examples/` directory that is included with the source code. A good place to start is the 'hello world' program in `test/hello.cxx`. Also do a google search for "FLTK example programs". "Erco's Cheat Page" is one that shows many simple examples of how to do specific things.

If you like to run example programs and look for ones that are like yours and then read them, download and build FLTK from the source, then run the `test/demo` program. Also, go into the 'examples/' directory and run 'make', then run some of those programs.

If you prefer watching TV to reading books and code, google search for "FLTK video tutorials" which has some introductory examples of how to write FLTK programs in C++ and build them.

23.2 How do I make a box with text?

The 'hello world' program shows how to make a box with text. All widgets have labels, so picking a simple widget like [Fl_Box](#) and setting its `label()` and using `align()` to align the label and `labelfont()` to set the font, and `labelsize()` to set the size, you can get text just how you want.

Labels are not selectable though; if you want selectable text, you can use [Fl_Output](#) or [Fl_Multiline_Output](#) for simple text that doesn't include scrollbars. For more complex text that might want scrollbars and multiple colors/fonts, use either [Fl_Text_Display](#) which handles plain text, or [Fl_Help_View](#) which handles simple HTML formatted text.

23.3 Can I use FLTK to make closed-source commercial applications?

Yes. The FLTK [Software License](#) is standard LGPL, but also includes a special clause ("exception") to allow for static linking. Specifically:

```
[from the top of the FLTK LGPL License section on exceptions]
```

```
3. Static linking of applications and widgets to the FLTK library does
```

not constitute a derivative work and does not require the author to provide source code for the application or widget, use the shared FLTK libraries, or link their applications or widgets against a user-supplied version of FLTK.

If you link the application or widget to a modified version of FLTK, then the changes to FLTK must be provided under the terms of the LGPL in sections 1, 2, and 4.

4. You do not have to provide a copy of the FLTK license with programs that are linked to the FLTK library, nor do you have to identify the FLTK license in your program or documentation as required by section 6 of the LGPL.

However, programs must still identify their use of FLTK. The following example statement can be included in user documentation to satisfy this requirement:

```
[program/widget] is based in part on the work of the
FLTK project (http://www.fltk.org).
```

23.4 Hitting the 'Escape' key closes windows - how do I prevent this?

[From FLTK article #378]

1. FLTK has a "global event handler" that makes Escape try to close the window, the same as clicking the close box. To disable this everywhere you can install your own that pretends it wants the escape key and thus stops the default one from seeing it (this may not be what you want, see below about the callbacks):

```
static int my_handler(int event) {
    if (event == FL_SHORTCUT) return 1; // eat all shortcut keys
    return 0;
}
...in main():
    Fl::add_handler(my_handler);
...
```

1. Attempts to close a window (both clicking the close box or typing Escape) call that window's callback. The default version of the callback does hide(). To make the window not close or otherwise do something different you replace the callback. To make the main window exit the program:

```
void my_callback(Fl_Widget*, void*) {
    exit(0);
}
...
main_window->callback(my_callback);
...
```

If you don't want Escape to close the main window and exit you can check for and ignore it. This is better than replacing the global handler because Escape will still close pop-up windows:

```
void my_callback(Fl_Widget*, void*) {
    if (Fl::event() == FL_SHORTCUT && Fl::event_key() == FL_Escape)
        return; // ignore Escape
    exit(0);
}
```

It is very common to ask for confirmation before exiting, this can be done with:

```
void my_callback(Fl_Widget*, void*) {
    if (fl_ask("Are you sure you want to quit?"))
        exit(0);
}
```

Chapter 24

Todo List

Page [Adding and Extending Widgets](#)

Clarify [FI_Window::damage\(uchar\)](#) handling - seems confused/wrong? ORing value doesn't match setting behaviour in [FL_Widget.H!](#)

Clarify [FI_Widget::test_shortcut\(\)](#) explanations. [FI_Widget.h](#) says Internal Use only, but subclassing chapter gives details!

Module [Box Types](#)

Description of boxtypes is incomplete. See below for the defined enum [FI_Boxtype](#).

Page [Drawing Things in FLTK](#)

add an [FI_Draw_Area_Cb](#) typedef to allow [fl_scroll\(...\)](#) to be doxygenated?

Member [FI_Browser::scrollbar_width](#) (int width)

This method should eventually be removed in 1.4+

Member [FI_Browser::scrollbar_width](#) () const

This method should eventually be removed in 1.4+

Member [FI_Browser::sort](#) (int flags=0)

Add a flag to ignore case

Class [FI_Button](#)

Refactor the doxygen comments for [FI_Button when\(\)](#) documentation.

Refactor the doxygen comments for [FI_Button type\(\)](#) documentation.

Class [FI_Chart](#)

Refactor [FI_Chart::type\(\)](#) information.

Class [FI_Choice](#)

Refactor the doxygen comments for [FI_Choice changed\(\)](#) documentation.

Class [FI_Counter](#)

Refactor the doxygen comments for [FI_Counter type\(\)](#) documentation.

Member [FI_Cursor](#)

enum [FI_Cursor](#) needs maybe an image.

Member [FI_File_Input::errorcolor](#) () const

Better docs for [FI_File_Input::errorcolor\(\)](#) - is it even used?

Member [FI_Group::sizes](#) ()

Should the internal representation of the [sizes\(\)](#) array be documented?

Member [fl_height](#) (int font, int size)

In the future, when the XFT issues are resolved, this function should simply return the 'size' value.

Member [FI_Input::handle_mouse](#) (int, int, int, int, int keepmark=0)

Add comment and parameters

Member `Fl_Input::handletext` (int e, int, int, int, int)

Add comment and parameters

Member `fl_intptr_t`

typedef's `fl_intptr_t` and `fl_uintptr_t` should be documented.

Class `Fl_Label`

There is an aspiration that the `Fl_Label` type will become a widget by itself. That way we will be avoiding a lot of code duplication by handling labels in a similar fashion to widgets containing text. We also provide an easy interface for very complex labels, containing html or vector graphics. However, this re-factoring is not in place in this release.

Member `Fl_Labeltype`

The doxygen comments are incomplete, and some labeltypes start with an underscore. Also, there are three external functions undocumented (yet):

- `fl_define_FL_SHADOW_LABEL()`
- `fl_define_FL_ENGRAVED_LABEL()`
- `fl_define_FL_EMBOSSSED_LABEL()`

Member `Fl_Menu::add` (const char *, int shortcut, Fl_Callback *, void **=0, int=0)

Raw integer shortcut needs examples. Dependent on responses to <http://fltk.org/newsgroups.php?gfltk.development+v:10086> and results of STR#2344

Member `fl_old_shortcut` (const char *s)

Fix these silly legacy issues in a future release to support more predictable behavior for the modifier keys.

Member `Fl_Preferences::get` (const char *entry, void *value, const void *defaultValue, int defaultSize, int maxSize)

maxSize should receive the number of bytes that were read.

Member `fl_reset_spot` (void)

provide user documentation for `fl_reset_spot` function

Member `Fl_Scroll::bbox` (int &, int &, int &, int &)

The visibility of the scrollbars ought to be checked/calculated outside of the `draw()` method (STR #1895).

Member `fl_set_spot` (int font, int size, int X, int Y, int W, int H, Fl_Window *win=0)

provide user documentation for `fl_set_spot` function

Member `fl_set_status` (int X, int Y, int W, int H)

provide user documentation for `fl_set_status` function

Member `Fl_String`

FIXME: temporary (?) typedef to mark UTF-8 and Unicode conversions

Member `Fl_Text_Display::display_insert` ()

Unicode?

Member `Fl_Text_Display::extend_range_for_styles` (int *start, int *end)

Unicode?

Member `Fl_Text_Display::handle_vline` (int mode, int lineStart, int lineLen, int leftChar, int rightChar, int topClip, int bottomClip, int leftClip, int rightClip) const

we need to handle hidden hyphens and tabs here!

we handle all styles and selections

we must provide code to get pixel positions of the middle of a character as well

Member `Fl_Text_Display::overstrike` (const char *text)

Unicode? Find out exactly what we do here and simplify.

Member `Fl_Text_Display::position_to_line` (int pos, int *lineNum) const

What does this do?

Member `Fl_Text_Display::position_to_linecol` (int pos, int *lineNum, int *column) const

a column number makes little sense in the UTF-8/variable font width environment. We will have to further define what exactly we want to return. Please check the functions that call this particular function.

Member `Fl_Text_Display::scroll` (int topLineNum, int horizOffset)

Column numbers make little sense here.

Member `Fl_Text_Display::shortcut` (int s)

FIXME : get set methods pointing on shortcut_ have no effects as shortcut_ is unused in this class and derived!

Member `Fl_Text_Display::shortcut` () const

FIXME : get set methods pointing on shortcut_ have no effects as shortcut_ is unused in this class and derived!

Member `Fl_Text_Display::wrap_mode` (int wrap, int wrap_margin)

we need new wrap modes to wrap at the window edge and based on pixel width or average character width.

Member `Fl_Text_Display::wrapped_column` (int row, int column) const

What does this do and how is it useful? Column numbers mean little in this context. Which functions depend on this one?

Unicode?

Member `Fl_Text_Display::wrapped_row` (int row) const

What does this do and how is it useful? Column numbers mean little in this context. Which functions depend on this one?

Member `Fl_Tiled_Image::Fl_Tiled_Image` (Fl_Image *i, int W=0, int H=0)

Fix `Fl_Tiled_Image` as background image for widgets and windows and fix the implementation of `Fl::scheme(const char *)`.

Member `Fl_Tree::handle` (int e)

add `Fl_Widget_Tracker` (see `Fl_Browser_cxx::handle()`)

Member `Fl_Tree::is_scrollbar` (Fl_Widget *w)

should be const

Member `Fl_Tree::show_self` ()

should be const

Member `Fl_When`

doxygen comments for values are incomplete and maybe wrong or unclear

Member `Fl_Widget::argument` () const

The user data value must be implemented using `intptr_t` or similar to avoid 64-bit machine incompatibilities.

Member `Fl_Widget::argument` (long v)

The user data value must be implemented using `intptr_t` or similar to avoid 64-bit machine incompatibilities.

Member `Fl_Widget::type` () const

Explain "simulate RTTI" (currently only used to decide if a widget is a window, i.e. `type() >= FL_WINDOW ?`). Is `type()` really used in a way that ensures "Forms compatibility" ?

Member `Fl_Window::show` (int argc, char **argv)

explain which system parameters are set up.

Member `Fl_Window::show` ()

Check if we can remove resetting the current group in a later FLTK version (after 1.3.x). This may break "already broken" programs though if they rely on this "feature".

Page Handling Events

Add details on how to detect repeating keys, since on some X servers a repeating key will generate both `FL_↔` KEYUP and `FL_KEYDOWN`, such that to tell if a key is held, you need `Fl::event_key(int)` to detect if the key is being held down during `FL_KEYUP` or not.

Page Unicode and UTF-8 Support

Verify 16/24 bit Unicode limit for different character sets? OksiD's code appears limited to 16-bit whereas the FLTK2 code appears to handle a wider set. What about illegal characters? See comments in `fl_utf8fromwc()` and `fl_utf8toUtf16()`.

Work through the code and this documentation to harmonize the `[OksiD]` and `[fltk2]` functions.

Do we need this info about planes?

Chapter 25

Deprecated List

Member `Fl::release ()`

Use `Fl::grab(0)` instead.

Member `Fl::set_idle (Fl_Old_Idle_Handler cb)`

This method is obsolete - use the `add_idle()` method instead.

Member `Fl::version ()`

Use `int Fl::api_version()` instead.

Member `fl_ask (const char *fmt,...)`

`fl_ask()` is deprecated since it uses "Yes" and "No" for the buttons which does not conform to the current FLTK Human Interface Guidelines. Use `fl_choice()` with the appropriate verbs instead.

Member `fl_clip`

`fl_clip(int, int, int, int)` is deprecated and will be removed from future releases. Please use `fl_push_clip(int x, int y, int w, int h)` instead.

Member `Fl_Group::focus (Fl_Widget *W)`

This is for backwards compatibility only.

Member `Fl_Menu_Item::check ()`

Member `Fl_Menu_Item::checked () const`

Member `Fl_Menu_Item::setonly ()`

This method is dangerous if radio items are first in the menu. Use `Fl_Menu_::setonly(Fl_Menu_Item*)` instead.

Member `Fl_Menu_Item::uncheck ()`

Member `Fl_Spinner::maximum () const`

Member `Fl_Spinner::minimum () const`

Member `Fl_Tree::first_visible ()`

in 1.3.3 ABI – use `first_visible_item()` instead.

Member `Fl_Tree::item_clicked (Fl_Tree_Item *val)`

in 1.3.3 ABI – use `callback_item()` instead.

Member `Fl_Tree::item_clicked ()`

in 1.3.3 ABI – use `callback_item()` instead.

Member `Fl_Tree::last_visible ()`

in 1.3.3 – use `last_visible_item()` instead.

Member `FI_Tree_Item::FI_Tree_Item (const FI_Tree_Prefs &prefs)`

in 1.3.3 ABI – you must use `FI_Tree_Item(FI_Tree*)` for proper horizontal scrollbar behavior.

Member `FI_Tree_Item::next_displayed (FI_Tree_Prefs &prefs)`

in 1.3.3 for confusing name, use `next_visible()` instead

Member `FI_Tree_Item::prev_displayed (FI_Tree_Prefs &prefs)`

in 1.3.3 for confusing name, use `prev_visible()`

Member `FL_VERSION`

This `double` version number is retained for compatibility with existing program code. New code should use `int FL_API_VERSION` instead. `FL_VERSION` is deprecated because comparisons of floating point values may fail due to rounding errors. However, there are currently no plans to remove this deprecated constant.

Member `FI_Widget::color2 (unsigned a)`

Use `selection_color(unsigned)` instead.

Member `FI_Widget::color2 () const`

Use `selection_color()` instead.

Member `FI_Window::free_position ()`

please use `force_position(0)` instead

Member `FI_Window::icon () const`

in 1.3.3

Member `FI_Window::icon (const void *ic)`

in 1.3.3

Chapter 26

Module Index

26.1 Modules

Here is a list of all modules:

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Events handling functions	216
Selection & Clipboard functions	230
Screen functions	233
Color & Font functions	238
Drawing functions	248
Multithreading support functions	272
Safe widget deletion support functions	274
Cairo Support Functions and Classes	277
Unicode and UTF-8 functions	278
Mac OS X-specific symbols	292
Common Dialogs classes and functions	294
File names and URI utility functions	306

Chapter 27

Hierarchical Index

27.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

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FI_Cairo_State	385
FL_CHART_ENTRY	391
FI_Device	415
FI_Graphics_Driver	465
FI_GDI_Graphics_Driver	449
FI_GDI_Printer_Graphics_Driver	451
FI_PostScript_Graphics_Driver	616
FI_Quartz_Graphics_Driver	646
FI_Xlib_Graphics_Driver	945
FI_Surface_Device	690
FI_Copy_Surface	409
FI_Display_Device	420
FI_Image_Surface	512
FI_Paged_Device	593
FI_PostScript_File_Device	611
FI_PostScript_Printer	622
FI_Printer	637
FI_System_Printer	697
FI_End	423
FI_File_Chooser	426
FI_File_Icon	432
FI_FLTK_File_Chooser	441
FI_GTK_File_Chooser	494
FI_Font_Descriptor	443
FI_Fontdesc	443
FI_GI_Choice	454
FI_Glut_Bitmap_Font	462
FI_Glut_StrokeChar	462
FI_Glut_StrokeFont	462
FI_Glut_StrokeStrip	463
FI_Glut_StrokeVertex	463
FI_Help_Block	494
FI_Help_Dialog	494
FI_Help_Font_Stack	496
FI_Help_Font_Style	497
FI_Help_Link	497
FI_Help_Target	498

FI_Image	507
FI_Bitmap	339
FI_XBM_Image	944
FI_Pixmap	600
FI_GIF_Image	453
FI_XPM_Image	947
FI_RGB_Image	655
FI_BMP_Image	341
FI_JPEG_Image	539
FI_PNG_Image	606
FI_PNM_Image	607
FI_Shared_Image	674
FI_Tiled_Image	792
FI_Label	541
FI_Mac_App_Menu	544
FI_Menu_Item	564
FI_Multi_Label	578
FI_Native_File_Chooser	581
FI_Plugin	603
FI_Device_Plugin	416
FI_Preferences	623
FI_Plugin_Manager	604
FI_Scroll::FI_Region_LRTB	651
FI_Scroll::FI_Region_XYWH	651
FI_Scroll::FI_Scrollbar_Data	671
FI_Text_Buffer	726
FI_Text_Selection	786
FI_Tooltip	798
FI_Tree_Item	844
FI_Tree_Item_Array	865
FI_Tree_Prefs	868
FI_Widget	888
FI_Box	342
FI_Button	380
FI_Light_Button	542
FI_Check_Button	394
FI_Radio_Light_Button	649
FI_Round_Button	660
FI_Radio_Round_Button	650
FI_Radio_Button	648
FI_Repeat_Button	651
FI_Return_Button	653
FI_Toggle_Button	797
FI_Chart	387
FI_Clock_Output	401
FI_Clock	399
FI_Round_Clock	662
FI_FormsBitmap	443
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FI_FormsText	446
FI_Free	447
FI_Group	484
FI_Browser_	364
FI_Browser	344
FI_File_Browser	424
FI_Hold_Browser	504

FI_Multi_Browser	577
FI_Select_Browser	673
FI_Check_Browser	392
FI_Color_Chooser	405
FI_Help_View	498
FI_Input_Choice	535
FI_Pack	592
FI_Scroll	662
FI_Spinner	686
FI_Table	701
FI_Table_Row	717
FI_Tabs	720
FI_Text_Display	742
FI_Text_Editor	778
FI_Tile	789
FI_Tree	802
FI_Window	925
FI_Double_Window	421
FI_Cairo_Window	386
FI_Overlay_Window	589
FI_Gl_Window	454
FI_Glut_Window	463
FI_Single_Window	681
FI_Menu_Window	575
FI_Wizard	943
FI_Input_	517
FI_Input	514
FI_File_Input	437
FI_Float_Input	441
FI_Int_Input	538
FI_Multiline_Input	579
FI_Output	588
FI_Multiline_Output	580
FI_Secret_Input	671
FI_Menu_	546
FI_Choice	395
FI_Menu_Bar	559
FI_Sys_Menu_Bar	692
FI_Menu_Button	561
FI_Positioner	608
FI_Progress	644
FI_Timer	794
FI_Valuator	873
FI_Adjuster	337
FI_Counter	412
FI_Simple_Counter	681
FI_Dial	418
FI_Fill_Dial	439
FI_Line_Dial	544
FI_Roller	659
FI_Slider	683
FI_Fill_Slider	440
FI_Hor_Fill_Slider	505
FI_Hor_Nice_Slider	505
FI_Hor_Slider	505
FI_Nice_Slider	587
FI_Scrollbar	668

FI_Value_Slider	885
FI_Hor_Value_Slider	506
FI_Value_Input	878
FI_Value_Output	882
FI_Widget_Tracker	924
FI_XColor	944
FI_Text_Editor::Key_Binding	948
FI_Graphics_Driver::matrix	948
FI_Preferences::Name	949
FI_Preferences::Node	950
FI_Paged_Device::page_format	951
FI_Preferences::RootNode	951
FI_Scroll::ScrollInfo	951
FI_Window::shape_data_type	952
FI_Text_Display::Style_Table_Entry	952

Chapter 28

Class Index

28.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

FI_Preferences::Entry	315
FI	
The FI is the FLTK global (static) class containing state information and global methods for the current application	315
FI_Adjuster	
Was stolen from Prisms, and has proven to be very useful for values that need a large dynamic range	337
FI_Bitmap	
Supports caching and drawing of mono-color (bitmap) images	339
FI_BMP_Image	
Supports loading, caching, and drawing of Windows Bitmap (BMP) image files	341
FI_Box	
This widget simply draws its box, and possibly its label	342
FI_Browser	
Displays a scrolling list of text lines, and manages all the storage for the text	344
FI_Browser_	
This is the base class for browsers	364
FI_Button	
Buttons generate callbacks when they are clicked by the user	380
FI_Cairo_State	
Contains all the necessary info on the current cairo context	385
FI_Cairo_Window	
This defines a pre-configured cairo fltk window	386
FI_Chart	
FI_Chart displays simple charts	387
FL_CHART_ENTRY	
For internal use only	391
FI_Check_Browser	
Displays a scrolling list of text lines that may be selected and/or checked by the user	392
FI_Check_Button	
A button with a "checkmark" to show its status	394
FI_Choice	
A button that is used to pop up a menu	395
FI_Clock	
This widget provides a round analog clock display	399
FI_Clock_Output	
This widget can be used to display a program-supplied time	401
FI_Color_Chooser	
Standard RGB color chooser	405

FI_Copy_Surface	Supports copying of graphical data to the clipboard	409
FI_Counter	Controls a single floating point value with button (or keyboard) arrows	412
FI_Device	All graphical output devices and all graphics systems	415
FI_Device_Plugin	This plugin socket allows the integration of new device drivers for special window or screen types	416
FI_Dial	Circular dial to control a single floating point value	418
FI_Display_Device	A display to which the computer can draw	420
FI_Double_Window	The FI_Double_Window provides a double-buffered window	421
FI_End	This is a dummy class that allows you to end a FI_Group in a constructor list of a class:	423
FI_File_Browser	Displays a list of filenames, optionally with file-specific icons	424
FI_File_Chooser	Displays a standard file selection dialog that supports various selection modes	426
FI_File_Icon	Manages icon images that can be used as labels in other widgets and as icons in the FileBrowser widget	432
FI_File_Input	This widget displays a pathname in a text input field	437
FI_Fill_Dial	Draws a dial with a filled arc	439
FI_Fill_Slider	Widget that draws a filled horizontal slider, useful as a progress or value meter	440
FI_Float_Input	Subclass of FI_Input that only allows the user to type floating point numbers (sign, digits, decimal point, more digits, 'E' or 'e', sign, digits)	441
FI_FLTK_File_Chooser	. . . . .	441
FI_Font_Descriptor	This a structure for an actual system font, with junk to help choose it and info on character sizes	443
FI_Fontdesc	. . . . .	443
FI_FormsBitmap	Forms compatibility Bitmap Image Widget	443
FI_FormsPixmap	Forms pixmap drawing routines	444
FI_FormsText	. . . . .	446
FI_Free	Emulation of the Forms "free" widget	447
FI_GDI_Graphics_Driver	The MSWindows-specific graphics class	449
FI_GDI_Printer_Graphics_Driver	The graphics driver used when printing on MSWindows	451
FI_GIF_Image	Supports loading, caching, and drawing of CompuServe GIF SM images	453
FI_GI_Choice	. . . . .	454
FI_GI_Window	Sets things up so OpenGL works	454
FI_Glut_Bitmap_Font	Fltk glut font/size attributes used in the glutXXX functions	462
FI_Glut_StrokeChar	. . . . .	462
FI_Glut_StrokeFont	. . . . .	462
FI_Glut_StrokeStrip	. . . . .	463
FI_Glut_StrokeVertex	. . . . .	463

FI_Glut_Window	GLUT is emulated using this window class and these static variables (plus several more static variables hidden in glut_compatibility.cxx):	463
FI_Graphics_Driver	A virtual class subclassed for each graphics driver FLTK uses	465
FI_Group	FLTK container widget	484
FI_GTK_File_Chooser		494
FI_Help_Block		494
FI_Help_Dialog	Displays a standard help dialog window using the FI_Help_View widget	494
FI_Help_Font_Stack		496
FI_Help_Font_Style	FI_Help_View font stack element definition	497
FI_Help_Link	Definition of a link for the html viewer	497
FI_Help_Target	FI_Help_Target structure	498
FI_Help_View	Displays HTML text	498
FI_Hold_Browser	The FI_Hold_Browser is a subclass of FI_Browser which lets the user select a single item, or no items by clicking on the empty space	504
FI_Hor_Fill_Slider		505
FI_Hor_Nice_Slider		505
FI_Hor_Slider	Horizontal Slider class	505
FI_Hor_Value_Slider		506
FI_Image	Base class for image caching and drawing	507
FI_Image_Surface	Directs all graphics requests to an FI_Image	512
FI_Input	This is the FLTK text input widget	514
FI_Input_	This class provides a low-overhead text input field	517
FI_Input_Choice	A combination of the input widget and a menu button	535
FI_Int_Input	Subclass of FI_Input that only allows the user to type decimal digits (or hex numbers of the form 0xaeF)	538
FI_JPEG_Image	Supports loading, caching, and drawing of Joint Photographic Experts Group (JPEG) File Interchange Format (JFIF) images	539
FI_Label	This struct stores all information for a text or mixed graphics label	541
FI_Light_Button	This subclass displays the "on" state by turning on a light, rather than drawing pushed in	542
FI_Line_Dial		544
FI_Mac_App_Menu	Mac OS-specific class allowing to customize and localize the application menu	544
FI_Menu_	Base class of all widgets that have a menu in FLTK	546
FI_Menu_Bar	This widget provides a standard menubar interface	559
FI_Menu_Button	This is a button that when pushed pops up a menu (or hierarchy of menus) defined by an array of FI_Menu_Item objects	561

FI_Menu_Item	The FI_Menu_Item structure defines a single menu item that is used by the FI_Menu_ class . . .	564
FI_Menu_Window	Window type used for menus	575
FI_Multi_Browser	Subclass of FI_Browser which lets the user select any set of the lines	577
FI_Multi_Label	This struct allows multiple labels to be added to objects that might normally have only one label	578
FI_Multiline_Input	This input field displays '\n' characters as new lines rather than ^J, and accepts the Return, Tab, and up and down arrow keys	579
FI_Multiline_Output	This widget is a subclass of FI_Output that displays multiple lines of text	580
FI_Native_File_Chooser	This class lets an FLTK application easily and consistently access the operating system's native file chooser	581
FI_Nice_Slider		587
FI_Output	This widget displays a piece of text	588
FI_Overlay_Window	This window provides double buffering and also the ability to draw the "overlay" which is another picture placed on top of the main image	589
FI_Pack	This widget was designed to add the functionality of compressing and aligning widgets	592
FI_Paged_Device	Represents page-structured drawing surfaces	593
FI_Pixmap	Supports caching and drawing of colormap (pixmap) images, including transparency	600
FI_Plugin	FI_Plugin allows link-time and run-time integration of binary modules	603
FI_Plugin_Manager	FI_Plugin_Manager manages link-time and run-time plugin binaries	604
FI_PNG_Image	Supports loading, caching, and drawing of Portable Network Graphics (PNG) image files	606
FI_PNM_Image	Supports loading, caching, and drawing of Portable Anymap (PNM, PBM, PGM, PPM) image files	607
FI_Positioner	This class is provided for Forms compatibility	608
FI_PostScript_File_Device	To send graphical output to a PostScript file	611
FI_PostScript_Graphics_Driver	PostScript graphical backend	616
FI_PostScript_Printer	Print support under Unix/Linux	622
FI_Preferences	FI_Preferences provides methods to store user settings between application starts	623
FI_Printer	OS-independent print support	637
FI_Progress	Displays a progress bar for the user	644
FI_Quartz_Graphics_Driver	The Mac OS X-specific graphics class	646
FI_Radio_Button		648
FI_Radio_Light_Button		649
FI_Radio_Round_Button		650
FI_Scroll::FI_Region_LRTB	A local struct to manage a region defined by left/right/top/bottom	651

FI_Scroll::FI_Region_XYWH	A local struct to manage a region defined by xywh	651
FI_Repeat_Button	The FI_Repeat_Button is a subclass of FI_Button that generates a callback when it is pressed and then repeatedly generates callbacks as long as it is held down	651
FI_Return_Button	The FI_Return_Button is a subclass of FI_Button that generates a callback when it is pressed or when the user presses the Enter key	653
FI_RGB_Image	Supports caching and drawing of full-color images with 1 to 4 channels of color information	655
FI_Roller	"dolly" control commonly used to move 3D objects	659
FI_Round_Button	Buttons generate callbacks when they are clicked by the user	660
FI_Round_Clock	A clock widget of type FL_ROUND_CLOCK	662
FI_Scroll	This container widget lets you maneuver around a set of widgets much larger than your window	662
FI_Scrollbar	Displays a slider with arrow buttons at the ends of the scrollbar	668
FI_Scroll::FI_Scrollbar_Data	A local struct to manage a scrollbar's xywh region and tab values	671
FI_Secret_Input	Subclass of FI_Input that displays its input as a string of placeholders	671
FI_Select_Browser	The class is a subclass of FI_Browser which lets the user select a single item, or no items by clicking on the empty space	673
FI_Shared_Image	This class supports caching, loading, scaling, and drawing of image files	674
FI_Simple_Counter	This widget creates a counter with only 2 arrow buttons	681
FI_Single_Window	This is the same as FI_Window	681
FI_Slider	Sliding knob inside a box	683
FI_Spinner	This widget is a combination of the input widget and repeat buttons	686
FI_Surface_Device	A drawing surface that's susceptible to receive graphical output	690
FI_Sys_Menu_Bar	A class to create, modify and delete menus that appear on Mac OS X in the menu bar at the top of the screen	692
FI_System_Printer	Print support under MSWindows and Mac OS	697
FI_Table	A table of widgets or other content	701
FI_Table_Row	A table with row selection capabilities	717
FI_Tabs	"file card tabs" interface that allows you to put lots and lots of buttons and switches in a panel, as popularized by many toolkits	720
FI_Text_Buffer	This class manages Unicode text displayed in one or more FI_Text_Display widgets	726
FI_Text_Display	Rich text display widget	742
FI_Text_Editor	This is the FLTK text editor widget	778

FI_Text_Selection	This is an internal class for FI_Text_Buffer to manage text selections	786
FI_Tile	Lets you resize its children by dragging the border between them	789
FI_Tiled_Image	This class supports tiling of images over a specified area	792
FI_Timer	This is provided only to emulate the Forms Timer widget	794
FI_Toggle_Button	The toggle button is a push button that needs to be clicked once to toggle on, and one more time to toggle off	797
FI_Tooltip	Tooltip support for all FLTK widgets	798
FI_Tree	Tree widget	802
FI_Tree_Item	Tree widget item	844
FI_Tree_Item_Array	Manages an array of FI_Tree_Item pointers	865
FI_Tree_Prefs	Tree widget's preferences	868
FI_Valuator	Controls a single floating-point value and provides a consistent interface to set the value, range, and step, and insures that callbacks are done the same for every object	873
FI_Value_Input	Displays a numeric value	878
FI_Value_Output	Displays a floating point value	882
FI_Value_Slider	FI_Slider widget with a box displaying the current value	885
FI_Widget	FI_Widget is the base class for all widgets in FLTK	888
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Chapter 30

Module Documentation

30.1 Callback function typedefs

Typedefs defined in `<FL/Fl.H>` for callback or handler functions passed as function parameters.

Typedefs

- typedef void(* [Fl_Abort_Handler](#)) (const char *format,...)
Signature of set_abort functions passed as parameters.
- typedef int(* [Fl_Args_Handler](#)) (int argc, char **argv, int &i)
Signature of args functions passed as parameters.
- typedef void(* [Fl_Atclose_Handler](#)) ([Fl_Window](#) *window, void *data)
Signature of set_atclose functions passed as parameters.
- typedef void(* [Fl_Awake_Handler](#)) (void *data)
Signature of some wakeup callback functions passed as parameters.
- typedef void() [Fl_Box_Draw_F](#)(int x, int y, int w, int h, [Fl_Color](#) color)
Signature of some box drawing functions passed as parameters.
- typedef void(* [Fl_Clipboard_Notify_Handler](#)) (int source, void *data)
Signature of add_clipboard_notify functions passed as parameters.
- typedef int(* [Fl_Event_Dispatch](#)) (int event, [Fl_Window](#) *w)
Signature of event_dispatch functions passed as parameters.
- typedef int(* [Fl_Event_Handler](#)) (int event)
Signature of add_handler functions passed as parameters.
- typedef void(* [Fl_FD_Handler](#)) (FL_SOCKET fd, void *data)
Signature of add_fd functions passed as parameters.
- typedef void(* [Fl_Idle_Handler](#)) (void *data)
Signature of add_idle callback functions passed as parameters.
- typedef void() [Fl_Label_Draw_F](#)(const [Fl_Label](#) *label, int x, int y, int w, int h, [Fl_Align](#) align)
Signature of some label drawing functions passed as parameters.
- typedef void() [Fl_Label_Measure_F](#)(const [Fl_Label](#) *label, int &width, int &height)
Signature of some label measurement functions passed as parameters.
- typedef void(* [Fl_Old_Idle_Handler](#)) ()
Signature of set_idle callback functions passed as parameters.
- typedef int(* [Fl_System_Handler](#)) (void *event, void *data)
Signature of add_system_handler functions passed as parameters.
- typedef void(* [Fl_Timeout_Handler](#)) (void *data)
Signature of some timeout callback functions passed as parameters.

30.1.1 Detailed Description

Typedefs defined in `<FL/FL.H>` for callback or handler functions passed as function parameters.

FLTK uses callback functions as parameters for some function calls, e.g. to set up global event handlers (`Fl::add_handler()`), to add a timeout handler (`Fl::add_timeout()`), and many more.

The typedefs defined in this group describe the function parameters used to set up or clear the callback functions and should also be referenced to define the callback function to handle such events in the user's code.

See also

`Fl::add_handler()`, `Fl::add_timeout()`, `Fl::repeat_timeout()`, `Fl::remove_timeout()` and others

30.1.2 Typedef Documentation

30.1.2.1 Fl_Event_Dispatch

```
typedef int (* Fl_Event_Dispatch) (int event, Fl_Window *w)
```

Signature of event_dispatch functions passed as parameters.

See also

`Fl::event_dispatch(Fl_Event_Dispatch)`

30.2 Windows handling functions

Windows and standard dialogs handling declared in `<FL/FL.H>`

Functions

- static void `Fl::default_atclose` (`Fl_Window *`, `void *`)
Default callback for window widgets.
- static `Fl_Window *` `Fl::first_window` ()
Returns the first top-level window in the list of shown() windows.
- static void `Fl::first_window` (`Fl_Window *`)
Sets the window that is returned by first_window().
- static `Fl_Window *` `Fl::grab` ()
Returns the window that currently receives all events.
- static void `Fl::grab` (`Fl_Window *`)
Selects the window to grab.
- static `Fl_Window *` `Fl::modal` ()
Returns the top-most modal() window currently shown.
- static `Fl_Window *` `Fl::next_window` (`const Fl_Window *`)
Returns the next top-level window in the list of shown() windows.
- static void `Fl::set_abort` (`Fl_Abort_Handler` f)
For back compatibility, sets the void Fl::fatal handler callback.
- static void `Fl::set_atclose` (`Fl_Atclose_Handler` f)
For back compatibility, sets the Fl::atclose handler callback.

Variables

- static void(* `Fl::atclose`)(`Fl_Window *`, `void *`)
Back compatibility: default window callback handler.

30.2.1 Detailed Description

Windows and standard dialogs handling declared in `<FL/FL.H>`

30.2.2 Function Documentation

30.2.2.1 default_atclose()

```
void Fl::default_atclose (
    Fl_Window * window,
    void * v ) [static]
```

Default callback for window widgets.

It hides the window and then calls the default widget callback.

30.2.2.2 first_window() [1/2]

```
Fl_Window * Fl::first_window ( ) [static]
```

Returns the first top-level window in the list of shown() windows.

If a modal() window is shown this is the top-most modal window, otherwise it is the most recent window to get an event.

30.2.2.3 first_window() [2/2]

```
void Fl::first_window (
    Fl_Window * window ) [static]
```

Sets the window that is returned by first_window().

The window is removed from wherever it is in the list and inserted at the top. This is not done if Fl::modal() is on or if the window is not shown(). Because the first window is used to set the "parent" of modal windows, this is often useful.

30.2.2.4 grab() [1/2]

```
static Fl_Window* Fl::grab ( ) [inline], [static]
```

Returns the window that currently receives all events.

Returns

The window that currently receives all events, or NULL if event grabbing is currently OFF.

30.2.2.5 grab() [2/2]

```
void Fl::grab (
    Fl_Window * win ) [static]
```

Selects the window to grab.

This is used when pop-up menu systems are active.

Send all events to the passed window no matter where the pointer or focus is (including in other programs). The window *does not have to be shown()*, this lets the handle() method of a "dummy" window override all event handling and allows you to map and unmap a complex set of windows (under both X and WIN32 *some* window must be mapped because the system interface needs a window id).

If grab() is on it will also affect show() of windows by doing system-specific operations (on X it turns on override-redirect). These are designed to make menus popup reliably and faster on the system.

To turn off grabbing do Fl::grab(0).

Be careful that your program does not enter an infinite loop while grab() is on. On X this will lock up your screen! To avoid this potential lockup, all newer operating systems seem to limit mouse pointer grabbing to the time during which a mouse button is held down. Some OS's may not support grabbing at all.

30.2.2.6 modal()

```
static Fl_Window* Fl::modal ( ) [inline], [static]
```

Returns the top-most modal() window currently shown.

This is the most recently shown() window with `modal()` true, or NULL if there are no `modal()` windows shown(). The `modal()` window has its `handle()` method called for all events, and no other windows will have `handle()` called (`grab()` overrides this).

30.2.2.7 next_window()

```
Fl_Window * Fl::next_window (
    const Fl_Window * window ) [static]
```

Returns the next top-level window in the list of shown() windows. You can use this call to iterate through all the windows that are shown().

Parameters

in	<code>window</code>	must be shown and not NULL
----	---------------------	----------------------------

30.2.2.8 set_atclose()

```
static void Fl::set_atclose (
    Fl_Atclose_Handler f ) [inline], [static]
```

For back compatibility, sets the `Fl::atclose` handler callback. You can now simply change the callback for the window instead.

See also

[Fl_Window::callback\(Fl_Callback*\)](#)

30.2.3 Variable Documentation

30.2.3.1 atclose

```
void(* Fl::atclose)(Fl_Window *, void *)=default_atclose [static], [default]
```

Back compatibility: default window callback handler.

See also

[Fl::set_atclose\(\)](#)

30.3 Events handling functions

Fl class events handling API declared in `<FL/Fl.H>`

Functions

- static void `Fl::add_handler` (`Fl_Event_Handler h`)
Install a function to parse unrecognized events.
- static void `Fl::add_system_handler` (`Fl_System_Handler h`, `void *data`)
Install a function to intercept system events.
- static `Fl_Widget *` `Fl::belowmouse` ()
Gets the widget that is below the mouse.
- static void `Fl::belowmouse` (`Fl_Widget *`)
Sets the widget that is below the mouse.
- static int `Fl::compose` (`int &del`)
Any text editing widget should call this for each FL_KEYBOARD event.
- static void `Fl::compose_reset` ()

- If the user moves the cursor, be sure to call `Fl::compose_reset()`.*
- static void `Fl::disable_im ()`
Disables the system input methods facilities.
 - static void `Fl::enable_im ()`
Enables the system input methods facilities.
 - static int `Fl::event ()`
Returns the last event that was processed.
 - static int `Fl::event_alt ()`
Returns non-zero if the Alt key is pressed.
 - static int `Fl::event_button ()`
Gets which particular mouse button caused the current event.
 - static int `Fl::event_button1 ()`
Returns non-zero if mouse button 1 is currently held down.
 - static int `Fl::event_button2 ()`
Returns non-zero if button 2 is currently held down.
 - static int `Fl::event_button3 ()`
Returns non-zero if button 3 is currently held down.
 - static int `Fl::event_buttons ()`
Returns the mouse buttons state bits; if non-zero, then at least one button is pressed now.
 - static int `Fl::event_clicks ()`
Returns non zero if we had a double click event.
 - static void `Fl::event_clicks (int i)`
Manually sets the number returned by `Fl::event_clicks()`.
 - static void * `Fl::event_clipboard ()`
During an `FL_PASTE` event of non-textual data, returns a pointer to the pasted data.
 - static const char * `Fl::event_clipboard_type ()`
Returns the type of the pasted data during an `FL_PASTE` event.
 - static int `Fl::event_command ()`
Returns non-zero if the `FL_COMMAND` key is pressed, either `FL_CTRL` or on OSX `FL_META`.
 - static int `Fl::event_ctrl ()`
Returns non-zero if the Control key is pressed.
 - static `Fl_Event_Dispatch Fl::event_dispatch ()`
Return the current event dispatch function.
 - static void `Fl::event_dispatch (Fl_Event_Dispatch d)`
Set a new event dispatch function.
 - static int `Fl::event_dx ()`
Returns the current horizontal mouse scrolling associated with the `FL_MOUSEWHEEL` event.
 - static int `Fl::event_dy ()`
Returns the current vertical mouse scrolling associated with the `FL_MOUSEWHEEL` event.
 - static int `Fl::event_inside (const Fl_Widget *)`
Returns whether or not the mouse event is inside a given child widget.
 - static int `Fl::event_inside (int, int, int, int)`
Returns whether or not the mouse event is inside the given rectangle.
 - static int `Fl::event_is_click ()`
Returns non-zero if the mouse has not moved far enough and not enough time has passed since the last `FL_PUSH` or `FL_KEYBOARD` event for it to be considered a "drag" rather than a "click".
 - static void `Fl::event_is_click (int i)`
Clears the value returned by `Fl::event_is_click()`.
 - static int `Fl::event_key ()`
Gets which key on the keyboard was last pushed.
 - static int `Fl::event_key (int key)`

- Returns true if the given `key` was held down (or pressed) during the last event.*

 - static int `Fl::event_length ()`
Returns the length of the text in `Fl::event_text()`.
 - static int `Fl::event_original_key ()`
Returns the keycode of the last key event, regardless of the NumLock state.
 - static int `Fl::event_shift ()`
Returns non-zero if the Shift key is pressed.
 - static int `Fl::event_state ()`
Returns the keyboard and mouse button states of the last event.
 - static int `Fl::event_state (int mask)`
Returns non-zero if any of the passed event state bits are turned on.
 - static const char * `Fl::event_text ()`
Returns the text associated with the current event, including `FL_PASTE` or `FL_DND_RELEASE` events.
 - static int `Fl::event_x ()`
Returns the mouse position of the event relative to the `Fl_Window` it was passed to.
 - static int `Fl::event_x_root ()`
Returns the mouse position on the screen of the event.
 - static int `Fl::event_y ()`
Returns the mouse position of the event relative to the `Fl_Window` it was passed to.
 - static int `Fl::event_y_root ()`
Returns the mouse position on the screen of the event.
 - static `Fl_Widget *` `Fl::focus ()`
Gets the current `Fl::focus()` widget.
 - static void `Fl::focus (Fl_Widget *)`
Sets the widget that will receive `FL_KEYBOARD` events.
 - static int `Fl::get_key (int key)`
Returns true if the given `key` is held down now.
 - static void `Fl::get_mouse (int &, int &)`
Return where the mouse is on the screen by doing a round-trip query to the server.
 - static int `Fl::handle (int, Fl_Window *)`
Handle events from the window system.
 - static int `Fl::handle_ (int, Fl_Window *)`
Handle events from the window system.
 - static `Fl_Widget *` `Fl::pushed ()`
Gets the widget that is being pushed.
 - static void `Fl::pushed (Fl_Widget *)`
Sets the widget that is being pushed.
 - static void `Fl::remove_handler (Fl_Event_Handler h)`
Removes a previously added event handler.
 - static void `Fl::remove_system_handler (Fl_System_Handler h)`
Removes a previously added system event handler.
 - static int `Fl::test_shortcut (Fl_Shortcut)`
Tests the current event, which must be an `FL_KEYBOARD` or `FL_SHORTCUT`, against a shortcut value (described in `Fl_Button`).

Variables

- const char *const `fl_eventnames []`
This is an array of event names you can use to convert event numbers into names.
- const char *const `fl_fontnames []`
This is an array of font names you can use to convert font numbers into names.

30.3.1 Detailed Description

Fl class events handling API declared in [<FL/Fl.H>](#)

30.3.2 Function Documentation

30.3.2.1 add_handler()

```
void Fl::add_handler (
    Fl_Event_Handler ha ) [static]
```

Install a function to parse unrecognized events.

If FLTK cannot figure out what to do with an event, it calls each of these functions (most recent first) until one of them returns non-zero. If none of them returns non-zero then the event is ignored. Events that cause this to be called are:

- [FL_SHORTCUT](#) events that are not recognized by any widget. This lets you provide global shortcut keys.
- [FL_SCREEN_CONFIGURATION_CHANGED](#) events. Under X11, this event requires the libXrandr.so shared library to be loadable at run-time and the X server to implement the RandR extension.
- [FL_FULLSCREEN](#) events sent to a window that enters or leaves fullscreen mode.
- System events that FLTK does not recognize. See [fl_xevent](#).
- *Some* other events when the widget FLTK selected returns zero from its [handle\(\)](#) method. Exactly which ones may change in future versions, however.

See also

[Fl::remove_handler\(Fl_Event_Handler\)](#)
[Fl::event_dispatch\(Fl_Event_Dispatch d\)](#)
[Fl::handle\(int, Fl_Window*\)](#)

30.3.2.2 add_system_handler()

```
void Fl::add_system_handler (
    Fl_System_Handler ha,
    void * data ) [static]
```

Install a function to intercept system events.

FLTK calls each of these functions as soon as a new system event is received. The processing will stop at the first function to return non-zero. If all functions return zero then the event is passed on for normal handling by FLTK.

Each function will be called with a pointer to the system event as the first argument and *data* as the second argument. The system event pointer will always be void *, but will point to different objects depending on the platform:

- X11: XEvent
- Windows: MSG
- OS X: NSEvent

Parameters

<i>ha</i>	The event handler function to register
<i>data</i>	User data to include on each call

See also

[Fl::remove_system_handler\(Fl_System_Handler\)](#)

30.3.2.3 belowmouse() [1/2]

```
static Fl_Widget* Fl::belowmouse ( ) [inline], [static]
```

Gets the widget that is below the mouse.

See also

[belowmouse\(Fl_Widget*\)](#)

30.3.2.4 belowmouse() [2/2]

```
void Fl::belowmouse (
    Fl_Widget * o ) [static]
```

Sets the widget that is below the mouse.

This is for highlighting buttons. It is not used to send FL_PUSH or FL_MOVE directly, for several obscure reasons, but those events typically go to this widget. This is also the first widget tried for FL_SHORTCUT events.

If you change the belowmouse widget, the previous one and all parents (that don't contain the new widget) are sent FL_LEAVE events. Changing this does *not* send FL_ENTER to this or any widget, because sending FL_ENTER is supposed to *test* if the widget wants the mouse (by it returning non-zero from [handle\(\)](#)).

30.3.2.5 compose()

```
int Fl::compose (
    int & del ) [static]
```

Any text editing widget should call this for each FL_KEYBOARD event.

Use of this function is very simple.

If *true* is returned, then it has modified the [Fl::event_text\(\)](#) and [Fl::event_length\(\)](#) to a set of *bytes* to insert (it may be of zero length!). It will also set the "del" parameter to the number of *bytes* to the left of the cursor to delete, this is used to delete the results of the previous call to [Fl::compose\(\)](#).

If *false* is returned, the keys should be treated as function keys, and del is set to zero. You could insert the text anyways, if you don't know what else to do.

On the Mac OS platform, text input can involve marked text, that is, temporary text replaced by other text during the input process. This occurs, e.g., when using dead keys or when entering CJK characters. Text editing widgets should preferentially signal marked text, usually underlining it. Widgets can use `int Fl::compose_state` after having called [Fl::compose\(int&\)](#) to obtain the length in bytes of marked text that always finishes at the current insertion point. It's the widget's task to underline marked text. Widgets should also call `void Fl::reset_marked_text()` when processing FL_UNFOCUS events. Optionally, widgets can also call `void Fl::insertion_point_location(int x, int y, int height)` to indicate the window coordinates of the bottom of the current insertion point and the line height. This way, auxiliary windows that help choosing among alternative characters appear just below the insertion point. If widgets don't do that, auxiliary windows appear at the widget's bottom. The [Fl_Input](#) and [Fl_Text_Editor](#) widgets underline marked text. If none of this is done by a user-defined text editing widget, text input will work, but will not signal to the user what text is marked. Finally, text editing widgets should call `set_flag(MAC_USE_ACCENTS_MENU)`; in their constructor if they want to use the feature introduced with Mac OS 10.7 "Lion" where pressing and holding a key on the keyboard opens an accented-character menu window.

Though the current implementation returns immediately, future versions may take quite awhile, as they may pop up a window or do other user-interface things to allow characters to be selected.

30.3.2.6 compose_reset()

```
void Fl::compose_reset ( ) [static]
```

If the user moves the cursor, be sure to call [Fl::compose_reset\(\)](#).

The next call to [Fl::compose\(\)](#) will start out in an initial state. In particular it will not set "del" to non-zero. This call is very fast so it is ok to call it many times and in many places.

30.3.2.7 disable_im()

```
static void Fl::disable_im ( ) [static]
```

Disables the system input methods facilities.

See also

[enable_im\(\)](#)

30.3.2.8 enable_im()

```
static void Fl::enable_im ( ) [static]
```

Enables the system input methods facilities.
This is the default.

See also

[disable_im\(\)](#)

30.3.2.9 event()

```
static int Fl::event ( ) [inline], [static]
```

Returns the last event that was processed.

This can be used to determine if a callback is being done in response to a keypress, mouse click, etc.

30.3.2.10 event_button()

```
static int Fl::event_button ( ) [inline], [static]
```

Gets which particular mouse button caused the current event.

This returns garbage if the most recent event was not a FL_PUSH or FL_RELEASE event.

Return values

<i>FL_LEFT_MOUSE</i>	
<i>FL_MIDDLE_MOUSE</i>	
<i>FL_RIGHT_MOUSE.</i>	

See also

[Fl::event_buttons\(\)](#)

30.3.2.11 event_button1()

```
static int Fl::event_button1 ( ) [inline], [static]
```

Returns non-zero if mouse button 1 is currently held down.

For more details, see [Fl::event_buttons\(\)](#).

30.3.2.12 event_button2()

```
static int Fl::event_button2 ( ) [inline], [static]
```

Returns non-zero if button 2 is currently held down.

For more details, see [Fl::event_buttons\(\)](#).

30.3.2.13 event_button3()

```
static int Fl::event_button3 ( ) [inline], [static]
```

Returns non-zero if button 3 is currently held down.
For more details, see [Fl::event_buttons\(\)](#).

30.3.2.14 event_buttons()

```
static int Fl::event_buttons ( ) [inline], [static]
```

Returns the mouse buttons state bits; if non-zero, then at least one button is pressed now.

This function returns the button state at the time of the event. During an FL_RELEASE event, the state of the released button will be 0. To find out, which button caused an FL_RELEASE event, you can use [Fl::event_button\(\)](#) instead.

Returns

a bit mask value like { [FL_BUTTON1] | [FL_BUTTON2] | [FL_BUTTON3] }

30.3.2.15 event_clicks() [1/2]

```
static int Fl::event_clicks ( ) [inline], [static]
```

Returns non zero if we had a double click event.

Return values

<i>Non-zero</i>	if the most recent FL_PUSH or FL_KEYBOARD was a "double click".
<i>N-1</i>	for N clicks. A double click is counted if the same button is pressed again while event_is_click() is true.

30.3.2.16 event_clicks() [2/2]

```
static void Fl::event_clicks (
    int i ) [inline], [static]
```

Manually sets the number returned by [Fl::event_clicks\(\)](#).

This can be used to set it to zero so that later code does not think an item was double-clicked.

Parameters

in	<i>i</i>	corresponds to no double-click if 0, i+1 mouse clicks otherwise
----	----------	---

See also

int [event_clicks\(\)](#)

30.3.2.17 event_clipboard()

```
static void* Fl::event_clipboard ( ) [inline], [static]
```

During an FL_PASTE event of non-textual data, returns a pointer to the pasted data.

The returned data is an [Fl_Image *](#) when the result of [Fl::event_clipboard_type\(\)](#) is [Fl::clipboard_image](#).

30.3.2.18 event_clipboard_type()

```
static const char* Fl::event_clipboard_type ( ) [inline], [static]
```

Returns the type of the pasted data during an FL_PASTE event.

This type can be [Fl::clipboard_plain_text](#) or [Fl::clipboard_image](#).

30.3.2.19 event_dispatch()

```
void Fl::event_dispatch (
    Fl_Event_Dispatch d ) [static]
```

Set a new event dispatch function.

The event dispatch function is called after native events are converted to FLTK events, but before they are handled by FLTK. If the dispatch function `Fl_Event_Dispatch d` is set, it is up to the dispatch function to call `Fl::handle_(int, Fl_Window*)` or to ignore the event.

The dispatch function itself must return 0 if it ignored the event, or non-zero if it used the event. If you call `Fl::handle_()`, then this will return the correct value.

The event dispatch can be used to handle exceptions in FLTK events and callbacks before they reach the native event handler:

```
int myHandler(int e, Fl_Window *w) {
    try {
        return Fl::handle_(e, w);
    } catch () {
        ...
    }
}
main() {
    Fl::event_dispatch(myHandler);
    ...
    Fl::run();
}
```

Parameters

<i>d</i>	new dispatch function, or NULL
----------	--------------------------------

See also

[Fl::add_handler\(Fl_Event_Handler\)](#)

[Fl::handle\(int, Fl_Window*\)](#)

[Fl::handle_\(int, Fl_Window*\)](#)

30.3.2.20 event_dx()

```
static int Fl::event_dx ( ) [inline], [static]
```

Returns the current horizontal mouse scrolling associated with the `FL_MOUSEWHEEL` event.

Right is positive.

30.3.2.21 event_dy()

```
static int Fl::event_dy ( ) [inline], [static]
```

Returns the current vertical mouse scrolling associated with the `FL_MOUSEWHEEL` event.

Down is positive.

30.3.2.22 event_inside() [1/2]

```
int Fl::event_inside (
    const Fl_Widget * o ) [static]
```

Returns whether or not the mouse event is inside a given child widget.

Returns non-zero if the current [Fl::event_x\(\)](#) and [Fl::event_y\(\)](#) put it inside the given child widget's bounding box.

This method can only be used to check whether the mouse event is inside a **child** widget of the window that handles the event, and there must not be an intermediate subwindow (i.e. the widget must not be inside a subwindow of the current window). However, it is valid if the widget is inside a nested [Fl_Group](#).

You must not use it with the window itself as the `o` argument in a window's [handle\(\)](#) method.

Note

The mentioned restrictions are necessary, because this method does not transform coordinates of child widgets, and thus the given widget `o` must be within the *same* window that is handling the current event. Otherwise the results are undefined.

You should always call this rather than doing your own comparison so you are consistent about edge effects.

See also

[Fl::event_inside\(int, int, int, int\)](#)

Parameters

<code>in</code>	<code>o</code>	child widget to be tested
-----------------	----------------	---------------------------

Returns

non-zero, if mouse event is inside the widget

30.3.2.23 event_inside() [2/2]

```
int Fl::event_inside (
    int xx,
    int yy,
    int ww,
    int hh ) [static]
```

Returns whether or not the mouse event is inside the given rectangle.

Returns non-zero if the current [Fl::event_x\(\)](#) and [Fl::event_y\(\)](#) put it inside the given arbitrary bounding box.

You should always call this rather than doing your own comparison so you are consistent about edge effects.

To find out, whether the event is inside a child widget of the current window, you can use [Fl::event_inside\(const Fl_Widget *\)](#).

Parameters

<code>in</code>	<code>xx,yy,ww,hh</code>	bounding box
-----------------	--------------------------	--------------

Returns

non-zero, if mouse event is inside

30.3.2.24 event_is_click() [1/2]

```
static int Fl::event_is_click ( ) [inline], [static]
```

Returns non-zero if the mouse has not moved far enough and not enough time has passed since the last `FL_PUSH` or `FL_KEYBOARD` event for it to be considered a "drag" rather than a "click".

You can test this on `FL_DRAG`, `FL_RELEASE`, and `FL_MOVE` events.

30.3.2.25 event_is_click() [2/2]

```
static void Fl::event_is_click (
    int i ) [inline], [static]
```

Clears the value returned by [Fl::event_is_click\(\)](#).

Useful to prevent the *next* click from being counted as a double-click or to make a popup menu pick an item with a single click. Don't pass non-zero to this.

30.3.2.26 event_key() [1/2]

```
static int Fl::event_key ( ) [inline], [static]
```

Gets which key on the keyboard was last pushed.

The returned integer 'key code' is not necessarily a text equivalent for the keystroke. For instance: if someone presses '5' on the numeric keypad with numlock on, [Fl::event_key\(\)](#) may return the 'key code' for this key, and NOT the character '5'. To always get the '5', use [Fl::event_text\(\)](#) instead.

Returns

an integer 'key code', or 0 if the last event was not a key press or release.

See also

int [event_key\(int\)](#), [event_text\(\)](#), [compose\(int&\)](#).

30.3.2.27 event_key() [2/2]

```
int Fl::event_key (
    int key ) [static]
```

Returns true if the given *key* was held down (or pressed) *during* the last event.

This is constant until the next event is read from the server.

[Fl::get_key\(int\)](#) returns true if the given key is held down *now*. Under X this requires a round-trip to the server and is *much* slower than [Fl::event_key\(int\)](#).

Keys are identified by the *unshifted* values. FLTK defines a set of symbols that should work on most modern machines for every key on the keyboard:

- All keys on the main keyboard producing a printable ASCII character use the value of that ASCII character (as though shift, ctrl, and caps lock were not on). The space bar is 32.
- All keys on the numeric keypad producing a printable ASCII character use the value of that ASCII character plus FL_KP. The highest possible value is FL_KP_Last so you can range-check to see if something is on the keypad.
- All numbered function keys use the number on the function key plus FL_F. The highest possible number is FL_F_Last, so you can range-check a value.
- Buttons on the mouse are considered keys, and use the button number (where the left button is 1) plus FL_Button.
- All other keys on the keypad have a symbol: FL_Escape, FL_BackSpace, FL_Tab, FL_Enter, FL_Print, FL_↵, FL_Scroll_Lock, FL_Pause, FL_Insert, FL_Home, FL_Page_Up, FL_Delete, FL_End, FL_Page_Down, FL_Left, FL_Up, FL_Right, FL_Down, FL_Iso_Key, FL_Shift_L, FL_Shift_R, FL_Control_L, FL_Control_R, FL_Caps_↵, FL_Lock, FL_Alt_L, FL_Alt_R, FL_Meta_L, FL_Meta_R, FL_Menu, FL_Num_Lock, FL_KP_Enter. Be careful not to confuse these with the very similar, but all-caps, symbols used by [Fl::event_state\(\)](#).

On X [Fl::get_key\(FL_Button+n\)](#) does not work.

On WIN32 [Fl::get_key\(FL_KP_Enter\)](#) and [Fl::event_key\(FL_KP_Enter\)](#) do not work.

30.3.2.28 event_length()

```
static int Fl::event_length ( ) [inline], [static]
```

Returns the length of the text in [Fl::event_text\(\)](#).

There will always be a nul at this position in the text. However there may be a nul before that if the keystroke translates to a nul character or you paste a nul character.

30.3.2.29 event_original_key()

```
static int Fl::event_original_key ( ) [inline], [static]
```

Returns the keycode of the last key event, regardless of the NumLock state.

If NumLock is deactivated, FLTK translates events from the numeric keypad into the corresponding arrow key events. [event_key\(\)](#) returns the translated key code, whereas [event_original_key\(\)](#) returns the keycode before NumLock translation.

30.3.2.30 event_state() [1/2]

```
static int Fl::event_state ( ) [inline], [static]
```

Returns the keyboard and mouse button states of the last event.

This is a bitfield of what shift states were on and what mouse buttons were held down during the most recent event.

The legal event state bits are:

- FL_SHIFT
- FL_CAPS_LOCK
- FL_CTRL
- FL_ALT
- FL_NUM_LOCK
- FL_META
- FL_SCROLL_LOCK
- FL_BUTTON1
- FL_BUTTON2
- FL_BUTTON3

X servers do not agree on shift states, and FL_NUM_LOCK, FL_META, and FL_SCROLL_LOCK may not work. The values were selected to match the XFree86 server on Linux. In addition there is a bug in the way X works so that the shift state is not correctly reported until the first event *after* the shift key is pressed or released.

30.3.2.31 event_state() [2/2]

```
static int Fl::event_state (
    int mask ) [inline], [static]
```

Returns non-zero if any of the passed event state bits are turned on.

Use `mask` to pass the event states you're interested in. The legal event state bits are defined in [Fl::event_state\(\)](#).

30.3.2.32 event_text()

```
static const char* Fl::event_text ( ) [inline], [static]
```

Returns the text associated with the current event, including FL_PASTE or FL_DND_RELEASE events.

This can be used in response to FL_KEYUP, FL_KEYDOWN, FL_PASTE, and FL_DND_RELEASE.

When responding to FL_KEYUP/FL_KEYDOWN, use this function instead of [Fl::event_key\(\)](#) to get the text equivalent of keystrokes suitable for inserting into strings and text widgets.

The returned string is guaranteed to be NULL terminated. However, see [Fl::event_length\(\)](#) for the actual length of the string, in case the string itself contains NULLs that are part of the text data.

Returns

A NULL terminated text string equivalent of the last keystroke.

30.3.2.33 event_x_root()

```
static int Fl::event_x_root ( ) [inline], [static]
```

Returns the mouse position on the screen of the event.

To find the absolute position of an [Fl_Window](#) on the screen, use the difference between [event_x_root\(\)](#), [event_y_root\(\)](#) and [event_x\(\)](#), [event_y\(\)](#).

30.3.2.34 event_y_root()

```
static int Fl::event_y_root ( ) [inline], [static]
```

Returns the mouse position on the screen of the event.

To find the absolute position of an [Fl_Window](#) on the screen, use the difference between [event_x_root\(\)](#), [event_y_root\(\)](#) and [event_x\(\)](#), [event_y\(\)](#).

30.3.2.35 focus() [1/2]

```
static Fl_Widget* Fl::focus ( ) [inline], [static]
```

Gets the current [Fl::focus\(\)](#) widget.

See also

[Fl::focus\(Fl_Widget*\)](#)

30.3.2.36 focus() [2/2]

```
void Fl::focus (
    Fl_Widget * o ) [static]
```

Sets the widget that will receive FL_KEYBOARD events.

If you change [Fl::focus\(\)](#), the previous widget and all parents (that don't contain the new widget) are sent FL_↔ UNFOCUS events. Changing the focus does *not* send FL_FOCUS to this or any widget, because sending FL_↔ FOCUS is supposed to *test* if the widget wants the focus (by it returning non-zero from [handle\(\)](#)).

See also

[Fl_Widget::take_focus\(\)](#)

30.3.2.37 get_key()

```
int Fl::get_key (
    int key ) [static]
```

Returns true if the given key is held down *now*.

Under X this requires a round-trip to the server and is *much* slower than [Fl::event_key\(int\)](#).

See also

[event_key\(int\)](#)

30.3.2.38 get_mouse()

```
static void Fl::get_mouse (
    int & ,
    int & ) [static]
```

Return where the mouse is on the screen by doing a round-trip query to the server.

You should use [Fl::event_x_root\(\)](#) and [Fl::event_y_root\(\)](#) if possible, but this is necessary if you are not sure if a mouse event has been processed recently (such as to position your first window). If the display is not open, this will open it.

30.3.2.39 handle()

```
int Fl::handle (
    int e,
    Fl_Window * window ) [static]
```

Handle events from the window system.

This is called from the native event dispatch after native events have been converted to FLTK notation. This function calls `Fl::handle_(int, Fl_Window*)` unless the user sets a dispatch function. If a user dispatch function is set, the user must make sure that `Fl::handle_()` is called, or the event will be ignored.

Parameters

<i>e</i>	the event type (<code>Fl::event_number()</code> is not yet set)
<i>window</i>	the window that caused this event

Returns

0 if the event was not handled

See also

[Fl::add_handler\(Fl_Event_Handler\)](#)

[Fl::event_dispatch\(Fl_Event_Dispatch\)](#)

30.3.2.40 handle_()

```
int Fl::handle_ (
    int e,
    Fl_Window * window ) [static]
```

Handle events from the window system.

This function is called from the native event dispatch, unless the user sets another dispatch function. In that case, the user dispatch function must decide when to call `Fl::handle_(int, Fl_Window*)`

Parameters

<i>e</i>	the event type (<code>Fl::event_number()</code> is not yet set)
<i>window</i>	the window that caused this event

Returns

0 if the event was not handled

See also

[Fl::event_dispatch\(Fl_Event_Dispatch\)](#)

30.3.2.41 pushed() [1/2]

```
static Fl_Widget* Fl::pushed ( ) [inline], [static]
```

Gets the widget that is being pushed.

See also

[void pushed\(Fl_Widget*\)](#)

30.3.2.42 pushed() [2/2]

```
void Fl::pushed (
    Fl_Widget * o ) [static]
```

Sets the widget that is being pushed.

FL_DRAG or FL_RELEASE (and any more FL_PUSH) events will be sent to this widget.

If you change the pushed widget, the previous one and all parents (that don't contain the new widget) are sent FL_RELEASE events. Changing this does *not* send FL_PUSH to this or any widget, because sending FL_PUSH is supposed to *test* if the widget wants the mouse (by it returning non-zero from [handle\(\)](#)).

30.3.2.43 remove_handler()

```
void Fl::remove_handler (
    Fl_Event_Handler ha ) [static]
```

Removes a previously added event handler.

See also

[Fl::handle\(int, Fl_Window*\)](#)

30.3.2.44 remove_system_handler()

```
void Fl::remove_system_handler (
    Fl_System_Handler ha ) [static]
```

Removes a previously added system event handler.

Parameters

<i>ha</i>	The event handler function to remove
-----------	--------------------------------------

See also

[Fl::add_system_handler\(Fl_System_Handler\)](#)

30.3.2.45 test_shortcut()

```
int Fl::test_shortcut (
    Fl_Shortcut shortcut ) [static]
```

Tests the current event, which must be an FL_KEYBOARD or FL_SHORTCUT, against a shortcut value (described in [Fl_Button](#)).

Not to be confused with [Fl_Widget::test_shortcut\(\)](#).

Returns

non-zero if there is a match.

30.3.3 Variable Documentation

30.3.3.1 fl_eventnames

```
const char* const fl_eventnames[]
```

This is an array of event names you can use to convert event numbers into names.

The array gets defined inline wherever your '#include <[FL/names.h](#)>' appears.

Example:

```
#include <FL/names.h> // array will be defined here
int MyClass::handle(int e) {
    printf("Event was %s (%d)\n", fl_eventnames[e], e);
    // ..resulting output might be e.g. "Event was FL_PUSH (1)"..
    [..]
}
```

30.3.3.2 fl_fontnames

```
const char* const fl_fontnames[]
```

Initial value:

```
=
{
  "FL_HELVETICA",
  "FL_HELVETICA_BOLD",
  "FL_HELVETICA_ITALIC",
  "FL_HELVETICA_BOLD_ITALIC",
  "FL_COURIER",
  "FL_COURIER_BOLD",
  "FL_COURIER_ITALIC",
  "FL_COURIER_BOLD_ITALIC",
  "FL_TIMES",
  "FL_TIMES_BOLD",
  "FL_TIMES_ITALIC",
  "FL_TIMES_BOLD_ITALIC",
  "FL_SYMBOL",
  "FL_SCREEN",
  "FL_SCREEN_BOLD",
  "FL_ZAPF_DINGBATS",
}
```

This is an array of font names you can use to convert font numbers into names. The array gets defined inline wherever your '#include <FL/names.h>' appears.

Example:

```
#include <FL/names.h> // array will be defined here
int MyClass::my_callback(FL_Widget *w, void*) {
  int fnum = w->labelfont();
  // Resulting output might be e.g. "Label's font is FL_HELVETICA (0)"
  printf("Label's font is %s (%d)\n", fl_fontnames[fnum], fnum);
  // ..resulting output might be e.g. "Label's font is FL_HELVETICA (0)"..
  [...]
}
```

30.4 Selection & Clipboard functions

FLTK global copy/cut/paste functions declared in <FL/Fl.H>

Functions

- static void [Fl::add_clipboard_notify](#) ([Fl_Clipboard_Notify_Handler](#) h, void *data=0)

FLTK will call the registered callback whenever there is a change to the selection buffer or the clipboard.
- static int [Fl::clipboard_contains](#) (const char *type)

Returns non 0 if the clipboard contains data matching type.
- static void [Fl::copy](#) (const char *stuff, int len, int destination=0, const char *type=[Fl::clipboard_plain_text](#))

Copies the data pointed to by stuff to the selection buffer (destination is 0), the clipboard (destination is 1), or both (destination is 2).
- static int [Fl::dnd](#) ()

Initiate a Drag And Drop operation.
- static void [Fl::paste](#) ([Fl_Widget](#) &receiver)

Backward compatibility only.
- static void [Fl::paste](#) ([Fl_Widget](#) &receiver, int source, const char *type=[Fl::clipboard_plain_text](#))

Pastes the data from the selection buffer (source is 0) or the clipboard (source is 1) into receiver.
- static void [Fl::remove_clipboard_notify](#) ([Fl_Clipboard_Notify_Handler](#) h)

Stop calling the specified callback when there are changes to the selection buffer or the clipboard.
- static void [Fl::selection](#) ([Fl_Widget](#) &owner, const char *, int len)

Changes the current selection.
- static [Fl_Widget](#) * [Fl::selection_owner](#) ()

back-compatibility only: Gets the widget owning the current selection
- static void [Fl::selection_owner](#) ([Fl_Widget](#) *)

Back-compatibility only: The single-argument call can be used to move the selection to another widget or to set the owner to NULL, without changing the actual text of the selection.

Variables

- static char const *const `Fl::clipboard_image` = "image"
Denotes image data.
- static char const *const `Fl::clipboard_plain_text` = "text/plain"
Denotes plain textual data.

30.4.1 Detailed Description

FLTK global copy/cut/paste functions declared in `<FL/FL.H>`

30.4.2 Function Documentation

30.4.2.1 `add_clipboard_notify()`

```
void Fl::add_clipboard_notify (
    Fl_Clipboard_Notify_Handler h,
    void * data = 0 ) [static]
```

FLTK will call the registered callback whenever there is a change to the selection buffer or the clipboard. The source argument indicates which of the two has changed. Only changes by other applications are reported.

Example:

```
void clip_callback(int source, void *data) {
    if ( source == 0 ) printf("CLIP CALLBACK: selection buffer changed\n");
    if ( source == 1 ) printf("CLIP CALLBACK: clipboard changed\n");
}
[.]
int main() {
    [.]
    Fl::add_clipboard_notify(clip_callback);
    [.]
}
```

Note

Some systems require polling to monitor the clipboard and may therefore have some delay in detecting changes.

30.4.2.2 `clipboard_contains()`

```
static int Fl::clipboard_contains (
    const char * type ) [static]
```

Returns non 0 if the clipboard contains data matching `type`.

`type` can be `Fl::clipboard_plain_text` or `Fl::clipboard_image`.

30.4.2.3 `copy()`

```
static void Fl::copy (
    const char * stuff,
    int len,
    int destination = 0,
    const char * type = Fl::clipboard_plain_text ) [static]
```

Copies the data pointed to by `stuff` to the selection buffer (`destination` is 0), the clipboard (`destination` is 1), or both (`destination` is 2).

Copying to both is only relevant on X11, on other platforms it maps to the clipboard (1). `len` is the number of relevant bytes in `stuff`. `type` is always `Fl::clipboard_plain_text`. The selection buffer is used for middle-mouse pastes and for drag-and-drop selections. The clipboard is used for traditional copy/cut/paste operations.

Note

This function is, at present, intended only to copy UTF-8 encoded textual data. To copy graphical data, use the [Fl_Copy_Surface](#) class. The `type` argument may allow in the future to copy other kinds of data.

30.4.2.4 dnd()

```
int Fl::dnd ( ) [static]
```

Initiate a Drag And Drop operation.

The selection buffer should be filled with relevant data before calling this method. FLTK will then initiate the system wide drag and drop handling. Dropped data will be marked as *text*.

Create a selection first using: `Fl::copy(const char *stuff, int len, 0)`

30.4.2.5 paste() [1/2]

```
void Fl::paste (
    Fl_Widget & receiver ) [static]
```

Backward compatibility only.

This calls `Fl::paste(receiver, 0)`;

See also

[Fl::paste\(Fl_Widget &receiver, int clipboard, const char* type\)](#)

30.4.2.6 paste() [2/2]

```
static void Fl::paste (
    Fl_Widget & receiver,
    int source,
    const char * type = Fl::clipboard_plain_text ) [static]
```

Pastes the data from the selection buffer (`source` is 0) or the clipboard (`source` is 1) into `receiver`.

The selection buffer (`source` is 0) is used for middle-mouse pastes and for drag-and-drop selections. The clipboard (`source` is 1) is used for copy/cut/paste operations.

If `source` is 1, the optional `type` argument indicates what type of data is requested from the clipboard. At present, [Fl::clipboard_plain_text](#) (requesting text data) and [Fl::clipboard_image](#) (requesting image data) are possible. Set things up so the handle function of the `receiver` widget will be called with an `FL_PASTE` event some time in the future if the clipboard does contain data of the requested type. While processing the `FL_PASTE` event:

- if `type` is [Fl::clipboard_plain_text](#), the text string from the specified `source` is in [Fl::event_text\(\)](#) with UTF-8 encoding, and the number of bytes in [Fl::event_length\(\)](#). If [Fl::paste\(\)](#) gets called during the drop step of a files-drag-and-drop operation, [Fl::event_text\(\)](#) contains a list of filenames (see [Drag and Drop Events](#)).
- if `type` is [Fl::clipboard_image](#), the pointer returned by [Fl::event_clipboard\(\)](#) can be safely cast to type [Fl_Image *](#) to obtain a pointer to the pasted image. Furthermore, starting with FLTK 1.3.4, the image is of type [Fl_RGB_Image](#) across all platforms. If `receiver` accepts the clipboard image, `receiver.handle()` should return 1 and the application should take ownership of this image (that is, delete it after use). Conversely, if `receiver.handle()` returns 0, the application must not use the image.

The receiver should be prepared to be called *directly* by this, or for it to happen *later*, or possibly *not at all*. This allows the window system to take as long as necessary to retrieve the paste buffer (or even to screw up completely) without complex and error-prone synchronization code in FLTK.

Platform details for image data:

- Unix/Linux platform: Clipboard images in PNG or BMP formats are recognized. Requires linking with the `fltk_images` library.
- MSWindows platform: Both bitmap and vectorial (Enhanced metafile) data from clipboard can be pasted as image data.
- Mac OS X platform: Both bitmap (TIFF) and vectorial (PDF) data from clipboard can be pasted as image data.

30.4.2.7 `selection()`

```
void Fl::selection (
    Fl_Widget & owner,
    const char * text,
    int len ) [static]
```

Changes the current selection.

The block of text is copied to an internal buffer by FLTK (be careful if doing this in response to an `FL_PASTE` as this may be the same buffer returned by `event_text()`). The `selection_owner()` widget is set to the passed owner.

30.4.2.8 `selection_owner()` [1/2]

```
static Fl_Widget* Fl::selection_owner ( ) [inline], [static]
```

back-compatibility only: Gets the widget owning the current selection

See also

`Fl_Widget*` [selection_owner\(Fl_Widget*\)](#)

30.4.2.9 `selection_owner()` [2/2]

```
void Fl::selection_owner (
    Fl_Widget * owner ) [static]
```

Back-compatibility only: The single-argument call can be used to move the selection to another widget or to set the owner to `NULL`, without changing the actual text of the selection.

`FL_SELECTIONCLEAR` is sent to the previous selection owner, if any.

Copying the buffer every time the selection is changed is obviously wasteful, especially for large selections. An interface will probably be added in a future version to allow the selection to be made by a callback function. The current interface will be emulated on top of this.

30.5 Screen functions

fl global screen functions declared in `<FL/FL.H>`

Functions

- static int [Fl::h](#) ()
Returns the height in pixels of the main screen work area.
- static int [Fl::screen_count](#) ()
Gets the number of available screens.
- static void [Fl::screen_dpi](#) (float &h, float &v, int n=0)
Gets the screen resolution in dots-per-inch for the given screen.
- static int [Fl::screen_num](#) (int x, int y)
Gets the screen number of a screen that contains the specified screen position x, y.

- static int `Fl::screen_num` (int `x`, int `y`, int `w`, int `h`)
Gets the screen number for the screen which intersects the most with the rectangle defined by `x`, `y`, `w`, `h`.
- static void `Fl::screen_work_area` (int &`X`, int &`Y`, int &`W`, int &`H`)
Gets the bounding box of the work area of the screen that contains the mouse pointer.
- static void `Fl::screen_work_area` (int &`X`, int &`Y`, int &`W`, int &`H`, int `mx`, int `my`)
Gets the bounding box of the work area of a screen that contains the specified screen position `mx`, `my`.
- static void `Fl::screen_work_area` (int &`X`, int &`Y`, int &`W`, int &`H`, int `n`)
Gets the bounding box of the work area of the given screen.
- static void `Fl::screen_xywh` (int &`X`, int &`Y`, int &`W`, int &`H`)
Gets the bounding box of a screen that contains the mouse pointer.
- static void `Fl::screen_xywh` (int &`X`, int &`Y`, int &`W`, int &`H`, int `mx`, int `my`)
Gets the bounding box of a screen that contains the specified screen position `mx`, `my`.
- static void `Fl::screen_xywh` (int &`X`, int &`Y`, int &`W`, int &`H`, int `mx`, int `my`, int `mw`, int `mh`)
Gets the screen bounding rect for the screen which intersects the most with the rectangle defined by `mx`, `my`, `mw`, `mh`.
- static void `Fl::screen_xywh` (int &`X`, int &`Y`, int &`W`, int &`H`, int `n`)
Gets the screen bounding rect for the given screen.
- static int `Fl::w` ()
Returns the width in pixels of the main screen work area.
- static int `Fl::x` ()
Returns the leftmost x coordinate of the main screen work area.
- static int `Fl::y` ()
Returns the topmost y coordinate of the main screen work area.

30.5.1 Detailed Description

fl global screen functions declared in <[FL/Fl.H](#)>

30.5.2 Function Documentation

30.5.2.1 screen_dpi()

```
void Fl::screen_dpi (
    float & h,
    float & v,
    int n = 0 ) [static]
```

Gets the screen resolution in dots-per-inch for the given screen.

Parameters

out	<code>h,v</code>	horizontal and vertical resolution
in	<code>n</code>	the screen number (0 to <code>Fl::screen_count()</code> - 1)

See also

void [screen_xywh](#)(int &`x`, int &`y`, int &`w`, int &`h`, int `mx`, int `my`)

30.5.2.2 screen_num() [1/2]

```
int Fl::screen_num (
    int x,
    int y ) [static]
```

Gets the screen number of a screen that contains the specified screen position x , y .

Parameters

in	<i>x,y</i>	the absolute screen position
----	------------	------------------------------

30.5.2.3 screen_num() [2/2]

```
int Fl::screen_num (
    int x,
    int y,
    int w,
    int h ) [static]
```

Gets the screen number for the screen which intersects the most with the rectangle defined by *x*, *y*, *w*, *h*.

Parameters

in	<i>x,y,w,h</i>	the rectangle to search for intersection with
----	----------------	---

30.5.2.4 screen_work_area() [1/3]

```
static void Fl::screen_work_area (
    int & X,
    int & Y,
    int & W,
    int & H ) [inline], [static]
```

Gets the bounding box of the work area of the screen that contains the mouse pointer.

Parameters

out	<i>X,Y,W,H</i>	the work area bounding box
-----	----------------	----------------------------

See also

[void screen_work_area\(int &x, int &y, int &w, int &h, int mx, int my\)](#)

30.5.2.5 screen_work_area() [2/3]

```
void Fl::screen_work_area (
    int & X,
    int & Y,
    int & W,
    int & H,
    int mx,
    int my ) [static]
```

Gets the bounding box of the work area of a screen that contains the specified screen position *mx*, *my*.

Parameters

out	<i>X,Y,W,H</i>	the work area bounding box
in	<i>mx,my</i>	the absolute screen position

30.5.2.6 screen_work_area() [3/3]

```
void Fl::screen_work_area (
    int & X,
    int & Y,
    int & W,
    int & H,
    int n ) [static]
```

Gets the bounding box of the work area of the given screen.

Parameters

out	<i>X,Y,W,H</i>	the work area bounding box
in	<i>n</i>	the screen number (0 to <code>Fl::screen_count()</code> - 1)

See also

void [screen_xywh\(int &x, int &y, int &w, int &h, int mx, int my\)](#)

30.5.2.7 screen_xywh() [1/4]

```
static void Fl::screen_xywh (
    int & X,
    int & Y,
    int & W,
    int & H ) [inline], [static]
```

Gets the bounding box of a screen that contains the mouse pointer.

Parameters

out	<i>X,Y,W,H</i>	the corresponding screen bounding box
-----	----------------	---------------------------------------

See also

void [screen_xywh\(int &x, int &y, int &w, int &h, int mx, int my\)](#)

30.5.2.8 screen_xywh() [2/4]

```
void Fl::screen_xywh (
    int & X,
    int & Y,
    int & W,
    int & H,
    int mx,
    int my ) [static]
```

Gets the bounding box of a screen that contains the specified screen position `mx, my`.

Parameters

out	<i>X,Y,W,H</i>	the corresponding screen bounding box
in	<i>mx,my</i>	the absolute screen position

30.5.2.9 screen_xywh() [3/4]

```
void Fl::screen_xywh (
    int & X,
    int & Y,
    int & W,
    int & H,
    int mx,
    int my,
    int mw,
    int mh ) [static]
```

Gets the screen bounding rect for the screen which intersects the most with the rectangle defined by mx, my, mw, mh.

Parameters

out	<i>X,Y,W,H</i>	the corresponding screen bounding box
in	<i>mx,my,mw,mh</i>	the rectangle to search for intersection with

See also

void [screen_xywh\(int &X, int &Y, int &W, int &H, int n\)](#)

30.5.2.10 screen_xywh() [4/4]

```
void Fl::screen_xywh (
    int & X,
    int & Y,
    int & W,
    int & H,
    int n ) [static]
```

Gets the screen bounding rect for the given screen.

Under MSWindows, Mac OS X, and the Gnome desktop, screen #0 contains the menubar/taskbar

Parameters

out	<i>X,Y,W,H</i>	the corresponding screen bounding box
in	<i>n</i>	the screen number (0 to Fl::screen_count() - 1)

See also

void [screen_xywh\(int &x, int &y, int &w, int &h, int mx, int my\)](#)

30.6 Color & Font functions

fl global color, font functions.

Functions

- [Fl_Color fl_color \(\)](#)
Returns the last fl_color() that was set.
- void [fl_color \(Fl_Color c\)](#)
Sets the color for all subsequent drawing operations.
- void [fl_color \(int c\)](#)
for back compatibility - use fl_color(Fl_Color c) instead

- void `fl_color` (`uchar` r, `uchar` g, `uchar` b)

Sets the color for all subsequent drawing operations.
- `FL_Color` `fl_color_average` (`FL_Color` color1, `FL_Color` color2, float weight)

Returns the weighted average color between the two given colors.
- `FL_Color` `fl_contrast` (`FL_Color` fg, `FL_Color` bg)

Returns a color that contrasts with the background color.
- int `fl_descent` ()

Returns the recommended distance above the bottom of a `fl_height()` tall box to draw the text at so it looks centered vertically in that box.
- `FL_Font` `fl_font` ()

*Returns the *face* set by the most recent call to `fl_font()`.*
- void `fl_font` (`FL_Font` face, `FL_Fontsize` fsize)

Sets the current font, which is then used in various drawing routines.
- int `fl_height` ()

Returns the recommended minimum line spacing for the current font.
- `FL_EXPORT` int `fl_height` (int font, int size)

*This function returns the actual height of the specified *font* and *size*.*
- `FL_Color` `fl_inactive` (`FL_Color` c)

Returns the inactive, dimmed version of the given color.
- `FL_EXPORT` const char * `fl_latin1_to_local` (const char *t, int n=-1)

Converts text from Windows/X11 latin1 character set to local encoding.
- `FL_EXPORT` const char * `fl_local_to_latin1` (const char *t, int n=-1)

Converts text from local encoding to Windows/X11 latin1 character set.
- `FL_EXPORT` const char * `fl_local_to_mac_roman` (const char *t, int n=-1)

Converts text from local encoding to Mac Roman character set.
- `FL_EXPORT` const char * `fl_mac_roman_to_local` (const char *t, int n=-1)

Converts text from Mac Roman character set to local encoding.
- `FL_EXPORT` `FL_Color` `fl_show_colormap` (`FL_Color` oldcol)

Pops up a window to let the user pick a colormap entry.
- `FL_Fontsize` `fl_size` ()

*Returns the *size* set by the most recent call to `fl_font()`.*
- `FL_EXPORT` void `fl_text_extents` (const char *, int &dx, int &dy, int &w, int &h)

Determines the minimum pixel dimensions of a nul-terminated string.
- void `fl_text_extents` (const char *t, int n, int &dx, int &dy, int &w, int &h)

*Determines the minimum pixel dimensions of a sequence of *n* characters.*
- `FL_EXPORT` double `fl_width` (const char *txt)

Returns the typographical width of a nul-terminated string using the current font face and size.
- double `fl_width` (const char *txt, int n)

*Returns the typographical width of a sequence of *n* characters using the current font face and size.*
- double `fl_width` (unsigned int c)

Returns the typographical width of a single character using the current font face and size.
- `ulong` `fl_xpixel` (`FL_Color` i)

Returns the X pixel number used to draw the given FLTK color index.
- `ulong` `fl_xpixel` (`uchar` r, `uchar` g, `uchar` b)

Returns the X pixel number used to draw the given rgb color.
- static void `FL::free_color` (`FL_Color` i, int overlay=0)

Frees the specified color from the colormap, if applicable.
- static unsigned `FL::get_color` (`FL_Color` i)

Returns the RGB value(s) for the given FLTK color index.
- static void `FL::get_color` (`FL_Color` i, `uchar` &red, `uchar` &green, `uchar` &blue)

Returns the RGB value(s) for the given FLTK color index.

- static const char * [Fl::get_font](#) ([Fl_Font](#))
Gets the string for this face.
- static const char * [Fl::get_font_name](#) ([Fl_Font](#), int *attributes=0)
Get a human-readable string describing the family of this face.
- static int [Fl::get_font_sizes](#) ([Fl_Font](#), int *&sizep)
Return an array of sizes in sizep.
- static void [Fl::set_color](#) ([Fl_Color](#) i, unsigned c)
Sets an entry in the fl_color index table.
- static void [Fl::set_color](#) ([Fl_Color](#), uchar, uchar, uchar)
Sets an entry in the fl_color index table.
- static void [Fl::set_font](#) ([Fl_Font](#), const char *)
Changes a face.
- static void [Fl::set_font](#) ([Fl_Font](#), [Fl_Font](#))
Copies one face to another.
- static [Fl_Font](#) [Fl::set_fonts](#) (const char **=0)
FLTK will open the display, and add every fonts on the server to the face table.

30.6.1 Detailed Description

fl global color, font functions.

These functions are declared in [<FL/Fl.H>](#) or [<FL/fl_draw.H>](#).

30.6.2 Function Documentation

30.6.2.1 fl_color() [1/3]

```
Fl_Color fl_color (
    void ) [inline]
```

Returns the last [fl_color\(\)](#) that was set.

This can be used for state save/restore.

30.6.2.2 fl_color() [2/3]

```
void fl_color (
    Fl_Color c ) [inline]
```

Sets the color for all subsequent drawing operations.

For colormapped displays, a color cell will be allocated out of [fl_colormap](#) the first time you use a color. If the colormap fills up then a least-squares algorithm is used to find the closest color. If no valid graphical context ([fl_gc](#)) is available, the foreground is not set for the current window.

Parameters

in	c	color
----	---	-------

30.6.2.3 fl_color() [3/3]

```
void fl_color (
    uchar r,
    uchar g,
    uchar b ) [inline]
```

Sets the color for all subsequent drawing operations.

The closest possible match to the RGB color is used. The RGB color is used directly on TrueColor displays. For

colormap visuals the nearest index in the gray ramp or color cube is used. If no valid graphical context (`fl_gc`) is available, the foreground is not set for the current window.

Parameters

in	<i>r,g,b</i>	color components
----	--------------	------------------

30.6.2.4 fl_color_average()

```
Fl_Color fl_color_average (
    Fl_Color color1,
    Fl_Color color2,
    float weight )
```

Returns the weighted average color between the two given colors.

The red, green and blue values are averages using the following formula:

$$\text{color} = \text{color1} * \text{weight} + \text{color2} * (1 - \text{weight})$$

Thus, a `weight` value of 1.0 will return the first color, while a value of 0.0 will return the second color.

Parameters

in	<i>color1,color2</i>	boundary colors
in	<i>weight</i>	weighting factor

30.6.2.5 fl_contrast()

```
Fl_Color fl_contrast (
    Fl_Color fg,
    Fl_Color bg )
```

Returns a color that contrasts with the background color.

This will be the foreground color if it contrasts sufficiently with the background color. Otherwise, returns `FL_WHITE` or `FL_BLACK` depending on which color provides the best contrast.

Parameters

in	<i>fg,bg</i>	foreground and background colors
----	--------------	----------------------------------

Returns

contrasting color

30.6.2.6 fl_font() [1/2]

```
Fl_Font fl_font (
    void ) [inline]
```

Returns the `face` set by the most recent call to `fl_font()`.

This can be used to save/restore the font.

30.6.2.7 fl_font() [2/2]

```
void fl_font (
    Fl_Font face,
    Fl_Fontsize fsize ) [inline]
```

Sets the current font, which is then used in various drawing routines.

You may call this outside a draw context if necessary to call `fl_width()`, but on X this will open the display.

The font is identified by a `face` and a `size`. The size of the font is measured in pixels and not "points". Lines should be spaced `size` pixels apart or more.

30.6.2.8 `fl_height()` [1/2]

```
int fl_height ( ) [inline]
```

Returns the recommended minimum line spacing for the current font.

You can also use the value of `size` passed to `fl_font()`

30.6.2.9 `fl_height()` [2/2]

```
FL_EXPORT int fl_height (
    int font,
    int size )
```

This function returns the actual height of the specified `font` and `size`.

Normally the font height should always be 'size', but with the advent of XFT, there are (currently) complexities that seem to only be solved by asking the font what its actual font height is. (See STR#2115)

This function was originally undocumented in 1.1.x, and was used only by `FL_Text_Display`. We're now documenting it in 1.3.x so that apps that need precise height info can get it with this function.

Returns

the height of the font in pixels.

Todo In the future, when the XFT issues are resolved, this function should simply return the 'size' value.

30.6.2.10 `fl_latin1_to_local()`

```
FL_EXPORT const char* fl_latin1_to_local (
    const char * t,
    int n = -1 )
```

Converts text from Windows/X11 latin1 character set to local encoding.

Parameters

in	<i>t</i>	character string (latin1 encoding)
in	<i>n</i>	optional number of characters to convert (default is all)

Returns

pointer to internal buffer containing converted characters

30.6.2.11 `fl_local_to_latin1()`

```
FL_EXPORT const char* fl_local_to_latin1 (
    const char * t,
    int n = -1 )
```

Converts text from local encoding to Windows/X11 latin1 character set.

Parameters

in	<i>t</i>	character string (local encoding)
in	<i>n</i>	optional number of characters to convert (default is all)

Returns

pointer to internal buffer containing converted characters

30.6.2.12 fl_local_to_mac_roman()

```
FL_EXPORT const char* fl_local_to_mac_roman (
    const char * t,
    int n = -1 )
```

Converts text from local encoding to Mac Roman character set.

Parameters

in	<i>t</i>	character string (local encoding)
in	<i>n</i>	optional number of characters to convert (default is all)

Returns

pointer to internal buffer containing converted characters

30.6.2.13 fl_mac_roman_to_local()

```
FL_EXPORT const char* fl_mac_roman_to_local (
    const char * t,
    int n = -1 )
```

Converts text from Mac Roman character set to local encoding.

Parameters

in	<i>t</i>	character string (Mac Roman encoding)
in	<i>n</i>	optional number of characters to convert (default is all)

Returns

pointer to internal buffer containing converted characters

30.6.2.14 fl_show_colormap()

```
FL_EXPORT Fl_Color fl_show_colormap (
    Fl_Color oldcol )
```

Pops up a window to let the user pick a colormap entry.



Figure 30.1 fl_show_colormap

Parameters

<code>in</code>	<code>oldcol</code>	color to be highlighted when grid is shown.
-----------------	---------------------	---

Return values

<code>FL_Color</code>	value of the chosen colormap entry.
-----------------------	-------------------------------------

See also

[FL_Color_Chooser](#)

30.6.2.15 fl_size()

```
FL_Fontsize fl_size ( ) [inline]
```

Returns the `size` set by the most recent call to `fl_font()`.

This can be used to save/restore the font.

30.6.2.16 fl_text_extents() [1/2]

```
FL_EXPORT void fl_text_extents (
    const char * c,
    int & dx,
    int & dy,
    int & w,
    int & h )
```

Determines the minimum pixel dimensions of a nul-terminated string.

Usage: given a string "txt" drawn using `fl_draw(txt, x, y)` you would determine its pixel extents on the display using `fl_text_extents(txt, dx, dy, wo, ho)` such that a bounding box that exactly fits around the text could be drawn with

`fl_rect(x+dx, y+dy, wo, ho)`. Note the `dx`, `dy` values hold the offset of the first "colored in" pixel of the string, from the draw origin.

No FLTK symbol expansion will be performed.

30.6.2.17 `fl_text_extents()` [2/2]

```
void fl_text_extents (
    const char * t,
    int n,
    int & dx,
    int & dy,
    int & w,
    int & h ) [inline]
```

Determines the minimum pixel dimensions of a sequence of `n` characters.

See also

[fl_text_extents\(const char*, int& dx, int& dy, int& w, int& h\)](#)

30.6.2.18 `fl_width()`

```
double fl_width (
    unsigned int c ) [inline]
```

Returns the typographical width of a single character using the current font face and size.

Note

if a valid `fl_gc` is NOT found then it uses the first window `gc`, or the screen `gc` if no fltk window is available when called.

30.6.2.19 `fl_xpixel()` [1/2]

```
ulong fl_xpixel (
    Fl_Color i )
```

Returns the X pixel number used to draw the given FLTK color index. This is the X pixel that `fl_color()` would use.

Parameters

<code>in</code>	<code>i</code>	color index
-----------------	----------------	-------------

Returns

X pixel number

30.6.2.20 `fl_xpixel()` [2/2]

```
ulong fl_xpixel (
    uchar r,
    uchar g,
    uchar b )
```

Returns the X pixel number used to draw the given rgb color. This is the X pixel that `fl_color()` would use.

Parameters

in	<i>r,g,b</i>	color components
----	--------------	------------------

Returns

X pixel number

30.6.2.21 free_color()

```
void Fl::free_color (
    Fl_Color i,
    int overlay = 0 ) [static]
```

Frees the specified color from the colormap, if applicable.

Free color *i* if used, and clear mapping table entry.

If *overlay* is non-zero then the color is freed from the overlay colormap.

Parameters

in	<i>i</i>	color index
in	<i>overlay</i>	0 for normal, 1 for overlay color

30.6.2.22 get_color() [1/2]

```
unsigned Fl::get_color (
    Fl_Color i ) [static]
```

Returns the RGB value(s) for the given FLTK color index.

This form returns the RGB values packed in a 32-bit unsigned integer with the red value in the upper 8 bits, the green value in the next 8 bits, and the blue value in bits 8-15. The lower 8 bits will always be 0.

30.6.2.23 get_color() [2/2]

```
void Fl::get_color (
    Fl_Color i,
    uchar & red,
    uchar & green,
    uchar & blue ) [static]
```

Returns the RGB value(s) for the given FLTK color index.

This form returns the red, green, and blue values separately in referenced variables.

See also unsigned [get_color\(Fl_Color c\)](#)

30.6.2.24 get_font()

```
const char * Fl::get_font (
    Fl_Font fnum ) [static]
```

Gets the string for this face.

This string is different for each face. Under X this value is passed to XListFonts to get all the sizes of this face.

30.6.2.25 get_font_name()

```
const char * Fl::get_font_name (
    Fl_Font fnum,
    int * attributes = 0 ) [static]
```

Get a human-readable string describing the family of this face.

This is useful if you are presenting a choice to the user. There is no guarantee that each face has a different name. The return value points to a static buffer that is overwritten each call.

The integer pointed to by `attributes` (if the pointer is not zero) is set to zero, `FL_BOLD` or `FL_ITALIC` or `FL_BOLD | FL_ITALIC`. To locate a "family" of fonts, search forward and back for a set with non-zero attributes, these faces along with the face with a zero attribute before them constitute a family.

30.6.2.26 `get_font_sizes()`

```
int Fl::get_font_sizes (
    Fl_Font fnum,
    int *& sizes ) [static]
```

Return an array of sizes in `sizes`.

The return value is the length of this array. The sizes are sorted from smallest to largest and indicate what sizes can be given to `fl_font()` that will be matched exactly (`fl_font()` will pick the closest size for other sizes). A zero in the first location of the array indicates a scalable font, where any size works, although the array may list sizes that work "better" than others. Warning: the returned array points at a static buffer that is overwritten each call. Under X this will open the display.

30.6.2.27 `set_color()` [1/2]

```
void Fl::set_color (
    Fl_Color i,
    unsigned c ) [static]
```

Sets an entry in the `fl_color` index table.

Set color mapping table entry `i` to color `c`.

You can set it to any 8-bit RGB color. The color is not allocated until `fl_color(i)` is used.

Parameters

in	<i>i</i>	color index
in	<i>c</i>	color

30.6.2.28 `set_color()` [2/2]

```
void Fl::set_color (
    Fl_Color i,
    uchar red,
    uchar green,
    uchar blue ) [static]
```

Sets an entry in the `fl_color` index table.

You can set it to any 8-bit RGB color. The color is not allocated until `fl_color(i)` is used.

30.6.2.29 `set_font()`

```
void Fl::set_font (
    Fl_Font fnum,
    const char * name ) [static]
```

Changes a face.

The string pointer is simply stored, the string is not copied, so the string must be in static memory.

30.6.2.30 `set_fonts()`

```
Fl_Font Fl::set_fonts (
    const char * xstarname = 0 ) [static]
```

FLTK will open the display, and add every fonts on the server to the face table.

It will attempt to put "families" of faces together, so that the normal one is first, followed by bold, italic, and bold italic.

The optional argument is a string to describe the set of fonts to add. Passing NULL will select only fonts that have the ISO8859-1 character set (and are thus usable by normal text). Passing "-*" will select all fonts with any encoding as long as they have normal X font names with dashes in them. Passing "*" will list every font that exists (on X this may produce some strange output). Other values may be useful but are system dependent. With WIN32 NULL selects fonts with ISO8859-1 encoding and non-NULL selects all fonts.

The return value is how many faces are in the table after this is done.

30.7 Drawing functions

FLTK global graphics and GUI drawing functions.

Macros

- `#define fl_clip fl_push_clip`
Intersects the current clip region with a rectangle and pushes this new region onto the stack (deprecated).

Enumerations

- enum {
`FL_SOLID = 0` , `FL_DASH = 1` , `FL_DOT = 2` , `FL_DASHDOT = 3` ,
`FL_DASHDOTDOT = 4` , `FL_CAP_FLAT = 0x100` , `FL_CAP_ROUND = 0x200` , `FL_CAP_SQUARE = 0x300` ,
`FL_JOIN_MITER = 0x1000` , `FL_JOIN_ROUND = 0x2000` , `FL_JOIN_BEVEL = 0x3000` }

Functions

- void `FL_Quartz_Graphics_Driver::copy_offscreen` (int x, int y, int w, int h, FL_Offscreen pixmap, int srcx, int srcy)
see fl_copy_offscreen()
- FL_EXPORT int `fl_add_symbol` (const char *name, void(*drawit)(FL_Color), int scalable)
Adds a symbol to the system.
- void `fl_arc` (double x, double y, double r, double start, double end)
Adds a series of points to the current path on the arc of a circle.
- void `fl_arc` (int x, int y, int w, int h, double a1, double a2)
Draw ellipse sections using integer coordinates.
- void `fl_begin_complex_polygon` ()
Starts drawing a complex filled polygon.
- void `fl_begin_line` ()
Starts drawing a list of lines.
- void `fl_begin_loop` ()
Starts drawing a closed sequence of lines.
- void `fl_begin_offscreen` (FL_Offscreen ctx)
Send all subsequent drawing commands to this offscreen buffer.
- void `fl_begin_points` ()
Starts drawing a list of points.
- void `fl_begin_polygon` ()
Starts drawing a convex filled polygon.
- FL_EXPORT char `fl_can_do_alpha_blending` ()
Checks whether platform supports true alpha blending for RGBA images.
- FL_EXPORT void `fl_chord` (int x, int y, int w, int h, double a1, double a2)
fl_chord declaration is a place holder - the function does not yet exist
- void `fl_circle` (double x, double y, double r)
fl_circle() is equivalent to fl_arc(x,y,r,0,360), but may be faster.
- int `fl_clip_box` (int x, int y, int w, int h, int &X, int &Y, int &W, int &H)

- Intersects the rectangle with the current clip region and returns the bounding box of the result.*

 - `FL_Region fl_clip_region ()`
Returns the current clipping region.
 - `void fl_clip_region (FL_Region r)`
Replaces the top of the clipping stack with a clipping region of any shape.
 - `void fl_copy_offscreen (int x, int y, int w, int h, FL_Offscreen pixmap, int srcx, int srcy)`
Copy a rectangular area of the given offscreen buffer into the current drawing destination.
 - `FL_Offscreen fl_create_offscreen (int w, int h)`
Creation of an offscreen graphics buffer.
 - `FL_EXPORT void fl_cursor (FL_Cursor)`
Sets the cursor for the current window to the specified shape and colors.
 - `FL_EXPORT void fl_cursor (FL_Cursor, FL_Color fg, FL_Color bg=FL_WHITE)`
 - `void fl_curve (double X0, double Y0, double X1, double Y1, double X2, double Y2, double X3, double Y3)`
Adds a series of points on a Bezier curve to the path.
 - `void fl_delete_offscreen (FL_Offscreen ctx)`
Deletion of an offscreen graphics buffer.
 - `void fl_draw (const char *str, int n, int x, int y)`
Draws starting at the given x, y location a UTF-8 string of length n bytes.
 - `FL_EXPORT void fl_draw (const char *str, int x, int y)`
Draws a nul-terminated UTF-8 string starting at the given x, y location.
 - `FL_EXPORT void fl_draw (const char *str, int x, int y, int w, int h, FL_Align align, FL_Image *img=0, int draw↔_symbols=1)`
Fancy string drawing function which is used to draw all the labels.
 - `FL_EXPORT void fl_draw (const char *str, int x, int y, int w, int h, FL_Align align, void(*callthis)(const char *, int, int, int), FL_Image *img=0, int draw_symbols=1)`
The same as fl_draw(const char,int,int,int,int,FL_Align,FL_Image*,int) with the addition of the callthis parameter, which is a pointer to a text drawing function such as fl_draw(const char*, int, int, int) to do the real work.*
 - `void fl_draw (int angle, const char *str, int n, int x, int y)`
Draws at the given x, y location a UTF-8 string of length n bytes rotating angle degrees counter-clockwise.
 - `FL_EXPORT void fl_draw (int angle, const char *str, int x, int y)`
Draws a nul-terminated UTF-8 string starting at the given x, y location and rotating angle degrees counter-clockwise.
 - `FL_EXPORT void fl_draw_box (FL_Boxtype, int x, int y, int w, int h, FL_Color)`
Draws a box using given type, position, size and color.
 - `void fl_draw_image (const uchar *buf, int X, int Y, int W, int H, int D=3, int L=0)`
Draws an 8-bit per color RGB or luminance image.
 - `void fl_draw_image (FL_Draw_Image_Cb cb, void *data, int X, int Y, int W, int H, int D=3)`
Draws an image using a callback function to generate image data.
 - `void fl_draw_image_mono (const uchar *buf, int X, int Y, int W, int H, int D=1, int L=0)`
Draws a gray-scale (1 channel) image.
 - `void fl_draw_image_mono (FL_Draw_Image_Cb cb, void *data, int X, int Y, int W, int H, int D=1)`
Draws a gray-scale image using a callback function to generate image data.
 - `FL_EXPORT int fl_draw_pixmap (char *const *data, int x, int y, FL_Color=FL_GRAY)`
Draw XPM image data, with the top-left corner at the given position.
 - `FL_EXPORT int fl_draw_pixmap (const char *const *cdata, int x, int y, FL_Color=FL_GRAY)`
Draw XPM image data, with the top-left corner at the given position.
 - `FL_EXPORT int fl_draw_symbol (const char *label, int x, int y, int w, int h, FL_Color)`
Draw the named symbol in the given rectangle using the given color.
 - `void fl_end_complex_polygon ()`
Ends complex filled polygon, and draws.
 - `void fl_end_line ()`

- Ends list of lines, and draws.*

 - void `fl_end_loop` ()
- Ends closed sequence of lines, and draws.*

 - void `fl_end_offscreen` ()
- Quit sending drawing commands to the current offscreen buffer.*

 - void `fl_end_points` ()
- Ends list of points, and draws.*

 - void `fl_end_polygon` ()
- Ends convex filled polygon, and draws.*

 - FL_EXPORT const char * `fl_expand_text` (const char *from, char *buf, int maxbuf, double maxw, int &n, double &width, int wrap, int draw_symbols=0)

Copy from to buf, replacing control characters with ^X.
- FL_EXPORT void `fl_frame` (const char *s, int x, int y, int w, int h)

Draws a series of line segments around the given box.
- FL_EXPORT void `fl_frame2` (const char *s, int x, int y, int w, int h)

Draws a series of line segments around the given box.
- void `fl_gap` ()

Call fl_gap() to separate loops of the path.
- void `fl_line` (int x, int y, int x1, int y1)

Draws a line from (x,y) to (x1,y1)
- void `fl_line` (int x, int y, int x1, int y1, int x2, int y2)

Draws a line from (x,y) to (x1,y1) and another from (x1,y1) to (x2,y2)
- void `fl_line_style` (int style, int width=0, char *dashes=0)

Sets how to draw lines (the "pen").
- void `fl_loop` (int x, int y, int x1, int y1, int x2, int y2)

Outlines a 3-sided polygon with lines.
- void `fl_loop` (int x, int y, int x1, int y1, int x2, int y2, int x3, int y3)

Outlines a 4-sided polygon with lines.
- FL_EXPORT void `fl_measure` (const char *str, int &x, int &y, int draw_symbols=1)

Measure how wide and tall the string will be when printed by the fl_draw() function with align parameter.
- FL_EXPORT int `fl_measure_pixmap` (char *const *data, int &w, int &h)

Get the dimensions of a pixmap.
- FL_EXPORT int `fl_measure_pixmap` (const char *const *cdata, int &w, int &h)

Get the dimensions of a pixmap.
- void `fl_mult_matrix` (double a, double b, double c, double d, double x, double y)

Concatenates another transformation onto the current one.
- int `fl_not_clipped` (int x, int y, int w, int h)

Does the rectangle intersect the current clip region?
- FL_EXPORT unsigned int `fl_old_shortcut` (const char *s)

Emulation of XForms named shortcuts.
- FL_EXPORT void `fl_overlay_clear` ()

Erase a selection rectangle without drawing a new one.
- FL_EXPORT void `fl_overlay_rect` (int x, int y, int w, int h)

Draws a selection rectangle, erasing a previous one by XOR'ing it first.
- void `fl_pie` (int x, int y, int w, int h, double a1, double a2)

Draw filled ellipse sections using integer coordinates.
- void `fl_point` (int x, int y)

Draws a single pixel at the given coordinates.
- void `fl_polygon` (int x, int y, int x1, int y1, int x2, int y2)

Fills a 3-sided polygon.
- void `fl_polygon` (int x, int y, int x1, int y1, int x2, int y2, int x3, int y3)

- Fills a 4-sided polygon.*

 - void `fl_pop_clip` ()

Restores the previous clip region.
- void `fl_pop_matrix` ()

Restores the current transformation matrix from the stack.
- void `fl_push_clip` (int x, int y, int w, int h)

Intersects the current clip region with a rectangle and pushes this new region onto the stack.
- void `fl_push_matrix` ()

Saves the current transformation matrix on the stack.
- void `fl_push_no_clip` ()

Pushes an empty clip region onto the stack so nothing will be clipped.
- FL_EXPORT `uchar * fl_read_image` (`uchar *p`, int X, int Y, int W, int H, int alpha=0)

Reads an RGB(A) image from the current window or off-screen buffer.
- void `fl_rect` (int x, int y, int w, int h)

Draws a 1-pixel border inside the given bounding box.
- void `fl_rect` (int x, int y, int w, int h, `FL_Color` c)

Draws with passed color a 1-pixel border inside the given bounding box.
- void `fl_rectf` (int x, int y, int w, int h)

Colors with current color a rectangle that exactly fills the given bounding box.
- void `fl_rectf` (int x, int y, int w, int h, `FL_Color` c)

Colors with passed color a rectangle that exactly fills the given bounding box.
- FL_EXPORT void `fl_rectf` (int x, int y, int w, int h, `uchar` r, `uchar` g, `uchar` b)

*Colors a rectangle with "exactly" the passed *r, g, b* color.*
- FL_EXPORT void `fl_reset_spot` (void)
- void `fl_restore_clip` ()

Undoes any clobbering of clip done by your program.
- void `fl_rotate` (double d)

Concatenates rotation transformation onto the current one.
- void `fl_rtl_draw` (const char *str, int n, int x, int y)

*Draws a UTF-8 string of length *n* bytes right to left starting at the given *x, y* location.*
- void `fl_scale` (double x)

Concatenates scaling transformation onto the current one.
- void `fl_scale` (double x, double y)

Concatenates scaling transformation onto the current one.
- FL_EXPORT void `fl_scroll` (int X, int Y, int W, int H, int dx, int dy, void(*draw_area)(void *, int, int, int, int), void *data)

Scroll a rectangle and draw the newly exposed portions.
- FL_EXPORT void `fl_set_spot` (int font, int size, int X, int Y, int W, int H, `FL_Window` *win=0)
- FL_EXPORT void `fl_set_status` (int X, int Y, int W, int H)
- FL_EXPORT const char * `fl_shortcut_label` (unsigned int shortcut)

Get a human-readable string from a shortcut value.
- FL_EXPORT const char * `fl_shortcut_label` (unsigned int shortcut, const char **eom)

Get a human-readable string from a shortcut value.
- double `fl_transform_dx` (double x, double y)

Transforms distance using current transformation matrix.
- double `fl_transform_dy` (double x, double y)

Transforms distance using current transformation matrix.
- double `fl_transform_x` (double x, double y)

Transforms coordinate using the current transformation matrix.
- double `fl_transform_y` (double x, double y)

Transforms coordinate using the current transformation matrix.

- void `fl_transformed_vertex` (double xf, double yf)
Adds coordinate pair to the vertex list without further transformations.
- void `fl_translate` (double x, double y)
Concatenates translation transformation onto the current one.
- void `fl_vertex` (double x, double y)
Adds a single vertex to the current path.
- void `fl_xyline` (int x, int y, int x1)
Draws a horizontal line from (x,y) to (x1,y)
- void `fl_xyline` (int x, int y, int x1, int y2)
Draws a horizontal line from (x,y) to (x1,y), then vertical from (x1,y) to (x1,y2)
- void `fl_xyline` (int x, int y, int x1, int y2, int x3)
Draws a horizontal line from (x,y) to (x1,y), then a vertical from (x1,y) to (x1,y2) and then another horizontal from (x1,y2) to (x3,y2)
- void `fl_yxline` (int x, int y, int y1)
Draws a vertical line from (x,y) to (x,y1)
- void `fl_yxline` (int x, int y, int y1, int x2)
Draws a vertical line from (x,y) to (x,y1), then a horizontal from (x,y1) to (x2,y1)
- void `fl_yxline` (int x, int y, int y1, int x2, int y3)
Draws a vertical line from (x,y) to (x,y1) then a horizontal from (x,y1) to (x2,y1), then another vertical from (x2,y1) to (x2,y3)

Variables

- const int `stack_max` = 16

30.7.1 Detailed Description

FLTK global graphics and GUI drawing functions.

These functions are declared in `<FL/fl_draw.H>`, and in `<FL/x.H>` for offscreen buffer-related ones.

30.7.2 Macro Definition Documentation

30.7.2.1 fl_clip

```
#define fl_clip fl_push_clip
```

Intersects the current clip region with a rectangle and pushes this new region onto the stack (deprecated).

Parameters

in	x,y,w,h	position and size
----	---------	-------------------

Deprecated `fl_clip(int, int, int, int)` is deprecated and will be removed from future releases. Please use `fl_push_clip(int x, int y, int w, int h)` instead.

30.7.3 Enumeration Type Documentation

30.7.3.1 anonymous enum

```
anonymous enum
```

Enumerator

FL_SOLID	line style: _____
FL_DASH	line style: _ _ _ _ _ _
FL_DOT	line style:
FL_DASHDOT	line style: _ . _ . _ .
FL_DASHDOTDOT	line style: _ . . _ . .
FL_CAP_FLAT	cap style: end is flat
FL_CAP_ROUND	cap style: end is round
FL_CAP_SQUARE	cap style: end wraps end point
FL_JOIN_MITER	join style: line join extends to a point
FL_JOIN_ROUND	join style: line join is rounded
FL_JOIN_BEVEL	join style: line join is tidied

30.7.4 Function Documentation

30.7.4.1 fl_add_symbol()

```
FL_EXPORT int fl_add_symbol (
    const char * name,
    void(*) (Fl_Color) drawit,
    int scalable )
```

Adds a symbol to the system.

Parameters

in	<i>name</i>	name of symbol (without the "@")
in	<i>drawit</i>	function to draw symbol
in	<i>scalable</i>	set to 1 if <i>drawit</i> uses scalable vector drawing

Returns

1 on success, 0 on failure

30.7.4.2 fl_arc() [1/2]

```
void fl_arc (
    double x,
    double y,
    double r,
    double start,
    double end ) [inline]
```

Adds a series of points to the current path on the arc of a circle.

You can get elliptical paths by using `scale` and `rotate` before calling `fl_arc()`.

Parameters

in	<i>x,y,r</i>	center and radius of circular arc
in	<i>start,end</i>	angles of start and end of arc measured in degrees counter-clockwise from 3 o'clock. If <i>end</i> is less than <i>start</i> then it draws the arc in a clockwise direction.

Examples:

```
// Draw an arc of points
fl_begin_points();
fl_arc(100.0, 100.0, 50.0, 0.0, 180.0);
fl_end_points();
// Draw arc with a line
fl_begin_line();
fl_arc(200.0, 100.0, 50.0, 0.0, 180.0);
fl_end_line();
// Draw filled arc
fl_begin_polygon();
fl_arc(300.0, 100.0, 50.0, 0.0, 180.0);
fl_end_polygon();
```

30.7.4.3 fl_arc() [2/2]

```
void fl_arc (
    int x,
    int y,
    int w,
    int h,
    double a1,
    double a2 ) [inline]
```

Draw ellipse sections using integer coordinates.

These functions match the rather limited circle drawing code provided by X and WIN32. The advantage over using `fl_arc` with floating point coordinates is that they are faster because they often use the hardware, and they draw much nicer small circles, since the small sizes are often hard-coded bitmaps.

If a complete circle is drawn it will fit inside the passed bounding box. The two angles are measured in degrees counter-clockwise from 3 o'clock and are the starting and ending angle of the arc, `a2` must be greater or equal to `a1`.

`fl_arc()` draws a series of lines to approximate the arc. Notice that the integer version of `fl_arc()` has a different number of arguments than the double version `fl_arc(double x, double y, double r, double start, double end)`

Parameters

in	<code>x,y,w,h</code>	bounding box of complete circle
in	<code>a1,a2</code>	start and end angles of arc measured in degrees counter-clockwise from 3 o'clock. <code>a2</code> must be greater than or equal to <code>a1</code> .

30.7.4.4 fl_begin_complex_polygon()

```
void fl_begin_complex_polygon ( ) [inline]
```

Starts drawing a complex filled polygon.

The polygon may be concave, may have holes in it, or may be several disconnected pieces. Call `fl_gap()` to separate loops of the path.

To outline the polygon, use `fl_begin_loop()` and replace each `fl_gap()` with `fl_end_loop();fl_begin_loop()` pairs.

Note

For portability, you should only draw polygons that appear the same whether "even/odd" or "non-zero" winding rules are used to fill them. Holes should be drawn in the opposite direction to the outside loop.

30.7.4.5 fl_begin_offscreen()

```
void fl_begin_offscreen (
    Fl_Offscreen ctx )
```

Send all subsequent drawing commands to this offscreen buffer.

Parameters

<code>ctx</code>	the offscreen buffer.
------------------	-----------------------

30.7.4.6 fl_begin_points()

```
void fl_begin_points ( ) [inline]
```

Starts drawing a list of points.

Points are added to the list with [fl_vertex\(\)](#)

30.7.4.7 fl_can_do_alpha_blending()

```
FL_EXPORT char fl_can_do_alpha_blending ( )
```

Checks whether platform supports true alpha blending for RGBA images.

Returns

1 if true alpha blending supported by platform

0 not supported so FLTK will use screen door transparency

30.7.4.8 fl_circle()

```
void fl_circle (
    double x,
    double y,
    double r ) [inline]
```

[fl_circle\(\)](#) is equivalent to [fl_arc\(x,y,r,0,360\)](#), but may be faster.

It must be the *only* thing in the path: if you want a circle as part of a complex polygon you must use [fl_arc\(\)](#)

Parameters

in	<code>x,y,r</code>	center and radius of circle
----	--------------------	-----------------------------

30.7.4.9 fl_clip_box()

```
int fl_clip_box (
    int x,
    int y,
    int w,
    int h,
    int & X,
    int & Y,
    int & W,
    int & H ) [inline]
```

Intersects the rectangle with the current clip region and returns the bounding box of the result.

Returns non-zero if the resulting rectangle is different to the original. This can be used to limit the necessary drawing to a rectangle. W and H are set to zero if the rectangle is completely outside the region.

Parameters

in	<code>x,y,w,h</code>	position and size of rectangle
out	<code>X,Y,W,H</code>	position and size of resulting bounding box.

Returns

Non-zero if the resulting rectangle is different to the original.

30.7.4.10 fl_clip_region()

```
void fl_clip_region (
    Fl_Region r ) [inline]
```

Replaces the top of the clipping stack with a clipping region of any shape. Fl_Region is an operating system specific type.

Parameters

in	<i>r</i>	clipping region
----	----------	-----------------

30.7.4.11 fl_copy_offscreen()

```
void fl_copy_offscreen (
    int x,
    int y,
    int w,
    int h,
    Fl_Offscreen pixmap,
    int srcx,
    int srcy )
```

Copy a rectangular area of the given offscreen buffer into the current drawing destination.

Parameters

<i>x,y</i>	position where to draw the copied rectangle
<i>w,h</i>	size of the copied rectangle
<i>pixmap</i>	offscreen buffer containing the rectangle to copy
<i>srcx,srcy</i>	origin in offscreen buffer of rectangle to copy

30.7.4.12 fl_create_offscreen()

```
Fl_Offscreen fl_create_offscreen (
    int w,
    int h )
```

Creation of an offscreen graphics buffer.

Parameters

<i>w,h</i>	width and height in pixels of the buffer.
------------	---

Returns

the created graphics buffer.

30.7.4.13 fl_cursor()

```
FL_EXPORT void fl_cursor (
    Fl_Cursor c )
```

Sets the cursor for the current window to the specified shape and colors. The cursors are defined in the <[FL/Enumerations.H](#)> header file.

30.7.4.14 fl_curve()

```
void fl_curve (
    double X0,
    double Y0,
    double X1,
    double Y1,
    double X2,
    double Y2,
    double X3,
    double Y3 ) [inline]
```

Adds a series of points on a Bezier curve to the path. The curve ends (and two of the points) are at X0,Y0 and X3,Y3.

Parameters

in	X0,Y0	curve start point
in	X1,Y1	curve control point
in	X2,Y2	curve control point
in	X3,Y3	curve end point

30.7.4.15 fl_delete_offscreen()

```
void fl_delete_offscreen (
    Fl_Offscreen ctx )
```

Deletion of an offscreen graphics buffer.

Parameters

ctx	the buffer to be deleted.
-----	---------------------------

30.7.4.16 fl_draw() [1/4]

```
FL_EXPORT void fl_draw (
    const char * str,
    int x,
    int y )
```

Draws a nul-terminated UTF-8 string starting at the given x, y location.

Text is aligned to the left and to the baseline of the font. To align to the bottom, subtract [fl_descent\(\)](#) from y. To align to the top, subtract [fl_descent\(\)](#) and add [fl_height\(\)](#). This version of [fl_draw](#) provides direct access to the text drawing function of the underlying OS. It does not apply any special handling to control characters.

30.7.4.17 fl_draw() [2/4]

```
FL_EXPORT void fl_draw (
    const char * str,
    int x,
    int y,
    int w,
    int h,
    Fl_Align align,
    Fl_Image * img,
    int draw_symbols )
```

Fancy string drawing function which is used to draw all the labels.

The string is formatted and aligned inside the passed box. Handles '\t' and '\n', expands all other control characters to '^X', and aligns inside or against the edges of the box. See [Fl_Widget::align\(\)](#) for values of `align`. The value `FL_ALIGN_INSIDE` is ignored, as this function always prints inside the box. If `img` is provided and is not `NULL`, the image is drawn above or below the text as specified by the `align` value. The `draw_symbols` argument specifies whether or not to look for symbol names starting with the '@' character'

30.7.4.18 fl_draw() [3/4]

```
void fl_draw (
    int angle,
    const char * str,
    int n,
    int x,
    int y ) [inline]
```

Draws at the given `x, y` location a UTF-8 string of length `n` bytes rotating `angle` degrees counter-clockwise.

Note

When using X11 (Unix, Linux, Cygwin et al.) this needs Xft to work. Under plain X11 (w/o Xft) rotated text is not supported by FLTK. A warning will be issued to `stderr` at runtime (only once) if you use this method with an angle other than 0.

30.7.4.19 fl_draw() [4/4]

```
FL_EXPORT void fl_draw (
    int angle,
    const char * str,
    int x,
    int y )
```

Draws a nul-terminated UTF-8 string starting at the given `x, y` location and rotating `angle` degrees counter-clockwise.

This version of `fl_draw` provides direct access to the text drawing function of the underlying OS and is supported by Xft, Win32 and MacOS fltk subsets.

30.7.4.20 fl_draw_box()

```
FL_EXPORT void fl_draw_box (
    Fl_Boxtype t,
    int x,
    int y,
    int w,
    int h,
    Fl_Color c )
```

Draws a box using given type, position, size and color.

Parameters

in	<i>t</i>	box type
in	<i>x,y,w,h</i>	position and size
in	<i>c</i>	color

30.7.4.21 `fl_draw_image()` [1/2]

```
void fl_draw_image (
    const uchar * buf,
    int X,
    int Y,
    int W,
    int H,
    int D = 3,
    int L = 0 ) [inline]
```

Draws an 8-bit per color RGB or luminance image.

Parameters

in	<i>buf</i>	points at the "r" data of the top-left pixel. Color data must be in <i>r, g, b</i> order. Luminance data is only one <i>gray</i> byte.
in	<i>X,Y</i>	position where to put top-left corner of image
in	<i>W,H</i>	size of the image
in	<i>D</i>	delta to add to the pointer between pixels. It may be any value greater than or equal to 1, or it can be negative to flip the image horizontally
in	<i>L</i>	delta to add to the pointer between lines (if 0 is passed it uses $\bar{W} * D$), and may be larger than $\bar{W} * D$ to crop data, or negative to flip the image vertically

It is highly recommended that you put the following code before the first `show()` of *any* window in your program to get rid of the dithering if possible:

```
Fl::visual(FL_RGB);
```

Gray scale (1-channel) images may be drawn. This is done if `abs(D)` is less than 3, or by calling `fl_draw_image_mono()`. Only one 8-bit sample is used for each pixel, and on screens with different numbers of bits for red, green, and blue only gray colors are used. Setting `D` greater than 1 will let you display one channel of a color image.

Note:

The X version does not support all possible visuals. If FLTK cannot draw the image in the current visual it will abort. FLTK supports any visual of 8 bits or less, and all common TrueColor visuals up to 32 bits.

30.7.4.22 `fl_draw_image()` [2/2]

```
void fl_draw_image (
    Fl_Draw_Image_Cb cb,
    void * data,
    int X,
    int Y,
    int W,
    int H,
    int D = 3 ) [inline]
```

Draws an image using a callback function to generate image data.

You can generate the image as it is being drawn, or do arbitrary decompression of stored data, provided it can be decompressed to individual scan lines easily.

Parameters

in	<i>cb</i>	callback function to generate scan line data
in	<i>data</i>	user data passed to callback function
in	<i>X,Y</i>	screen position of top left pixel
in	<i>W,H</i>	image width and height
in	<i>D</i>	data size in bytes (must be greater than 0)

See also

[fl_draw_image\(const uchar* buf, int X,int Y,int W,int H, int D, int L\)](#)

The callback function *cb* is called with the `void* data` user data pointer to allow access to a structure of information about the image, and the *x*, *y*, and *w* of the scan line desired from the image. 0,0 is the upper-left corner of the image, not *x*, *y*. A pointer to a buffer to put the data into is passed. You must copy *w* pixels from scanline *y*, starting at pixel *x*, to this buffer.

Due to cropping, less than the whole image may be requested. So *x* may be greater than zero, the first *y* may be greater than zero, and *w* may be less than *W*. The buffer is long enough to store the entire *W * D* pixels, this is for convenience with some decompression schemes where you must decompress the entire line at once: decompress it into the buffer, and then if *x* is not zero, copy the data over so the *x*'th pixel is at the start of the buffer.

You can assume the *y*'s will be consecutive, except the first one may be greater than zero.

If *D* is 4 or more, you must fill in the unused bytes with zero.

30.7.4.23 fl_draw_image_mono() [1/2]

```
void fl_draw_image_mono (
    const uchar * buf,
    int X,
    int Y,
    int W,
    int H,
    int D = 1,
    int L = 0 ) [inline]
```

Draws a gray-scale (1 channel) image.

See also

[fl_draw_image\(const uchar* buf, int X,int Y,int W,int H, int D, int L\)](#)

30.7.4.24 fl_draw_image_mono() [2/2]

```
void fl_draw_image_mono (
    Fl_Draw_Image_Cb cb,
    void * data,
    int X,
    int Y,
    int W,
    int H,
    int D = 1 ) [inline]
```

Draws a gray-scale image using a callback function to generate image data.

See also

[fl_draw_image\(Fl_Draw_Image_Cb cb, void* data, int X,int Y,int W,int H, int D\)](#)

30.7.4.25 fl_draw_pixmap() [1/2]

```
FL_EXPORT int fl_draw_pixmap (
    char *const * data,
    int x,
    int y,
    Fl_Color bg )
```

Draw XPM image data, with the top-left corner at the given position.

The image is dithered on 8-bit displays so you won't lose color space for programs displaying both images and pixmaps.

Parameters

in	<i>data</i>	pointer to XPM image data
in	<i>x,y</i>	position of top-left corner
in	<i>bg</i>	background color

Returns

0 if there was any error decoding the XPM data.

30.7.4.26 fl_draw_pixmap() [2/2]

```
FL_EXPORT int fl_draw_pixmap (
    const char *const * cdata,
    int x,
    int y,
    Fl_Color bg )
```

Draw XPM image data, with the top-left corner at the given position.

See also

[fl_draw_pixmap\(char* const* data, int x, int y, Fl_Color bg\)](#)

30.7.4.27 fl_draw_symbol()

```
FL_EXPORT int fl_draw_symbol (
    const char * label,
    int x,
    int y,
    int w,
    int h,
    Fl_Color col )
```

Draw the named symbol in the given rectangle using the given color.

Parameters

in	<i>label</i>	name of symbol
in	<i>x,y</i>	position of symbol
in	<i>w,h</i>	size of symbol
in	<i>col</i>	color of symbox

Returns

1 on success, 0 on failure

30.7.4.28 fl_expand_text()

```
FL_EXPORT const char* fl_expand_text (
    const char * from,
    char * buf,
    int maxbuf,
    double maxw,
    int & n,
    double & width,
    int wrap,
    int draw_symbols )
```

Copy *from* to *buf*, replacing control characters with ^X.

Stop at a newline or if *maxbuf* characters written to buffer. Also word-wrap if *width* exceeds *maxw*. Returns a pointer to the start of the next line of characters. Sets *n* to the number of characters put into the buffer. Sets *width* to the width of the string in the [current font](#).

30.7.4.29 fl_frame()

```
FL_EXPORT void fl_frame (
    const char * s,
    int x,
    int y,
    int w,
    int h )
```

Draws a series of line segments around the given box.

The string *s* must contain groups of 4 letters which specify one of 24 standard grayscale values, where 'A' is black and 'X' is white. The order of each set of 4 characters is: top, left, bottom, right. The result of calling [fl_frame\(\)](#) with a string that is not a multiple of 4 characters in length is undefined. The only difference between this function and [fl_frame2\(\)](#) is the order of the line segments.

Parameters

in	<i>s</i>	sets of 4 grayscale values in top, left, bottom, right order
in	<i>x,y,w,h</i>	position and size

30.7.4.30 fl_frame2()

```
FL_EXPORT void fl_frame2 (
    const char * s,
    int x,
    int y,
    int w,
    int h )
```

Draws a series of line segments around the given box.

The string *s* must contain groups of 4 letters which specify one of 24 standard grayscale values, where 'A' is black and 'X' is white. The order of each set of 4 characters is: bottom, right, top, left. The result of calling [fl_frame2\(\)](#) with a string that is not a multiple of 4 characters in length is undefined. The only difference between this function and [fl_frame\(\)](#) is the order of the line segments.

Parameters

in	<i>s</i>	sets of 4 grayscale values in bottom, right, top, left order
----	----------	--

Parameters

in	<i>x,y,w,h</i>	position and size
----	----------------	-------------------

30.7.4.31 fl_gap()

```
void fl_gap ( ) [inline]
```

Call `fl_gap()` to separate loops of the path.

It is unnecessary but harmless to call `fl_gap()` before the first vertex, after the last vertex, or several times in a row.

30.7.4.32 fl_line_style()

```
void fl_line_style (
    int style,
    int width = 0,
    char * dashes = 0 ) [inline]
```

Sets how to draw lines (the "pen").

If you change this it is your responsibility to set it back to the default using `fl_line_style(0)`.

Parameters

in	<i>style</i>	A bitmask which is a bitwise-OR of a line style, a cap style, and a join style. If you don't specify a dash type you will get a solid line. If you don't specify a cap or join type you will get a system-defined default of whatever value is fastest.
in	<i>width</i>	The thickness of the lines in pixels. Zero results in the system defined default, which on both X and Windows is somewhat different and nicer than 1.
in	<i>dashes</i>	A pointer to an array of dash lengths, measured in pixels. The first location is how long to draw a solid portion, the next is how long to draw the gap, then the solid, etc. It is terminated with a zero-length entry. A NULL pointer or a zero-length array results in a solid line. Odd array sizes are not supported and result in undefined behavior.

Note

Because of how line styles are implemented on Win32 systems, you *must* set the line style *after* setting the drawing color. If you set the color after the line style you will lose the line style settings.

The `dashes` array does not work under Windows 95, 98 or Me, since those operating systems do not support complex line styles.

30.7.4.33 fl_measure()

```
FL_EXPORT void fl_measure (
    const char * str,
    int & w,
    int & h,
    int draw_symbols )
```

Measure how wide and tall the string will be when printed by the `fl_draw()` function with `align` parameter.

If the incoming `w` is non-zero it will wrap to that width.

The `current font` is used to do the width/height calculations, so unless its value is known at the time `fl_measure()` is called, it is advised to first set the current font with `fl_font()`. With event-driven GUI programming you can never be sure which widget was exposed and redrawn last, nor which font it used. If you have not called `fl_font()` explicitly in your own code, the width and height may be set to unexpected values, even zero!

Note: In the general use case, it's a common error to forget to set `w` to 0 before calling `fl_measure()` when wrap behavior isn't needed.

Parameters

in	<i>str</i>	nul-terminated string
out	<i>w,h</i>	width and height of string in current font
in	<i>draw_symbols</i>	non-zero to enable @symbol handling [default=1]

```
// Example: Common use case for fl_measure()
const char *s = "This is a test";
int wi=0, hi=0;           // initialize to zero before calling fl_measure()
fl_font(FL_HELVETICA, 14); // set current font face/size to be used for measuring
fl_measure(s, wi, hi);    // returns pixel width/height of string in current font
```

30.7.4.34 fl_measure_pixmap() [1/2]

```
FL_EXPORT int fl_measure_pixmap (
    char *const * data,
    int & w,
    int & h )
```

Get the dimensions of a pixmap.

An XPM image contains the dimensions in its data. This function returns the width and height.

Parameters

in	<i>data</i>	pointer to XPM image data.
out	<i>w,h</i>	width and height of image

Returns

non-zero if the dimensions were parsed OK

0 if there were any problems

30.7.4.35 fl_measure_pixmap() [2/2]

```
FL_EXPORT int fl_measure_pixmap (
    const char *const * cdata,
    int & w,
    int & h )
```

Get the dimensions of a pixmap.

See also

[fl_measure_pixmap\(char* const* data, int &w, int &h\)](#)

30.7.4.36 fl_mult_matrix()

```
void fl_mult_matrix (
    double a,
    double b,
    double c,
    double d,
    double x,
    double y ) [inline]
```

Concatenates another transformation onto the current one.

Parameters

in	a,b,c,d,x,y	transformation matrix elements such that $X' = aX + cY + x$ and $Y' = bX + dY + y$
----	---------------	--

30.7.4.37 fl_not_clipped()

```
int fl_not_clipped (
    int x,
    int y,
    int w,
    int h ) [inline]
```

Does the rectangle intersect the current clip region?

Parameters

in	x,y,w,h	position and size of rectangle
----	-----------	--------------------------------

Returns

non-zero if any of the rectangle intersects the current clip region. If this returns 0 you don't have to draw the object.

Note

Under X this returns 2 if the rectangle is partially clipped, and 1 if it is entirely inside the clip region.

30.7.4.38 fl_old_shortcut()

```
FL_EXPORT unsigned int fl_old_shortcut (
    const char * s )
```

Emulation of XForms named shortcuts.

Converts ascii shortcut specifications (eg. " $\wedge c$ ") into the FLTK integer equivalent (eg. FL_CTRL+c)
These ascii characters are used to specify the various keyboard modifier keys:

```
# - Alt
+ - Shift
^ - Control
! - Meta
@ - Command (Ctrl on linux/win, Meta on OSX)
```

These special characters can be combined to form chords of modifier keys. (See 'Remarks' below)

After the optional modifier key prefixes listed above, one can either specify a single keyboard character to use as the shortcut, or a numeric sequence in hex, decimal or octal.

Examples:

```
"c"      -- Uses 'c' as the shortcut
"#^c"    -- Same as FL_ALT|FL_CTRL|'c'
"#^!c"   -- Same as FL_ALT|FL_CTRL|FL_META|'c'
"@c"     -- Same as FL_COMMAND|'c' (see FL_COMMAND for platform specific behavior)
"0x63"   -- Same as "c" (hex 63=='c')
"99"     -- Same as "c" (dec 99=='c')
"0143"   -- Same as "c" (octal 0143=='c')
"^0x63"  -- Same as (FL_CTRL|'c'), or (FL_CTRL|0x63)
"^99"    -- Same as (FL_CTRL|'c'), or (FL_CTRL|99)
"^0143"  -- Same as (FL_CTRL|'c'), or (FL_CTRL|0143)
```

Remarks

Due to XForms legacy, there are some odd things to consider when using the modifier characters.

(1) You can use the special modifier keys for chords *only* if the modifiers are provided in this order: #, +, ^, !, @. Other ordering can yield undefined results.

So for instance, Ctrl-Alt-c must be specified as "#^c" (and not "^#c"), due to the above ordering rule.

(2) If you want to make a shortcut that uses one of the special modifier characters (as the character being modified), then to avoid confusion, specify the numeric equivalent, e.g.

If you want..	Then use..
-----	-----
'#' as the shortcut..	"0x23" (instead of just "#").
'+' as the shortcut..	"0x2b" (instead of just "+").
'^' as the shortcut..	"0x5e" (instead of just "^").
Alt-+ as the shortcut..	"#0x2b" (instead of "#+").
Alt-^ as the shortcut..	"#0x5e" (instead of "#^").
..etc..	

As a general rule that's easy to remember, unless the shortcut key to be modified is a single alpha-numeric character [A-Z,a-z,0-9], it's probably best to use the numeric equivalents.

Todo Fix these silly legacy issues in a future release to support more predictable behavior for the modifier keys.

30.7.4.39 fl_pie()

```
void fl_pie (
    int x,
    int y,
    int w,
    int h,
    double a1,
    double a2 ) [inline]
```

Draw filled ellipse sections using integer coordinates.

Like `fl_arc()`, but `fl_pie()` draws a filled-in pie slice. This slice may extend outside the line drawn by `fl_arc()`; to avoid this use `w - 1` and `h - 1`.

Parameters

in	<i>x,y,w,h</i>	bounding box of complete circle
in	<i>a1,a2</i>	start and end angles of arc measured in degrees counter-clockwise from 3 o'clock. <i>a2</i> must be greater than or equal to <i>a1</i> .

30.7.4.40 fl_polygon() [1/2]

```
void fl_polygon (
    int x,
    int y,
    int x1,
    int y1,
    int x2,
    int y2 ) [inline]
```

Fills a 3-sided polygon.

The polygon must be convex.

30.7.4.41 fl_polygon() [2/2]

```
void fl_polygon (
    int x,
    int y,
    int x1,
    int y1,
    int x2,
    int y2,
    int x3,
    int y3 ) [inline]
```

Fills a 4-sided polygon.

The polygon must be convex.

30.7.4.42 fl_pop_clip()

```
void fl_pop_clip ( ) [inline]
```

Restores the previous clip region.

You must call [fl_pop_clip\(\)](#) once for every time you call [fl_push_clip\(\)](#). Unpredictable results may occur if the clip stack is not empty when you return to FLTK.

30.7.4.43 fl_push_clip()

```
void fl_push_clip (
    int x,
    int y,
    int w,
    int h ) [inline]
```

Intersects the current clip region with a rectangle and pushes this new region onto the stack.

Parameters

in	<i>x,y,w,h</i>	position and size
----	----------------	-------------------

30.7.4.44 fl_push_matrix()

```
void fl_push_matrix ( ) [inline]
```

Saves the current transformation matrix on the stack.

The maximum depth of the stack is 32.

30.7.4.45 fl_read_image()

```
FL_EXPORT uchar* fl_read_image (
    uchar * p,
    int X,
    int Y,
    int W,
    int H,
    int alpha = 0 )
```

Reads an RGB(A) image from the current window or off-screen buffer.

Parameters

in	<i>p</i>	pixel buffer, or NULL to allocate one
in	<i>X,Y</i>	position of top-left of image to read
in	<i>W,H</i>	width and height of image to read
in	<i>alpha</i>	alpha value for image (0 for none)

Returns

pointer to pixel buffer, or NULL if allocation failed.

The `p` argument points to a buffer that can hold the image and must be at least $W*H*3$ bytes when reading RGB images, or $W*H*4$ bytes when reading RGBA images. If NULL, `fl_read_image()` will create an array of the proper size which can be freed using `delete[]`.

The `alpha` parameter controls whether an alpha channel is created and the value that is placed in the alpha channel. If 0, no alpha channel is generated.

30.7.4.46 fl_rect()

```
void fl_rect (
    int x,
    int y,
    int w,
    int h ) [inline]
```

Draws a 1-pixel border *inside* the given bounding box.

This function is meant for quick drawing of simple boxes. The behavior is undefined for line widths that are not 1.

30.7.4.47 fl_rectf()

```
FL_EXPORT void fl_rectf (
    int x,
    int y,
    int w,
    int h,
    uchar r,
    uchar g,
    uchar b )
```

Colors a rectangle with "exactly" the passed `r, g, b` color.

On screens with less than 24 bits of color this is done by drawing a solid-colored block using `fl_draw_image()` so that the correct color shade is produced.

30.7.4.48 fl_reset_spot()

```
FL_EXPORT void fl_reset_spot (
    void )
```

Todo provide user documentation for `fl_reset_spot` function

30.7.4.49 fl_rotate()

```
void fl_rotate (
    double d ) [inline]
```

Concatenates rotation transformation onto the current one.

Parameters

<code>in</code>	<code>d</code>	- rotation angle, counter-clockwise in degrees (not radians)
-----------------	----------------	--

30.7.4.50 fl_scale() [1/2]

```
void fl_scale (
    double x ) [inline]
```

Concatenates scaling transformation onto the current one.

Parameters

in	<i>x</i>	scale factor in both x-direction and y-direction
----	----------	--

30.7.4.51 fl_scale() [2/2]

```
void fl_scale (
    double x,
    double y ) [inline]
```

Concatenates scaling transformation onto the current one.

Parameters

in	<i>x,y</i>	scale factors in x-direction and y-direction
----	------------	--

30.7.4.52 fl_scroll()

```
FL_EXPORT void fl_scroll (
    int X,
    int Y,
    int W,
    int H,
    int dx,
    int dy,
    void(*) (void *, int, int, int, int) draw_area,
    void * data )
```

Scroll a rectangle and draw the newly exposed portions.

Parameters

in	<i>X,Y</i>	position of top-left of rectangle
in	<i>W,H</i>	size of rectangle
in	<i>dx,dy</i>	pixel offsets for shifting rectangle
in	<i>draw_area</i>	callback function to draw rectangular areas
in	<i>data</i>	pointer to user data for callback The contents of the rectangular area is first shifted by <i>dx</i> and <i>dy</i> pixels. The <i>draw_area</i> callback is then called for every newly exposed rectangular area.

30.7.4.53 fl_set_spot()

```
FL_EXPORT void fl_set_spot (
    int font,
    int size,
    int X,
    int Y,
    int W,
    int H,
    Fl_Window * win = 0 )
```

Todo provide user documentation for `fl_set_spot` function

30.7.4.54 fl_set_status()

```
FL_EXPORT void fl_set_status (
    int X,
    int Y,
    int W,
    int H )
```

Todo provide user documentation for fl_set_status function

30.7.4.55 fl_shortcut_label() [1/2]

```
FL_EXPORT const char* fl_shortcut_label (
    unsigned int shortcut )
```

Get a human-readable string from a shortcut value.

Unparse a shortcut value as used by [Fl_Button](#) or [Fl_Menu_Item](#) into a human-readable string like "Alt+N". This only works if the shortcut is a character key or a numbered function key. If the shortcut is zero then an empty string is returned. The return value points at a static buffer that is overwritten with each call.

Since

FLTK 1.3.4 modifier key names can be localized, but key names can not yet be localized. This may be added to a future FLTK version.

Modifier key names (human-readable shortcut names) can be defined with the following global const char * pointer variables:

- fl_local_ctrl => name of FL_CTRL
- fl_local_alt => name of FL_ALT
- fl_local_shift => name of FL_SHIFT
- fl_local_meta => name of FL_META

```
fl_local_ctrl = "Strg"; // German for "Ctrl"
fl_local_shift = "Umschalt"; // German for "Shift"
```

The shortcut name will be constructed by adding all modifier names in the order defined above plus the name of the key. A '+' character is added to each modifier name unless it has a trailing '\' or a trailing '+'.

Example:

Ctrl+Alt+Shift+Meta+F12

The default values for modifier key names are as given above for all platforms except Mac OS X. Mac OS X uses graphical characters that represent the typical OS X modifier names in menus, e.g. cloverleaf, saucepan, etc. You may, however, redefine Mac OS X modifier names as well.

Parameters

in	<i>shortcut</i>	the integer value containing the ascii character or extended keystroke plus modifiers
----	-----------------	---

Returns

a pointer to a static buffer containing human readable text for the shortcut

30.7.4.56 fl_shortcut_label() [2/2]

```
FL_EXPORT const char* fl_shortcut_label (
    unsigned int shortcut,
    const char ** eom )
```

Get a human-readable string from a shortcut value.

Parameters

in	<i>shortcut</i>	the integer value containing the ascii character or extended keystroke plus modifiers
in	<i>eom</i>	if this pointer is set, it will receive a pointer to the end of the modifier text

Returns

a pointer to a static buffer containing human readable text for the shortcut

See also

[fl_shortcut_label\(unsigned int shortcut\)](#)

30.7.4.57 fl_transform_dx()

```
double fl_transform_dx (
    double x,
    double y ) [inline]
```

Transforms distance using current transformation matrix.

Parameters

in	<i>x,y</i>	coordinate
----	------------	------------

30.7.4.58 fl_transform_dy()

```
double fl_transform_dy (
    double x,
    double y ) [inline]
```

Transforms distance using current transformation matrix.

Parameters

in	<i>x,y</i>	coordinate
----	------------	------------

30.7.4.59 fl_transform_x()

```
double fl_transform_x (
    double x,
    double y ) [inline]
```

Transforms coordinate using the current transformation matrix.

Parameters

in	<i>x,y</i>	coordinate
----	------------	------------

30.7.4.60 fl_transform_y()

```
double fl_transform_y (
    double x,
```

```
double y ) [inline]
```

Transforms coordinate using the current transformation matrix.

Parameters

in	<i>x,y</i>	coordinate
----	------------	------------

30.7.4.61 fl_transformed_vertex()

```
void fl_transformed_vertex (
    double xf,
    double yf ) [inline]
```

Adds coordinate pair to the vertex list without further transformations.

Parameters

in	<i>xf,yf</i>	transformed coordinate
----	--------------	------------------------

30.7.4.62 fl_translate()

```
void fl_translate (
    double x,
    double y ) [inline]
```

Concatenates translation transformation onto the current one.

Parameters

in	<i>x,y</i>	translation factor in x-direction and y-direction
----	------------	---

30.7.4.63 fl_vertex()

```
void fl_vertex (
    double x,
    double y ) [inline]
```

Adds a single vertex to the current path.

Parameters

in	<i>x,y</i>	coordinate
----	------------	------------

30.8 Multithreading support functions

fl multithreading support functions declared in <FL/FI.H>

Functions

- static int [Fl::awake](#) ([Fl_Awake_Handler](#) cb, void *message=0)
See *void awake(void* message=0)*.
- static void [Fl::awake](#) (void *message=0)

Sends a message pointer to the main thread, causing any pending [Fl::wait\(\)](#) call to terminate so that the main thread can retrieve the message and any pending redraws can be processed.

- static int [Fl::lock](#) ()

The [lock\(\)](#) method blocks the current thread until it can safely access FLTK widgets and data.

- static void * [Fl::thread_message](#) ()

The [thread_message\(\)](#) method returns the last message that was sent from a child by the [awake\(\)](#) method.

- static void [Fl::unlock](#) ()

The [unlock\(\)](#) method releases the lock that was set using the [lock\(\)](#) method.

30.8.1 Detailed Description

fl multithreading support functions declared in [<FL/FL.H>](#)

30.8.2 Function Documentation

30.8.2.1 [awake\(\)](#) [1/2]

```
int Fl::awake (
    Fl_Awake_Handler func,
    void * data = 0 ) [static]
```

See void [awake\(void* message=0\)](#).

Let the main thread know an update is pending and have it call a specific function.

Registers a function that will be called by the main thread during the next message handling cycle. Returns 0 if the callback function was registered, and -1 if registration failed. Over a thousand [awake](#) callbacks can be registered simultaneously.

See also

[Fl::awake\(void* message=0\)](#)

30.8.2.2 [awake\(\)](#) [2/2]

```
void Fl::awake (
    void * msg = 0 ) [static]
```

Sends a message pointer to the main thread, causing any pending [Fl::wait\(\)](#) call to terminate so that the main thread can retrieve the message and any pending redraws can be processed.

Multiple calls to [Fl::awake\(\)](#) will queue multiple pointers for the main thread to process, up to a system-defined (typically several thousand) depth. The default message handler saves the last message which can be accessed using the [Fl::thread_message\(\)](#) function.

In the context of a threaded application, a call to [Fl::awake\(\)](#) with no argument will trigger event loop handling in the main thread. Since it is not possible to call [Fl::flush\(\)](#) from a subsidiary thread, [Fl::awake\(\)](#) is the best (and only, really) substitute.

See also: [Multithreading](#)

30.8.2.3 [lock\(\)](#)

```
int Fl::lock ( ) [static]
```

The [lock\(\)](#) method blocks the current thread until it can safely access FLTK widgets and data.

Child threads should call this method prior to updating any widgets or accessing data. The main thread must call [lock\(\)](#) to initialize the threading support in FLTK. [lock\(\)](#) will return non-zero if threading is not available on the platform.

Child threads must call [unlock\(\)](#) when they are done accessing FLTK.

When the [wait\(\)](#) method is waiting for input or timeouts, child threads are given access to FLTK. Similarly, when the main thread needs to do processing, it will wait until all child threads have called [unlock\(\)](#) before processing additional data.

Returns

0 if threading is available on the platform; non-zero otherwise.

See also: [Multithreading](#)

30.8.2.4 thread_message()

```
void * Fl::thread_message ( ) [static]
```

The [thread_message\(\)](#) method returns the last message that was sent from a child by the [awake\(\)](#) method.

See also: [Multithreading](#)

30.8.2.5 unlock()

```
void Fl::unlock ( ) [static]
```

The [unlock\(\)](#) method releases the lock that was set using the [lock\(\)](#) method.

Child threads should call this method as soon as they are finished accessing FLTK.

See also: [Multithreading](#)

30.9 Safe widget deletion support functions

These functions, declared in `<FL/Fl.H>`, support deletion of widgets inside callbacks.

Functions

- static void [Fl::clear_widget_pointer](#) ([Fl_Widget](#) const *w)
Clears a widget pointer in the watch list.
- static void [Fl::delete_widget](#) ([Fl_Widget](#) *w)
Schedules a widget for deletion at the next call to the event loop.
- static void [Fl::do_widget_deletion](#) ()
Deletes widgets previously scheduled for deletion.
- static void [Fl::release_widget_pointer](#) ([Fl_Widget](#) *&w)
Releases a widget pointer from the watch list.
- static void [Fl::watch_widget_pointer](#) ([Fl_Widget](#) *&w)
Adds a widget pointer to the widget watch list.

30.9.1 Detailed Description

These functions, declared in `<FL/Fl.H>`, support deletion of widgets inside callbacks.

[Fl::delete_widget\(\)](#) should be called when deleting widgets or complete widget trees ([Fl_Group](#), [Fl_Window](#), ...)
inside callbacks.

The other functions are intended for internal use. The preferred way to use them is by using the helper class [Fl_Widget_Tracker](#).

The following is to show how it works ...

There are three groups of related methods:

1. scheduled widget deletion
 - [Fl::delete_widget\(\)](#) schedules widgets for deletion
 - [Fl::do_widget_deletion\(\)](#) deletes all scheduled widgets
2. widget watch list ("smart pointers")
 - [Fl::watch_widget_pointer\(\)](#) adds a widget pointer to the watch list
 - [Fl::release_widget_pointer\(\)](#) removes a widget pointer from the watch list
 - [Fl::clear_widget_pointer\(\)](#) clears a widget pointer *in* the watch list
3. the class [Fl_Widget_Tracker](#):

- the constructor calls [Fl::watch_widget_pointer\(\)](#)
- the destructor calls [Fl::release_widget_pointer\(\)](#)
- the access methods can be used to test, if a widget has been deleted

See also

[Fl_Widget_Tracker](#).

30.9.2 Function Documentation

30.9.2.1 clear_widget_pointer()

```
void Fl::clear_widget_pointer (
    Fl_Widget const * w ) [static]
```

Clears a widget pointer *in* the watch list.

This is called when a widget is destroyed (by its destructor). You should never call this directly.

Note

Internal use only !

This method searches the widget watch list for pointers to the widget and clears each pointer that points to it. Widget pointers can be added to the widget watch list by calling [Fl::watch_widget_pointer\(\)](#) or by using the helper class [Fl_Widget_Tracker](#) (recommended).

See also

[Fl::watch_widget_pointer\(\)](#)

class [Fl_Widget_Tracker](#)

30.9.2.2 delete_widget()

```
void Fl::delete_widget (
    Fl_Widget * wi ) [static]
```

Schedules a widget for deletion at the next call to the event loop.

Use this method to delete a widget inside a callback function.

To avoid early deletion of widgets, this function should be called toward the end of a callback and only after any call to the event loop ([Fl::wait\(\)](#), [Fl::flush\(\)](#), [Fl::check\(\)](#), [fl_ask\(\)](#), etc.).

When deleting groups or windows, you must only delete the group or window widget and not the individual child widgets.

Since

FLTK 1.3.4 the widget will be hidden immediately, but the actual destruction will be delayed until the event loop is finished. Up to FLTK 1.3.3 windows wouldn't be hidden before the event loop was done, hence you had to `hide()` a window in your window close callback if you called [Fl::delete_widget\(\)](#) to destroy (and hide) the window.

FLTK 1.3.0 it is not necessary to remove widgets from their parent groups or windows before calling this, because it will be done in the widget's destructor, but it is not a failure to do this nevertheless.

Note

In FLTK 1.1 you **must** remove widgets from their parent group (or window) before deleting them.

See also

[Fl_Widget::~~Fl_Widget\(\)](#)

30.9.2.3 do_widget_deletion()

```
void Fl::do_widget_deletion ( ) [static]
```

Deletes widgets previously scheduled for deletion.

This is for internal use only. You should never call this directly.

[Fl::do_widget_deletion\(\)](#) is called from the FLTK event loop or whenever you call [Fl::wait\(\)](#). The previously scheduled widgets are deleted in the same order they were scheduled by calling [Fl::delete_widget\(\)](#).

See also

[Fl::delete_widget\(Fl_Widget *wi\)](#)

30.9.2.4 release_widget_pointer()

```
void Fl::release_widget_pointer (
    Fl_Widget *& w ) [static]
```

Releases a widget pointer from the watch list.

This is used to remove a widget pointer that has been added to the watch list with [Fl::watch_widget_pointer\(\)](#), when it is not needed anymore.

Note

Internal use only, please use class [Fl_Widget_Tracker](#) instead.

See also

[Fl::watch_widget_pointer\(\)](#)

30.9.2.5 watch_widget_pointer()

```
void Fl::watch_widget_pointer (
    Fl_Widget *& w ) [static]
```

Adds a widget pointer to the widget watch list.

Note

Internal use only, please use class [Fl_Widget_Tracker](#) instead.

This can be used, if it is possible that a widget might be deleted during a callback or similar function. The widget pointer must be added to the watch list before calling the callback. After the callback the widget pointer can be queried, if it is NULL. If it is NULL, then the widget has been deleted during the callback and must not be accessed anymore. If the widget pointer is *not* NULL, then the widget has not been deleted and can be accessed safely.

After accessing the widget, the widget pointer must be released from the watch list by calling [Fl::release_widget_pointer\(\)](#).

Example for a button that is clicked (from its [handle\(\)](#) method):

```
Fl_Widget *wp = this;           // save 'this' in a pointer variable
Fl::watch_widget_pointer(wp);   // add the pointer to the watch list
set_changed();                 // set the changed flag
do_callback();                 // call the callback
if (!wp) {                     // the widget has been deleted
    // DO NOT ACCESS THE DELETED WIDGET !
} else {                        // the widget still exists
    clear_changed();           // reset the changed flag
}
Fl::release_widget_pointer(wp); // remove the pointer from the watch list
```

This works, because all widgets call [Fl::clear_widget_pointer\(\)](#) in their destructors.

See also

[Fl::release_widget_pointer\(\)](#)

[Fl::clear_widget_pointer\(\)](#)

An easier and more convenient method to control widget deletion during callbacks is to use the class [Fl_Widget_Tracker](#) with a local (automatic) variable.

See also

class [Fl_Widget_Tracker](#)

30.10 Cairo Support Functions and Classes

Classes

- class [Fl_Cairo_State](#)
Contains all the necessary info on the current cairo context.
- class [Fl_Cairo_Window](#)
This defines a pre-configured cairo fltk window.

Functions

- static bool [Fl::cairo_autolink_context](#) ()
Gets the current autolink mode for cairo support.
- static void [Fl::cairo_autolink_context](#) (bool alink)
when `FLTK_HAVE_CAIRO` is defined and `cairo_autolink_context()` is true, any current window `dc` is linked to a current cairo context.
- static cairo_t* [Fl::cairo_cc](#) ()
Gets the current cairo context linked with a fltk window.
- static void [Fl::cairo_cc](#) (cairo_t *c, bool own=false)
Sets the current cairo context to `c`.
- static cairo_t* [Fl::cairo_make_current](#) ([Fl_Window](#) *w)
Provides a corresponding cairo context for window `wi`.

30.10.1 Detailed Description

30.10.2 Function Documentation

30.10.2.1 `cairo_autolink_context()` [1/2]

```
static bool Fl::cairo_autolink_context ( ) [inline], [static]
```

Gets the current autolink mode for cairo support.

Return values

<i>false</i>	if no cairo context autolink is made for each window.
<i>true</i>	if any fltk window is attached a cairo context when it is current.

See also

void [cairo_autolink_context](#)(bool alink)

Note

Only available when configure has the `--enable-cairo` option

30.10.2.2 `cairo_autolink_context()` [2/2]

```
static void Fl::cairo_autolink_context (
    bool alink ) [inline], [static]
```

when `FLTK_HAVE_CAIRO` is defined and `cairo_autolink_context()` is true, any current window `dc` is linked to a current cairo context.

This is not the default, because it may not be necessary to add cairo support to all fltk supported windows. When you wish to associate a cairo context in this mode, you need to call explicitly in your `draw()` overridden method, `Fl::cairo_make_current(Fl_Window*)`. This will create a cairo context but only for this Window. Still in custom cairo application it is possible to handle completely this process automatically by setting `alink` to true. In this last case, you don't need anymore to call `Fl::cairo_make_current()`. You can use `Fl::cairo_cc()` to get the current cairo context anytime.

Note

Only available when configure has the `--enable-cairo` option

30.10.2.3 `cairo_cc()`

```
static void Fl::cairo_cc (
    cairo_t * c,
    bool own = false ) [inline], [static]
```

Sets the current cairo context to `c`.

Set `own` to true if you want fltk to handle this cc deletion.

Note

Only available when configure has the `--enable-cairo` option

30.10.2.4 `cairo_make_current()`

```
cairo_t * Fl::cairo_make_current (
    Fl_Window * wi ) [static]
```

Provides a corresponding cairo context for window `wi`.

This is needed in a `draw()` override if `Fl::cairo_autolink_context()` returns false, which is the default. The `cairo_↔context()` does not need to be freed as it is freed every time a new cairo context is created. When the program terminates, a call to `Fl::cairo_make_current(0)` will destroy any residual context.

Note

A new cairo context is not always re-created when this method is used. In particular, if the current graphical context and the current window didn't change between two calls, the previous gc is internally kept, thus optimizing the drawing performances. Also, after this call, `Fl::cairo_cc()` is adequately updated with this cairo context.

Only available when configure has the `--enable-cairo` option

Returns

the valid `cairo_t*` cairo context associated to this window.

30.11 Unicode and UTF-8 functions

fl global Unicode and UTF-8 handling functions declared in `<FL/fl_utf8.h>`

Macros

- `#define ERRORS_TO_CP1252 1`
- `#define ERRORS_TO_ISO8859_1 1`
- `#define NBC 0xFFFF + 1`
- `#define STRICT_RFC3629 0`

Functions

- FL_EXPORT int [fl_access](#) (const char *f, int mode)
Cross-platform function to test a files access() with a UTF-8 encoded name or value.
- FL_EXPORT int [fl_chmod](#) (const char *f, int mode)
Cross-platform function to set a files mode() with a UTF-8 encoded name or value.
- FL_EXPORT int [fl_execvp](#) (const char *file, char *const *argv)
- FL_EXPORT FILE * [fl_fopen](#) (const char *f, const char *mode)
Cross-platform function to open files with a UTF-8 encoded name.
- FL_EXPORT char * [fl_getcwd](#) (char *b, int l)
Cross-platform function to get the current working directory as a UTF-8 encoded value.
- FL_EXPORT char * [fl_getenv](#) (const char *v)
Cross-platform function to get environment variables with a UTF-8 encoded name or value.
- FL_EXPORT char [fl_make_path](#) (const char *path)
Cross-platform function to recursively create a path in the file system.
- FL_EXPORT void [fl_make_path_for_file](#) (const char *path)
Cross-platform function to create a path for the file in the file system.
- FL_EXPORT int [fl_mkdir](#) (const char *f, int mode)
Cross-platform function to create a directory with a UTF-8 encoded name.
- FL_EXPORT unsigned int [fl_nonspacing](#) (unsigned int ucs)
Returns true if the Unicode character ucs is non-spacing.
- FL_EXPORT int [fl_open](#) (const char *f, int oflags,...)
Cross-platform function to open files with a UTF-8 encoded name.
- FL_EXPORT int [fl_rename](#) (const char *f, const char *n)
Cross-platform function to rename a filesystem object using UTF-8 encoded names.
- FL_EXPORT int [fl_rmdir](#) (const char *f)
Cross-platform function to remove a directory with a UTF-8 encoded name.
- FL_EXPORT int [fl_stat](#) (const char *f, struct stat *b)
Cross-platform function to stat() a file using a UTF-8 encoded name or value.
- FL_EXPORT int [fl_system](#) (const char *cmd)
Cross-platform function to run a system command with a UTF-8 encoded string.
- FL_EXPORT int [fl_tolower](#) (unsigned int ucs)
Returns the Unicode lower case value of ucs.
- FL_EXPORT int [fl_toupper](#) (unsigned int ucs)
Returns the Unicode upper case value of ucs.
- FL_EXPORT unsigned [fl_ucs_to_Utf16](#) (const unsigned ucs, unsigned short *dst, const unsigned dstlen)
- FL_EXPORT int [fl_unlink](#) (const char *f)
Cross-platform function to unlink() (that is, delete) a file using a UTF-8 encoded filename.
- FL_EXPORT char * [fl_utf2mbcs](#) (const char *s)
Converts UTF-8 string s to a local multi-byte character string.
- FL_EXPORT const char * [fl_utf8back](#) (const char *p, const char *start, const char *end)
- FL_EXPORT int [fl_utf8bytes](#) (unsigned ucs)
Return the number of bytes needed to encode the given UCS4 character in UTF-8.
- FL_EXPORT unsigned [fl_utf8decode](#) (const char *p, const char *end, int *len)
- FL_EXPORT int [fl_utf8encode](#) (unsigned ucs, char *buf)
- FL_EXPORT unsigned [fl_utf8from_mb](#) (char *dst, unsigned dstlen, const char *src, unsigned srclen)
- FL_EXPORT unsigned [fl_utf8froma](#) (char *dst, unsigned dstlen, const char *src, unsigned srclen)
- FL_EXPORT unsigned [fl_utf8fromwbc](#) (char *dst, unsigned dstlen, const wchar_t *src, unsigned srclen)
- FL_EXPORT const char * [fl_utf8fwd](#) (const char *p, const char *start, const char *end)
- FL_EXPORT int [fl_utf8len](#) (char c)
Returns the byte length of the UTF-8 sequence with first byte c, or -1 if c is not valid.
- FL_EXPORT int [fl_utf8len1](#) (char c)

Returns the byte length of the UTF-8 sequence with first byte *c*, or 1 if *c* is not valid.

- FL_EXPORT int [fl_utf8locale](#) (void)
- FL_EXPORT int [fl_utf8test](#) (const char *src, unsigned len)
- FL_EXPORT unsigned [fl_utf8to_mb](#) (const char *src, unsigned srclen, char *dst, unsigned dstlen)
- FL_EXPORT unsigned [fl_utf8toa](#) (const char *src, unsigned srclen, char *dst, unsigned dstlen)
- FL_EXPORT unsigned [fl_utf8toUtf16](#) (const char *src, unsigned srclen, unsigned short *dst, unsigned dstlen)
- FL_EXPORT unsigned [fl_utf8towc](#) (const char *src, unsigned srclen, wchar_t *dst, unsigned dstlen)

Converts a UTF-8 string into a wide character string.

- FL_EXPORT int [fl_utf_nb_char](#) (const unsigned char *buf, int len)

Returns the number of Unicode chars in the UTF-8 string.

- FL_EXPORT int [fl_utf_strcasecmp](#) (const char *s1, const char *s2)

UTF-8 aware strcasecmp - converts to Unicode and tests.

- FL_EXPORT int [fl_utf_strncasecmp](#) (const char *s1, const char *s2, int n)

UTF-8 aware strncasecmp - converts to lower case Unicode and tests.

- FL_EXPORT int [fl_utf_tolower](#) (const unsigned char *str, int len, char *buf)

Converts the string *str* to its lower case equivalent into *buf*.

- FL_EXPORT int [fl_utf_toupper](#) (const unsigned char *str, int len, char *buf)

Converts the string *str* to its upper case equivalent into *buf*.

- FL_EXPORT int [fl_wcwidth](#) (const char *src)

extended wrapper around [fl_wcwidth_\(unsigned int ucs\)](#) function.

- FL_EXPORT int [fl_wcwidth_](#) (unsigned int ucs)

wrapper to adapt Markus Kuhn's implementation of `wcwidth()` for FLTK

30.11.1 Detailed Description

fl global Unicode and UTF-8 handling functions declared in [<FL/fl_utf8.h>](#)

30.11.2 Macro Definition Documentation

30.11.2.1 ERRORS_TO_CP1252

```
#define ERRORS_TO_CP1252 1
```

Set to 1 to turn bad UTF-8 bytes in the 0x80-0x9f range into the Unicode index for Microsoft's CP1252 character set. You should also set `ERRORS_TO_ISO8859_1`. With this a huge amount of more available text (such as all web pages) are correctly converted to Unicode.

30.11.2.2 ERRORS_TO_ISO8859_1

```
#define ERRORS_TO_ISO8859_1 1
```

Set to 1 to turn bad UTF-8 bytes into ISO-8859-1. If this is zero they are instead turned into the Unicode REPLACEMENT CHARACTER, of value 0xfffd. If this is on [fl_utf8decode\(\)](#) will correctly map most (perhaps all) human-readable text that is in ISO-8859-1. This may allow you to completely ignore character sets in your code because virtually everything is either ISO-8859-1 or UTF-8.

30.11.2.3 STRICT_RFC3629

```
#define STRICT_RFC3629 0
```

A number of Unicode code points are in fact illegal and should not be produced by a UTF-8 converter. Turn this on will replace the bytes in those encodings with errors. If you do this then converting arbitrary 16-bit data to UTF-8 and then back is not an identity, which will probably break a lot of software.

30.11.3 Function Documentation

30.11.3.1 fl_access()

```
int fl_access (
    const char * f,
    int mode )
```

Cross-platform function to test a files access() with a UTF-8 encoded name or value.

This function is especially useful under the MSWindows platform where the standard access() function fails with UTF-8 encoded non-ASCII filenames.

Parameters

in	<i>f</i>	the UTF-8 encoded filename
in	<i>mode</i>	the mode to test

Returns

the return value of _waccess() on Windows or access() on other platforms.

30.11.3.2 fl_chmod()

```
int fl_chmod (
    const char * f,
    int mode )
```

Cross-platform function to set a files mode() with a UTF-8 encoded name or value.

This function is especially useful under the MSWindows platform where the standard chmod() function fails with UTF-8 encoded non-ASCII filenames.

Parameters

in	<i>f</i>	the UTF-8 encoded filename
in	<i>mode</i>	the mode to set

Returns

the return value of _wchmod() on Windows or chmod() on other platforms.

30.11.3.3 fl_fopen()

```
FILE * fl_fopen (
    const char * f,
    const char * mode )
```

Cross-platform function to open files with a UTF-8 encoded name.

This function is especially useful under the MSWindows platform where the standard fopen() function fails with UTF-8 encoded non-ASCII filenames.

Parameters

<i>f</i>	the UTF-8 encoded filename
<i>mode</i>	same as the second argument of the standard fopen() function

Returns

a FILE pointer upon successful completion, or NULL in case of error.

See also

[fl_open\(\)](#).

30.11.3.4 fl_getcwd()

```
char * fl_getcwd (
    char * b,
    int l )
```

Cross-platform function to get the current working directory as a UTF-8 encoded value.

This function is especially useful under the MSWindows platform where the standard `_wgetcwd()` function returns UTF-16 encoded non-ASCII filenames.

Parameters

<i>b</i>	the buffer to populate
<i>l</i>	the length of the buffer

Returns

the CWD encoded as UTF-8.

30.11.3.5 fl_getenv()

```
char * fl_getenv (
    const char * v )
```

Cross-platform function to get environment variables with a UTF-8 encoded name or value.

This function is especially useful under the MSWindows platform where non-ASCII environment variables are encoded as wide characters. The returned value of the variable is encoded in UTF-8 as well.

On platforms other than MSWindows this function calls `getenv` directly. The return value is returned as-is.

Parameters

<i>in</i>	<i>v</i>	the UTF-8 encoded environment variable
-----------	----------	--

Returns

the environment variable in UTF-8 encoding, or NULL in case of error.

30.11.3.6 fl_make_path()

```
char fl_make_path (
    const char * path )
```

Cross-platform function to recursively create a path in the file system.

This function creates a `path` in the file system by recursively creating all directories.

30.11.3.7 fl_make_path_for_file()

```
void fl_make_path_for_file (
    const char * path )
```

Cross-platform function to create a path for the file in the file system.

This function strips the filename from the given `path` and creates a path in the file system by recursively creating all directories.

30.11.3.8 fl_mkdir()

```
int fl_mkdir (
    const char * f,
    int mode )
```

Cross-platform function to create a directory with a UTF-8 encoded name.

This function is especially useful on the MSWindows platform where the standard `_wmkdir()` function expects UTF-16 encoded non-ASCII filenames.

Parameters

in	<i>f</i>	the UTF-8 encoded filename
in	<i>mode</i>	the mode of the directory

Returns

the return value of `_wmkdir()` on Windows or `mkdir()` on other platforms.

30.11.3.9 fl_nonspacing()

```
unsigned int fl_nonspacing (
    unsigned int ucs )
```

Returns true if the Unicode character `ucs` is non-spacing.

Non-spacing characters in Unicode are typically combining marks like tilde (~), diaeresis (¨), or other marks that are added to a base character, for instance 'a' (base character) + '¨' (combining mark) = 'ä' (German Umlaut).

- http://unicode.org/glossary/#base_character
- http://unicode.org/glossary/#nonspacing_mark
- http://unicode.org/glossary/#combining_character

30.11.3.10 fl_open()

```
int fl_open (
    const char * f,
    int oflags,
    ... )
```

Cross-platform function to open files with a UTF-8 encoded name.

This function is especially useful under the MSWindows platform where the standard `open()` function fails with UTF-8 encoded non-ASCII filenames.

Parameters

<i>f</i>	the UTF-8 encoded filename
<i>oflags</i>	other arguments are as in the standard <code>open()</code> function

Returns

a file descriptor upon successful completion, or -1 in case of error.

See also

[fl_fopen\(\)](#).

30.11.3.11 fl_rename()

```
int fl_rename (
    const char * f,
    const char * n )
```

Cross-platform function to rename a filesystem object using UTF-8 encoded names.

This function is especially useful on the MSWindows platform where the standard `_wrename()` function expects UTF-16 encoded non-ASCII filenames.

Parameters

in	<i>f</i>	the UTF-8 encoded filename to change
in	<i>n</i>	the new UTF-8 encoded filename to set

Returns

the return value of `_wrename()` on Windows or `rename()` on other platforms.

30.11.3.12 fl_rmdir()

```
int fl_rmdir (
    const char * f )
```

Cross-platform function to remove a directory with a UTF-8 encoded name.

This function is especially useful on the MSWindows platform where the standard `_wrmdir()` function expects UTF-16 encoded non-ASCII filenames.

Parameters

in	<i>f</i>	the UTF-8 encoded filename to remove
----	----------	--------------------------------------

Returns

the return value of `_wrmdir()` on Windows or `rmdir()` on other platforms.

30.11.3.13 fl_stat()

```
int fl_stat (
    const char * f,
    struct stat * b )
```

Cross-platform function to `stat()` a file using a UTF-8 encoded name or value.

This function is especially useful under the MSWindows platform where the standard `stat()` function fails with UTF-8 encoded non-ASCII filenames.

Parameters

in	<i>f</i>	the UTF-8 encoded filename
	<i>b</i>	the stat struct to populate

Returns

the return value of `_wstat()` on Windows or `stat()` on other platforms.

30.11.3.14 `fl_system()`

```
int fl_system (
    const char * cmd )
```

Cross-platform function to run a system command with a UTF-8 encoded string.

This function is especially useful under the MSWindows platform where non-ASCII program (file) names must be encoded as wide characters.

On platforms other than MSWindows this function calls `system()` directly.

Parameters

<code>in</code>	<code>cmd</code>	the UTF-8 encoded command string
-----------------	------------------	----------------------------------

Returns

the return value of `_wsystem()` on Windows or `system()` on other platforms.

30.11.3.15 `fl_ucs_to_Utf16()`

```
unsigned fl_ucs_to_Utf16 (
    const unsigned ucs,
    unsigned short * dst,
    const unsigned dstlen )
```

Convert a single 32-bit Unicode codepoint into an array of 16-bit characters. These are used by some system calls, especially on Windows.

`ucs` is the value to convert.

`dst` points at an array to write, and `dstlen` is the number of locations in this array. At most `dstlen` words will be written, and a 0 terminating word will be added if `dstlen` is large enough. Thus this function will never overwrite the buffer and will attempt return a zero-terminated string if space permits. If `dstlen` is zero then `dst` can be set to NULL and no data is written, but the length is returned.

The return value is the number of 16-bit words that *would* be written to `dst` if it is large enough, not counting any terminating zero.

If the return value is greater than `dstlen` it indicates truncation, you should then allocate a new array of size `return+1` and call this again.

Unicode characters in the range 0x10000 to 0x10ffff are converted to "surrogate pairs" which take two words each (in UTF-16 encoding). Typically, setting `dstlen` to 2 will ensure that any valid Unicode value can be converted, and setting `dstlen` to 3 or more will allow a NULL terminated sequence to be returned.

30.11.3.16 `fl_unlink()`

```
int fl_unlink (
    const char * f )
```

Cross-platform function to `unlink()` (that is, delete) a file using a UTF-8 encoded filename.

This function is especially useful under the MSWindows platform where the standard function expects UTF-16 encoded non-ASCII filenames.

Parameters

<code>f</code>	the filename to unlink
----------------	------------------------

Returns

the return value of `_wunlink()` on Windows or `unlink()` on other platforms.

30.11.3.17 fl_utf8back()

```
const char * fl_utf8back (
    const char * p,
    const char * start,
    const char * end )
```

Move `p` backward until it points to the start of a UTF-8 character. If it already points at the start of one then it is returned unchanged. Any UTF-8 errors are treated as though each byte of the error is an individual character.

`start` is the start of the string and is used to limit the backwards search for the start of a UTF-8 character.

`end` is the end of the string and is assumed to be a break between characters. It is assumed to be greater than `p`.

If you wish to decrement a UTF-8 pointer, pass `p-1` to this.

30.11.3.18 fl_utf8bytes()

```
int fl_utf8bytes (
    unsigned ucs )
```

Return the number of bytes needed to encode the given UCS4 character in UTF-8.

Parameters

in	<i>ucs</i>	UCS4 encoded character
----	------------	------------------------

Returns

number of bytes required

Returns number of bytes that `utf8encode()` will use to encode the character `ucs`.

30.11.3.19 fl_utf8decode()

```
unsigned fl_utf8decode (
    const char * p,
    const char * end,
    int * len )
```

Decode a single UTF-8 encoded character starting at `p`. The resulting Unicode value (in the range 0-0x10ffff) is returned, and `len` is set to the number of bytes in the UTF-8 encoding (adding `len` to `p` will point at the next character).

If `p` points at an illegal UTF-8 encoding, including one that would go past `end`, or where a code uses more bytes than necessary, then `*(unsigned char*)p` is translated as though it is in the Microsoft CP1252 character set and `len` is set to 1. Treating errors this way allows this to decode almost any ISO-8859-1 or CP1252 text that has been mistakenly placed where UTF-8 is expected, and has proven very useful.

If you want errors to be converted to error characters (as the standards recommend), adding a test to see if the length is unexpectedly 1 will work:

```
if (*p & 0x80) { // what should be a multibyte encoding
    code = fl_utf8decode(p,end,&len);
    if (len<2) code = 0xFFFD; // Turn errors into REPLACEMENT CHARACTER
} else { // handle the 1-byte UTF-8 encoding:
    code = *p;
    len = 1;
}
```

Direct testing for the 1-byte case (as shown above) will also speed up the scanning of strings where the majority of characters are ASCII.

30.11.3.20 fl_utf8encode()

```
int fl_utf8encode (
    unsigned ucs,
    char * buf )
```

Write the UTF-8 encoding of *ucs* into *buf* and return the number of bytes written. Up to 4 bytes may be written. If you know that *ucs* is less than 0x10000 then at most 3 bytes will be written. If you wish to speed this up, remember that anything less than 0x80 is written as a single byte.

If *ucs* is greater than 0x10ffff this is an illegal character according to RFC 3629. These are converted as though they are 0xFFFF (REPLACEMENT CHARACTER).

RFC 3629 also says many other values for *ucs* are illegal (in the range 0xd800 to 0xdfff, or ending with 0xfffe or 0xffff). However I encode these as though they are legal, so that `utf8encode/fl_utf8decode` will be the identity for all codes between 0 and 0x10ffff.

30.11.3.21 `fl_utf8from_mb()`

```
unsigned fl_utf8from_mb (
    char * dst,
    unsigned dstlen,
    const char * src,
    unsigned srclen )
```

Convert a filename from the locale-specific multibyte encoding used by Windows to UTF-8 as used by FLTK.

Up to *dstlen* bytes are written to *dst*, including a null terminator. The return value is the number of bytes that would be written, not counting the null terminator. If greater or equal to *dstlen* then if you malloc a new array of size *n*+1 you will have the space needed for the entire string. If *dstlen* is zero then nothing is written and this call just measures the storage space needed.

On Unix or on Windows when a UTF-8 locale is in effect, this does not change the data. You may also want to check if `fl_utf8test()` returns non-zero, so that the filesystem can store filenames in UTF-8 encoding regardless of the locale.

30.11.3.22 `fl_utf8froma()`

```
unsigned fl_utf8froma (
    char * dst,
    unsigned dstlen,
    const char * src,
    unsigned srclen )
```

Convert an ISO-8859-1 (ie normal c-string) byte stream to UTF-8.

It is possible this should convert Microsoft's CP1252 to UTF-8 instead. This would translate the codes in the range 0x80-0x9f to different characters. Currently it does not do this.

Up to *dstlen* bytes are written to *dst*, including a null terminator. The return value is the number of bytes that would be written, not counting the null terminator. If greater or equal to *dstlen* then if you malloc a new array of size *n*+1 you will have the space needed for the entire string. If *dstlen* is zero then nothing is written and this call just measures the storage space needed.

srclen is the number of bytes in *src* to convert.

If the return value equals *srclen* then this indicates that no conversion is necessary, as only ASCII characters are in the string.

30.11.3.23 `fl_utf8fromwc()`

```
unsigned fl_utf8fromwc (
    char * dst,
    unsigned dstlen,
    const wchar_t * src,
    unsigned srclen )
```

Turn "wide characters" as returned by some system calls (especially on Windows) into UTF-8.

Up to *dstlen* bytes are written to *dst*, including a null terminator. The return value is the number of bytes that would be written, not counting the null terminator. If greater or equal to *dstlen* then if you malloc a new array of size *n*+1 you will have the space needed for the entire string. If *dstlen* is zero then nothing is written and this call just measures the storage space needed.

srclen is the number of words in *src* to convert. On Windows this is not necessarily the number of characters, due to there possibly being "surrogate pairs" in the UTF-16 encoding used. On Unix `wchar_t` is 32 bits and each location is a character.

On Unix if a `src` word is greater than 0x10fff then this is an illegal character according to RFC 3629. These are converted as though they are 0xFFFD (REPLACEMENT CHARACTER). Characters in the range 0xd800 to 0xffff, or ending with 0xffe or 0xffff are also illegal according to RFC 3629. However I encode these as though they are legal, so that `fl_utf8towc` will return the original data.

On Windows "surrogate pairs" are converted to a single character and UTF-8 encoded (as 4 bytes). Mismatched halves of surrogate pairs are converted as though they are individual characters.

30.11.3.24 `fl_utf8fwd()`

```
const char * fl_utf8fwd (
    const char * p,
    const char * start,
    const char * end )
```

Move `p` forward until it points to the start of a UTF-8 character. If it already points at the start of one then it is returned unchanged. Any UTF-8 errors are treated as though each byte of the error is an individual character.

`start` is the start of the string and is used to limit the backwards search for the start of a UTF-8 character.

`end` is the end of the string and is assumed to be a break between characters. It is assumed to be greater than `p`.

This function is for moving a pointer that was jumped to the middle of a string, such as when doing a binary search for a position. You should use either this or `fl_utf8back()` depending on which direction your algorithm can handle the pointer moving. Do not use this to scan strings, use `fl_utf8decode()` instead.

30.11.3.25 `fl_utf8len()`

```
int fl_utf8len (
    char c )
```

Returns the byte length of the UTF-8 sequence with first byte `c`, or -1 if `c` is not valid.

This function is helpful for finding faulty UTF-8 sequences.

See also

[fl_utf8len1](#)

30.11.3.26 `fl_utf8len1()`

```
int fl_utf8len1 (
    char c )
```

Returns the byte length of the UTF-8 sequence with first byte `c`, or 1 if `c` is not valid.

This function can be used to scan faulty UTF-8 sequences, albeit ignoring invalid codes.

See also

[fl_utf8len](#)

30.11.3.27 `fl_utf8locale()`

```
int fl_utf8locale (
    void )
```

Return true if the "locale" seems to indicate that UTF-8 encoding is used. If true the `fl_utf8to_mb` and `fl_utf8from_mb` don't do anything useful.

It is highly recommended that you change your system so this does return true. On Windows this is done by setting the "codepage" to CP_UTF8. On Unix this is done by setting `$LC_CTYPE` to a string containing the letters "utf" or "UTF" in it, or by deleting all `$LC*` and `$LANG` environment variables. In the future it is likely that all non-Asian Unix systems will return true, due to the compatibility of UTF-8 with ISO-8859-1.

30.11.3.28 fl_utf8test()

```
int fl_utf8test (
    const char * src,
    unsigned srclen )
```

Examines the first `srclen` bytes in `src` and returns a verdict on whether it is UTF-8 or not.

- Returns 0 if there is any illegal UTF-8 sequences, using the same rules as [fl_utf8decode\(\)](#). Note that some UCS values considered illegal by RFC 3629, such as 0xffff, are considered legal by this.
- Returns 1 if there are only single-byte characters (ie no bytes have the high bit set). This is legal UTF-8, but also indicates plain ASCII. It also returns 1 if `srclen` is zero.
- Returns 2 if there are only characters less than 0x800.
- Returns 3 if there are only characters less than 0x10000.
- Returns 4 if there are characters in the 0x10000 to 0x10ffff range.

Because there are many illegal sequences in UTF-8, it is almost impossible for a string in another encoding to be confused with UTF-8. This is very useful for transitioning Unix to UTF-8 filenames, you can simply test each filename with this to decide if it is UTF-8 or in the locale encoding. My hope is that if this is done we will be able to cleanly transition to a locale-less encoding.

30.11.3.29 fl_utf8to_mb()

```
unsigned fl_utf8to_mb (
    const char * src,
    unsigned srclen,
    char * dst,
    unsigned dstlen )
```

Convert the UTF-8 used by FLTK to the locale-specific encoding used for filenames (and sometimes used for data in files). Unfortunately due to stupid design you will have to do this as needed for filenames. This is a bug on both Unix and Windows.

Up to `dstlen` bytes are written to `dst`, including a null terminator. The return value is the number of bytes that would be written, not counting the null terminator. If greater or equal to `dstlen` then if you malloc a new array of size `n+1` you will have the space needed for the entire string. If `dstlen` is zero then nothing is written and this call just measures the storage space needed.

If [fl_utf8locale\(\)](#) returns true then this does not change the data.

30.11.3.30 fl_utf8toa()

```
unsigned fl_utf8toa (
    const char * src,
    unsigned srclen,
    char * dst,
    unsigned dstlen )
```

Convert a UTF-8 sequence into an array of 1-byte characters.

If the UTF-8 decodes to a character greater than 0xff then it is replaced with '?'.

Errors in the UTF-8 sequence are converted as individual bytes, same as [fl_utf8decode\(\)](#) does. This allows ISO-8859-1 text mistakenly identified as UTF-8 to be printed correctly (and possibly CP1252 on Windows).

`src` points at the UTF-8 sequence, and `srclen` is the number of bytes to convert.

Up to `dstlen` bytes are written to `dst`, including a null terminator. The return value is the number of bytes that would be written, not counting the null terminator. If greater or equal to `dstlen` then if you malloc a new array of size `n+1` you will have the space needed for the entire string. If `dstlen` is zero then nothing is written and this call just measures the storage space needed.

30.11.3.31 fl_utf8toUtf16()

```
unsigned fl_utf8toUtf16 (
    const char * src,
```

```

    unsigned srclen,
    unsigned short * dst,
    unsigned dstlen )

```

Convert a UTF-8 sequence into an array of 16-bit characters. These are used by some system calls, especially on Windows.

`src` points at the UTF-8, and `srclen` is the number of bytes to convert.

`dst` points at an array to write, and `dstlen` is the number of locations in this array. At most `dstlen-1` words will be written there, plus a 0 terminating word. Thus this function will never overwrite the buffer and will always return a zero-terminated string. If `dstlen` is zero then `dst` can be null and no data is written, but the length is returned. The return value is the number of 16-bit words that *would* be written to `dst` if it were long enough, not counting the terminating zero. If the return value is greater or equal to `dstlen` it indicates truncation, you can then allocate a new array of size `return+1` and call this again.

Errors in the UTF-8 are converted as though each byte in the erroneous string is in the Microsoft CP1252 encoding. This allows ISO-8859-1 text mistakenly identified as UTF-8 to be printed correctly.

Unicode characters in the range 0x10000 to 0x10ffff are converted to "surrogate pairs" which take two words each (this is called UTF-16 encoding).

30.11.3.32 fl_utf8towc()

```

unsigned fl_utf8towc (
    const char * src,
    unsigned srclen,
    wchar_t * dst,
    unsigned dstlen )

```

Converts a UTF-8 string into a wide character string.

This function generates 32-bit `wchar_t` (e.g. "ucs4" as it were) except on Windows where it is equivalent to `fl_utf8toUtf16` and returns UTF-16.

`src` points at the UTF-8, and `srclen` is the number of bytes to convert.

`dst` points at an array to write, and `dstlen` is the number of locations in this array. At most `dstlen-1` `wchar_t` will be written there, plus a 0 terminating `wchar_t`.

The return value is the number of `wchar_t` that *would* be written to `dst` if it were long enough, not counting the terminating zero. If the return value is greater or equal to `dstlen` it indicates truncation, you can then allocate a new array of size `return+1` and call this again.

Notice that `sizeof(wchar_t)` is 2 on Windows and is 4 on Linux and most other systems. Where `wchar_t` is 16 bits, Unicode characters in the range 0x10000 to 0x10ffff are converted to "surrogate pairs" which take two words each (this is called UTF-16 encoding). If `wchar_t` is 32 bits this rather nasty problem is avoided.

Note that Windows includes Cygwin, i.e. compiled with Cygwin's POSIX layer (`cygwin1.dll`, `-enable-cygwin`), either native (GDI) or X11.

30.11.3.33 fl_utf_strcasecmp()

```

int fl_utf_strcasecmp (
    const char * s1,
    const char * s2 )

```

UTF-8 aware `strcasecmp` - converts to Unicode and tests.

Returns

result of comparison

Return values

0	if the strings are equal
1	if s1 is greater than s2
-1	if s1 is less than s2

30.11.3.34 fl_utf_strncasecmp()

```
int fl_utf_strncasecmp (
    const char * s1,
    const char * s2,
    int n )
```

UTF-8 aware strncasecmp - converts to lower case Unicode and tests.

Parameters

<i>s1,s2</i>	the UTF-8 strings to compare
<i>n</i>	the maximum number of UTF-8 characters to compare

Returns

result of comparison

Return values

<i>0</i>	if the strings are equal
<i>>0</i>	if s1 is greater than s2
<i><0</i>	if s1 is less than s2

30.11.3.35 fl_utf_tolower()

```
int fl_utf_tolower (
    const unsigned char * str,
    int len,
    char * buf )
```

Converts the string *str* to its lower case equivalent into *buf*.

Warning: to be safe *buf* length must be at least $3 * len$ [for 16-bit Unicode]

30.11.3.36 fl_utf_toupper()

```
int fl_utf_toupper (
    const unsigned char * str,
    int len,
    char * buf )
```

Converts the string *str* to its upper case equivalent into *buf*.

Warning: to be safe *buf* length must be at least $3 * len$ [for 16-bit Unicode]

30.11.3.37 fl_wcwidth()

```
int fl_wcwidth (
    const char * src )
```

extended wrapper around [fl_wcwidth_\(unsigned int ucs\)](#) function.

Parameters

<i>in</i>	<i>src</i>	pointer to start of UTF-8 byte sequence
-----------	------------	---

Returns

width of character in columns

Depending on build options, this function may map C1 control characters (0x80 to 0x9f) to CP1252, and return the width of that character instead. This is not the same behaviour as `fl_wcwidth_(unsigned int ucs)`.

Note that other control characters and DEL will still return -1, so if you want different behaviour, you need to test for those characters before calling `fl_wcwidth_()`, and handle them separately.

30.11.3.38 fl_wcwidth_()

```
int fl_wcwidth_ (
    unsigned int ucs )
```

wrapper to adapt Markus Kuhn's implementation of `wcwidth()` for FLTK

Parameters

in	<i>ucs</i>	Unicode character value
----	------------	-------------------------

Returns

width of character in columns

See <http://www.cl.cam.ac.uk/~mgk25/ucs/wcwidth.c> for Markus Kuhn's original implementation of `wcwidth()` and `wcswidth()` (defined in IEEE Std 1002.1-2001) for Unicode.

WARNING: this function returns widths for "raw" Unicode characters. It does not even try to map C1 control characters (0x80 to 0x9F) to CP1252, and C0/C1 control characters and DEL will return -1. You are advised to use `fl_width(const char* src)` instead.

30.12 Mac OS X-specific symbols

Mac OS X-specific symbols declared in `<FL/x.H>` or `<FL/gl.h>`

Classes

- class `Fl_Mac_App_Menu`
Mac OS-specific class allowing to customize and localize the application menu.

Functions

- void `fl_mac_set_about` (`Fl_Callback *`*cb*, `void *`*user_data*, `int` *shortcut*=0)
Attaches a callback to the "About myprog" item of the system application menu.
- void `fl_open_callback` (`void(*cb)(const char *)`)
Register a function called for each file dropped onto an application icon.
- void `gl_texture_pile_height` (`int` *max*)
Changes the height of the pile of pre-computed string textures.
- `int` `gl_texture_pile_height` (`void`)
Returns the current height of the pile of pre-computed string textures.

Variables

- `int` `fl_mac_os_version`
The version number of the running Mac OS X (e.g., 100604 for 10.6.4)
- `int` `fl_mac_quit_early`
Determines whether cmd-Q or the "Quit xxx" item of application menu terminates the app or only the event loop.
- class `Fl_Sys_Menu_Bar * fl_sys_menu_bar`
The system menu bar.

30.12.1 Detailed Description

Mac OS X-specific symbols declared in `<FL/x.H>` or `<FL/gl.h>`

See also

[The Apple OS X Interface](#)

30.12.2 Function Documentation

30.12.2.1 `fl_mac_set_about()`

```
void fl_mac_set_about (
    Fl_Callback * cb,
    void * user_data,
    int shortcut = 0 )
```

Attaches a callback to the "About myprog" item of the system application menu.

Parameters

<i>cb</i>	a callback that will be called by "About myprog" menu item with NULL 1st argument.
<i>user_data</i>	a pointer transmitted as 2nd argument to the callback.
<i>shortcut</i>	optional shortcut to attach to the "About myprog" menu item (e.g., FL_META+'a')

30.12.2.2 `fl_open_callback()`

```
void fl_open_callback (
    void(*) (const char *) cb )
```

Register a function called for each file dropped onto an application icon.

cb will be called with a single Unix-style file name and path. If multiple files were dropped, *cb* will be called multiple times.

30.12.2.3 `gl_texture_pile_height()` [1/2]

```
void gl_texture_pile_height (
    int max )
```

Changes the height of the pile of pre-computed string textures.

Strings that are often re-displayed can be processed much faster if this pile is set high enough to hold all of them.

Parameters

<i>max</i>	Height of the texture pile
------------	----------------------------

30.12.2.4 `gl_texture_pile_height()` [2/2]

```
int gl_texture_pile_height (
    void )
```

Returns the current height of the pile of pre-computed string textures.

The default value is 100

30.12.3 Variable Documentation

30.12.3.1 fl_mac_quit_early

```
int fl_mac_quit_early [extern]
```

Determines whether cmd-Q or the "Quit xxx" item of application menu terminates the app or only the event loop. By default, `fl_mac_quit_early = 1`, and cmd-Q or "Quit xxx" terminate the app when all windows are closed without `Fl::run()` returning. If `fl_mac_quit_early` is set to 0, cmd-Q or "Quit xxx" terminate only the event loop when all windows are closed, and `Fl::run()` returns.

Note

This OS-specific variable will not be part of the API of FLTK 1.4.

30.13 Common Dialogs classes and functions

Classes

- class `Fl_Color_Chooser`
The `Fl_Color_Chooser` widget provides a standard RGB color chooser.
- class `Fl_File_Chooser`
The `Fl_File_Chooser` widget displays a standard file selection dialog that supports various selection modes.

Functions

- void `fl_alert` (const char *fmt,...)
Shows an alert message dialog box.
- int `fl_ask` (const char *fmt,...)
Shows a dialog displaying the `fmt` message, this dialog features 2 yes/no buttons.
- void `fl_beep` (int type)
Emits a system beep message.
- int `fl_choice` (const char *fmt, const char *b0, const char *b1, const char *b2,...)
Shows a dialog displaying the printf style `fmt` message, this dialog features up to 3 customizable choice buttons.
- int `fl_choice_n` (const char *fmt, const char *b0, const char *b1, const char *b2,...)
Like `fl_choice()` but with extended (negative) return values.
- int `fl_color_chooser` (const char *name, double &r, double &g, double &b, int cmode)
Pops up a window to let the user pick an arbitrary RGB color.
- int `fl_color_chooser` (const char *name, uchar &r, uchar &g, uchar &b, int cmode)
Pops up a window to let the user pick an arbitrary RGB color.
- char * `fl_dir_chooser` (const char *message, const char *fname, int relative)
Shows a file chooser dialog and gets a directory.
- char * `fl_file_chooser` (const char *message, const char *pat, const char *fname, int relative)
Shows a file chooser dialog and gets a filename.
- void `fl_file_chooser_callback` (void(*cb)(const char *))
Set the file chooser callback.
- void `fl_file_chooser_ok_label` (const char *l)
Set the "OK" button label.
- const char * `fl_input` (const char *fmt, const char *defstr,...)
Shows an input dialog displaying the `fmt` message.
- void `fl_message` (const char *fmt,...)
Shows an information message dialog box.
- void `fl_message_hotspot` (int enable)
Sets whether or not to move the common message box used in many common dialogs like `fl_message()`, `fl_alert()`, `fl_ask()`, `fl_choice()`, `fl_input()`, `fl_password()` to follow the mouse pointer.
- int `fl_message_hotspot` (void)

Gets whether or not to move the common message box used in many common dialogs like `fl_message()`, `fl_alert()`, `fl_ask()`, `fl_choice()`, `fl_input()`, `fl_password()` to follow the mouse pointer.

- `Fl_Widget * fl_message_icon ()`

Gets the `Fl_Box` icon container of the current default dialog used in many common dialogs like `fl_message()`, `fl_alert()`, `fl_ask()`, `fl_choice()`, `fl_input()`, `fl_password()`

- `void fl_message_title (const char *title)`

Sets the title of the dialog window used in many common dialogs.

- `void fl_message_title_default (const char *title)`

Sets the default title of the dialog window used in many common dialogs.

- `const char * fl_password (const char *fmt, const char *defstr,...)`

Shows an input dialog displaying the `fmt` message.

Variables

- `static void(* Fl::error)(const char *,...) = ::error`

FLTK calls `Fl::error()` to output a normal error message.

- `static void(* Fl::fatal)(const char *,...) = ::fatal`

FLTK calls `Fl::fatal()` to output a fatal error message.

- `const char * fl_cancel = "Cancel"`

string pointer used in common dialogs, you can change it to another language

- `const char * fl_close = "Close"`

string pointer used in common dialogs, you can change it to another language

- `const char * fl_no = "No"`

string pointer used in common dialogs, you can change it to another language

- `const char * fl_ok = "OK"`

string pointer used in common dialogs, you can change it to another language

- `const char * fl_yes = "Yes"`

string pointer used in common dialogs, you can change it to another language

- `static void(* Fl::warning)(const char *,...) = ::warning`

FLTK calls `Fl::warning()` to output a warning message.

30.13.1 Detailed Description

30.13.2 Function Documentation

30.13.2.1 `fl_alert()`

```
void fl_alert (
    const char * fmt,
    ... )
```

Shows an alert message dialog box.

Note

Common dialog boxes are application modal. No more than one common dialog box can be open at any time. Requests for additional dialog boxes are ignored.

```
#include <FL/fl_ask.H>
```

Parameters

<code>in</code>	<code>fmt</code>	can be used as an sprintf-like format and variables for the message text
-----------------	------------------	--

30.13.2.2 fl_ask()

```
int fl_ask (
    const char * fmt,
    ... )
```

Shows a dialog displaying the `fmt` message, this dialog features 2 yes/no buttons.

Note

Common dialog boxes are application modal. No more than one common dialog box can be open at any time. Requests for additional dialog boxes are ignored.

```
#include <FL/fl_ask.H>
```

Parameters

in	<code>fmt</code>	can be used as an sprintf-like format and variables for the message text
----	------------------	--

Return values

0	if the no button is selected or another dialog box is still open
1	if yes is selected

Deprecated `fl_ask()` is deprecated since it uses "Yes" and "No" for the buttons which does not conform to the current FLTK Human Interface Guidelines. Use `fl_choice()` with the appropriate verbs instead.

30.13.2.3 fl_beep()

```
void fl_beep (
    int type )
```

Emits a system beep message.

Parameters

in	<code>type</code>	The beep type from the <code>FL_Beep</code> enumeration.
----	-------------------	--

Note

```
#include <FL/fl_ask.H>
```

30.13.2.4 fl_choice()

```
int fl_choice (
    const char * fmt,
    const char * b0,
    const char * b1,
    const char * b2,
    ... )
```

Shows a dialog displaying the printf style `fmt` message, this dialog features up to 3 customizable choice buttons.

Note

Common dialog boxes are application modal. No more than one common dialog box can be open at any time. Requests for additional dialog boxes are ignored.

```
#include <FL/fl_ask.H>
```

Three choices with printf() style formatting:

```
int num_msgs = GetNumberOfMessages();
switch ( fl_choice("What to do with %d messages?", "Send", "Save", "Delete", num_msgs) ) {
  case 0: .. // Send
  case 1: .. // Save (default)
  case 2: .. // Delete
  ..
}
```

Three choice example:

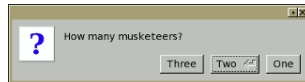


Figure 30.2 fl_choice() three choices

```
switch ( fl_choice("How many musketeers?", "One", "Two", "Three") ) {
  case 0: .. // One
  case 1: .. // Two (default)
  case 2: .. // Three
}
```

Two choice example:

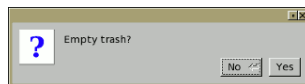


Figure 30.3 fl_choice() two choices

```
switch ( fl_choice("Empty trash?", "Yes", "No", 0) ) {
  case 0: .. // Yes
  case 1: .. // No (default)
}
```

One choice example:

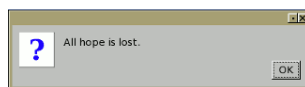


Figure 30.4 fl_choice() one choice

```
fl_choice("All hope is lost.", "OK", 0, 0); // "OK" default
```

Parameters

in	<i>fmt</i>	can be used as an sprintf-like format and variables for the message text
in	<i>b0</i>	text label of button 0
in	<i>b1</i>	text label of button 1 (can be 0)
in	<i>b2</i>	text label of button 2 (can be 0)

Return values

0	if the first button with <i>b0</i> text is pushed or another dialog box is still open
1	if the second button with <i>b1</i> text is pushed
2	if the third button with <i>b2</i> text is pushed

30.13.2.5 fl_choice_n()

```
int fl_choice_n (
    const char * fmt,
    const char * b0,
    const char * b1,
    const char * b2,
    ... )
```

Like [fl_choice\(\)](#) but with extended (negative) return values.

This function can return negative values as described below whereas [fl_choice\(\)](#) only returns "button values" (0, 1, 2).

With [fl_choice_n\(\)](#) you can arrange the buttons in a way that any button can be the standard "cancel" button because Escape and closing the window with the close button can be distinguished from button return codes.

Negative values are always "special" and should be considered like "cancel".

The special value `-3` means that the dialog was blocked (not executed).

Other than that both functions are the same.

See also

[fl_choice\(\)](#)

Since

1.3.8

Parameters

in	<i>fmt</i>	can be used as an sprintf-like format and variables for the message text
in	<i>b0</i>	text label of button 0
in	<i>b1</i>	text label of button 1 (can be 0)
in	<i>b2</i>	text label of button 2 (can be 0)

Return values

-3	if another dialog box is still open (the dialog was blocked)
-2	if the dialog window was closed by clicking the close button
-1	if the dialog was closed by hitting Escape
0	if the first button with <i>b0</i> text is pushed
1	if the second button with <i>b1</i> text is pushed
2	if the third button with <i>b2</i> text is pushed

30.13.2.6 fl_color_chooser() [1/2]

```
int fl_color_chooser (
    const char * name,
    double & r,
    double & g,
    double & b,
    int cmode ) [related]
```

Pops up a window to let the user pick an arbitrary RGB color.

Note

```
#include <FL/Fl_Color_Chooser.H>
```

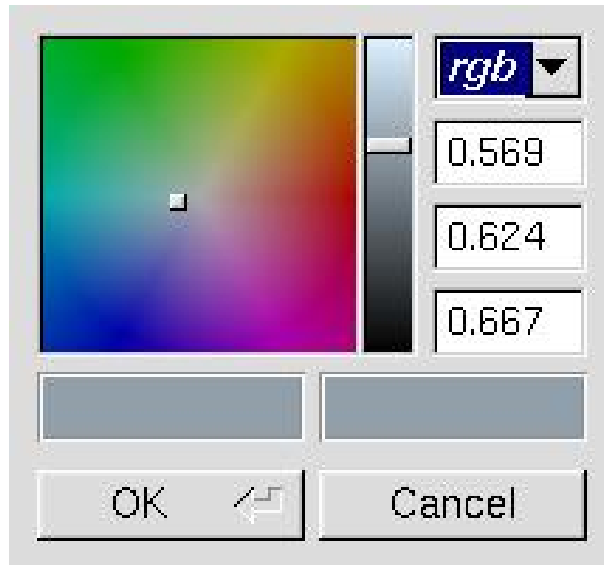


Figure 30.5 fl_color_chooser

Parameters

in	<i>name</i>	Title label for the window
in, out	<i>r,g,b</i>	Color components in the range 0.0 to 1.0.
in	<i>cmode</i>	Optional mode for color chooser. See mode(int) . Default -1 if none (rgb mode).

Return values

1	if user confirms the selection
0	if user cancels the dialog

30.13.2.7 fl_color_chooser() [2/2]

```
int fl_color_chooser (
    const char * name,
    uchar & r,
    uchar & g,
    uchar & b,
    int cmode ) [related]
```

Pops up a window to let the user pick an arbitrary RGB color.

Note

```
#include <FL/Fl_Color_Chooser.H>
```

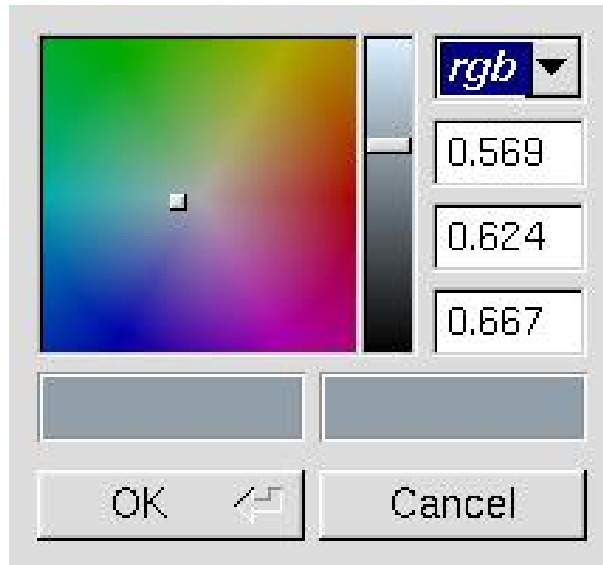


Figure 30.6 fl_color_chooser

Parameters

in	<i>name</i>	Title label for the window
in, out	<i>r,g,b</i>	Color components in the range 0 to 255.
in	<i>cmode</i>	Optional mode for color chooser. See mode(int) . Default -1 if none (rgb mode).

Return values

1	if user confirms the selection
0	if user cancels the dialog

30.13.2.8 fl_dir_chooser()

```
char * fl_dir_chooser (
    const char * message,
    const char * fname,
    int relative ) [related]
```

Shows a file chooser dialog and gets a directory.

Note

```
#include <FL/Fl_File_Chooser.H>
```

Parameters

in	<i>message</i>	title bar text
in	<i>fname</i>	initial/default directory name
in	<i>relative</i>	0 for absolute path return, relative otherwise

Returns

the directory path string chosen by the user or NULL if user cancels

30.13.2.9 fl_file_chooser()

```
char * fl_file_chooser (
    const char * message,
    const char * pat,
    const char * fname,
    int relative ) [related]
```

Shows a file chooser dialog and gets a filename.

Note

```
#include <FL/Fl_File_Chooser.H>
```

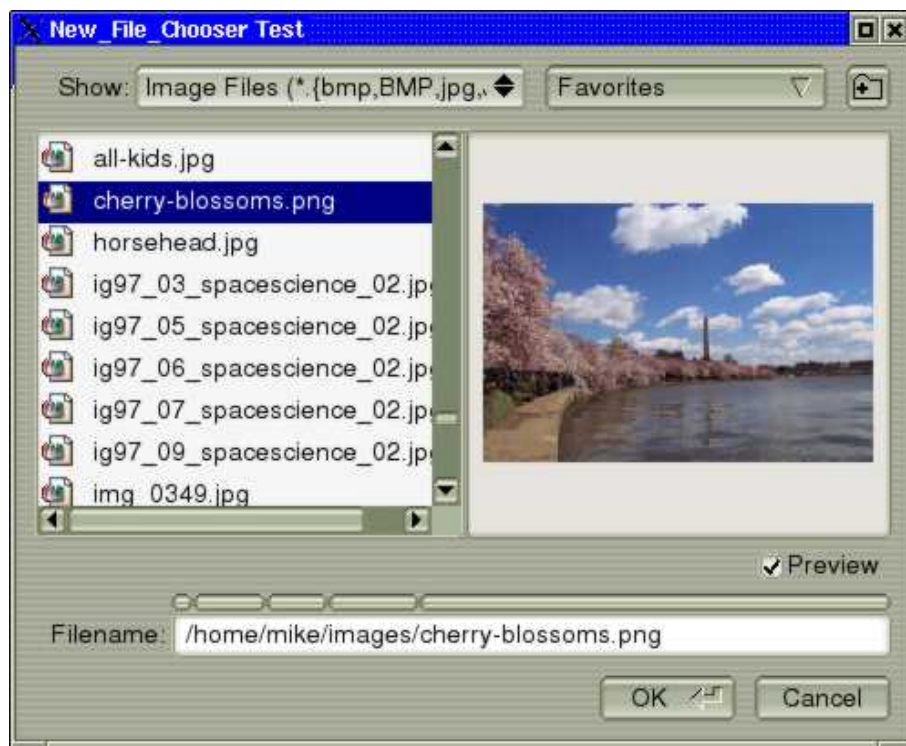


Figure 30.7 Fl_File_Chooser

Parameters

in	<i>message</i>	text in title bar
in	<i>pat</i>	filename pattern filter
in	<i>fname</i>	initial/default filename selection
in	<i>relative</i>	0 for absolute path name, relative path name otherwise

Returns

the user selected filename, in absolute or relative format or NULL if user cancels

30.13.2.10 fl_file_chooser_callback()

```
void fl_file_chooser_callback (
    void(*) (const char *) cb ) [related]
```

Set the file chooser callback.

Note

```
#include <FL/Fl_File_Chooser.H>
```

30.13.2.11 fl_file_chooser_ok_label()

```
void fl_file_chooser_ok_label (
    const char * l ) [related]
```

Set the "OK" button label.

Note

```
#include <FL/Fl_File_Chooser.H>
```

30.13.2.12 fl_input()

```
const char* fl_input (
    const char * fmt,
    const char * defstr,
    ... )
```

Shows an input dialog displaying the *fmt* message.

Note

Common dialog boxes are application modal. No more than one common dialog box can be open at any time. Requests for additional dialog boxes are ignored.

```
#include <FL/fl_ask.H>
```

Parameters

in	<i>fmt</i>	can be used as an sprintf-like format and variables for the message text
in	<i>defstr</i>	defines the default returned string if no text is entered

Returns

the user string input if OK was pushed, NULL if Cancel was pushed or another dialog box was still open

30.13.2.13 fl_message()

```
void fl_message (
    const char * fmt,
    ... )
```

Shows an information message dialog box.

Note

Common dialog boxes are application modal. No more than one common dialog box can be open at any time. Requests for additional dialog boxes are ignored.

```
#include <FL/fl_ask.H>
```

Parameters

<code>in</code>	<code>fmt</code>	can be used as an sprintf-like format and variables for the message text
-----------------	------------------	--

30.13.2.14 fl_message_hotspot() [1/2]

```
void fl_message_hotspot (
    int enable )
```

Sets whether or not to move the common message box used in many common dialogs like [fl_message\(\)](#), [fl_alert\(\)](#), [fl_ask\(\)](#), [fl_choice\(\)](#), [fl_input\(\)](#), [fl_password\(\)](#) to follow the mouse pointer.

The default is *enabled*, so that the default button is the hotspot and appears at the mouse position.

Note

```
#include <FL/fl_ask.H>
```

Parameters

<code>in</code>	<code>enable</code>	non-zero enables hotspot behavior, 0 disables hotspot
-----------------	---------------------	---

30.13.2.15 fl_message_hotspot() [2/2]

```
int fl_message_hotspot (
    void )
```

Gets whether or not to move the common message box used in many common dialogs like [fl_message\(\)](#), [fl_alert\(\)](#), [fl_ask\(\)](#), [fl_choice\(\)](#), [fl_input\(\)](#), [fl_password\(\)](#) to follow the mouse pointer.

Note

```
#include <FL/fl_ask.H>
```

Returns

0 if disable, non-zero otherwise

See also

[fl_message_hotspot\(int\)](#)

30.13.2.16 fl_message_icon()

```
Fl_Widget* fl_message_icon ( )
```

Gets the [Fl_Box](#) icon container of the current default dialog used in many common dialogs like [fl_message\(\)](#), [fl_alert\(\)](#), [fl_ask\(\)](#), [fl_choice\(\)](#), [fl_input\(\)](#), [fl_password\(\)](#)

Note

```
#include <FL/fl_ask.H>
```

30.13.2.17 fl_message_title()

```
void fl_message_title (
    const char * title )
```

Sets the title of the dialog window used in many common dialogs.

This window `title` will be used in the next call of one of the common dialogs like [fl_message\(\)](#), [fl_alert\(\)](#), [fl_ask\(\)](#), [fl_choice\(\)](#), [fl_input\(\)](#), [fl_password\(\)](#).

The `title` string is copied internally, so that you can use a local variable or free the string immediately after this call. It applies only to the **next** call of one of the common dialogs and will be reset to an empty title (the default for all dialogs) after that call.

Note

```
#include <FL/fl_ask.H>
```

Parameters

in	<i>title</i>	window label, string copied internally
----	--------------	--

30.13.2.18 fl_message_title_default()

```
void fl_message_title_default (
    const char * title )
```

Sets the default title of the dialog window used in many common dialogs.

This window `title` will be used in all subsequent calls of one of the common dialogs like [fl_message\(\)](#), [fl_alert\(\)](#), [fl_ask\(\)](#), [fl_choice\(\)](#), [fl_input\(\)](#), [fl_password\(\)](#), unless a specific title has been set with [fl_message_title\(const char *title\)](#).

The default is no title. You can override the default title for a single dialog with [fl_message_title\(const char *title\)](#).

The `title` string is copied internally, so that you can use a local variable or free the string immediately after this call.

Note

```
#include <FL/fl_ask.H>
```

Parameters

in	<i>title</i>	default window label, string copied internally
----	--------------	--

30.13.2.19 fl_password()

```
const char* fl_password (
    const char * fmt,
    const char * defstr,
    ... )
```

Shows an input dialog displaying the `fmt` message.

Like [fl_input\(\)](#) except the input text is not shown, '*' characters are displayed instead.

Note

Common dialog boxes are application modal. No more than one common dialog box can be open at any time. Requests for additional dialog boxes are ignored.

```
#include <FL/fl_ask.H>
```


Parameters

in	<i>fmt</i>	can be used as an sprintf-like format and variables for the message text
in	<i>defstr</i>	defines the default returned string if no text is entered

Returns

the user string input if OK was pushed, NULL if Cancel was pushed or another dialog box was still open

30.13.3 Variable Documentation

30.13.3.1 error

```
void(* Fl::error)(const char *format,...) = ::error [static]
```

FLTK calls [Fl::error\(\)](#) to output a normal error message.

The default version on Windows displays the error message in a MessageBox window.

The default version on all other platforms prints the error message to stderr.

You can override the behavior by setting the function pointer to your own routine.

[Fl::error\(\)](#) means there is a recoverable error such as the inability to read an image file. The default implementation returns after displaying the message.

Note

```
#include <FL/Fl.H>
```

30.13.3.2 fatal

```
void(* Fl::fatal)(const char *format,...) = ::fatal [static]
```

FLTK calls [Fl::fatal\(\)](#) to output a fatal error message.

The default version on Windows displays the error message in a MessageBox window.

The default version on all other platforms prints the error message to stderr.

You can override the behavior by setting the function pointer to your own routine.

[Fl::fatal\(\)](#) must not return, as FLTK is in an unusable state, however your version may be able to use longjmp or an exception to continue, as long as it does not call FLTK again. The default implementation exits with status 1 after displaying the message.

Note

```
#include <FL/Fl.H>
```

30.13.3.3 warning

```
void(* Fl::warning)(const char *format,...) = ::warning [static]
```

FLTK calls [Fl::warning\(\)](#) to output a warning message.

The default version on Windows returns *without* printing a warning message, because Windows programs normally don't have stderr (a console window) enabled.

The default version on all other platforms prints the warning message to stderr.

You can override the behavior by setting the function pointer to your own routine.

[Fl::warning\(\)](#) means that there was a recoverable problem, the display may be messed up, but the user can probably keep working - all X protocol errors call this, for example. The default implementation returns after displaying the message.

Note

```
#include <FL/Fl.H>
```

30.14 File names and URI utility functions

File names and URI functions defined in [<FL/filename.H>](#)

Macros

- `#define fl_dirent_h_cyclic_include`
- `#define FL_PATH_MAX 2048`
all path buffers should use this length

Typedefs

- typedef int() [Fl_File_Sort_F](#)(struct dirent **, struct dirent **)
File sorting function.

Functions

- FL_EXPORT void [fl_decode_uri](#) (char *uri)
Decodes a URL-encoded string.
- FL_EXPORT int [fl_filename_absolute](#) (char *to, int tolen, const char *from)
Makes a filename absolute from a relative filename.
- FL_EXPORT int [fl_filename_expand](#) (char *to, int tolen, const char *from)
Expands a filename containing shell variables and tilde (~).
- FL_EXPORT const char * [fl_filename_ext](#) (const char *buf)
Gets the extensions of a filename.
- FL_EXPORT void [fl_filename_free_list](#) (struct dirent ***l, int n)
Free the list of filenames that is generated by [fl_filename_list\(\)](#).
- FL_EXPORT int [fl_filename_isdir](#) (const char *name)
Determines if a file exists and is a directory from its filename.
- FL_EXPORT int [fl_filename_list](#) (const char *d, struct dirent ***l, [Fl_File_Sort_F](#) *s=fl_numericsort)
Portable and const-correct wrapper for the `scandir()` function.
- FL_EXPORT int [fl_filename_match](#) (const char *name, const char *pattern)
Checks if a string `s` matches a pattern `p`.
- FL_EXPORT const char * [fl_filename_name](#) (const char *filename)
Gets the file name from a path.
- FL_EXPORT int [fl_filename_relative](#) (char *to, int tolen, const char *from)
Makes a filename relative to the current working directory.
- FL_EXPORT char * [fl_filename_setext](#) (char *to, int tolen, const char *ext)
Replaces the extension in `buf` of `max`.
- FL_EXPORT int [fl_open_uri](#) (const char *uri, char *msg, int msglen)
Opens the specified Uniform Resource Identifier (URI).

30.14.1 Detailed Description

File names and URI functions defined in [<FL/filename.H>](#)

30.14.2 Typedef Documentation

30.14.2.1 Fl_File_Sort_F

```
typedef int() Fl_File_Sort_F(struct dirent **, struct dirent **)
File sorting function.
```

See also

[fl_filename_list\(\)](#)

30.14.3 Function Documentation

30.14.3.1 fl_decode_uri()

```
void fl_decode_uri (
    char * uri )
```

Decodes a URL-encoded string.

In a Uniform Resource Identifier (URI), all non-ASCII bytes and several others (e.g., '<', '"', ''') are URL-encoded using 3 bytes by "%XY" where XY is the hexadecimal value of the byte. This function decodes the URI restoring its original UTF-8 encoded content. Decoding is done in-place.

30.14.3.2 fl_filename_absolute()

```
FL_EXPORT int fl_filename_absolute (
    char * to,
    int tolen,
    const char * from )
```

Makes a filename absolute from a relative filename.

```
#include <FL/filename.H>
[.]
chdir("/var/tmp");
fl_filename_absolute(out, sizeof(out), "foo.txt");           // out="/var/tmp/foo.txt"
fl_filename_absolute(out, sizeof(out), "./foo.txt");        // out="/var/tmp/foo.txt"
fl_filename_absolute(out, sizeof(out), "../log/messages"); // out="/var/log/messages"
```

Parameters

out	to	resulting absolute filename
in	tolen	size of the absolute filename buffer
in	from	relative filename

Returns

0 if no change, non zero otherwise

30.14.3.3 fl_filename_expand()

```
FL_EXPORT int fl_filename_expand (
    char * to,
    int tolen,
    const char * from )
```

Expands a filename containing shell variables and tilde (~).

Currently handles these variants:

```
"~username"           // if 'username' does not exist, result will be unchanged
"~/file"
"$VARNAME"           // does NOT handle ${VARNAME}
```

Examples:

```
#include <FL/filename.H>
[.]
putenv("TMPDIR=/var/tmp");
fl_filename_expand(out, sizeof(out), "~/fred.cshrc");       // out="/usr/fred.cshrc"
fl_filename_expand(out, sizeof(out), "~/cshrc");           // out="/usr/<yourname>.cshrc"
```

```
fl_filename_expand(out, sizeof(out), "$TMPDIR/foo.txt"); // out="/var/tmp/foo.txt"
```

Parameters

out	<i>to</i>	resulting expanded filename
in	<i>toLen</i>	size of the expanded filename buffer
in	<i>from</i>	filename containing shell variables

Returns

0 if no change, non zero otherwise

30.14.3.4 `fl_filename_ext()`

```
FL_EXPORT const char* fl_filename_ext (
    const char * buf )
```

Gets the extensions of a filename.

```
#include <FL/filename.H>
[...
const char *out;
out = fl_filename_ext("/some/path/foo.txt");           // result: ".txt"
out = fl_filename_ext("/some/path/foo");             // result: NULL
```

Parameters

in	<i>buf</i>	the filename to be parsed
----	------------	---------------------------

Returns

a pointer to the extension (including '.') if any or NULL otherwise

30.14.3.5 `fl_filename_free_list()`

```
FL_EXPORT void fl_filename_free_list (
    struct dirent *** list,
    int n )
```

Free the list of filenames that is generated by `fl_filename_list()`.

Free everything that was allocated by a previous call to `fl_filename_list()`. Use the return values as parameters for this function.

Parameters

in, out	<i>list</i>	table containing the resulting directory listing
in	<i>n</i>	number of entries in the list

30.14.3.6 `fl_filename_isdir()`

```
FL_EXPORT int fl_filename_isdir (
    const char * n )
```

Determines if a file exists and is a directory from its filename.

```
#include <FL/filename.H>
[...
fl_filename_isdir("/etc");           // returns non-zero
fl_filename_isdir("/etc/hosts");    // returns 0
```

Parameters

in	<i>n</i>	the filename to parse
----	----------	-----------------------

Returns

non zero if file exists and is a directory, zero otherwise

30.14.3.7 fl_filename_list()

```
FL_EXPORT int fl_filename_list (
    const char * d,
    dirent *** list,
    Fl_File_Sort_F * sort )
```

Portable and const-correct wrapper for the scandir() function.

For each file in that directory a "dirent" structure is created. The only portable thing about a dirent is that dirent->d_name is the nul-terminated file name. An pointers array to these dirent's is created and a pointer to the array is returned in *list. The number of entries is given as a return value. If there is an error reading the directory a number less than zero is returned, and errno has the reason; errno does not work under WIN32.

Include:

```
#include <FL/filename.H>
```

Parameters

in	<i>d</i>	the name of the directory to list. It does not matter if it has a trailing slash.
out	<i>list</i>	table containing the resulting directory listing
in	<i>sort</i>	sorting functor: <ul style="list-style-type: none"> • <code>fl_alphasort</code>: The files are sorted in ascending alphabetical order; upper and lowercase letters are compared according to their ASCII ordering uppercase before lowercase. • <code>fl_casealphasort</code>: The files are sorted in ascending alphabetical order; upper and lowercase letters are compared equally case is not significant. • <code>fl_casenumERICsort</code>: The files are sorted in ascending "alphanumeric" order, where an attempt is made to put unpadding numbers in consecutive order; upper and lowercase letters are compared equally case is not significant. • <code>fl_numericSORT</code>: The files are sorted in ascending "alphanumeric" order, where an attempt is made to put unpadding numbers in consecutive order; upper and lowercase letters are compared according to their ASCII ordering - uppercase before lowercase.

Returns

the number of entries if no error, a negative value otherwise.

30.14.3.8 fl_filename_match()

```
FL_EXPORT int fl_filename_match (
    const char * s,
    const char * p )
```

Checks if a string *s* matches a pattern *p*.

The following syntax is used for the pattern:

- `*` matches any sequence of 0 or more characters.
- `?` matches any single character.
- `[set]` matches any character in the set. Set can contain any single characters, or a-z to represent a range. To match `]` or `-` they must be the first characters. To match `^` or `!` they must not be the first characters.
- `[^set]` or `[!set]` matches any character not in the set.

- {X|Y|Z} or {X,Y,Z} matches any one of the subexpressions literally.
- \x quotes the character x so it has no special meaning.
- x all other characters must be matched exactly.

Include:

```
#include <FL/filename.H>
```

Parameters

in	<i>s</i>	the string to check for a match
in	<i>p</i>	the string pattern

Returns

non zero if the string matches the pattern

30.14.3.9 fl_filename_name()

```
FL_EXPORT const char* fl_filename_name (
    const char * filename )
```

Gets the file name from a path.

Similar to `basename(3)`, exceptions shown below.

```
#include <FL/filename.H>
[.]
const char *out;
out = fl_filename_name("/usr/lib");      // out="lib"
out = fl_filename_name("/usr/");        // out=""      (basename(3) returns "usr" instead)
out = fl_filename_name("/usr");        // out="usr"
out = fl_filename_name("/");           // out=""      (basename(3) returns "/" instead)
out = fl_filename_name(".");           // out="."
out = fl_filename_name("..");          // out=".."
```

Returns

a pointer to the char after the last slash, or to `filename` if there is none.

30.14.3.10 fl_filename_relative()

```
FL_EXPORT int fl_filename_relative (
    char * to,
    int tolen,
    const char * from )
```

Makes a filename relative to the current working directory.

```
#include <FL/filename.H>
[.]
chdir("/var/tmp/somedir");           // set cwd to /var/tmp/somedir
[.]
char out[FL_PATH_MAX];
fl_filename_relative(out, sizeof(out), "/var/tmp/somedir/foo.txt"); // out="foo.txt", return=1
fl_filename_relative(out, sizeof(out), "/var/tmp/foo.txt");         // out="../foo.txt", return=1
fl_filename_relative(out, sizeof(out), "foo.txt");                   // out="foo.txt", return=0 (no
change)
fl_filename_relative(out, sizeof(out), "../foo.txt");               // out="../foo.txt", return=0 (no
change)
fl_filename_relative(out, sizeof(out), "../foo.txt");               // out="../foo.txt", return=0 (no
change)
```

Parameters

out	<i>to</i>	resulting relative filename
in	<i>tolen</i>	size of the relative filename buffer
in	<i>from</i>	absolute filename

Returns

0 if no change, non zero otherwise

30.14.3.11 fl_filename_setext()

```
FL_EXPORT char* fl_filename_setext (
    char * buf,
    int buflen,
    const char * ext )
```

Replaces the extension in *buf* of max.

size *buflen* with the extension in *ext*.

If there's no '.' in *buf*, *ext* is appended.

If *ext* is NULL, behaves as if it were an empty string ("").

Example

```
#include <FL/filename.H>
[.]
char buf[FL_PATH_MAX] = "/path/myfile.cxx";
fl_filename_setext(buf, sizeof(buf), ".txt"); // buf[] becomes "/path/myfile.txt"
```

Returns

buf itself for calling convenience.

30.14.3.12 fl_open_uri()

```
int fl_open_uri (
    const char * uri,
    char * msg,
    int msglen )
```

Opens the specified Uniform Resource Identifier (URI).

Uses an operating-system dependent program or interface. For URIs using the "ftp", "http", or "https" schemes, the system default web browser is used to open the URI, while "mailto" and "news" URIs are typically opened using the system default mail reader and "file" URIs are opened using the file system navigator.

On success, the (optional) *msg* buffer is filled with the command that was run to open the URI; on Windows, this will always be "open uri".

On failure, the *msg* buffer is filled with an English error message.

Note**Platform Specific Issues: Windows**

With "file:" based URIs on Windows, you may encounter issues with anchors being ignored. Example: "file://c:/some/index.html#anchor" may open in the browser without the "#anchor" suffix. The behavior seems to vary across different Windows versions. Workaround: open a link to a separate html file that redirects to the desired "file:" URI.

Example

```
#include <FL/filename.H>
[.]
char errmsg[512];
if ( !fl_open_uri("http://google.com/", errmsg, sizeof(errmsg)) ) {
    char warnmsg[768];
    sprintf(warnmsg, "Error: %s", errmsg);
    fl_alert(warnmsg);
}
```

Parameters

<i>uri</i>	The URI to open
<i>msg</i>	Optional buffer which contains the command or error message
<i>msglen</i>	Length of optional buffer

Returns

1 on success, 0 on failure

Chapter 31

Class Documentation

31.1 FI_Preferences::Entry Struct Reference

Public Attributes

- char * **name**
- char * **value**

The documentation for this struct was generated from the following file:

- FI_Preferences.H

31.2 FI Class Reference

The **FI** is the FLTK global (static) class containing state information and global methods for the current application.
`#include <Fl.H>`

Public Types

- enum **FI_Option** {
 OPTION_ARROW_FOCUS = 0, **OPTION_VISIBLE_FOCUS**, **OPTION_DND_TEXT**, **OPTION_SHOW_TOOLTIPS**,
 OPTION_FNFC_USES_GTK, **OPTION_LAST** }

Enumerator for global FLTK options.

Static Public Member Functions

- static int **abi_check** (const int val=**FL_ABI_VERSION**)
Returns whether the runtime library ABI version is correct.
- static int **abi_version** ()
*Returns the compiled-in value of the **FL_ABI_VERSION** constant.*
- static int **add_awake_handler_** (**FI_Awake_Handler**, void *)
*Adds an awake handler for use in **awake()**.*
- static void **add_check** (**FI_Timeout_Handler**, void **=0)
FLTK will call this callback just before it flushes the display and waits for events.
- static void **add_clipboard_notify** (**FI_Clipboard_Notify_Handler** h, void *data=0)
FLTK will call the registered callback whenever there is a change to the selection buffer or the clipboard.
- static void **add_fd** (int fd, **FI_FD_Handler** cb, void **=0)
*See void **add_fd**(int fd, int when, **FI_FD_Handler** cb, void* = 0)*
- static void **add_fd** (int fd, int when, **FI_FD_Handler** cb, void **=0)
Adds file descriptor fd to listen to.
- static void **add_handler** (**FI_Event_Handler** h)

- Install a function to parse unrecognized events.*

 - static void `add_idle` (`FI_Idle_Handler` cb, void *data=0)

Adds a callback function that is called every time by `Fl::wait()` and also makes it act as though the timeout is zero (this makes `Fl::wait()` return immediately, so if it is in a loop it is called repeatedly, and thus the idle function is called repeatedly).
 - static void `add_system_handler` (`FI_System_Handler` h, void *data)

Install a function to intercept system events.
 - static void `add_timeout` (double t, `FI_Timeout_Handler`, void *=0)

Adds a one-shot timeout callback.
 - static int `api_version` ()

Returns the compiled-in value of the `FL_API_VERSION` constant.
 - static int `arg` (int argc, char **argv, int &i)

Parse a single switch from `argv`, starting at word `i`.
 - static void `args` (int argc, char **argv)

Parse all command line switches matching standard FLTK options only.
 - static int `args` (int argc, char **argv, int &i, `FI_Args_Handler` cb=0)

Parse command line switches using the `cb` argument handler.
 - static int `awake` (`FI_Awake_Handler` cb, void *message=0)

See void `awake(void message=0)`.*
 - static void `awake` (void *message=0)

Sends a message pointer to the main thread, causing any pending `Fl::wait()` call to terminate so that the main thread can retrieve the message and any pending redraws can be processed.
 - static void `background` (`uchar`, `uchar`, `uchar`)

Changes `fl_color(FL_BACKGROUND_COLOR)` to the given color, and changes the gray ramp from 32 to 56 to black to white.
 - static void `background2` (`uchar`, `uchar`, `uchar`)

Changes the alternative background color.
 - static `Fl_Widget *` `belowmouse` ()

Gets the widget that is below the mouse.
 - static void `belowmouse` (`Fl_Widget *`)

Sets the widget that is below the mouse.
 - static `Fl_Color` `box_color` (`Fl_Color`)

Gets the drawing color to be used for the background of a box.
 - static int `box_dh` (`Fl_Boxtype`)

Returns the height offset for the given boxtype.
 - static int `box_dw` (`Fl_Boxtype`)

Returns the width offset for the given boxtype.
 - static int `box_dx` (`Fl_Boxtype`)

Returns the X offset for the given boxtype.
 - static int `box_dy` (`Fl_Boxtype`)

Returns the Y offset for the given boxtype.
 - static bool `cairo_autolink_context` ()

Gets the current autolink mode for cairo support.
 - static void `cairo_autolink_context` (bool alink)

when `FLTK_HAVE_CAIRO` is defined and `cairo_autolink_context()` is true, any current window dc is linked to a current cairo context.
 - static `cairo_t *` `cairo_cc` ()

Gets the current cairo context linked with a fltk window.
 - static void `cairo_cc` (`cairo_t *`c, bool own=false)

Sets the current cairo context to `c`.
 - static `cairo_t *` `cairo_make_current` (`Fl_Window *`w)

Provides a corresponding cairo context for window `wi`.

- static int `check` ()
Same as `Fl::wait(0)`.
- static void `clear_widget_pointer` (`Fl_Widget` const *w)
Clears a widget pointer in the watch list.
- static int `clipboard_contains` (const char *type)
Returns non 0 if the clipboard contains data matching `type`.
- static int `compose` (int &del)
Any text editing widget should call this for each `FL_KEYBOARD` event.
- static void `compose_reset` ()
If the user moves the cursor, be sure to call `Fl::compose_reset()`.
- static void `copy` (const char *stuff, int len, int destination=0, const char *type=`Fl::clipboard_plain_text`)
Copies the data pointed to by `stuff` to the selection buffer (`destination` is 0), the clipboard (`destination` is 1), or both (`destination` is 2).
- static int `damage` ()
If true then `flush()` will do something.
- static void `damage` (int d)
If true then `flush()` will do something.
- static void `default_atclose` (`Fl_Window` *, void *)
Default callback for window widgets.
- static void `delete_widget` (`Fl_Widget` *w)
Schedules a widget for deletion at the next call to the event loop.
- static void `disable_im` ()
Disables the system input methods facilities.
- static void `display` (const char *)
Sets the X display to use for all windows.
- static int `dnd` ()
Initiate a Drag And Drop operation.
- static int `dnd_text_ops` ()
Gets or sets whether drag and drop text operations are supported.
- static void `dnd_text_ops` (int v)
Gets or sets whether drag and drop text operations are supported.
- static void `do_widget_deletion` ()
Deletes widgets previously scheduled for deletion.
- static int `draw_box_active` ()
Determines if the currently drawn box is active or inactive.
- static void `enable_im` ()
Enables the system input methods facilities.
- static int `event` ()
Returns the last event that was processed.
- static int `event_alt` ()
Returns non-zero if the Alt key is pressed.
- static int `event_button` ()
Gets which particular mouse button caused the current event.
- static int `event_button1` ()
Returns non-zero if mouse button 1 is currently held down.
- static int `event_button2` ()
Returns non-zero if button 2 is currently held down.
- static int `event_button3` ()
Returns non-zero if button 3 is currently held down.
- static int `event_buttons` ()
Returns the mouse buttons state bits; if non-zero, then at least one button is pressed now.

- static int [event_clicks](#) ()
Returns non zero if we had a double click event.
- static void [event_clicks](#) (int i)
Manually sets the number returned by [Fl::event_clicks\(\)](#).
- static void * [event_clipboard](#) ()
During an [FL_PASTE](#) event of non-textual data, returns a pointer to the pasted data.
- static const char * [event_clipboard_type](#) ()
Returns the type of the pasted data during an [FL_PASTE](#) event.
- static int [event_command](#) ()
Returns non-zero if the [FL_COMMAND](#) key is pressed, either [FL_CTRL](#) or on OSX [FL_META](#).
- static int [event_ctrl](#) ()
Returns non-zero if the Control key is pressed.
- static [Fl_Event_Dispatch](#) [event_dispatch](#) ()
Return the current event dispatch function.
- static void [event_dispatch](#) ([Fl_Event_Dispatch](#) d)
Set a new event dispatch function.
- static int [event_dx](#) ()
Returns the current horizontal mouse scrolling associated with the [FL_MOUSEWHEEL](#) event.
- static int [event_dy](#) ()
Returns the current vertical mouse scrolling associated with the [FL_MOUSEWHEEL](#) event.
- static int [event_inside](#) (const [Fl_Widget](#) *)
Returns whether or not the mouse event is inside a given child widget.
- static int [event_inside](#) (int, int, int, int)
Returns whether or not the mouse event is inside the given rectangle.
- static int [event_is_click](#) ()
Returns non-zero if the mouse has not moved far enough and not enough time has passed since the last [FL_PUSH](#) or [FL_KEYBOARD](#) event for it to be considered a "drag" rather than a "click".
- static void [event_is_click](#) (int i)
Clears the value returned by [Fl::event_is_click\(\)](#).
- static int [event_key](#) ()
Gets which key on the keyboard was last pushed.
- static int [event_key](#) (int key)
Returns true if the given `key` was held down (or pressed) during the last event.
- static int [event_length](#) ()
Returns the length of the text in [Fl::event_text\(\)](#).
- static int [event_original_key](#) ()
Returns the keycode of the last key event, regardless of the NumLock state.
- static int [event_shift](#) ()
Returns non-zero if the Shift key is pressed.
- static int [event_state](#) ()
Returns the keyboard and mouse button states of the last event.
- static int [event_state](#) (int mask)
Returns non-zero if any of the passed event state bits are turned on.
- static const char * [event_text](#) ()
Returns the text associated with the current event, including [FL_PASTE](#) or [FL_DND_RELEASE](#) events.
- static int [event_x](#) ()
Returns the mouse position of the event relative to the [Fl_Window](#) it was passed to.
- static int [event_x_root](#) ()
Returns the mouse position on the screen of the event.
- static int [event_y](#) ()
Returns the mouse position of the event relative to the [Fl_Window](#) it was passed to.

- static int `event_y_root` ()
Returns the mouse position on the screen of the event.
- static `FI_Window * first_window` ()
Returns the first top-level window in the list of shown() windows.
- static void `first_window` (`FI_Window *`)
Sets the window that is returned by `first_window()`.
- static void `flush` ()
Causes all the windows that need it to be redrawn and graphics forced out through the pipes.
- static `FI_Widget * focus` ()
Gets the current `FI::focus()` widget.
- static void `focus` (`FI_Widget *`)
Sets the widget that will receive `FL_KEYBOARD` events.
- static void `foreground` (`uchar, uchar, uchar`)
Changes `fl_color(FL_FOREGROUND_COLOR)`.
- static void `free_color` (`FI_Color i, int overlay=0`)
Frees the specified color from the colormap, if applicable.
- static int `get_awake_handler_` (`FI_Awake_Handler &, void *&`)
Gets the last stored awake handler for use in `awake()`.
- static `FI_Box_Draw_F * get_boxtype` (`FI_Boxtype`)
Gets the current box drawing function for the specified box type.
- static unsigned `get_color` (`FI_Color i`)
Returns the RGB value(s) for the given FLTK color index.
- static void `get_color` (`FI_Color i, uchar &red, uchar &green, uchar &blue`)
Returns the RGB value(s) for the given FLTK color index.
- static const char * `get_font` (`FI_Font`)
Gets the string for this face.
- static const char * `get_font_name` (`FI_Font, int *attributes=0`)
Get a human-readable string describing the family of this face.
- static int `get_font_sizes` (`FI_Font, int *&sizep`)
Return an array of sizes in `sizep`.
- static int `get_key` (int `key`)
Returns true if the given `key` is held down now.
- static void `get_mouse` (int &, int &)
Return where the mouse is on the screen by doing a round-trip query to the server.
- static void `get_system_colors` ()
Read the user preference colors from the system and use them to call `FI::foreground()`, `FI::background()`, and `FI::background2()`.
- static int `gl_visual` (int, int *`alist=0`)
This does the same thing as `FI::visual(int)` but also requires OpenGL drawing to work.
- static `FI_Window * grab` ()
Returns the window that currently receives all events.
- static void `grab` (`FI_Window &win`)
See `grab(FI_Window)`*
- static void `grab` (`FI_Window *`)
Selects the window to grab.
- static int `h` ()
Returns the height in pixels of the main screen work area.
- static int `handle` (int, `FI_Window *`)
Handle events from the window system.
- static int `handle_` (int, `FI_Window *`)
Handle events from the window system.

- static int [has_check](#) ([FI_Timeout_Handler](#), void *=0)
Returns 1 if the check exists and has not been called yet, 0 otherwise.
- static int [has_idle](#) ([FI_Idle_Handler](#) cb, void *data=0)
Returns true if the specified idle callback is currently installed.
- static int [has_timeout](#) ([FI_Timeout_Handler](#), void *=0)
Returns true if the timeout exists and has not been called yet.
- static int [is_scheme](#) (const char *name)
Returns whether the current scheme is the given name.
- static int [lock](#) ()
The [lock\(\)](#) method blocks the current thread until it can safely access FLTK widgets and data.
- static [FI_Window](#) * [modal](#) ()
Returns the top-most [modal\(\)](#) window currently shown.
- static [FI_Window](#) * [next_window](#) (const [FI_Window](#) *)
Returns the next top-level window in the list of [shown\(\)](#) windows.
- static bool [option](#) ([FI_Option](#) opt)
FLTK library options management.
- static void [option](#) ([FI_Option](#) opt, bool val)
Override an option while the application is running.
- static void [own_colormap](#) ()
Makes FLTK use its [own colormap](#).
- static void [paste](#) ([FI_Widget](#) &receiver)
Backward compatibility only.
- static void [paste](#) ([FI_Widget](#) &receiver, int source, const char *type=[FI::clipboard_plain_text](#))
*Pastes the data from the selection buffer (*source is 0*) or the clipboard (*source is 1*) into receiver.*
- static [FI_Widget](#) * [pushed](#) ()
Gets the widget that is being pushed.
- static void [pushed](#) ([FI_Widget](#) *)
Sets the widget that is being pushed.
- static [FI_Widget](#) * [readqueue](#) ()
Reads the default callback queue and returns the first widget.
- static int [ready](#) ()
This is similar to [FI::check\(\)](#) except this does not call [FI::flush\(\)](#) or any callbacks, which is useful if your program is in a state where such callbacks are illegal.
- static void [redraw](#) ()
Redraws all widgets.
- static void [release](#) ()
Releases the current grabbed window, equals [grab\(0\)](#).
- static void [release_widget_pointer](#) ([FI_Widget](#) *&w)
Releases a widget pointer from the watch list.
- static int [reload_scheme](#) ()
Called by scheme according to scheme name.
- static void [remove_check](#) ([FI_Timeout_Handler](#), void *=0)
Removes a check callback.
- static void [remove_clipboard_notify](#) ([FI_Clipboard_Notify_Handler](#) h)
Stop calling the specified callback when there are changes to the selection buffer or the clipboard.
- static void [remove_fd](#) (int)
Removes a file descriptor handler.
- static void [remove_fd](#) (int, int when)
Removes a file descriptor handler.
- static void [remove_handler](#) ([FI_Event_Handler](#) h)
Removes a previously added event handler.

- static void `remove_idle` (`FI_Idle_Handler` cb, void *data=0)
Removes the specified idle callback, if it is installed.
- static void `remove_system_handler` (`FI_System_Handler` h)
Removes a previously added system event handler.
- static void `remove_timeout` (`FI_Timeout_Handler`, void *=0)
Removes a timeout callback.
- static void `repeat_timeout` (double t, `FI_Timeout_Handler`, void *=0)
Repeats a timeout callback from the expiration of the previous timeout, allowing for more accurate timing.
- static int `run` ()
As long as any windows are displayed this calls `FI::wait()` repeatedly.
- static const char * `scheme` ()
*See void `scheme(const char *name)`*
- static int `scheme` (const char *name)
Sets the current widget scheme.
- static int `screen_count` ()
Gets the number of available screens.
- static void `screen_dpi` (float &h, float &v, int n=0)
Gets the screen resolution in dots-per-inch for the given screen.
- static int `screen_num` (int x, int y)
Gets the screen number of a screen that contains the specified screen position x, y.
- static int `screen_num` (int x, int y, int w, int h)
Gets the screen number for the screen which intersects the most with the rectangle defined by x, y, w, h.
- static void `screen_work_area` (int &X, int &Y, int &W, int &H)
Gets the bounding box of the work area of the screen that contains the mouse pointer.
- static void `screen_work_area` (int &X, int &Y, int &W, int &H, int mx, int my)
Gets the bounding box of the work area of a screen that contains the specified screen position mx, my.
- static void `screen_work_area` (int &X, int &Y, int &W, int &H, int n)
Gets the bounding box of the work area of the given screen.
- static void `screen_xywh` (int &X, int &Y, int &W, int &H)
Gets the bounding box of a screen that contains the mouse pointer.
- static void `screen_xywh` (int &X, int &Y, int &W, int &H, int mx, int my)
Gets the bounding box of a screen that contains the specified screen position mx, my.
- static void `screen_xywh` (int &X, int &Y, int &W, int &H, int mx, int my, int mw, int mh)
Gets the screen bounding rect for the screen which intersects the most with the rectangle defined by mx, my, mw, mh.
- static void `screen_xywh` (int &X, int &Y, int &W, int &H, int n)
Gets the screen bounding rect for the given screen.
- static int `scrollbar_size` ()
Gets the default scrollbar size used by `FI_Browser_`, `FI_Help_View`, `FI_Scroll`, and `FI_Text_Display` widgets.
- static void `scrollbar_size` (int W)
Sets the default scrollbar size that is used by the `FI_Browser_`, `FI_Help_View`, `FI_Scroll`, and `FI_Text_Display` widgets.
- static void `selection` (`FI_Widget` &owner, const char *, int len)
Changes the current selection.
- static `FI_Widget` * `selection_owner` ()
back-compatibility only: Gets the widget owning the current selection
- static void `selection_owner` (`FI_Widget` *)
Back-compatibility only: The single-argument call can be used to move the selection to another widget or to set the owner to NULL, without changing the actual text of the selection.
- static void `set_abort` (`FI_Abort_Handler` f)
For back compatibility, sets the void `FI::fatal` handler callback.
- static void `set_atclose` (`FI_Atclose_Handler` f)

- For back compatibility, sets the `Fl::atclose` handler callback.*

 - static void `set_box_color` (`Fl_Color`)

Sets the drawing color for the box that is currently drawn.
- static void `set_boxtype` (`Fl_Boxtype`, `Fl_Box_Draw_F *`, `uchar`, `uchar`, `uchar`, `uchar`)

Sets the function to call to draw a specific boxtype.
- static void `set_boxtype` (`Fl_Boxtype`, `Fl_Boxtype` from)

Copies the from boxtype.
- static void `set_color` (`Fl_Color` i, unsigned c)

Sets an entry in the `fl_color` index table.
- static void `set_color` (`Fl_Color`, `uchar`, `uchar`, `uchar`)

Sets an entry in the `fl_color` index table.
- static void `set_font` (`Fl_Font`, const char *)

Changes a face.
- static void `set_font` (`Fl_Font`, `Fl_Font`)

Copies one face to another.
- static `Fl_Font` `set_fonts` (const char *=0)

FLTK will open the display, and add every fonts on the server to the face table.
- static void `set_idle` (`Fl_Old_Idle_Handler` cb)

Sets an idle callback.
- static void `set_labeltype` (`Fl_Labeltype`, `Fl_Label_Draw_F *`, `Fl_Label_Measure_F *`)

Sets the functions to call to draw and measure a specific labeltype.
- static void `set_labeltype` (`Fl_Labeltype`, `Fl_Labeltype` from)

Sets the functions to call to draw and measure a specific labeltype.
- static int `test_shortcut` (`Fl_Shortcut`)

Tests the current event, which must be an `FL_KEYBOARD` or `FL_SHORTCUT`, against a shortcut value (described in `Fl_Button`).
- static void * `thread_message` ()

The `thread_message()` method returns the last message that was sent from a child by the `awake()` method.
- static void `unlock` ()

The `unlock()` method releases the lock that was set using the `lock()` method.
- static int `use_high_res_GL` ()

returns whether GL windows should be drawn at high resolution on Apple computers with retina displays.
- static void `use_high_res_GL` (int val)

sets whether GL windows should be drawn at high resolution on Apple computers with retina displays
- static double `version` ()

Returns the compiled-in value of the `FL_VERSION` constant.
- static int `visible_focus` ()

Gets or sets the visible keyboard focus on buttons and other non-text widgets.
- static void `visible_focus` (int v)

Gets or sets the visible keyboard focus on buttons and other non-text widgets.
- static int `visual` (int)

Selects a visual so that your graphics are drawn correctly.
- static int `w` ()

Returns the width in pixels of the main screen work area.
- static int `wait` ()

Waits until "something happens" and then returns.
- static double `wait` (double time)

See int `Fl::wait()`
- static void `watch_widget_pointer` (`Fl_Widget *&w`)

Adds a widget pointer to the widget watch list.
- static int `x` ()

Returns the leftmost x coordinate of the main screen work area.
- static int `y` ()

Returns the topmost y coordinate of the main screen work area.

Static Public Attributes

- static void(* [atclose](#))(FI_Window *, void *)
Back compatibility: default window callback handler.
- static char const *const [clipboard_image](#) = "image"
Denotes image data.
- static char const *const [clipboard_plain_text](#) = "text/plain"
Denotes plain textual data.
- static void(* [error](#))(const char *,...) = ::error
FLTK calls [Fl::error\(\)](#) to output a normal error message.
- static void(* [fatal](#))(const char *,...) = ::fatal
FLTK calls [Fl::fatal\(\)](#) to output a fatal error message.
- static const char *const [help](#) = helpmsg+13
Usage string displayed if [Fl::args\(\)](#) detects an invalid argument.
- static void(* [idle](#))()
The currently executing idle callback function: DO NOT USE THIS DIRECTLY!
- static void(* [warning](#))(const char *,...) = ::warning
FLTK calls [Fl::warning\(\)](#) to output a warning message.

31.2.1 Detailed Description

The [Fl](#) is the FLTK global (static) class containing state information and global methods for the current application.

31.2.2 Member Enumeration Documentation

31.2.2.1 Fl_Option

enum [Fl::Fl_Option](#)

Enumerator for global FLTK options.

These options can be set system wide, per user, or for the running application only.

See also

[Fl::option\(Fl_Option, bool\)](#)

[Fl::option\(Fl_Option\)](#)

Enumerator

OPTION_ARROW_FOCUS	When switched on, moving the text cursor beyond the start or end of a text in a text widget will change focus to the next text widget. (This is considered 'old' behavior) When switched off (default), the cursor will stop at the end of the text. Pressing Tab or Ctrl-Tab will advance the keyboard focus. See also: Fl_Input::tab_nav()
OPTION_VISIBLE_FOCUS	If visible focus is switched on (default), FLTK will draw a dotted rectangle inside the widget that will receive the next keystroke. If switched off, no such indicator will be drawn and keyboard navigation is disabled.
OPTION_DND_TEXT	If text drag-and-drop is enabled (default), the user can select and drag text from any text widget. If disabled, no dragging is possible, however dropping text from other applications still works.
OPTION_SHOW_TOOLTIPS	If tooltips are enabled (default), hovering the mouse over a widget with a tooltip text will open a little tooltip window until the mouse leaves the widget. If disabled, no tooltip is shown.

Enumerator

OPTION_FNFC_USES_GTK	When switched on (default), Fl_Native_File_Chooser runs GTK file dialogs if the GTK library is available on the platform (linux/unix only). When switched off, GTK file dialogs aren't used even if the GTK library is available.
OPTION_LAST	For internal use only.

31.2.3 Member Function Documentation

31.2.3.1 `abi_check()`

```
static int Fl::abi_check (
    const int val = FL_ABI_VERSION ) [inline], [static]
```

Returns whether the runtime library ABI version is correct.

This enables you to check the ABI version of the linked FLTK library at runtime.

Returns 1 (true) if the compiled ABI version (in the header files) and the linked library ABI version (used at runtime) are the same, 0 (false) otherwise.

Argument `val` can be used to query a particular library ABI version. Use for instance 10303 to query if the runtime library is compatible with FLTK ABI version 1.3.3. This is rarely useful.

The default `val` argument is `FL_ABI_VERSION`, which checks the version defined at configure time (i.e. in the header files at program compilation time) against the linked library version used at runtime. This is particularly useful if you linked with a shared object library, but it also concerns static linking.

See also

[Fl::abi_version\(\)](#)

31.2.3.2 `abi_version()`

```
int Fl::abi_version ( ) [static]
```

Returns the compiled-in value of the `FL_ABI_VERSION` constant.

This is useful for checking the version of a shared library.

31.2.3.3 `add_check()`

```
void Fl::add_check (
    Fl_Timeout_Handler cb,
    void * argp = 0 ) [static]
```

FLTK will call this callback just before it flushes the display and waits for events.

This is different than an idle callback because it is only called once, then FLTK calls the system and tells it not to return until an event happens.

This can be used by code that wants to monitor the application's state, such as to keep a display up to date. The advantage of using a check callback is that it is called only when no events are pending. If events are coming in quickly, whole blocks of them will be processed before this is called once. This can save significant time and avoid the application falling behind the events.

Sample code:

```
bool state_changed; // anything that changes the display turns this on
void callback(void*) {
    if (!state_changed) return;
    state_changed = false;
    do_expensive_calculation();
    widget->redraw();
}
main() {
    Fl::add_check(callback);
    return Fl::run();
}
```

31.2.3.4 add_fd()

```
static void Fl::add_fd (
    int fd,
    int when,
    Fl_FD_Handler cb,
    void * = 0 ) [static]
```

Adds file descriptor `fd` to listen to.

When the `fd` becomes ready for reading `Fl::wait()` will call the callback and then return. The callback is passed the `fd` and the arbitrary `void*` argument.

The second version takes a `when` bitfield, with the bits `FL_READ`, `FL_WRITE`, and `FL_EXCEPT` defined, to indicate when the callback should be done.

There can only be one callback of each type for a file descriptor. `Fl::remove_fd()` gets rid of *all* the callbacks for a given file descriptor.

Under UNIX *any* file descriptor can be monitored (files, devices, pipes, sockets, etc.). Due to limitations in Microsoft Windows, WIN32 applications can only monitor sockets.

31.2.3.5 add_idle()

```
void Fl::add_idle (
    Fl_Idle_Handler cb,
    void * data = 0 ) [static]
```

Adds a callback function that is called every time by `Fl::wait()` and also makes it act as though the timeout is zero (this makes `Fl::wait()` return immediately, so if it is in a loop it is called repeatedly, and thus the idle function is called repeatedly).

The idle function can be used to get background processing done.

You can have multiple idle callbacks. To remove an idle callback use `Fl::remove_idle()`.

`Fl::wait()` and `Fl::check()` call idle callbacks, but `Fl::ready()` does not.

The idle callback can call any FLTK functions, including `Fl::wait()`, `Fl::check()`, and `Fl::ready()`.

FLTK will not recursively call the idle callback.

31.2.3.6 add_timeout()

```
void Fl::add_timeout (
    double t,
    Fl_Timeout_Handler cb,
    void * argp = 0 ) [static]
```

Adds a one-shot timeout callback.

The function will be called by `Fl::wait()` at `t` seconds after this function is called. The optional `void*` argument is passed to the callback.

You can have multiple timeout callbacks. To remove a timeout callback use `Fl::remove_timeout()`.

If you need more accurate, repeated timeouts, use `Fl::repeat_timeout()` to reschedule the subsequent timeouts.

The following code will print "TICK" each second on stdout with a fair degree of accuracy:

```
#include <stdio.h>
#include <FL/Fl.H>
#include <FL/Fl_Window.H>
void callback(void*) {
    printf("TICK\n");
    Fl::repeat_timeout(1.0, callback);    // retrigger timeout
}
int main() {
    Fl_Window win(100,100);
    win.show();
    Fl::add_timeout(1.0, callback);    // set up first timeout
    return Fl::run();
}
```

31.2.3.7 api_version()

```
int Fl::api_version ( ) [static]
```

Returns the compiled-in value of the `FL_API_VERSION` constant.

This is useful for checking the version of a shared library.

31.2.3.8 `arg()`

```
int Fl::arg (
    int argc,
    char ** argv,
    int & i ) [static]
```

Parse a single switch from `argv`, starting at word `i`.

Returns the number of words eaten (1 or 2, or 0 if it is not recognized) and adds the same value to `i`.

This is the default argument handler used internally by `Fl::args(...)`, but you can use this function if you prefer to step through the standard FLTK switches yourself.

All standard FLTK switches except `-bg2` may be abbreviated to just one letter and case is ignored:

- `-bg color` or `-background color`
Sets the background color using [Fl::background\(\)](#).
- `-bg2 color` or `-background2 color`
Sets the secondary background color using [Fl::background2\(\)](#).
- `-display host:n.n`
Sets the X display to use; this option is silently ignored under WIN32 and MacOS.
- `-dnd` and `-nodnd`
Enables or disables drag and drop text operations using [Fl::dnd_text_ops\(\)](#).
- `-fg color` or `-foreground color`
Sets the foreground color using [Fl::foreground\(\)](#).
- `-geometry WxH+X+Y`
Sets the initial window position and size according to the standard X geometry string.
- `-iconic`
Iconifies the window using [Fl_Window::iconize\(\)](#).
- `-kbd` and `-nokbd`
Enables or disables visible keyboard focus for non-text widgets using [Fl::visible_focus\(\)](#).
- `-name string`
Sets the window class using [Fl_Window::xclass\(\)](#).
- `-scheme string`
Sets the widget scheme using [Fl::scheme\(\)](#).
- `-title string`
Sets the window title using [Fl_Window::label\(\)](#).
- `-tooltips` and `-notooltips`
Enables or disables tooltips using [Fl_Tooltip::enable\(\)](#).

If your program requires other switches in addition to the standard FLTK options, you will need to pass your own argument handler to [Fl::args\(int,char**,int&,Fl_Args_Handler\)](#) explicitly.

31.2.3.9 `args()` [1/2]

```
void Fl::args (
    int argc,
    char ** argv ) [static]
```

Parse all command line switches matching standard FLTK options only.

It parses all the switches, and if any are not recognized it calls `Fl::abort(Fl::help)`, i.e. unlike the long form, an unrecognized switch generates an error message and causes the program to exit.

31.2.3.10 args() [2/2]

```
int Fl::args (
    int argc,
    char ** argv,
    int & i,
    Fl_Args_Handler cb = 0 ) [static]
```

Parse command line switches using the `cb` argument handler.

Returns 0 on error, or the number of words processed.

FLTK provides this as an *entirely optional* command line switch parser. You don't have to call it if you don't want to. Everything it can do can be done with other calls to FLTK.

To use the switch parser, call `Fl::args(...)` near the start of your program. This does **not** open the display, instead switches that need the display open are stashed into static variables. Then you **must** display your first window by calling `window->show(argc, argv)`, which will do anything stored in the static variables.

Providing an argument handler callback `cb` lets you define your own switches. It is called with the same `argc` and `argv`, and with `i` set to the index of the switch to be processed. The `cb` handler should return zero if the switch is unrecognized, and not change `i`. It should return non-zero to indicate the number of words processed if the switch is recognized, i.e. 1 for just the switch, and more than 1 for the switch plus associated parameters. `i` should be incremented by the same amount.

The `cb` handler is called **before** any other tests, so *you can also override any standard FLTK switch* (this is why FLTK can use very short switches instead of the long ones all other toolkits force you to use). See [Fl::arg\(\)](#) for descriptions of the standard switches.

On return `i` is set to the index of the first non-switch. This is either:

- The first word that does not start with '-'.
- The word '-' (used by many programs to name stdin as a file)
- The first unrecognized switch (return value is 0).
- `argc`

The return value is `i` unless an unrecognized switch is found, in which case it is zero. If your program takes no arguments other than switches you should produce an error if the return value is less than `argc`.

A usage string is displayed if `Fl::args()` detects an invalid argument on the command-line. You can change the message by setting the `Fl::help` pointer.

A very simple command line parser can be found in `examples/howto-parse-args.cxx`

The simpler `Fl::args(int argc, char **argv)` form is useful if your program does not have command line switches of its own.

31.2.3.11 background()

```
void Fl::background (
    uchar r,
    uchar g,
    uchar b ) [static]
```

Changes `fl_color(FL_BACKGROUND_COLOR)` to the given color, and changes the gray ramp from 32 to 56 to black to white.

These are the colors used as backgrounds by almost all widgets and used to draw the edges of all the boxtypes.

31.2.3.12 background2()

```
void Fl::background2 (
    uchar r,
    uchar g,
    uchar b ) [static]
```

Changes the alternative background color.

This color is used as a background by [Fl_Input](#) and other text widgets.

This call may change `fl_color(FL_FOREGROUND_COLOR)` if it does not provide sufficient contrast to `FL_BACKGROUND2_COLOR`.

31.2.3.13 box_color()

```
Fl_Color Fl::box_color (
    Fl_Color c ) [static]
```

Gets the drawing color to be used for the background of a box.

This method is only useful inside box drawing code. It returns the color to be used, either `fl_inactive(c)` if the widget is `inactive_r()` or `c` otherwise.

31.2.3.14 box_dh()

```
int Fl::box_dh (
    Fl_Boxtype t ) [static]
```

Returns the height offset for the given boxtype.

See also

[box_dy\(\)](#).

31.2.3.15 box_dw()

```
int Fl::box_dw (
    Fl_Boxtype t ) [static]
```

Returns the width offset for the given boxtype.

See also

[box_dy\(\)](#).

31.2.3.16 box_dx()

```
int Fl::box_dx (
    Fl_Boxtype t ) [static]
```

Returns the X offset for the given boxtype.

See also

[box_dy\(\)](#)

31.2.3.17 box_dy()

```
int Fl::box_dy (
    Fl_Boxtype t ) [static]
```

Returns the Y offset for the given boxtype.

These functions return the offset values necessary for a given boxtype, useful for computing the area inside a box's borders, to prevent overdrawing the borders.

For instance, in the case of a boxtype like `FL_DOWN_BOX` where the border width might be 2 pixels all around, the above functions would return 2, 2, 4, and 4 for `box_dx`, `box_dy`, `box_dw`, and `box_dh` respectively.

An example to compute the area inside a widget's box():

```
int X = yourwidget->x() + Fl::box_dx(yourwidget->box());
int Y = yourwidget->y() + Fl::box_dy(yourwidget->box());
int W = yourwidget->w() - Fl::box_dw(yourwidget->box());
int H = yourwidget->h() - Fl::box_dh(yourwidget->box());
```

These functions are mainly useful in the `draw()` code for deriving custom widgets, where one wants to avoid drawing over the widget's own border `box()`.

31.2.3.18 check()

```
int Fl::check ( ) [static]
```

Same as `Fl::wait(0)`.

Calling this during a big calculation will keep the screen up to date and the interface responsive:

```
while (!calculation_done()) {
  calculate();
  Fl::check();
  if (user_hit_abort_button()) break;
}
```

This returns non-zero if any windows are displayed, and 0 if no windows are displayed (this is likely to change in future versions of FLTK).

31.2.3.19 display()

```
void Fl::display (
    const char * d ) [static]
```

Sets the X display to use for all windows.

Actually this just sets the environment variable `$DISPLAY` to the passed string, so this only works before you `show()` the first window or otherwise open the display, and does nothing useful under WIN32.

31.2.3.20 dnd_text_ops() [1/2]

```
static int Fl::dnd_text_ops ( ) [inline], [static]
```

Gets or sets whether drag and drop text operations are supported.

This specifically affects whether selected text can be dragged from text fields or dragged within a text field as a cut/paste shortcut.

31.2.3.21 dnd_text_ops() [2/2]

```
static void Fl::dnd_text_ops (
    int v ) [inline], [static]
```

Gets or sets whether drag and drop text operations are supported.

This specifically affects whether selected text can be dragged from text fields or dragged within a text field as a cut/paste shortcut.

31.2.3.22 draw_box_active()

```
int Fl::draw_box_active ( ) [static]
```

Determines if the currently drawn box is active or inactive.

If inactive, the box color should be changed to the inactive color.

See also

[Fl::box_color\(Fl_Color c\)](#)

31.2.3.23 flush()

```
void Fl::flush ( ) [static]
```

Causes all the windows that need it to be redrawn and graphics forced out through the pipes.

This is what `wait()` does before looking for events.

Note: in multi-threaded applications you should only call `Fl::flush()` from the main thread. If a child thread needs to trigger a redraw event, it should instead call `Fl::awake()` to get the main thread to process the event queue.

31.2.3.24 get_system_colors()

```
void Fl::get_system_colors ( ) [static]
```

Read the user preference colors from the system and use them to call `Fl::foreground()`, `Fl::background()`, and `Fl::background2()`.

This is done by `Fl_Window::show(argc,argv)` before applying the `-fg` and `-bg` switches.

On X this reads some common values from the Xdefaults database. KDE users can set these values by running the "krdb" program, and newer versions of KDE set this automatically if you check the "apply style to other X programs" switch in their control panel.

31.2.3.25 gl_visual()

```
int Fl::gl_visual (
    int mode,
    int * alist = 0 ) [static]
```

This does the same thing as [Fl::visual\(int\)](#) but also requires OpenGL drawing to work.

This *must* be done if you want to draw in normal windows with OpenGL with [gl_start\(\)](#) and [gl_end\(\)](#). It may be useful to call this so your X windows use the same visual as an [Fl_Gl_Window](#), which on some servers will reduce colormap flashing.

See [Fl_Gl_Window](#) for a list of additional values for the argument.

31.2.3.26 is_scheme()

```
static int Fl::is_scheme (
    const char * name ) [inline], [static]
```

Returns whether the current scheme is the given name.

This is a fast inline convenience function to support scheme-specific code in widgets, e.g. in their [draw\(\)](#) methods, if required.

Use a valid scheme name, not NULL (although NULL is allowed, this is not a useful argument - see below).

If [Fl::scheme\(\)](#) has not been set or has been set to the default scheme ("none" or "base"), then this will always return 0 regardless of the argument, because [Fl::scheme\(\)](#) is NULL in this case.

Note

The stored scheme name is always lowercase, and this method will do a case-sensitive compare, so you **must** provide a lowercase string to return the correct value. This is intentional for performance reasons.

Example:

```
if ( Fl::is_scheme("gtk+") ) { your_code_here(); }
```

Parameters

in	<i>name</i>	lowercase string of requested scheme name.
----	-------------	--

Returns

1 if the given scheme is active, 0 otherwise.

See also

[Fl::scheme\(const char *name\)](#)

31.2.3.27 option() [1/2]

```
bool Fl::option (
    Fl_Option opt ) [static]
```

FLTK library options management.

This function needs to be documented in more detail. It can be used for more optional settings, such as using a native file chooser instead of the FLTK one wherever possible, disabling tooltips, disabling visible focus, disabling FLTK file chooser preview, etc. .

There should be a command line option interface.

There should be an application that manages options system wide, per user, and per application.

Example:

```
if ( Fl::option(Fl::OPTION_ARROW_FOCUS) )
    { ..on.. }
else
    { ..off.. }
```

Note

As of FLTK 1.3.0, options can be managed within fluid, using the menu *Edit/Global FLTK Settings*.

Parameters

<i>opt</i>	which option
------------	--------------

Returns

true or false

See also

enum [Fl::Fl_Option](#)
[Fl::option\(Fl_Option, bool\)](#)

Since

FLTK 1.3.0

31.2.3.28 option() [2/2]

```
void Fl::option (
    Fl_Option opt,
    bool val ) [static]
```

Override an option while the application is running.
 This function does not change any system or user settings.

Example:

```
Fl::option(Fl::OPTION_ARROW_FOCUS, true);    // on
Fl::option(Fl::OPTION_ARROW_FOCUS, false);  // off
```

Parameters

<i>opt</i>	which option
<i>val</i>	set to true or false

See also

enum [Fl::Fl_Option](#)
 bool [Fl::option\(Fl_Option\)](#)

31.2.3.29 own_colormap()

```
void Fl::own_colormap ( ) [static]
```

Makes FLTK use its [own colormap](#).

This may make FLTK display better and will reduce conflicts with other programs that want lots of colors. However the colors may flash as you move the cursor between windows.

This does nothing if the current visual is not colormapped.

31.2.3.30 readqueue()

```
Fl_Widget * Fl::readqueue ( ) [static]
```

Reads the default callback queue and returns the first widget.

All `Fl_Widgets` that don't have a callback defined use the default callback `static Fl_Widget::default_callback()` that puts a pointer to the widget in a queue. This method reads the oldest widget out of this queue. The queue (FIFO) is limited (currently 20 items). If the queue overflows, the oldest entry (`Fl_Widget *`) is discarded. Relying on the default callback and reading the callback queue with `Fl::readqueue()` is not recommended. If you need a callback, you should set one with `Fl_Widget::callback(Fl_Callback *cb, void *data)` or one of its variants.

See also

[Fl_Widget::callback\(\)](#)
[Fl_Widget::callback\(Fl_Callback *cb, void *data\)](#)
[Fl_Widget::default_callback\(\)](#)

31.2.3.31 ready()

```
int Fl::ready ( ) [static]
```

This is similar to `Fl::check()` except this does *not* call `Fl::flush()` or any callbacks, which is useful if your program is in a state where such callbacks are illegal.

This returns true if `Fl::check()` would do anything (it will continue to return true until you call `Fl::check()` or `Fl::wait()`).

```
while (!calculation_done()) {
    calculate();
    if (Fl::ready()) {
        do_expensive_cleanup();
        Fl::check();
        if (user_hit_abort_button()) break;
    }
}
```

31.2.3.32 release()

```
static void Fl::release ( ) [inline], [static]
```

Releases the current grabbed window, equals `grab(0)`.

Deprecated Use `Fl::grab(0)` instead.

See also

[grab\(Fl_Window*\)](#)

31.2.3.33 reload_scheme()

```
int Fl::reload_scheme ( ) [static]
```

Called by scheme according to scheme name.

Loads or reloads the current scheme selection. See void [scheme\(const char *name\)](#)

31.2.3.34 remove_check()

```
void Fl::remove_check (
    Fl_Timeout_Handler cb,
    void * argp = 0 ) [static]
```

Removes a check callback.

It is harmless to remove a check callback that no longer exists.

31.2.3.35 remove_timeout()

```
void Fl::remove_timeout (
    Fl_Timeout_Handler cb,
    void * argp = 0 ) [static]
```

Removes a timeout callback.

It is harmless to remove a timeout callback that no longer exists.

Note

This version removes all matching timeouts, not just the first one. This may change in the future.

31.2.3.36 repeat_timeout()

```
void Fl::repeat_timeout (
    double t,
    Fl_Timeout_Handler cb,
    void * argp = 0 ) [static]
```

Repeats a timeout callback from the expiration of the previous timeout, allowing for more accurate timing.

You may only call this method inside a timeout callback.

The following code will print "TICK" each second on stdout with a fair degree of accuracy:

```
void callback(void*) {
    puts("TICK");
    Fl::repeat_timeout(1.0, callback);
}
int main() {
    Fl::add_timeout(1.0, callback);
    return Fl::run();
}
```

31.2.3.37 run()

```
int Fl::run ( ) [static]
```

As long as any windows are displayed this calls [Fl::wait\(\)](#) repeatedly.

When all the windows are closed it returns zero (supposedly it would return non-zero on any errors, but FLTK calls exit directly for these). A normal program will end main() with return [Fl::run\(\)](#);

31.2.3.38 scheme()

```
int Fl::scheme (
    const char * s ) [static]
```

Sets the current widget scheme.

NULL will use the scheme defined in the FLTK_SCHEME environment variable or the scheme resource under X11. Otherwise, any of the following schemes can be used:

- "none" - This is the default look-n-feel which resembles old Windows (95/98/Me/NT/2000) and old GTK/KDE
- "base" - This is an alias for "none"
- "plastic" - This scheme is inspired by the Aqua user interface on Mac OS X
- "gtk+" - This scheme is inspired by the Red Hat Bluecurve theme
- "gleam" - This scheme is inspired by the Clearlooks Glossy scheme. (Colin Jones and Edmanuel Torres).

Uppercase scheme names are equivalent, but the stored scheme name will always be lowercase and [Fl::scheme\(\)](#) will return this lowercase name.

If the resulting scheme name is not defined, the default scheme will be used and [Fl::scheme\(\)](#) will return NULL.

See also

[Fl::is_scheme\(\)](#)

31.2.3.39 scrollbar_size() [1/2]

```
int Fl::scrollbar_size ( ) [static]
```

Gets the default scrollbar size used by [Fl_Browser_](#), [Fl_Help_View](#), [Fl_Scroll](#), and [Fl_Text_Display](#) widgets.

Returns

The default size for widget scrollbars, in pixels.

31.2.3.40 scrollbar_size() [2/2]

```
void Fl::scrollbar_size (
    int W ) [static]
```

Sets the default scrollbar size that is used by the [Fl_Browser_](#), [Fl_Help_View](#), [Fl_Scroll](#), and [Fl_Text_Display](#) widgets.

Parameters

in	<i>W</i>	The new default size for widget scrollbars, in pixels.
----	----------	--

31.2.3.41 set_box_color()

```
void Fl::set_box_color (
    Fl_Color c ) [static]
```

Sets the drawing color for the box that is currently drawn.

This method sets the current drawing color [fl_color\(\)](#) depending on the widget's state to either *c* or [fl_inactive\(c\)](#).

It should be used whenever a box background is drawn in the box (type) drawing code instead of calling [fl_color\(Fl_Color bg\)](#) with the background color *bg*, usually [Fl_Widget::color\(\)](#).

This method is only useful inside box drawing code. Whenever a box is drawn with one of the standard box drawing methods, a static variable is set depending on the widget's current state - if the widget is [inactive_r\(\)](#) then the internal variable is false (0), otherwise it is true (1). This is faster than calling [Fl_Widget::active_r\(\)](#) because the state is cached.

See also

[Fl::draw_box_active\(\)](#)

[Fl::box_color\(Fl_Color\)](#)

31.2.3.42 set_idle()

```
static void Fl::set_idle (
    Fl_Old_Idle_Handler cb ) [inline], [static]
```

Sets an idle callback.

Deprecated This method is obsolete - use the [add_idle\(\)](#) method instead.

31.2.3.43 use_high_res_GL() [1/2]

```
static int Fl::use_high_res_GL ( ) [inline], [static]
```

returns whether GL windows should be drawn at high resolution on Apple computers with retina displays.

Default is no.

Version

1.3.4

31.2.3.44 use_high_res_GL() [2/2]

```
static void Fl::use_high_res_GL (
    int val ) [inline], [static]
```

sets whether GL windows should be drawn at high resolution on Apple computers with retina displays

Version

1.3.4

31.2.3.45 version()

```
double Fl::version ( ) [static]
```

Returns the compiled-in value of the FL_VERSION constant.

This is useful for checking the version of a shared library.

Deprecated Use int [Fl::api_version\(\)](#) instead.

31.2.3.46 visible_focus() [1/2]

```
static int Fl::visible_focus ( ) [inline], [static]
```

Gets or sets the visible keyboard focus on buttons and other non-text widgets.

The default mode is to enable keyboard focus for all widgets.

31.2.3.47 visible_focus() [2/2]

```
static void Fl::visible_focus (
    int v ) [inline], [static]
```

Gets or sets the visible keyboard focus on buttons and other non-text widgets.

The default mode is to enable keyboard focus for all widgets.

31.2.3.48 visual()

```
int Fl::visual (
    int flags ) [static]
```

Selects a visual so that your graphics are drawn correctly.

This is only allowed before you call `show()` on any windows. This does nothing if the default visual satisfies the capabilities, or if no visual satisfies the capabilities, or on systems that don't have such brain-dead notions.

Only the following combinations do anything useful:

- `Fl::visual(FL_RGB)`
Full/true color (if there are several depths FLTK chooses the largest). Do this if you use `fl_draw_image` for much better (non-dithered) output.
- `Fl::visual(FL_RGB8)`
Full color with at least 24 bits of color. `FL_RGB` will always pick this if available, but if not it will happily return a less-than-24 bit deep visual. This call fails if 24 bits are not available.
- `Fl::visual(FL_DOUBLE|FL_INDEX)`
Hardware double buffering. Call this if you are going to use [Fl_Double_Window](#).
- `Fl::visual(FL_DOUBLE|FL_RGB)`
- `Fl::visual(FL_DOUBLE|FL_RGB8)`
Hardware double buffering and full color.

This returns true if the system has the capabilities by default or FLTK succeeded in turning them on. Your program will still work even if this returns false (it just won't look as good).

31.2.3.49 wait()

```
int Fl::wait ( ) [static]
```

Waits until "something happens" and then returns.

Call this repeatedly to "run" your program. You can also check what happened each time after this returns, which is quite useful for managing program state.

What this really does is call all idle callbacks, all elapsed timeouts, call [Fl::flush\(\)](#) to get the screen to update, and then wait some time (zero if there are idle callbacks, the shortest of all pending timeouts, or infinity), for any events from the user or any [Fl::add_fd\(\)](#) callbacks. It then handles the events and calls the callbacks and then returns.

The return value of [Fl::wait\(\)](#) is non-zero if there are any visible windows - this may change in future versions of FLTK.

[Fl::wait\(time\)](#) waits a maximum of *time* seconds. *It can return much sooner if something happens.*

The return value is positive if an event or fd happens before the time elapsed. It is zero if nothing happens (on Win32 this will only return zero if *time* is zero). It is negative if an error occurs (this will happen on UNIX if a signal happens).

31.2.4 Member Data Documentation

31.2.4.1 help

```
const char *const Fl::help = helpmsg+13 [static]
```

Usage string displayed if [Fl::args\(\)](#) detects an invalid argument.

This may be changed to point to customized text at run-time.

31.2.4.2 idle

```
void(* Fl::idle)() [static]
```

The currently executing idle callback function: DO NOT USE THIS DIRECTLY!

This is now used as part of a higher level system allowing multiple idle callback functions to be called.

See also

[add_idle\(\)](#), [remove_idle\(\)](#)

The documentation for this class was generated from the following files:

- [Fl.H](#)
- [Fl.cxx](#)
- [Fl_abort.cxx](#)
- [Fl_add_idle.cxx](#)
- [Fl_arg.cxx](#)
- [fl_boxtype.cxx](#)
- [fl_color.cxx](#)
- [fl_color_mac.cxx](#)
- [fl_color_win32.cxx](#)
- [Fl_compose.cxx](#)
- [Fl_display.cxx](#)
- [fl_dnd_win32.cxx](#)
- [fl_dnd_x.cxx](#)
- [Fl_get_key.cxx](#)
- [Fl_get_key_mac.cxx](#)
- [Fl_get_key_win32.cxx](#)
- [Fl_get_system_colors.cxx](#)
- [Fl_grab.cxx](#)
- [fl_labeltype.cxx](#)
- [Fl_lock.cxx](#)
- [Fl_own_colormap.cxx](#)

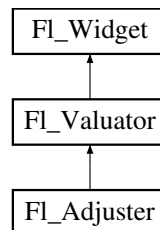
- fl_set_font.cxx
- fl_set_fonts_mac.cxx
- fl_set_fonts_win32.cxx
- fl_set_fonts_x.cxx
- fl_set_fonts_xft.cxx
- fl_shortcut.cxx
- FL_visual.cxx
- FL_Widget.cxx
- FL_Window.cxx
- gl_start.cxx
- screen_xywh.cxx
- FL_Cairo.cxx

31.3 FL_Adjuster Class Reference

The [FL_Adjuster](#) widget was stolen from Prisms, and has proven to be very useful for values that need a large dynamic range.

```
#include <FL_Adjuster.H>
```

Inheritance diagram for FL_Adjuster:



Public Member Functions

- [FL_Adjuster](#) (int X, int Y, int W, int H, const char *l=0)
Creates a new [FL_Adjuster](#) widget using the given position, size, and label string.
- int [soft](#) () const
If "soft" is turned on, the user is allowed to drag the value outside the range.
- void [soft](#) (int s)
If "soft" is turned on, the user is allowed to drag the value outside the range.

Protected Member Functions

- void [draw](#) ()
Draws the widget.
- int [handle](#) (int)
Handles the specified event.
- void [value_damage](#) ()
Asks for partial redraw.

Additional Inherited Members

31.3.1 Detailed Description

The [FL_Adjuster](#) widget was stolen from Prisms, and has proven to be very useful for values that need a large dynamic range.

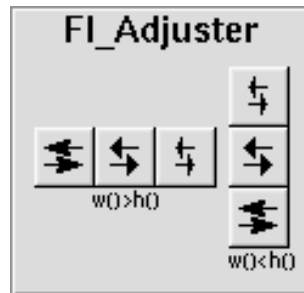


Figure 31.1 FL_Adjuster

When you press a button and drag to the right the value increases. When you drag to the left it decreases. The largest button adjusts by $100 * \text{step}()$, the next by $10 * \text{step}()$ and that smallest button by $\text{step}()$. Clicking on the buttons increments by 10 times the amount dragging by a pixel does. Shift + click decrements by 10 times the amount.

31.3.2 Constructor & Destructor Documentation

31.3.2.1 FL_Adjuster()

```
Fl_Adjuster::Fl_Adjuster (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new [FL_Adjuster](#) widget using the given position, size, and label string. It looks best if one of the dimensions is 3 times the other. Inherited destructor destroys the Valuator.

31.3.3 Member Function Documentation

31.3.3.1 draw()

```
void Fl_Adjuster::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own draw() method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scroll; // scroll is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Implements [FL_Widget](#).

31.3.3.2 handle()

```
int Fl_Adjuster::handle (
    int event ) [protected], [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Widget](#).

31.3.3.3 soft() [1/2]

```
int Fl_Adjuster::soft ( ) const [inline]
```

If "soft" is turned on, the user is allowed to drag the value outside the range.

If they drag the value to one of the ends, let go, then grab again and continue to drag, they can get to any value. Default is one.

31.3.3.4 soft() [2/2]

```
void Fl_Adjuster::soft (
    int s ) [inline]
```

If "soft" is turned on, the user is allowed to drag the value outside the range.

If they drag the value to one of the ends, let go, then grab again and continue to drag, they can get to any value. Default is one.

The documentation for this class was generated from the following files:

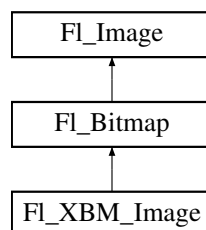
- [Fl_Adjuster.H](#)
- [Fl_Adjuster.cxx](#)

31.4 Fl_Bitmap Class Reference

The [Fl_Bitmap](#) class supports caching and drawing of mono-color (bitmap) images.

```
#include <Fl_Bitmap.H>
```

Inheritance diagram for [Fl_Bitmap](#):



Public Member Functions

- [Fl_Image](#) * **copy** ()
- virtual [Fl_Image](#) * **copy** (int W, int H)
 - The copy() method creates a copy of the specified image.*
- void **draw** (int X, int Y)

- virtual void [draw](#) (int X, int Y, int W, int H, int cx=0, int cy=0)
Draws the image with a bounding box.
- [Fl_Bitmap](#) (const char *bits, int W, int H)
The constructors create a new bitmap from the specified bitmap data.
- [Fl_Bitmap](#) (const uchar *bits, int W, int H)
The constructors create a new bitmap from the specified bitmap data.
- virtual void [label](#) ([Fl_Menu_Item](#) *m)
The [label\(\)](#) methods are an obsolete way to set the image attribute of a widget or menu item.
- virtual void [label](#) ([Fl_Widget](#) *w)
The [label\(\)](#) methods are an obsolete way to set the image attribute of a widget or menu item.
- virtual void [uncache](#) ()
If the image has been cached for display, delete the cache data.
- virtual [~Fl_Bitmap](#) ()
The destructor frees all memory and server resources that are used by the bitmap.

Public Attributes

- int [alloc_array](#)
Non-zero if array points to bitmap data allocated internally.
- const uchar * [array](#)
pointer to raw bitmap data

Friends

- class [Fl_GDI_Graphics_Driver](#)
- class [Fl_GDI_Printer_Graphics_Driver](#)
- class [Fl_Quartz_Graphics_Driver](#)
- class [Fl_Xlib_Graphics_Driver](#)

Additional Inherited Members

31.4.1 Detailed Description

The [Fl_Bitmap](#) class supports caching and drawing of mono-color (bitmap) images. Images are drawn using the current color.

31.4.2 Member Function Documentation

31.4.2.1 [copy\(\)](#)

```
Fl_Image * Fl_Bitmap::copy (
    int W,
    int H ) [virtual]
```

The [copy\(\)](#) method creates a copy of the specified image.

If the width and height are provided, the image is resized to the specified size. The image should be deleted (or in the case of [Fl_Shared_Image](#), released) when you are done with it.

Reimplemented from [Fl_Image](#).

31.4.2.2 draw()

```
void Fl_Bitmap::draw (
    int X,
    int Y,
    int W,
    int H,
    int cx = 0,
    int cy = 0 ) [virtual]
```

Draws the image with a bounding box.

Arguments *X*, *Y*, *W*, *H* specify a bounding box for the image, with the origin (upper-left corner) of the image offset by the *cx* and *cy* arguments.

In other words: `fl_push_clip(X, Y, W, H)` is applied, the image is drawn with its upper-left corner at *X-cx*, *Y-cy* and its own width and height, `fl_pop_clip()` is applied.

Reimplemented from [Fl_Image](#).

31.4.2.3 label() [1/2]

```
void Fl_Bitmap::label (
    Fl_Menu_Item * m ) [virtual]
```

The `label()` methods are an obsolete way to set the image attribute of a widget or menu item.

Use the `image()` or `deimage()` methods of the [Fl_Widget](#) and [Fl_Menu_Item](#) classes instead.

Reimplemented from [Fl_Image](#).

31.4.2.4 label() [2/2]

```
void Fl_Bitmap::label (
    Fl_Widget * widget ) [virtual]
```

The `label()` methods are an obsolete way to set the image attribute of a widget or menu item.

Use the `image()` or `deimage()` methods of the [Fl_Widget](#) and [Fl_Menu_Item](#) classes instead.

Reimplemented from [Fl_Image](#).

31.4.2.5 uncache()

```
void Fl_Bitmap::uncache ( ) [virtual]
```

If the image has been cached for display, delete the cache data.

This allows you to change the data used for the image and then redraw it without recreating an image object.

Reimplemented from [Fl_Image](#).

The documentation for this class was generated from the following files:

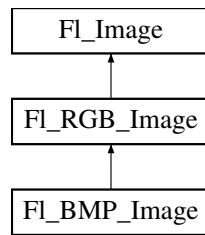
- [Fl_Bitmap.H](#)
- [Fl_Bitmap.cxx](#)

31.5 FI_BMP_Image Class Reference

The [Fl_BMP_Image](#) class supports loading, caching, and drawing of Windows Bitmap (BMP) image files.

```
#include <Fl_BMP_Image.H>
```

Inheritance diagram for [Fl_BMP_Image](#):



Public Member Functions

- [FI_BMP_Image](#) (const char *filename)
The constructor loads the named BMP image from the given bmp filename.

Additional Inherited Members

31.5.1 Detailed Description

The [FI_BMP_Image](#) class supports loading, caching, and drawing of Windows Bitmap (BMP) image files.

31.5.2 Constructor & Destructor Documentation

31.5.2.1 FI_BMP_Image()

```

FI_BMP_Image::FI_BMP_Image (
    const char * bmp )
  
```

The constructor loads the named BMP image from the given bmp filename.

The destructor frees all memory and server resources that are used by the image.

Use [FI_Image::fail\(\)](#) to check if [FI_BMP_Image](#) failed to load. [fail\(\)](#) returns `ERR_FILE_ACCESS` if the file could not be opened or read, `ERR_FORMAT` if the BMP format could not be decoded, and `ERR_NO_IMAGE` if the image could not be loaded for another reason.

The documentation for this class was generated from the following files:

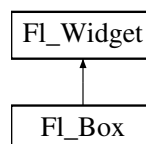
- FI_BMP_Image.H
- FI_BMP_Image.cxx

31.6 FI_Box Class Reference

This widget simply draws its box, and possibly its label.

```
#include <Fl_Box.H>
```

Inheritance diagram for FI_Box:



Public Member Functions

- [FI_Box](#) ([FI_Boxtype](#) b, int X, int Y, int W, int H, const char *l)
See [FI_Box::FI_Box\(int x, int y, int w, int h, const char * = 0\)](#)
- [FI_Box](#) (int X, int Y, int W, int H, const char *l=0)
- virtual int [handle](#) (int)
Handles the specified event.

Protected Member Functions

- void `draw()`
Draws the widget.

Additional Inherited Members

31.6.1 Detailed Description

This widget simply draws its box, and possibly its label.

Putting it before some other widgets and making it big enough to surround them will let you draw a frame around them.

31.6.2 Constructor & Destructor Documentation

31.6.2.1 Fl_Box()

```
Fl_Box::Fl_Box (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

- The first constructor sets `box()` to `FL_NO_BOX`, which means it is invisible. However such widgets are useful as placeholders or `Fl_Group::resizable()` values. To change the box to something visible, use `box(n)`.
- The second form of the constructor sets the box to the specified box type.

The destructor removes the box.

31.6.3 Member Function Documentation

31.6.3.1 draw()

```
void Fl_Box::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call `redraw()` instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own draw() method*, e.g. for an embedded scrollbar, you can do it (because `draw()` is virtual) like this:

```
Fl_Widget *s = &scroll;           // scroll is an embedded Fl_Scrollbar
s->draw();                          // calls Fl_Scrollbar::draw()
```

Implements `Fl_Widget`.

31.6.3.2 handle()

```
int Fl_Box::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited `handle()` method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Widget](#).

The documentation for this class was generated from the following files:

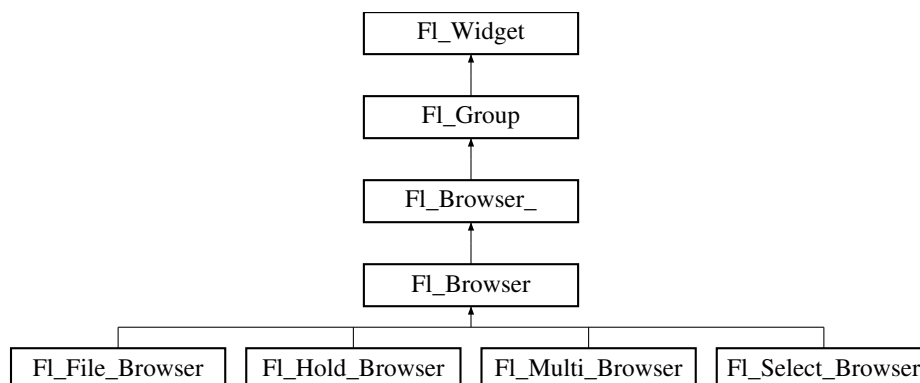
- [Fl_Box.H](#)
- [Fl_Box.cxx](#)

31.7 Fl_Browser Class Reference

The [Fl_Browser](#) widget displays a scrolling list of text lines, and manages all the storage for the text.

```
#include <Fl_Browser.H>
```

Inheritance diagram for [Fl_Browser](#):



Public Types

- enum [Fl_Line_Position](#) { **TOP** , **BOTTOM** , **MIDDLE** }

For internal use only?

Public Member Functions

- void [add](#) (const char *newtext, void *d=0)
Adds a new line to the end of the browser.
- void [bottomline](#) (int line)
Scrolls the browser so the bottom item in the browser is showing the specified line.
- void [clear](#) ()
Removes all the lines in the browser.
- char [column_char](#) () const
Gets the current column separator character.
- void [column_char](#) (char c)

- Sets the column separator to `c`.*

 - `const int * column_widths () const`
- Gets the current column width array.*

 - `void column_widths (const int *arr)`
- Sets the current array to `arr`.*

 - `void * data (int line) const`
- Returns the user `data()` for specified `line`.*

 - `void data (int line, void *d)`
- Sets the user data for specified `line` to `d`.*

 - `void display (int line, int val=1)`
- For back compatibility.*

 - `int displayed (int line) const`
- Returns non-zero if `line` has been scrolled to a position where it is being displayed.*

 - `FI_Browser (int X, int Y, int W, int H, const char *L=0)`
- The constructor makes an empty browser.*

 - `char format_char () const`
- Gets the current format code prefix character, which by default is '@'.*

 - `void format_char (char c)`
- Sets the current format code prefix character to `c`.*

 - `void hide ()`
- Hides the entire `FI_Browser` widget – opposite of `show()`.*

 - `void hide (int line)`
- Makes `line` invisible, preventing selection by the user.*

 - `FI_Image * icon (int line) const`
- Returns the icon currently defined for `line`.*

 - `void icon (int line, FI_Image *icon)`
- Set the image icon for `line` to the value `icon`.*

 - `void insert (int line, const char *newtext, void *d=0)`
- Insert a new entry whose label is `newtext` above given `line`, optional data `d`.*

 - `void lineposition (int line, FI_Line_Position pos)`
- Updates the browser so that `line` is shown at position `pos`.*

 - `int load (const char *filename)`
- Clears the browser and reads the file, adding each line from the file to the browser.*

 - `void make_visible (int line)`
- Make the item at the specified `line` `visible()`.*

 - `void middleline (int line)`
- Scrolls the browser so the middle item in the browser is showing the specified `line`.*

 - `void move (int to, int from)`
- Line `from` is removed and reinserted at `to`.*

 - `void remove (int line)`
- Remove entry for given `line` number, making the browser one line shorter.*

 - `void remove_icon (int line)`
- Removes the icon for `line`.*

 - `void replace (int a, const char *b)`
- For back compatibility only.*

 - `int select (int line, int val=1)`
- Sets the selection state of the item at `line` to the value `val`.*

 - `int selected (int line) const`
- Returns 1 if specified `line` is selected, 0 if not.*

 - `void show ()`
- Shows the entire `FI_Browser` widget – opposite of `hide()`.*

- void **show** (int line)
Makes `line` visible, and available for selection by user.
- int **size** () const
Returns how many lines are in the browser.
- void **size** (int W, int H)
- void **swap** (int a, int b)
Swaps two browser lines `a` and `b`.
- const char * **text** (int line) const
Returns the label text for the specified `line`.
- void **text** (int line, const char *newtext)
Sets the text for the specified `line` to `newtext`.
- **Fl_Fontsize** **textsize** () const
Gets the default text size (in pixels) for the lines in the browser.
- void **textsize** (**Fl_Fontsize** newSize)
Sets the default text size (in pixels) for the lines in the browser to `newSize`.
- int **topline** () const
Returns the line that is currently visible at the top of the browser.
- void **topline** (int line)
Scrolls the browser so the top item in the browser is showing the specified `line`.
- int **value** () const
Returns the line number of the currently selected line, or 0 if none selected.
- void **value** (int line)
Sets the browser's `value()`, which selects the specified `line`.
- int **visible** (int line) const
Returns non-zero if the specified `line` is visible, 0 if hidden.
- **~Fl_Browser** ()
The destructor deletes all list items and destroys the browser.

Protected Member Functions

- **FL_BLINE** * **_remove** (int line)
Removes the item at the specified `line`.
- **FL_BLINE** * **find_line** (int line) const
Returns the item for specified `line`.
- int **full_height** () const
The height of the entire list of all `visible()` items in pixels.
- int **incr_height** () const
The default 'average' item height (including inter-item spacing) in pixels.
- void **insert** (int line, **FL_BLINE** *item)
Insert specified `item` above `line`.
- void * **item_at** (int line) const
Return the item at specified `line`.
- void **item_draw** (void *item, int X, int Y, int W, int H) const
Draws `item` at the position specified by `X Y W H`.
- void * **item_first** () const
Returns the very first item in the list.
- int **item_height** (void *item) const
Returns height of `item` in pixels.
- void * **item_last** () const
Returns the very last item in the list.
- void * **item_next** (void *item) const

- Returns the next item after `item`.*

 - void * [item_prev](#) (void *item) const
- Returns the previous item before `item`.*

 - void [item_select](#) (void *item, int val)
- Change the selection state of `item` to the value `val`.*

 - int [item_selected](#) (void *item) const
- See if `item` is selected.*

 - void [item_swap](#) (void *a, void *b)
- Swap the items `a` and `b`.*

 - const char * [item_text](#) (void *item) const
- Returns the label text for `item`.*

 - int [item_width](#) (void *item) const
- Returns width of `item` in pixels.*

 - int [lineno](#) (void *item) const
- Returns line number corresponding to `item`, or zero if not found.*

 - void [swap](#) (FL_BLINE *a, FL_BLINE *b)
- Swap the two items `a` and `b`.*

Additional Inherited Members

31.7.1 Detailed Description

The [FI_Browser](#) widget displays a scrolling list of text lines, and manages all the storage for the text.

This is not a text editor or spreadsheet! But it is useful for showing a vertical list of named objects to the user.

Each line in the browser is identified by number. *The numbers start at one* (this is so that zero can be reserved for "no line" in the selective browsers). *Unless otherwise noted, the methods do not check to see if the passed line number is in range and legal. It must always be greater than zero and \leq [size\(\)](#).*

Each line contains a null-terminated string of text and a void * data pointer. The text string is displayed, the void * pointer can be used by the callbacks to reference the object the text describes.

The base class does nothing when the user clicks on it. The subclasses [FI_Select_Browser](#), [FI_Hold_Browser](#), and [FI_Multi_Browser](#) react to user clicks to select lines in the browser and do callbacks.

The base class [FI_Browser_](#) provides the scrolling and selection mechanisms of this and all the subclasses, but the dimensions and appearance of each item are determined by the subclass. You can use [FI_Browser_](#) to display information other than text, or text that is dynamically produced from your own data structures. If you find that loading the browser is a lot of work or is inefficient, you may want to make a subclass of [FI_Browser_](#).

Some common coding patterns used for working with [FI_Browser](#):

```
// How to loop through all the items in the browser
for ( int t=1; t<=browser->size(); t++ ) { // index 1 based..!
    printf("item #%d, label='%s'\n", t, browser->text(t));
}
```

Note: If you are *subclassing* [FI_Browser](#), it's more efficient to use the protected methods [item_first\(\)](#) and [item_next\(\)](#), since [FI_Browser](#) internally uses linked lists to manage the browser's items. For more info, see [find_item\(int\)](#).

31.7.2 Constructor & Destructor Documentation

31.7.2.1 FI_Browser()

```
Fl_Browser::Fl_Browser (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

The constructor makes an empty browser.

Parameters

in	<i>X,Y,W,H</i>	position and size.
in	<i>L</i>	label string, may be NULL.

31.7.3 Member Function Documentation

31.7.3.1 `_remove()`

```
FL_BLINE * Fl_Browser::_remove (
    int line ) [protected]
```

Removes the item at the specified `line`.

Caveat: See efficiency note in [find_line\(\)](#). You must call [redraw\(\)](#) to make any changes visible.

Parameters

in	<i>line</i>	The line number to be removed. (1 based) Must be in range!
----	-------------	--

Returns

Pointer to browser item that was removed (and is no longer valid).

See also

[add\(\)](#), [insert\(\)](#), [remove\(\)](#), [swap\(int,int\)](#), [clear\(\)](#)

31.7.3.2 `add()`

```
void Fl_Browser::add (
    const char * newtext,
    void * d = 0 )
```

Adds a new line to the end of the browser.

The text string `newtext` may contain format characters; see [format_char\(\)](#) for details. `newtext` is copied using the `strdup()` function, and can be NULL to make a blank line.

The optional `void*` argument `d` will be the [data\(\)](#) for the new item.

Parameters

in	<i>newtext</i>	The label text used for the added item
in	<i>d</i>	Optional user data() for the item (0 if unspecified)

See also

[add\(\)](#), [insert\(\)](#), [remove\(\)](#), [swap\(int,int\)](#), [clear\(\)](#)

31.7.3.3 `bottomline()`

```
void Fl_Browser::bottomline (
    int line ) [inline]
```

Scrolls the browser so the bottom item in the browser is showing the specified `line`.

Parameters

<code>in</code>	<i>line</i>	The line to be displayed at the bottom.
-----------------	-------------	---

See also

[topline\(\)](#), [middleline\(\)](#), [bottomline\(\)](#), [displayed\(\)](#), [lineposition\(\)](#)

31.7.3.4 clear()

```
void Fl_Browser::clear ( )
```

Removes all the lines in the browser.

See also

[add\(\)](#), [insert\(\)](#), [remove\(\)](#), [swap\(int,int\)](#), [clear\(\)](#)

31.7.3.5 column_char() [1/2]

```
char Fl_Browser::column_char ( ) const [inline]
```

Gets the current column separator character.

The default is '\t' (tab).

See also

[column_char\(\)](#), [column_widths\(\)](#)

31.7.3.6 column_char() [2/2]

```
void Fl_Browser::column_char (
    char c ) [inline]
```

Sets the column separator to c.

This will only have an effect if you also set [column_widths\(\)](#). The default is '\t' (tab).

See also

[column_char\(\)](#), [column_widths\(\)](#)

31.7.3.7 column_widths() [1/2]

```
const int* Fl_Browser::column_widths ( ) const [inline]
```

Gets the current column width array.

This array is zero-terminated and specifies the widths in pixels of each column. The text is split at each [column_char\(\)](#) and each part is formatted into it's own column. After the last column any remaining text is formatted into the space between the last column and the right edge of the browser, even if the text contains instances of [column_char\(\)](#) . The default value is a one-element array of just a zero, which means there are no columns.

Example:

```
Fl_Browser *b = new Fl_Browser(..);
static int widths[] = { 50, 50, 50, 70, 70, 40, 40, 70, 70, 50, 0 }; // widths for each column
b->column_widths(widths); // assign array to widget
b->column_char('\t'); // use tab as the column character
b->add("USER\tPID\tCPU\tMEM\tVSZ\tRSS\tTTY\tSTAT\tSTART\tTIME\tCOMMAND");
b->add("root\t2888\t0.0\t0.0\t1352\t0\ttty3\tSW\tAug15\t0:00\t@b@f/sbin/mingetty tty3");
b->add("root\t13115\t0.0\t0.0\t1352\t0\ttty2\tSW\tAug30\t0:00\t@b@f/sbin/mingetty tty2");
[...]
```

See also

[column_char\(\)](#), [column_widths\(\)](#)

31.7.3.8 column_widths() [2/2]

```
void Fl_Browser::column_widths (
    const int * arr ) [inline]
```

Sets the current array to `arr`.
Make sure the last entry is zero.

See also

[column_char\(\)](#), [column_widths\(\)](#)

31.7.3.9 data() [1/2]

```
void * Fl_Browser::data (
    int line ) const
```

Returns the user [data\(\)](#) for specified `line`.

Return value can be NULL if `line` is out of range or no user [data\(\)](#) was defined. The parameter `line` is 1 based (1 will be the first item in the list).

Parameters

in	<i>line</i>	The line number of the item whose data() is returned. (1 based)
----	-------------	---

Returns

The user data pointer (can be NULL)

31.7.3.10 data() [2/2]

```
void Fl_Browser::data (
    int line,
    void * d )
```

Sets the user data for specified `line` to `d`.
Does nothing if `line` is out of range.

Parameters

in	<i>line</i>	The line of the item whose data() is to be changed. (1 based)
in	<i>d</i>	The new data to be assigned to the item. (can be NULL)

31.7.3.11 display()

```
void Fl_Browser::display (
    int line,
    int val = 1 )
```

For back compatibility.

This calls `show(line)` if `val` is true, and `hide(line)` otherwise. If `val` is not specified, the default is 1 (makes the line visible).

See also

[show\(int\)](#), [hide\(int\)](#), [display\(\)](#), [visible\(\)](#), [make_visible\(\)](#)

31.7.3.12 displayed()

```
int Fl_Browser::displayed (
    int line ) const [inline]
```

Returns non-zero if `line` has been scrolled to a position where it is being displayed.

Checks to see if the item's vertical position is within the top and bottom edges of the display window. This does NOT take into account the [hide\(\)/show\(\)](#) status of the widget or item.

Parameters

in	<i>line</i>	The line to be checked
----	-------------	------------------------

Returns

1 if visible, 0 if not visible.

See also

[topline\(\)](#), [middleline\(\)](#), [bottomline\(\)](#), [displayed\(\)](#), [lineposition\(\)](#)

31.7.3.13 find_line()

```
FL_BLINE * Fl_Browser::find_line (
    int line ) const [protected]
```

Returns the item for specified `line`.

Note: This call is slow. It's fine for e.g. responding to user clicks, but slow if called often, such as in a tight sorting loop. Finding an item 'by line' involves a linear lookup on the internal linked list. The performance hit can be significant if the browser's contents is large, and the method is called often (e.g. during a sort). If you're writing a subclass, use the protected methods [item_first\(\)](#), [item_next\(\)](#), etc. to access the internal linked list more efficiently.

Parameters

in	<i>line</i>	The line number of the item to return. (1 based)
----	-------------	--

Return values

<i>item</i>	that was found.
<i>NULL</i>	if line is out of range.

See also

[item_at\(\)](#), [find_line\(\)](#), [lineno\(\)](#)

31.7.3.14 format_char() [1/2]

```
char Fl_Browser::format_char ( ) const [inline]
```

Gets the current format code prefix character, which by default is '@'.

A string of formatting codes at the start of each column are stripped off and used to modify how the rest of the line is printed:

- '@.' Print rest of line, don't look for more '@' signs
- '@@' Print rest of line starting with '@'
- '@1' Use a LARGE (24 point) font

- '@m' Use a medium large (18 point) font
- '@s' Use a small (11 point) font
- '@b' Use a **bold** font (adds FL_BOLD to font)
- '@i' Use an *italic* font (adds FL_ITALIC to font)
- '@f' or '@t' Use a fixed-pitch font (sets font to FL_COURIER)
- '@c' Center the line horizontally
- '@r' Right-justify the text
- '@B0', '@B1', ... '@B255' Fill the background with fl_color(n)
- '@C0', '@C1', ... '@C255' Use fl_color(n) to draw the text
- '@F0', '@F1', ... Use fl_font(n) to draw the text
- '@S1', '@S2', ... Use point size n to draw the text
- '@u' or '@_' Underline the text.
- '@-' draw an engraved line through the middle.

Notice that the '@.' command can be used to reliably terminate the parsing. To print a random string in a random color, use `sprintf("@C%d@.%s", color, string)` and it will work even if the string starts with a digit or has the format character in it.

31.7.3.15 format_char() [2/2]

```
void Fl_Browser::format_char (
    char c ) [inline]
```

Sets the current format code prefix character to *c*.

The default prefix is '@'. Set the prefix to 0 to disable formatting.

See also

[format_char\(\)](#) for list of '@' codes

31.7.3.16 full_height()

```
int Fl_Browser::full_height ( ) const [protected], [virtual]
```

The height of the entire list of all [visible\(\)](#) items in pixels.

This returns the accumulated height of *all* the items in the browser that are not hidden with [hide\(\)](#), including items scrolled off screen.

Returns

The accumulated size of all the visible items in pixels.

See also

[item_height\(\)](#), [item_width\(\)](#),
[incr_height\(\)](#), [full_height\(\)](#)

Reimplemented from [Fl_Browser_.](#)

31.7.3.17 hide()

```
void Fl_Browser::hide (
    int line )
```

Makes *line* invisible, preventing selection by the user.

The line can still be selected under program control. This changes the [full_height\(\)](#) if the state was changed. When a line is made invisible, lines below it are moved up in the display. [redraw\(\)](#) is called automatically if a change occurred.

Parameters

in	<i>line</i>	The line to be hidden. (1 based)
----	-------------	----------------------------------

See also

[show\(int\)](#), [hide\(int\)](#), [display\(\)](#), [visible\(\)](#), [make_visible\(\)](#)

31.7.3.18 icon() [1/2]

```
Fl_Image * Fl_Browser::icon (
    int line ) const
```

Returns the icon currently defined for *line*.
If no icon is defined, NULL is returned.

Parameters

in	<i>line</i>	The line whose icon is returned.
----	-------------	----------------------------------

Returns

The icon defined, or NULL if none.

31.7.3.19 icon() [2/2]

```
void Fl_Browser::icon (
    int line,
    Fl_Image * icon )
```

Set the image icon for *line* to the value *icon*.
Caller is responsible for keeping the icon allocated. The *line* is automatically redrawn.

Parameters

in	<i>line</i>	The line to be modified. If out of range, nothing is done.
in	<i>icon</i>	The image icon to be assigned to the <i>line</i> . If NULL, any previous icon is removed.

31.7.3.20 incr_height()

```
int Fl_Browser::incr_height ( ) const [protected], [virtual]
```

The default 'average' item height (including inter-item spacing) in pixels.
This currently returns [textsize\(\)](#) + 2.

Returns

The value in pixels.

See also

[item_height\(\)](#), [item_width\(\)](#),
[incr_height\(\)](#), [full_height\(\)](#)

Reimplemented from [Fl_Browser_.](#)

31.7.3.21 insert() [1/2]

```
void Fl_Browser::insert (
    int line,
    const char * newtext,
    void * d = 0 )
```

Insert a new entry whose label is *newtext* *above* given *line*, optional data *d*.

Text may contain format characters; see [format_char\(\)](#) for details. *newtext* is copied using the `strdup()` function, and can be NULL to make a blank line.

The optional void * argument *d* will be the [data\(\)](#) of the new item.

Parameters

in	<i>line</i>	Line position for insert. (1 based) If <i>line</i> > size() , the entry will be added at the end.
in	<i>newtext</i>	The label text for the new line.
in	<i>d</i>	Optional pointer to user data to be associated with the new line.

31.7.3.22 insert() [2/2]

```
void Fl_Browser::insert (
    int line,
    FL_BLINE * item ) [protected]
```

Insert specified *item* above *line*.

If *line* > [size\(\)](#) then the line is added to the end.

Caveat: See efficiency note in [find_line\(\)](#).

Parameters

in	<i>line</i>	The new line will be inserted above this line (1 based).
in	<i>item</i>	The item to be added.

31.7.3.23 item_at()

```
void* Fl_Browser::item_at (
    int line ) const [inline], [protected], [virtual]
```

Return the item at specified *line*.

Parameters

in	<i>line</i>	The line of the item to return. (1 based)
----	-------------	---

Returns

The item, or NULL if line out of range.

See also

[item_at\(\)](#), [find_line\(\)](#), [lineno\(\)](#)

Reimplemented from [Fl_Browser_.](#)

31.7.3.24 item_draw()

```
void Fl_Browser::item_draw (
    void * item,
    int X,
    int Y,
    int W,
    int H ) const [protected], [virtual]
```

Draws *item* at the position specified by X Y W H.

The W and H values are used for clipping. Should only be called within the context of an FLTK [draw\(\)](#).

Parameters

in	<i>item</i>	The item to be drawn
in	X,Y,W,H	position and size.

Implements [Fl_Browser_](#).

31.7.3.25 item_first()

```
void * Fl_Browser::item_first ( ) const [protected], [virtual]
```

Returns the very first item in the list.

Example of use:

```
// Walk the browser from beginning to end
for ( void *i=item_first(); i; i=item_next(i) ) {
    printf("item label='%s'\n", item_text(i));
}
```

Returns

The first item, or NULL if list is empty.

See also

[item_first\(\)](#), [item_last\(\)](#), [item_next\(\)](#), [item_prev\(\)](#)

Implements [Fl_Browser_](#).

31.7.3.26 item_height()

```
int Fl_Browser::item_height (
    void * item ) const [protected], [virtual]
```

Returns height of *item* in pixels.

This takes into account embedded @ codes within the [text\(\)](#) label.

Parameters

in	<i>item</i>	The item whose height is returned.
----	-------------	------------------------------------

Returns

The height of the item in pixels.

See also

[item_height\(\)](#), [item_width\(\)](#),
[incr_height\(\)](#), [full_height\(\)](#)

Implements [Fl_Browser_](#).

31.7.3.27 `item_last()`

```
void * Fl_Browser::item_last ( ) const [protected], [virtual]
```

Returns the very last item in the list.

Example of use:

```
// Walk the browser in reverse, from end to start
for ( void *i=item_last(); i; i=item_prev(i) ) {
    printf("item label='%s'\n", item_text(i));
}
```

Returns

The last item, or NULL if list is empty.

See also

[item_first\(\)](#), [item_last\(\)](#), [item_next\(\)](#), [item_prev\(\)](#)

Reimplemented from [Fl_Browser_.](#)

31.7.3.28 `item_next()`

```
void * Fl_Browser::item_next (
    void * item ) const [protected], [virtual]
```

Returns the next item after `item`.

Parameters

in	<i>item</i>	The 'current' item
----	-------------	--------------------

Returns

The next item after `item`, or NULL if there are none after this one.

See also

[item_first\(\)](#), [item_last\(\)](#), [item_next\(\)](#), [item_prev\(\)](#)

Implements [Fl_Browser_.](#)

31.7.3.29 `item_prev()`

```
void * Fl_Browser::item_prev (
    void * item ) const [protected], [virtual]
```

Returns the previous item before `item`.

Parameters

in	<i>item</i>	The 'current' item
----	-------------	--------------------

Returns

The previous item before `item`, or NULL if there are none before this one.

See also

[item_first\(\)](#), [item_last\(\)](#), [item_next\(\)](#), [item_prev\(\)](#)

Implements [Fl_Browser_.](#)

31.7.3.30 item_select()

```
void Fl_Browser::item_select (
    void * item,
    int val ) [protected], [virtual]
```

Change the selection state of *item* to the value *val*.

Parameters

in	<i>item</i>	The item to be changed.
in	<i>val</i>	The new selection state: 1 selects, 0 de-selects.

See also

[select\(\)](#), [selected\(\)](#), [value\(\)](#), [item_select\(\)](#), [item_selected\(\)](#)

Reimplemented from [Fl_Browser_](#).

31.7.3.31 item_selected()

```
int Fl_Browser::item_selected (
    void * item ) const [protected], [virtual]
```

See if *item* is selected.

Parameters

in	<i>item</i>	The item whose selection state is to be checked.
----	-------------	--

Returns

1 if selected, 0 if not.

See also

[select\(\)](#), [selected\(\)](#), [value\(\)](#), [item_select\(\)](#), [item_selected\(\)](#)

Reimplemented from [Fl_Browser_](#).

31.7.3.32 item_swap()

```
void Fl_Browser::item_swap (
    void * a,
    void * b ) [inline], [protected], [virtual]
```

Swap the items *a* and *b*.

You must call [redraw\(\)](#) to make any changes visible.

Parameters

in	<i>a,b</i>	the items to be swapped.
----	------------	--------------------------

See also

[swap\(int,int\)](#), [item_swap\(\)](#)

Reimplemented from [Fl_Browser_](#).

31.7.3.33 `item_text()`

```
const char * Fl_Browser::item_text (
    void * item ) const [protected], [virtual]
```

Returns the label text for *item*.

Parameters

<code>in</code>	<i>item</i>	The item whose label text is returned.
-----------------	-------------	--

Returns

The item's text string. (Can be NULL)

Reimplemented from [Fl_Browser_](#).

31.7.3.34 `item_width()`

```
int Fl_Browser::item_width (
    void * item ) const [protected], [virtual]
```

Returns width of *item* in pixels.

This takes into account embedded @ codes within the [text\(\)](#) label.

Parameters

<code>in</code>	<i>item</i>	The item whose width is returned.
-----------------	-------------	-----------------------------------

Returns

The width of the item in pixels.

See also

[item_height\(\)](#), [item_width\(\)](#),
[incr_height\(\)](#), [full_height\(\)](#)

Implements [Fl_Browser_](#).

31.7.3.35 `lineno()`

```
int Fl_Browser::lineno (
    void * item ) const [protected]
```

Returns line number corresponding to *item*, or zero if not found.

Caveat: See efficiency note in [find_line\(\)](#).

Parameters

<code>in</code>	<i>item</i>	The item to be found
-----------------	-------------	----------------------

Returns

The line number of the item, or 0 if not found.

See also

[item_at\(\)](#), [find_line\(\)](#), [lineno\(\)](#)

31.7.3.36 `lineposition()`

```
void Fl_Browser::lineposition (
    int line,
    Fl_Line_Position pos )
```

Updates the browser so that `line` is shown at position `pos`.

Parameters

in	<i>line</i>	line number. (1 based)
in	<i>pos</i>	position.

See also

[topline\(\)](#), [middleline\(\)](#), [bottomline\(\)](#)

31.7.3.37 `load()`

```
int Fl_Browser::load (
    const char * filename )
```

Clears the browser and reads the file, adding each line from the file to the browser.

If the filename is NULL or a zero-length string then this just clears the browser. This returns zero if there was any error in opening or reading the file, in which case `errno` is set to the system error. The [data\(\)](#) of each line is set to NULL.

Parameters

in	<i>filename</i>	The filename to load
----	-----------------	----------------------

Returns

1 if OK, 0 on error (`errno` has reason)

See also

[add\(\)](#)

31.7.3.38 `make_visible()`

```
void Fl_Browser::make_visible (
    int line ) [inline]
```

Make the item at the specified line [visible\(\)](#).

Functionally similar to [show\(int line\)](#). If `line` is out of range, redisplay top or bottom of list as appropriate.

Parameters

in	<i>line</i>	The line to be made visible.
----	-------------	------------------------------

See also

[show\(int\)](#), [hide\(int\)](#), [display\(\)](#), [visible\(\)](#), [make_visible\(\)](#)

31.7.3.39 middleline()

```
void Fl_Browser::middleline (
    int line ) [inline]
```

Scrolls the browser so the middle item in the browser is showing the specified line.

Parameters

in	<i>line</i>	The line to be displayed in the middle.
----	-------------	---

See also

[topline\(\)](#), [middleline\(\)](#), [bottomline\(\)](#), [displayed\(\)](#), [lineposition\(\)](#)

31.7.3.40 move()

```
void Fl_Browser::move (
    int to,
    int from )
```

Line *from* is removed and reinserted at *to*.

Note: *to* is calculated *after* line *from* gets removed.

Parameters

in	<i>to</i>	Destination line number (calculated <i>after</i> line <i>from</i> is removed)
in	<i>from</i>	Line number of item to be moved

31.7.3.41 remove()

```
void Fl_Browser::remove (
    int line )
```

Remove entry for given line number, making the browser one line shorter.

You must call [redraw\(\)](#) to make any changes visible.

Parameters

in	<i>line</i>	Line to be removed. (1 based) If <i>line</i> is out of range, no action is taken.
----	-------------	--

See also

[add\(\)](#), [insert\(\)](#), [remove\(\)](#), [swap\(int,int\)](#), [clear\(\)](#)

31.7.3.42 remove_icon()

```
void Fl_Browser::remove_icon (
    int line )
```


Removes the icon for `line`.
It's ok to remove an icon if none has been defined.

Parameters

<code>in</code>	<code>line</code>	The line whose icon is to be removed.
-----------------	-------------------	---------------------------------------

31.7.3.43 `select()`

```
int Fl_Browser::select (
    int line,
    int val = 1 )
```

Sets the selection state of the item at `line` to the value `val`.
If `val` is not specified, the default is 1 (selects the item).

Parameters

<code>in</code>	<code>line</code>	The line number of the item to be changed. (1 based)
<code>in</code>	<code>val</code>	The new selection state (1=select, 0=de-select).

Returns

1 if the state changed, 0 if not.

See also

[select\(\)](#), [selected\(\)](#), [value\(\)](#), [item_select\(\)](#), [item_selected\(\)](#)

31.7.3.44 `selected()`

```
int Fl_Browser::selected (
    int line ) const
```

Returns 1 if specified `line` is selected, 0 if not.

Parameters

<code>in</code>	<code>line</code>	The line being checked (1 based)
-----------------	-------------------	----------------------------------

Returns

1 if item selected, 0 if not.

See also

[select\(\)](#), [selected\(\)](#), [value\(\)](#), [item_select\(\)](#), [item_selected\(\)](#)

31.7.3.45 `show()`

```
void Fl_Browser::show (
    int line )
```

Makes `line` visible, and available for selection by user.

Opposite of [hide\(int\)](#). This changes the [full_height\(\)](#) if the state was changed. [redraw\(\)](#) is called automatically if a change occurred.

Parameters

in	<i>line</i>	The line to be shown. (1 based)
----	-------------	---------------------------------

See also

[show\(int\)](#), [hide\(int\)](#), [display\(\)](#), [visible\(\)](#), [make_visible\(\)](#)

31.7.3.46 size()

```
int Fl_Browser::size ( ) const [inline]
```

Returns how many lines are in the browser.

The last line number is equal to this. Returns 0 if browser is empty.

31.7.3.47 swap() [1/2]

```
void Fl_Browser::swap (
    FL_BLINE * a,
    FL_BLINE * b ) [protected]
```

Swap the two items a and b.

Uses [swapping\(\)](#) to ensure list updates correctly.

Parameters

in	<i>a,b</i>	The two items to be swapped.
----	------------	------------------------------

See also

[swap\(int,int\)](#), [item_swap\(\)](#)

31.7.3.48 swap() [2/2]

```
void Fl_Browser::swap (
    int a,
    int b )
```

Swaps two browser lines a and b.

You must call [redraw\(\)](#) to make any changes visible.

Parameters

in	<i>a,b</i>	The two lines to be swapped. (both 1 based)
----	------------	---

See also

[swap\(int,int\)](#), [item_swap\(\)](#)

31.7.3.49 text() [1/2]

```
const char * Fl_Browser::text (
    int line ) const
```

Returns the label text for the specified line.

Return value can be NULL if `line` is out of range or unset. The parameter `line` is 1 based.

Parameters

in	<i>line</i>	The line number of the item whose text is returned. (1 based)
----	-------------	---

Returns

The text string (can be NULL)

31.7.3.50 text() [2/2]

```
void Fl_Browser::text (
    int line,
    const char * newtext )
```

Sets the text for the specified *line* to *newtext*.

Text may contain format characters; see [format_char\(\)](#) for details. *newtext* is copied using the `strdup()` function, and can be NULL to make a blank line.

Does nothing if *line* is out of range.

Parameters

in	<i>line</i>	The line of the item whose text will be changed. (1 based)
in	<i>newtext</i>	The new string to be assigned to the item.

31.7.3.51 textsize()

```
void Fl_Browser::textsize (
    Fl_Fontsize newSize )
```

Sets the default text size (in pixels) for the lines in the browser to *newSize*.

This method recalculates all item heights and caches the total height internally for optimization of later item changes. This can be slow if there are many items in the browser.

It returns immediately (w/o recalculation) if *newSize* equals the current [textsize\(\)](#).

You *may* need to call [redraw\(\)](#) to see the effect and to have the scrollbar positions recalculated.

You should set the text size *before* populating the browser with items unless you really need to *change* the size later.

31.7.3.52 topline() [1/2]

```
int Fl_Browser::topline ( ) const
```

Returns the line that is currently visible at the top of the browser.

If there is no vertical scrollbar then this will always return 1.

Returns

The [lineno\(\)](#) of the [top\(\)](#) of the browser.

31.7.3.53 topline() [2/2]

```
void Fl_Browser::topline (
    int line ) [inline]
```

Scrolls the browser so the top item in the browser is showing the specified *line*.

Parameters

in	<i>line</i>	The line to be displayed at the top.
----	-------------	--------------------------------------

See also

[topline\(\)](#), [middleline\(\)](#), [bottomline\(\)](#), [displayed\(\)](#), [lineposition\(\)](#)

31.7.3.54 value() [1/2]

```
int Fl_Browser::value ( ) const
```

Returns the line number of the currently selected line, or 0 if none selected.

Returns

The line number of current selection, or 0 if none selected.

See also

[select\(\)](#), [selected\(\)](#), [value\(\)](#), [item_select\(\)](#), [item_selected\(\)](#)

31.7.3.55 value() [2/2]

```
void Fl_Browser::value (
    int line ) [inline]
```

Sets the browser's [value\(\)](#), which selects the specified line. This is the same as calling [select\(line\)](#).

See also

[select\(\)](#), [selected\(\)](#), [value\(\)](#), [item_select\(\)](#), [item_selected\(\)](#)

31.7.3.56 visible()

```
int Fl_Browser::visible (
    int line ) const
```

Returns non-zero if the specified `line` is visible, 0 if hidden. Use [show\(int\)](#), [hide\(int\)](#), or [make_visible\(int\)](#) to change an item's visible state.

Parameters

<code>in</code>	<i>line</i>	The line in the browser to be tested. (1 based)
-----------------	-------------	---

See also

[show\(int\)](#), [hide\(int\)](#), [display\(\)](#), [visible\(\)](#), [make_visible\(\)](#)

The documentation for this class was generated from the following files:

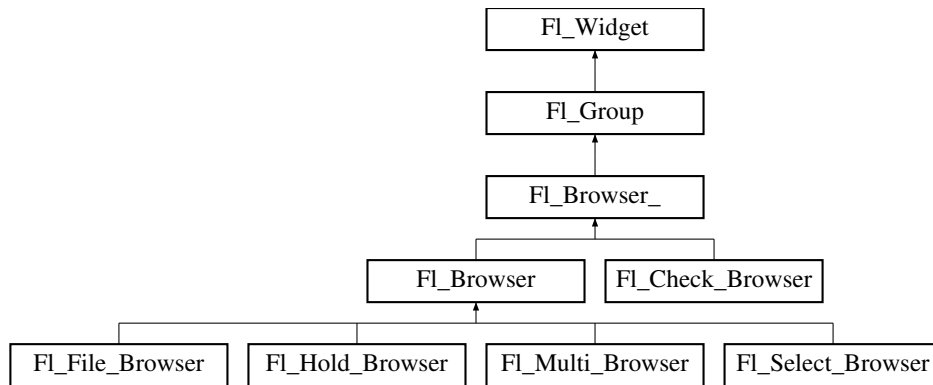
- `Fl_Browser.H`
- `Fl_Browser.cxx`
- `Fl_Browser_load.cxx`

31.8 Fl_Browser_ Class Reference

This is the base class for browsers.

```
#include <Fl_Browser_.H>
```

Inheritance diagram for `Fl_Browser_`:



Public Types

- enum {
[HORIZONTAL](#) = 1 , [VERTICAL](#) = 2 , [BOTH](#) = 3 , [ALWAYS_ON](#) = 4 ,
[HORIZONTAL_ALWAYS](#) = 5 , [VERTICAL_ALWAYS](#) = 6 , [BOTH_ALWAYS](#) = 7 }
Values for [has_scrollbar\(\)](#).

Public Member Functions

- int [deselect](#) (int docallbacks=0)
Deselects all items in the list and returns 1 if the state changed or 0 if it did not.
- void [display](#) (void *item)
*Displays the *item*, scrolling the list as necessary.*
- int [handle](#) (int event)
*Handles the *event* within the normal widget bounding box.*
- uchar [has_scrollbar](#) () const
Returns the current scrollbar mode, see [Fl_Browser_::has_scrollbar\(uchar\)](#)
- void [has_scrollbar](#) (uchar mode)
Sets whether the widget should have scrollbars or not (default [Fl_Browser_::BOTH](#)).
- int [hposition](#) () const
*Gets the horizontal scroll position of the list as a pixel position *pos*.*
- void [hposition](#) (int)
*Sets the horizontal scroll position of the list to pixel position *pos*.*
- int [position](#) () const
*Gets the vertical scroll position of the list as a pixel position *pos*.*
- void [position](#) (int pos)
*Sets the vertical scroll position of the list to pixel position *pos*.*
- void [resize](#) (int X, int Y, int W, int H)
Repositions and/or resizes the browser.
- void [scrollbar_left](#) ()
Moves the vertical scrollbar to the lefthand side of the list.
- void [scrollbar_right](#) ()
Moves the vertical scrollbar to the righthand side of the list.
- int [scrollbar_size](#) () const
Gets the current size of the scrollbars' troughs, in pixels.
- void [scrollbar_size](#) (int newSize)
*Sets the pixel size of the scrollbars' troughs to *newSize*, in pixels.*
- int [scrollbar_width](#) () const
This method has been deprecated, existing for backwards compatibility only.
- void [scrollbar_width](#) (int width)

- This method has been deprecated, existing for backwards compatibility only.*
- int [select](#) (void *item, int val=1, int docallbacks=0)
Sets the selection state of `item` to `val`, and returns 1 if the state changed or 0 if it did not.
 - int [select_only](#) (void *item, int docallbacks=0)
Selects `item` and returns 1 if the state changed or 0 if it did not.
 - void [sort](#) (int flags=0)
Sort the items in the browser based on `flags`.
 - [FI_Color](#) [textcolor](#) () const
Gets the default text color for the lines in the browser.
 - void [textcolor](#) ([FI_Color](#) col)
Sets the default text color for the lines in the browser to color `col`.
 - [FI_Font](#) [textfont](#) () const
Gets the default text font for the lines in the browser.
 - void [textfont](#) ([FI_Font](#) font)
Sets the default text font for the lines in the browser to `font`.
 - [FI_Fontsize](#) [textsize](#) () const
Gets the default text size (in pixels) for the lines in the browser.
 - void [textsize](#) ([FI_Fontsize](#) newSize)
Sets the default text size (in pixels) for the lines in the browser to `size`.

Public Attributes

- [FI_Scrollbar](#) [hscrollbar](#)
Horizontal scrollbar.
- [FI_Scrollbar](#) [scrollbar](#)
Vertical scrollbar.

Protected Member Functions

- void [bbox](#) (int &X, int &Y, int &W, int &H) const
Returns the bounding box for the interior of the list's display window, inside the scrollbars.
- void [deleting](#) (void *item)
This method should be used when `item` is being deleted from the list.
- int [displayed](#) (void *item) const
Returns non-zero if `item` has been scrolled to a position where it is being displayed.
- void [draw](#) ()
Draws the list within the normal widget bounding box.
- void * [find_item](#) (int ypos)
This method returns the item under mouse `y` position `ypos`.
- [FI_Browser_](#) (int X, int Y, int W, int H, const char *L=0)
The constructor makes an empty browser.
- virtual int [full_height](#) () const
This method may be provided by the subclass to indicate the full height of the item list, in pixels.
- virtual int [full_width](#) () const
This method may be provided by the subclass to indicate the full width of the item list, in pixels.
- virtual int [incr_height](#) () const
This method may be provided to return the average height of all items to be used for scrolling.
- void [inserting](#) (void *a, void *b)
This method should be used when an item is in the process of being inserted into the list.
- virtual void * [item_at](#) (int index) const
This method must be provided by the subclass to return the item for the specified `index`.
- virtual void [item_draw](#) (void *item, int X, int Y, int W, int H) const =0

- This method must be provided by the subclass to draw the `item` in the area indicated by `X`, `Y`, `W`, `H`.*

 - virtual void * `item_first` () const =0
- This method must be provided by the subclass to return the first item in the list.*

 - virtual int `item_height` (void *item) const =0
- This method must be provided by the subclass to return the height of `item` in pixels.*

 - virtual void * `item_last` () const
- This method must be provided by the subclass to return the last item in the list.*

 - virtual void * `item_next` (void *item) const =0
- This method must be provided by the subclass to return the item in the list after `item`.*

 - virtual void * `item_prev` (void *item) const =0
- This method must be provided by the subclass to return the item in the list before `item`.*

 - virtual int `item_quick_height` (void *item) const
- This method may be provided by the subclass to return the height of the `item`, in pixels.*

 - virtual void `item_select` (void *item, int val=1)
- This method must be implemented by the subclass if it supports multiple selections; sets the selection state to `val` for the `item`.*

 - virtual int `item_selected` (void *item) const
- This method must be implemented by the subclass if it supports multiple selections; returns the selection state for `item`.*

 - virtual void `item_swap` (void *a, void *b)
- This optional method should be provided by the subclass to efficiently swap browser items `a` and `b`, such as for sorting.*

 - virtual const char * `item_text` (void *item) const
- This optional method returns a string (label) that may be used for sorting.*

 - virtual int `item_width` (void *item) const =0
- This method must be provided by the subclass to return the width of the `item` in pixels.*

 - int `leftedge` () const
- This method returns the `X` position of the left edge of the list area after adjusting for the scrollbar and border, if any.*

 - void `new_list` ()
- This method should be called when the list data is completely replaced or cleared.*

 - void `redraw_line` (void *item)
- This method should be called when the contents of `item` has changed, but not its height.*

 - void `redraw_lines` ()
- This method will cause the entire list to be redrawn.*

 - void `replacing` (void *a, void *b)
- This method should be used when item `a` is being replaced by item `b`.*

 - void * `selection` () const
- Returns the item currently selected, or NULL if there is no selection.*

 - void `swapping` (void *a, void *b)
- This method should be used when two items `a` and `b` are being swapped.*

 - void * `top` () const
- Returns the item that appears at the top of the list.*

Additional Inherited Members

31.8.1 Detailed Description

This is the base class for browsers.

To be useful it must be subclassed and several virtual functions defined. The Forms-compatible browser and the file chooser's browser are subclassed off of this.

This has been designed so that the subclass has complete control over the storage of the data, although because `next()` and `prev()` functions are used to index, it works best as a linked list or as a large block of characters in which the line breaks must be searched for.

A great deal of work has been done so that the "height" of a data object does not need to be determined until it is drawn. This is useful if actually figuring out the size of an object requires accessing image data or doing `stat()` on a file or doing some other slow operation.

31.8.1.1 Keyboard navigation of browser items

The keyboard navigation of browser items is only possible if `visible_focus()` is enabled. If disabled, the widget rejects keyboard focus; Tab and Shift-Tab focus navigation will skip the widget.

In 'Select' and 'Normal' mode, the widget rejects keyboard focus; no navigation keys are supported (other than scrollbar positioning).

In 'Hold' mode, the widget accepts keyboard focus, and Up/Down arrow keys can navigate the selected item.

In 'Multi' mode, the widget accepts keyboard focus, and Up/Down arrow keys navigate the focus box; Space toggles the current item's selection, Enter selects only the current item (deselects all others). If Shift (or Ctrl) is combined with Up/Down arrow keys, the current item's selection state is extended to the next item. In this way one can extend a selection or de-selection.

31.8.2 Member Enumeration Documentation

31.8.2.1 anonymous enum

anonymous enum

Values for `has_scrollbar()`.

Anonymous enum bit flags for `has_scrollbar()`.

- bit 0: horizontal
- bit 1: vertical
- bit 2: 'always' (to be combined with bits 0 and 1)
- bit 3-31: reserved for future use

Enumerator

HORIZONTAL	Only show horizontal scrollbar.
VERTICAL	Only show vertical scrollbar.
BOTH	Show both scrollbars. (default)
ALWAYS_ON	Specified scrollbar(s) should 'always' be shown (to be used with HORIZONTAL/VERTICAL)
HORIZONTAL_ALWAYS	Horizontal scrollbar always on.
VERTICAL_ALWAYS	Vertical scrollbar always on.
BOTH_ALWAYS	Both scrollbars always on.

31.8.3 Constructor & Destructor Documentation

31.8.3.1 Fl_Browser_()

```
Fl_Browser_::Fl_Browser_ (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 ) [protected]
```

The constructor makes an empty browser.

Parameters

in	<code>X,Y,W,H</code>	position and size.
----	----------------------	--------------------

Parameters

in	<i>L</i>	The label string, may be NULL.
----	----------	--------------------------------

31.8.4 Member Function Documentation

31.8.4.1 bbox()

```
void Fl_Browser_::bbox (
    int & X,
    int & Y,
    int & W,
    int & H ) const [protected]
```

Returns the bounding box for the interior of the list's display window, inside the scrollbars.

Parameters

out	<i>X,Y,W,H</i>	The returned bounding box. (The original contents of these parameters are overwritten)
-----	----------------	---

31.8.4.2 deleting()

```
void Fl_Browser_::deleting (
    void * item ) [protected]
```

This method should be used when *item* is being deleted from the list.

It allows the `Fl_Browser_` to discard any cached data it has on the item. This method does not actually delete the item, but handles the follow up bookkeeping after the item has just been deleted.

Parameters

in	<i>item</i>	The item being deleted.
----	-------------	-------------------------

31.8.4.3 deselect()

```
int Fl_Browser_::deselect (
    int docallbacks = 0 )
```

Deselects all items in the list and returns 1 if the state changed or 0 if it did not.

If the optional `docallbacks` parameter is non-zero, `deselect` tries to call the callback function for the widget.

Parameters

in	<i>docallbacks</i>	If 1, invokes widget callback if item changed. If 0, doesn't do callback (default).
----	--------------------	--

31.8.4.4 display()

```
void Fl_Browser_::display (
    void * item )
```

Displays the *item*, scrolling the list as necessary.

Parameters

in	<i>item</i>	The item to be displayed.
----	-------------	---------------------------

See also

[display\(\)](#), [displayed\(\)](#)

31.8.4.5 displayed()

```
int Fl_Browser_::displayed (
    void * item ) const [protected]
```

Returns non-zero if *item* has been scrolled to a position where it is being displayed.

Checks to see if the item's vertical position is within the top and bottom edges of the display window. This does NOT take into account the [hide\(\)/show\(\)](#) status of the widget or item.

Parameters

in	<i>item</i>	The item to check
----	-------------	-------------------

Returns

1 if visible, 0 if not visible.

See also

[display\(\)](#), [displayed\(\)](#)

31.8.4.6 find_item()

```
void * Fl_Browser_::find_item (
    int ypos ) [protected]
```

This method returns the item under mouse y position *ypos*.

NULL is returned if no item is displayed at that position.

Parameters

in	<i>ypos</i>	The y position (eg. Fl::event_y()) to find an item under.
----	-------------	--

Returns

The item, or NULL if not found

31.8.4.7 full_height()

```
int Fl_Browser_::full_height ( ) const [protected], [virtual]
```

This method may be provided by the subclass to indicate the full height of the item list, in pixels.

The default implementation computes the full height from the item heights. Includes the items that are scrolled off screen.

Returns

The height of the entire list, in pixels.

Reimplemented in [Fl_Browser](#).

31.8.4.8 full_width()

```
int Fl_Browser_::full_width ( ) const [protected], [virtual]
```

This method may be provided by the subclass to indicate the full width of the item list, in pixels. The default implementation computes the full width from the item widths.

Returns

The maximum width of all the items, in pixels.

31.8.4.9 handle()

```
int Fl_Browser_::handle (
    int event ) [virtual]
```

Handles the `event` within the normal widget bounding box.

Parameters

<code>in</code>	<code>event</code>	The event to process.
-----------------	--------------------	-----------------------

Returns

1 if event was processed, 0 if not.

Reimplemented from [Fl_Widget](#).

Reimplemented in [Fl_Check_Browser](#).

31.8.4.10 has_scrollbar()

```
void Fl_Browser_::has_scrollbar (
    uchar mode ) [inline]
```

Sets whether the widget should have scrollbars or not (default [Fl_Browser_::BOTH](#)).

By default you can scroll in both directions, and the scrollbars disappear if the data will fit in the widget.

[has_scrollbar\(\)](#) changes this based on the value of `mode` :

- 0 - No scrollbars.
- [Fl_Browser_::HORIZONTAL](#) - Only a horizontal scrollbar.
- [Fl_Browser_::VERTICAL](#) - Only a vertical scrollbar.
- [Fl_Browser_::BOTH](#) - The default is both scrollbars.
- [Fl_Browser_::HORIZONTAL_ALWAYS](#) - Horizontal scrollbar always on, vertical always off.
- [Fl_Browser_::VERTICAL_ALWAYS](#) - Vertical scrollbar always on, horizontal always off.
- [Fl_Browser_::BOTH_ALWAYS](#) - Both always on.

31.8.4.11 hposition() [1/2]

```
int Fl_Browser_::hposition ( ) const [inline]
```

Gets the horizontal scroll position of the list as a pixel position `pos`.

The position returned is how many pixels of the list are scrolled off the left edge of the screen. Example: A position of '18' indicates the left 18 pixels of the list are scrolled off the left edge of the screen.

See also

[position\(\)](#), [hposition\(\)](#)

31.8.4.12 hposition() [2/2]

```
void Fl_Browser_::hposition (
    int pos )
```

Sets the horizontal scroll position of the list to pixel position `pos`.

The position is how many pixels of the list are scrolled off the left edge of the screen. Example: A position of '18' scrolls the left 18 pixels of the list off the left edge of the screen.

Parameters

in	<code>pos</code>	The horizontal position (in pixels) to scroll the browser to.
----	------------------	---

See also

[position\(\)](#), [hposition\(\)](#)

31.8.4.13 incr_height()

```
int Fl_Browser_::incr_height ( ) const [protected], [virtual]
```

This method may be provided to return the average height of all items to be used for scrolling.

The default implementation uses the height of the first item.

Returns

The average height of items, in pixels.

Reimplemented in [Fl_Browser](#).

31.8.4.14 inserting()

```
void Fl_Browser_::inserting (
    void * a,
    void * b ) [protected]
```

This method should be used when an item is in the process of being inserted into the list.

It allows the [Fl_Browser_](#) to update its cache data as needed, scheduling a redraw for the affected lines. This method does not actually insert items, but handles the follow up bookkeeping after items have been inserted.

Parameters

in	<code>a</code>	The starting item position
in	<code>b</code>	The new item being inserted

31.8.4.15 item_at()

```
virtual void* Fl_Browser_::item_at (
    int index ) const [inline], [protected], [virtual]
```

This method must be provided by the subclass to return the item for the specified `index`.

Parameters

in	<code>index</code>	The <code>index</code> of the item to be returned
----	--------------------	---

Returns

The item at the specified `index`.

Reimplemented in [Fl_Browser](#).

31.8.4.16 item_first()

```
virtual void* Fl_Browser_::item_first ( ) const [protected], [pure virtual]
```

This method must be provided by the subclass to return the first item in the list.

See also

[item_first\(\)](#), [item_next\(\)](#), [item_last\(\)](#), [item_prev\(\)](#)

Implemented in [Fl_Browser](#).

31.8.4.17 item_height()

```
virtual int Fl_Browser_::item_height (
    void * item ) const [protected], [pure virtual]
```

This method must be provided by the subclass to return the height of `item` in pixels. Allow for two additional pixels for the list selection box.

Parameters

<code>in</code>	<code><i>item</i></code>	The item whose height is returned.
-----------------	--------------------------	------------------------------------

Returns

The height of the specified `item` in pixels.

See also

[item_height\(\)](#), [item_width\(\)](#), [item_quick_height\(\)](#)

Implemented in [Fl_Browser](#).

31.8.4.18 item_last()

```
virtual void* Fl_Browser_::item_last ( ) const [inline], [protected], [virtual]
```

This method must be provided by the subclass to return the last item in the list.

See also

[item_first\(\)](#), [item_next\(\)](#), [item_last\(\)](#), [item_prev\(\)](#)

Reimplemented in [Fl_Browser](#).

31.8.4.19 item_next()

```
virtual void* Fl_Browser_::item_next (
    void * item ) const [protected], [pure virtual]
```

This method must be provided by the subclass to return the item in the list after `item`.

See also

[item_first\(\)](#), [item_next\(\)](#), [item_last\(\)](#), [item_prev\(\)](#)

Implemented in [Fl_Browser](#).

31.8.4.20 item_prev()

```
virtual void* Fl_Browser_::item_prev (
    void * item ) const [protected], [pure virtual]
```

This method must be provided by the subclass to return the item in the list before *item*.

See also

[item_first\(\)](#), [item_next\(\)](#), [item_last\(\)](#), [item_prev\(\)](#)

Implemented in [Fl_Browser](#).

31.8.4.21 item_quick_height()

```
int Fl_Browser_::item_quick_height (
    void * item ) const [protected], [virtual]
```

This method may be provided by the subclass to return the height of the *item*, in pixels.

Allow for two additional pixels for the list selection box. This method differs from *item_height* in that it is only called for selection and scrolling operations. The default implementation calls *item_height*.

Parameters

in	<i>item</i>	The item whose height to return.
----	-------------	----------------------------------

Returns

The height, in pixels.

31.8.4.22 item_select()

```
void Fl_Browser_::item_select (
    void * item,
    int val = 1 ) [protected], [virtual]
```

This method must be implemented by the subclass if it supports multiple selections; sets the selection state to *val* for the *item*.

Sets the selection state for *item*, where optional *val* is 1 (select, the default) or 0 (de-select).

Parameters

in	<i>item</i>	The item to be selected
in	<i>val</i>	The optional selection state; 1=select, 0=de-select. The default is to select the item (1).

Reimplemented in [Fl_Browser](#).

31.8.4.23 item_selected()

```
int Fl_Browser_::item_selected (
    void * item ) const [protected], [virtual]
```

This method must be implemented by the subclass if it supports multiple selections; returns the selection state for *item*.

The method should return 1 if *item* is selected, or 0 otherwise.

Parameters

in	<i>item</i>	The item to test.
----	-------------	-------------------

Reimplemented in [Fl_Browser](#).

31.8.4.24 item_swap()

```
virtual void Fl_Browser_::item_swap (
    void * a,
    void * b ) [inline], [protected], [virtual]
```

This optional method should be provided by the subclass to efficiently swap browser items a and b, such as for sorting.

Parameters

in	<i>a,b</i>	The two items to be swapped.
----	------------	------------------------------

Reimplemented in [Fl_Browser](#).

31.8.4.25 item_text()

```
virtual const char* Fl_Browser_::item_text (
    void * item ) const [inline], [protected], [virtual]
```

This optional method returns a string (label) that may be used for sorting.

Parameters

in	<i>item</i>	The item whose label text is returned.
----	-------------	--

Returns

The item's text label. (Can be NULL if blank)

Reimplemented in [Fl_Browser](#).

31.8.4.26 item_width()

```
virtual int Fl_Browser_::item_width (
    void * item ) const [protected], [pure virtual]
```

This method must be provided by the subclass to return the width of the *item* in pixels. Allow for two additional pixels for the list selection box.

Parameters

in	<i>item</i>	The item whose width is returned.
----	-------------	-----------------------------------

Returns

The width of the item in pixels.

Implemented in [Fl_Browser](#).

31.8.4.27 leftedge()

```
int Fl_Browser_::leftedge ( ) const [protected]
```

This method returns the X position of the left edge of the list area after adjusting for the scrollbar and border, if any.

Returns

The X position of the left edge of the list, in pixels.

See also

[Fl_Browser_::bbox\(\)](#)

31.8.4.28 new_list()

```
void Fl_Browser_::new_list ( ) [protected]
```

This method should be called when the list data is completely replaced or cleared.

It informs the [Fl_Browser_](#) widget that any cached information it has concerning the items is invalid. This method does not clear the list, it just handles the follow up bookkeeping after the list has been cleared.

31.8.4.29 position() [1/2]

```
int Fl_Browser_::position ( ) const [inline]
```

Gets the vertical scroll position of the list as a pixel position `pos`.

The position returned is how many pixels of the list are scrolled off the top edge of the screen. Example: A position of '3' indicates the top 3 pixels of the list are scrolled off the top edge of the screen.

See also

[position\(\)](#), [hposition\(\)](#)

31.8.4.30 position() [2/2]

```
void Fl_Browser_::position (
    int pos )
```

Sets the vertical scroll position of the list to pixel position `pos`.

The position is how many pixels of the list are scrolled off the top edge of the screen. Example: A position of '3' scrolls the top three pixels of the list off the top edge of the screen.

Parameters

in	<i>pos</i>	The vertical position (in pixels) to scroll the browser to.
----	------------	---

See also

[position\(\)](#), [hposition\(\)](#)

31.8.4.31 redraw_line()

```
void Fl_Browser_::redraw_line (
    void * item ) [protected]
```

This method should be called when the contents of `item` has changed, but not its height.

Parameters

in	<i>item</i>	The item that needs to be redrawn.
----	-------------	------------------------------------

See also

[redraw_lines\(\)](#), [redraw_line\(\)](#)

31.8.4.32 redraw_lines()

```
void Fl_Browser_::redraw_lines ( ) [inline], [protected]
```

This method will cause the entire list to be redrawn.

See also

[redraw_lines\(\)](#), [redraw_line\(\)](#)

31.8.4.33 replacing()

```
void Fl_Browser_::replacing (
    void * a,
    void * b ) [protected]
```

This method should be used when item *a* is being replaced by item *b*.

It allows the [Fl_Browser_](#) to update its cache data as needed, schedules a redraw for the item being changed, and tries to maintain the selection. This method does not actually replace the item, but handles the follow up bookkeeping after the item has just been replaced.

Parameters

in	<i>a</i>	Item being replaced
in	<i>b</i>	Item to replace 'a'

31.8.4.34 resize()

```
void Fl_Browser_::resize (
    int X,
    int Y,
    int W,
    int H ) [virtual]
```

Repositions and/or resizes the browser.

Parameters

in	<i>X,Y,W,H</i>	The new position and size for the browser, in pixels.
----	----------------	---

Reimplemented from [Fl_Widget](#).

31.8.4.35 scrollbar_left()

```
void Fl_Browser_::scrollbar_left ( ) [inline]
```

Moves the vertical scrollbar to the lefthand side of the list.

For back compatibility.

31.8.4.36 scrollbar_right()

```
void Fl_Browser_::scrollbar_right ( ) [inline]
```

Moves the vertical scrollbar to the righthand side of the list.

For back compatibility.

31.8.4.37 scrollbar_size() [1/2]

```
int Fl_Browser_::scrollbar_size ( ) const [inline]
```

Gets the current size of the scrollbars' troughs, in pixels.

If this value is zero (default), this widget will use the [Fl::scrollbar_size\(\)](#) value as the scrollbar's width.

Returns

Scrollbar size in pixels, or 0 if the global [Fl::scrollbar_size\(\)](#) is being used.

See also

[Fl::scrollbar_size\(int\)](#)

31.8.4.38 scrollbar_size() [2/2]

```
void Fl_Browser_::scrollbar_size (
    int newSize ) [inline]
```

Sets the pixel size of the scrollbars' troughs to `newSize`, in pixels.

Normally you should not need this method, and should use [Fl::scrollbar_size\(int\)](#) instead to manage the size of ALL your widgets' scrollbars. This ensures your application has a consistent UI, is the default behavior, and is normally what you want.

Only use THIS method if you really need to override the global scrollbar size. The need for this should be rare.

Setting `newSize` to the special value of 0 causes the widget to track the global [Fl::scrollbar_size\(\)](#), which is the default.

Parameters

in	<i>newSize</i>	Sets the scrollbar size in pixels. If 0 (default), scrollbar size tracks the global Fl::scrollbar_size()
----	----------------	---

See also

[Fl::scrollbar_size\(\)](#)

31.8.4.39 scrollbar_width() [1/2]

```
int Fl_Browser_::scrollbar_width ( ) const [inline]
```

This method has been deprecated, existing for backwards compatibility only.

Use [scrollbar_size\(\)](#) instead. This method always returns the global value [Fl::scrollbar_size\(\)](#).

Returns

Always returns the global value [Fl::scrollbar_size\(\)](#).

Todo This method should eventually be removed in 1.4+

31.8.4.40 scrollbar_width() [2/2]

```
void Fl_Browser_::scrollbar_width (
    int width ) [inline]
```

This method has been deprecated, existing for backwards compatibility only.

Use [scrollbar_size\(int\)](#) instead. This method sets the global [Fl::scrollbar_size\(\)](#), and forces this instance of the widget to use it.

Todo This method should eventually be removed in 1.4+

31.8.4.41 select()

```
int Fl_Browser_::select (
    void * item,
    int val = 1,
    int docalbacks = 0 )
```

Sets the selection state of *item* to *val*, and returns 1 if the state changed or 0 if it did not. If *docalbacks* is non-zero, *select* tries to call the callback function for the widget.

Parameters

in	<i>item</i>	The item whose selection state is to be changed
in	<i>val</i>	The new selection state (1=select, 0=de-select)
in	<i>docalbacks</i>	If 1, invokes widget callback if item changed. If 0, doesn't do callback (default).

Returns

1 if state was changed, 0 if not.

31.8.4.42 select_only()

```
int Fl_Browser_::select_only (
    void * item,
    int docalbacks = 0 )
```

Selects *item* and returns 1 if the state changed or 0 if it did not. Any other items in the list are deselected.

Parameters

in	<i>item</i>	The <i>item</i> to select.
in	<i>docalbacks</i>	If 1, invokes widget callback if item changed. If 0, doesn't do callback (default).

31.8.4.43 selection()

```
void* Fl_Browser_::selection ( ) const [inline], [protected]
```

Returns the item currently selected, or NULL if there is no selection.

For multiple selection browsers this call returns the currently focused item, even if it is not selected. To find all selected items, call [Fl_Multi_Browser::selected\(\)](#) for every item in question.

31.8.4.44 sort()

```
void Fl_Browser_::sort (
    int flags = 0 )
```

Sort the items in the browser based on *flags*.

[item_swap\(void*, void*\)](#) and [item_text\(void*\)](#) must be implemented for this call.

Parameters

in	<i>flags</i>	FL_SORT_ASCENDING – sort in ascending order FL_SORT_DESCENDING – sort in descending order Values other than the above will cause undefined behavior Other flags may appear in the future.
----	--------------	--

Todo Add a flag to ignore case

31.8.4.45 `swapping()`

```
void Fl_Browser_::swapping (
    void * a,
    void * b ) [protected]
```

This method should be used when two items `a` and `b` are being swapped.

It allows the `Fl_Browser_` to update its cache data as needed, schedules a redraw for the two items, and tries to maintain the current selection. This method does not actually swap items, but handles the follow up bookkeeping after items have been swapped.

Parameters

in	<code>a,b</code>	Items being swapped.
----	------------------	----------------------

31.8.4.46 `textfont()`

```
Fl_Font Fl_Browser_::textfont ( ) const [inline]
```

Gets the default text font for the lines in the browser.

See also

[textfont\(\)](#), [textsize\(\)](#), [textcolor\(\)](#)

31.8.5 Member Data Documentation

31.8.5.1 `hscrollbar`

```
Fl_Scrollbar Fl_Browser_::hscrollbar
```

Horizontal scrollbar.

Public, so that it can be accessed directly.

31.8.5.2 `scrollbar`

```
Fl_Scrollbar Fl_Browser_::scrollbar
```

Vertical scrollbar.

Public, so that it can be accessed directly.

The documentation for this class was generated from the following files:

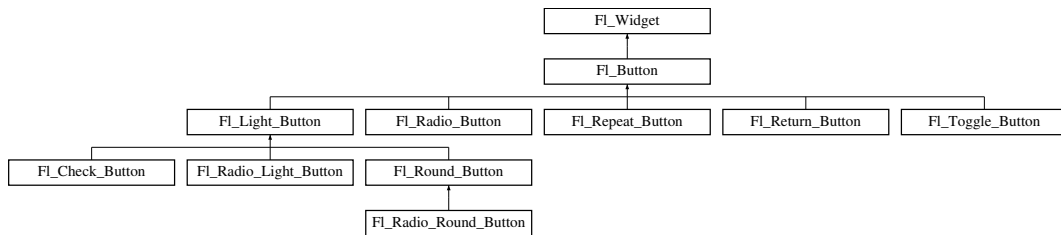
- `Fl_Browser_.H`
- `Fl_Browser_.cxx`

31.9 `Fl_Button` Class Reference

Buttons generate callbacks when they are clicked by the user.

```
#include <Fl_Button.H>
```

Inheritance diagram for `Fl_Button`:



Public Member Functions

- int `clear` ()
Same as `value(0)`.
- `Fl_Boxtype` `down_box` () const
Returns the current down box type, which is drawn when `value()` is non-zero.
- void `down_box` (`Fl_Boxtype` b)
Sets the down box type.
- `Fl_Color` `down_color` () const
(for backwards compatibility)
- void `down_color` (unsigned c)
(for backwards compatibility)
- `Fl_Button` (int X, int Y, int W, int H, const char *L=0)
The constructor creates the button using the given position, size, and label.
- virtual int `handle` (int)
Handles the specified event.
- int `set` ()
Same as `value(1)`.
- void `setonly` ()
Turns on this button and turns off all other radio buttons in the group (calling `value(1)` or `set()` does not do this).
- int `shortcut` () const
Returns the current shortcut key for the button.
- void `shortcut` (const char *s)
(for backwards compatibility)
- void `shortcut` (int s)
Sets the shortcut key to s.
- char `value` () const
Returns the current value of the button (0 or 1).
- int `value` (int v)
Sets the current value of the button.

Protected Member Functions

- virtual void `draw` ()
Draws the widget.
- void `simulate_key_action` ()

Static Protected Member Functions

- static void `key_release_timeout` (void *)

Static Protected Attributes

- static `Fl_Widget_Tracker` * `key_release_tracker` = 0

Additional Inherited Members

31.9.1 Detailed Description

Buttons generate callbacks when they are clicked by the user.

You control exactly when and how by changing the values for `type()` and `when()`. Buttons can also generate callbacks in response to `FL_SHORTCUT` events. The button can either have an explicit `shortcut(int s)` value or a letter shortcut can be indicated in the `label()` with an `'&'` character before it. For the label shortcut it does not matter if `Alt` is held down, but if you have an input field in the same window, the user will have to hold down the `Alt` key so that the input field does not eat the event first as an `FL_KEYBOARD` event.

Todo Refactor the doxygen comments for `Fl_Button type()` documentation.

For an `Fl_Button` object, the `type()` call returns one of:

- `FL_NORMAL_BUTTON (0)`: `value()` remains unchanged after button press.
- `FL_TOGGLE_BUTTON`: `value()` is inverted after button press.
- `FL_RADIO_BUTTON`: `value()` is set to 1 after button press, and all other buttons in the current group with `type () == FL_RADIO_BUTTON` are set to zero.

Todo Refactor the doxygen comments for `Fl_Button when()` documentation.

For an `Fl_Button` object, the following `when()` values are useful, the default being `FL_WHEN_RELEASE`:

- `0`: The callback is not done, instead `changed()` is turned on.
- `FL_WHEN_RELEASE`: The callback is done after the user successfully clicks the button, or when a shortcut is typed.
- `FL_WHEN_CHANGED`: The callback is done each time the `value()` changes (when the user pushes and releases the button, and as the mouse is dragged around in and out of the button).

31.9.2 Constructor & Destructor Documentation

31.9.2.1 Fl_Button()

```
Fl_Button::Fl_Button (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

The constructor creates the button using the given position, size, and label.

The default box type is `box(FL_UP_BOX)`.

You can control how the button is drawn when ON by setting `down_box()`. The default is `FL_NO_BOX (0)` which will select an appropriate box type using the normal (OFF) box type by using `fl_down(box())`.

Derived classes may handle this differently.

Parameters

in	<code>X,Y,W,H</code>	position and size of the widget
in	<code>L</code>	widget label, default is no label

31.9.3 Member Function Documentation

31.9.3.1 clear()

```
int Fl_Button::clear ( ) [inline]
Same as value (0).
```

See also

[value\(int v\)](#)

31.9.3.2 down_box() [1/2]

```
Fl_Boxtype Fl_Button::down_box ( ) const [inline]
Returns the current down box type, which is drawn when value() is non-zero.
```

Return values

<i>Fl_Boxtype</i>	
-------------------	--

31.9.3.3 down_box() [2/2]

```
void Fl_Button::down_box (
    Fl_Boxtype b ) [inline]
```

Sets the down box type.

The default value of 0 causes FLTK to figure out the correct matching down version of [box\(\)](#).

Some derived classes (e.g. [Fl_Round_Button](#) and [Fl_Light_Button](#) use [down_box\(\)](#) for special purposes. See docs of these classes.

Parameters

<i>in</i>	<i>b</i>	down box type
-----------	----------	---------------

31.9.3.4 draw()

```
void Fl_Button::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own draw() method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scroll;           // scroll is an embedded Fl_Scrollbar
s->draw();                          // calls Fl_Scrollbar::draw()
```

Implements [Fl_Widget](#).

Reimplemented in [Fl_Return_Button](#), and [Fl_Light_Button](#).

31.9.3.5 handle()

```
int Fl_Button::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[FI_Event](#)

Reimplemented from [FI_Widget](#).

Reimplemented in [FI_Return_Button](#), [FI_Repeat_Button](#), and [FI_Light_Button](#).

31.9.3.6 set()

```
int Fl_Button::set ( ) [inline]
```

Same as `value(1)`.

See also

[value\(int v\)](#)

31.9.3.7 shortcut() [1/2]

```
int Fl_Button::shortcut ( ) const [inline]
```

Returns the current shortcut key for the button.

Return values

<i>int</i>	
------------	--

31.9.3.8 shortcut() [2/2]

```
void Fl_Button::shortcut (
    int s ) [inline]
```

Sets the shortcut key to *s*.

Setting this overrides the use of '&' in the [label\(\)](#). The value is a bitwise OR of a key and a set of shift flags, for example: `FL_ALT | 'a'`, or `FL_ALT | (FL_F + 10)`, or just `'a'`. A value of 0 disables the shortcut.

The key can be any value returned by [Fl::event_key\(\)](#), but will usually be an ASCII letter. Use a lower-case letter unless you require the shift key to be held down.

The shift flags can be any set of values accepted by [Fl::event_state\(\)](#). If the bit is on, that shift key must be pushed. Meta, Alt, Ctrl, and Shift must be off if they are not in the shift flags (zero for the other bits indicates a "don't care" setting).

Parameters

in	<i>s</i>	bitwise OR of key and shift flags
----	----------	-----------------------------------

31.9.3.9 value()

```
int Fl_Button::value (
    int v )
```

Sets the current value of the button.

A non-zero value sets the button to 1 (ON), and zero sets it to 0 (OFF).

Parameters

in	v	button value.
----	---	---------------

See also

[set\(\)](#), [clear\(\)](#)

The documentation for this class was generated from the following files:

- Fl_Button.H
- Fl_Button.cxx

31.10 Fl_Cairo_State Class Reference

Contains all the necessary info on the current cairo context.

```
#include <Fl_Cairo.H>
```

Public Member Functions

- bool [autolink](#) () const
Gets the autolink option. See [Fl::cairo_autolink_context\(bool\)](#)
- void [autolink](#) (bool b)
Sets the autolink option, only available with `-enable-cairoext`.
- cairo_t * [cc](#) () const
Gets the current cairo context.
- void [cc](#) (cairo_t *c, bool own=true)
Sets the current cairo context.
- void * [gc](#) () const
Gets the last gc attached to a cc.
- void [gc](#) (void *c)
Sets the gc c to keep track on.
- void * [window](#) () const
Gets the last window attached to a cc.
- void [window](#) (void *w)
Sets the window w to keep track on.

31.10.1 Detailed Description

Contains all the necessary info on the current cairo context.

A private internal & unique corresponding object is created to permit cairo context state handling while keeping it opaque. For internal use only.

Note

Only available when configure has the `-enable-cairo` option

31.10.2 Member Function Documentation

31.10.2.1 cc()

```
void Fl_Cairo_State::cc (
    cairo_t * c,
    bool own = true ) [inline]
```

Sets the current cairo context.

`own == true` (the default) indicates that the cairo context `c` will be deleted by FLTK internally when another `cc` is set later.

`own == false` indicates `cc` deletion is handled externally by the user program.

The documentation for this class was generated from the following files:

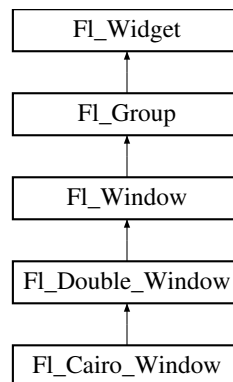
- `Fl_Cairo.H`
- `Fl_Cairo.cxx`

31.11 FI_Cairo_Window Class Reference

This defines a pre-configured cairo fltk window.

```
#include <Fl_Cairo_Window.H>
```

Inheritance diagram for `Fl_Cairo_Window`:



Public Types

- typedef void(* `cairo_draw_cb`) (`Fl_Cairo_Window` *self, cairo_t *def)
This defines the cairo draw callback prototype that you must further.

Public Member Functions

- `Fl_Cairo_Window` (int `w`, int `h`)
- void `set_draw_cb` (`cairo_draw_cb` cb)

You must provide a draw callback which will implement your cairo rendering.

Protected Member Functions

- void `draw` ()

Overloaded to provide cairo callback support.

Additional Inherited Members

31.11.1 Detailed Description

This defines a pre-configured cairo fltk window.

This class overloads the virtual `draw()` method for you, so that the only thing you have to do is to provide your cairo code. All cairo context handling is achieved transparently.

Note

You can alternatively define your custom cairo fltk window, and thus at least override the `draw()` method to provide custom cairo support. In this case you will probably use `Fl::cairo_make_current(Fl_Window*)` to attach a context to your window. You should do it only when your window is the current window.

See also

[Fl_Window::current\(\)](#)

31.11.2 Member Function Documentation**31.11.2.1 set_draw_cb()**

```
void Fl_Cairo_Window::set_draw_cb (
    cairo_draw_cb cb ) [inline]
```

You must provide a draw callback which will implement your cairo rendering. This method will permit you to set your cairo callback to `cb`.

The documentation for this class was generated from the following file:

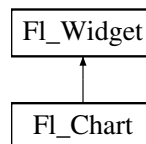
- `Fl_Cairo_Window.H`

31.12 Fl_Chart Class Reference

`Fl_Chart` displays simple charts.

```
#include <Fl_Chart.H>
```

Inheritance diagram for `Fl_Chart`:

**Public Member Functions**

- void `add` (double val, const char *str=0, unsigned col=0)
 - Add the data value val with optional label str and color col to the chart.*
- `uchar autosize` () const
 - Get whether the chart will automatically adjust the bounds of the chart.*
- void `autosize` (uchar n)
 - Set whether the chart will automatically adjust the bounds of the chart.*
- void `bounds` (double *a, double *b) const
 - Gets the lower and upper bounds of the chart values.*
- void `bounds` (double a, double b)
 - Sets the lower and upper bounds of the chart values.*
- void `clear` ()
 - Removes all values from the chart.*
- `Fl_Chart` (int X, int Y, int W, int H, const char *L=0)
 - Create a new Fl_Chart widget using the given position, size and label string.*
- void `insert` (int ind, double val, const char *str=0, unsigned col=0)
 - Inserts a data value val at the given position ind.*
- int `maxsize` () const

- Gets the maximum number of data values for a chart.*

 - void `maxsize` (int m)

Set the maximum number of data values for a chart.
- void `replace` (int ind, double val, const char *str=0, unsigned col=0)

Replace a data value `val` at the given position `ind`.
- int `size` () const

Returns the number of data values in the chart.
- void `size` (int W, int H)
- `FI_Color` `textcolor` () const

Gets the chart's text color.
- void `textcolor` (`FI_Color` n)

gets the chart's text color to `n`.
- `FI_Font` `textfont` () const

Gets the chart's text font.
- void `textfont` (`FI_Font` s)

Sets the chart's text font to `s`.
- `FI_Fontsize` `textsize` () const

Gets the chart's text size.
- void `textsize` (`FI_Fontsize` s)

gets the chart's text size to `s`.
- `~FI_Chart` ()

Destroys the `FI_Chart` widget and all of its data.

Protected Member Functions

- void `draw` ()

Draws the widget.

Additional Inherited Members

31.12.1 Detailed Description

`FI_Chart` displays simple charts.

It is provided for Forms compatibility.

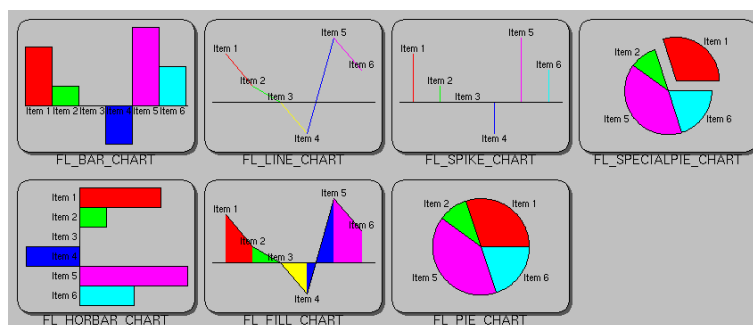


Figure 31.2 `FI_Chart`

Todo Refactor `FI_Chart::type()` information.

The type of an `FI_Chart` object can be set using `type(uchar t)` to:

- `FL_BAR_CHART`: Each sample value is drawn as a vertical bar.
- `FL_FILLED_CHART`: The chart is filled from the bottom of the graph to the sample values.
- `FL_HORBAR_CHART`: Each sample value is drawn as a horizontal bar.

- `FL_LINE_CHART`: The chart is drawn as a polyline with vertices at each sample value.
- `FL_PIE_CHART`: A pie chart is drawn with each sample value being drawn as a proportionate slice in the circle.
- `FL_SPECIALPIE_CHART`: Like `FL_PIE_CHART`, but the first slice is separated from the pie.
- `FL_SPIKE_CHART`: Each sample value is drawn as a vertical line.

31.12.2 Constructor & Destructor Documentation

31.12.2.1 Fl_Chart()

```
Fl_Chart::Fl_Chart (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Create a new `Fl_Chart` widget using the given position, size and label string. The default boxstyle is `FL_NO_BOX`.

Parameters

in	<i>X,Y,W,H</i>	position and size of the widget
in	<i>L</i>	widget label, default is no label

31.12.3 Member Function Documentation

31.12.3.1 add()

```
void Fl_Chart::add (
    double val,
    const char * str = 0,
    unsigned col = 0 )
```

Add the data value `val` with optional label `str` and color `col` to the chart.

Parameters

in	<i>val</i>	data value
in	<i>str</i>	optional data label
in	<i>col</i>	optional data color

31.12.3.2 autosize() [1/2]

```
uchar Fl_Chart::autosize ( ) const [inline]
```

Get whether the chart will automatically adjust the bounds of the chart.

Returns

non-zero if auto-sizing is enabled and zero if disabled.

31.12.3.3 autosize() [2/2]

```
void Fl_Chart::autosize (
    uchar n ) [inline]
```

Set whether the chart will automatically adjust the bounds of the chart.

Parameters

in	<i>n</i>	non-zero to enable automatic resizing, zero to disable.
----	----------	---

31.12.3.4 bounds() [1/2]

```
void Fl_Chart::bounds (
    double * a,
    double * b ) const [inline]
```

Gets the lower and upper bounds of the chart values.

Parameters

out	<i>a,b</i>	are set to lower, upper
-----	------------	-------------------------

31.12.3.5 bounds() [2/2]

```
void Fl_Chart::bounds (
    double a,
    double b )
```

Sets the lower and upper bounds of the chart values.

Parameters

in	<i>a,b</i>	are used to set lower, upper
----	------------	------------------------------

31.12.3.6 draw()

```
void Fl_Chart::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scroll; // scroll is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Implements [Fl_Widget](#).

31.12.3.7 insert()

```
void Fl_Chart::insert (
    int ind,
    double val,
    const char * str = 0,
    unsigned col = 0 )
```

Inserts a data value `val` at the given position `ind`.
Position 1 is the first data value.

Parameters

in	<i>ind</i>	insertion position
in	<i>val</i>	data value
in	<i>str</i>	optional data label
in	<i>col</i>	optional data color

31.12.3.8 maxsize()

```
void Fl_Chart::maxsize (
    int m )
```

Set the maximum number of data values for a chart.

If you do not call this method then the chart will be allowed to grow to any size depending on available memory.

Parameters

in	<i>m</i>	maximum number of data values allowed.
----	----------	--

31.12.3.9 replace()

```
void Fl_Chart::replace (
    int ind,
    double val,
    const char * str = 0,
    unsigned col = 0 )
```

Replace a data value `val` at the given position `ind`.

Position 1 is the first data value.

Parameters

in	<i>ind</i>	insertion position
in	<i>val</i>	data value
in	<i>str</i>	optional data label
in	<i>col</i>	optional data color

The documentation for this class was generated from the following files:

- Fl_Chart.H
- Fl_Chart.cxx

31.13 FL_CHART_ENTRY Struct Reference

For internal use only.

```
#include <Fl_Chart.H>
```

Public Attributes

- unsigned `col`

For internal use only.

- char `str` [FL_CHART_LABEL_MAX+1]
For internal use only.
- float `val`
For internal use only.

31.13.1 Detailed Description

For internal use only.

The documentation for this struct was generated from the following file:

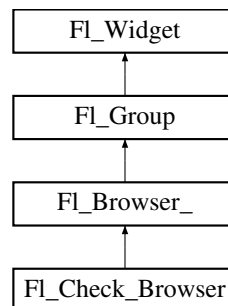
- FI_Chart.H

31.14 FI_Check_Browser Class Reference

The `FI_Check_Browser` widget displays a scrolling list of text lines that may be selected and/or checked by the user.

```
#include <FI_Check_Browser.H>
```

Inheritance diagram for `FI_Check_Browser`:



Public Member Functions

- int `add` (char *s)
Add a new unchecked line to the end of the browser.
- int `add` (char *s, int b)
Add a new line to the end of the browser.
- int `add` (const char *s)
*See int FI_Check_Browser::add(char *s)*
- int `add` (const char *s, int b)
*See int FI_Check_Browser::add(char *s)*
- void `check_all` ()
Sets all the items checked.
- void `check_none` ()
Sets all the items unchecked.
- int `checked` (int item) const
Gets the current status of item item.
- void `checked` (int item, int b)
Sets the check status of item item to b.
- void `clear` ()
Remove every item from the browser.
- `FI_Check_Browser` (int x, int y, int w, int h, const char *l=0)
The constructor makes an empty browser.
- int `nchecked` () const
Returns how many items are currently checked.

- int [nitems](#) () const
Returns how many lines are in the browser.
- int [remove](#) (int item)
Remove line n and make the browser one line shorter.
- void [set_checked](#) (int item)
Equivalent to Fl_Check_Browser::checked(item, 1).
- char * [text](#) (int item) const
Return a pointer to an internal buffer holding item item's text.
- int [value](#) () const
Returns the index of the currently selected item.
- [~Fl_Check_Browser](#) ()
The destructor deletes all list items and destroys the browser.

Protected Member Functions

- int [handle](#) (int)
Handles the event within the normal widget bounding box.

Additional Inherited Members

31.14.1 Detailed Description

The [Fl_Check_Browser](#) widget displays a scrolling list of text lines that may be selected and/or checked by the user.

31.14.2 Member Function Documentation

31.14.2.1 [add\(\)](#) [1/2]

```
int Fl_Check_Browser::add (  
    char * s )
```

Add a new unchecked line to the end of the browser.

See also

[add\(char *s, int b\)](#)

31.14.2.2 [add\(\)](#) [2/2]

```
int Fl_Check_Browser::add (  
    char * s,  
    int b )
```

Add a new line to the end of the browser.

The text is copied using the `strdup()` function. It may also be NULL to make a blank line. It can set the item checked if `b` is not 0.

31.14.2.3 [handle\(\)](#)

```
int Fl_Check_Browser::handle (  
    int event ) [protected], [virtual]
```

Handles the `event` within the normal widget bounding box.

Parameters

in	<i>event</i>	The event to process.
----	--------------	-----------------------

Returns

1 if event was processed, 0 if not.

Reimplemented from [Fl_Browser_](#).

31.14.2.4 nchecked()

```
int Fl_Check_Browser::nchecked ( ) const [inline]
```

Returns how many items are currently checked.

31.14.2.5 nitems()

```
int Fl_Check_Browser::nitems ( ) const [inline]
```

Returns how many lines are in the browser.

The last line number is equal to this.

31.14.2.6 remove()

```
int Fl_Check_Browser::remove (
    int item )
```

Remove line n and make the browser one line shorter.

Returns the number of lines left in the browser.

31.14.2.7 set_checked()

```
void Fl_Check_Browser::set_checked (
    int item ) [inline]
```

Equivalent to `Fl_Check_Browser::checked(item, 1)`.

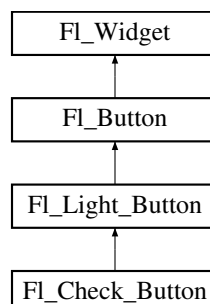
The documentation for this class was generated from the following files:

- `Fl_Check_Browser.H`
- `Fl_Check_Browser.cxx`

31.15 Fl_Check_Button Class Reference

A button with a "checkmark" to show its status.

Inheritance diagram for `Fl_Check_Button`:



Public Member Functions

- [Fl_Check_Button](#) (int X, int Y, int W, int H, const char *L=0)
Creates a new [Fl_Check_Button](#) widget using the given position, size, and label string.

Additional Inherited Members

31.15.1 Detailed Description

A button with a "checkmark" to show its status.

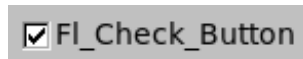


Figure 31.3 [Fl_Check_Button](#)

Buttons generate callbacks when they are clicked by the user. You control exactly when and how by changing the values for [type\(\)](#) and [when\(\)](#).

The [Fl_Check_Button](#) subclass displays its "ON" state by showing a "checkmark" rather than drawing itself pushed in.

31.15.2 Constructor & Destructor Documentation

31.15.2.1 [Fl_Check_Button\(\)](#)

```
Fl_Check_Button::Fl_Check_Button (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new [Fl_Check_Button](#) widget using the given position, size, and label string.

The default box type is `FL_NO_BOX`, which draws the label w/o a box right of the checkmark.

The [selection_color\(\)](#) sets the color of the checkmark. Default is `FL_FOREGROUND_COLOR` (usually black).

You can use [down_box\(\)](#) to change the box type of the checkmark. Default is `FL_DOWN_BOX`.

Parameters

in	<i>X,Y,W,H</i>	position and size of the widget
in	<i>L</i>	widget label, default is no label

The documentation for this class was generated from the following files:

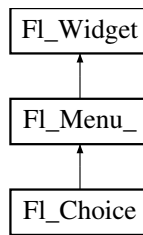
- [Fl_Check_Button.H](#)
- [Fl_Check_Button.cxx](#)

31.16 Fl_Choice Class Reference

A button that is used to pop up a menu.

```
#include <Fl_Choice.H>
```

Inheritance diagram for [Fl_Choice](#):



Public Member Functions

- [Fl_Choice](#) (int X, int Y, int W, int H, const char *L=0)
Create a new [Fl_Choice](#) widget using the given position, size and label string.
- int [handle](#) (int)
Handles the specified event.
- int [value](#) () const
Gets the index of the last item chosen by the user.
- int [value](#) (const [Fl_Menu_Item](#) *v)
Sets the currently selected value using a pointer to menu item.
- int [value](#) (int v)
Sets the currently selected value using the index into the menu item array.

Protected Member Functions

- void [draw](#) ()
Draws the widget.

Additional Inherited Members

31.16.1 Detailed Description

A button that is used to pop up a menu.

This is a button that, when pushed, pops up a menu (or hierarchy of menus) defined by an array of [Fl_Menu_Item](#) objects. Motif calls this an `OptionButton`.

The only difference between this and a [Fl_Menu_Button](#) is that the name of the most recent chosen menu item is displayed inside the box, while the label is displayed outside the box. However, since the use of this is most often to control a single variable rather than do individual callbacks, some of the [Fl_Menu_Button](#) methods are redescribed here in those terms.

When the user clicks a menu item, [value\(\)](#) is set to that item and then:

- The item's callback is done if one has been set; the `Fl_Choice` is passed as the `Fl_Widget*` argument, along with any userdata configured for the callback.
- If the item does not have a callback, the `Fl_Choice` widget's callback is done instead, along with any userdata configured for it. The callback can determine which item was picked using `value()`, `mvalue()`, `item_pathname()`, etc.

All three mouse buttons pop up the menu. The Forms behavior of the first two buttons to increment/decrement the choice is not implemented. This could be added with a subclass, however.

The menu will also pop up in response to shortcuts indicated by putting a '&' character in the [label\(\)](#). See [Fl_Button::shortcut\(int s\)](#) for a description of this.

Typing the [shortcut\(\)](#) of any of the items will do exactly the same as when you pick the item with the mouse. The '&' character in item names are only looked at when the menu is popped up, however.

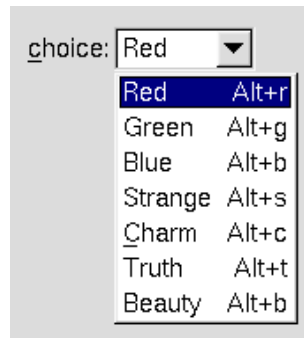


Figure 31.4 Fl_Choice

Todo Refactor the doxygen comments for `Fl_Choice changed()` documentation.

- `int Fl_Widget::changed() const` This value is true the user picks a different value. *It is turned off by `value()` and just before doing a callback (the callback can turn it back on if desired).*
- `void Fl_Widget::set_changed()` This method sets the `changed()` flag.
- `void Fl_Widget::clear_changed()` This method clears the `changed()` flag.
- `Fl_Boxtype Fl_Choice::down_box() const` Gets the current down box, which is used when the menu is popped up. The default down box type is `FL_DOWN_BOX`.
- `void Fl_Choice::down_box(Fl_Boxtype b)` Sets the current down box type to `b`.

31.16.2 Constructor & Destructor Documentation

31.16.2.1 Fl_Choice()

```
Fl_Choice::Fl_Choice (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Create a new `Fl_Choice` widget using the given position, size and label string.

The default boxtype is `FL_UP_BOX`.

The constructor sets `menu()` to `NULL`. See `Fl_Menu_` for the methods to set or change the menu.

Parameters

in	<code>X,Y,W,H</code>	position and size of the widget
in	<code>L</code>	widget label, default is no label

31.16.3 Member Function Documentation

31.16.3.1 draw()

```
void Fl_Choice::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call `redraw()` instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scroll;           // scroll is an embedded Fl_Scrollbar
s->draw();                         // calls Fl_Scrollbar::draw()
```

Implements [Fl_Widget](#).

31.16.3.2 [handle\(\)](#)

```
int Fl_Choice::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Widget](#).

31.16.3.3 [value\(\)](#) [1/3]

```
int Fl_Choice::value ( ) const [inline]
```

Gets the index of the last item chosen by the user.

The index is zero initially.

31.16.3.4 [value\(\)](#) [2/3]

```
int Fl_Choice::value (
    const Fl_Menu_Item * v )
```

Sets the currently selected value using a pointer to menu item.

Changing the selected value causes a [redraw\(\)](#).

Parameters

in	<i>v</i>	pointer to menu item in the menu item array.
----	----------	--

Returns

non-zero if the new value is different to the old one.

31.16.3.5 value() [3/3]

```
int Fl_Choice::value (
    int v )
```

Sets the currently selected value using the index into the menu item array. Changing the selected value causes a [redraw\(\)](#).

Parameters

in	v	index of value in the menu item array.
----	---	--

Returns

non-zero if the new value is different to the old one.

The documentation for this class was generated from the following files:

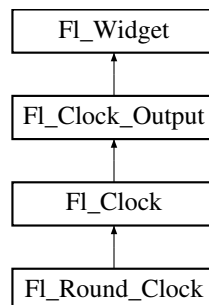
- Fl_Choice.H
- Fl_Choice.cxx

31.17 Fl_Clock Class Reference

This widget provides a round analog clock display.

```
#include <Fl_Clock.H>
```

Inheritance diagram for Fl_Clock:

**Public Member Functions**

- [Fl_Clock](#) (int X, int Y, int W, int H, const char *L=0)
Create an [Fl_Clock](#) widget using the given position, size, and label string.
- [Fl_Clock](#) (uchar t, int X, int Y, int W, int H, const char *L)
Create an [Fl_Clock](#) widget using the given boxtype, position, size, and label string.
- int [handle](#) (int)
Handles the specified event.
- [~Fl_Clock](#) ()
The destructor removes the clock.

Additional Inherited Members

31.17.1 Detailed Description

This widget provides a round analog clock display.

`Fl_Clock` is provided for Forms compatibility. It installs a 1-second timeout callback using `Fl::add_timeout()`. You can choose the rounded or square type of the clock with `type()`, see below.

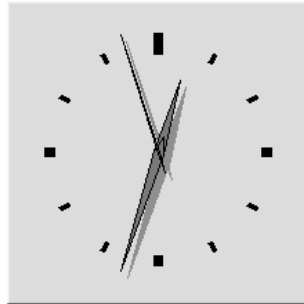


Figure 31.5 `FL_SQUARE_CLOCK` type

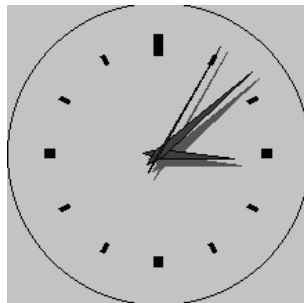


Figure 31.6 `FL_ROUND_CLOCK` type

31.17.2 Constructor & Destructor Documentation

31.17.2.1 `Fl_Clock()` [1/2]

```
Fl_Clock::Fl_Clock (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Create an `Fl_Clock` widget using the given position, size, and label string. The default boxtype is `FL_NO_BOX`.

Parameters

in	<code>X,Y,W,H</code>	position and size of the widget
in	<code>L</code>	widget label, default is no label

31.17.2.2 `Fl_Clock()` [2/2]

```
Fl_Clock::Fl_Clock (
```



```

    uchar t,
    int X,
    int Y,
    int W,
    int H,
    const char * L )

```

Create an [Fl_Clock](#) widget using the given boxtype, position, size, and label string.

Parameters

in	<i>t</i>	boxtype
in	<i>X,Y,W,H</i>	position and size of the widget
in	<i>L</i>	widget label, default is no label

31.17.3 Member Function Documentation

31.17.3.1 handle()

```

int Fl_Clock::handle (
    int event ) [virtual]

```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget. When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise. Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Widget](#).

The documentation for this class was generated from the following files:

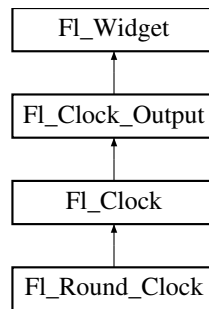
- [Fl_Clock.H](#)
- [Fl_Clock.cxx](#)

31.18 Fl_Clock_Output Class Reference

This widget can be used to display a program-supplied time.

```
#include <Fl_Clock.H>
```

Inheritance diagram for [Fl_Clock_Output](#):



Public Member Functions

- `Fl_Clock_Output` (int X, int Y, int W, int H, const char *L=0)
Create a new *Fl_Clock_Output* widget with the given position, size and label.
- `int hour () const`
Returns the displayed hour (0 to 23).
- `int minute () const`
Returns the displayed minute (0 to 59).
- `int second () const`
Returns the displayed second (0 to 60, 60=leap second).
- `ulong value () const`
Returns the displayed time.
- `void value (int H, int m, int s)`
Set the displayed time.
- `void value (ulong v)`
Set the displayed time.

Protected Member Functions

- `void draw ()`
Draw clock with current position and size.
- `void draw (int X, int Y, int W, int H)`
Draw clock with the given position and size.

Additional Inherited Members

31.18.1 Detailed Description

This widget can be used to display a program-supplied time.

The time shown on the clock is not updated. To display the current time, use `Fl_Clock` instead.

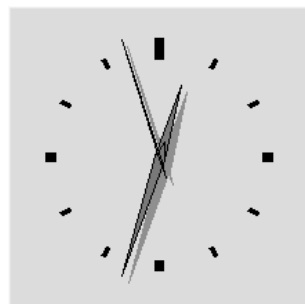


Figure 31.7 FL_SQUARE_CLOCK type

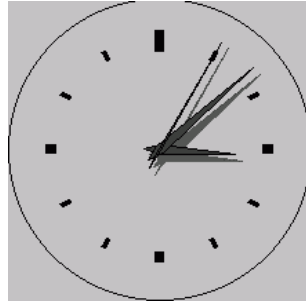


Figure 31.8 FL_ROUND_CLOCK type

31.18.2 Constructor & Destructor Documentation

31.18.2.1 Fl_Clock_Output()

```
Fl_Clock_Output::Fl_Clock_Output (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Create a new [Fl_Clock_Output](#) widget with the given position, size and label. The default boxtype is FL_NO_BOX.

Parameters

in	<i>X,Y,W,H</i>	position and size of the widget
in	<i>L</i>	widget label, default is no label

31.18.3 Member Function Documentation

31.18.3.1 draw()

```
void Fl_Clock_Output::draw (
    int X,
    int Y,
    int W,
    int H ) [protected]
```

Draw clock with the given position and size.

Parameters

in	<i>X,Y,W,H</i>	position and size
----	----------------	-------------------

31.18.3.2 hour()

```
int Fl_Clock_Output::hour ( ) const [inline]
```

Returns the displayed hour (0 to 23).

See also

[value\(\)](#), [minute\(\)](#), [second\(\)](#)

31.18.3.3 minute()

```
int Fl_Clock_Output::minute ( ) const [inline]
```

Returns the displayed minute (0 to 59).

See also

[value\(\)](#), [hour\(\)](#), [second\(\)](#)

31.18.3.4 second()

```
int Fl_Clock_Output::second ( ) const [inline]
```

Returns the displayed second (0 to 60, 60=leap second).

See also

[value\(\)](#), [hour\(\)](#), [minute\(\)](#)

31.18.3.5 value() [1/3]

```
ulong Fl_Clock_Output::value ( ) const [inline]
```

Returns the displayed time.
Returns the time in seconds since the UNIX epoch (January 1, 1970).

See also

[value\(ulong\)](#)

31.18.3.6 value() [2/3]

```
void Fl_Clock_Output::value (
    int H,
    int m,
    int s )
```

Set the displayed time.
Set the time in hours, minutes, and seconds.

Parameters

in	<i>H,m,s</i>	displayed time
----	--------------	----------------

See also

[hour\(\)](#), [minute\(\)](#), [second\(\)](#)

31.18.3.7 value() [3/3]

```
void Fl_Clock_Output::value (
    ulong v )
```

Set the displayed time.

Set the time in seconds since the UNIX epoch (January 1, 1970).

Parameters

in	v	seconds since epoch
----	---	---------------------

See also

[value\(\)](#)

The documentation for this class was generated from the following files:

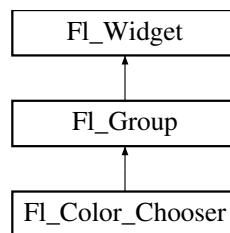
- Fl_Clock.H
- Fl_Clock.cxx

31.19 Fl_Color_Chooser Class Reference

The [Fl_Color_Chooser](#) widget provides a standard RGB color chooser.

```
#include <Fl_Color_Chooser.H>
```

Inheritance diagram for [Fl_Color_Chooser](#):



Public Member Functions

- double [b](#) () const
Returns the current blue value.
- [Fl_Color_Chooser](#) (int X, int Y, int W, int H, const char *L=0)
Creates a new [Fl_Color_Chooser](#) widget using the given position, size, and label string.
- double [g](#) () const
Returns the current green value.
- int [hsv](#) (double H, double S, double V)
Set the hsv values.
- double [hue](#) () const
Returns the current hue.
- int [mode](#) ()
Returns which [Fl_Color_Chooser](#) variant is currently active.
- void [mode](#) (int newMode)
Set which [Fl_Color_Chooser](#) variant is currently active.
- double [r](#) () const
Returns the current red value.
- int [rgb](#) (double R, double G, double B)
Sets the current rgb color values.
- double [saturation](#) () const
Returns the saturation.
- double [value](#) () const
Returns the value/brightness.

Static Public Member Functions

- static void [hsv2rgb](#) (double H, double S, double V, double &R, double &G, double &B)
This static method converts HSV colors to RGB colorspace.
- static void [rgb2hsv](#) (double R, double G, double B, double &H, double &S, double &V)
This static method converts RGB colors to HSV colorspace.

Related Functions

(Note that these are not member functions.)

- int [fl_color_chooser](#) (const char *name, double &r, double &g, double &b, int cmode)
Pops up a window to let the user pick an arbitrary RGB color.
- int [fl_color_chooser](#) (const char *name, uchar &r, uchar &g, uchar &b, int cmode)
Pops up a window to let the user pick an arbitrary RGB color.

Additional Inherited Members

31.19.1 Detailed Description

The [Fl_Color_Chooser](#) widget provides a standard RGB color chooser.

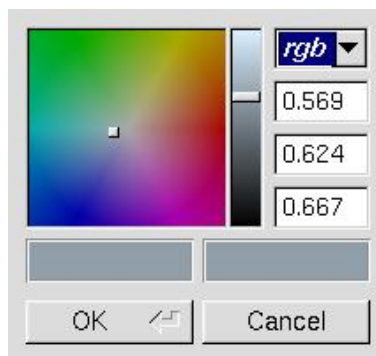


Figure 31.9 [fl_color_chooser\(\)](#)

You can place any number of the widgets into a panel of your own design. The diagram shows the widget as part of a color chooser dialog created by the [fl_color_chooser\(\)](#) function. The [Fl_Color_Chooser](#) widget contains the hue box, value slider, and rgb input fields from the above diagram (it does not have the color chips or the Cancel or OK buttons). The callback is done every time the user changes the rgb value. It is not done if they move the hue control in a way that produces the *same* rgb value, such as when saturation or value is zero.

The [fl_color_chooser\(\)](#) function pops up a window to let the user pick an arbitrary RGB color. They can pick the hue and saturation in the "hue box" on the left (hold down CTRL to just change the saturation), and the brightness using the vertical slider. Or they can type the 8-bit numbers into the RGB [Fl_Value_Input](#) fields, or drag the mouse across them to adjust them. The pull-down menu lets the user set the input fields to show RGB, HSV, or 8-bit RGB (0 to 255).

[fl_color_chooser\(\)](#) returns non-zero if the user picks ok, and updates the RGB values. If the user picks cancel or closes the window this returns zero and leaves RGB unchanged.

If you use the color chooser on an 8-bit screen, it will allocate all the available colors, leaving you no space to exactly represent the color the user picks! You can however use [fl_rectf\(\)](#) to fill a region with a simulated color using dithering.

31.19.2 Constructor & Destructor Documentation

31.19.2.1 Fl_Color_Chooser()

```
Fl_Color_Chooser::Fl_Color_Chooser (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new [Fl_Color_Chooser](#) widget using the given position, size, and label string. The recommended dimensions are 200x95. The color is initialized to black.

Parameters

in	<i>X,Y,W,H</i>	position and size of the widget
in	<i>L</i>	widget label, default is no label

31.19.3 Member Function Documentation

31.19.3.1 b()

```
double Fl_Color_Chooser::b ( ) const [inline]
```

Returns the current blue value.

$0 \leq b \leq 1$.

31.19.3.2 g()

```
double Fl_Color_Chooser::g ( ) const [inline]
```

Returns the current green value.

$0 \leq g \leq 1$.

31.19.3.3 hsv()

```
int Fl_Color_Chooser::hsv (
    double H,
    double S,
    double V )
```

Set the hsv values.

The passed values are clamped (or for hue, modulus 6 is used) to get legal values. Does not do the callback.

Parameters

in	<i>H,S,V</i>	color components.
----	--------------	-------------------

Returns

1 if a new hsv value was set, 0 if the hsv value was the previous one.

31.19.3.4 hsv2rgb()

```
void Fl_Color_Chooser::hsv2rgb (
    double H,
    double S,
    double V,
    double & R,
```

```
double & G,
double & B ) [static]
```

This *static* method converts HSV colors to RGB colorspace.

Parameters

in	<i>H,S,V</i>	color components
out	<i>R,G,B</i>	color components

31.19.3.5 hue()

```
double Fl_Color_Chooser::hue ( ) const [inline]
```

Returns the current hue.

$0 \leq \text{hue} < 6$. Zero is red, one is yellow, two is green, etc. *This value is convenient for the internal calculations - some other systems consider hue to run from zero to one, or from 0 to 360.*

31.19.3.6 mode() [1/2]

```
int Fl_Color_Chooser::mode ( ) [inline]
```

Returns which [Fl_Color_Chooser](#) variant is currently active.

Returns

color modes are rgb(0), byte(1), hex(2), or hsv(3)

31.19.3.7 mode() [2/2]

```
void Fl_Color_Chooser::mode (
    int newMode )
```

Set which [Fl_Color_Chooser](#) variant is currently active.

Parameters

in	<i>newMode</i>	color modes are rgb(0), byte(1), hex(2), or hsv(3)
----	----------------	--

31.19.3.8 r()

```
double Fl_Color_Chooser::r ( ) const [inline]
```

Returns the current red value.

$0 \leq r \leq 1$.

31.19.3.9 rgb()

```
int Fl_Color_Chooser::rgb (
    double R,
    double G,
    double B )
```

Sets the current rgb color values.

Does not do the callback. Does not clamp (but out of range values will produce psychedelic effects in the hue selector).

Parameters

in	<i>R,G,B</i>	color components.
----	--------------	-------------------

Returns

1 if a new rgb value was set, 0 if the rgb value was the previous one.

31.19.3.10 rgb2hsv()

```
void Fl_Color_Chooser::rgb2hsv (
    double R,
    double G,
    double B,
    double & H,
    double & S,
    double & V ) [static]
```

This *static* method converts RGB colors to HSV colorspace.

Parameters

in	<i>R,G,B</i>	color components
out	<i>H,S,V</i>	color components

31.19.3.11 saturation()

```
double Fl_Color_Chooser::saturation ( ) const [inline]
```

Returns the saturation.

0 <= saturation <= 1.

31.19.3.12 value()

```
double Fl_Color_Chooser::value ( ) const [inline]
```

Returns the value/brightness.

0 <= value <= 1.

The documentation for this class was generated from the following files:

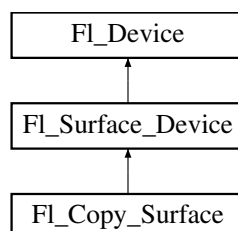
- [Fl_Color_Chooser.H](#)
- [Fl_Color_Chooser.cxx](#)

31.20 Fl_Copy_Surface Class Reference

Supports copying of graphical data to the clipboard.

```
#include <Fl_Copy_Surface.H>
```

Inheritance diagram for Fl_Copy_Surface:



Public Member Functions

- `const char * class_name ()`
Returns the name of the class of this object.
- `void draw (Fl_Widget *widget, int delta_x=0, int delta_y=0)`
Copies a widget in the clipboard.
- `void draw_decorated_window (Fl_Window *win, int delta_x=0, int delta_y=0)`
Copies a window and its borders and title bar to the clipboard.
- `Fl_Copy_Surface (int w, int h)`
Constructor.
- `int h ()`
Returns the pixel height of the copy surface.
- `void set_current ()`
Make this surface the current drawing surface.
- `int w ()`
Returns the pixel width of the copy surface.
- `~Fl_Copy_Surface ()`
Destructor.

Static Public Attributes

- `static const char * class_id = "Fl_Copy_Surface"`

Additional Inherited Members

31.20.1 Detailed Description

Supports copying of graphical data to the clipboard.

After creation of an `Fl_Copy_Surface` object, call `set_current()` on it, and all subsequent graphics requests will be recorded in the clipboard. It's possible to draw widgets (using `Fl_Copy_Surface::draw()`) or to use any of the [Drawing functions](#) or the [Color & Font functions](#). Finally, delete the `Fl_Copy_Surface` object to load the clipboard with the graphical data.

`Fl_Gl_Window` 's can be copied to the clipboard as well.

Usage example:

```
Fl_Widget *g = ...; // a widget you want to copy to the clipboard
Fl_Copy_Surface *copy_surf = new Fl_Copy_Surface(g->w(), g->h()); // create an Fl_Copy_Surface object
copy_surf->set_current(); // direct graphics requests to the clipboard
fl_color(FL_WHITE); fl_rectf(0, 0, g->w(), g->h()); // draw a white background
copy_surf->draw(g); // draw the g widget in the clipboard
delete copy_surf; // after this, the clipboard is loaded
Fl_Display_Device::display_device()->set_current(); // direct graphics requests back to the display
```

Platform details:

- MSWindows: Transparent RGB images copy without transparency. The graphical data are copied to the clipboard as an 'enhanced metafile'.
- Mac OS: The graphical data are copied to the clipboard (a.k.a. pasteboard) in two 'flavors': 1) in vectorial form as PDF data; 2) in bitmap form as a TIFF image. Applications to which the clipboard content is pasted can use the flavor that suits them best.
- X11: the graphical data are copied to the clipboard as an image in BMP format.

31.20.2 Constructor & Destructor Documentation

31.20.2.1 Fl_Copy_Surface()

```
Fl_Copy_Surface::Fl_Copy_Surface (
    int w,
    int h )
```

Constructor.

Parameters

<i>w</i>	and
<i>h</i>	are the width and height of the clipboard surface in pixels where drawing will occur.

31.20.3 Member Function Documentation

31.20.3.1 class_name()

```
const char* Fl_Copy_Surface::class_name ( ) [inline], [virtual]
```

Returns the name of the class of this object.

Use of the [class_name\(\)](#) function is discouraged because it will be removed from future FLTK versions.

The class of an instance of an [Fl_Device](#) subclass can be checked with code such as:

```
if ( instance->class_name() == Fl_Printer::class_id ) { ... }
```

Reimplemented from [Fl_Device](#).

31.20.3.2 draw()

```
void Fl_Copy_Surface::draw (
    Fl_Widget * widget,
    int delta_x = 0,
    int delta_y = 0 )
```

Copies a widget in the clipboard.

Parameters

<i>widget</i>	any FLTK widget (e.g., standard, custom, window, GL view) to copy
<i>delta</i> _↔ <i>_x</i>	and
<i>delta</i> _↔ <i>_y</i>	give the position in the clipboard of the top-left corner of the widget

31.20.3.3 draw_decorated_window()

```
void Fl_Copy_Surface::draw_decorated_window (
    Fl_Window * win,
    int delta_x = 0,
    int delta_y = 0 )
```

Copies a window and its borders and title bar to the clipboard.

Parameters

<i>win</i>	an FLTK window to copy
<i>delta</i> _↔ <i>_x</i>	and

Parameters

<code>delta</code> ↔	give the position in the clipboard of the top-left corner of the window's title bar
<code>_y</code>	

31.20.3.4 set_current()

```
void Fl_Copy_Surface::set_current (
    void ) [virtual]
```

Make this surface the current drawing surface.

This surface will receive all future graphics requests.

Reimplemented from [Fl_Surface_Device](#).

The documentation for this class was generated from the following files:

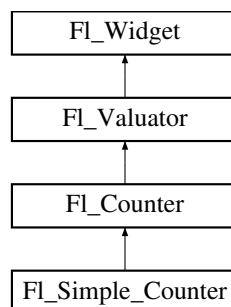
- `Fl_Copy_Surface.H`
- `Fl_Copy_Surface.cxx`

31.21 Fl_Counter Class Reference

Controls a single floating point value with button (or keyboard) arrows.

```
#include <Fl_Counter.H>
```

Inheritance diagram for `Fl_Counter`:

**Public Member Functions**

- [Fl_Counter](#) (int X, int Y, int W, int H, const char *L=0)
Creates a new [Fl_Counter](#) widget using the given position, size, and label string.
- int [handle](#) (int)
Handles the specified event.
- void [lstep](#) (double a)
Sets the increment for the large step buttons.
- double [step](#) () const
Returns the increment for normal step buttons.
- void [step](#) (double a)
Sets the increment for the normal step buttons.
- void [step](#) (double a, double b)
Sets the increments for the normal and large step buttons.
- [Fl_Color](#) [textcolor](#) () const
Gets the font color.
- void [textcolor](#) ([Fl_Color](#) s)
Sets the font color to s.
- [Fl_Font](#) [textfont](#) () const

- *Gets the text font.*
- void `textfont (Fl_Font s)`
Sets the text font to s.
- `Fl_Fonsize textsize () const`
Gets the font size.
- void `textsize (Fl_Fonsize s)`
Sets the font size to s.
- `~Fl_Counter ()`
Destroys the valuator.

Protected Member Functions

- void `draw ()`
Draws the widget.

Additional Inherited Members

31.21.1 Detailed Description

Controls a single floating point value with button (or keyboard) arrows. Double arrows buttons achieve larger steps than simple arrows.

See also

[Fl_Spinner](#) for `value` input with vertical `step` arrows.

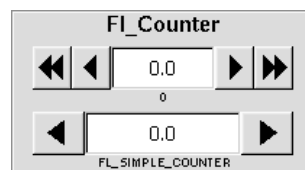


Figure 31.10 Fl_Counter

Todo Refactor the doxygen comments for `Fl_Counter type()` documentation.

The type of an `Fl_Counter` object can be set using `type(uchar t)` to:

- `FL_NORMAL_COUNTER`: Displays a counter with 4 arrow buttons.
- `FL_SIMPLE_COUNTER`: Displays a counter with only 2 arrow buttons.

31.21.2 Constructor & Destructor Documentation

31.21.2.1 Fl_Counter()

```
Fl_Counter::Fl_Counter (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new `Fl_Counter` widget using the given position, size, and label string. The default type is `FL_NORMAL_COUNTER`.

Parameters

in	<i>X,Y,W,H</i>	position and size of the widget
in	<i>L</i>	widget label, default is no label

31.21.3 Member Function Documentation

31.21.3.1 draw()

```
void Fl_Counter::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own draw() method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scroll;           // scroll is an embedded Fl_Scrollbar
s->draw();                          // calls Fl_Scrollbar::draw()
```

Implements [Fl_Widget](#).

31.21.3.2 handle()

```
int Fl_Counter::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Widget](#).

31.21.3.3 lstep()

```
void Fl_Counter::lstep (
    double a ) [inline]
```

Sets the increment for the large step buttons.

The default value is 1.0.

Parameters

in	<i>a</i>	large step increment.
----	----------	-----------------------

31.21.3.4 step() [1/2]

```
void Fl_Counter::step (
    double a ) [inline]
```

Sets the increment for the normal step buttons.

Parameters

in	<i>a</i>	normal step increment.
----	----------	------------------------

31.21.3.5 step() [2/2]

```
void Fl_Counter::step (
    double a,
    double b ) [inline]
```

Sets the increments for the normal and large step buttons.

Parameters

in	<i>a,b</i>	normal and large step increments.
----	------------	-----------------------------------

The documentation for this class was generated from the following files:

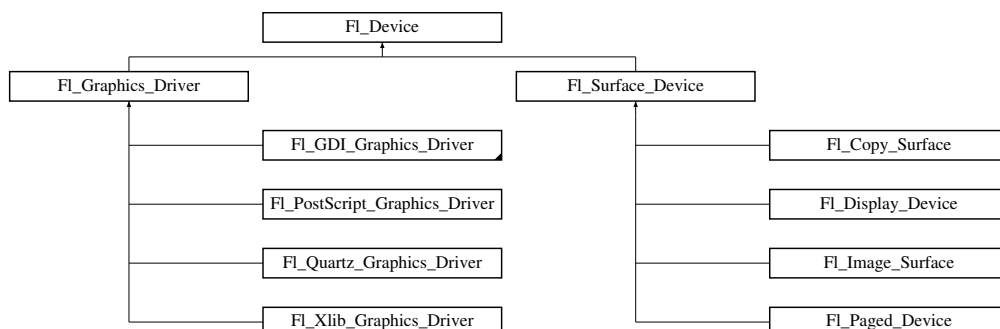
- Fl_Counter.H
- Fl_Counter.cxx

31.22 Fl_Device Class Reference

All graphical output devices and all graphics systems.

```
#include <Fl_Device.H>
```

Inheritance diagram for Fl_Device:



Public Member Functions

- virtual const char * [class_name](#) ()
Returns the name of the class of this object.
- virtual [~Fl_Device](#) ()

Virtual destructor.

Static Public Attributes

- static const char * [class_id](#) = "Fl_Device"
A string that identifies each subclass of [Fl_Device](#).

31.22.1 Detailed Description

All graphical output devices and all graphics systems.
This class supports a rudimentary system of run-time type information.

31.22.2 Constructor & Destructor Documentation

31.22.2.1 ~Fl_Device()

```
virtual Fl_Device::~Fl_Device ( ) [inline], [virtual]
```

Virtual destructor.

The destructor of [Fl_Device](#) must be virtual to make the destructors of derived classes being called correctly on destruction.

31.22.3 Member Function Documentation

31.22.3.1 class_name()

```
virtual const char* Fl_Device::class_name ( ) [inline], [virtual]
```

Returns the name of the class of this object.

Use of the [class_name\(\)](#) function is discouraged because it will be removed from future FLTK versions.

The class of an instance of an [Fl_Device](#) subclass can be checked with code such as:

```
if ( instance->class_name() == Fl_Printer::class_id ) { ... }
```

Reimplemented in [Fl_Printer](#), [Fl_PostScript_Printer](#), [Fl_System_Printer](#), [Fl_PostScript_File_Device](#), [Fl_PostScript_Graphics_Driver](#), [Fl_Paged_Device](#), [Fl_Image_Surface](#), [Fl_Display_Device](#), [Fl_Surface_Device](#), [Fl_Xlib_Graphics_Driver](#), [Fl_GDI_Printer_Graphics_Driver](#), [Fl_GDI_Graphics_Driver](#), [Fl_Quartz_Graphics_Driver](#), [Fl_Graphics_Driver](#), and [Fl_Copy_Surface](#).

31.22.4 Member Data Documentation

31.22.4.1 class_id

```
const char * Fl_Device::class_id = "Fl_Device" [static]
```

A string that identifies each subclass of [Fl_Device](#).

Function [class_name\(\)](#) applied to a device of this class returns this string.

The documentation for this class was generated from the following files:

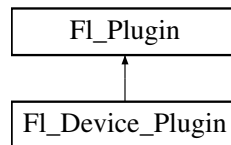
- [Fl_Device.H](#)
- [Fl_Device.cxx](#)

31.23 Fl_Device_Plugin Class Reference

This plugin socket allows the integration of new device drivers for special window or screen types.

```
#include <Fl_Device.H>
```

Inheritance diagram for [Fl_Device_Plugin](#):



Public Member Functions

- `Fl_Device_Plugin` (const char *pluginName)
The constructor.
- virtual const char * `klass` ()
Returns the class name.
- virtual const char * `name` ()=0
Returns the plugin name.
- virtual int `print` (Fl_Widget *w, int x, int y, int height)=0
Prints a widget.
- `Fl_RGB_Image` * `rectangle_capture` (Fl_Widget *widget, int x, int y, int w, int h)
captures a rectangle of a widget as an image

31.23.1 Detailed Description

This plugin socket allows the integration of new device drivers for special window or screen types.

This class is not intended for use outside the FLTK library. It is currently used to provide an automated printing service and screen capture for OpenGL windows, if linked with `fltk_gl`.

31.23.2 Member Function Documentation

31.23.2.1 print()

```
virtual int Fl_Device_Plugin::print (
    Fl_Widget * w,
    int x,
    int y,
    int height ) [pure virtual]
```

Prints a widget.

Parameters

<i>w</i>	the widget
<i>x,y</i>	offsets where to print relatively to coordinates origin
<i>height</i>	height of the current drawing area

31.23.2.2 rectangle_capture()

```
Fl_RGB_Image* Fl_Device_Plugin::rectangle_capture (
    Fl_Widget * widget,
    int x,
    int y,
    int w,
    int h ) [inline]
```

captures a rectangle of a widget as an image

Returns

The captured pixels as an RGB image

The documentation for this class was generated from the following file:

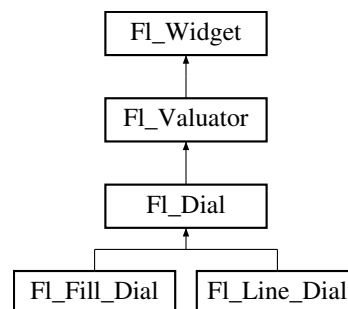
- [Fl_Device.H](#)

31.24 Fl_Dial Class Reference

The [Fl_Dial](#) widget provides a circular dial to control a single floating point value.

```
#include <Fl_Dial.H>
```

Inheritance diagram for Fl_Dial:

**Public Member Functions**

- short [angle1](#) () const
Sets Or gets the angles used for the minimum and maximum values.
- void [angle1](#) (short a)
See short [angle1\(\)](#) const.
- short [angle2](#) () const
See short [angle1\(\)](#) const.
- void [angle2](#) (short a)
See short [angle1\(\)](#) const.
- void [angles](#) (short a, short b)
See short [angle1\(\)](#) const.
- [Fl_Dial](#) (int x, int y, int w, int h, const char *l=0)
Creates a new [Fl_Dial](#) widget using the given position, size, and label string.
- int [handle](#) (int)
Allow subclasses to handle event based on current position and size.

Protected Member Functions

- void [draw](#) ()
Draws dial at current position and size.
- void [draw](#) (int X, int Y, int W, int H)
Draws dial at given position and size.
- int [handle](#) (int event, int X, int Y, int W, int H)
Allows subclasses to handle event based on given position and size.

Additional Inherited Members

31.24.1 Detailed Description

The [Fl_Dial](#) widget provides a circular dial to control a single floating point value.

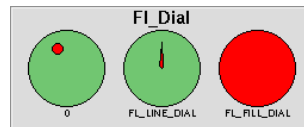


Figure 31.11 Fl_Dial

Use [type\(\)](#) to set the type of the dial to:

- `FL_NORMAL_DIAL` - Draws a normal dial with a knob.
- `FL_LINE_DIAL` - Draws a dial with a line.
- `FL_FILL_DIAL` - Draws a dial with a filled arc.

31.24.2 Constructor & Destructor Documentation

31.24.2.1 Fl_Dial()

```
Fl_Dial::Fl_Dial (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new [Fl_Dial](#) widget using the given position, size, and label string. The default type is `FL_NORMAL_DIAL`.

31.24.3 Member Function Documentation

31.24.3.1 angle1()

```
short Fl_Dial::angle1 ( ) const [inline]
```

Sets Or gets the angles used for the minimum and maximum values.

The default values are 45 and 315 (0 degrees is straight down and the angles progress clockwise). Normally `angle1` is less than `angle2`, but if you reverse them the dial moves counter-clockwise.

31.24.3.2 draw()

```
void Fl_Dial::draw (
    int X,
    int Y,
    int W,
    int H ) [protected]
```

Draws dial at given position and size.

Parameters

in	<code>X,Y,W,H</code>	position and size
----	----------------------	-------------------

31.24.3.3 handle()

```
int Fl_Dial::handle (
    int event,
    int X,
    int Y,
    int W,
    int H ) [protected]
```

Allows subclasses to handle event based on given position and size.

Parameters

in	<i>event,X,Y,W,H</i>	event to handle, related position and size.
----	----------------------	---

The documentation for this class was generated from the following files:

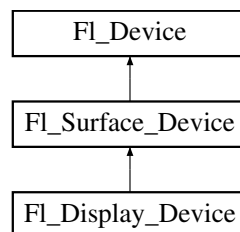
- Fl_Dial.H
- Fl_Dial.cxx

31.25 Fl_Display_Device Class Reference

A display to which the computer can draw.

```
#include <Fl_Device.H>
```

Inheritance diagram for Fl_Display_Device:



Public Member Functions

- const char * [class_name](#) ()
Returns the name of the class of this object.
- [Fl_Display_Device](#) ([Fl_Graphics_Driver](#) *graphics_driver)
A constructor that sets the graphics driver used by the display.

Static Public Member Functions

- static [Fl_Display_Device](#) * [display_device](#) ()
Returns the platform display device.

Static Public Attributes

- static const char * [class_id](#) = "Fl_Display_Device"

Additional Inherited Members

31.25.1 Detailed Description

A display to which the computer can draw.

When the program begins running, an `Fl_Display_Device` instance has been created and made the current drawing surface. There is no need to create any other object of this class.

31.25.2 Member Function Documentation

31.25.2.1 `class_name()`

```
const char* Fl_Display_Device::class_name ( ) [inline], [virtual]
```

Returns the name of the class of this object.

Use of the `class_name()` function is discouraged because it will be removed from future FLTK versions.

The class of an instance of an `Fl_Device` subclass can be checked with code such as:

```
if ( instance->class_name() == Fl_Printer::class_id ) { ... }
```

Reimplemented from `Fl_Surface_Device`.

The documentation for this class was generated from the following files:

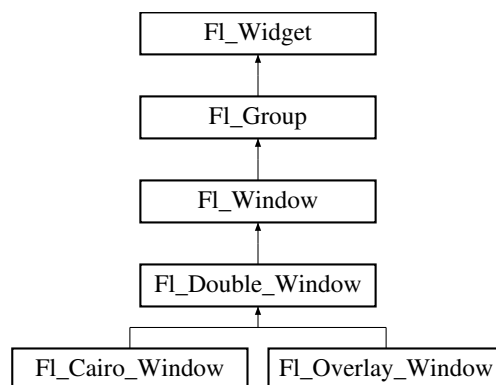
- [Fl_Device.H](#)
- [Fl_Device.cxx](#)

31.26 `Fl_Double_Window` Class Reference

The `Fl_Double_Window` provides a double-buffered window.

```
#include <Fl_Double_Window.H>
```

Inheritance diagram for `Fl_Double_Window`:



Public Member Functions

- `Fl_Double_Window` (int W, int H, const char *l=0)
Creates a new `Fl_Double_Window` widget using the given position, size, and label (title) string.
- `Fl_Double_Window` (int X, int Y, int W, int H, const char *l=0)
*See `Fl_Double_Window::Fl_Double_Window(int w, int h, const char *label = 0)`*
- void `flush` ()
Forces the window to be redrawn.
- void `hide` ()
Removes the window from the screen.
- void `resize` (int, int, int, int)
Changes the size and position of the window.
- void `show` ()
Puts the window on the screen.
- void `show` (int a, char **b)
- `~Fl_Double_Window` ()
The destructor also deletes all the children.

Protected Member Functions

- void [flush](#) (int eraseoverlay)
Forces the window to be redrawn.

Protected Attributes

- char [force_doublebuffering_](#)
Force double buffering, even if the OS already buffers windows (overlays need that on MacOS and Windows2000)

Additional Inherited Members

31.26.1 Detailed Description

The [Fl_Double_Window](#) provides a double-buffered window.

If possible this will use the X double buffering extension (Xdbe). If not, it will draw the window data into an off-screen pixmap, and then copy it to the on-screen window.

It is highly recommended that you put the following code before the first [show\(\)](#) of *any* window in your program:

```
Fl::visual (FL_DOUBLE|FL_INDEX)
```

This makes sure you can use Xdbe on servers where double buffering does not exist for every visual.

31.26.2 Constructor & Destructor Documentation

31.26.2.1 ~Fl_Double_Window()

```
Fl_Double_Window::~Fl_Double_Window ( )
```

The destructor *also deletes all the children*.

This allows a whole tree to be deleted at once, without having to keep a pointer to all the children in the user code.

31.26.3 Member Function Documentation

31.26.3.1 flush()

```
void Fl_Double_Window::flush (
    int eraseoverlay ) [protected]
```

Forces the window to be redrawn.

Parameters

in	<i>eraseoverlay</i>	non-zero to erase overlay, zero to ignore
----	---------------------	---

[Fl_Overlay_Window](#) relies on flush(1) copying the back buffer to the front everywhere, even if [damage\(\)](#) == 0, thus erasing the overlay, and leaving the clip region set to the entire window.

31.26.3.2 hide()

```
void Fl_Double_Window::hide ( ) [virtual]
```

Removes the window from the screen.

If the window is already hidden or has not been shown then this does nothing and is harmless.

Reimplemented from [Fl_Window](#).

Reimplemented in [Fl_Overlay_Window](#).

31.26.3.3 `resize()`

```
void Fl_Double_Window::resize (
    int X,
    int Y,
    int W,
    int H ) [virtual]
```

Changes the size and position of the window.

If `shown()` is true, these changes are communicated to the window server (which may refuse that size and cause a further resize). If `shown()` is false, the size and position are used when `show()` is called. See [Fl_Group](#) for the effect of resizing on the child widgets.

You can also call the [Fl_Widget](#) methods `size(x,y)` and `position(w,h)`, which are inline wrappers for this virtual function.

A top-level window can not force, but merely suggest a position and size to the operating system. The window manager may not be willing or able to display a window at the desired position or with the given dimensions. It is up to the application developer to verify window parameters after the resize request.

Reimplemented from [Fl_Window](#).

Reimplemented in [Fl_Overlay_Window](#).

31.26.3.4 `show()`

```
void Fl_Double_Window::show ( ) [virtual]
```

Puts the window on the screen.

Usually (on X) this has the side effect of opening the display.

If the window is already shown then it is restored and raised to the top. This is really convenient because your program can call `show()` at any time, even if the window is already up. It also means that `show()` serves the purpose of `raise()` in other toolkits.

[Fl_Window::show\(int argc, char **argv\)](#) is used for top-level windows and allows standard arguments to be parsed from the command-line.

Note

For some obscure reasons [Fl_Window::show\(\)](#) resets the current group by calling `Fl_Group::current(0)`. The comments in the code say "get rid of very common user bug: forgot end()". Although this is true it may have unwanted side effects if you `show()` an unrelated window (maybe for an error message or warning) while building a window or any other group widget.

Todo Check if we can remove resetting the current group in a later FLTK version (after 1.3.x). This may break "already broken" programs though if they rely on this "feature".

See also

[Fl_Window::show\(int argc, char **argv\)](#)

Reimplemented from [Fl_Window](#).

Reimplemented in [Fl_Overlay_Window](#).

The documentation for this class was generated from the following files:

- [Fl_Double_Window.H](#)
- [Fl_Double_Window.cxx](#)

31.27 Fl_End Class Reference

This is a dummy class that allows you to end a [Fl_Group](#) in a constructor list of a class:

```
#include <Fl_Group.H>
```

Public Member Functions

- [Fl_End\(\)](#)

All it does is calling `Fl_Group::current()->end()`

31.27.1 Detailed Description

This is a dummy class that allows you to end a `Fl_Group` in a constructor list of a class:

```
class MyClass {
  Fl_Group group;
  Fl_Button button_in_group;
  Fl_End end;
  Fl_Button button_outside_group;
  MyClass();
};
MyClass::MyClass() :
  group(10,10,100,100),
  button_in_group(20,20,60,30),
  end(),
  button_outside_group(10,120,60,30)
{ }
```

The documentation for this class was generated from the following file:

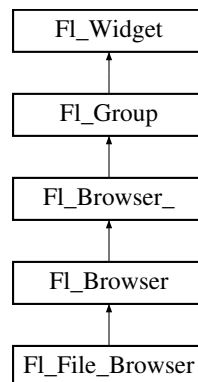
- `Fl_Group.H`

31.28 Fl_File_Browser Class Reference

The `Fl_File_Browser` widget displays a list of filenames, optionally with file-specific icons.

```
#include <Fl_File_Browser.H>
```

Inheritance diagram for `Fl_File_Browser`:



Public Types

- enum { **FILES** , **DIRECTORIES** }

Public Member Functions

- int `filetype` () const
Sets or gets the file browser type, FILES or DIRECTORIES.
- void `filetype` (int t)
Sets or gets the file browser type, FILES or DIRECTORIES.
- const char * `filter` () const
Sets or gets the filename filter.
- void `filter` (const char *pattern)
Sets or gets the filename filter.
- `Fl_File_Browser` (int, int, int, int, const char *=0)
The constructor creates the Fl_File_Browser widget at the specified position and size.
- uchar `iconsize` () const
Sets or gets the size of the icons.
- void `iconsize` (uchar s)
Sets or gets the size of the icons.
- int `load` (const char *directory, `Fl_File_Sort_F` *sort=fl_numericsort)

Loads the specified directory into the browser.

- `Fl_Fontsize` `textsize` () const
- void `textsize` (`Fl_Fontsize` s)

Additional Inherited Members

31.28.1 Detailed Description

The `Fl_File_Browser` widget displays a list of filenames, optionally with file-specific icons.

31.28.2 Constructor & Destructor Documentation

31.28.2.1 Fl_File_Browser()

```
Fl_File_Browser::Fl_File_Browser (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

The constructor creates the `Fl_File_Browser` widget at the specified position and size. The destructor destroys the widget and frees all memory that has been allocated.

31.28.3 Member Function Documentation

31.28.3.1 filetype() [1/2]

```
int Fl_File_Browser::filetype ( ) const [inline]
```

Sets or gets the file browser type, FILES or DIRECTORIES.

When set to FILES, both files and directories are shown. Otherwise only directories are shown.

31.28.3.2 filetype() [2/2]

```
void Fl_File_Browser::filetype (
    int t ) [inline]
```

Sets or gets the file browser type, FILES or DIRECTORIES.

When set to FILES, both files and directories are shown. Otherwise only directories are shown.

31.28.3.3 filter() [1/2]

```
const char* Fl_File_Browser::filter ( ) const [inline]
```

Sets or gets the filename filter.

The pattern matching uses the `fl_filename_match()` function in FLTK.

31.28.3.4 filter() [2/2]

```
void Fl_File_Browser::filter (
    const char * pattern )
```

Sets or gets the filename filter.

The pattern matching uses the `fl_filename_match()` function in FLTK.

31.28.3.5 iconsize() [1/2]

```
uchar Fl_File_Browser::iconsize ( ) const [inline]
```

Sets or gets the size of the icons.

The default size is 20 pixels.

31.28.3.6 iconsize() [2/2]

```
void Fl_File_Browser::iconsize (
    uchar s ) [inline]
```

Sets or gets the size of the icons.

The default size is 20 pixels.

31.28.3.7 load()

```
int Fl_File_Browser::load (
    const char * directory,
    Fl_File_Sort_F * sort = fl_numeric_sort )
```

Loads the specified directory into the browser.

If icons have been loaded then the correct icon is associated with each file in the list.

The sort argument specifies a sort function to be used with [fl_filename_list\(\)](#).

The documentation for this class was generated from the following files:

- [Fl_File_Browser.H](#)
- [Fl_File_Browser.cxx](#)

31.29 FI_File_Chooser Class Reference

The [Fl_File_Chooser](#) widget displays a standard file selection dialog that supports various selection modes.

Public Types

- enum { **SINGLE** = 0 , **MULTI** = 1 , **CREATE** = 2 , **DIRECTORY** = 4 }

Public Member Functions

- [Fl_Widget](#) * [add_extra](#) ([Fl_Widget](#) *gr)
 - Adds extra widget at the bottom of [Fl_File_Chooser](#) window.*
- void [callback](#) (void(*cb)([Fl_File_Chooser](#) *, void *), void *d=0)
 - Sets the file chooser callback cb and associated data d.*
- [Fl_Color](#) [color](#) ()
 - Gets the background color of the [Fl_File_Browser](#) list.*
- void [color](#) ([Fl_Color](#) c)
 - Sets the background color of the [Fl_File_Browser](#) list.*
- int [count](#) ()
 - Returns the number of selected files.*
- char * [directory](#) ()
 - Gets the current directory.*
- void [directory](#) (const char *d)
 - Sets the current directory.*
- const char * [filter](#) ()
 - See void [filter\(const char *pattern\)](#)*
- void [filter](#) (const char *p)
 - Sets or gets the current filename filter patterns.*

- int `filter_value` ()
Gets the current filename filter selection.
- void `filter_value` (int f)
Sets the current filename filter selection.
- `FI_File_Chooser` (const char *d, const char *p, int t, const char *title)
The constructor creates the `FI_File_Chooser` dialog shown.
- void `hide` ()
Hides the `FI_File_Chooser` window.
- uchar `iconsize` ()
Gets the size of the icons in the `FI_File_Browser`.
- void `iconsize` (uchar s)
Sets the size of the icons in the `FI_File_Browser`.
- const char * `label` ()
Gets the title bar text for the `FI_File_Chooser`.
- void `label` (const char *l)
Sets the title bar text for the `FI_File_Chooser`.
- const char * `ok_label` ()
Gets the label for the "ok" button in the `FI_File_Chooser`.
- void `ok_label` (const char *l)
Sets the label for the "ok" button in the `FI_File_Chooser`.
- int `preview` () const
Returns the current state of the preview box.
- void `preview` (int e)
Enable or disable the preview tile.
- void `rescan` ()
Reloads the current directory in the `FI_File_Browser`.
- void `rescan_keep_filename` ()
Rescan the current directory without clearing the filename, then select the file if it is in the list.
- void `show` ()
Shows the `FI_File_Chooser` window.
- int `shown` ()
Returns non-zero if the file chooser main window `show()` has been called (but not `hide()` see `FI_Window::shown()`)
- `FI_Color` `textcolor` ()
Gets the current `FI_File_Browser` text color.
- void `textcolor` (`FI_Color` c)
Sets the current `FI_File_Browser` text color.
- `FI_Font` `textfont` ()
Gets the current `FI_File_Browser` text font.
- void `textfont` (`FI_Font` f)
Sets the current `FI_File_Browser` text font.
- `FI_Fontsize` `textsize` ()
Gets the current `FI_File_Browser` text size.
- void `textsize` (`FI_Fontsize` s)
Sets the current `FI_File_Browser` text size.
- int `type` ()
Gets the current type of `FI_File_Chooser`.
- void `type` (int t)
Sets the current type of `FI_File_Chooser`.
- void * `user_data` () const
Gets the file chooser user data.
- void `user_data` (void *d)

- Sets the file chooser user data d.*
- void [value](#) (const char *filename)
 - Sets the current value of the selected file.*
- const char * [value](#) (int f=1)
 - Gets the current value of the selected file(s).*
- int [visible](#) ()
 - Returns 1 if the [Fl_File_Chooser](#) window is visible.*
- [~Fl_File_Chooser](#) ()
 - Destroys the widget and frees all memory used by it.*

Public Attributes

- [Fl_Button](#) * [newButton](#)
 - The "new directory" button is exported so that application developers can control the appearance and use.*
- [Fl_Check_Button](#) * [previewButton](#)
 - The "preview" button is exported so that application developers can control the appearance and use.*
- [Fl_Check_Button](#) * [showHiddenButton](#)
 - When checked, hidden files (i.e., filename begins with dot) are displayed.*

Static Public Attributes

- static const char * [add_favorites_label](#) = "Add to Favorites"
 - [standard text may be customized at run-time]*
- static const char * [all_files_label](#) = "All Files (*)"
 - [standard text may be customized at run-time]*
- static const char * [custom_filter_label](#) = "Custom Filter"
 - [standard text may be customized at run-time]*
- static const char * [existing_file_label](#) = "Please choose an existing file!"
 - [standard text may be customized at run-time]*
- static const char * [favorites_label](#) = "Favorites"
 - [standard text may be customized at run-time]*
- static const char * [filename_label](#) = "Filename:"
 - [standard text may be customized at run-time]*
- static const char * [filesystems_label](#) = "File Systems"
 - [standard text may be customized at run-time]*
- static const char * [hidden_label](#) = "Show hidden files"
 - [standard text may be customized at run-time]*
- static const char * [manage_favorites_label](#) = "Manage Favorites"
 - [standard text may be customized at run-time]*
- static const char * [new_directory_label](#) = "New Directory?"
 - [standard text may be customized at run-time]*
- static const char * [new_directory_tooltip](#) = "Create a new directory."
 - [standard text may be customized at run-time]*
- static const char * [preview_label](#) = "Preview"
 - [standard text may be customized at run-time]*
- static const char * [save_label](#) = "Save"
 - [standard text may be customized at run-time]*
- static const char * [show_label](#) = "Show:"
 - [standard text may be customized at run-time]*
- static [Fl_File_Sort_F](#) * [sort](#) = fl_numericsort
 - the sort function that is used when loading the contents of a directory.*

Related Functions

(Note that these are not member functions.)

- char * [fl_dir_chooser](#) (const char *message, const char *fname, int relative)
Shows a file chooser dialog and gets a directory.
- char * [fl_file_chooser](#) (const char *message, const char *pat, const char *fname, int relative)
Shows a file chooser dialog and gets a filename.
- void [fl_file_chooser_callback](#) (void(*cb)(const char *))
Set the file chooser callback.
- void [fl_file_chooser_ok_label](#) (const char *)
Set the "OK" button label.

31.29.1 Detailed Description

The [FI_File_Chooser](#) widget displays a standard file selection dialog that supports various selection modes.

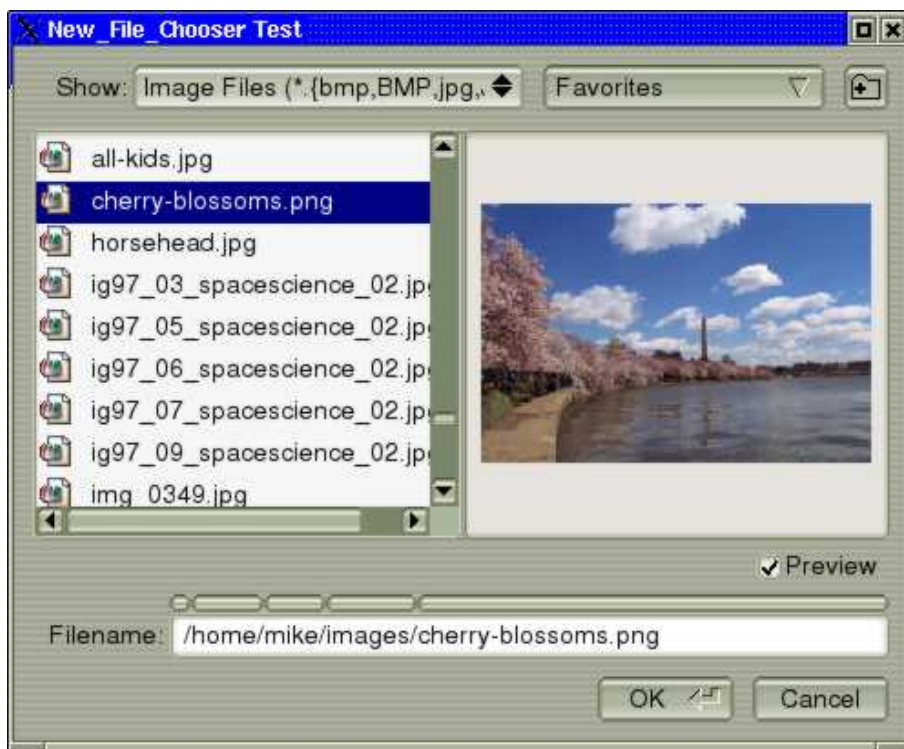


Figure 31.12 FI_File_Chooser

The [FI_File_Chooser](#) widget transmits UTF-8 encoded filenames to its user. It is recommended to open files that may have non-ASCII names with the [fl_fopen\(\)](#) or [fl_open\(\)](#) utility functions that handle these names in a cross-platform way (whereas the standard `fopen()/open()` functions fail on the MSWindows platform to open files with a non-ASCII name).

The [FI_File_Chooser](#) class also exports several static values that may be used to localize or customize the appearance of all file chooser dialogs:

Member	Default value
<code>add_favorites_label</code>	"Add to Favorites"
<code>all_files_label</code>	"All Files (*)"
<code>custom_filter_label</code>	"Custom Filter"
<code>existing_file_label</code>	"Please choose an existing file!"
<code>favorites_label</code>	"Favorites"

Member	Default value
filename_label	"Filename:"
filesystems_label	"My Computer" (WIN32) "File Systems" (all others)
hidden_label	"Show hidden files:"
manage_favorites_label	"Manage Favorites"
new_directory_label	"New Directory?"
new_directory_tooltip	"Create a new directory."
preview_label	"Preview"
save_label	"Save"
show_label	"Show:"
sort	fl_numericsort

The [Fl_File_Chooser::sort](#) member specifies the sort function that is used when loading the contents of a directory and can be customized at run-time.

The [Fl_File_Chooser](#) class also exports the [Fl_File_Chooser::newButton](#) and [Fl_File_Chooser::previewButton](#) widgets so that application developers can control their appearance and use. For more complex customization, consider copying the FLTK file chooser code and changing it accordingly.

31.29.2 Constructor & Destructor Documentation

31.29.2.1 Fl_File_Chooser()

```
Fl_File_Chooser::Fl_File_Chooser (
    const char * pathname,
    const char * pattern,
    int type,
    const char * title )
```

The constructor creates the [Fl_File_Chooser](#) dialog shown.

The pathname argument can be a directory name or a complete file name (in which case the corresponding file is highlighted in the list and in the filename input field.)

The pattern argument can be a NULL string or "*" to list all files, or it can be a series of descriptions and filter strings separated by tab characters (\t). The format of filters is either "Description text (patterns)" or just "patterns". A file chooser that provides filters for HTML and image files might look like:

```
"HTML Files (*.html)\tImage Files (*.bmp,gif,jpg,png) "
```

The file chooser will automatically add the "All Files (*)" pattern to the end of the string you pass if you do not provide one. The first filter in the string is the default filter.

See the FLTK documentation on [fl_filename_match\(\)](#) for the kinds of pattern strings that are supported.

The type argument can be one of the following:

- SINGLE - allows the user to select a single, existing file.
- MULTI - allows the user to select one or more existing files.
- CREATE - allows the user to select a single, existing file or specify a new filename.
- DIRECTORY - allows the user to select a single, existing directory.

The title argument is used to set the title bar text for the [Fl_File_Chooser](#) window.

31.29.3 Member Function Documentation

31.29.3.1 add_extra()

```
Fl_Widget * Fl_File_Chooser::add_extra (
    Fl_Widget * gr )
```

Adds extra widget at the bottom of [Fl_File_Chooser](#) window.

Returns pointer for previous extra widget or NULL if not set previously. If argument is NULL only remove previous extra widget.

Note

[Fl_File_Chooser](#) does **not** delete extra widget in destructor! To prevent memory leakage, don't forget to delete unused extra widgets

31.29.3.2 filter()

```
void Fl_File_Chooser::filter (
    const char * pattern )
```

Sets or gets the current filename filter patterns.

The filter patterns use [fl_filename_match\(\)](#). Multiple patterns can be used by separating them with tabs, like "*.jpg\t*.png\t*.gif\t* ". In addition, you can provide human-readable labels with the patterns inside parenthesis, like "JPEG Files (*.jpg)\tPNG Files (*.png)\tGIF Files (*.gif)\tAll Files (*)" .

Use filter(NULL) to show all files.

31.29.3.3 iconsize() [1/2]

```
uchar Fl_File_Chooser::iconsize ( )
```

Gets the size of the icons in the [Fl_File_Browser](#).

By default the icon size is set to 1.5 times the [textsize\(\)](#).

31.29.3.4 iconsize() [2/2]

```
void Fl_File_Chooser::iconsize (
    uchar s )
```

Sets the size of the icons in the [Fl_File_Browser](#).

By default the icon size is set to 1.5 times the [textsize\(\)](#).

31.29.3.5 preview()

```
void Fl_File_Chooser::preview (
    int e )
```

Enable or disable the preview tile.

1 = enable preview, 0 = disable preview.

31.29.3.6 value()

```
const char * Fl_File_Chooser::value (
    int f = 1 )
```

Gets the current value of the selected file(s).

f is a 1-based index into a list of file names. The number of selected files is returned by [Fl_File_Chooser::count\(\)](#).

This sample code loops through all selected files:

```
// Get list of filenames user selected from a MULTI chooser
for ( int t=1; t<=chooser->count(); t++ ) {
    const char *filename = chooser->value(t);
    ...
}
```

31.29.4 Member Data Documentation

31.29.4.1 showHiddenButton

`Fl_File_Chooser::showHiddenButton`

When checked, hidden files (i.e., filename begins with dot) are displayed.

The "showHiddenButton" button is exported so that application developers can control its appearance.

The documentation for this class was generated from the following files:

- `Fl_File_Chooser.H`
- `Fl_File_Chooser.cxx`
- `Fl_File_Chooser2.cxx`
- `fl_file_dir.cxx`

31.30 FI_File_Icon Class Reference

The `Fl_File_Icon` class manages icon images that can be used as labels in other widgets and as icons in the `FileBrowser` widget.

```
#include <Fl_File_Icon.H>
```

Public Types

- enum {
 ANY , **PLAIN** , **FIFO** , **DEVICE** ,
 LINK , **DIRECTORY** }
- enum {
 END , **COLOR** , **LINE** , **CLOSEDLINE** ,
 POLYGON , **OUTLINEPOLYGON** , **VERTEX** }

Public Member Functions

- short * `add` (short d)
 Adds a keyword value to the icon array, returning a pointer to it.
- short * `add_color` (`Fl_Color` c)
 Adds a color value to the icon array, returning a pointer to it.
- short * `add_vertex` (float x, float y)
 Adds a vertex value to the icon array, returning a pointer to it.
- short * `add_vertex` (int x, int y)
 Adds a vertex value to the icon array, returning a pointer to it.
- void `clear` ()
 Clears all icon data from the icon.
- void `draw` (int x, int y, int w, int h, `Fl_Color` ic, int active=1)
 Draws an icon in the indicated area.
- `Fl_File_Icon` (const char *p, int t, int nd=0, short *d=0)
 Creates a new `Fl_File_Icon` with the specified information.
- void `label` (`Fl_Widget` *w)
 Applies the icon to the widget, registering the `Fl_File_Icon` label type as needed.
- void `load` (const char *f)
 Loads the specified icon image.
- int `load_fti` (const char *fti)
 Loads an SGI icon file.
- int `load_image` (const char *i)
 Load an image icon file from an image filename.
- `Fl_File_Icon` * `next` ()
 Returns next file icon object.
- const char * `pattern` ()

- Returns the filename matching pattern for the icon.*

 - int `size` ()

Returns the number of words of data used by the icon.
- int `type` ()

Returns the filetype associated with the icon, which can be one of the following:
- short * `value` ()

Returns the data array for the icon.
- `~Fl_File_Icon` ()

The destructor destroys the icon and frees all memory that has been allocated for it.

Static Public Member Functions

- static `Fl_File_Icon * find` (const char *filename, int filetype=ANY)

Finds an icon that matches the given filename and file type.
- static `Fl_File_Icon * first` ()

Returns a pointer to the first icon in the list.
- static void `labeltype` (const `Fl_Label` *o, int x, int y, int w, int h, `Fl_Align` a)

Draw the icon label.
- static void `load_system_icons` (void)

Loads all system-defined icons.

31.30.1 Detailed Description

The `Fl_File_Icon` class manages icon images that can be used as labels in other widgets and as icons in the `FileBrowser` widget.

31.30.2 Constructor & Destructor Documentation

31.30.2.1 Fl_File_Icon()

```
Fl_File_Icon::Fl_File_Icon (
    const char * p,
    int t,
    int nd = 0,
    short * d = 0 )
```

Creates a new `Fl_File_Icon` with the specified information.

Parameters

in	<i>p</i>	filename pattern
in	<i>t</i>	file type
in	<i>nd</i>	number of data values
in	<i>d</i>	data values

31.30.3 Member Function Documentation

31.30.3.1 add()

```
short * Fl_File_Icon::add (
    short d )
```

Adds a keyword value to the icon array, returning a pointer to it.

Parameters

in	<i>d</i>	data value
----	----------	------------

31.30.3.2 add_color()

```
short* Fl_File_Icon::add_color (
    Fl_Color c ) [inline]
```

Adds a color value to the icon array, returning a pointer to it.

Parameters

in	<i>c</i>	color value
----	----------	-------------

31.30.3.3 add_vertex() [1/2]

```
short* Fl_File_Icon::add_vertex (
    float x,
    float y ) [inline]
```

Adds a vertex value to the icon array, returning a pointer to it.

The floating point version goes from 0.0 to 1.0. The origin (0.0) is in the lower-lefthand corner of the icon.

Parameters

in	<i>x,y</i>	vertex coordinates
----	------------	--------------------

31.30.3.4 add_vertex() [2/2]

```
short* Fl_File_Icon::add_vertex (
    int x,
    int y ) [inline]
```

Adds a vertex value to the icon array, returning a pointer to it.

The integer version accepts coordinates from 0 to 10000. The origin (0.0) is in the lower-lefthand corner of the icon.

Parameters

in	<i>x,y</i>	vertex coordinates
----	------------	--------------------

31.30.3.5 draw()

```
void Fl_File_Icon::draw (
    int x,
    int y,
    int w,
    int h,
    Fl_Color ic,
    int active = 1 )
```

Draws an icon in the indicated area.

Parameters

in	<i>x,y,w,h</i>	position and size
in	<i>ic</i>	icon color
in	<i>active</i>	status, default is active [non-zero]

31.30.3.6 find()

```
Fl_File_Icon * Fl_File_Icon::find (
    const char * filename,
    int filetype = ANY ) [static]
```

Finds an icon that matches the given filename and file type.

Parameters

in	<i>filename</i>	name of file
in	<i>filetype</i>	enumerated file type

Returns

matching file icon or NULL

31.30.3.7 label()

```
void Fl_File_Icon::label (
    Fl_Widget * w )
```

Applies the icon to the widget, registering the [Fl_File_Icon](#) label type as needed.

Parameters

in	<i>w</i>	widget for which this icon will become the label
----	----------	--

31.30.3.8 labeltype()

```
void Fl_File_Icon::labeltype (
    const Fl_Label * o,
    int x,
    int y,
    int w,
    int h,
    Fl_Align a ) [static]
```

Draw the icon label.

Parameters

in	<i>o</i>	label data
in	<i>x,y,w,h</i>	position and size of label
in	<i>a</i>	label alignment [not used]

31.30.3.9 load()

```
void Fl_File_Icon::load (
    const char * f )
```

Loads the specified icon image.
The format is deduced from the filename.

Parameters

in	<i>f</i>	filename
----	----------	----------

31.30.3.10 load_fti()

```
int Fl_File_Icon::load_fti (
    const char * fti )
```

Loads an SGI icon file.

Parameters

in	<i>fti</i>	icon filename
----	------------	---------------

Returns

0 on success, non-zero on error

31.30.3.11 load_image()

```
int Fl_File_Icon::load_image (
    const char * ifile )
```

Load an image icon file from an image filename.

Parameters

in	<i>ifile</i>	image filename
----	--------------	----------------

Returns

0 on success, non-zero on error

31.30.3.12 load_system_icons()

```
void Fl_File_Icon::load_system_icons (
    void ) [static]
```

Loads all system-defined icons.

This call is useful when using the FileChooser widget and should be used when the application starts:

```
Fl\_File\_Icon::load\_system\_icons\(\);
```

31.30.3.13 next()

```
Fl\_File\_Icon\* Fl_File_Icon::next ( ) [inline]
```

Returns next file icon object.

See [Fl_File_Icon::first\(\)](#)

31.30.3.14 type()

```
int Fl_File_Icon::type ( ) [inline]
```

Returns the filetype associated with the icon, which can be one of the following:

- `Fl_File_Icon::ANY`, any kind of file.
- `Fl_File_Icon::PLAIN`, plain files.
- `Fl_File_Icon::FIFO`, named pipes.
- `Fl_File_Icon::DEVICE`, character and block devices.
- `Fl_File_Icon::LINK`, symbolic links.
- `Fl_File_Icon::DIRECTORY`, directories.

The documentation for this class was generated from the following files:

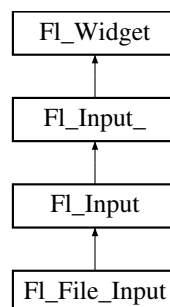
- `Fl_File_Icon.H`
- `Fl_File_Icon.cxx`
- `Fl_File_Icon2.cxx`

31.31 Fl_File_Input Class Reference

This widget displays a pathname in a text input field.

```
#include <Fl_File_Input.H>
```

Inheritance diagram for `Fl_File_Input`:



Public Member Functions

- `Fl_Boxtype down_box ()` const
Gets the box type used for the navigation bar.
- void `down_box (Fl_Boxtype b)`
Sets the box type to use for the navigation bar.
- `Fl_Color errorcolor ()` const
Gets the current error color.
- void `errorcolor (Fl_Color c)`
Sets the current error color to c.
- `Fl_File_Input (int X, int Y, int W, int H, const char *L=0)`
Creates a new Fl_File_Input widget using the given position, size, and label string.
- virtual int `handle (int event)`
Handle events in the widget.
- const char * `value ()`
Returns the current value, which is a pointer to an internal buffer and is valid only until the next event is handled.
- int `value (const char *str)`
Sets the value of the widget given a new string value.
- int `value (const char *str, int len)`
Sets the value of the widget given a new string value and its length.

Protected Member Functions

- virtual void [draw](#) ()

Draws the file input widget.

Additional Inherited Members

31.31.1 Detailed Description

This widget displays a pathname in a text input field.

A navigation bar located above the input field allows the user to navigate upward in the directory tree. You may want to handle `FL_WHEN_CHANGED` events for tracking text changes and also `FL_WHEN_RELEASE` for button release when changing to parent dir. `FL_WHEN_RELEASE` callback won't be called if the directory clicked is the same as the current one.

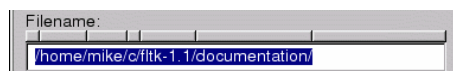


Figure 31.13 `Fl_File_Input`

Note

As all `Fl_Input` derived objects, `Fl_File_Input` may call its callback when losing focus (see `FL_UNFOCUS`) to update its state like its cursor shape. One resulting side effect is that you should call `clear_changed()` early in your callback to avoid reentrant calls if you plan to show another window or dialog box in the callback.

31.31.2 Constructor & Destructor Documentation

31.31.2.1 `Fl_File_Input()`

```
Fl_File_Input::Fl_File_Input (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new `Fl_File_Input` widget using the given position, size, and label string. The default boxtype is `FL_DOWN_BOX`.

Parameters

in	<code>X,Y,W,H</code>	position and size of the widget
in	<code>L</code>	widget label, default is no label

31.31.3 Member Function Documentation

31.31.3.1 `down_box()`

```
void Fl_File_Input::down_box (
    Fl_Boxtype b ) [inline]
```

Sets the box type to use for the navigation bar.

31.31.3.2 errorcolor()

`Fl_Color Fl_File_Input::errorcolor () const [inline]`
 Gets the current error color.

Todo Better docs for `Fl_File_Input::errorcolor()` - is it even used?

31.31.3.3 handle()

```
int Fl_File_Input::handle (
    int event ) [virtual]
```

Handle events in the widget.
 Return non zero if event is handled.

Parameters

in	<i>event</i>	
----	--------------	--

Reimplemented from [Fl_Widget](#).

31.31.3.4 value() [1/2]

```
int Fl_File_Input::value (
    const char * str )
```

Sets the value of the widget given a new string value.
 Returns non 0 on success.

Parameters

in	<i>str</i>	new string value
----	------------	------------------

31.31.3.5 value() [2/2]

```
int Fl_File_Input::value (
    const char * str,
    int len )
```

Sets the value of the widget given a new string value and its length.
 Returns non 0 on success.

Parameters

in	<i>str</i>	new string value
in	<i>len</i>	length of value

The documentation for this class was generated from the following files:

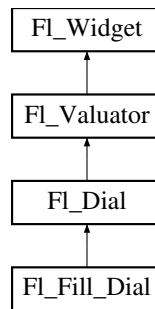
- `Fl_File_Input.H`
- `Fl_File_Input.cxx`

31.32 Fl_Fill_Dial Class Reference

Draws a dial with a filled arc.

```
#include <Fl_Fill_Dial.H>
```

Inheritance diagram for `Fl_Fill_Dial`:



Public Member Functions

- [Fl_Fill_Dial](#) (int X, int Y, int W, int H, const char *L)
Creates a filled dial, also setting its type to FL_FILL_DIAL.

Additional Inherited Members

31.32.1 Detailed Description

Draws a dial with a filled arc.

The documentation for this class was generated from the following files:

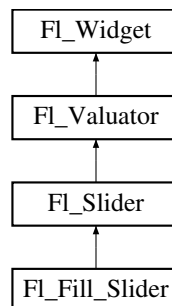
- Fl_Fill_Dial.H
- Fl_Dial.cxx

31.33 Fl_Fill_Slider Class Reference

Widget that draws a filled horizontal slider, useful as a progress or value meter.

```
#include <Fl_Fill_Slider.H>
```

Inheritance diagram for Fl_Fill_Slider:



Public Member Functions

- [Fl_Fill_Slider](#) (int X, int Y, int W, int H, const char *L=0)
Creates the slider from its position, size and optional title.

Additional Inherited Members

31.33.1 Detailed Description

Widget that draws a filled horizontal slider, useful as a progress or value meter.

The documentation for this class was generated from the following files:

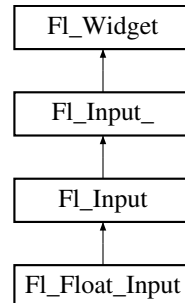
- Fl_Fill_Slider.H
- Fl_Slider.cxx

31.34 FI_Float_Input Class Reference

The `FI_Float_Input` class is a subclass of `FI_Input` that only allows the user to type floating point numbers (sign, digits, decimal point, more digits, 'E' or 'e', sign, digits).

```
#include <FI_Float_Input.H>
```

Inheritance diagram for `FI_Float_Input`:



Public Member Functions

- `FI_Float_Input` (int X, int Y, int W, int H, const char *l=0)
Creates a new `FI_Float_Input` widget using the given position, size, and label string.

Additional Inherited Members

31.34.1 Detailed Description

The `FI_Float_Input` class is a subclass of `FI_Input` that only allows the user to type floating point numbers (sign, digits, decimal point, more digits, 'E' or 'e', sign, digits).

31.34.2 Constructor & Destructor Documentation

31.34.2.1 FI_Float_Input()

```
FI_Float_Input::FI_Float_Input (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new `FI_Float_Input` widget using the given position, size, and label string.

The default boxtype is `FL_DOWN_BOX`.

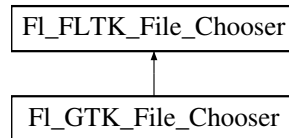
Inherited destructor destroys the widget and any value associated with it.

The documentation for this class was generated from the following files:

- `FI_Float_Input.H`
- `FI_Input.cxx`

31.35 FI_FLTK_File_Chooser Class Reference

Inheritance diagram for `FI_FLTK_File_Chooser`:



Protected Member Functions

- virtual int **count** () const
- const char * **directory** () const
- void **directory** (const char *val)
- const char * **errmsg** () const
- void **errmsg** (const char *msg)
- int **exist_dialog** ()
- virtual const char * **filename** () const
- virtual const char * **filename** (int i) const
- const char * **filter** () const
- void **filter** (const char *)
- int **filter_value** () const
- void **filter_value** (int i)
- int **filters** () const
- **FI_FLTK_File_Chooser** (int val)
- int **options** () const
- void **options** (int)
- void **parse_filter** ()
- const char * **preset_file** () const
- void **preset_file** (const char *)
- virtual int **show** ()
- virtual const char * **title** () const
- virtual void **title** (const char *)
- int **type** () const
- virtual void **type** (int)
- int **type_fl_file** (int)

Protected Attributes

- int **_btype**
- char * **_directory**
- char * **_errmsg**
- [FI_File_Chooser](#) * **_file_chooser**
- char * **_filter**
- int **_filtvalue**
- int **_nfilters**
- int **_options**
- char * **_parsedfilt**
- char * **_preset_file**
- char * **_prevvalue**

Friends

- class **FI_Native_File_Chooser**

The documentation for this class was generated from the following files:

- [FI_Native_File_Chooser.H](#)
- [FI_Native_File_Chooser_FLTK.cxx](#)

31.36 Fl_Font_Descriptor Class Reference

This a structure for an actual system font, with junk to help choose it and info on character sizes.

```
#include <Fl_Font.H>
```

Public Attributes

- [Fl_Font_Descriptor](#) * **next**
linked list for this Fl_Fontdesc
- [Fl_Fontsize](#) **size**
font size

31.36.1 Detailed Description

This a structure for an actual system font, with junk to help choose it and info on character sizes.

Each [Fl_Fontdesc](#) has a linked list of these. These are created the first time each system font/size combination is used.

The documentation for this class was generated from the following file:

- Fl_Font.H

31.37 Fl_Fontdesc Struct Reference

Public Attributes

- [Fl_Font_Descriptor](#) * **first**
- char **fontname** [128]
- int **n**
- const char * **name**
- char ** **xlist**

The documentation for this struct was generated from the following file:

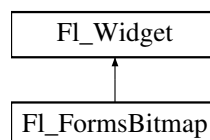
- Fl_Font.H

31.38 Fl_FormsBitmap Class Reference

Forms compatibility Bitmap Image Widget.

```
#include <Fl_FormsBitmap.H>
```

Inheritance diagram for Fl_FormsBitmap:



Public Member Functions

- [Fl_Bitmap](#) * **bitmap** () const
Gets a the current associated Fl_Bitmap objects.
- void **bitmap** ([Fl_Bitmap](#) *B)
Sets a new bitmap.
- [Fl_FormsBitmap](#) ([Fl_Boxtype](#), int, int, int, int, const char *=0)
Creates a bitmap widget from a box type, position, size and optional label specification.
- void **set** (int W, int H, const [uchar](#) *bits)
Sets a new bitmap bits with size W,H.

Protected Member Functions

- void `draw` ()
Draws the bitmap and its associated box.

Additional Inherited Members

31.38.1 Detailed Description

Forms compatibility Bitmap Image Widget.

31.38.2 Member Function Documentation

31.38.2.1 `set()`

```
void Fl_FormsBitmap::set (
    int W,
    int H,
    const uchar * bits )
```

Sets a new bitmap bits with size W,H.

Deletes the previous one.

The documentation for this class was generated from the following files:

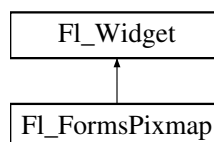
- `Fl_FormsBitmap.H`
- `forms_bitmap.cxx`

31.39 `Fl_FormsPixmap` Class Reference

Forms pixmap drawing routines.

```
#include <Fl_FormsPixmap.H>
```

Inheritance diagram for `Fl_FormsPixmap`:



Public Member Functions

- `Fl_FormsPixmap` (`Fl_Boxtype` t, int X, int Y, int W, int H, const char *L=0)
Creates a new `Fl_FormsPixmap` widget using the given box type, position, size and label string.
- `Fl_Pixmap * Pixmap` () const
Get the internal pixmap pointer.
- void `Pixmap` (`Fl_Pixmap *B`)
Set the internal pixmap pointer to an existing pixmap.
- void `set` (char *const *bits)
Set/create the internal pixmap using raw data.

Protected Member Functions

- void `draw` ()
Draws the widget.

Additional Inherited Members

31.39.1 Detailed Description

Forms pixmap drawing routines.

31.39.2 Constructor & Destructor Documentation

31.39.2.1 Fl_FormsPixmap()

```
Fl_FormsPixmap::Fl_FormsPixmap (
    Fl_Boxtype t,
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new [Fl_FormsPixmap](#) widget using the given box type, position, size and label string.

Parameters

in	<i>t</i>	box type
in	<i>X,Y,W,H</i>	position and size
in	<i>L</i>	widget label, default is no label

31.39.3 Member Function Documentation

31.39.3.1 draw()

```
void Fl_FormsPixmap::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scroll;           // scroll is an embedded Fl_Scrollbar
s->draw();                        // calls Fl_Scrollbar::draw()
```

Implements [Fl_Widget](#).

31.39.3.2 Pixmap()

```
void Fl_FormsPixmap::Pixmap (
    Fl_Pixmap * B ) [inline]
```

Set the internal pixmap pointer to an existing pixmap.

Parameters

in	<i>B</i>	existing pixmap
----	----------	-----------------

31.39.3.3 set()

```
void Fl_FormsPixmap::set (
    char *const * bits )
```

Set/create the internal pixmap using raw data.

Parameters

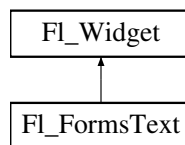
in	<i>bits</i>	raw data
----	-------------	----------

The documentation for this class was generated from the following files:

- Fl_FormsPixmap.H
- forms_pixmap.cxx

31.40 FI_FormsText Class Reference

Inheritance diagram for Fl_FormsText:



Public Member Functions

- **Fl_FormsText** ([Fl_Boxtype](#) b, int X, int Y, int W, int H, const char *l=0)

Protected Member Functions

- void **draw** ()
Draws the widget.

Additional Inherited Members

31.40.1 Member Function Documentation

31.40.1.1 draw()

```
void Fl_FormsText::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own draw()* method, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scroll;           // scroll is an embedded Fl_Scrollbar
s->draw();                         // calls Fl_Scrollbar::draw()
```

Implements [Fl_Widget](#).

The documentation for this class was generated from the following file:

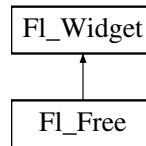
- forms.H

31.41 Fl_Free Class Reference

Emulation of the Forms "free" widget.

```
#include <Fl_Free.H>
```

Inheritance diagram for Fl_Free:



Public Member Functions

- `Fl_Free` (`uchar t`, `int X`, `int Y`, `int W`, `int H`, `const char *L`, `FL_HANDLEPTR hdl`)
Create a new `Fl_Free` widget with type, position, size, label and handler.
- `int handle` (`int e`)
Handles the specified event.
- `~Fl_Free` ()
The destructor will call the handle function with the event `FL_FREE_MEM`.

Protected Member Functions

- `void draw` ()
Draws the widget.

Additional Inherited Members

31.41.1 Detailed Description

Emulation of the Forms "free" widget.

This emulation allows the free demo to run, and appears to be useful for porting programs written in Forms which use the free widget or make subclasses of the Forms widgets.

There are five types of free, which determine when the handle function is called:

- `FL_NORMAL_FREE` normal event handling.
- `FL_SLEEPING_FREE` deactivates event handling (widget is inactive).
- `FL_INPUT_FREE` accepts `FL_FOCUS` events.
- `FL_CONTINUOUS_FREE` sets a timeout callback 100 times a second and provides an `FL_STEP` event. This has obvious detrimental effects on machine performance.
- `FL_ALL_FREE` same as `FL_INPUT_FREE` and `FL_CONTINUOUS_FREE`.

31.41.2 Constructor & Destructor Documentation

31.41.2.1 Fl_Free()

```
Fl_Free::Fl_Free (
    uchar t,
    int X,
    int Y,
    int W,
    int H,
```

```
const char * L,
FL_HANDLEPTR hdl )
```

Create a new `Fl_Free` widget with type, position, size, label and handler.

Parameters

in	<i>t</i>	type
in	<i>X,Y,W,H</i>	position and size
in	<i>L</i>	widget label
in	<i>hdl</i>	handler function

The constructor takes both the type and the handle function. The handle function should be declared as follows:

```
int handle_function(Fl_Widget *w,
                  int event,
                  float event_x,
                  float event_y,
                  char key)
```

This function is called from the `handle()` method in response to most events, and is called by the `draw()` method.

The event argument contains the event type:

```
// old event names for compatibility:
#define FL_MOUSE          FL_DRAG
#define FL_DRAW          0
#define FL_STEP          9
#define FL_FREEMEM       12
#define FL_FREEZE        FL_UNMAP
#define FL_THAW          FL_MAP
```

31.41.3 Member Function Documentation

31.41.3.1 draw()

```
void Fl_Free::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call `redraw()` instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own draw() method*, e.g. for an embedded scrollbar, you can do it (because `draw()` is virtual) like this:

```
Fl_Widget *s = &scroll; // scroll is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Implements `Fl_Widget`.

31.41.3.2 handle()

```
int Fl_Free::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited `handle()` method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
---	---

Return values

1	if the event was used and can be deleted
---	--

See also

[FI_Event](#)

Reimplemented from [FI_Widget](#).

The documentation for this class was generated from the following files:

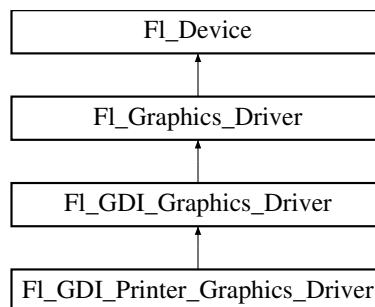
- FI_Free.H
- forms_free.cxx

31.42 FI_GDI_Graphics_Driver Class Reference

The MSWindows-specific graphics class.

```
#include <FI_Device.H>
```

Inheritance diagram for FI_GDI_Graphics_Driver:



Public Member Functions

- `const char * class_name ()`
Returns the name of the class of this object.
- `void color (FI_Color c)`
see fl_color(FI_Color c).
- `void color (uchar r, uchar g, uchar b)`
see fl_color(uchar r, uchar g, uchar b).
- `void copy_offscreen (int x, int y, int w, int h, FI_Offscreen pixmap, int srcx, int srcy)`
see fl_copy_offscreen()
- `int descent ()`
see fl_descent().
- `void draw (const char *str, int n, int x, int y)`
*see fl_draw(const char *str, int n, int x, int y).*
- `void draw (FI_Bitmap *pixmap, int XP, int YP, int WP, int HP, int cx, int cy)`
Draws an FI_Bitmap object to the device.
- `void draw (FI_Pixmap *pixmap, int XP, int YP, int WP, int HP, int cx, int cy)`
Draws an FI_Pixmap object to the device.
- `void draw (FI_RGB_Image *img, int XP, int YP, int WP, int HP, int cx, int cy)`
Draws an FI_RGB_Image object to the device.
- `void draw (int angle, const char *str, int n, int x, int y)`
*see fl_draw(int angle, const char *str, int n, int x, int y).*
- `void draw_image (const uchar *buf, int X, int Y, int W, int H, int D=3, int L=0)`

- *see fl_draw_image(const uchar* buf, int X,int Y,int W,int H, int D, int L).*
- void `draw_image` (`Fl_Draw_Image_Cb` cb, void *data, int X, int Y, int W, int H, int D=3)
 - *see fl_draw_image(Fl_Draw_Image_Cb cb, void* data, int X,int Y,int W,int H, int D).*
- void `draw_image_mono` (const uchar *buf, int X, int Y, int W, int H, int D=1, int L=0)
 - *see fl_draw_image_mono(const uchar* buf, int X,int Y,int W,int H, int D, int L).*
- void `draw_image_mono` (`Fl_Draw_Image_Cb` cb, void *data, int X, int Y, int W, int H, int D=1)
 - *see fl_draw_image_mono(Fl_Draw_Image_Cb cb, void* data, int X,int Y,int W,int H, int D).*
- void `font` (`Fl_Font` face, `Fl_Fontsize` size)
 - *see fl_font(Fl_Font face, Fl_Fontsize size).*
- int `height` ()
 - *see fl_height().*
- void `rtl_draw` (const char *str, int n, int x, int y)
 - *see fl_rtl_draw(const char *str, int n, int x, int y).*
- void `text_extents` (const char *, int n, int &dx, int &dy, int &w, int &h)
 - *see fl_text_extents(const char*, int n, int& dx, int& dy, int& w, int& h).*
- double `width` (const char *str, int n)
 - *see fl_width(const char *str, int n).*
- double `width` (unsigned int c)
 - *see fl_width(unsigned int n).*

Static Public Attributes

- static const char * `class_id` = "Fl_GDI_Graphics_Driver"

Additional Inherited Members

31.42.1 Detailed Description

The MSWindows-specific graphics class.

This class is implemented only on the MSWindows platform.

31.42.2 Member Function Documentation

31.42.2.1 class_name()

```
const char* Fl_GDI_Graphics_Driver::class_name ( ) [inline], [virtual]
```

Returns the name of the class of this object.

Use of the `class_name()` function is discouraged because it will be removed from future FLTK versions.

The class of an instance of an `Fl_Device` subclass can be checked with code such as:

```
if ( instance->class_name() == Fl_Printer::class_id ) { ... }
```

Reimplemented from `Fl_Graphics_Driver`.

Reimplemented in `Fl_GDI_Printer_Graphics_Driver`.

31.42.2.2 draw() [1/3]

```
void Fl_GDI_Graphics_Driver::draw (
    Fl_Bitmap * bm,
    int XP,
    int YP,
    int WP,
    int HP,
    int cx,
    int cy ) [virtual]
```

Draws an [FI_Bitmap](#) object to the device.

Specifies a bounding box for the image, with the origin (upper left-hand corner) of the image offset by the *cx* and *cy* arguments.

Reimplemented from [FI_Graphics_Driver](#).

Reimplemented in [FI_GDI_Printer_Graphics_Driver](#).

31.42.2.3 draw() [2/3]

```
void Fl_GDI_Graphics_Driver::draw (
    Fl_Pixmap * pxm,
    int XP,
    int YP,
    int WP,
    int HP,
    int cx,
    int cy ) [virtual]
```

Draws an [FI_Pixmap](#) object to the device.

Specifies a bounding box for the image, with the origin (upper left-hand corner) of the image offset by the *cx* and *cy* arguments.

Reimplemented from [FI_Graphics_Driver](#).

Reimplemented in [FI_GDI_Printer_Graphics_Driver](#).

31.42.2.4 draw() [3/3]

```
void Fl_GDI_Graphics_Driver::draw (
    Fl_RGB_Image * rgb,
    int XP,
    int YP,
    int WP,
    int HP,
    int cx,
    int cy ) [virtual]
```

Draws an [FI_RGB_Image](#) object to the device.

Specifies a bounding box for the image, with the origin (upper left-hand corner) of the image offset by the *cx* and *cy* arguments.

Reimplemented from [FI_Graphics_Driver](#).

The documentation for this class was generated from the following files:

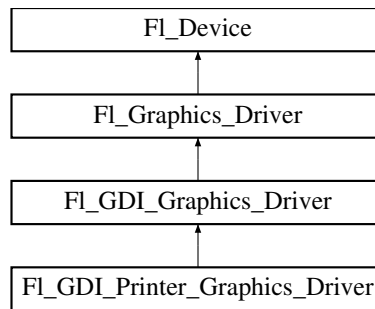
- [FI_Device.H](#)
- [fl_color_win32.cxx](#)
- [FI_Device.cxx](#)
- [fl_draw_image_win32.cxx](#)

31.43 FI_GDI_Printer_Graphics_Driver Class Reference

The graphics driver used when printing on MSWindows.

```
#include <Fl_Device.H>
```

Inheritance diagram for [FI_GDI_Printer_Graphics_Driver](#):



Public Member Functions

- `const char * class_name ()`
Returns the name of the class of this object.
- `void draw (Fl_Bitmap *bm, int XP, int YP, int WP, int HP, int cx, int cy)`
Draws an *Fl_Bitmap* object to the device.
- `void draw (Fl_Pixmap *pixmap, int XP, int YP, int WP, int HP, int cx, int cy)`
Draws an *Fl_Pixmap* object to the device.
- `int draw_scaled (Fl_Image *img, int XP, int YP, int WP, int HP)`
Draws an *Fl_Image* scaled to width *W* & height *H* with top-left corner at *X,Y*.

Static Public Attributes

- `static const char * class_id = "Fl_GDI_Printer_Graphics_Driver"`

Additional Inherited Members

31.43.1 Detailed Description

The graphics driver used when printing on MSWindows.

This class is implemented only on the MSWindows platform. It's extremely similar to [Fl_GDI_Graphics_Driver](#).

31.43.2 Member Function Documentation

31.43.2.1 class_name()

```
const char* Fl_GDI_Printer_Graphics_Driver::class_name ( ) [inline], [virtual]
```

Returns the name of the class of this object.

Use of the `class_name()` function is discouraged because it will be removed from future FLTK versions.

The class of an instance of an [Fl_Device](#) subclass can be checked with code such as:

```
if ( instance->class_name() == Fl_Printer::class_id ) { ... }
```

Reimplemented from [Fl_GDI_Graphics_Driver](#).

31.43.2.2 draw() [1/2]

```
void Fl_GDI_Printer_Graphics_Driver::draw (
    Fl_Bitmap * bm,
    int XP,
    int YP,
    int WP,
    int HP,
    int cx,
    int cy ) [virtual]
```

Draws an [FI_Bitmap](#) object to the device.

Specifies a bounding box for the image, with the origin (upper left-hand corner) of the image offset by the *cx* and *cy* arguments.

Reimplemented from [FI_GDI_Graphics_Driver](#).

31.43.2.3 draw() [2/2]

```
void Fl_GDI_Printer_Graphics_Driver::draw (
    Fl_Pixmap * pxm,
    int XP,
    int YP,
    int WP,
    int HP,
    int cx,
    int cy ) [virtual]
```

Draws an [FI_Pixmap](#) object to the device.

Specifies a bounding box for the image, with the origin (upper left-hand corner) of the image offset by the *cx* and *cy* arguments.

Reimplemented from [FI_GDI_Graphics_Driver](#).

31.43.2.4 draw_scaled()

```
int Fl_GDI_Printer_Graphics_Driver::draw_scaled (
    Fl_Image * img,
    int X,
    int Y,
    int W,
    int H ) [virtual]
```

Draws an [FI_Image](#) scaled to width *W* & height *H* with top-left corner at *X,Y*.

Returns

zero when the graphics driver doesn't implement scaled drawing, non-zero if it does implement it.

Reimplemented from [FI_Graphics_Driver](#).

The documentation for this class was generated from the following files:

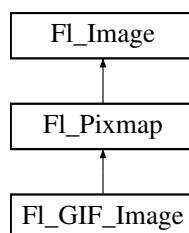
- [FI_Device.H](#)
- [FI_Device.cxx](#)

31.44 FI_GIF_Image Class Reference

The [FI_GIF_Image](#) class supports loading, caching, and drawing of CompuServe GIFSM images.

```
#include <Fl_GIF_Image.H>
```

Inheritance diagram for [FI_GIF_Image](#):



Public Member Functions

- [FI_GIF_Image](#) (const char *filename)

The constructor loads the named GIF image.

Additional Inherited Members

31.44.1 Detailed Description

The [Fl_GIF_Image](#) class supports loading, caching, and drawing of Compuserve GIFSM images. The class loads the first image and supports transparency.

31.44.2 Constructor & Destructor Documentation

31.44.2.1 Fl_GIF_Image()

```
Fl_GIF_Image::Fl_GIF_Image (
    const char * infname )
```

The constructor loads the named GIF image.

The destructor frees all memory and server resources that are used by the image.

Use [Fl_Image::fail\(\)](#) to check if [Fl_GIF_Image](#) failed to load. [fail\(\)](#) returns `ERR_FILE_ACCESS` if the file could not be opened or read, `ERR_FORMAT` if the GIF format could not be decoded, and `ERR_NO_IMAGE` if the image could not be loaded for another reason.

The documentation for this class was generated from the following files:

- [Fl_GIF_Image.H](#)
- [Fl_GIF_Image.cxx](#)

31.45 Fl_Gl_Choice Class Reference

Static Public Member Functions

- static [Fl_Gl_Choice](#) * [find](#) (int mode, const int *)

Public Attributes

- GLXFBConfig [best_fb](#)
- Colormap [colormap](#)
- XVisualInfo * [vis](#)

The documentation for this class was generated from the following files:

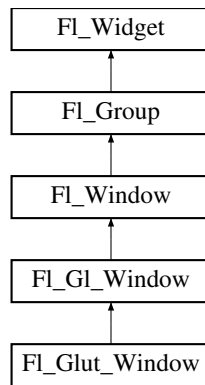
- [Fl_Gl_Choice.H](#)
- [Fl_Gl_Choice.cxx](#)

31.46 Fl_Gl_Window Class Reference

The [Fl_Gl_Window](#) widget sets things up so OpenGL works.

```
#include <Fl_Gl_Window.H>
```

Inheritance diagram for [Fl_Gl_Window](#):



Public Member Functions

- virtual [Fl_Gl_Window](#) * [as_gl_window](#) ()
Returns an [Fl_Gl_Window](#) pointer if this widget is an [Fl_Gl_Window](#).
- int [can_do](#) ()
Returns non-zero if the hardware supports the current OpenGL mode.
- int [can_do_overlay](#) ()
Returns true if the hardware overlay is possible.
- void * [context](#) () const
Returns a pointer to the GLContext that this window is using.
- void [context](#) (void *, int destroy_flag=0)
Sets a pointer to the GLContext that this window is using.
- char [context_valid](#) () const
Will only be set if the OpenGL context is created or recreated.
- void [context_valid](#) (char v)
See char [Fl_Gl_Window::context_valid\(\)](#) const.
- [Fl_Gl_Window](#) (int W, int H, const char *l=0)
Creates a new [Fl_Gl_Window](#) widget using the given size, and label string.
- [Fl_Gl_Window](#) (int X, int Y, int W, int H, const char *l=0)
Creates a new [Fl_Gl_Window](#) widget using the given position, size, and label string.
- void [flush](#) ()
Forces the window to be drawn, this window is also made current and calls [draw\(\)](#).
- int [handle](#) (int)
Handle some FLTK events as needed.
- void [hide](#) ()
Hides the window and destroys the OpenGL context.
- void [hide_overlay](#) ()
Hides the window if it is not this window, does nothing in WIN32.
- void [invalidate](#) ()
The [invalidate\(\)](#) method turns off [valid\(\)](#) and is equivalent to calling [value\(0\)](#).
- void [make_current](#) ()
The [make_current\(\)](#) method selects the OpenGL context for the widget.
- void [make_overlay_current](#) ()
The [make_overlay_current\(\)](#) method selects the OpenGL context for the widget's overlay.
- [Fl_Mode](#) [mode](#) () const
Returns the current OpenGL capabilities of the window.
- int [mode](#) (const int *a)
Set the OpenGL capabilities of the window using platform-specific data.
- int [mode](#) (int a)

- Set or change the OpenGL capabilities of the window.*

 - void `ortho` ()
 - Sets the projection so 0,0 is in the lower left of the window and each pixel is 1 unit wide/tall.*
 - int `pixel_h` ()
 - Gives the window height in OpenGL pixels.*
 - int `pixel_w` ()
 - Gives the window width in OpenGL pixels.*
 - float `pixels_per_unit` ()
 - The number of pixels per FLTK unit of length for the window.*
 - void `redraw_overlay` ()
 - This method causes `draw_overlay()` to be called at a later time.*
 - void `resize` (int, int, int, int)
 - Changes the size and position of the window.*
 - void `show` ()
 - Puts the window on the screen.*
 - void `show` (int a, char **b)
 - void `swap_buffers` ()
 - The `swap_buffers()` method swaps the back and front buffers.*
 - char `valid` () const
 - Is turned off when FLTK creates a new context for this window or when the window resizes, and is turned on after `draw()` is called.*
 - void `valid` (char v)
 - See char `FI_Gl_Window::valid()` const.*
 - `~FI_Gl_Window` ()
 - The destructor removes the widget and destroys the OpenGL context associated with it.*

Static Public Member Functions

- static int `can_do` (const int *m)
 - Returns non-zero if the hardware supports the given OpenGL mode.*
- static int `can_do` (int m)
 - Returns non-zero if the hardware supports the given OpenGL mode.*

Protected Member Functions

- virtual void `draw` ()
 - Draws the `FI_Gl_Window`.*

Friends

- class `_FI_Gl_Overlay`

Additional Inherited Members

31.46.1 Detailed Description

The `FI_Gl_Window` widget sets things up so OpenGL works.

It also keeps an OpenGL "context" for that window, so that changes to the lighting and projection may be reused between redraws. `FI_Gl_Window` also flushes the OpenGL streams and swaps buffers after `draw()` returns.

OpenGL hardware typically provides some overlay bit planes, which are very useful for drawing UI controls atop your 3D graphics. If the overlay hardware is not provided, FLTK tries to simulate the overlay. This works pretty well if your graphics are double buffered, but not very well for single-buffered.

Please note that the FLTK drawing and clipping functions will not work inside an `FI_Gl_Window`. All drawing should be done using OpenGL calls exclusively. Even though `FI_Gl_Window` is derived from `FI_Group`, it is not useful to add other FLTK Widgets as children, unless those widgets are modified to draw using OpenGL calls.

31.46.2 Constructor & Destructor Documentation

31.46.2.1 Fl_Gl_Window() [1/2]

```
Fl_Gl_Window::Fl_Gl_Window (
    int W,
    int H,
    const char * l = 0 ) [inline]
```

Creates a new [Fl_Gl_Window](#) widget using the given size, and label string.
The default boxtype is FL_NO_BOX. The default mode is FL_RGB|FL_DOUBLE|FL_DEPTH.

31.46.2.2 Fl_Gl_Window() [2/2]

```
Fl_Gl_Window::Fl_Gl_Window (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 ) [inline]
```

Creates a new [Fl_Gl_Window](#) widget using the given position, size, and label string.
The default boxtype is FL_NO_BOX. The default mode is FL_RGB|FL_DOUBLE|FL_DEPTH.

31.46.3 Member Function Documentation

31.46.3.1 as_gl_window()

```
virtual Fl\_Gl\_Window\* Fl_Gl_Window::as_gl_window ( ) [inline], [virtual]
```

Returns an [Fl_Gl_Window](#) pointer if this widget is an [Fl_Gl_Window](#).

Use this method if you have a widget (pointer) and need to know whether this widget is derived from [Fl_Gl_Window](#).
If it returns non-NULL, then the widget in question is derived from [Fl_Gl_Window](#).

Return values

NULL	if this widget is not derived from Fl_Gl_Window .
------	---

Note

This method is provided to avoid `dynamic_cast`.

See also

[Fl_Widget::as_group\(\)](#), [Fl_Widget::as_window\(\)](#)

Reimplemented from [Fl_Widget](#).

31.46.3.2 can_do()

```
static int Fl_Gl_Window::can_do (
    const int * m ) [inline], [static]
```

Returns non-zero if the hardware supports the given OpenGL mode.

See also

[Fl_Gl_Window::mode\(const int *a\)](#)

31.46.3.3 can_do_overlay()

```
int Fl_Gl_Window::can_do_overlay ( )
```

Returns true if the hardware overlay is possible.

If this is false, FLTK will try to simulate the overlay, with significant loss of update speed. Calling this will cause FLTK to open the display.

31.46.3.4 context() [1/2]

```
void* Fl_Gl_Window::context ( ) const [inline]
```

Returns a pointer to the GLContext that this window is using.

See also

```
void context(void* v, int destroy_flag)
```

31.46.3.5 context() [2/2]

```
void Fl_Gl_Window::context (
    void * v,
    int destroy_flag = 0 )
```

Sets a pointer to the GLContext that this window is using.

This is a system-dependent structure, but it is portable to copy the context from one window to another. You can also set it to NULL, which will force FLTK to recreate the context the next time [make_current\(\)](#) is called, this is useful for getting around bugs in OpenGL implementations.

If *destroy_flag* is true the context will be destroyed by fltk when the window is destroyed, or when the [mode\(\)](#) is changed, or the next time [context\(x\)](#) is called.

31.46.3.6 context_valid()

```
char Fl_Gl_Window::context_valid ( ) const [inline]
```

Will only be set if the OpenGL context is created or recreated.

It differs from [Fl_Gl_Window::valid\(\)](#) which is also set whenever the context changes size.

31.46.3.7 draw()

```
void Fl_Gl_Window::draw (
    void ) [protected], [virtual]
```

Draws the [Fl_Gl_Window](#).

You **must subclass** [Fl_Gl_Window](#) and provide an implementation for [draw\(\)](#).

You **must override** the [draw\(\)](#) method.

You may also provide an implementation of [draw_overlay\(\)](#) if you want to draw into the overlay planes. You can avoid reinitializing the viewport and lights and other things by checking [valid\(\)](#) at the start of [draw\(\)](#) and only doing the initialization if it is false.

The [draw\(\)](#) method can *only* use OpenGL calls. Do not attempt to call X, any of the functions in [<FL/fl_draw.H>](#), or GLX directly. Do not call [gl_start\(\)](#) or [gl_finish\(\)](#).

If double-buffering is enabled in the window, the back and front buffers are swapped after this function is completed.

Reimplemented from [Fl_Window](#).

Reimplemented in [Fl_Glut_Window](#).

31.46.3.8 make_current()

```
void Fl_Gl_Window::make_current ( )
```

The [make_current\(\)](#) method selects the OpenGL context for the widget.

It is called automatically prior to the [draw\(\)](#) method being called and can also be used to implement feedback and/or selection within the [handle\(\)](#) method.

31.46.3.9 make_overlay_current()

```
void Fl_Gl_Window::make_overlay_current ( )
```

The `make_overlay_current()` method selects the OpenGL context for the widget's overlay.

It is called automatically prior to the `draw_overlay()` method being called and can also be used to implement feedback and/or selection within the `handle()` method.

31.46.3.10 mode() [1/3]

```
Fl_Mode Fl_Gl_Window::mode ( ) const [inline]
```

Returns the current OpenGL capabilities of the window.

Don't use this if capabilities were set through `Fl_Gl_Window::mode(const int *a)`.

31.46.3.11 mode() [2/3]

```
int Fl_Gl_Window::mode (
    const int * a ) [inline]
```

Set the OpenGL capabilities of the window using platform-specific data.

Parameters

<code>a</code>	zero-ending array of platform-specific attributes and attribute values
----------------	--

Unix/Linux platform: attributes are GLX attributes adequate for the 3rd argument of the `glXChooseVisual()` function (e.g., `GLX_DOUBLEBUFFER`, defined by including `<GL/glx.h>`).

Note

What attributes are adequate here is subject to change. The preferred, stable public API is `Fl_Gl_Window::mode(int a)`.

MSWindows platform: this member function is of no use.

Mac OS X platform: attributes belong to the `CGLPixelFormatAttribute` enumeration (defined by including `<OpenGL/OpenGL.h>`, e.g., `kCGLPFADoubleBuffer`) and may be followed by adequate attribute values.

31.46.3.12 mode() [3/3]

```
int Fl_Gl_Window::mode (
    int a ) [inline]
```

Set or change the OpenGL capabilities of the window.

The value can be any of the following OR'd together:

- `FL_RGB` - RGB color (not indexed)
- `FL_RGB8` - RGB color with at least 8 bits of each color
- `FL_INDEX` - Indexed mode
- `FL_SINGLE` - not double buffered
- `FL_DOUBLE` - double buffered
- `FL_ACCUM` - accumulation buffer
- `FL_ALPHA` - alpha channel in color
- `FL_DEPTH` - depth buffer
- `FL_STENCIL` - stencil buffer
- `FL_MULTISAMPLE` - multisample antialiasing
- `FL_OPENGL3` - use OpenGL version 3.0 or more.

FL_RGB and FL_SINGLE have a value of zero, so they are "on" unless you give FL_INDEX or FL_DOUBLE. If the desired combination cannot be done, FLTK will try turning off FL_MULTISAMPLE. If this also fails the `show()` will call `Fl::error()` and not show the window.

You can change the mode while the window is displayed. This is most useful for turning double-buffering on and off. Under X this will cause the old X window to be destroyed and a new one to be created. If this is a top-level window this will unfortunately also cause the window to blink, raise to the top, and be de-iconized, and the `xid()` will change, possibly breaking other code. It is best to make the GL window a child of another window if you wish to do this!

`mode()` must not be called within `draw()` since it changes the current context.

The FL_OPENGL3 flag is required to access OpenGL version 3 or more under the X11 and MacOS platforms; it's optional under Windows. See more details in [Using OpenGL 3.0 \(or higher versions\)](#).

Version

the FL_OPENGL3 flag appeared in version 1.3.4

31.46.3.13 ortho()

```
void Fl_Gl_Window::ortho ( )
```

Sets the projection so 0,0 is in the lower left of the window and each pixel is 1 unit wide/tall.

If you are drawing 2D images, your `draw()` method may want to call this if `valid()` is false.

31.46.3.14 pixel_h()

```
int Fl_Gl_Window::pixel_h ( ) [inline]
```

Gives the window height in OpenGL pixels.

Generally identical with the result of the `h()` function, but for a window mapped to an Apple 'retina' display, and if `Fl::use_high_res_GL(bool)` is set to true, `pixel_h()` returns $2 * h()$. This method detects when the window has been moved between low and high resolution displays and automatically adjusts the returned value.

Version

1.3.4

31.46.3.15 pixel_w()

```
int Fl_Gl_Window::pixel_w ( ) [inline]
```

Gives the window width in OpenGL pixels.

Generally identical with the result of the `w()` function, but for a window mapped to an Apple 'retina' display, and if `Fl::use_high_res_GL(bool)` is set to true, `pixel_w()` returns $2 * w()$. This method detects when the window has been moved between low and high resolution displays and automatically adjusts the returned value.

Version

1.3.4

31.46.3.16 pixels_per_unit()

```
float Fl_Gl_Window::pixels_per_unit ( ) [inline]
```

The number of pixels per FLTK unit of length for the window.

Returns 1, except for a window mapped to an Apple 'retina' display, and if `Fl::use_high_res_GL(bool)` is set to true, when it returns 2. This method dynamically adjusts its value when the window is moved to/from a retina display. This method is useful, e.g., to convert, in a window's `handle()` method, the FLTK units returned by `Fl::event_x()` and `Fl::event_y()` to the pixel units used by the OpenGL source code.

Version

1.3.4

31.46.3.17 redraw_overlay()

```
void Fl_Gl_Window::redraw_overlay ( )
```

This method causes `draw_overlay()` to be called at a later time.

Initially the overlay is clear. If you want the window to display something in the overlay when it first appears, you must call this immediately after you `show()` your window.

31.46.3.18 resize()

```
void Fl_Gl_Window::resize (
    int X,
    int Y,
    int W,
    int H ) [virtual]
```

Changes the size and position of the window.

If `shown()` is true, these changes are communicated to the window server (which may refuse that size and cause a further resize). If `shown()` is false, the size and position are used when `show()` is called. See [Fl_Group](#) for the effect of resizing on the child widgets.

You can also call the [Fl_Widget](#) methods `size(x,y)` and `position(w,h)`, which are inline wrappers for this virtual function.

A top-level window can not force, but merely suggest a position and size to the operating system. The window manager may not be willing or able to display a window at the desired position or with the given dimensions. It is up to the application developer to verify window parameters after the resize request.

Reimplemented from [Fl_Window](#).

31.46.3.19 show()

```
void Fl_Gl_Window::show ( ) [virtual]
```

Puts the window on the screen.

Usually (on X) this has the side effect of opening the display.

If the window is already shown then it is restored and raised to the top. This is really convenient because your program can call `show()` at any time, even if the window is already up. It also means that `show()` serves the purpose of `raise()` in other toolkits.

[Fl_Window::show\(int argc, char **argv\)](#) is used for top-level windows and allows standard arguments to be parsed from the command-line.

Note

For some obscure reasons [Fl_Window::show\(\)](#) resets the current group by calling `Fl_Group::current(0)`. The comments in the code say "get rid of very common user bug: forgot end()". Although this is true it may have unwanted side effects if you `show()` an unrelated window (maybe for an error message or warning) while building a window or any other group widget.

Todo Check if we can remove resetting the current group in a later FLTK version (after 1.3.x). This may break "already broken" programs though if they rely on this "feature".

See also

[Fl_Window::show\(int argc, char **argv\)](#)

Reimplemented from [Fl_Window](#).

31.46.3.20 swap_buffers()

```
void Fl_Gl_Window::swap_buffers ( )
```

The `swap_buffers()` method swaps the back and front buffers.

It is called automatically after the `draw()` method is called.

31.46.3.21 valid()

```
char Fl_Gl_Window::valid ( ) const [inline]
```

Is turned off when FLTK creates a new context for this window or when the window resizes, and is turned on *after* `draw()` is called.

You can use this inside your `draw()` method to avoid unnecessarily initializing the OpenGL context. Just do this:

```
void mywindow::draw() {
    if (!valid()) {
        glViewport(0,0,pixel_w(),pixel_h());
        glFrustum(...);
        ...other initialization...
    }
    if (!context_valid()) {
        ...load textures, etc. ...
    }
    ... draw your geometry here ...
}
```

You can turn `valid()` on by calling `valid(1)`. You should only do this after fixing the transformation inside a `draw()` or after `make_current()`. This is done automatically after `draw()` returns.

The documentation for this class was generated from the following files:

- `Fl_Gl_Window.H`
- `Fl_Gl_Overlay.cxx`
- `Fl_Gl_Window.cxx`

31.47 FI_Glut_Bitmap_Font Struct Reference

ftlk glut font/size attributes used in the glutXXX functions

```
#include <glut.H>
```

Public Attributes

- `FI_Font` font
- `FI_Fontsize` size

31.47.1 Detailed Description

ftlk glut font/size attributes used in the glutXXX functions

The documentation for this struct was generated from the following file:

- `glut.H`

31.48 FI_Glut_StrokeChar Struct Reference

Public Attributes

- int **Number**
- GLfloat **Right**
- const `FI_Glut_StrokeStrip * Strips`

The documentation for this struct was generated from the following file:

- `glut.H`

31.49 FI_Glut_StrokeFont Struct Reference

Public Attributes

- const `FI_Glut_StrokeChar ** Characters`
- GLfloat **Height**
- char * **Name**

- int **Quantity**

The documentation for this struct was generated from the following file:

- glut.H

31.50 FI_Glut_StrokeStrip Struct Reference

Public Attributes

- int **Number**
- const [FI_Glut_StrokeVertex](#) * **Vertices**

The documentation for this struct was generated from the following file:

- glut.H

31.51 FI_Glut_StrokeVertex Struct Reference

Public Attributes

- GLfloat **X**
- GLfloat **Y**

The documentation for this struct was generated from the following file:

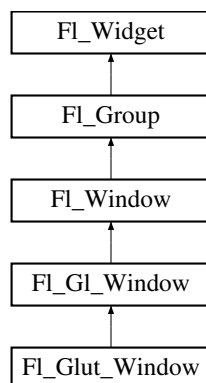
- glut.H

31.52 FI_Glut_Window Class Reference

GLUT is emulated using this window class and these static variables (plus several more static variables hidden in `glut_compatibility.cxx`):

```
#include <glut.H>
```

Inheritance diagram for `FI_Glut_Window`:



Public Member Functions

- [FI_Glut_Window](#) (int *w*, int *h*, const char *)
Creates a glut window, registers to the glut windows list.
- [FI_Glut_Window](#) (int *x*, int *y*, int *w*, int *h*, const char *)
Creates a glut window, registers to the glut windows list.
- void **make_current** ()
- [~FI_Glut_Window](#) ()
Destroys the glut window, first unregister it from the glut windows list.

Public Attributes

- void(* **display**)()
- void(* **entry**)(int)
- void(* **keyboard**)(uchar, int x, int y)
- int **menu** [3]
- void(* **motion**)(int x, int y)
- void(* **mouse**)(int b, int state, int x, int y)
- int **number**
- void(* **overlaydisplay**)()
- void(* **passivemotion**)(int x, int y)
- void(* **reshape**)(int w, int h)
- void(* **special**)(int, int x, int y)
- void(* **visibility**)(int)

Protected Member Functions

- void **draw** ()
Draws the [FL_Gl_Window](#).
- void **draw_overlay** ()
You must implement this virtual function if you want to draw into the overlay.
- int **handle** (int)
Handle some FLTK events as needed.

Additional Inherited Members

31.52.1 Detailed Description

GLUT is emulated using this window class and these static variables (plus several more static variables hidden in `glut_compatibility.cxx`):

31.52.2 Member Function Documentation

31.52.2.1 **draw()**

```
void Fl_Glut_Window::draw (
    void ) [protected], [virtual]
```

Draws the [FL_Gl_Window](#).

You **must subclass** [FL_Gl_Window](#) and provide an implementation for [draw\(\)](#).

You **must override** the [draw\(\)](#) method.

You may also provide an implementation of [draw_overlay\(\)](#) if you want to draw into the overlay planes. You can avoid reinitializing the viewport and lights and other things by checking [valid\(\)](#) at the start of [draw\(\)](#) and only doing the initialization if it is false.

The [draw\(\)](#) method can *only* use OpenGL calls. Do not attempt to call X, any of the functions in `<FL/fl_draw.H>`, or glX directly. Do not call [gl_start\(\)](#) or [gl_finish\(\)](#).

If double-buffering is enabled in the window, the back and front buffers are swapped after this function is completed. Reimplemented from [FL_Gl_Window](#).

31.52.2.2 **draw_overlay()**

```
void Fl_Glut_Window::draw_overlay ( ) [protected], [virtual]
```

You must implement this virtual function if you want to draw into the overlay.

The overlay is cleared before this is called. You should draw anything that is not clear using OpenGL. You must use `gl_color(i)` to choose colors (it allocates them from the colormap using system-specific calls), and remember that you are in an indexed OpenGL mode and drawing anything other than flat-shaded will probably not work.

Both this function and `FI_GI_Window::draw()` should check `FI_GI_Window::valid()` and set the same transformation. If you don't your code may not work on other systems. Depending on the OS, and on whether overlays are real or simulated, the OpenGL context may be the same or different between the overlay and main window.

Reimplemented from `FI_GI_Window`.

The documentation for this class was generated from the following files:

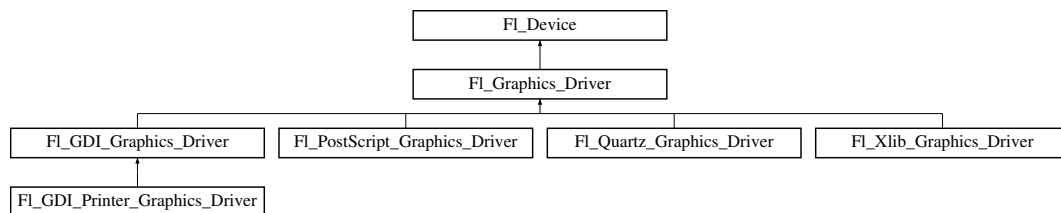
- `glut.H`
- `glut_compatibility.cxx`

31.53 FI_Graphics_Driver Class Reference

A virtual class subclassed for each graphics driver FLTK uses.

```
#include <Fl_Device.H>
```

Inheritance diagram for `FI_Graphics_Driver`:



Classes

- struct `matrix`
A 2D coordinate transformation matrix.

Public Member Functions

- virtual const char * `class_name` ()
Returns the name of the class of this object.
- `FI_Color` `color` ()
see `fl_color(void)`.
- virtual int `descent` ()
see `fl_descent()`.
- virtual int `draw_scaled` (`FI_Image` *img, int X, int Y, int W, int H)
Draws an `FI_Image` scaled to width *W* & height *H* with top-left corner at *X*, *Y*.
- `FI_Font` `font` ()
see `fl_font(void)`.
- virtual void `font` (`FI_Font` face, `FI_Fontsize` fsize)
see `fl_font(FI_Font face, FI_Fontsize size)`.
- `FI_Font_Descriptor` * `font_descriptor` ()
Returns a pointer to the current `FI_Font_Descriptor` for the graphics driver.
- void `font_descriptor` (`FI_Font_Descriptor` *d)
Sets the current `FI_Font_Descriptor` for the graphics driver.
- virtual int `height` ()
see `fl_height()`.
- `FI_Fontsize` `size` ()
see `fl_size()`.
- virtual void `text_extents` (const char *, int n, int &dx, int &dy, int &w, int &h)
see `fl_text_extents(const char*, int n, int& dx, int& dy, int& w, int& h)`.
- virtual double `width` (const char *str, int n)

- *see fl_width(const char *str, int n).*
- virtual double **width** (unsigned int c)
see fl_width(unsigned int n).
- virtual **~FI_Graphics_Driver** ()
The destructor.

Static Public Attributes

- static const char * **class_id** = "FI_Graphics_Driver"

Protected Member Functions

- virtual void **arc** (double x, double y, double r, double start, double end)
see fl_arc(double x, double y, double r, double start, double end).
- virtual void **arc** (int x, int y, int w, int h, double a1, double a2)
see fl_arc(int x, int y, int w, int h, double a1, double a2).
- virtual void **begin_complex_polygon** ()
see fl_begin_complex_polygon().
- virtual void **begin_line** ()
see fl_begin_line().
- virtual void **begin_loop** ()
see fl_begin_loop().
- virtual void **begin_points** ()
see fl_begin_points().
- virtual void **begin_polygon** ()
see fl_begin_polygon().
- virtual void **circle** (double x, double y, double r)
see fl_circle(double x, double y, double r).
- virtual int **clip_box** (int x, int y, int w, int h, int &X, int &Y, int &W, int &H)
see fl_clip_box(int x, int y, int w, int h, int &X, int &Y, int &W, int &H).
- FI_Region **clip_region** ()
see fl_clip_region().
- void **clip_region** (FI_Region r)
see fl_clip_region(FI_Region r).
- virtual void **color** (FI_Color c)
see fl_color(FI_Color c).
- virtual void **color** (uchar r, uchar g, uchar b)
see fl_color(uchar r, uchar g, uchar b).
- virtual void **copy_offscreen** (int x, int y, int w, int h, FI_Offscreen pixmap, int srcx, int srcy)
see fl_copy_offscreen().
- virtual void **curve** (double X0, double Y0, double X1, double Y1, double X2, double Y2, double X3, double Y3)
see fl_curve(double X0, double Y0, double X1, double Y1, double X2, double Y2, double X3, double Y3).
- virtual void **draw** (const char *str, int n, int x, int y)
*see fl_draw(const char *str, int n, int x, int y).*
- virtual void **draw** (FI_Bitmap *bm, int XP, int YP, int WP, int HP, int cx, int cy)
Draws an FI_Bitmap object to the device.
- virtual void **draw** (FI_Pixmap *pxm, int XP, int YP, int WP, int HP, int cx, int cy)
Draws an FI_Pixmap object to the device.
- virtual void **draw** (FI_RGB_Image *rgb, int XP, int YP, int WP, int HP, int cx, int cy)
Draws an FI_RGB_Image object to the device.
- virtual void **draw** (int angle, const char *str, int n, int x, int y)

- see [fl_draw\(int angle, const char *str, int n, int x, int y\)](#).
- virtual void [draw_image](#) (const uchar *buf, int X, int Y, int W, int H, int D=3, int L=0)
 - see [fl_draw_image\(const uchar* buf, int X,int Y,int W,int H, int D, int L\)](#).
- virtual void [draw_image](#) (FI_Draw_Image_Cb cb, void *data, int X, int Y, int W, int H, int D=3)
 - see [fl_draw_image\(FI_Draw_Image_Cb cb, void* data, int X,int Y,int W,int H, int D\)](#).
- virtual void [draw_image_mono](#) (const uchar *buf, int X, int Y, int W, int H, int D=1, int L=0)
 - see [fl_draw_image_mono\(const uchar* buf, int X,int Y,int W,int H, int D, int L\)](#).
- virtual void [draw_image_mono](#) (FI_Draw_Image_Cb cb, void *data, int X, int Y, int W, int H, int D=1)
 - see [fl_draw_image_mono\(FI_Draw_Image_Cb cb, void* data, int X,int Y,int W,int H, int D\)](#).
- virtual void [end_complex_polygon](#) ()
 - see [fl_end_complex_polygon\(\)](#).
- virtual void [end_line](#) ()
 - see [fl_end_line\(\)](#).
- virtual void [end_loop](#) ()
 - see [fl_end_loop\(\)](#).
- virtual void [end_points](#) ()
 - see [fl_end_points\(\)](#).
- virtual void [end_polygon](#) ()
 - see [fl_end_polygon\(\)](#).
- [FI_Graphics_Driver](#) ()
 - The constructor.
- virtual void [gap](#) ()
 - see [fl_gap\(\)](#).
- virtual void [line](#) (int x, int y, int x1, int y1)
 - see [fl_line\(int x, int y, int x1, int y1\)](#).
- virtual void [line](#) (int x, int y, int x1, int y1, int x2, int y2)
 - see [fl_line\(int x, int y, int x1, int y1, int x2, int y2\)](#).
- virtual void [line_style](#) (int style, int width=0, char *dashes=0)
 - see [fl_line_style\(int style, int width, char* dashes\)](#).
- virtual void [loop](#) (int x0, int y0, int x1, int y1, int x2, int y2)
 - see [fl_loop\(int x0, int y0, int x1, int y1, int x2, int y2\)](#).
- virtual void [loop](#) (int x0, int y0, int x1, int y1, int x2, int y2, int x3, int y3)
 - see [fl_loop\(int x0, int y0, int x1, int y1, int x2, int y2, int x3, int y3\)](#).
- void [mult_matrix](#) (double a, double b, double c, double d, double x, double y)
 - see [fl_mult_matrix\(double a, double b, double c, double d, double x, double y\)](#).
- virtual int [not_clipped](#) (int x, int y, int w, int h)
 - see [fl_not_clipped\(int x, int y, int w, int h\)](#).
- virtual void [pie](#) (int x, int y, int w, int h, double a1, double a2)
 - see [fl_pie\(int x, int y, int w, int h, double a1, double a2\)](#).
- virtual void [point](#) (int x, int y)
 - see [fl_point\(int x, int y\)](#).
- virtual void [polygon](#) (int x0, int y0, int x1, int y1, int x2, int y2)
 - see [fl_polygon\(int x0, int y0, int x1, int y1, int x2, int y2\)](#).
- virtual void [polygon](#) (int x0, int y0, int x1, int y1, int x2, int y2, int x3, int y3)
 - see [fl_polygon\(int x0, int y0, int x1, int y1, int x2, int y2, int x3, int y3\)](#).
- virtual void [pop_clip](#) ()
 - see [fl_pop_clip\(\)](#).
- void [pop_matrix](#) ()
 - see [fl_pop_matrix\(\)](#).
- virtual void [push_clip](#) (int x, int y, int w, int h)
 - see [fl_push_clip\(int x, int y, int w, int h\)](#).

- void `push_matrix` ()
 see `fl_push_matrix()`.
- virtual void `push_no_clip` ()
 see `fl_push_no_clip()`.
- virtual void `rect` (int x, int y, int w, int h)
 see `fl_rect(int x, int y, int w, int h)`.
- virtual void `rectf` (int x, int y, int w, int h)
 see `fl_rectf(int x, int y, int w, int h)`.
- void `restore_clip` ()
 see `fl_restore_clip()`.
- void `rotate` (double d)
 see `fl_rotate(double d)`.
- virtual void `rtl_draw` (const char *str, int n, int x, int y)
 *see `fl_rtl_draw(const char *str, int n, int x, int y)`.*
- void `scale` (double x)
 see `fl_scale(double x)`.
- void `scale` (double x, double y)
 see `fl_scale(double x, double y)`.
- double `transform_dx` (double x, double y)
 see `fl_transform_dx(double x, double y)`.
- double `transform_dy` (double x, double y)
 see `fl_transform_dy(double x, double y)`.
- double `transform_x` (double x, double y)
 see `fl_transform_x(double x, double y)`.
- double `transform_y` (double x, double y)
 see `fl_transform_y(double x, double y)`.
- virtual void `transformed_vertex` (double xf, double yf)
 see `fl_transformed_vertex(double xf, double yf)`.
- void `translate` (double x, double y)
 see `fl_translate(double x, double y)`.
- virtual void `vertex` (double x, double y)
 see `fl_vertex(double x, double y)`.
- virtual void `xyline` (int x, int y, int x1)
 see `fl_xyline(int x, int y, int x1)`.
- virtual void `xyline` (int x, int y, int x1, int y2)
 see `fl_xyline(int x, int y, int x1, int y2)`.
- virtual void `xyline` (int x, int y, int x1, int y2, int x3)
 see `fl_xyline(int x, int y, int x1, int y2, int x3)`.
- virtual void `yxline` (int x, int y, int y1)
 see `fl_yxline(int x, int y, int y1)`.
- virtual void `yxline` (int x, int y, int y1, int x2)
 see `fl_yxline(int x, int y, int y1, int x2)`.
- virtual void `yxline` (int x, int y, int y1, int x2, int y3)
 see `fl_yxline(int x, int y, int y1, int x2, int y3)`.

Protected Attributes

- `matrix * fl_matrix`
 Points to the current coordinate transformation matrix.

Friends

- void [fl_arc](#) (double x, double y, double r, double start, double end)
Adds a series of points to the current path on the arc of a circle.
- void [fl_arc](#) (int x, int y, int w, int h, double a1, double a2)
Draw ellipse sections using integer coordinates.
- void [fl_begin_complex_polygon](#) ()
Starts drawing a complex filled polygon.
- void [fl_begin_line](#) ()
Starts drawing a list of lines.
- void [fl_begin_loop](#) ()
Starts drawing a closed sequence of lines.
- void [fl_begin_points](#) ()
Starts drawing a list of points.
- void [fl_begin_polygon](#) ()
Starts drawing a convex filled polygon.
- class **FI_Bitmap**
- void [fl_circle](#) (double x, double y, double r)
[fl_circle\(\)](#) is equivalent to [fl_arc\(x,y,r,0,360\)](#), but may be faster.
- int [fl_clip_box](#) (int x, int y, int w, int h, int &X, int &Y, int &W, int &H)
Intersects the rectangle with the current clip region and returns the bounding box of the result.
- FI_Region [fl_clip_region](#) ()
Returns the current clipping region.
- void [fl_clip_region](#) (FI_Region r)
Replaces the top of the clipping stack with a clipping region of any shape.
- void [fl_color](#) (FI_Color c)
Sets the color for all subsequent drawing operations.
- void [fl_color](#) (uchar r, uchar g, uchar b)
Sets the color for all subsequent drawing operations.
- FL_EXPORT void [fl_copy_offscreen](#) (int x, int y, int w, int h, FI_Offscreen pixmap, int srcx, int srcy)
Copy a rectangular area of the given offscreen buffer into the current drawing destination.
- void [fl_curve](#) (double X0, double Y0, double X1, double Y1, double X2, double Y2, double X3, double Y3)
Adds a series of points on a Bezier curve to the path.
- void [fl_draw](#) (const char *str, int n, int x, int y)
Draws starting at the given x, y location a UTF-8 string of length n bytes.
- void [fl_draw](#) (int angle, const char *str, int n, int x, int y)
Draws at the given x, y location a UTF-8 string of length n bytes rotating angle degrees counter-clockwise.
- void [fl_draw_image](#) (const uchar *buf, int X, int Y, int W, int H, int D, int L)
Draws an 8-bit per color RGB or luminance image.
- void [fl_draw_image](#) (FI_Draw_Image_Cb cb, void *data, int X, int Y, int W, int H, int D)
Draws an image using a callback function to generate image data.
- void [fl_draw_image_mono](#) (const uchar *buf, int X, int Y, int W, int H, int D, int L)
Draws a gray-scale (1 channel) image.
- FL_EXPORT void [fl_draw_image_mono](#) (FI_Draw_Image_Cb cb, void *data, int X, int Y, int W, int H, int D)
Draws a gray-scale image using a callback function to generate image data.
- void [fl_end_complex_polygon](#) ()
Ends complex filled polygon, and draws.
- void [fl_end_line](#) ()
Ends list of lines, and draws.
- void [fl_end_loop](#) ()
Ends closed sequence of lines, and draws.

- void `fl_end_points` ()
Ends list of points, and draws.
- void `fl_end_polygon` ()
Ends convex filled polygon, and draws.
- void `fl_font` (`FI_Font` face, `FI_Fontsize` size)
Sets the current font, which is then used in various drawing routines.
- void `fl_gap` ()
Call `fl_gap()` to separate loops of the path.
- void `fl_line` (int x, int y, int x1, int y1)
Draws a line from (x,y) to (x1,y1)
- void `fl_line` (int x, int y, int x1, int y1, int x2, int y2)
Draws a line from (x,y) to (x1,y1) and another from (x1,y1) to (x2,y2)
- void `fl_line_style` (int style, int width, char *dashes)
Sets how to draw lines (the "pen").
- void `fl_loop` (int x0, int y0, int x1, int y1, int x2, int y2)
Outlines a 3-sided polygon with lines.
- void `fl_loop` (int x0, int y0, int x1, int y1, int x2, int y2, int x3, int y3)
Outlines a 4-sided polygon with lines.
- void `fl_mult_matrix` (double a, double b, double c, double d, double x, double y)
Concatenates another transformation onto the current one.
- int `fl_not_clipped` (int x, int y, int w, int h)
Does the rectangle intersect the current clip region?
- void `fl_pie` (int x, int y, int w, int h, double a1, double a2)
Draw filled ellipse sections using integer coordinates.
- class **FI_Pixmap**
- void `fl_point` (int x, int y)
Draws a single pixel at the given coordinates.
- void `fl_polygon` (int x0, int y0, int x1, int y1, int x2, int y2)
Fills a 3-sided polygon.
- void `fl_polygon` (int x0, int y0, int x1, int y1, int x2, int y2, int x3, int y3)
Fills a 4-sided polygon.
- void `fl_pop_clip` ()
Restores the previous clip region.
- void `fl_pop_matrix` ()
Restores the current transformation matrix from the stack.
- void `fl_push_clip` (int x, int y, int w, int h)
Intersects the current clip region with a rectangle and pushes this new region onto the stack.
- void `fl_push_matrix` ()
Saves the current transformation matrix on the stack.
- void `fl_push_no_clip` ()
Pushes an empty clip region onto the stack so nothing will be clipped.
- void `fl_rect` (int x, int y, int w, int h)
Draws a 1-pixel border inside the given bounding box.
- void `fl_rectf` (int x, int y, int w, int h)
Colors with current color a rectangle that exactly fills the given bounding box.
- void `fl_restore_clip` ()
Undoes any clobbering of clip done by your program.
- class **FI_RGB_Image**
- void `fl_rotate` (double d)
Concatenates rotation transformation onto the current one.
- void `fl_rtl_draw` (const char *str, int n, int x, int y)

- Draws a UTF-8 string of length n bytes right to left starting at the given x, y location.*

 - void `fl_scale` (double x)
 - Concatenates scaling transformation onto the current one.*
 - void `fl_scale` (double x , double y)
 - Concatenates scaling transformation onto the current one.*
 - double `fl_transform_dx` (double x , double y)
 - Transforms distance using current transformation matrix.*
 - double `fl_transform_dy` (double x , double y)
 - Transforms distance using current transformation matrix.*
 - double `fl_transform_x` (double x , double y)
 - Transforms coordinate using the current transformation matrix.*
 - double `fl_transform_y` (double x , double y)
 - Transforms coordinate using the current transformation matrix.*
 - void `fl_transformed_vertex` (double x_f , double y_f)
 - Adds coordinate pair to the vertex list without further transformations.*
 - void `fl_translate` (double x , double y)
 - Concatenates translation transformation onto the current one.*
 - void `fl_vertex` (double x , double y)
 - Adds a single vertex to the current path.*
 - void `fl_xyline` (int x , int y , int x_1)
 - Draws a horizontal line from (x,y) to (x_1,y)*
 - void `fl_xyline` (int x , int y , int x_1 , int y_2)
 - Draws a horizontal line from (x,y) to (x_1,y) , then vertical from (x_1,y) to (x_1,y_2)*
 - void `fl_xyline` (int x , int y , int x_1 , int y_2 , int x_3)
 - Draws a horizontal line from (x,y) to (x_1,y) , then a vertical from (x_1,y) to (x_1,y_2) and then another horizontal from (x_1,y_2) to (x_3,y_2)*
 - void `fl_yxline` (int x , int y , int y_1)
 - Draws a vertical line from (x,y) to (x,y_1)*
 - void `fl_yxline` (int x , int y , int y_1 , int x_2)
 - Draws a vertical line from (x,y) to (x,y_1) , then a horizontal from (x,y_1) to (x_2,y_1)*
 - void `fl_yxline` (int x , int y , int y_1 , int x_2 , int y_3)
 - Draws a vertical line from (x,y) to (x,y_1) then a horizontal from (x,y_1) to (x_2,y_1) , then another vertical from (x_2,y_1) to (x_2,y_3)*
 - FL_EXPORT void `gl_start` ()
 - Creates an OpenGL context.*

31.53.1 Detailed Description

A virtual class subclassed for each graphics driver FLTK uses.

Typically, FLTK applications do not use directly objects from this class. Rather, they perform drawing operations (e.g., `fl_rectf()`) that operate on the current drawing surface (see [FL_Surface_Device](#)). Drawing operations are functionally presented in [Drawing Things in FLTK](#) and as function lists in the [Drawing functions](#) and [Color & Font functions](#) modules. The `fl_graphics_driver` global variable gives at any time the graphics driver used by all drawing operations. Its value changes when drawing operations are directed to another drawing surface by `FL_Surface_Device::set_current()`.

The `FL_Graphics_Driver` class is of interest if one wants to perform new kinds of drawing operations. An example would be to draw to a PDF file. This would involve creating a new `FL_Graphics_Driver` derived class. This new class should implement all virtual methods of the `FL_Graphics_Driver` class to support all FLTK drawing functions.

31.53.2 Member Function Documentation

31.53.2.1 `class_name()`

```
virtual const char* Fl_Graphics_Driver::class_name ( ) [inline], [virtual]
```

Returns the name of the class of this object.

Use of the `class_name()` function is discouraged because it will be removed from future FLTK versions.

The class of an instance of an `Fl_Device` subclass can be checked with code such as:

```
if ( instance->class_name() == Fl_Printer::class_id ) { ... }
```

Reimplemented from `Fl_Device`.

Reimplemented in `Fl_PostScript_Graphics_Driver`, `Fl_Xlib_Graphics_Driver`, `Fl_GDI_Printer_Graphics_Driver`, `Fl_GDI_Graphics_Driver`, and `Fl_Quartz_Graphics_Driver`.

31.53.2.2 `draw()` [1/3]

```
virtual void Fl_Graphics_Driver::draw (
    Fl_Bitmap * bm,
    int XP,
    int YP,
    int WP,
    int HP,
    int cx,
    int cy ) [inline], [protected], [virtual]
```

Draws an `Fl_Bitmap` object to the device.

Specifies a bounding box for the image, with the origin (upper left-hand corner) of the image offset by the `cx` and `cy` arguments.

Reimplemented in `Fl_Xlib_Graphics_Driver`, `Fl_GDI_Graphics_Driver`, `Fl_Quartz_Graphics_Driver`, `Fl_GDI_Printer_Graphics_Driver`, and `Fl_PostScript_Graphics_Driver`.

31.53.2.3 `draw()` [2/3]

```
virtual void Fl_Graphics_Driver::draw (
    Fl_Pixmap * pxm,
    int XP,
    int YP,
    int WP,
    int HP,
    int cx,
    int cy ) [inline], [protected], [virtual]
```

Draws an `Fl_Pixmap` object to the device.

Specifies a bounding box for the image, with the origin (upper left-hand corner) of the image offset by the `cx` and `cy` arguments.

Reimplemented in `Fl_PostScript_Graphics_Driver`, `Fl_Xlib_Graphics_Driver`, `Fl_GDI_Printer_Graphics_Driver`, `Fl_GDI_Graphics_Driver`, and `Fl_Quartz_Graphics_Driver`.

31.53.2.4 `draw()` [3/3]

```
virtual void Fl_Graphics_Driver::draw (
    Fl_RGB_Image * rgb,
    int XP,
    int YP,
    int WP,
    int HP,
    int cx,
    int cy ) [inline], [protected], [virtual]
```

Draws an `Fl_RGB_Image` object to the device.

Specifies a bounding box for the image, with the origin (upper left-hand corner) of the image offset by the `cx` and `cy` arguments.

Reimplemented in [Fl_PostScript_Graphics_Driver](#), [Fl_Xlib_Graphics_Driver](#), [Fl_GDI_Graphics_Driver](#), and [Fl_Quartz_Graphics_Driver](#).

31.53.2.5 draw_scaled()

```
int Fl_Graphics_Driver::draw_scaled (
    Fl_Image * img,
    int X,
    int Y,
    int W,
    int H ) [virtual]
```

Draws an [Fl_Image](#) scaled to width W & height H with top-left corner at X,Y.

Returns

zero when the graphics driver doesn't implement scaled drawing, non-zero if it does implement it.

Reimplemented in [Fl_PostScript_Graphics_Driver](#), [Fl_GDI_Printer_Graphics_Driver](#), and [Fl_Quartz_Graphics_Driver](#).

31.53.3 Friends And Related Function Documentation

31.53.3.1 fl_arc [1/2]

```
void fl_arc (
    double x,
    double y,
    double r,
    double start,
    double end ) [friend]
```

Adds a series of points to the current path on the arc of a circle.

You can get elliptical paths by using scale and rotate before calling [fl_arc\(\)](#).

Parameters

in	<i>x,y,r</i>	center and radius of circular arc
in	<i>start,end</i>	angles of start and end of arc measured in degrees counter-clockwise from 3 o'clock. If end is less than start then it draws the arc in a clockwise direction.

Examples:

```
// Draw an arc of points
fl_begin_points();
fl_arc(100.0, 100.0, 50.0, 0.0, 180.0);
fl_end_points();
// Draw arc with a line
fl_begin_line();
fl_arc(200.0, 100.0, 50.0, 0.0, 180.0);
fl_end_line();
// Draw filled arc
fl_begin_polygon();
fl_arc(300.0, 100.0, 50.0, 0.0, 180.0);
fl_end_polygon();
```

31.53.3.2 fl_arc [2/2]

```
void fl_arc (
    int x,
    int y,
    int w,
    int h,
```

```
double a1,
double a2 ) [friend]
```

Draw ellipse sections using integer coordinates.

These functions match the rather limited circle drawing code provided by X and WIN32. The advantage over using `fl_arc` with floating point coordinates is that they are faster because they often use the hardware, and they draw much nicer small circles, since the small sizes are often hard-coded bitmaps.

If a complete circle is drawn it will fit inside the passed bounding box. The two angles are measured in degrees counter-clockwise from 3 o'clock and are the starting and ending angle of the arc, `a2` must be greater or equal to `a1`.

`fl_arc()` draws a series of lines to approximate the arc. Notice that the integer version of `fl_arc()` has a different number of arguments than the double version `fl_arc(double x, double y, double r, double start, double end)`

Parameters

in	<code>x,y,w,h</code>	bounding box of complete circle
in	<code>a1,a2</code>	start and end angles of arc measured in degrees counter-clockwise from 3 o'clock. <code>a2</code> must be greater than or equal to <code>a1</code> .

31.53.3.3 fl_begin_complex_polygon

```
void fl_begin_complex_polygon ( ) [friend]
```

Starts drawing a complex filled polygon.

The polygon may be concave, may have holes in it, or may be several disconnected pieces. Call `fl_gap()` to separate loops of the path.

To outline the polygon, use `fl_begin_loop()` and replace each `fl_gap()` with `fl_end_loop();fl_begin_loop()` pairs.

Note

For portability, you should only draw polygons that appear the same whether "even/odd" or "non-zero" winding rules are used to fill them. Holes should be drawn in the opposite direction to the outside loop.

31.53.3.4 fl_begin_points

```
void fl_begin_points ( ) [friend]
```

Starts drawing a list of points.

Points are added to the list with `fl_vertex()`

31.53.3.5 fl_circle

```
void fl_circle (
double x,
double y,
double r ) [friend]
```

`fl_circle()` is equivalent to `fl_arc(x,y,r,0,360)`, but may be faster.

It must be the *only* thing in the path: if you want a circle as part of a complex polygon you must use `fl_arc()`

Parameters

in	<code>x,y,r</code>	center and radius of circle
----	--------------------	-----------------------------

31.53.3.6 fl_clip_box

```
int fl_clip_box (
```

```

    int x,
    int y,
    int w,
    int h,
    int & X,
    int & Y,
    int & W,
    int & H ) [friend]

```

Intersects the rectangle with the current clip region and returns the bounding box of the result.

Returns non-zero if the resulting rectangle is different to the original. This can be used to limit the necessary drawing to a rectangle. W and H are set to zero if the rectangle is completely outside the region.

Parameters

in	<i>x,y,w,h</i>	position and size of rectangle
out	<i>X,Y,W,H</i>	position and size of resulting bounding box.

Returns

Non-zero if the resulting rectangle is different to the original.

31.53.3.7 fl_clip_region

```

void fl_clip_region (
    Fl_Region r ) [friend]

```

Replaces the top of the clipping stack with a clipping region of any shape.

Fl_Region is an operating system specific type.

Parameters

in	<i>r</i>	clipping region
----	----------	-----------------

31.53.3.8 fl_color [1/2]

```

void fl_color (
    Fl_Color c ) [friend]

```

Sets the color for all subsequent drawing operations.

For colormapped displays, a color cell will be allocated out of `fl_colormap` the first time you use a color. If the colormap fills up then a least-squares algorithm is used to find the closest color. If no valid graphical context (`fl_gc`) is available, the foreground is not set for the current window.

Parameters

in	<i>c</i>	color
----	----------	-------

31.53.3.9 fl_color [2/2]

```

void fl_color (
    uchar r,
    uchar g,
    uchar b ) [friend]

```

Sets the color for all subsequent drawing operations.

The closest possible match to the RGB color is used. The RGB color is used directly on TrueColor displays. For colormap visuals the nearest index in the gray ramp or color cube is used. If no valid graphical context (`fl_gc`) is available, the foreground is not set for the current window.

Parameters

in	<i>r,g,b</i>	color components
----	--------------	------------------

31.53.3.10 fl_copy_offscreen

```
FL_EXPORT void fl_copy_offscreen (
    int x,
    int y,
    int w,
    int h,
    Fl_Offscreen pixmap,
    int srcx,
    int srcy ) [friend]
```

Copy a rectangular area of the given offscreen buffer into the current drawing destination.

Parameters

<i>x,y</i>	position where to draw the copied rectangle
<i>w,h</i>	size of the copied rectangle
<i>pixmap</i>	offscreen buffer containing the rectangle to copy
<i>srcx,srcy</i>	origin in offscreen buffer of rectangle to copy

31.53.3.11 fl_curve

```
void fl_curve (
    double X0,
    double Y0,
    double X1,
    double Y1,
    double X2,
    double Y2,
    double X3,
    double Y3 ) [friend]
```

Adds a series of points on a Bezier curve to the path.

The curve ends (and two of the points) are at $X0, Y0$ and $X3, Y3$.

Parameters

in	<i>X0,Y0</i>	curve start point
in	<i>X1,Y1</i>	curve control point
in	<i>X2,Y2</i>	curve control point
in	<i>X3,Y3</i>	curve end point

31.53.3.12 fl_draw

```
void fl_draw (
```

```

    int angle,
    const char * str,
    int n,
    int x,
    int y ) [friend]

```

Draws at the given x, y location a UTF-8 string of length n bytes rotating $angle$ degrees counter-clockwise.

Note

When using X11 (Unix, Linux, Cygwin et al.) this needs Xft to work. Under plain X11 (w/o Xft) rotated text is not supported by FLTK. A warning will be issued to `stderr` at runtime (only once) if you use this method with an angle other than 0.

31.53.3.13 fl_draw_image [1/2]

```

void fl_draw_image (
    const uchar * buf,
    int X,
    int Y,
    int W,
    int H,
    int D = 3,
    int L = 0 ) [friend]

```

Draws an 8-bit per color RGB or luminance image.

Parameters

in	<i>buf</i>	points at the "r" data of the top-left pixel. Color data must be in r, g, b order. Luminance data is only one <code>gray</code> byte.
in	<i>X, Y</i>	position where to put top-left corner of image
in	<i>W, H</i>	size of the image
in	<i>D</i>	delta to add to the pointer between pixels. It may be any value greater than or equal to 1, or it can be negative to flip the image horizontally
in	<i>L</i>	delta to add to the pointer between lines (if 0 is passed it uses $W * D$), and may be larger than $W * D$ to crop data, or negative to flip the image vertically

It is highly recommended that you put the following code before the first `show()` of *any* window in your program to get rid of the dithering if possible:

```
Fl::visual(FL_RGB);
```

Gray scale (1-channel) images may be drawn. This is done if `abs(D)` is less than 3, or by calling `fl_draw_image_mono()`. Only one 8-bit sample is used for each pixel, and on screens with different numbers of bits for red, green, and blue only gray colors are used. Setting `D` greater than 1 will let you display one channel of a color image.

Note:

The X version does not support all possible visuals. If FLTK cannot draw the image in the current visual it will abort. FLTK supports any visual of 8 bits or less, and all common TrueColor visuals up to 32 bits.

31.53.3.14 fl_draw_image [2/2]

```

void fl_draw_image (
    Fl_Draw_Image_Cb cb,
    void * data,
    int X,
    int Y,

```

```

    int W,
    int H,
    int D = 3 ) [friend]

```

Draws an image using a callback function to generate image data.

You can generate the image as it is being drawn, or do arbitrary decompression of stored data, provided it can be decompressed to individual scan lines easily.

Parameters

in	<i>cb</i>	callback function to generate scan line data
in	<i>data</i>	user data passed to callback function
in	<i>X,Y</i>	screen position of top left pixel
in	<i>W,H</i>	image width and height
in	<i>D</i>	data size in bytes (must be greater than 0)

See also

[fl_draw_image\(const uchar* buf, int X,int Y,int W,int H, int D, int L\)](#)

The callback function *cb* is called with the `void*` *data* user data pointer to allow access to a structure of information about the image, and the *x*, *y*, and *w* of the scan line desired from the image. 0,0 is the upper-left corner of the image, not *x*, *y*. A pointer to a buffer to put the data into is passed. You must copy *w* pixels from scanline *y*, starting at pixel *x*, to this buffer.

Due to cropping, less than the whole image may be requested. So *x* may be greater than zero, the first *y* may be greater than zero, and *w* may be less than *W*. The buffer is long enough to store the entire *W* * *D* pixels, this is for convenience with some decompression schemes where you must decompress the entire line at once: decompress it into the buffer, and then if *x* is not zero, copy the data over so the *x*'th pixel is at the start of the buffer.

You can assume the *y*'s will be consecutive, except the first one may be greater than zero.

If *D* is 4 or more, you must fill in the unused bytes with zero.

31.53.3.15 fl_draw_image_mono [1/2]

```

void fl_draw_image_mono (
    const uchar * buf,
    int X,
    int Y,
    int W,
    int H,
    int D = 1,
    int L = 0 ) [friend]

```

Draws a gray-scale (1 channel) image.

See also

[fl_draw_image\(const uchar* buf, int X,int Y,int W,int H, int D, int L\)](#)

31.53.3.16 fl_draw_image_mono [2/2]

```

FL_EXPORT void fl_draw_image_mono (
    Fl_Draw_Image_Cb cb,
    void * data,
    int X,
    int Y,
    int W,
    int H,
    int D = 1 ) [friend]

```

Draws a gray-scale image using a callback function to generate image data.

See also

[fl_draw_image\(Fl_Draw_Image_Cb cb, void* data, int X,int Y,int W,int H, int D\)](#)

31.53.3.17 fl_font

```
void fl_font (
    Fl_Font face,
    Fl_Fontsize size ) [friend]
```

Sets the current font, which is then used in various drawing routines.

You may call this outside a draw context if necessary to call [fl_width\(\)](#), but on X this will open the display.

The font is identified by a *face* and a *size*. The size of the font is measured in pixels and not "points". Lines should be spaced *size* pixels apart or more.

31.53.3.18 fl_gap

```
void fl_gap ( ) [friend]
```

Call [fl_gap\(\)](#) to separate loops of the path.

It is unnecessary but harmless to call [fl_gap\(\)](#) before the first vertex, after the last vertex, or several times in a row.

31.53.3.19 fl_line_style

```
void fl_line_style (
    int style,
    int width = 0,
    char * dashes = 0 ) [friend]
```

Sets how to draw lines (the "pen").

If you change this it is your responsibility to set it back to the default using [fl_line_style\(0\)](#).

Parameters

in	<i>style</i>	A bitmask which is a bitwise-OR of a line style, a cap style, and a join style. If you don't specify a dash type you will get a solid line. If you don't specify a cap or join type you will get a system-defined default of whatever value is fastest.
in	<i>width</i>	The thickness of the lines in pixels. Zero results in the system defined default, which on both X and Windows is somewhat different and nicer than 1.
in	<i>dashes</i>	A pointer to an array of dash lengths, measured in pixels. The first location is how long to draw a solid portion, the next is how long to draw the gap, then the solid, etc. It is terminated with a zero-length entry. A NULL pointer or a zero-length array results in a solid line. Odd array sizes are not supported and result in undefined behavior.

Note

Because of how line styles are implemented on Win32 systems, you *must* set the line style *after* setting the drawing color. If you set the color after the line style you will lose the line style settings.

The *dashes* array does not work under Windows 95, 98 or Me, since those operating systems do not support complex line styles.

31.53.3.20 fl_mult_matrix

```
void fl_mult_matrix (
    double a,
    double b,
    double c,
    double d,
```

```
double x,
double y ) [friend]
```

Concatenates another transformation onto the current one.

Parameters

in	a,b,c,d,x,y	transformation matrix elements such that $X' = aX + cY + x$ and $Y' = bX + dY + y$
----	---------------	--

31.53.3.21 fl_not_clipped

```
int fl_not_clipped (
    int x,
    int y,
    int w,
    int h ) [friend]
```

Does the rectangle intersect the current clip region?

Parameters

in	x,y,w,h	position and size of rectangle
----	-----------	--------------------------------

Returns

non-zero if any of the rectangle intersects the current clip region. If this returns 0 you don't have to draw the object.

Note

Under X this returns 2 if the rectangle is partially clipped, and 1 if it is entirely inside the clip region.

31.53.3.22 fl_pie

```
void fl_pie (
    int x,
    int y,
    int w,
    int h,
    double a1,
    double a2 ) [friend]
```

Draw filled ellipse sections using integer coordinates.

Like [fl_arc\(\)](#), but [fl_pie\(\)](#) draws a filled-in pie slice. This slice may extend outside the line drawn by [fl_arc\(\)](#); to avoid this use $w - 1$ and $h - 1$.

Parameters

in	x,y,w,h	bounding box of complete circle
in	$a1,a2$	start and end angles of arc measured in degrees counter-clockwise from 3 o'clock. $a2$ must be greater than or equal to $a1$.

31.53.3.23 fl_polygon [1/2]

```
void fl_polygon (
    int x0,
    int y0,
    int x1,
    int y1,
    int x2,
    int y2 ) [friend]
```

Fills a 3-sided polygon.
The polygon must be convex.

31.53.3.24 fl_polygon [2/2]

```
void fl_polygon (
    int x0,
    int y0,
    int x1,
    int y1,
    int x2,
    int y2,
    int x3,
    int y3 ) [friend]
```

Fills a 4-sided polygon.
The polygon must be convex.

31.53.3.25 fl_pop_clip

```
void fl_pop_clip ( ) [friend]
```

Restores the previous clip region.

You must call [fl_pop_clip\(\)](#) once for every time you call [fl_push_clip\(\)](#). Unpredictable results may occur if the clip stack is not empty when you return to FLTK.

31.53.3.26 fl_push_clip

```
void fl_push_clip (
    int x,
    int y,
    int w,
    int h ) [friend]
```

Intersects the current clip region with a rectangle and pushes this new region onto the stack.

Parameters

in	<i>x,y,w,h</i>	position and size
----	----------------	-------------------

31.53.3.27 fl_push_matrix

```
void fl_push_matrix ( ) [friend]
```

Saves the current transformation matrix on the stack.

The maximum depth of the stack is 32.

31.53.3.28 fl_rect

```
void fl_rect (
    int x,
    int y,
```

```

    int w,
    int h ) [friend]

```

Draws a 1-pixel border *inside* the given bounding box.

This function is meant for quick drawing of simple boxes. The behavior is undefined for line widths that are not 1.

31.53.3.29 fl_rotate

```

void fl_rotate (
    double d ) [friend]

```

Concatenates rotation transformation onto the current one.

Parameters

in	<i>d</i>	- rotation angle, counter-clockwise in degrees (not radians)
----	----------	--

31.53.3.30 fl_scale [1/2]

```

void fl_scale (
    double x ) [friend]

```

Concatenates scaling transformation onto the current one.

Parameters

in	<i>x</i>	scale factor in both x-direction and y-direction
----	----------	--

31.53.3.31 fl_scale [2/2]

```

void fl_scale (
    double x,
    double y ) [friend]

```

Concatenates scaling transformation onto the current one.

Parameters

in	<i>x,y</i>	scale factors in x-direction and y-direction
----	------------	--

31.53.3.32 fl_transform_dx

```

double fl_transform_dx (
    double x,
    double y ) [friend]

```

Transforms distance using current transformation matrix.

Parameters

in	<i>x,y</i>	coordinate
----	------------	------------

31.53.3.33 fl_transform_dy

```

double fl_transform_dy (

```

```
double x,  
double y ) [friend]
```

Transforms distance using current transformation matrix.

Parameters

in	<i>x,y</i>	coordinate
----	------------	------------

31.53.3.34 fl_transform_x

```
double fl_transform_x (  
double x,  
double y ) [friend]
```

Transforms coordinate using the current transformation matrix.

Parameters

in	<i>x,y</i>	coordinate
----	------------	------------

31.53.3.35 fl_transform_y

```
double fl_transform_y (  
double x,  
double y ) [friend]
```

Transforms coordinate using the current transformation matrix.

Parameters

in	<i>x,y</i>	coordinate
----	------------	------------

31.53.3.36 fl_transformed_vertex

```
void fl_transformed_vertex (  
double xf,  
double yf ) [friend]
```

Adds coordinate pair to the vertex list without further transformations.

Parameters

in	<i>xf,yf</i>	transformed coordinate
----	--------------	------------------------

31.53.3.37 fl_translate

```
void fl_translate (  
double x,  
double y ) [friend]
```

Concatenates translation transformation onto the current one.

Parameters

in	x,y	translation factor in x-direction and y-direction
----	-----	---

31.53.3.38 fl_vertex

```
void fl_vertex (  
    double x,  
    double y ) [friend]
```

Adds a single vertex to the current path.

Parameters

in	x,y	coordinate
----	-----	------------

The documentation for this class was generated from the following files:

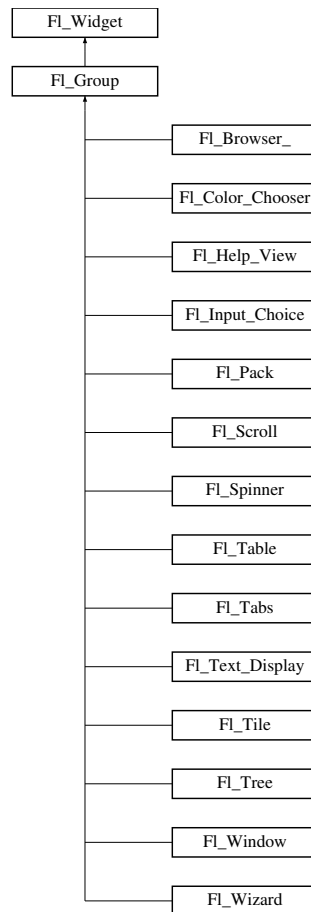
- [Fl_Device.H](#)
- [fl_arc.cxx](#)
- [fl_arci.cxx](#)
- [fl_curve.cxx](#)
- [Fl_Device.cxx](#)
- [Fl_Double_Window.cxx](#)
- [Fl_Image.cxx](#)
- [fl_line_style.cxx](#)
- [fl_rect.cxx](#)
- [fl_vertex.cxx](#)

31.54 Fl_Group Class Reference

The [Fl_Group](#) class is the FLTK container widget.

```
#include <Fl_Group.H>
```

Inheritance diagram for Fl_Group:



Public Member Functions

- [FL_Widget *& _ddfdesign_kludge \(\)](#)
This is for forms compatibility only.
- void [add \(FL_Widget &\)](#)
The widget is removed from its current group (if any) and then added to the end of this group.
- void [add \(FL_Widget *o\)](#)
See void [FL_Group::add\(FL_Widget &w\)](#)
- void [add_resizable \(FL_Widget &o\)](#)
Adds a widget to the group and makes it the resizable widget.
- [FL_Widget *const * array \(\) const](#)
Returns a pointer to the array of children.
- virtual [FL_Group * as_group \(\)](#)
Returns an [FL_Group](#) pointer if this widget is an [FL_Group](#).
- void [begin \(\)](#)
Sets the current group so you can build the widget tree by just constructing the widgets.
- [FL_Widget * child \(int n\) const](#)
Returns [array\(\)\[n\]](#).
- int [children \(\) const](#)
Returns how many child widgets the group has.
- void [clear \(\)](#)
Deletes all child widgets from memory recursively.
- unsigned int [clip_children \(\)](#)
Returns the current clipping mode.

- void `clip_children` (int c)
Controls whether the group widget clips the drawing of child widgets to its bounding box.
- void `end` ()
Exactly the same as `current(this->parent())`.
- int `find` (const `FL_Widget` &o) const
*See int `FL_Group::find(const FL_Widget *w)` const.*
- int `find` (const `FL_Widget` *) const
Searches the child array for the widget and returns the index.
- `FL_Group` (int, int, int, int, const char *s=0)
Creates a new `FL_Group` widget using the given position, size, and label string.
- void `focus` (`FL_Widget` *W)
- void `forms_end` ()
This is for forms compatibility only.
- int `handle` (int)
Handles the specified event.
- void `init_sizes` ()
Resets the internal array of widget sizes and positions.
- void `insert` (`FL_Widget` &, int i)
The widget is removed from its current group (if any) and then inserted into this group.
- void `insert` (`FL_Widget` &o, `FL_Widget` *before)
This does `insert(w, find(before))`.
- void `remove` (`FL_Widget` &)
Removes a widget from the group but does not delete it.
- void `remove` (`FL_Widget` *o)
Removes the widget o from the group.
- void `remove` (int index)
Removes the widget at index from the group but does not delete it.
- `FL_Widget` * `resizable` () const
*See void `FL_Group::resizable(FL_Widget *box)`*
- void `resizable` (`FL_Widget` &o)
*See void `FL_Group::resizable(FL_Widget *box)`*
- void `resizable` (`FL_Widget` *o)
The resizable widget defines the resizing box for the group.
- void `resize` (int, int, int, int)
Resizes the `FL_Group` widget and all of its children.
- virtual `~FL_Group` ()
The destructor also deletes all the children.

Static Public Member Functions

- static `FL_Group` * `current` ()
Returns the currently active group.
- static void `current` (`FL_Group` *g)
Sets the current group.

Protected Member Functions

- void `draw` ()
Draws the widget.
- void `draw_child` (`Fl_Widget` &widget) const
Forces a child to redraw.
- void `draw_children` ()
Draws all children of the group.
- void `draw_outside_label` (const `Fl_Widget` &widget) const
Parents normally call this to draw outside labels of child widgets.
- int * `sizes` ()
Returns the internal array of widget sizes and positions.
- void `update_child` (`Fl_Widget` &widget) const
Draws a child only if it needs it.

Additional Inherited Members

31.54.1 Detailed Description

The `Fl_Group` class is the FLTK container widget.

It maintains an array of child widgets. These children can themselves be any widget including `Fl_Group`. The most important subclass of `Fl_Group` is `Fl_Window`, however groups can also be used to control radio buttons or to enforce resize behavior.

The tab and arrow keys are used to move the focus between widgets of this group, and to other groups. The only modifier grabbed is shift (for shift-tab), so that ctrl-tab, alt-up, and such are free for the app to use as shortcuts.

31.54.2 Constructor & Destructor Documentation

31.54.2.1 `Fl_Group()`

```
Fl_Group::Fl_Group (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new `Fl_Group` widget using the given position, size, and label string. The default boxtype is `FL_NO_BOX`.

31.54.2.2 `~Fl_Group()`

```
Fl_Group::~Fl_Group ( ) [virtual]
```

The destructor *also deletes all the children*.

This allows a whole tree to be deleted at once, without having to keep a pointer to all the children in the user code. It is allowed that the `Fl_Group` and all of its children are automatic (local) variables, but you must declare the `Fl_Group` *first*, so that it is destroyed last.

If you add static or automatic (local) variables to an `Fl_Group`, then it is your responsibility to remove (or delete) all such static or automatic child widgets *before destroying* the group - otherwise the child widgets' destructors would be called twice!

31.54.3 Member Function Documentation

31.54.3.1 array()

```
Fl_Widget *const * Fl_Group::array ( ) const
```

Returns a pointer to the array of children.

This pointer is only valid until the next time a child is added or removed.

31.54.3.2 as_group()

```
virtual Fl_Group* Fl_Group::as_group ( ) [inline], [virtual]
```

Returns an [Fl_Group](#) pointer if this widget is an [Fl_Group](#).

Use this method if you have a widget (pointer) and need to know whether this widget is derived from [Fl_Group](#). If it returns non-NULL, then the widget in question is derived from [Fl_Group](#), and you can use the returned pointer to access its children or other [Fl_Group](#)-specific methods.

Example:

```
void my_callback (Fl_Widget *w, void *) {
    Fl_Group *g = w->as_group();
    if (g)
        printf ("This group has %d children\n",g->children());
    else
        printf ("This widget is not a group!\n");
}
```

Return values

NULL	if this widget is not derived from Fl_Group .
------	---

Note

This method is provided to avoid `dynamic_cast`.

See also

[Fl_Widget::as_window\(\)](#), [Fl_Widget::as_gl_window\(\)](#)

Reimplemented from [Fl_Widget](#).

31.54.3.3 begin()

```
void Fl_Group::begin ( )
```

Sets the current group so you can build the widget tree by just constructing the widgets.

[begin\(\)](#) is automatically called by the constructor for [Fl_Group](#) (and thus for [Fl_Window](#) as well). [begin\(\)](#) is *exactly the same as* `current(this)`. *Don't forget to [end\(\)](#) the group or window!*

31.54.3.4 child()

```
Fl_Widget* Fl_Group::child (
    int n ) const [inline]
```

Returns [array\(\)](#)[n].

No range checking is done!

31.54.3.5 clear()

```
void Fl_Group::clear ( )
```

Deletes all child widgets from memory recursively.

This method differs from the [remove\(\)](#) method in that it affects all child widgets and deletes them from memory.

31.54.3.6 clip_children() [1/2]

```
unsigned int Fl_Group::clip_children ( ) [inline]
```

Returns the current clipping mode.

Returns

true, if clipping is enabled, false otherwise.

See also

void [Fl_Group::clip_children\(int c\)](#)

31.54.3.7 clip_children() [2/2]

```
void Fl_Group::clip_children (
    int c ) [inline]
```

Controls whether the group widget clips the drawing of child widgets to its bounding box.

Set *c* to 1 if you want to clip the child widgets to the bounding box.

The default is to not clip (0) the drawing of child widgets.

31.54.3.8 current() [1/2]

```
Fl_Group * Fl_Group::current ( ) [static]
```

Returns the currently active group.

The [Fl_Widget](#) constructor automatically does [current\(\)](#)->[add\(widget\)](#) if this is not null. To prevent new widgets from being added to a group, call [Fl_Group::current\(0\)](#).

31.54.3.9 current() [2/2]

```
void Fl_Group::current (
    Fl_Group * g ) [static]
```

Sets the current group.

See also

[Fl_Group::current\(\)](#)

31.54.3.10 draw()

```
void Fl_Group::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scroll;           // scroll is an embedded Fl_Scrollbar
s->draw();                         // calls Fl_Scrollbar::draw()
```

Implements [Fl_Widget](#).

Reimplemented in [Fl_Table](#), [Fl_Glut_Window](#), [Fl_Window](#), [Fl_Tree](#), [Fl_Text_Display](#), [Fl_Tabs](#), [Fl_Scroll](#), [Fl_Pack](#), and [Fl_Help_View](#).

31.54.3.11 draw_child()

```
void Fl_Group::draw_child (
    Fl_Widget & widget ) const [protected]
```

Forces a child to redraw.

This draws a child widget, if it is not clipped. The damage bits are cleared after drawing.

31.54.3.12 draw_children()

```
void Fl_Group::draw_children ( ) [protected]
```

Draws all children of the group.

This is useful, if you derived a widget from [Fl_Group](#) and want to draw a special border or background. You can call [draw_children\(\)](#) from the derived [draw\(\)](#) method after drawing the box, border, or background.

31.54.3.13 end()

```
void Fl_Group::end ( )
```

Exactly the same as [current\(this->parent\(\)\)](#).

Any new widgets added to the widget tree will be added to the parent of the group.

31.54.3.14 find()

```
int Fl_Group::find (
    const Fl_Widget * o ) const
```

Searches the child array for the widget and returns the index.

Returns [children\(\)](#) if the widget is NULL or not found.

31.54.3.15 focus()

```
void Fl_Group::focus (
    Fl_Widget * W ) [inline]
```

Deprecated This is for backwards compatibility only.

You should use *W->take_focus()* instead.

See also

[Fl_Widget::take_focus\(\)](#);

31.54.3.16 handle()

```
int Fl_Group::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Widget](#).

Reimplemented in [Fl_Glut_Window](#), [Fl_Window](#), [Fl_Tabs](#), [Fl_Scroll](#), [Fl_Help_View](#), [Fl_Tile](#), [Fl_Table_Row](#), [Fl_Spinner](#), [Fl_Tree](#), [Fl_Text_Editor](#), [Fl_Text_Display](#), and [Fl_Table](#).

31.54.3.17 `init_sizes()`

```
void Fl_Group::init_sizes ( )
```

Resets the internal array of widget sizes and positions.

The [Fl_Group](#) widget keeps track of the original widget sizes and positions when resizing occurs so that if you resize a window back to its original size the widgets will be in the correct places. If you rearrange the widgets in your group, call this method to register the new arrangement with the [Fl_Group](#) that contains them.

If you add or remove widgets, this will be done automatically.

Note

The internal array of widget sizes and positions will be allocated and filled when the next [resize\(\)](#) occurs.

See also

[sizes\(\)](#)

31.54.3.18 `insert()` [1/2]

```
void Fl_Group::insert (
    Fl_Widget & o,
    int index )
```

The widget is removed from its current group (if any) and then inserted into this group.

It is put at index *n* - or at the end, if *n* >= [children\(\)](#). This can also be used to rearrange the widgets inside a group.

31.54.3.19 `insert()` [2/2]

```
void Fl_Group::insert (
    Fl_Widget & o,
    Fl_Widget * before ) [inline]
```

This does `insert(w, find(before))`.

This will append the widget if `before` is not in the group.

31.54.3.20 `remove()` [1/3]

```
void Fl_Group::remove (
    Fl_Widget & o )
```

Removes a widget from the group but does not delete it.

This method does nothing if the widget is not a child of the group.

This method differs from the [clear\(\)](#) method in that it only affects a single widget and does not delete it from memory.

Note

If you have the child's index anyway, use [remove\(int index\)](#) instead, because this doesn't need a child lookup in the group's table of children. This can be much faster, if there are lots of children.

31.54.3.21 `remove()` [2/3]

```
void Fl_Group::remove (
    Fl_Widget * o ) [inline]
```

Removes the widget `o` from the group.

See also

`void remove\(Fl_Widget&\)`

31.54.3.22 remove() [3/3]

```
void Fl_Group::remove (
    int index )
```

Removes the widget at `index` from the group but does not delete it.

This method does nothing if `index` is out of bounds.

This method differs from the [clear\(\)](#) method in that it only affects a single widget and does not delete it from memory.

Since

FLTK 1.3.0

31.54.3.23 resizable()

```
void Fl_Group::resizable (
    Fl_Widget * o ) [inline]
```

The resizable widget defines the resizing box for the group.

When the group is resized it calculates a new size and position for all of its children. Widgets that are horizontally or vertically inside the dimensions of the box are scaled to the new size. Widgets outside the box are moved.

In these examples the gray area is the resizable:

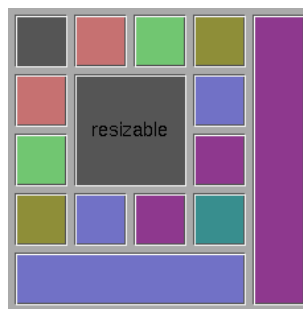


Figure 31.14 before resize

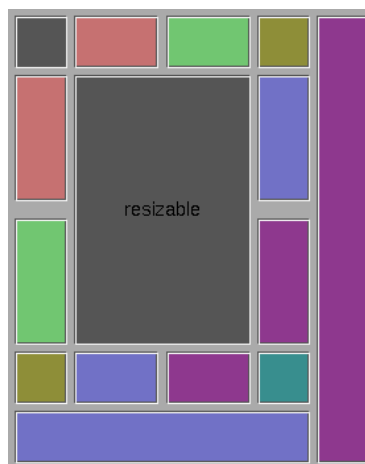


Figure 31.15 after resize

The resizable may be set to the group itself, in which case all the contents are resized. This is the default value for [Fl_Group](#), although NULL is the default for [Fl_Window](#) and [Fl_Pack](#).

If the resizable is NULL then all widgets remain a fixed size and distance from the top-left corner.

It is possible to achieve any type of resize behavior by using an invisible [Fl_Box](#) as the resizable and/or by using a hierarchy of child [Fl_Group](#)'s.

31.54.3.24 `resize()`

```
void Fl_Group::resize (
    int X,
    int Y,
    int W,
    int H ) [virtual]
```

Resizes the [Fl_Group](#) widget and all of its children.

The [Fl_Group](#) widget first resizes itself, and then it moves and resizes all its children according to the rules documented for [Fl_Group::resizable\(Fl_Widget*\)](#)

See also

[Fl_Group::resizable\(Fl_Widget*\)](#)

[Fl_Group::resizable\(\)](#)

[Fl_Widget::resize\(int,int,int,int\)](#)

Reimplemented from [Fl_Widget](#).

Reimplemented in [Fl_Tree](#), [Fl_Overlay_Window](#), [Fl_Help_View](#), [Fl_Window](#), [Fl_Tile](#), [Fl_Text_Display](#), [Fl_Table](#), [Fl_Spinner](#), [Fl_Scroll](#), and [Fl_Input_Choice](#).

31.54.3.25 `sizes()`

```
int * Fl_Group::sizes ( ) [protected]
```

Returns the internal array of widget sizes and positions.

If the [sizes\(\)](#) array does not exist, it will be allocated and filled with the current widget sizes and positions.

Note

You should never need to use this method directly, unless you have special needs to rearrange the children of a [Fl_Group](#). [Fl_Tile](#) uses this to rearrange its widget positions.

See also

[init_sizes\(\)](#)

Todo Should the internal representation of the [sizes\(\)](#) array be documented?

31.54.3.26 `update_child()`

```
void Fl_Group::update_child (
    Fl_Widget & widget ) const [protected]
```

Draws a child only if it needs it.

This draws a child widget, if it is not clipped *and* if any [damage\(\)](#) bits are set. The damage bits are cleared after drawing.

See also

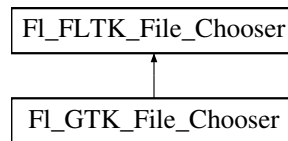
[Fl_Group::draw_child\(Fl_Widget& widget\) const](#)

The documentation for this class was generated from the following files:

- [Fl_Group.H](#)
- [Fl_Group.cxx](#)
- [forms_compatibility.cxx](#)

31.55 FI_GTK_File_Chooser Class Reference

Inheritance diagram for FI_GTK_File_Chooser:



Friends

- class [FI_Native_File_Chooser](#)

Additional Inherited Members

The documentation for this class was generated from the following files:

- [FI_Native_File_Chooser.H](#)
- [FI_Native_File_Chooser_GTK.cxx](#)

31.56 FI_Help_Block Struct Reference

Public Attributes

- [FI_Color](#) **bgcolor**
- [uchar](#) **border**
- const char * **end**
- int **h**
- int **line** [32]
- const char * **start**
- int **w**
- int **x**
- int **y**

The documentation for this struct was generated from the following file:

- [FI_Help_View.H](#)

31.57 FI_Help_Dialog Class Reference

The [FI_Help_Dialog](#) widget displays a standard help dialog window using the [FI_Help_View](#) widget.

Public Member Functions

- [FI_Help_Dialog](#) ()
The constructor creates the dialog pictured above.
- int [h](#) ()
Returns the position and size of the help dialog.
- void [hide](#) ()
Hides the [FI_Help_Dialog](#) window.
- void [load](#) (const char *f)
Loads the specified HTML file into the [FI_Help_View](#) widget.
- void [position](#) (int xx, int yy)
Set the screen position of the dialog.

- void [resize](#) (int xx, int yy, int ww, int hh)
Change the position and size of the dialog.
- void [show](#) ()
Shows the [FI_Help_Dialog](#) window.
- void [show](#) (int argc, char **argv)
*Shows the main Help Dialog Window Delegates call to encapsulated window_ void [FI_Window::show\(int argc, char **argv\)](#) instance method.*
- [FI_Fontsize](#) [textsize](#) ()
Sets or gets the default text size for the help view.
- void [textsize](#) ([FI_Fontsize](#) s)
Sets or gets the default text size for the help view.
- void [topline](#) (const char *n)
Sets the top line in the [FI_Help_View](#) widget to the named or numbered line.
- void [topline](#) (int n)
Sets the top line in the [FI_Help_View](#) widget to the named or numbered line.
- const char * [value](#) () const
The first form sets the current buffer to the string provided and reformats the text.
- void [value](#) (const char *f)
The first form sets the current buffer to the string provided and reformats the text.
- int [visible](#) ()
Returns 1 if the [FI_Help_Dialog](#) window is visible.
- int [w](#) ()
Returns the position and size of the help dialog.
- int [x](#) ()
Returns the position and size of the help dialog.
- int [y](#) ()
Returns the position and size of the help dialog.
- [~FI_Help_Dialog](#) ()
The destructor destroys the widget and frees all memory that has been allocated for the current file.

31.57.1 Detailed Description

The [FI_Help_Dialog](#) widget displays a standard help dialog window using the [FI_Help_View](#) widget.

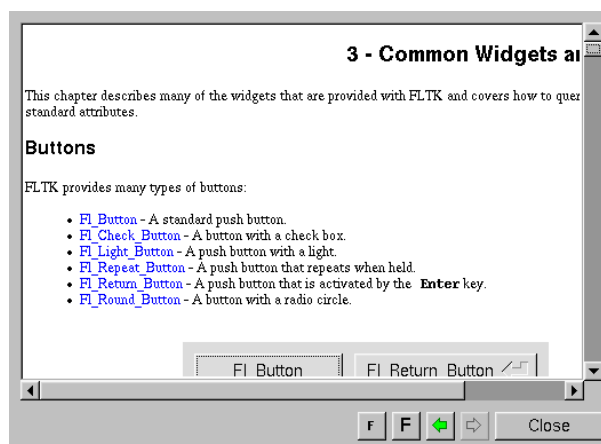


Figure 31.16 [FI_Help_Dialog](#)

31.57.2 Member Function Documentation

31.57.2.1 load()

```
void Fl_Help_Dialog::load (
    const char * f )
```

Loads the specified HTML file into the [Fl_Help_View](#) widget.
The filename can also contain a target name ("filename.html#target").

31.57.2.2 show()

```
void Fl_Help_Dialog::show ( )
```

Shows the [Fl_Help_Dialog](#) window.
Shows the main Help Dialog Window Delegates call to encapsulated window_ void [Fl_Window::show\(\)](#) method.

31.57.2.3 textsize()

```
void Fl_Help_Dialog::textsize (
    Fl_Fontsize s )
```

Sets or gets the default text size for the help view.
Sets the internal [Fl_Help_View](#) instance text size.
Delegates call to encapsulated view_ void [Fl_Help_View::textsize\(Fl_Fontsize s\)](#) instance method

31.57.2.4 value() [1/2]

```
const char * Fl_Help_Dialog::value ( ) const
```

The first form sets the current buffer to the string provided and reformats the text.
It also clears the history of the "back" and "forward" buttons. The second form returns the current buffer contents.

31.57.2.5 value() [2/2]

```
void Fl_Help_Dialog::value (
    const char * v )
```

The first form sets the current buffer to the string provided and reformats the text.
It also clears the history of the "back" and "forward" buttons. The second form returns the current buffer contents.
The documentation for this class was generated from the following files:

- [Fl_Help_Dialog.H](#)
- [Fl_Help_Dialog.cxx](#)
- [Fl_Help_Dialog_Dox.cxx](#)

31.58 Fl_Help_Font_Stack Struct Reference

Public Member Functions

- `size_t` [count](#) () const
Gets the current count of font style elements in the stack.
- [Fl_Help_Font_Stack](#) ()
font stack construction, initialize attributes.
- void [init](#) ([Fl_Font](#) f, [Fl_Fontsize](#) s, [Fl_Color](#) c)
- void [pop](#) ([Fl_Font](#) &f, [Fl_Fontsize](#) &s, [Fl_Color](#) &c)
Pops from the stack the font style triplet and calls [fl_font\(\)](#) & [fl_color\(\)](#) adequately.
- void [push](#) ([Fl_Font](#) f, [Fl_Fontsize](#) s, [Fl_Color](#) c)
Pushes the font style triplet on the stack, also calls [fl_font\(\)](#) & [fl_color\(\)](#) adequately.
- void [top](#) ([Fl_Font](#) &f, [Fl_Fontsize](#) &s, [Fl_Color](#) &c)
Gets the top (current) element on the stack.

Protected Attributes

- [FI_Help_Font_Style elts_](#) [100]
font elements
- [size_t nfonts_](#)
current number of fonts in stack

The documentation for this struct was generated from the following file:

- [FI_Help_View.H](#)

31.59 FI_Help_Font_Style Struct Reference

[FI_Help_View](#) font stack element definition.

```
#include <FI_Help_View.H>
```

Public Member Functions

- [FI_Help_Font_Style](#) ([FI_Font](#) afont, [FI_Fontsize](#) asize, [FI_Color](#) acolor)
- void [get](#) ([FI_Font](#) &afont, [FI_Fontsize](#) &asize, [FI_Color](#) &acolor)
Gets current font attributes.
- void [set](#) ([FI_Font](#) afont, [FI_Fontsize](#) asize, [FI_Color](#) acolor)
Sets current font attributes.

Public Attributes

- [FI_Color](#) c
Font Color.
- [FI_Font](#) f
Font.
- [FI_Fontsize](#) s
Font Size.

31.59.1 Detailed Description

[FI_Help_View](#) font stack element definition.

The documentation for this struct was generated from the following file:

- [FI_Help_View.H](#)

31.60 FI_Help_Link Struct Reference

Definition of a link for the html viewer.

```
#include <FI_Help_View.H>
```

Public Attributes

- char [filename](#) [192]
Reference filename.
- int [h](#)
Height of link text.
- char [name](#) [32]
Link target (blank if none)
- int [w](#)
Width of link text.

- int `x`
X offset of link text.
- int `y`
Y offset of link text.

31.60.1 Detailed Description

Definition of a link for the html viewer.

The documentation for this struct was generated from the following file:

- `Fl_Help_View.H`

31.61 `Fl_Help_Target` Struct Reference

`Fl_Help_Target` structure.

```
#include <Fl_Help_View.H>
```

Public Attributes

- char `name` [32]
Target name.
- int `y`
Y offset of target.

31.61.1 Detailed Description

`Fl_Help_Target` structure.

The documentation for this struct was generated from the following file:

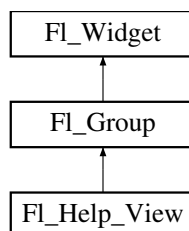
- `Fl_Help_View.H`

31.62 `Fl_Help_View` Class Reference

The `Fl_Help_View` widget displays HTML text.

```
#include <Fl_Help_View.H>
```

Inheritance diagram for `Fl_Help_View`:



Public Member Functions

- void `clear_selection` ()
Removes the current text selection.
- const char * `directory` () const
Returns the current directory for the text in the buffer.
- const char * `filename` () const
Returns the current filename for the text in the buffer.
- int `find` (const char *s, int p=0)

- Finds the specified string *s* at starting position *p*.*

 - `FI_Help_View` (int xx, int yy, int ww, int hh, const char *l=0)

The constructor creates the `FI_Help_View` widget at the specified position and size.
- int `handle` (int)

Handles events in the widget.
- int `leftline` () const

Gets the left position in pixels.
- void `leftline` (int)

Scrolls the text to the indicated position, given a pixel column.
- void `link` (FI_Help_Func *fn)

This method assigns a callback function to use when a link is followed or a file is loaded (via `FI_Help_View::load()`) that requires a different file or path.
- int `load` (const char *f)

Loads the specified file.
- void `resize` (int, int, int, int)

Resizes the help widget.
- int `scrollbar_size` () const

Gets the current size of the scrollbars' troughs, in pixels.
- void `scrollbar_size` (int newSize)

*Sets the pixel size of the scrollbars' troughs to *newSize*, in pixels.*
- void `select_all` ()

Selects all the text in the view.
- int `size` () const

Gets the size of the help view.
- void `size` (int W, int H)
- `FI_Color` `textcolor` () const

Returns the current default text color.
- void `textcolor` (`FI_Color` c)

Sets the default text color.
- `FI_Font` `textfont` () const

Returns the current default text font.
- void `textfont` (`FI_Font` f)

Sets the default text font.
- `FI_Fontsize` `textsize` () const

Gets the default text size.
- void `textsize` (`FI_Fontsize` s)

Sets the default text size.
- const char * `title` ()

Returns the current document title, or NULL if there is no title.
- int `topline` () const

Returns the current top line in pixels.
- void `topline` (const char *n)

Scrolls the text to the indicated position, given a named destination.
- void `topline` (int)

Scrolls the text to the indicated position, given a pixel line.
- const char * `value` () const

Returns the current buffer contents.
- void `value` (const char *val)

Sets the current help text buffer to the string provided and reformats the text.
- `~FI_Help_View` ()

Destroys the `FI_Help_View` widget.

Protected Member Functions

- void `draw` ()
Draws the `Fl_Help_View` widget.

Additional Inherited Members

31.62.1 Detailed Description

The `Fl_Help_View` widget displays HTML text.

Most HTML 2.0 elements are supported, as well as a primitive implementation of tables. GIF, JPEG, and PNG images are displayed inline.

Supported HTML tags:

- A: HREF/NAME
- B
- BODY: BGCOLOR/TEXT/LINK
- BR
- CENTER
- CODE
- DD
- DL
- DT
- EM
- FONT: COLOR/SIZE/FACE=(helvetica/arial/sans/times/serif/symbol/courier)
- H1/H2/H3/H4/H5/H6
- HEAD
- HR
- I
- IMG: SRC/WIDTH/HEIGHT/ALT
- KBD
- LI
- OL
- P
- PRE
- STRONG
- TABLE: TH/TD/TR/BORDER/BGCOLOR/COLSPAN/ALIGN=CENTER|RIGHT|LEFT
- TITLE
- TT
- U
- UL
- VAR

Supported color names:

- black,red,green,yellow,blue,magenta,fuchsia,cyan,aqua,white,gray,grey,lime,maroon,navy,olive,purple,silver,teal.

Supported urls:

- Internal: file:
- External: http: ftp: https: ipp: mailto: news:

Quoted char names:

- Aacute aacute Acirc acirc acute AElig aelig Agrave agrave amp Aring aring Atilde atilde Auml auml
- brvbar bull
- Ccedil ccedil cedil cent copy curren
- deg divide
- Eacute eacute Ecirc ecirc Egrave egrave ETH eth Euml euml euro
- frac12 frac14 frac34
- gt
- Iacute iacute Icirc icirc Iexcl Igrave igrave Iquest Iuml iuml
- laquo lt
- macr micro middot
- nbsp not Ntilde ntilde
- Oacute oacute Ocirc ocirc Ograve ograve ordf ordm Oslash oslash Otilde otilde Ouml ouml
- para permil plusmn pound
- quot
- raquo reg
- sect shy sup1 sup2 sup3 szlig
- THORN thorn times trade
- Uacute uacute Ucirc ucirc Ugrave ugrave uml Uuml uuml
- Yacute yacute
- yen Yuml yuml

31.62.2 Constructor & Destructor Documentation

31.62.2.1 ~Fl_Help_View()

`Fl_Help_View::~Fl_Help_View ()`

Destroys the [Fl_Help_View](#) widget.

The destructor destroys the widget and frees all memory that has been allocated for the current document.

31.62.3 Member Function Documentation

31.62.3.1 find()

```
int Fl_Help_View::find (
    const char * s,
    int p = 0 )
```

Finds the specified string *s* at starting position *p*.

Returns

the matching position or -1 if not found

31.62.3.2 leftline()

```
void Fl_Help_View::leftline (
    int left )
```

Scrolls the text to the indicated position, given a pixel column.

If the given pixel value *left* is out of range, then the text is scrolled to the left or right side of the document, resp.

Parameters

<i>in</i>	<i>left</i>	left column number in pixels (0 = left side)
-----------	-------------	--

31.62.3.3 link()

```
void Fl_Help_View::link (
    Fl_Help_Func * fn ) [inline]
```

This method assigns a callback function to use when a link is followed or a file is loaded (via [Fl_Help_View::load\(\)](#)) that requires a different file or path.

The callback function receives a pointer to the [Fl_Help_View](#) widget and the URI or full pathname for the file in question. It must return a pathname that can be opened as a local file or NULL:

```
const char *fn(Fl_Widget *w, const char *uri);
```

The link function can be used to retrieve remote or virtual documents, returning a temporary file that contains the actual data. If the link function returns NULL, the value of the [Fl_Help_View](#) widget will remain unchanged.

If the link callback cannot handle the URI scheme, it should return the uri value unchanged or set the [value\(\)](#) of the widget before returning NULL.

31.62.3.4 load()

```
int Fl_Help_View::load (
    const char * f )
```

Loads the specified file.

This method loads the specified file or URL.

31.62.3.5 scrollbar_size() [1/2]

```
int Fl_Help_View::scrollbar_size ( ) const [inline]
```

Gets the current size of the scrollbars' troughs, in pixels.

If this value is zero (default), this widget will use the [Fl::scrollbar_size\(\)](#) value as the scrollbar's width.

Returns

Scrollbar size in pixels, or 0 if the global [Fl::scrollbar_size\(\)](#) is being used.

See also

[Fl::scrollbar_size\(int\)](#)

31.62.3.6 scrollbar_size() [2/2]

```
void Fl_Help_View::scrollbar_size (
    int newSize ) [inline]
```

Sets the pixel size of the scrollbars' troughs to `newSize`, in pixels.

Normally you should not need this method, and should use [Fl::scrollbar_size\(int\)](#) instead to manage the size of ALL your widgets' scrollbars. This ensures your application has a consistent UI, is the default behavior, and is normally what you want.

Only use THIS method if you really need to override the global scrollbar size. The need for this should be rare.

Setting `newSize` to the special value of 0 causes the widget to track the global [Fl::scrollbar_size\(\)](#), which is the default.

Parameters

in	<i>newSize</i>	Sets the scrollbar size in pixels. If 0 (default), scrollbar size tracks the global Fl::scrollbar_size()
----	----------------	---

See also

[Fl::scrollbar_size\(\)](#)

31.62.3.7 topline() [1/2]

```
void Fl_Help_View::topline (
    const char * n )
```

Scrolls the text to the indicated position, given a named destination.

Parameters

in	<i>n</i>	target name
----	----------	-------------

31.62.3.8 topline() [2/2]

```
void Fl_Help_View::topline (
    int top )
```

Scrolls the text to the indicated position, given a pixel line.

If the given pixel value `top` is out of range, then the text is scrolled to the top or bottom of the document, resp.

Parameters

in	<i>top</i>	top line number in pixels (0 = start of document)
----	------------	---

31.62.3.9 value()

```
void Fl_Help_View::value (
    const char * val )
```

Sets the current help text buffer to the string provided and reformats the text.

The provided character string `val` is copied internally and will be freed when [value\(\)](#) is called again, or when the widget is destroyed.

If `val` is NULL, then the widget is cleared.

The documentation for this class was generated from the following files:

- Fl_Help_View.H

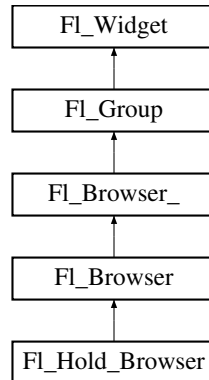
- [Fl_Help_View.cxx](#)

31.63 Fl_Hold_Browser Class Reference

The [Fl_Hold_Browser](#) is a subclass of [Fl_Browser](#) which lets the user select a single item, or no items by clicking on the empty space.

```
#include <Fl_Hold_Browser.H>
```

Inheritance diagram for [Fl_Hold_Browser](#):



Public Member Functions

- [Fl_Hold_Browser](#) (int X, int Y, int W, int H, const char *L=0)
Creates a new [Fl_Hold_Browser](#) widget using the given position, size, and label string.

Additional Inherited Members

31.63.1 Detailed Description

The [Fl_Hold_Browser](#) is a subclass of [Fl_Browser](#) which lets the user select a single item, or no items by clicking on the empty space.

As long as the mouse button is held down the item pointed to by it is highlighted, and this highlighting remains on when the mouse button is released. Normally the callback is done when the user releases the mouse, but you can change this with [when\(\)](#).

See [Fl_Browser](#) for methods to add and remove lines from the browser.

31.63.2 Constructor & Destructor Documentation

31.63.2.1 Fl_Hold_Browser()

```
Fl_Hold_Browser::Fl_Hold_Browser (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new [Fl_Hold_Browser](#) widget using the given position, size, and label string.

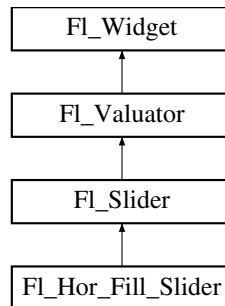
The default boxtype is `FL_DOWN_BOX`. The constructor specializes [Fl_Browser\(\)](#) by setting the type to `FL_HOLD_BROWSER`. The destructor destroys the widget and frees all memory that has been allocated.

The documentation for this class was generated from the following files:

- [Fl_Hold_Browser.H](#)
- [Fl_Browser.cxx](#)

31.64 Fl_Hor_Fill_Slider Class Reference

Inheritance diagram for Fl_Hor_Fill_Slider:



Public Member Functions

- **Fl_Hor_Fill_Slider** (int X, int Y, int W, int H, const char *L=0)

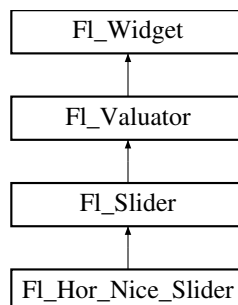
Additional Inherited Members

The documentation for this class was generated from the following files:

- Fl_Hor_Fill_Slider.H
- Fl_Slider.cxx

31.65 Fl_Hor_Nice_Slider Class Reference

Inheritance diagram for Fl_Hor_Nice_Slider:



Public Member Functions

- **Fl_Hor_Nice_Slider** (int X, int Y, int W, int H, const char *L=0)

Additional Inherited Members

The documentation for this class was generated from the following files:

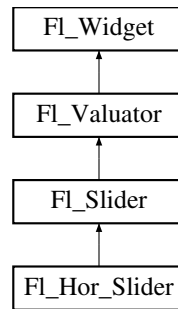
- Fl_Hor_Nice_Slider.H
- Fl_Slider.cxx

31.66 Fl_Hor_Slider Class Reference

Horizontal Slider class.

```
#include <Fl_Hor_Slider.H>
```

Inheritance diagram for `Fl_Hor_Slider`:



Public Member Functions

- [Fl_Hor_Slider](#) (int X, int Y, int W, int H, const char *l=0)
Creates a new [Fl_Hor_Slider](#) widget using the given position, size, and label string.

Additional Inherited Members

31.66.1 Detailed Description

Horizontal Slider class.

See also

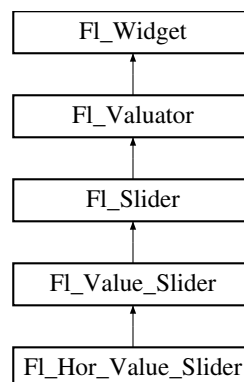
class [Fl_Slider](#).

The documentation for this class was generated from the following files:

- `Fl_Hor_Slider.H`
- `Fl_Slider.cxx`

31.67 Fl_Hor_Value_Slider Class Reference

Inheritance diagram for `Fl_Hor_Value_Slider`:



Public Member Functions

- [Fl_Hor_Value_Slider](#) (int X, int Y, int W, int H, const char *l=0)

Additional Inherited Members

The documentation for this class was generated from the following files:

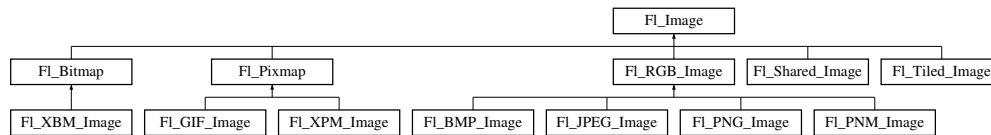
- `Fl_Hor_Value_Slider.H`
- `Fl_Value_Slider.cxx`

31.68 Fl_Image Class Reference

Base class for image caching and drawing.

```
#include <Fl_Image.H>
```

Inheritance diagram for Fl_Image:



Public Member Functions

- virtual void **color_average** (Fl_Color c, float i)
The `color_average()` method averages the colors in the image with the FLTK color value c.
- Fl_Image * **copy** ()
The `copy()` method creates a copy of the specified image.
- virtual Fl_Image * **copy** (int W, int H)
The `copy()` method creates a copy of the specified image.
- int **count** () const
The `count()` method returns the number of data values associated with the image.
- int **d** () const
Returns the current image depth.
- const char *const * **data** () const
Returns a pointer to the current image data array.
- virtual void **desaturate** ()
The `desaturate()` method converts an image to grayscale.
- void **draw** (int X, int Y)
Draws the image.
- virtual void **draw** (int X, int Y, int W, int H, int cx=0, int cy=0)
Draws the image with a bounding box.
- int **fail** ()
Returns a value that is not 0 if there is currently no image available.
- Fl_Image (int W, int H, int D)
The constructor creates an empty image with the specified width, height, and depth.
- int **h** () const
Returns the current image height in pixels.
- void **inactive** ()
The `inactive()` method calls `color_average(FL_BACKGROUND_COLOR, 0.33f)` to produce an image that appears grayed out.
- virtual void **label** (Fl_Menu_Item *m)
The `label()` methods are an obsolete way to set the image attribute of a widget or menu item.
- virtual void **label** (Fl_Widget *w)
The `label()` methods are an obsolete way to set the image attribute of a widget or menu item.
- int **ld** () const
Returns the current line data size in bytes.
- virtual void **uncache** ()
If the image has been cached for display, delete the cache data.
- int **w** () const
Returns the current image width in pixels.
- virtual ~Fl_Image ()
The destructor is a virtual method that frees all memory used by the image.

Static Public Member Functions

- static [FI_RGB_Scaling](#) [RGB_scaling](#) ()
Returns the currently used RGB image scaling method.
- static void [RGB_scaling](#) ([FI_RGB_Scaling](#))
Sets the RGB image scaling method used for [copy\(int, int\)](#).

Static Public Attributes

- static const int **ERR_FILE_ACCESS** = -2
- static const int **ERR_FORMAT** = -3
- static const int **ERR_NO_IMAGE** = -1

Protected Member Functions

- void [d](#) (int D)
Sets the current image depth.
- void [data](#) (const char *const *p, int c)
Sets the current array pointer and count of pointers in the array.
- void [draw_empty](#) (int X, int Y)
The protected method [draw_empty\(\)](#) draws a box with an X in it.
- void [h](#) (int H)
Sets the current image height in pixels.
- void [ld](#) (int LD)
Sets the current line data size in bytes.
- void [w](#) (int W)
Sets the current image width in pixels.

Static Protected Member Functions

- static void **labeltype** (const [FI_Label](#) *lo, int lx, int ly, int lw, int lh, [FI_Align](#) la)
- static void **measure** (const [FI_Label](#) *lo, int &lw, int &lh)

31.68.1 Detailed Description

Base class for image caching and drawing.

[FI_Image](#) is the base class used for caching and drawing all kinds of images in FLTK. This class keeps track of common image data such as the pixels, colormap, width, height, and depth. Virtual methods are used to provide type-specific image handling.

Since the [FI_Image](#) class does not support image drawing by itself, calling the [draw\(\)](#) method results in a box with an X in it being drawn instead.

31.68.2 Constructor & Destructor Documentation

31.68.2.1 [FI_Image\(\)](#)

```
FI_Image::FI_Image (
    int W,
    int H,
    int D )
```

The constructor creates an empty image with the specified width, height, and depth.

The width and height are in pixels. The depth is 0 for bitmaps, 1 for pixmap (colormap) images, and 1 to 4 for color images.

31.68.3 Member Function Documentation

31.68.3.1 color_average()

```
void Fl_Image::color_average (
    Fl_Color c,
    float i ) [virtual]
```

The `color_average()` method averages the colors in the image with the FLTK color value `c`.

The `i` argument specifies the amount of the original image to combine with the color, so a value of 1.0 results in no color blend, and a value of 0.0 results in a constant image of the specified color.

An internal copy is made of the original image before changes are applied, to avoid modifying the original image.

Reimplemented in [Fl_Tiled_Image](#), [Fl_Shared_Image](#), [Fl_Pixmap](#), and [Fl_RGB_Image](#).

31.68.3.2 copy() [1/2]

```
Fl_Image* Fl_Image::copy ( ) [inline]
```

The `copy()` method creates a copy of the specified image.

If the width and height are provided, the image is resized to the specified size. The image should be deleted (or in the case of [Fl_Shared_Image](#), released) when you are done with it.

31.68.3.3 copy() [2/2]

```
Fl_Image * Fl_Image::copy (
    int W,
    int H ) [virtual]
```

The `copy()` method creates a copy of the specified image.

If the width and height are provided, the image is resized to the specified size. The image should be deleted (or in the case of [Fl_Shared_Image](#), released) when you are done with it.

Reimplemented in [Fl_Tiled_Image](#), [Fl_Shared_Image](#), [Fl_Pixmap](#), [Fl_RGB_Image](#), and [Fl_Bitmap](#).

31.68.3.4 count()

```
int Fl_Image::count ( ) const [inline]
```

The `count()` method returns the number of data values associated with the image.

The value will be 0 for images with no associated data, 1 for bitmap and color images, and greater than 2 for pixmap images.

31.68.3.5 d()

```
int Fl_Image::d ( ) const [inline]
```

Returns the current image depth.

The return value will be 0 for bitmaps, 1 for pixmaps, and 1 to 4 for color images.

31.68.3.6 data()

```
const char* const* Fl_Image::data ( ) const [inline]
```

Returns a pointer to the current image data array.

Use the `count()` method to find the size of the data array.

31.68.3.7 desaturate()

```
void Fl_Image::desaturate ( ) [virtual]
```

The `desaturate()` method converts an image to grayscale.

If the image contains an alpha channel (depth = 4), the alpha channel is preserved.

An internal copy is made of the original image before changes are applied, to avoid modifying the original image.

Reimplemented in [Fl_Tiled_Image](#), [Fl_Shared_Image](#), [Fl_Pixmap](#), and [Fl_RGB_Image](#).

31.68.3.8 draw() [1/2]

```
void Fl_Image::draw (
    int X,
    int Y ) [inline]
```

Draws the image.

This form specifies the upper-lefthand corner of the image.

31.68.3.9 draw() [2/2]

```
void Fl_Image::draw (
    int X,
    int Y,
    int W,
    int H,
    int cx = 0,
    int cy = 0 ) [virtual]
```

Draws the image with a bounding box.

Arguments X, Y, W, H specify a bounding box for the image, with the origin (upper-left corner) of the image offset by the cx and cy arguments.

In other words: `fl_push_clip(X, Y, W, H)` is applied, the image is drawn with its upper-left corner at X-cx, Y-cy and its own width and height, `fl_pop_clip()` is applied.

Reimplemented in [Fl_Pixmap](#), [Fl_RGB_Image](#), [Fl_Bitmap](#), [Fl_Tiled_Image](#), and [Fl_Shared_Image](#).

31.68.3.10 draw_empty()

```
void Fl_Image::draw_empty (
    int X,
    int Y ) [protected]
```

The protected method [draw_empty\(\)](#) draws a box with an X in it.

It can be used to draw any image that lacks image data.

31.68.3.11 fail()

```
int Fl_Image::fail ( )
```

Returns a value that is not 0 if there is currently no image available.

Example use:

```
[..]
Fl_Box box(X, Y, W, H);
Fl_JPEG_Image jpg("/tmp/foo.jpg");
switch ( jpg.fail() ) {
    case Fl_Image::ERR_NO_IMAGE:
    case Fl_Image::ERR_FILE_ACCESS:
        fl_alert("/tmp/foo.jpg: %s", strerror(errno)); // shows actual os error to user
        exit(1);
    case Fl_Image::ERR_FORMAT:
        fl_alert("/tmp/foo.jpg: couldn't decode image");
        exit(1);
}
box.image(jpg);
[..]
```

Returns

ERR_NO_IMAGE if no image was found

ERR_FILE_ACCESS if there was a file access related error (errno should be set)

ERR_FORMAT if image decoding failed.

31.68.3.12 inactive()

```
void Fl_Image::inactive ( ) [inline]
```

The [inactive\(\)](#) method calls `color_average(FL_BACKGROUND_COLOR, 0.33f)` to produce an image that appears grayed out.

An internal copy is made of the original image before changes are applied, to avoid modifying the original image.

31.68.3.13 label() [1/2]

```
void Fl_Image::label (
    Fl_Menu_Item * m ) [virtual]
```

The [label\(\)](#) methods are an obsolete way to set the image attribute of a widget or menu item.

Use the [image\(\)](#) or [deimage\(\)](#) methods of the [Fl_Widget](#) and [Fl_Menu_Item](#) classes instead.

Reimplemented in [Fl_Pixmap](#), [Fl_RGB_Image](#), and [Fl_Bitmap](#).

31.68.3.14 label() [2/2]

```
void Fl_Image::label (
    Fl_Widget * widget ) [virtual]
```

The [label\(\)](#) methods are an obsolete way to set the image attribute of a widget or menu item.

Use the [image\(\)](#) or [deimage\(\)](#) methods of the [Fl_Widget](#) and [Fl_Menu_Item](#) classes instead.

Reimplemented in [Fl_Pixmap](#), [Fl_RGB_Image](#), and [Fl_Bitmap](#).

31.68.3.15 ld() [1/2]

```
int Fl_Image::ld ( ) const [inline]
```

Returns the current line data size in bytes.

See also

[ld\(int\)](#)

31.68.3.16 ld() [2/2]

```
void Fl_Image::ld (
    int LD ) [inline], [protected]
```

Sets the current line data size in bytes.

Color images may contain extra data that is included after every line of color image data and is normally not present.

If `LD` is zero, then line data size is assumed to be `w() * d()` bytes.

If `LD` is non-zero, then it must be positive and larger than `w() * d()` to account for the extra data per line.

31.68.3.17 RGB_scaling()

```
void Fl_Image::RGB_scaling (
    Fl_RGB_Scaling method ) [static]
```

Sets the RGB image scaling method used for [copy\(int, int\)](#).

Applies to all RGB images, defaults to `FL_RGB_SCALING_NEAREST`.

31.68.3.18 uncache()

```
void Fl_Image::uncache ( ) [virtual]
```

If the image has been cached for display, delete the cache data.

This allows you to change the data used for the image and then redraw it without recreating an image object.

Reimplemented in [Fl_Shared_Image](#), [Fl_Pixmap](#), [Fl_RGB_Image](#), and [Fl_Bitmap](#).

The documentation for this class was generated from the following files:

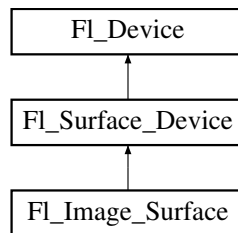
- [Fl_Image.H](#)
- [Fl_Image.cxx](#)

31.69 FI_Image_Surface Class Reference

Directs all graphics requests to an [FI_Image](#).

```
#include <Fl_Image_Surface.H>
```

Inheritance diagram for `FI_Image_Surface`:



Public Member Functions

- `const char * class_name ()`
Returns the name of the class of this object.
- `void draw (FI_Widget *, int delta_x=0, int delta_y=0)`
Draws a widget in the image surface.
- `void draw_decorated_window (FI_Window *win, int delta_x=0, int delta_y=0)`
Draws a window and its borders and title bar to the image drawing surface.
- `FI_Image_Surface (int w, int h, int highres=0)`
Constructor with optional high resolution.
- `FI_Shared_Image * highres_image ()`
Returns a possibly high resolution image made of all drawings sent to the [FI_Image_Surface](#) object.
- `FI_RGB_Image * image ()`
Returns an image made of all drawings sent to the [FI_Image_Surface](#) object.
- `void set_current ()`
Make this surface the current drawing surface.
- `~FI_Image_Surface ()`
The destructor.

Static Public Attributes

- `static const char * class_id = "FI_Image_Surface"`

Additional Inherited Members

31.69.1 Detailed Description

Directs all graphics requests to an [FI_Image](#).

After creation of an [FI_Image_Surface](#) object, call `set_current()` on it, and all subsequent graphics requests will be recorded in the image. It's possible to draw widgets (using [FI_Image_Surface::draw\(\)](#)) or to use any of the [Drawing functions](#) or the [Color & Font functions](#). Finally, call `image()` on the object to obtain a newly allocated [FI_RGB_Image](#) object.

`FI_GL_Window` objects can be drawn in the image as well.

Usage example:

```

Fl_Widget *g = ...; // a widget you want to draw in an image
FI_Image_Surface *img_surf = new FI_Image_Surface(g->w(), g->h()); // create an FI_Image_Surface object
img_surf->set_current(); // direct graphics requests to the image
fl_color(FL_WHITE); fl_rectf(0, 0, g->w(), g->h()); // draw a white background
img_surf->draw(g); // draw the g widget in the image
FI_RGB_Image* image = img_surf->image(); // get the resulting image
delete img_surf; // delete the img_surf object
Fl_Display_Device::display_device()->set_current(); // direct graphics requests back to the display
  
```


31.69.2 Constructor & Destructor Documentation

31.69.2.1 Fl_Image_Surface()

```
Fl_Image_Surface::Fl_Image_Surface (
    int w,
    int h,
    int highres = 0 )
```

Constructor with optional high resolution.

Parameters

<i>w</i>	and
<i>h</i>	give the size in pixels of the resulting image.
<i>highres</i>	if non-zero, the surface pixel size is twice as high and wide as <i>w</i> and <i>h</i> , which is useful to draw it later on a high resolution display (e.g., retina display). This is implemented for the Mac OS platform only. If <i>highres</i> is non-zero, use Fl_Image_Surface::highres_image() to get the image data.

Version

1.3.4 and requires compilation with `-DFL_ABI_VERSION=10304` (1.3.3 without the `highres` parameter)

31.69.3 Member Function Documentation

31.69.3.1 class_name()

```
const char* Fl_Image_Surface::class_name ( ) [inline], [virtual]
```

Returns the name of the class of this object.

Use of the [class_name\(\)](#) function is discouraged because it will be removed from future FLTK versions.

The class of an instance of an [Fl_Device](#) subclass can be checked with code such as:

```
if ( instance->class_name() == Fl_Printer::class_id ) { ... }
```

Reimplemented from [Fl_Surface_Device](#).

31.69.3.2 draw()

```
void Fl_Image_Surface::draw (
    Fl_Widget * widget,
    int delta_x = 0,
    int delta_y = 0 )
```

Draws a widget in the image surface.

Parameters

<i>widget</i>	any FLTK widget (e.g., standard, custom, window, GL view) to draw in the image
<i>delta</i> _↔ <i>_x</i>	and
<i>delta</i> _↔ <i>_y</i>	give the position in the image of the top-left corner of the widget

31.69.3.3 draw_decorated_window()

```
void Fl_Image_Surface::draw_decorated_window (
    Fl_Window * win,
    int delta_x = 0,
    int delta_y = 0 )
```

Draws a window and its borders and title bar to the image drawing surface.

Parameters

<i>win</i>	an FLTK window to draw in the image
<i>delta_x</i>	and
<i>delta_y</i>	give the position in the image of the top-left corner of the window's title bar

31.69.3.4 highres_image()

```
Fl_Shared_Image * Fl_Image_Surface::highres_image ( )
```

Returns a possibly high resolution image made of all drawings sent to the [Fl_Image_Surface](#) object.

The [Fl_Image_Surface](#) object should have been constructed with [Fl_Image_Surface\(W, H, 1\)](#). The returned image is scaled to a size of WxH drawing units and may have a pixel size twice as wide and high. The returned object should be deallocated with [Fl_Shared_Image::release\(\)](#) after use.

Version

1.3.4 and requires compilation with `-DFL_ABI_VERSION=10304`

31.69.3.5 image()

```
Fl_RGB_Image * Fl_Image_Surface::image ( )
```

Returns an image made of all drawings sent to the [Fl_Image_Surface](#) object.

The returned object contains its own copy of the RGB data. Prefer [Fl_Image_Surface::highres_image\(\)](#) if the surface was constructed with the highres option on.

31.69.3.6 set_current()

```
void Fl_Image_Surface::set_current (
    void ) [virtual]
```

Make this surface the current drawing surface.

This surface will receive all future graphics requests.

Reimplemented from [Fl_Surface_Device](#).

The documentation for this class was generated from the following files:

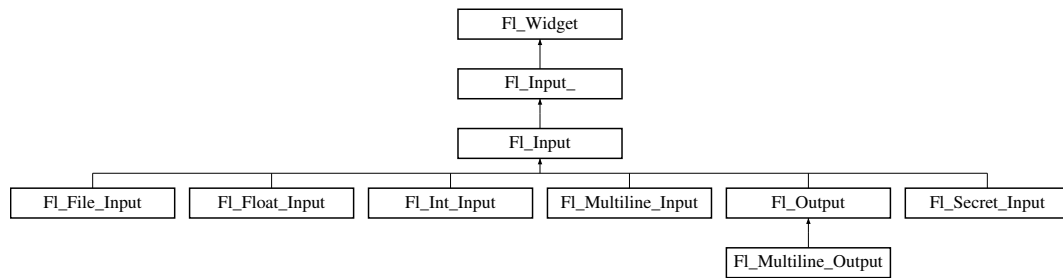
- [Fl_Image_Surface.H](#)
- [Fl_Image_Surface.cxx](#)

31.70 FI_Input Class Reference

This is the FLTK text input widget.

```
#include <Fl_Input.H>
```

Inheritance diagram for [Fl_Input](#):



Public Member Functions

- [Fl_Input](#) (int, int, int, int, const char *=0)
Creates a new *Fl_Input* widget using the given position, size, and label string.
- int [handle](#) (int)
Handles the specified event.

Protected Member Functions

- void [draw](#) ()
Draws the widget.

Additional Inherited Members

31.70.1 Detailed Description

This is the FLTK text input widget.

It displays a single line of text and lets the user edit it. Normally it is drawn with an inset box and a white background. The text may contain any characters, and will correctly display any UTF text, using $\wedge X$ notation for unprintable control characters. It assumes the font can draw any characters of the used scripts, which is true for standard fonts under MSWindows and Mac OS X. Characters can be input using the keyboard or the character palette/map. Character composition is done using dead keys and/or a compose key as defined by the operating system.

Table 31.190 Keyboard and mouse bindings.

Mouse button 1	Moves the cursor to this point. Drag selects characters. Double click selects words. Triple click selects all line. Shift+click extends the selection. When you select text it is automatically copied to the selection buffer.
Mouse button 2	Insert the selection buffer at the point clicked. You can also select a region and replace it with the selection buffer by selecting the region with mouse button 2.
Mouse button 3	Currently acts like button 1.
Backspace	Deletes one character to the left, or deletes the selected region.
Delete	Deletes one character to the right, or deletes the selected region. Combine with Shift for equivalent of $\wedge X$ (copy+cut).
Enter	May cause the callback, see when() .

Table 31.191 Platform specific keyboard bindings.

Windows/Linux	Mac	Function
$\wedge A$	Command-A	Selects all text in the widget.
$\wedge C$	Command-C	Copy the current selection to the clipboard.
$\wedge I$	$\wedge I$	Insert a tab.

^J	^J	Insert a Line Feed. (Similar to literal 'Enter' character)
^L	^L	Insert a Form Feed.
^M	^M	Insert a Carriage Return.
^V, Shift-Insert	Command-V	Paste the clipboard. (Macs keyboards don't have "Insert" keys, but if they did, Shift-Insert would work)
^X, Shift-Delete	Command-X, Shift-Delete	Cut. Copy the selection to the clipboard and delete it. (If there's no selection, Shift-Delete acts like Delete)
^Z	Command-Z	Undo. This is a single-level undo mechanism, but all adjacent deletions and insertions are concatenated into a single "undo". Often this will undo a lot more than you expected.
Shift-^Z	Shift-Command-Z	Redo. Currently same behavior as ^Z. Reserved for future multilevel undo/redo.
Arrow Keys	Arrow Keys	Standard cursor movement. Can be combined with Shift to extend selection.
Home	Command-Up, Command-Left	Move to start of line. Can be combined with Shift to extend selection.
End	Command-Down, Command-Right	Move to end of line. Can be combined with Shift to extend selection.
Ctrl-Home	Command-Up, Command-PgUp, Ctrl-Left	Move to top of document/field. In single line input, moves to start of line. In multiline input, moves to start of top line. Can be combined with Shift to extend selection.
Ctrl-End	Command-End, Command-PgDn, Ctrl-Right	Move to bottom of document/field. In single line input, moves to end of line. In multiline input, moves to end of last line. Can be combined with Shift to extend selection.
Ctrl-Left	Alt-Left	Word left. Can be combined with Shift to extend selection.
Ctrl-Right	Alt-Right	Word right. Can be combined with Shift to extend selection.
Ctrl-Backspace	Alt-Backspace	Delete word left.
Ctrl-Delete	Alt-Delete	Delete word right.

31.70.2 Constructor & Destructor Documentation

31.70.2.1 Fl_Input()

```
Fl_Input::Fl_Input (
    int X,
    int Y,
```

```

    int W,
    int H,
    const char * l = 0 )

```

Creates a new [Fl_Input](#) widget using the given position, size, and label string. The default boxtype is `FL_DOWN_BOX`.

31.70.3 Member Function Documentation

31.70.3.1 draw()

```
void Fl_Input::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scroll;           // scroll is an embedded Fl_Scrollbar
s->draw();                         // calls Fl_Scrollbar::draw()
```

Implements [Fl_Widget](#).

31.70.3.2 handle()

```
int Fl_Input::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Widget](#).

Reimplemented in [Fl_Secret_Input](#).

The documentation for this class was generated from the following files:

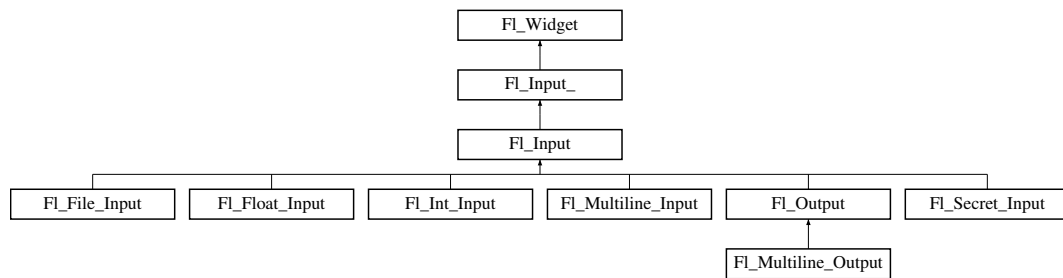
- [Fl_Input.H](#)
- [Fl_Input.cxx](#)

31.71 Fl_Input_ Class Reference

This class provides a low-overhead text input field.

```
#include <Fl_Input_.H>
```

Inheritance diagram for `Fl_Input_`:



Public Member Functions

- `int copy` (int clipboard)
Put the current selection into the clipboard.
- `int copy_cuts` ()
Copies the yank buffer to the clipboard.
- `Fl_Color cursor_color` () const
Gets the color of the cursor.
- `void cursor_color` (Fl_Color n)
Sets the color of the cursor.
- `int cut` ()
Deletes the current selection.
- `int cut` (int a, int b)
Deletes all characters between index a and b.
- `int cut` (int n)
Deletes the next n bytes rounded to characters before or after the cursor.
- `Fl_Input_` (int, int, int, int, const char *=0)
Creates a new Fl_Input_ widget.
- `Fl_Char index` (int i) const
Returns the character at index i.
- `int input_type` () const
Gets the input field type.
- `void input_type` (int t)
Sets the input field type.
- `int insert` (const char *t, int l=0)
Inserts text at the cursor position.
- `int mark` () const
Gets the current selection mark.
- `int mark` (int m)
Sets the current selection mark.
- `int maximum_size` () const
Gets the maximum length of the input field in characters.
- `void maximum_size` (int m)
Sets the maximum length of the input field in characters.
- `int position` () const
Gets the position of the text cursor.
- `int position` (int p)
Sets the cursor position and mark.
- `int position` (int p, int m)
Sets the index for the cursor and mark.

- int `readonly` () const
Gets the read-only state of the input field.
- void `readonly` (int b)
Sets the read-only state of the input field.
- int `replace` (int b, int e, const char *text, int ilen=0)
Deletes text from b to e and inserts the new string text.
- void `resize` (int, int, int, int)
Changes the size of the widget.
- int `shortcut` () const
Return the shortcut key associated with this widget.
- void `shortcut` (int s)
Sets the shortcut key associated with this widget.
- int `size` () const
Returns the number of bytes in value().
- void `size` (int W, int H)
Sets the width and height of this widget.
- int `static_value` (const char *)
Changes the widget text.
- int `static_value` (const char *, int)
Changes the widget text.
- int `tab_nav` () const
Gets whether the Tab key causes focus navigation in multiline input fields or not.
- void `tab_nav` (int val)
Sets whether the Tab key does focus navigation, or inserts tab characters into FI_Multiline_Input.
- `FI_Color` `textcolor` () const
Gets the color of the text in the input field.
- void `textcolor` (`FI_Color` n)
Sets the color of the text in the input field.
- `FI_Font` `textfont` () const
Gets the font of the text in the input field.
- void `textfont` (`FI_Font` s)
Sets the font of the text in the input field.
- `FI_Fontsize` `textsize` () const
Gets the size of the text in the input field.
- void `textsize` (`FI_Fontsize` s)
Sets the size of the text in the input field.
- int `undo` ()
Undoes previous changes to the text buffer.
- const char * `value` () const
Returns the text displayed in the widget.
- int `value` (const char *)
Changes the widget text.
- int `value` (const char *, int)
Changes the widget text.
- int `wrap` () const
Gets the word wrapping state of the input field.
- void `wrap` (int b)
Sets the word wrapping state of the input field.
- `~FI_Input_` ()
Destroys the widget.

Protected Member Functions

- void [drawtext](#) (int, int, int, int)
 - Draws the text in the passed bounding box.*
- void [handle_mouse](#) (int, int, int, int, int keepmark=0)
 - Handles mouse clicks and mouse moves.*
- int [handletext](#) (int e, int, int, int, int)
 - Handles all kinds of text field related events.*
- int [line_end](#) (int i) const
 - Finds the end of a line.*
- int [line_start](#) (int i) const
 - Finds the start of a line.*
- int [linesPerPage](#) ()
- void [maybe_do_callback](#) ()
- int [up_down_position](#) (int, int keepmark=0)
 - Moves the cursor to the column given by `up_down_pos`.*
- int [word_end](#) (int i) const
 - Finds the end of a word.*
- int [word_start](#) (int i) const
 - Finds the start of a word.*
- int [xscroll](#) () const
- int [yscroll](#) () const
- void [yscroll](#) (int yOffset)

Additional Inherited Members

31.71.1 Detailed Description

This class provides a low-overhead text input field.

This is a virtual base class below [FL_Input](#). It has all the same interfaces, but lacks the [handle\(\)](#) and [draw\(\)](#) method. You may want to subclass it if you are one of those people who likes to change how the editing keys work. It may also be useful for adding scrollbars to the input field.

This can act like any of the subclasses of [FL_Input](#), by setting [type\(\)](#) to one of the following values:

```
#define FL_NORMAL_INPUT      0
#define FL_FLOAT_INPUT      1
#define FL_INT_INPUT        2
#define FL_MULTILINE_INPUT  4
#define FL_SECRET_INPUT     5
#define FL_INPUT_TYPE       7
#define FL_INPUT_READONLY   8
#define FL_NORMAL_OUTPUT    (FL_NORMAL_INPUT | FL_INPUT_READONLY)
#define FL_MULTILINE_OUTPUT (FL_MULTILINE_INPUT | FL_INPUT_READONLY)
#define FL_INPUT_WRAP       16
#define FL_MULTILINE_INPUT_WRAP (FL_MULTILINE_INPUT | FL_INPUT_WRAP)
#define FL_MULTILINE_OUTPUT_WRAP (FL_MULTILINE_INPUT | FL_INPUT_READONLY | FL_INPUT_WRAP)
```

All variables that represent an index into a text buffer are byte-oriented, not character oriented, counting from 0 (at or before the first character) to [size\(\)](#) (at the end of the buffer, after the last byte). Since UTF-8 characters can be up to six bytes long, simply incrementing such an index will not reliably advance to the next character in the text buffer. Indices and pointers into the text buffer should always point at a 7 bit ASCII character or the beginning of a UTF-8 character sequence. Behavior for false UTF-8 sequences and pointers into the middle of a sequence are undefined.

See also

[FL_Text_Display](#), [FL_Text_Editor](#) for more powerful text handling widgets

31.71.2 Constructor & Destructor Documentation

31.71.2.1 Fl_Input_()

```
Fl_Input_::Fl_Input_ (
    int X,
    int Y,
    int W,
    int H,
    const char * I = 0 )
```

Creates a new [Fl_Input_](#) widget.

This function creates a new [Fl_Input_](#) widget and adds it to the current [Fl_Group](#). The [value\(\)](#) is set to NULL. The default boxtype is `FL_DOWN_BOX`.

Parameters

<i>X,Y,W,H</i>	the dimensions of the new widget
<i>I</i>	an optional label text

31.71.2.2 ~Fl_Input_()

```
Fl_Input_::~~Fl_Input_ ( )
```

Destroys the widget.

The destructor clears all allocated buffers and removes the widget from the parent [Fl_Group](#).

31.71.3 Member Function Documentation

31.71.3.1 copy()

```
int Fl_Input_::copy (
    int clipboard )
```

Put the current selection into the clipboard.

This function copies the current selection between [mark\(\)](#) and [position\(\)](#) into the specified `clipboard`. This does not replace the old clipboard contents if [position\(\)](#) and [mark\(\)](#) are equal. Clipboard 0 maps to the current text selection and clipboard 1 maps to the cut/paste clipboard.

Parameters

<i>clipboard</i>	the clipboard destination 0 or 1
------------------	----------------------------------

Returns

0 if no text is selected, 1 if the selection was copied

See also

`Fl::copy(const char *, int, int)`

31.71.3.2 copy_cuts()

```
int Fl_Input_::copy_cuts ( )
```

Copies the *yank* buffer to the clipboard.

This method copies all the previous contiguous cuts from the undo information to the clipboard. This function implements the `^K` shortcut key.

Returns

0 if the operation did not change the clipboard

See also

[copy\(int\)](#), [cut\(\)](#)

31.71.3.3 cursor_color() [1/2]

```
Fl_Color Fl_Input_::cursor_color ( ) const [inline]
```

Gets the color of the cursor.

Returns

the current cursor color

31.71.3.4 cursor_color() [2/2]

```
void Fl_Input_::cursor_color (
    Fl_Color n ) [inline]
```

Sets the color of the cursor.

The default color for the cursor is FL_BLACK.

Parameters

in	<i>n</i>	the new cursor color
----	----------	----------------------

31.71.3.5 cut() [1/3]

```
int Fl_Input_::cut ( ) [inline]
```

Deletes the current selection.

This function deletes the currently selected text *without* storing it in the clipboard. To use the clipboard, you may call [copy\(\)](#) first or [copy_cuts\(\)](#) after this call.

Returns

0 if no data was copied

31.71.3.6 cut() [2/3]

```
int Fl_Input_::cut (
    int a,
    int b ) [inline]
```

Deletes all characters between index *a* and *b*.

This function deletes the currently selected text *without* storing it in the clipboard. To use the clipboard, you may call [copy\(\)](#) first or [copy_cuts\(\)](#) after this call.

Parameters

<i>a,b</i>	range of bytes rounded to full characters and clamped to the buffer
------------	---

Returns

0 if no data was copied

31.71.3.7 cut() [3/3]

```
int Fl_Input_::cut (
    int n ) [inline]
```

Deletes the next *n* bytes rounded to characters before or after the cursor.

This function deletes the currently selected text *without* storing it in the clipboard. To use the clipboard, you may call [copy\(\)](#) first or [copy_cuts\(\)](#) after this call.

Parameters

<i>n</i>	number of bytes rounded to full characters and clamped to the buffer. A negative number will cut characters to the left of the cursor.
----------	--

Returns

0 if no data was copied

31.71.3.8 drawtext()

```
void Fl_Input_::drawtext (
    int X,
    int Y,
    int W,
    int H ) [protected]
```

Draws the text in the passed bounding box.

If [damage\(\)](#) & FL_DAMAGE_ALL is true, this assumes the area has already been erased to [color\(\)](#). Otherwise it does minimal update and erases the area itself.

Parameters

<i>X,Y,W,H</i>	area that must be redrawn
----------------	---------------------------

31.71.3.9 handle_mouse()

```
void Fl_Input_::handle_mouse (
    int X,
    int Y,
    int ,
    int ,
    int drag = 0 ) [protected]
```

Handles mouse clicks and mouse moves.

Todo Add comment and parameters

31.71.3.10 handletext()

```
int Fl_Input_::handletext (
```

```

    int event,
    int X,
    int Y,
    int W,
    int H ) [protected]

```

Handles all kinds of text field related events.
This is called by derived classes.

Todo Add comment and parameters

31.71.3.11 index()

```

unsigned int Fl_Input_::index (
    int i ) const

```

Returns the character at index *i*.
This function returns the UTF-8 character at *i* as a ucs4 character code.

Parameters

in	<i>i</i>	index into the value field
----	----------	----------------------------

Returns

the character at index *i*

31.71.3.12 input_type() [1/2]

```

int Fl_Input_::input_type ( ) const [inline]

```

Gets the input field type.

Returns

the current input type

31.71.3.13 input_type() [2/2]

```

void Fl_Input_::input_type (
    int t ) [inline]

```

Sets the input field type.

A [redraw\(\)](#) is required to reformat the input field.

Parameters

in	<i>t</i>	new input type
----	----------	----------------

31.71.3.14 insert()

```

int Fl_Input_::insert (
    const char * t,
    int l = 0 ) [inline]

```

Inserts text at the cursor position.

This function inserts the string in *t* at the cursor [position\(\)](#) and moves the new position and mark to the end of the inserted text.

Parameters

in	<i>t</i>	text that will be inserted
in	<i>l</i>	length of text, or 0 if the string is terminated by nul.

Returns

0 if no text was inserted

31.71.3.15 line_end()

```
int Fl_Input_::line_end (
    int i ) const [protected]
```

Finds the end of a line.

This call calculates the end of a line based on the given index *i*.

Parameters

in	<i>i</i>	starting index for the search
----	----------	-------------------------------

Returns

end of the line

31.71.3.16 line_start()

```
int Fl_Input_::line_start (
    int i ) const [protected]
```

Finds the start of a line.

This call calculates the start of a line based on the given index *i*.

Parameters

in	<i>i</i>	starting index for the search
----	----------	-------------------------------

Returns

start of the line

31.71.3.17 mark() [1/2]

```
int Fl_Input_::mark ( ) const [inline]
```

Gets the current selection mark.

Returns

index into the text

31.71.3.18 mark() [2/2]

```
int Fl_Input_::mark (
    int m ) [inline]
```

Sets the current selection mark.

`mark(n)` is the same as `position(position(), n)`.

Parameters

<i>m</i>	new index of the mark
----------	-----------------------

Returns

0 if the mark did not change

See also

[position\(\)](#), [position\(int, int\)](#)

31.71.3.19 `maximum_size()` [1/2]

```
int Fl_Input_::maximum_size ( ) const [inline]
```

Gets the maximum length of the input field in characters.

See also

[maximum_size\(int\)](#).

31.71.3.20 `maximum_size()` [2/2]

```
void Fl_Input_::maximum_size (
    int m ) [inline]
```

Sets the maximum length of the input field in characters.

This limits the number of **characters** that can be inserted in the widget.

Since FLTK 1.3 this is different than the buffer size, since one character can be more than one byte in UTF-8 encoding. In FLTK 1.1 this was the same (one byte = one character).

31.71.3.21 `position()` [1/3]

```
int Fl_Input_::position ( ) const [inline]
```

Gets the position of the text cursor.

Returns

the cursor position as an index in the range 0..[size\(\)](#)

See also

[position\(int, int\)](#)

31.71.3.22 `position()` [2/3]

```
int Fl_Input_::position (
    int p ) [inline]
```

Sets the cursor position and mark.

`position(n)` is the same as `position(n, n)`.

Parameters

<i>p</i>	new index for cursor and mark
----------	-------------------------------

Returns

0 if no positions changed

See also

[position\(int, int\)](#), [position\(\)](#), [mark\(int\)](#)

31.71.3.23 position() [3/3]

```
int Fl_Input_::position (
    int p,
    int m )
```

Sets the index for the cursor and mark.

The input widget maintains two pointers into the string. The *position* (*p*) is where the cursor is. The *mark* (*m*) is the other end of the selected text. If they are equal then there is no selection. Changing this does not affect the clipboard (use [copy\(\)](#) to do that).

Changing these values causes a [redraw\(\)](#). The new values are bounds checked.

Parameters

<i>p</i>	index for the cursor position
<i>m</i>	index for the mark

Returns

0 if no positions changed

See also

[position\(int\)](#), [position\(\)](#), [mark\(int\)](#)

31.71.3.24 readonly() [1/2]

```
int Fl_Input_::readonly ( ) const [inline]
```

Gets the read-only state of the input field.

Returns

non-zero if this widget is read-only

31.71.3.25 readonly() [2/2]

```
void Fl_Input_::readonly (
    int b ) [inline]
```

Sets the read-only state of the input field.

Parameters

in	<i>b</i>	if <i>b</i> is 0, the text in this widget can be edited by the user
----	----------	---

31.71.3.26 replace()

```
int Fl_Input_::replace (
    int b,
    int e,
    const char * text,
    int ilen = 0 )
```

Deletes text from `b` to `e` and inserts the new string `text`.

All changes to the text buffer go through this function. It deletes the region between `b` and `e` (either one may be less or equal to the other), and then inserts the string `text` at that point and moves the [mark\(\)](#) and [position\(\)](#) to the end of the insertion. Does the callback if [when\(\)](#) & `FL_WHEN_CHANGED` and there is a change.

Set `b` and `e` equal to not delete anything. Set `text` to `NULL` to not insert anything.

`ilen` can be zero or `strlen(text)`, which saves a tiny bit of time if you happen to already know the length of the insertion, or can be used to insert a portion of a string. If `ilen` is zero, `strlen(text)` is used instead.

`b` and `e` are clamped to the `0..size()` range, so it is safe to pass any values. `b`, `e`, and `ilen` are used as numbers of bytes (not characters), where `b` and `e` count from 0 to [size\(\)](#) (end of buffer).

If `b` and/or `e` don't point to a valid UTF-8 character boundary, they are adjusted to the previous (`b`) or the next (`e`) valid UTF-8 character boundary, resp..

If the current number of characters in the buffer minus deleted characters plus inserted characters in `text` would overflow the number of allowed characters ([maximum_size\(\)](#)), then only the first characters of the string are inserted, so that [maximum_size\(\)](#) is not exceeded.

[cut\(\)](#) and [insert\(\)](#) are just inline functions that call [replace\(\)](#).

Parameters

in	<i>b</i>	beginning index of text to be deleted
in	<i>e</i>	ending index of text to be deleted and insertion position
in	<i>text</i>	string that will be inserted
in	<i>ilen</i>	length of <code>text</code> or 0 for nul terminated strings

Returns

0 if nothing changed

Note

If `text` does not point to a valid UTF-8 character or includes invalid UTF-8 sequences, the text is inserted nevertheless (counting invalid UTF-8 bytes as one character each).

31.71.3.27 resize()

```
void Fl_Input_::resize (
    int X,
    int Y,
    int W,
    int H ) [virtual]
```

Changes the size of the widget.

This call updates the text layout so that the cursor is visible.

Parameters

in	<i>X,Y,W,H</i>	new size of the widget
----	----------------	------------------------

See also

[Fl_Widget::resize\(int, int, int, int\)](#)

Reimplemented from [Fl_Widget](#).

31.71.3.28 shortcut() [1/2]

```
int Fl_Input_::shortcut ( ) const [inline]
```

Return the shortcut key associated with this widget.

Returns

shortcut keystroke

See also

[Fl_Button::shortcut\(\)](#)

31.71.3.29 shortcut() [2/2]

```
void Fl_Input_::shortcut (
    int s ) [inline]
```

Sets the shortcut key associated with this widget.

Pressing the shortcut key gives text editing focus to this widget.

Parameters

in	s	new shortcut keystroke
----	---	------------------------

See also

[Fl_Button::shortcut\(\)](#)

31.71.3.30 size() [1/2]

```
int Fl_Input_::size ( ) const [inline]
```

Returns the number of bytes in [value\(\)](#).

This may be greater than `strlen(value())` if there are nul characters in the text.

Returns

number of bytes in the text

31.71.3.31 size() [2/2]

```
void Fl_Input_::size (
    int W,
    int H ) [inline]
```

Sets the width and height of this widget.

Parameters

in	W,H	new width and height
----	-----	----------------------

See also

[Fl_Widget::size\(int, int\)](#)

31.71.3.32 static_value() [1/2]

```
int Fl_Input_::static_value (
    const char * str )
```

Changes the widget text.

This function changes the text and sets the mark and the point to the end of it. The string is *not* copied. If the user edits the string it is copied to the internal buffer then. This can save a great deal of time and memory if your program is rapidly changing the values of text fields, but this will only work if the passed string remains unchanged until either the [Fl_Input](#) is destroyed or [value\(\)](#) is called again.

Parameters

in	<i>str</i>	the new text
----	------------	--------------

Returns

non-zero if the new value is different than the current one

31.71.3.33 static_value() [2/2]

```
int Fl_Input_::static_value (
    const char * str,
    int len )
```

Changes the widget text.

This function changes the text and sets the mark and the point to the end of it. The string is *not* copied. If the user edits the string it is copied to the internal buffer then. This can save a great deal of time and memory if your program is rapidly changing the values of text fields, but this will only work if the passed string remains unchanged until either the [Fl_Input](#) is destroyed or [value\(\)](#) is called again.

You can use the `len` parameter to directly set the length if you know it already or want to put `nul` characters in the text.

Parameters

in	<i>str</i>	the new text
in	<i>len</i>	the length of the new text

Returns

non-zero if the new value is different than the current one

31.71.3.34 tab_nav() [1/2]

```
int Fl_Input_::tab_nav ( ) const [inline]
```

Gets whether the Tab key causes focus navigation in multiline input fields or not.

If enabled (default), hitting Tab causes focus navigation to the next widget.

If disabled, hitting Tab inserts a tab character into the text field.

Returns

1 if Tab advances focus (default), 0 if Tab inserts tab characters.

See also

[tab_nav\(int\), Fl::OPTION_ARROW_FOCUS.](#)

31.71.3.35 tab_nav() [2/2]

```
void Fl_Input_::tab_nav (
    int val ) [inline]
```

Sets whether the Tab key does focus navigation, or inserts tab characters into [Fl_Multiline_Input](#).

By default this flag is enabled to provide the 'normal' behavior most users expect; Tab navigates focus to the next widget. To inserting an actual Tab character, users can use Ctrl-I or copy/paste.

Disabling this flag gives the old FLTK behavior where Tab inserts a tab character into the text field, in which case only the mouse can be used to navigate to the next field.

History: This flag was provided for backwards support of FLTK's old 1.1.x behavior where Tab inserts a tab character instead of navigating focus to the next widget. This behavior was unique to [Fl_Multiline_Input](#). With the advent of [Fl_Text_Editor](#), this old behavior has been deprecated.

Parameters

in	val	If val is 1, Tab advances focus (default). If val is 0, Tab inserts a tab character (old FLTK behavior).
----	-----	---

See also

[tab_nav\(\)](#), [Fl::OPTION_ARROW_FOCUS](#).

31.71.3.36 textcolor() [1/2]

```
Fl_Color Fl_Input_::textcolor ( ) const [inline]
```

Gets the color of the text in the input field.

Returns

the text color

See also

[textcolor\(Fl_Color\)](#)

31.71.3.37 textcolor() [2/2]

```
void Fl_Input_::textcolor (
    Fl_Color n ) [inline]
```

Sets the color of the text in the input field.

The text color defaults to `FL_FOREGROUND_COLOR`.

Parameters

in	n	new text color
----	---	----------------

See also

[textcolor\(\)](#)

31.71.3.38 textfont() [1/2]

```
Fl_Font Fl_Input_::textfont ( ) const [inline]
```

Gets the font of the text in the input field.

Returns

the current Fl_Font index

31.71.3.39 textfont() [2/2]

```
void Fl_Input_::textfont (
    Fl_Font s ) [inline]
```

Sets the font of the text in the input field.

The text font defaults to FL_HELVETICA.

Parameters

in	s	the new text font
----	---	-------------------

31.71.3.40 textsize() [1/2]

```
Fl_Fontsize Fl_Input_::textsize ( ) const [inline]
```

Gets the size of the text in the input field.

Returns

the text height in pixels

31.71.3.41 textsize() [2/2]

```
void Fl_Input_::textsize (
    Fl_Fontsize s ) [inline]
```

Sets the size of the text in the input field.

The text height defaults to FL_NORMAL_SIZE.

Parameters

in	s	the new font height in pixel units
----	---	------------------------------------

31.71.3.42 undo()

```
int Fl_Input_::undo ( )
```

Undoes previous changes to the text buffer.

This call undoes a number of previous calls to [replace\(\)](#).

Returns

non-zero if any change was made.

31.71.3.43 up_down_position()

```
int Fl_Input_::up_down_position (
```

```
int i,
int keepmark = 0 ) [protected]
```

Moves the cursor to the column given by `up_down_pos`.

This function is helpful when implementing up and down cursor movement. It moves the cursor from the beginning of a line to the column indicated by the global variable `up_down_pos` in pixel units.

Parameters

in	<i>i</i>	index into the beginning of a line of text
in	<i>keepmark</i>	if set, move only the cursor, but not the mark

Returns

index to new cursor position

31.71.3.44 value() [1/3]

```
const char* Fl_Input_::value ( ) const [inline]
```

Returns the text displayed in the widget.

This function returns the current value, which is a pointer to the internal buffer and is valid only until the next event is handled.

Returns

pointer to an internal buffer - do not free() this

See also

[Fl_Input_::value\(const char*\)](#)

31.71.3.45 value() [2/3]

```
int Fl_Input_::value (
    const char * str )
```

Changes the widget text.

This function changes the text and sets the mark and the point to the end of it. The string is copied to the internal buffer. Passing NULL is the same as "".

Parameters

in	<i>str</i>	the new text
----	------------	--------------

Returns

non-zero if the new value is different than the current one

See also

[Fl_Input_::value\(const char* str, int len\)](#), [Fl_Input_::value\(\)](#)

31.71.3.46 value() [3/3]

```
int Fl_Input_::value (
    const char * str,
    int len )
```

Changes the widget text.

This function changes the text and sets the mark and the point to the end of it. The string is copied to the internal buffer. Passing `NULL` is the same as `""`.

You can use the `length` parameter to directly set the length if you know it already or want to put `nul` characters in the text.

Parameters

in	<i>str</i>	the new text
in	<i>len</i>	the length of the new text

Returns

non-zero if the new value is different than the current one

See also

[Fl_Input::value\(const char* str\)](#), [Fl_Input::value\(\)](#)

31.71.3.47 word_end()

```
int Fl_Input::word_end (
    int i ) const [protected]
```

Finds the end of a word.

Returns the index after the last byte of a word. If the index is already at the end of a word, it will find the end of the following word, so if you call it repeatedly you will move forwards to the end of the text.

Note that this is inconsistent with [line_end\(\)](#).

Parameters

in	<i>i</i>	starting index for the search
----	----------	-------------------------------

Returns

end of the word

31.71.3.48 word_start()

```
int Fl_Input::word_start (
    int i ) const [protected]
```

Finds the start of a word.

Returns the index of the first byte of a word. If the index is already at the beginning of a word, it will find the beginning of the previous word, so if you call it repeatedly you will move backwards to the beginning of the text.

Note that this is inconsistent with [line_start\(\)](#).

Parameters

in	<i>i</i>	starting index for the search
----	----------	-------------------------------

Returns

start of the word, or previous word

31.71.3.49 wrap() [1/2]

```
int Fl_Input_::wrap ( ) const [inline]
```

Gets the word wrapping state of the input field.

Word wrap is only functional with multi-line input fields.

31.71.3.50 wrap() [2/2]

```
void Fl_Input_::wrap (
    int b ) [inline]
```

Sets the word wrapping state of the input field.

Word wrap is only functional with multi-line input fields.

The documentation for this class was generated from the following files:

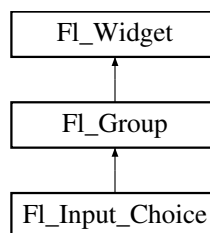
- Fl_Input_.H
- Fl_Input_.cxx

31.72 Fl_Input_Choice Class Reference

A combination of the input widget and a menu button.

```
#include <Fl_Input_Choice.H>
```

Inheritance diagram for Fl_Input_Choice:

**Public Member Functions**

- void **add** (const char *s)
Adds an item to the menu.
- int **changed** () const
*Returns the combined **changed()** state of the input and menu button widget.*
- void **clear** ()
Removes all items from the menu.
- void **clear_changed** ()
*Clears the **changed()** state of both input and menu button widgets.*
- **Fl_Boxtype** **down_box** () const
Gets the box type of the menu button.
- void **down_box** (**Fl_Boxtype** b)
Sets the box type of the menu button.
- **Fl_Input_Choice** (int X, int Y, int W, int H, const char *L=0)
*Creates a new **Fl_Input_Choice** widget using the given position, size, and label string.*
- **Fl_Input** * **input** ()
*Returns a pointer to the internal **Fl_Input** widget.*
- const **Fl_Menu_Item** * **menu** ()
*Gets the **Fl_Menu_Item** array used for the menu.*
- void **menu** (const **Fl_Menu_Item** *m)
*Sets the **Fl_Menu_Item** array used for the menu.*
- **Fl_Menu_Button** * **menubutton** ()

- Returns a pointer to the internal `FL_Menu_Button` widget.*
- void `resize` (int X, int Y, int W, int H)
 - Resizes the `FL_Group` widget and all of its children.*
- void `set_changed` ()
 - Sets the `changed()` state of both input and menu button widgets to the specified value.*
- `FL_Color` `textcolor` () const
 - Gets the `FL_Input` text field's text color.*
- void `textcolor` (`FL_Color` c)
 - Sets the `FL_Input` text field's text color to c.*
- `FL_Font` `textfont` () const
 - Gets the `FL_Input` text field's font style.*
- void `textfont` (`FL_Font` f)
 - Sets the `FL_Input` text field's font style to f.*
- `FL_Fontsize` `textsize` () const
 - Gets the `FL_Input` text field's font size.*
- void `textsize` (`FL_Fontsize` s)
 - Sets the `FL_Input` text field's font size to s.*
- const char * `value` () const
 - Returns the `FL_Input` text field's current contents.*
- void `value` (const char *val)
 - Sets the `FL_Input` text field's contents to val.*
- void `value` (int val)
 - Chooses item# val in the menu, and sets the `FL_Input` text field to that value.*

Additional Inherited Members

31.72.1 Detailed Description

A combination of the input widget and a menu button.

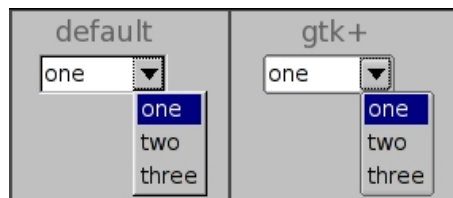


Figure 31.17 `FL_Input_Choice` widget

The user can either type into the input area, or use the menu button chooser on the right to choose an item which loads the input area with the selected text.

The application can directly access both the internal `FL_Input` and `FL_Menu_Button` widgets respectively using the `input()` and `menubutton()` accessor methods.

The default behavior is to invoke the `FL_Input_Choice::callback()` if the user changes the input field's contents, either by typing, pasting, or clicking a different item in the choice menu.

The callback can determine if an item was picked vs. typing into the input field by checking the value of `menubutton()->changed()`, which will be:

- 1: the user picked a different item in the choice menu
- 0: the user typed or pasted directly into the input field

Example use:

```
#include <stdio.h>
#include <FL/Fl.H>
#include <FL/Fl_Double_Window.H>
#include <FL/Fl_Input_Choice.H>
void choice_cb(FL_Widget *w, void *userdata) {
    // Show info about the picked item
    FL_Input_Choice *choice = (FL_Input_Choice*)w;
```



```

const Fl_Menu_Item *item = choice->menubutton()->mvalue();
printf("*** Choice Callback:\n");
printf("  item label()=' %s'\n", item ? item->label() : "(No item)");
printf("  item value()=%d\n", choice->menubutton()->value());
printf("  input value()=' %s'\n", choice->input()->value());
printf("  The user %s\n", choice->menubutton()->changed()
       ? "picked a menu item"
       : "typed text");
}
int main() {
  Fl_Double_Window win(200,100,"Input Choice");
  win.begin();
  Fl_Input_Choice choice(10,10,100,30);
  choice.callback(choice_cb, 0);
  choice.add("Red");
  choice.add("Orange");
  choice.add("Yellow");
  //choice.value("Red"); // uncomment to make "Red" default
  win.end();
  win.show();
  return Fl::run();
}

```

31.72.2 Constructor & Destructor Documentation

31.72.2.1 Fl_Input_Choice()

```

Fl_Input_Choice::Fl_Input_Choice (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )

```

Creates a new [Fl_Input_Choice](#) widget using the given position, size, and label string. Inherited destructor destroys the widget and any values associated with it.

31.72.3 Member Function Documentation

31.72.3.1 add()

```

void Fl_Input_Choice::add (
    const char * s ) [inline]

```

Adds an item to the menu.

You can access the more complex [Fl_Menu_Button::add\(\)](#) methods (setting callbacks, userdata, etc), via [menubutton\(\)](#). Example:

```

Fl_Input_Choice *choice = new Fl_Input_Choice(100,10,120,25,"Fonts");
Fl_Menu_Button *mb = choice->menubutton(); // use Fl_Input_Choice's Fl_Menu_Button
mb->add("Helvetica", 0, MyFont_CB, (void*)mydata); // use Fl_Menu_Button's add() methods
mb->add("Courier", 0, MyFont_CB, (void*)mydata);
mb->add("More..", 0, FontDialog_CB, (void*)mydata);

```

31.72.3.2 input()

```

Fl_Input* Fl_Input_Choice::input ( ) [inline]

```

Returns a pointer to the internal [Fl_Input](#) widget.

This can be used to directly access all of the [Fl_Input](#) widget's methods.

31.72.3.3 menubutton()

```

Fl_Menu_Button* Fl_Input_Choice::menubutton ( ) [inline]

```

Returns a pointer to the internal [Fl_Menu_Button](#) widget.

This can be used to access any of the methods of the menu button, e.g.

```

Fl_Input_Choice *choice = new Fl_Input_Choice(100,10,120,25,"Choice:");

```

```
[..]
// Print all the items in the choice menu
for ( int t=0; t<choice->menubutton()->size(); t++ ) {
    const Fl_Menu_Item &item = choice->menubutton()->menu()[t];
    printf("item %d -- label=%s\n", t, item.label() ? item.label() : "(Null)");
}

```

31.72.3.4 `resize()`

```
void Fl_Input_Choice::resize (
    int X,
    int Y,
    int W,
    int H ) [inline], [virtual]

```

Resizes the [Fl_Group](#) widget and all of its children.

The [Fl_Group](#) widget first resizes itself, and then it moves and resizes all its children according to the rules documented for [Fl_Group::resizable\(Fl_Widget*\)](#)

See also

[Fl_Group::resizable\(Fl_Widget*\)](#)

[Fl_Group::resizable\(\)](#)

[Fl_Widget::resize\(int,int,int,int\)](#)

Reimplemented from [Fl_Group](#).

31.72.3.5 `value()` [1/2]

```
void Fl_Input_Choice::value (
    const char * val ) [inline]

```

Sets the [Fl_Input](#) text field's contents to `val`.

Does not affect the menu selection.

31.72.3.6 `value()` [2/2]

```
void Fl_Input_Choice::value (
    int val ) [inline]

```

Chooses item# `val` in the menu, and sets the [Fl_Input](#) text field to that value.

Any previous text is cleared.

The documentation for this class was generated from the following files:

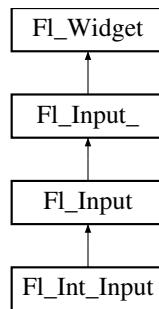
- [Fl_Input_Choice.H](#)
- [Fl_Group.cxx](#)

31.73 [Fl_Int_Input](#) Class Reference

The [Fl_Int_Input](#) class is a subclass of [Fl_Input](#) that only allows the user to type decimal digits (or hex numbers of the form 0xae).

```
#include <Fl_Int_Input.H>
```

Inheritance diagram for [Fl_Int_Input](#):



Public Member Functions

- [FI_Int_Input](#) (int X, int Y, int W, int H, const char *l=0)
Creates a new [FI_Int_Input](#) widget using the given position, size, and label string.

Additional Inherited Members

31.73.1 Detailed Description

The [FI_Int_Input](#) class is a subclass of [FI_Input](#) that only allows the user to type decimal digits (or hex numbers of the form 0xae).

31.73.2 Constructor & Destructor Documentation

31.73.2.1 FI_Int_Input()

```

FI_Int_Input::FI_Int_Input (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
  
```

Creates a new [FI_Int_Input](#) widget using the given position, size, and label string. The default boxtype is `FL_DOWN_BOX`.

Inherited destructor destroys the widget and any value associated with it.

The documentation for this class was generated from the following files:

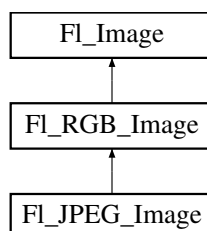
- `FI_Int_Input.H`
- `FI_Input.cxx`

31.74 FI_JPEG_Image Class Reference

The [FI_JPEG_Image](#) class supports loading, caching, and drawing of Joint Photographic Experts Group (JPEG) File Interchange Format (JFIF) images.

```
#include <FI_JPEG_Image.H>
```

Inheritance diagram for [FI_JPEG_Image](#):



Public Member Functions

- [FI_JPEG_Image](#) (const char *filename)
The constructor loads the JPEG image from the given jpeg filename.
- [FI_JPEG_Image](#) (const char *name, const unsigned char *data)
The constructor loads the JPEG image from memory.

Additional Inherited Members

31.74.1 Detailed Description

The [FI_JPEG_Image](#) class supports loading, caching, and drawing of Joint Photographic Experts Group (JPEG) File Interchange Format (JFIF) images.

The class supports grayscale and color (RGB) JPEG image files.

31.74.2 Constructor & Destructor Documentation

31.74.2.1 FI_JPEG_Image() [1/2]

```
FI_JPEG_Image::FI_JPEG_Image (
    const char * filename )
```

The constructor loads the JPEG image from the given jpeg filename.

The inherited destructor frees all memory and server resources that are used by the image.

Use [FI_Image::fail\(\)](#) to check if [FI_JPEG_Image](#) failed to load. [fail\(\)](#) returns `ERR_FILE_ACCESS` if the file could not be opened or read, `ERR_FORMAT` if the JPEG format could not be decoded, and `ERR_NO_IMAGE` if the image could not be loaded for another reason. If the image has loaded correctly, [w\(\)](#), [h\(\)](#), and [d\(\)](#) should return values greater than zero.

Parameters

in	<i>filename</i>	a full path and name pointing to a valid jpeg file.
----	-----------------	---

31.74.2.2 FI_JPEG_Image() [2/2]

```
FI_JPEG_Image::FI_JPEG_Image (
    const char * name,
    const unsigned char * data )
```

The constructor loads the JPEG image from memory.

Construct an image from a block of memory inside the application. Fluid offers "binary Data" chunks as a great way to add image data into the C++ source code. `name_png` can be NULL. If a name is given, the image is added to the list of shared images (see: [FI_Shared_Image](#)) and will be available by that name.

The inherited destructor frees all memory and server resources that are used by the image.

Use [FI_Image::fail\(\)](#) to check if [FI_JPEG_Image](#) failed to load. [fail\(\)](#) returns `ERR_FILE_ACCESS` if the file could not be opened or read, `ERR_FORMAT` if the JPEG format could not be decoded, and `ERR_NO_IMAGE` if the image could not be loaded for another reason. If the image has loaded correctly, [w\(\)](#), [h\(\)](#), and [d\(\)](#) should return values greater than zero.

Parameters

<i>name</i>	A unique name or NULL
<i>data</i>	A pointer to the memory location of the JPEG image

The documentation for this class was generated from the following files:

- [FI_JPEG_Image.H](#)

- `Fl_JPEG_Image.cxx`

31.75 Fl_Label Struct Reference

This struct stores all information for a text or mixed graphics label.

```
#include <Fl_Widget.H>
```

Public Member Functions

- void `draw` (int, int, int, int, `Fl_Align`) const
Draws the label aligned to the given box.
- void `measure` (int &w, int &h) const
Measures the size of the label.

Public Attributes

- `Fl_Align align_`
alignment of label
- `Fl_Color color`
text color
- `Fl_Image * deimage`
optional image for a deactivated label
- `Fl_Font font`
label font used in text
- `Fl_Image * image`
optional image for an active label
- `Fl_Fontsize size`
size of label font
- `uchar type`
type of label.
- `const char * value`
label text

31.75.1 Detailed Description

This struct stores all information for a text or mixed graphics label.

Todo There is an aspiration that the `Fl_Label` type will become a widget by itself. That way we will be avoiding a lot of code duplication by handling labels in a similar fashion to widgets containing text. We also provide an easy interface for very complex labels, containing html or vector graphics. However, this re-factoring is not in place in this release.

31.75.2 Member Function Documentation

31.75.2.1 draw()

```
void Fl_Label::draw (
    int X,
    int Y,
    int W,
    int H,
    Fl_Align align ) const
```

Draws the label aligned to the given box.

Draws a label with arbitrary alignment in an arbitrary box.

31.75.2.2 measure()

```
void Fl_Label::measure (
    int & W,
    int & H ) const
```

Measures the size of the label.

Parameters

<code>in, out</code>	<code>W,H</code>	: this is the requested size for the label text plus image; on return, this will contain the size needed to fit the label
----------------------	------------------	---

31.75.3 Member Data Documentation

31.75.3.1 type

```
uchar Fl_Label::type
```

type of label.

See also

[Fl_Labeltype](#)

The documentation for this struct was generated from the following files:

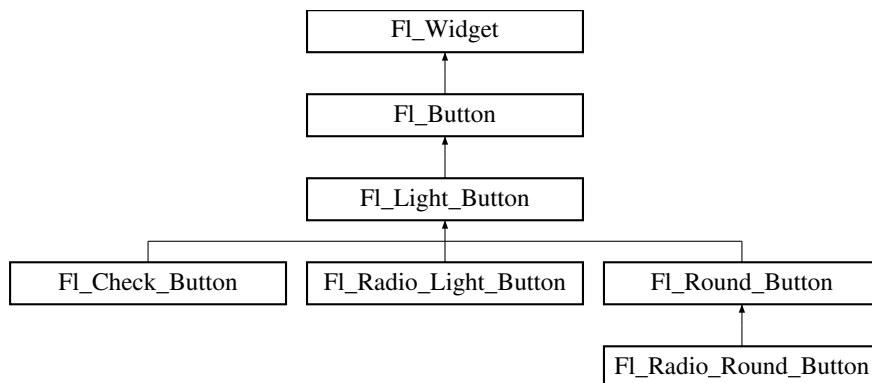
- [Fl_Widget.H](#)
- [fl_labeltype.cxx](#)

31.76 FI_Light_Button Class Reference

This subclass displays the "on" state by turning on a light, rather than drawing pushed in.

```
#include <Fl_Light_Button.H>
```

Inheritance diagram for `Fl_Light_Button`:



Public Member Functions

- [Fl_Light_Button](#) (int `x`, int `y`, int `w`, int `h`, const char `*l=0`)
Creates a new `Fl_Light_Button` widget using the given position, size, and label string.
- virtual int [handle](#) (int)
Handles the specified event.

Protected Member Functions

- virtual void [draw](#) ()

Draws the widget.

Additional Inherited Members

31.76.1 Detailed Description

This subclass displays the "on" state by turning on a light, rather than drawing pushed in.

The shape of the "light" is initially set to FL_DOWN_BOX. The color of the light when on is controlled with [selection_color\(\)](#), which defaults to FL_YELLOW.

Buttons generate callbacks when they are clicked by the user. You control exactly when and how by changing the values for [type\(\)](#) and [when\(\)](#).



Figure 31.18 Fl_Light_Button

31.76.2 Constructor & Destructor Documentation

31.76.2.1 Fl_Light_Button()

```
Fl_Light_Button::Fl_Light_Button (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new [Fl_Light_Button](#) widget using the given position, size, and label string. The destructor deletes the check button.

31.76.3 Member Function Documentation

31.76.3.1 draw()

```
void Fl_Light_Button::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own draw() method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scroll; // scroll is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Reimplemented from [Fl_Button](#).

31.76.3.2 handle()

```
int Fl_Light_Button::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited `handle()` method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters

<code>in</code>	<code>event</code>	the kind of event received
-----------------	--------------------	----------------------------

Return values

<code>0</code>	if the event was not used or understood
<code>1</code>	if the event was used and can be deleted

See also

[FI_Event](#)

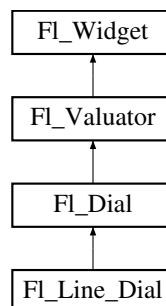
Reimplemented from [FI_Button](#).

The documentation for this class was generated from the following files:

- `FI_Light_Button.H`
- `FI_Light_Button.cxx`

31.77 FI_Line_Dial Class Reference

Inheritance diagram for `FI_Line_Dial`:



Public Member Functions

- `FI_Line_Dial` (int X, int Y, int W, int H, const char *L=0)

Additional Inherited Members

The documentation for this class was generated from the following files:

- `FI_Line_Dial.H`
- `FI_Dial.cxx`

31.78 FI_Mac_App_Menu Class Reference

Mac OS-specific class allowing to customize and localize the application menu.

Static Public Member Functions

- static void `custom_application_menu_items` (const [FI_Menu_Item](#) *m)
Adds custom menu item(s) to the application menu of the system menu bar.

Static Public Attributes

- static const char * [about](#) = "About %@"
Localizable text for the "About xxx" application menu item.
- static const char * [hide](#) = "Hide %@"
Localizable text for the "Hide xxx" application menu item.
- static const char * [hide_others](#) = "Hide Others"
Localizable text for the "Hide Others" application menu item.
- static const char * [print](#) = "Print Front Window"
Localizable text for the "Print Front Window" application menu item.
- static const char * [quit](#) = "Quit %@"
Localizable text for the "Quit xxx" application menu item.
- static const char * [services](#) = "Services"
Localizable text for the "Services" application menu item.
- static const char * [show](#) = "Show All"
Localizable text for the "Show All" application menu item.

31.78.1 Detailed Description

Mac OS-specific class allowing to customize and localize the application menu. The public class attributes are used to build the application menu. They can be localized at run time to any UTF-8 text by placing instructions such as this before `fl_open_display()` gets called:

```
Fl_Mac_App_Menu::print = "Imprimer la fenêtre";
```

See also

[The Apple OS X Interface](#) for another way to localization.

31.78.2 Member Function Documentation

31.78.2.1 custom_application_menu_items()

```
void Fl_Mac_App_Menu::custom_application_menu_items (
    const Fl_Menu_Item * m ) [static]
```

Adds custom menu item(s) to the application menu of the system menu bar.

They are positioned after the "Print Front Window" item, or at its place if it was removed with `Fl_Mac_App_Menu::print = ""`.

Parameters

<i>m</i>	zero-ending array of Fl_Menu_Item 's.
----------	---

31.78.3 Member Data Documentation

31.78.3.1 print

```
const char * Fl_Mac_App_Menu::print = "Print Front Window" [static]
```

Localizable text for the "Print Front Window" application menu item.

This menu item won't be displayed if `Fl_Mac_App_Menu::print` is set to an empty string.

The documentation for this class was generated from the following files:

- [mac.H](#)

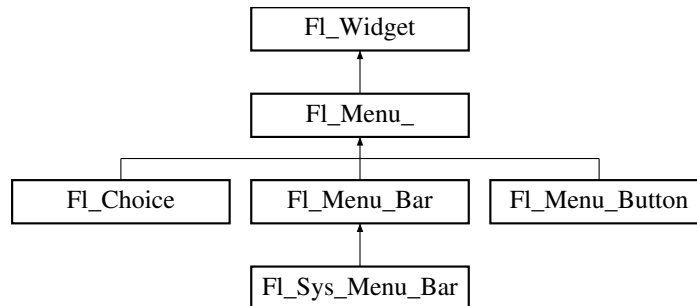
- `Fl.cxx`
- `Fl_Sys_Menu_Bar.mm`

31.79 `Fl_Menu_` Class Reference

Base class of all widgets that have a menu in FLTK.

```
#include <Fl_Menu_.H>
```

Inheritance diagram for `Fl_Menu_`:



Public Member Functions

- `int add (const char *)`
This is a Forms (and SGI GL library) compatible add function, it adds many menu items, with '|' separating the menu items, and tab separating the menu item names from an optional shortcut string.
- `int add (const char *, int shortcut, Fl_Callback *, void *=0, int=0)`
Adds a new menu item.
- `int add (const char *a, const char *b, Fl_Callback *c, void *d=0, int e=0)`
See `int Fl_Menu_::add(const char label, int shortcut, Fl_Callback*, void *user_data=0, int flags=0)`*
- `void clear ()`
Same as `menu(NULL)`, set the array pointer to null, indicating a zero-length menu.
- `int clear_submenu (int index)`
Clears the specified submenu pointed to by `index` of all menu items.
- `void copy (const Fl_Menu_Item *m, void *user_data=0)`
Sets the menu array pointer with a copy of `m` that will be automatically deleted.
- `Fl_Boxtype down_box () const`
This box type is used to surround the currently-selected items in the menus.
- `void down_box (Fl_Boxtype b)`
See `Fl_Boxtype Fl_Menu_::down_box() const`
- `Fl_Color down_color () const`
For back compatibility, same as `selection_color()`
- `void down_color (unsigned c)`
For back compatibility, same as `selection_color()`
- `int find_index (const char *name) const`
Find the menu item index for a given menu `pathname`, such as "Edit/Copy".
- `int find_index (const Fl_Menu_Item *item) const`
Find the index into the menu array for a given `item`.
- `int find_index (Fl_Callback *cb) const`
Find the index into the menu array for a given callback `cb`.
- `const Fl_Menu_Item * find_item (const char *name)`
Find the menu item for a given menu `pathname`, such as "Edit/Copy".
- `const Fl_Menu_Item * find_item (Fl_Callback *)`

- Find the menu item for the given callback `cb`.*

 - `FI_Menu_` (int, int, int, int, const char *`=0`)

Creates a new `FI_Menu_` widget using the given position, size, and label string.
- void `global` ()
- Make the shortcuts for this menu work no matter what window has the focus when you type it.*
- int `insert` (int `index`, const char *, int `shortcut`, `FI_Callback` *, void *`=0`, int `=0`)
- Inserts a new menu item at the specified `index` position.*
- int `insert` (int `index`, const char *`a`, const char *`b`, `FI_Callback` *`c`, void *`d=0`, int `e=0`)
- See int `FI_Menu_::insert(const char* label, int shortcut, FI_Callback*, void *user_data=0, int flags=0)`*
- int `item_pathname` (char *`name`, int `namelen`, const `FI_Menu_Item` *`finditem=0`) const
- Get the menu 'pathname' for the specified menuitem.*
- const `FI_Menu_Item` * `menu` () const
- Returns a pointer to the array of `FI_Menu_Items`.*
- void `menu` (const `FI_Menu_Item` *`m`)
- Sets the menu array pointer directly.*
- int `mode` (int `i`) const
- Gets the flags of item `i`.*
- void `mode` (int `i`, int `fl`)
- Sets the flags of item `i`.*
- const `FI_Menu_Item` * `mvalue` () const
- Returns a pointer to the last menu item that was picked.*
- const `FI_Menu_Item` * `picked` (const `FI_Menu_Item` *)
- When user picks a menu item, call this.*
- void `remove` (int)
- Deletes item `i` from the menu.*
- void `replace` (int, const char *)
- Changes the text of item `i`.*
- void `setonly` (`FI_Menu_Item` *`item`)
- Turns the radio item "on" for the menu item and turns "off" adjacent radio items of the same group.*
- void `shortcut` (int `i`, int `s`)
- Changes the shortcut of item `i` to `s`.*
- int `size` () const
- This returns the number of `FI_Menu_Item` structures that make up the menu, correctly counting submenus.*
- void `size` (int `W`, int `H`)
- const `FI_Menu_Item` * `test_shortcut` ()
- Returns the menu item with the entered shortcut (key value).*
- const char * `text` () const
- Returns the title of the last item chosen.*
- const char * `text` (int `i`) const
- Returns the title of item `i`.*
- `FI_Color` `textcolor` () const
- Get the current color of menu item labels.*
- void `textcolor` (`FI_Color` `c`)
- Sets the current color of menu item labels.*
- `FI_Font` `textfont` () const
- Gets the current font of menu item labels.*
- void `textfont` (`FI_Font` `c`)
- Sets the current font of menu item labels.*
- `FI_Fontsize` `textsize` () const
- Gets the font size of menu item labels.*
- void `textsize` (`FI_Fontsize` `c`)

Sets the font size of menu item labels.

- int `value` () const

Returns the index into `menu()` of the last item chosen by the user.

- int `value` (const `FI_Menu_Item` *)

The value is the index into `menu()` of the last item chosen by the user.

- int `value` (int i)

The value is the index into `menu()` of the last item chosen by the user.

Protected Member Functions

- int `item_pathname_` (char *name, int namelen, const `FI_Menu_Item` *finditem, const `FI_Menu_Item` *menu=0) const

Protected Attributes

- `uchar` `alloc`
- `uchar` `down_box_`
- `FI_Color` `textcolor_`
- `FI_Font` `textfont_`
- `FI_Fontsize` `textsize_`

Additional Inherited Members

31.79.1 Detailed Description

Base class of all widgets that have a menu in FLTK.

Currently FLTK provides you with `FI_Menu_Button`, `FI_Menu_Bar`, and `FI_Choice`.

The class contains a pointer to an array of structures of type `FI_Menu_Item`. The array may either be supplied directly by the user program, or it may be "private": a dynamically allocated array managed by the `FI_Menu_`.

When the user clicks a menu item, `value()` is set to that item and then:

- If the `FI_Menu_Item` has a callback set, that callback is invoked with any userdata configured for it. (The `FI_Menu_` widget's callback is NOT invoked.)
- For any `FI_Menu_Items` that **don't** have a callback set, the `FI_Menu_` widget's callback is invoked with any userdata configured for it. The callback can determine which item was picked using `value()`, `mvalue()`, `item_pathname()`, etc.

31.79.2 Constructor & Destructor Documentation

31.79.2.1 `FI_Menu_()`

```
Fl_Menu_::Fl_Menu_ (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new `FI_Menu_` widget using the given position, size, and label string.

`menu()` is initialized to null.

31.79.3 Member Function Documentation

31.79.3.1 add() [1/2]

```
int Fl_Menu_::add (
    const char * str )
```

This is a Forms (and SGI GL library) compatible add function, it adds many menu items, with '|' separating the menu items, and tab separating the menu item names from an optional shortcut string.

The passed string is split at any '|' characters and then `add(s,0,0,0,0)` is done with each section. This is often useful if you are just using the value, and is compatible with Forms and other GL programs. The section strings use the same special characters as described for the long version of [add\(\)](#).

No items must be added to a menu during a callback to the same menu.

Parameters

<i>str</i>	string containing multiple menu labels as described above
------------	---

Returns

the index into the [menu\(\)](#) array, where the entry was added

31.79.3.2 add() [2/2]

```
int Fl_Menu_::add (
    const char * label,
    int shortcut,
    Fl_Callback * callback,
    void * userdata = 0,
    int flags = 0 )
```

Adds a new menu item.

Parameters

in	<i>label</i>	The text label for the menu item.
in	<i>shortcut</i>	Optional keyboard shortcut that can be an int or string: (FL_CTRL+'a') or "^a". Default 0 if none.
in	<i>callback</i>	Optional callback invoked when user clicks the item. Default 0 if none.
in	<i>userdata</i>	Optional user data passed as an argument to the callback. Default 0 if none.
in	<i>flags</i>	Optional flags that control the type of menu item; see below. Default is 0 for none.

Returns

The index into the [menu\(\)](#) array, where the entry was added.

Description

If the menu array was directly set with `menu(x)`, then [copy\(\)](#) is done to make a private array.

Since this method can change the internal menu array, any menu item pointers or indices the application may have cached can become stale, and should be recalculated/refreshed.

A menu item's callback must not [add\(\)](#) items to its parent menu during the callback.

Detailed Description of Parameters

label

The menu item's label. This argument is required and must not be NULL.

The characters "&", "/", "\", and "_" are treated as special characters in the label string. The "&" character specifies that the following character is an accelerator and will be underlined. The "\" character is used to escape the next character in the string. Labels starting with the "_" character cause a divider to be placed after that menu item.

A label of the form "File/Quit" will create the submenu "File" with a menu item called "Quit". The "/" character is ignored if it appears as the first character of the label string, e.g. "/File/Quit".

The label string is copied to new memory and can be freed. The other arguments (including the shortcut) are copied into the menu item unchanged.

If an item exists already with that name then it is replaced with this new one. Otherwise this new one is added to the end of the correct menu or submenu. The return value is the offset into the array that the new entry was placed at.

shortcut

The keyboard shortcut for this menu item.

This parameter is optional, and defaults to 0 to indicate no shortcut.

The shortcut can either be a raw integer value (eg. FL_CTRL+'A') or a string (eg. "^c" or "^97").

Raw integer shortcuts can be a combination of keyboard chars (eg. 'A') and optional keyboard modifiers (see [Fl::event_state\(\)](#), e.g. FL_SHIFT, etc). In addition, FL_COMMAND can be used to denote FL_META under Mac OS X and FL_CTRL under other platforms.

String shortcuts can be specified in one of two ways:

```
[#+^]<ascii_value>    e.g. "97", "^97", "+97", "#97"
[#+^]<ascii_char>    e.g. "a", "^a", "+a", "#a"
```

..where <ascii_value> is a decimal value representing an ASCII character (eg. 97 is the ascii code for 'a'), and the optional prefixes enhance the value that follows. Multiple prefixes must appear in the order below.

```
# - Alt
+ - Shift
^ - Control
```

Internally, the text shortcuts are converted to integer values using [fl_old_shortcut\(const char*\)](#).

callback

The callback to invoke when this menu item is selected.

This parameter is optional, and defaults to 0 for no callback.

userdata

The callback's 'user data' that is passed to the callback.

This parameter is optional, and defaults to 0.

flags

These are bit flags to define what kind of menu item this is.

This parameter is optional, and defaults to 0 to define a 'regular' menu item.

These flags can be 'OR'ed together:

```
FL_MENU_INACTIVE // Deactivate menu item (gray out)
FL_MENU_TOGGLE  // Item is a checkbox toggle (shows checkbox for on/off state)
FL_MENU_VALUE   // The on/off state for checkbox/radio buttons (if set, state is 'on')
FL_MENU_RADIO   // Item is a radio button (one checkbox of many can be on)
FL_MENU_INVISIBLE // Item will not show up (shortcut will work)
FL_SUBMENU_POINTER // Indicates user_data() is a pointer to another menu array
FL_SUBMENU      // This item is a submenu to other items
FL_MENU_DIVIDER // Creates divider line below this item. Also ends a group of radio buttons.
```

If FL_SUBMENU is set in an item's flags, then actually two items are added: the first item is the menu item (submenu title), as expected, and the second item is the submenu terminating item with the label and all other members set to 0. If you add submenus with the 'path' technique, then the corresponding submenu terminators (maybe more than one) are added as well.

Todo Raw integer shortcut needs examples. Dependent on responses to <http://fltk.org/newsgroups.php?gfltk.development+v:10086> and results of STR#2344

31.79.3.3 clear()

```
void Fl_Menu_::clear ( )
```

Same as menu(NULL), set the array pointer to null, indicating a zero-length menu.

Menus must not be cleared during a callback to the same menu.

31.79.3.4 clear_submenu()

```
int Fl_Menu_::clear_submenu (
    int index )
```

Clears the specified submenu pointed to by `index` of all menu items.

This method is useful for clearing a submenu so that it can be re-populated with new items. Example: a "File/Recent Files/..." submenu that shows the last few files that have been opened.

The specified `index` must point to a submenu.

The submenu is cleared with `remove()`. If the menu array was directly set with `menu(x)`, then `copy()` is done to make a private array.

Warning

Since this method can change the internal menu array, any menu item pointers or indices the application may have cached can become stale, and should be recalculated/refreshed.

Example:

```
int index = menubar->find_index("File/Recent"); // get index of "File/Recent" submenu
if ( index != -1 ) menubar->clear_submenu(index); // clear the submenu
menubar->add("File/Recent/Aaa");
menubar->add("File/Recent/Bbb");
[...]
```

Parameters

<i>index</i>	The index of the submenu to be cleared
--------------	--

Returns

0 on success, -1 if the index is out of range or not a submenu

See also

[remove\(int\)](#)

31.79.3.5 copy()

```
void Fl_Menu_::copy (
    const Fl_Menu_Item * m,
    void * ud = 0 )
```

Sets the menu array pointer with a copy of *m* that will be automatically deleted.

If userdata *ud* is not NULL, then all user data pointers are changed in the menus as well. See [void Fl_Menu_::menu\(const Fl_Menu_Item* m\)](#).

31.79.3.6 down_box()

```
Fl_Boxtype Fl_Menu_::down_box ( ) const [inline]
```

This box type is used to surround the currently-selected items in the menus.

If this is FL_NO_BOX then it acts like FL_THIN_UP_BOX and [selection_color\(\)](#) acts like FL_WHITE, for back compatibility.

31.79.3.7 find_index() [1/3]

```
int Fl_Menu_::find_index (
    const char * pathname ) const
```

Find the menu item index for a given menu *pathname*, such as "Edit/Copy".

This method finds a menu item's index position for the given menu *pathname*, also traversing submenus, but **not** submenu pointers (FL_SUBMENU_POINTER).

To get the menu item pointer for a *pathname*, use [find_item\(\)](#)

Parameters

<i>in</i>	<i>pathname</i>	The path and name of the menu item to find
-----------	-----------------	--

Returns

The index of the matching item, or -1 if not found.

See also

[item_pathname\(\)](#)

31.79.3.8 find_index() [2/3]

```
int Fl_Menu_::find_index (
    const Fl_Menu_Item * item ) const
```

Find the index into the menu array for a given *item*.

A way to convert a menu item pointer into an index.

Does **not** handle items that are in submenu pointers (FL_SUBMENU_POINTER).
 -1 is returned if the item is not in this menu or is part of an FL_SUBMENU_POINTER submenu.
 Current implementation is fast and not expensive.

```
// Convert an index-to-item
int index = 12;
const Fl_Menu_Item *item = mymenu->menu() + index;
// Convert an item-to-index
int index = mymenu->find_index(item);
if ( index == -1 ) { ..error.. }
```

Parameters

in	<i>item</i>	The item to be found
----	-------------	----------------------

Returns

The index of the item, or -1 if not found.

See also

[menu\(\)](#)

31.79.3.9 find_index() [3/3]

```
int Fl_Menu_::find_index (
    Fl_Callback * cb ) const
```

Find the index into the menu array for a given callback *cb*.

This method finds a menu item's index position, also traversing submenus, but **not** submenu pointers (FL_↔SUBMENU_POINTER). This is useful if an application uses internationalisation and a menu item can not be found using its label. This search is also much faster.

Parameters

<i>cb</i>	Find the first item with this callback
-----------	--

Returns

The index of the item with the specific callback, or -1 if not found

See also

[find_index\(const char*\)](#)

31.79.3.10 find_item() [1/2]

```
const Fl_Menu_Item * Fl_Menu_::find_item (
    const char * pathname )
```

Find the menu item for a given menu *pathname*, such as "Edit/Copy".

This method finds a menu item in the menu array, also traversing submenus, but not submenu pointers (FL_↔SUBMENU_POINTER).

To get the menu item's index, use [find_index\(const char*\)](#)

Example:

```
Fl_Menu_Bar *menubar = new Fl_Menu_Bar(..);
menubar->add("File/&Open");
menubar->add("File/&Save");
menubar->add("Edit/&Copy");
// [...]
Fl_Menu_Item *item;
if ( ( item = (Fl_Menu_Item*)menubar->find_item("File/&Open") ) != NULL ) {
    item->labelcolor(FL_RED);
}
```

```

}
if ( ( item = (Fl_Menu_Item*)menubar->find_item("Edit/&Copy") ) != NULL ) {
    item->labelcolor(FL_GREEN);
}

```

Parameters

<i>pathname</i>	The path and name of the menu item
-----------------	------------------------------------

Returns

The item found, or NULL if not found

See also

[find_index\(const char*\)](#), [find_item\(Fl_Callback*\)](#), [item_pathname\(\)](#)

31.79.3.11 find_item() [2/2]

```

const Fl_Menu_Item * Fl_Menu_::find_item (
    Fl_Callback * cb )

```

Find the menu item for the given callback *cb*.

This method finds a menu item in a menu array, also traversing submenus, but not submenu pointers. This is useful if an application uses internationalisation and a menu item can not be found using its label. This search is also much faster.

Parameters

<i>in</i>	<i>cb</i>	find the first item with this callback
-----------	-----------	--

Returns

The item found, or NULL if not found

See also

[find_item\(const char*\)](#)

31.79.3.12 global()

```

void Fl_Menu_::global ( )

```

Make the shortcuts for this menu work no matter what window has the focus when you type it.

This is done by using [Fl::add_handler\(\)](#). This `Fl_Menu_` widget does not have to be visible (ie the window it is in can be hidden, or it does not have to be put in a window at all).

Currently there can be only one [global\(\)](#) menu. Setting a new one will replace the old one. There is no way to remove the [global\(\)](#) setting (so don't destroy the widget!)

31.79.3.13 insert()

```

int Fl_Menu_::insert (
    int index,
    const char * label,
    int shortcut,
    Fl_Callback * callback,
    void * userdata = 0,
    int flags = 0 )

```

Inserts a new menu item at the specified `index` position.

If `index` is -1, the menu item is appended; same behavior as [add\(\)](#).

To properly insert a menu item, `label` must be the name of the item (eg. "Quit"), and not a 'menu pathname' (eg. "File/Quit"). If a menu pathname is specified, the value of `index` is *ignored*, the new item's position defined by the pathname.

For more details, see [add\(\)](#). Except for the `index` parameter, [add\(\)](#) has more detailed information on parameters and behavior, and is functionally equivalent.

Parameters

in	<i>index</i>	The menu array's index position where the new item is inserted. If -1, behavior is the same as add() .
in	<i>label</i>	The text label for the menu item. If the label is a menu pathname, <code>index</code> is ignored, and the pathname indicates the position of the new item.
in	<i>shortcut</i>	Optional keyboard shortcut. Can be an int (FL_CTRL+'a') or a string ("^a"). Default is 0.
in	<i>callback</i>	Optional callback invoked when user clicks the item. Default 0 if none.
in	<i>userdata</i>	Optional user data passed as an argument to the callback. Default 0 if none.
in	<i>flags</i>	Optional flags that control the type of menu item; see add() for more info. Default is 0 for none.

Returns

The index into the [menu\(\)](#) array, where the entry was added.

See also

[add\(\)](#)

31.79.3.14 item_pathname()

```
int Fl_Menu_::item_pathname (
    char * name,
    int namelen,
    const Fl_Menu_Item * finditem = 0 ) const
```

Get the menu 'pathname' for the specified menuitem.

If `finditem==NULL`, [mvalue\(\)](#) is used (the most recently picked menuitem).

Example:

```
Fl_Menu_Bar *menubar = 0;
void my_menu_callback(Fl_Widget*,void*) {
    char name[80];
    if ( menubar->item_pathname(name, sizeof(name)-1) == 0 ) { // recently picked item
        if ( strcmp(name, "File/&Open") == 0 ) { .. } // open invoked
        if ( strcmp(name, "File/&Save") == 0 ) { .. } // save invoked
        if ( strcmp(name, "Edit/&Copy") == 0 ) { .. } // copy invoked
    }
}
int main() {
    [...]
    menubar = new Fl_Menu_Bar(..);
    menubar->add("File/&Open", 0, my_menu_callback);
    menubar->add("File/&Save", 0, my_menu_callback);
    menubar->add("Edit/&Copy", 0, my_menu_callback);
    [...]
}
```

Returns

- 0 : OK (name has menuitem's pathname)
- -1 : item not found (name=="")
- -2 : 'name' not large enough (name=="")

See also

[find_item\(\)](#)

31.79.3.15 menu() [1/2]

```
const Fl_Menu_Item* Fl_Menu_::menu ( ) const [inline]
```

Returns a pointer to the array of `Fl_Menu_Items`.

This will either be the value passed to `menu(value)` or the private copy.

See also

[size\(\)](#) – returns the [size](#) of the `Fl_Menu_Item` array.

Example: How to walk the array:

```
for ( int t=0; t<menubar->size(); t++ ) { // walk array of items
    const Fl_Menu_Item &item = menubar->menu()[t]; // get each item
    fprintf(stderr, "item #%d -- label=%s, value=%s type=%s\n",
        t,
        item.label() ? item.label() : "(Null)", // menu terminators have NULL labels
        (item.flags & FL_MENU_VALUE) ? "set" : "clear", // value of toggle or radio items
        (item.flags & FL_SUBMENU) ? "Submenu" : "Item"); // see if item is a submenu or actual item
}
```

31.79.3.16 menu() [2/2]

```
void Fl_Menu_::menu (
    const Fl_Menu_Item * m )
```

Sets the menu array pointer directly.

If the old menu is private it is deleted. NULL is allowed and acts the same as a zero-length menu. If you try to modify the array (with [add\(\)](#), [replace\(\)](#), or [remove\(\)](#)) a private copy is automatically done.

31.79.3.17 mode() [1/2]

```
int Fl_Menu_::mode (
    int i ) const [inline]
```

Gets the flags of item `i`.

For a list of the flags, see [Fl_Menu_Item](#).

31.79.3.18 mode() [2/2]

```
void Fl_Menu_::mode (
    int i,
    int fl ) [inline]
```

Sets the flags of item `i`.

For a list of the flags, see [Fl_Menu_Item](#).

31.79.3.19 mvalue()

```
const Fl_Menu_Item* Fl_Menu_::mvalue ( ) const [inline]
```

Returns a pointer to the last menu item that was picked.

31.79.3.20 picked()

```
const Fl_Menu_Item * Fl_Menu_::picked (
    const Fl_Menu_Item * v )
```

When user picks a menu item, call this.

It will do the callback. Unfortunately this also casts away const for the checkboxes, but this was necessary so non-checkbox menus can really be declared const...

31.79.3.21 remove()

```
void Fl_Menu_::remove (
    int i )
```

Deletes item *i* from the menu.

If the menu array was directly set with menu(x) then [copy\(\)](#) is done to make a private array.

No items must be removed from a menu during a callback to the same menu.

Parameters

<i>i</i>	index into menu array
----------	-----------------------

31.79.3.22 replace()

```
void Fl_Menu_::replace (
    int i,
    const char * str )
```

Changes the text of item *i*.

This is the only way to get slash into an [add\(\)](#)'ed menu item. If the menu array was directly set with menu(x) then [copy\(\)](#) is done to make a private array.

Parameters

<i>i</i>	index into menu array
<i>str</i>	new label for menu item at index <i>i</i>

31.79.3.23 size()

```
int Fl_Menu_::size ( ) const
```

This returns the number of [Fl_Menu_Item](#) structures that make up the menu, correctly counting submenus.

This includes the "terminator" item at the end. To copy a menu array you need to copy [size\(\)*sizeof\(Fl_Menu_Item\)](#) bytes. If the menu is NULL this returns zero (an empty menu will return 1).

31.79.3.24 test_shortcut()

```
const Fl_Menu_Item* Fl_Menu_::test_shortcut ( ) [inline]
```

Returns the menu item with the entered shortcut (key value).

This searches the complete [menu\(\)](#) for a shortcut that matches the entered key value. It must be called for a FL_KEYBOARD or FL_SHORTCUT event.

If a match is found, the menu's callback will be called.

Returns

matched [Fl_Menu_Item](#) or NULL.

31.79.3.25 text() [1/2]

```
const char* Fl_Menu_::text ( ) const [inline]
```

Returns the title of the last item chosen.

31.79.3.26 text() [2/2]

```
const char* Fl_Menu_::text (
    int i ) const [inline]
```

Returns the title of item i.

31.79.3.27 textcolor()

```
Fl_Color Fl_Menu_::textcolor ( ) const [inline]
```

Get the current color of menu item labels.

31.79.3.28 textfont() [1/2]

```
Fl_Font Fl_Menu_::textfont ( ) const [inline]
```

Gets the current font of menu item labels.

31.79.3.29 textfont() [2/2]

```
void Fl_Menu_::textfont (
    Fl_Font c ) [inline]
```

Sets the current font of menu item labels.

31.79.3.30 textsize() [1/2]

```
Fl_Fontsize Fl_Menu_::textsize ( ) const [inline]
```

Gets the font size of menu item labels.

31.79.3.31 textsize() [2/2]

```
void Fl_Menu_::textsize (
    Fl_Fontsize c ) [inline]
```

Sets the font size of menu item labels.

31.79.3.32 value() [1/3]

```
int Fl_Menu_::value ( ) const [inline]
```

Returns the index into [menu\(\)](#) of the last item chosen by the user. It is zero initially.

31.79.3.33 value() [2/3]

```
int Fl_Menu_::value (
    const Fl_Menu_Item * m )
```

The value is the index into [menu\(\)](#) of the last item chosen by the user.

It is zero initially. You can set it as an integer, or set it with a pointer to a menu item. The set routines return non-zero if the new value is different than the old one.

31.79.3.34 value() [3/3]

```
int Fl_Menu_::value (
    int i ) [inline]
```

The value is the index into [menu\(\)](#) of the last item chosen by the user.

It is zero initially. You can set it as an integer, or set it with a pointer to a menu item. The set routines return non-zero if the new value is different than the old one.

The documentation for this class was generated from the following files:

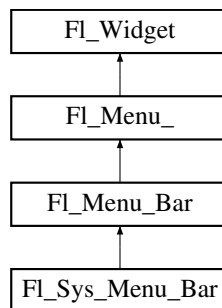
- [Fl_Menu_.H](#)
- [Fl_Menu_.cxx](#)
- [Fl_Menu_add.cxx](#)
- [Fl_Menu_global.cxx](#)

31.80 FI_Menu_Bar Class Reference

This widget provides a standard menubar interface.

```
#include <Fl_Menu_Bar.H>
```

Inheritance diagram for [Fl_Menu_Bar](#):

**Public Member Functions**

- [Fl_Menu_Bar](#) (int X, int Y, int W, int H, const char *l=0)
Creates a new [Fl_Menu_Bar](#) widget using the given position, size, and label string.
- int [handle](#) (int)
Handles the specified event.

Protected Member Functions

- void [draw](#) ()
Draws the widget.

Additional Inherited Members**31.80.1 Detailed Description**

This widget provides a standard menubar interface.

Usually you will put this widget along the top edge of your window. The height of the widget should be 30 for the menu titles to draw correctly with the default font.

The items on the bar and the menus they bring up are defined by a single [Fl_Menu_Item](#) array. Because a [Fl_Menu_Item](#) array defines a hierarchy, the top level menu defines the items in the menubar, while the submenus define the pull-down menus. Sub-sub menus and lower pop up to the right of the submenus.

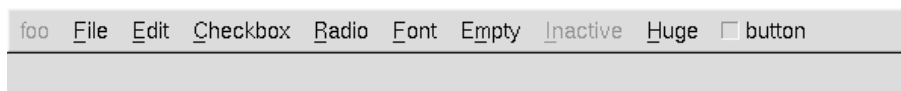


Figure 31.19 menubar

If there is an item in the top menu that is not a title of a submenu, then it acts like a "button" in the menubar. Clicking on it will pick it.

When the user clicks a menu item, `value()` is set to that item and then:

- The item's callback is done if one has been set; the `Fl_Menu_Bar` is passed as the `Fl_Widget*` argument, along with any userdata configured for the callback.
- If the item does not have a callback, the `Fl_Menu_Bar`'s callback is done instead, along with any userdata configured for the callback. The callback can determine which item was picked using `value()`, `mvalue()`, `item_pathname()`, etc.

Submenus will also pop up in response to shortcuts indicated by putting a '&' character in the name field of the menu item. If you put a '&' character in a top-level "button" then the shortcut picks it. The '&' character in submenus is ignored until the menu is popped up.

Typing the `shortcut()` of any of the menu items will cause callbacks exactly the same as when you pick the item with the mouse.

31.80.2 Constructor & Destructor Documentation

31.80.2.1 Fl_Menu_Bar()

```
Fl_Menu_Bar::Fl_Menu_Bar (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new `Fl_Menu_Bar` widget using the given position, size, and label string.

The default boxtype is `FL_UP_BOX`.

The constructor sets `menu()` to `NULL`. See `Fl_Menu_` for the methods to set or change the menu.

`labelsize()`, `labelfont()`, and `labelcolor()` are used to control how the menubar items are drawn. They are initialized from the `Fl_Menu` static variables, but you can change them if desired.

`label()` is ignored unless you change `align()` to put it outside the menubar.

The destructor removes the `Fl_Menu_Bar` widget and all of its menu items.

31.80.3 Member Function Documentation

31.80.3.1 draw()

```
void Fl_Menu_Bar::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call `redraw()` instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own `draw()` method*, e.g. for an embedded scrollbar, you can do it (because `draw()` is virtual) like this:

```
Fl_Widget *s = &scroll; // scroll is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Implements `Fl_Widget`.

Reimplemented in `Fl_Sys_Menu_Bar`.

31.80.3.2 handle()

```
int Fl_Menu_Bar::handle (
    int event ) [virtual]
```


Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget. When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise. Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters

<code>in</code>	<code>event</code>	the kind of event received
-----------------	--------------------	----------------------------

Return values

<code>0</code>	if the event was not used or understood
<code>1</code>	if the event was used and can be deleted

See also

[FI_Event](#)

Reimplemented from [FI_Widget](#).

The documentation for this class was generated from the following files:

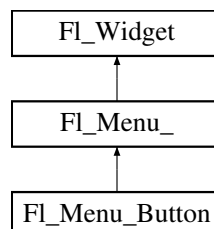
- [FI_Menu_Bar.H](#)
- [FI_Menu_Bar.cxx](#)

31.81 FI_Menu_Button Class Reference

This is a button that when pushed pops up a menu (or hierarchy of menus) defined by an array of [FI_Menu_Item](#) objects.

```
#include <FI_Menu_Button.H>
```

Inheritance diagram for [FI_Menu_Button](#):



Public Types

- enum [popup_buttons](#) {
[POPUP1](#) = 1 , [POPUP2](#) , [POPUP12](#) , [POPUP3](#) ,
[POPUP13](#) , [POPUP23](#) , [POPUP123](#) }

indicate what mouse buttons pop up the menu.

Public Member Functions

- [FI_Menu_Button](#) (int, int, int, int, const char *=0)
Creates a new [FI_Menu_Button](#) widget using the given position, size, and label string.
- int [handle](#) (int)
Handles the specified event.
- const [FI_Menu_Item](#) * [popup](#) ()
Act exactly as though the user clicked the button or typed the shortcut key.

Protected Member Functions

- void `draw ()`
Draws the widget.

Additional Inherited Members

31.81.1 Detailed Description

This is a button that when pushed pops up a menu (or hierarchy of menus) defined by an array of `Fl_Menu_Item` objects.



Figure 31.20 menu_button

Normally any mouse button will pop up a menu and it is lined up below the button as shown in the picture. However an `Fl_Menu_Button` may also control a pop-up menu. This is done by setting the `type()`. If `type()` is zero a normal menu button is produced. If it is nonzero then this is a pop-up menu. The bits in `type()` indicate what mouse buttons pop up the menu (see `Fl_Menu_Button::popup_buttons`).

The menu will also pop up in response to shortcuts indicated by putting a '&' character in the `label()`.

Typing the `shortcut()` of any of the menu items will cause callbacks exactly the same as when you pick the item with the mouse. The '&' character in menu item names are only looked at when the menu is popped up, however.

When the user clicks a menu item, `value()` is set to that item and then:

- The item's callback is done if one has been set; the `Fl_Menu_Button` is passed as the `Fl_Widget*` argument, along with any userdata configured for the callback.
- If the item does not have a callback, the `Fl_Menu_Button`'s callback is done instead, along with any userdata configured for it. The callback can determine which item was picked using `value()`, `mvalue()`, `item_pathname()`, etc.

31.81.2 Member Enumeration Documentation

31.81.2.1 popup_buttons

enum `Fl_Menu_Button::popup_buttons`

indicate what mouse buttons pop up the menu.

Values for `type()` used to indicate what mouse buttons pop up the menu. `Fl_Menu_Button::POPUP3` is usually what you want.

Enumerator

POPUP1	pops up with the mouse 1st button.
POPUP2	pops up with the mouse 2nd button.
POPUP12	pops up with the mouse 1st or 2nd buttons.
POPUP3	pops up with the mouse 3rd button.
POPUP13	pops up with the mouse 1st or 3rd buttons.
POPUP23	pops up with the mouse 2nd or 3rd buttons.
POPUP123	pops up with any mouse button.

31.81.3 Constructor & Destructor Documentation

31.81.3.1 Fl_Menu_Button()

```
Fl_Menu_Button::Fl_Menu_Button (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new [Fl_Menu_Button](#) widget using the given position, size, and label string.

The default boxtype is FL_UP_BOX.

The constructor sets [menu\(\)](#) to NULL. See [Fl_Menu_](#) for the methods to set or change the menu.

31.81.4 Member Function Documentation

31.81.4.1 draw()

```
void Fl_Menu_Button::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scroll;           // scroll is an embedded Fl_Scrollbar
s->draw();                         // calls Fl_Scrollbar::draw()
```

Implements [Fl_Widget](#).

31.81.4.2 handle()

```
int Fl_Menu_Button::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[FI_Event](#)

Reimplemented from [FI_Widget](#).

31.81.4.3 popup()

```
const FI_Menu_Item * FI_Menu_Button::popup ( )
```

Act exactly as though the user clicked the button or typed the shortcut key.

The menu appears, it waits for the user to pick an item, and if they pick one it sets [value\(\)](#) and does the callback or sets [changed\(\)](#) as described above. The menu item is returned or NULL if the user dismisses the menu.

The documentation for this class was generated from the following files:

- [FI_Menu_Button.H](#)
- [FI_Menu_Button.cxx](#)

31.82 FI_Menu_Item Struct Reference

The [FI_Menu_Item](#) structure defines a single menu item that is used by the [FI_Menu_](#) class.

```
#include <FI_Menu_Item.H>
```

Public Member Functions

- void [activate](#) ()
Allows a menu item to be picked.
- int [active](#) () const
Gets whether or not the item can be picked.
- int [activevisible](#) () const
Returns non 0 if FL_INACTIVE and FL_INVISIBLE are cleared, 0 otherwise.
- int [add](#) (const char *, int [shortcut](#), [FI_Callback](#) *, void *=0, int=0)
Adds a menu item.
- int [add](#) (const char *a, const char *b, [FI_Callback](#) *c, void *d=0, int e=0)
See int add(const char, int shortcut, FI_Callback*, void*, int)*
- long [argument](#) () const
Gets the user_data() argument that is sent to the callback function.
- void [argument](#) (long v)
Sets the user_data() argument that is sent to the callback function.
- [FI_Callback_p](#) [callback](#) () const
Returns the callback function that is set for the menu item.
- void [callback](#) ([FI_Callback](#) *c)
Sets the menu item's callback function.
- void [callback](#) ([FI_Callback](#) *c, void *p)
Sets the menu item's callback function and userdata() argument.
- void [callback](#) ([FI_Callback0](#) *c)
Sets the menu item's callback function.
- void [callback](#) ([FI_Callback1](#) *c, long p=0)
Sets the menu item's callback function and userdata() argument.

- void [check](#) ()
back compatibility only
- int [checkbox](#) () const
Returns true if a checkbox will be drawn next to this item.
- int [checked](#) () const
back compatibility only
- void [clear](#) ()
Turns the check or radio item "off" for the menu item.
- void [deactivate](#) ()
Prevents a menu item from being picked.
- void [do_callback](#) (FI_Widget *o) const
Calls the FI_Menu_Item item's callback, and provides the FI_Widget argument.
- void [do_callback](#) (FI_Widget *o, long arg) const
Calls the FI_Menu_Item item's callback, and provides the FI_Widget argument.
- void [do_callback](#) (FI_Widget *o, void *arg) const
Calls the FI_Menu_Item item's callback, and provides the FI_Widget argument.
- void [draw](#) (int x, int y, int w, int h, const FI_Menu_ *, int t=0) const
Draws the menu item in bounding box x,y,w,h, optionally selects the item.
- const FI_Menu_Item * [find_shortcut](#) (int *ip=0, const bool require_alt=false) const
Search only the top level menu for a shortcut.
- FI_Menu_Item * [first](#) ()
Returns the first menu item, same as next(0).
- const FI_Menu_Item * [first](#) () const
Returns the first menu item, same as next(0).
- void [hide](#) ()
Hides an item in the menu.
- void [image](#) (FI_Image &a)
compatibility api for FLUID, same as a.label(this)
- void [image](#) (FI_Image *a)
compatibility api for FLUID, same as a->label(this)
- int [insert](#) (int, const char *, int, FI_Callback *, void **=0, int=0)
Inserts an item at position index.
- const char * [label](#) () const
Returns the title of the item.
- void [label](#) (const char *a)
See const char FI_Menu_Item::label() const*

- void [label](#) (FI_Labeltype a, const char *b)
See const char FI_Menu_Item::label() const*

- FI_Color [labelcolor](#) () const
Gets the menu item's label color.
- void [labelcolor](#) (FI_Color a)
Sets the menu item's label color.
- FI_Font [labelfont](#) () const
Gets the menu item's label font.
- void [labelfont](#) (FI_Font a)
Sets the menu item's label font.
- FI_Fontsize [labelsize](#) () const
Gets the label font pixel size/height.
- void [labelsize](#) (FI_Fontsize a)

- Sets the label font pixel size/height.*
- `FI_Labeltype labeltype () const`

Returns the menu item's labeltype.
- `void labeltype (FI_Labeltype a)`

Sets the menu item's labeltype.
- `int measure (int *h, const FI_Menu_ *) const`

Measures width of label, including effect of & characters.
- `FI_Menu_Item * next (int i=1)`

Advances a pointer by n items through a menu array, skipping the contents of submenus and invisible items.
- `const FI_Menu_Item * next (int=1) const`

Advance a pointer by n items through a menu array, skipping the contents of submenus and invisible items.
- `const FI_Menu_Item * popup (int X, int Y, const char *title=0, const FI_Menu_Item *picked=0, const FI_Menu_Item *s=0) const`

This method is called by widgets that want to display menus.
- `const FI_Menu_Item * pulldown (int X, int Y, int W, int H, const FI_Menu_Item *picked=0, const FI_Menu_Item *s=0, const FI_Menu_Item *title=0, int menubar=0) const`

Pulldown() is similar to popup(), but a rectangle is provided to position the menu.
- `int radio () const`

Returns true if this item is a radio item.
- `void set ()`

Turns the check or radio item "on" for the menu item.
- `void setonly ()`

Turns the radio item "on" for the menu item and turns "off" adjacent radio items set.
- `int shortcut () const`

Gets what key combination shortcut will trigger the menu item.
- `void shortcut (int s)`

Sets exactly what key combination will trigger the menu item.
- `void show ()`

Makes an item visible in the menu.
- `int size () const`

Size of the menu starting from this menu item.
- `int submenu () const`

Returns true if either FL_SUBMENU or FL_SUBMENU_POINTER is on in the flags.
- `const FI_Menu_Item * test_shortcut () const`

This is designed to be called by a widgets handle() method in response to a FL_SHORTCUT event.
- `void uncheck ()`

back compatibility only
- `void * user_data () const`

Gets the user_data() argument that is sent to the callback function.
- `void user_data (void *v)`

Sets the user_data() argument that is sent to the callback function.
- `int value () const`

Returns the current value of the check or radio item.
- `int visible () const`

Gets the visibility of an item.

Public Attributes

- [Fl_Callback](#) * `callback_`
menu item callback
- `int` `flags`
menu item flags like FL_MENU_TOGGLE, FL_MENU_RADIO
- [Fl_Color](#) `labelcolor_`
menu item text color
- [Fl_Font](#) `labelfont_`
which font for this menu item text
- [Fl_Fontsize](#) `labelsize_`
size of menu item text
- `uchar` `labeltype_`
how the menu item text looks like
- `int` `shortcut_`
menu item shortcut
- `const char` * `text`
menu item text, returned by `label()`
- `void` * `user_data_`
menu item user_data for the menu's callback

31.82.1 Detailed Description

The [Fl_Menu_Item](#) structure defines a single menu item that is used by the [Fl_Menu_](#) class.

```
struct Fl_Menu_Item {
  const char*   text;           // label()
  ulong         shortcut_;
  Fl_Callback*  callback_;
  void*         user_data_;
  int           flags;
  uchar         labeltype_;
  uchar         labelfont_;
  uchar         labelsize_;
  uchar         labelcolor_;
};
enum { // values for flags:
  FL_MENU_INACTIVE   = 1,      // Deactivate menu item (gray out)
  FL_MENU_TOGGLE    = 2,      // Item is a checkbox toggle (shows checkbox for on/off state)
  FL_MENU_VALUE     = 4,      // The on/off state for checkbox/radio buttons (if set, state is 'on')
  FL_MENU_RADIO     = 8,      // Item is a radio button (one checkbox of many can be on)
  FL_MENU_INVISIBLE = 0x10,   // Item will not show up (shortcut will work)
  FL_SUBMENU_POINTER = 0x20,   // Indicates user_data() is a pointer to another menu array
  FL_SUBMENU        = 0x40,   // This item is a submenu to other items
  FL_MENU_DIVIDER   = 0x80,   // Creates divider line below this item. Also ends a group of radio buttons.
  FL_MENU_HORIZONTAL = 0x100  // ??? -- reserved
};
```

Typically menu items are statically defined; for example:

```
Fl_Menu_Item popup[] = {
  {"&alpha",    FL_ALT+'a', the_cb, (void*)1},
  {"&beta",    FL_ALT+'b', the_cb, (void*)2},
  {"&gamma",    FL_ALT+'c', the_cb, (void*)3, FL_MENU_DIVIDER},
  {"&strange",  0,         strange_cb},
  {"&charm",    0,         charm_cb},
  {"&truth",    0,         truth_cb},
  {"&beauty",   0,         beauty_cb},
  {"sub&menu",  0,         0, 0, FL_SUBMENU},
  {"one"},
  {"two"},
  {"three"},
  {},
  {"inactive", FL_ALT+'i', 0, 0, FL_MENU_INACTIVE|FL_MENU_DIVIDER},
  {"invisible",FL_ALT+'i', 0, 0, FL_MENU_INVISIBLE},
  {"check",    FL_ALT+'i', 0, 0, FL_MENU_TOGGLE|FL_MENU_VALUE},
  {"box",      FL_ALT+'i', 0, 0, FL_MENU_TOGGLE},
  {}
};
```

produces:

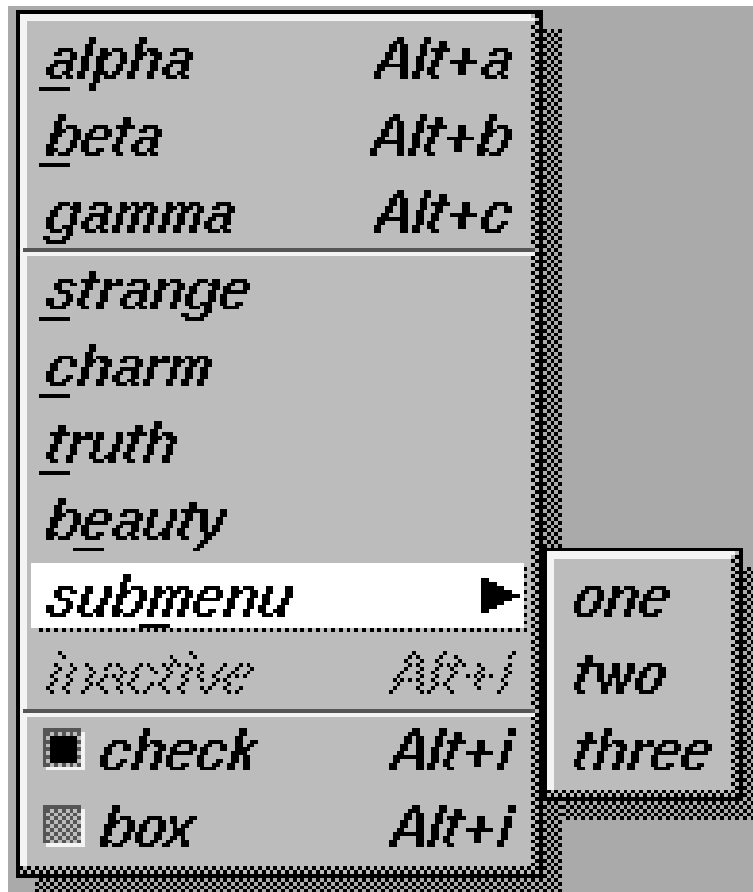


Figure 31.21 menu

A submenu title is identified by the bit `FL_SUBMENU` in the flags field, and ends with a `label()` that is `NULL`. You can nest menus to any depth. A pointer to the first item in the submenu can be treated as an `Fl_Menu` array itself. It is also possible to make separate submenu arrays with `FL_SUBMENU_POINTER` flags. You should use the method functions to access structure members and not access them directly to avoid compatibility problems with future releases of FLTK.

31.82.2 Member Function Documentation

31.82.2.1 `add()`

```
int Fl_Menu_Item::add (
    const char * mytext,
    int sc,
    Fl_Callback * cb,
    void * data = 0,
    int myflags = 0 )
```

Adds a menu item.

The text is split at '/' characters to automatically produce submenus (actually a totally unnecessary feature as you can now add submenu titles directly by setting `FL_SUBMENU` in the flags).

Returns

the index into the `menu()` array, where the entry was added

See also

[Fl_Menu_Item::insert\(int, const char*, int, Fl_Callback*, void*, int\)](#)

31.82.2.2 `argument()` [1/2]

```
long Fl_Menu_Item::argument ( ) const [inline]
```

Gets the `user_data()` argument that is sent to the callback function.

For convenience you can also define the callback as taking a long argument. This method casts the stored `user_data()` argument to long and returns it as a *long* value.

31.82.2.3 `argument()` [2/2]

```
void Fl_Menu_Item::argument (
    long v ) [inline]
```

Sets the `user_data()` argument that is sent to the callback function.

For convenience you can also define the callback as taking a long argument. This method casts the given argument `v` to `void*` and stores it in the menu item's `userdata()` member. This may not be portable to some machines.

31.82.2.4 `callback()` [1/5]

```
Fl_Callback_p Fl_Menu_Item::callback ( ) const [inline]
```

Returns the callback function that is set for the menu item.

Each item has space for a callback function and an argument for that function. Due to back compatibility, the `Fl_Menu_Item` itself is not passed to the callback, instead you have to get it by calling `((Fl_Menu_*)w)->mvalue()` where `w` is the widget argument.

31.82.2.5 `callback()` [2/5]

```
void Fl_Menu_Item::callback (
    Fl_Callback * c ) [inline]
```

Sets the menu item's callback function.

This method does not set the `userdata()` argument.

See also

[Fl_Callback_p](#) `Fl_MenuItem::callback()` const

31.82.2.6 `callback()` [3/5]

```
void Fl_Menu_Item::callback (
    Fl_Callback * c,
    void * p ) [inline]
```

Sets the menu item's callback function and `userdata()` argument.

See also

[Fl_Callback_p](#) `Fl_MenuItem::callback()` const

31.82.2.7 `callback()` [4/5]

```
void Fl_Menu_Item::callback (
    Fl_Callback0 * c ) [inline]
```

Sets the menu item's callback function.

This method does not set the `userdata()` argument.

See also

[Fl_Callback_p](#) `Fl_MenuItem::callback()` const

31.82.2.8 callback() [5/5]

```
void Fl_Menu_Item::callback (
    Fl_Callback1 * c,
    long p = 0 ) [inline]
```

Sets the menu item's callback function and userdata() argument.

This method does not set the userdata() argument. The argument `is` is cast to `void*` and stored as the `userdata()` for the menu item's callback function.

See also

[Fl_Callback_p](#) `Fl_MenuItem::callback()` `const`

31.82.2.9 check()

```
void Fl_Menu_Item::check ( ) [inline]
back compatibility only
```

Deprecated .

31.82.2.10 checkbox()

```
int Fl_Menu_Item::checkbox ( ) const [inline]
```

Returns true if a checkbox will be drawn next to this item.

This is true if `FL_MENU_TOGGLE` or `FL_MENU_RADIO` is set in the flags.

31.82.2.11 checked()

```
int Fl_Menu_Item::checked ( ) const [inline]
back compatibility only
```

Deprecated .

31.82.2.12 deactivate()

```
void Fl_Menu_Item::deactivate ( ) [inline]
```

Prevents a menu item from being picked.

Note that this will also cause the menu item to appear grayed-out.

31.82.2.13 do_callback() [1/3]

```
void Fl_Menu_Item::do_callback (
    Fl_Widget * o ) const [inline]
```

Calls the `Fl_Menu_Item` item's callback, and provides the `Fl_Widget` argument.

The callback is called with the stored `user_data()` as its second argument. You must first check that `callback()` is non-zero before calling this.

31.82.2.14 do_callback() [2/3]

```
void Fl_Menu_Item::do_callback (
    Fl_Widget * o,
    long arg ) const [inline]
```

Calls the `Fl_Menu_Item` item's callback, and provides the `Fl_Widget` argument.

This call overrides the callback's second argument with the given value `arg`. `long arg` is cast to `void*` when calling the callback. You must first check that `callback()` is non-zero before calling this.

31.82.2.15 do_callback() [3/3]

```
void Fl_Menu_Item::do_callback (
    Fl_Widget * o,
    void * arg ) const [inline]
```

Calls the [Fl_Menu_Item](#) item's callback, and provides the [Fl_Widget](#) argument.

This call overrides the callback's second argument with the given value `arg`. You must first check that `callback()` is non-zero before calling this.

31.82.2.16 find_shortcut()

```
const Fl_Menu_Item * Fl_Menu_Item::find_shortcut (
    int * ip = 0,
    const bool require_alt = false ) const
```

Search only the top level menu for a shortcut.

Either `&x` in the label or the shortcut fields are used.

This tests the current event, which must be an `FL_KEYBOARD` or `FL_SHORTCUT`, against a shortcut value.

Parameters

<i>ip</i>	returns the index of the item, if <i>ip</i> is not NULL.
<i>require_alt</i>	if true: match only if Alt key is pressed.

Returns

found [Fl_Menu_Item](#) or NULL

31.82.2.17 insert()

```
int Fl_Menu_Item::insert (
    int index,
    const char * mytext,
    int sc,
    Fl_Callback * cb,
    void * data = 0,
    int myflags = 0 )
```

Inserts an item at position `index`.

If `index` is -1, the item is added the same way as [Fl_Menu_Item::add\(\)](#).

If 'mytext' contains any un-escaped front slashes (`/`), it's assumed a menu pathname is being specified, and the value of `index` will be ignored.

In all other aspects, the behavior of [insert\(\)](#) is the same as [add\(\)](#).

Parameters

in	<i>index</i>	insert new items here
in	<i>mytext</i>	new label string, details see above
in	<i>sc</i>	keyboard shortcut for new item
in	<i>cb</i>	callback function for new item
in	<i>data</i>	user data for new item
in	<i>myflags</i>	menu flags as described in Fl_Menu_Item

Returns

the index into the `menu()` array, where the entry was added

31.82.2.18 label()

```
const char* Fl_Menu_Item::label ( ) const [inline]
```

Returns the title of the item.

A NULL here indicates the end of the menu (or of a submenu). A '&' in the item will print an underscore under the next letter, and if the menu is popped up that letter will be a "shortcut" to pick that item. To get a real '&' put two in a row.

31.82.2.19 labelcolor() [1/2]

```
Fl_Color Fl_Menu_Item::labelcolor ( ) const [inline]
```

Gets the menu item's label color.

This color is passed to the `labeltype` routine, and is typically the color of the label text. This defaults to `FL_BLACK`. If this color is not black fltk will **not** use overlay bitplanes to draw the menu - this is so that images put in the menu draw correctly.

31.82.2.20 labelcolor() [2/2]

```
void Fl_Menu_Item::labelcolor (
    Fl_Color a ) [inline]
```

Sets the menu item's label color.

See also

[Fl_Color Fl_Menu_Item::labelcolor\(\) const](#)

31.82.2.21 labelfont() [1/2]

```
Fl_Font Fl_Menu_Item::labelfont ( ) const [inline]
```

Gets the menu item's label font.

Fonts are identified by small 8-bit indexes into a table. See the enumeration list for predefined fonts. The default value is a Helvetica font. The function [Fl::set_font\(\)](#) can define new fonts.

31.82.2.22 labelfont() [2/2]

```
void Fl_Menu_Item::labelfont (
    Fl_Font a ) [inline]
```

Sets the menu item's label font.

Fonts are identified by small 8-bit indexes into a table. See the enumeration list for predefined fonts. The default value is a Helvetica font. The function [Fl::set_font\(\)](#) can define new fonts.

31.82.2.23 labeltype() [1/2]

```
Fl_Labeltype Fl_Menu_Item::labeltype ( ) const [inline]
```

Returns the menu item's labeltype.

A labeltype identifies a routine that draws the label of the widget. This can be used for special effects such as emboss, or to use the [label\(\)](#) pointer as another form of data such as a bitmap. The value `FL_NORMAL_LABEL` prints the label as text.

31.82.2.24 labeltype() [2/2]

```
void Fl_Menu_Item::labeltype (
    Fl_Labeltype a ) [inline]
```

Sets the menu item's labeltype.

A labeltype identifies a routine that draws the label of the widget. This can be used for special effects such as emboss, or to use the [label\(\)](#) pointer as another form of data such as a bitmap. The value `FL_NORMAL_LABEL` prints the label as text.

31.82.2.25 measure()

```
int Fl_Menu_Item::measure (
    int * hp,
    const Fl_Menu_ * m ) const
```

Measures width of label, including effect of & characters.
Optionally, can get height if hp is not NULL.

31.82.2.26 next() [1/2]

```
Fl_Menu_Item* Fl_Menu_Item::next (
    int i = 1 ) [inline]
```

Advances a pointer by n items through a menu array, skipping the contents of submenus and invisible items.
There are two calls so that you can advance through const and non-const data.

31.82.2.27 next() [2/2]

```
const Fl_Menu_Item * Fl_Menu_Item::next (
    int n = 1 ) const
```

Advance a pointer by n items through a menu array, skipping the contents of submenus and invisible items.
There are two calls so that you can advance through const and non-const data.

31.82.2.28 popup()

```
const Fl_Menu_Item * Fl_Menu_Item::popup (
    int X,
    int Y,
    const char * title = 0,
    const Fl_Menu_Item * picked = 0,
    const Fl_Menu_ * button = 0 ) const
```

This method is called by widgets that want to display menus.

The menu stays up until the user picks an item or dismisses it. The selected item (or NULL if none) is returned. *This does not do the callbacks or change the state of check or radio items.*

X,Y is the position of the mouse cursor, relative to the window that got the most recent event (usually you can pass [Fl::event_x\(\)](#) and [Fl::event_y\(\)](#) unchanged here).

title is a character string title for the menu. If non-zero a small box appears above the menu with the title in it.

The menu is positioned so the cursor is centered over the item picked. This will work even if picked is in a submenu. If picked is zero or not in the menu item table the menu is positioned with the cursor in the top-left corner.

button is a pointer to an [Fl_Menu_](#) from which the color and boxtypes for the menu are pulled. If NULL then defaults are used.

31.82.2.29 pulldown()

```
const Fl_Menu_Item * Fl_Menu_Item::pulldown (
    int X,
    int Y,
    int W,
    int H,
    const Fl_Menu_Item * initial_item = 0,
    const Fl_Menu_ * pbutton = 0,
    const Fl_Menu_Item * t = 0,
    int menubar = 0 ) const
```

Pulldown() is similar to [popup\(\)](#), but a rectangle is provided to position the menu.

The menu is made at least W wide, and the picked item is centered over the rectangle (like [Fl_Choice](#) uses). If picked is zero or not found, the menu is aligned just below the rectangle (like a pulldown menu).

The title and menubar arguments are used internally by the [Fl_Menu_Bar](#) widget.

31.82.2.30 radio()

```
int Fl_Menu_Item::radio ( ) const [inline]
```

Returns true if this item is a radio item.

When a radio button is selected all "adjacent" radio buttons are turned off. A set of radio items is delimited by an item that has [radio\(\)](#) false, or by an item with FL_MENU_DIVIDER turned on.

31.82.2.31 set()

```
void Fl_Menu_Item::set ( ) [inline]
```

Turns the check or radio item "on" for the menu item.

Note that this does not turn off any adjacent radio items like [set_only\(\)](#) does.

31.82.2.32 setonly()

```
void Fl_Menu_Item::setonly ( )
```

Turns the radio item "on" for the menu item and turns "off" adjacent radio items set.

Deprecated This method is dangerous if radio items are first in the menu. Use [Fl_Menu_::setonly\(Fl_Menu_Item*\)](#) instead.

31.82.2.33 shortcut()

```
void Fl_Menu_Item::shortcut (
    int s ) [inline]
```

Sets exactly what key combination will trigger the menu item.

The value is a logical 'or' of a key and a set of shift flags, for instance FL_ALT+'a' or FL_ALT+FL_F+10 or just 'a'. A value of zero disables the shortcut.

The key can be any value returned by [Fl::event_key\(\)](#), but will usually be an ASCII letter. Use a lower-case letter unless you require the shift key to be held down.

The shift flags can be any set of values accepted by [Fl::event_state\(\)](#). If the bit is on that shift key must be pushed. Meta, Alt, Ctrl, and Shift must be off if they are not in the shift flags (zero for the other bits indicates a "don't care" setting).

31.82.2.34 size()

```
int Fl_Menu_Item::size ( ) const
```

Size of the menu starting from this menu item.

This method counts all menu items starting with `this` menu item, including all menu items in the same (sub)menu level, all nested submenus, **and** the terminating empty (0) menu item.

It does **not** count menu items referred to by FL_SUBMENU_POINTER menu items (except the single menu item with FL_SUBMENU_POINTER).

All menu items counted are consecutive in memory (one array).

Example:

```
schemechoice = new Fl_Choice(X+125,Y,140,25,"FLTK Scheme");
schemechoice->add("none");
schemechoice->add("plastic");
schemechoice->add("gtk+");
schemechoice->add("gleam");
printf("schemechoice->menu()->size() = %d\n", schemechoice->menu()->size());
```

Output:

```
schemechoice->menu()->size() = 5
```

31.82.2.35 submenu()

```
int Fl_Menu_Item::submenu ( ) const [inline]
```

Returns true if either FL_SUBMENU or FL_SUBMENU_POINTER is on in the flags.

FL_SUBMENU indicates an embedded submenu that goes from the next item through the next one with a NULL [label\(\)](#). FL_SUBMENU_POINTER indicates that [user_data\(\)](#) is a pointer to another menu array.

31.82.2.36 test_shortcut()

```
const Fl_Menu_Item * Fl_Menu_Item::test_shortcut ( ) const
```

This is designed to be called by a widget's handle() method in response to a FL_SHORTCUT event.

If the current event matches one of the items shortcut, that item is returned. If the keystroke does not match any shortcuts then NULL is returned. This only matches the [shortcut\(\)](#) fields, not the letters in the title preceeded by ' '.

31.82.2.37 uncheck()

```
void Fl_Menu_Item::uncheck ( ) [inline]
```

back compatibility only

Deprecated .

31.82.2.38 value()

```
int Fl_Menu_Item::value ( ) const [inline]
```

Returns the current value of the check or radio item.

This is zero (0) if the menu item is not checked and non-zero otherwise. You should not rely on a particular value, only zero or non-zero.

Note

The returned value for a checked menu item as of FLTK 1.3.2 is FL_MENU_VALUE (4), but may be 1 in a future version.

The documentation for this struct was generated from the following files:

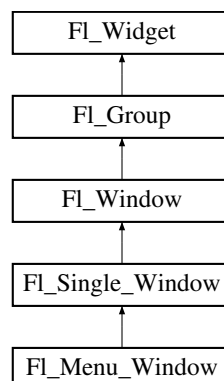
- [Fl_Menu_Item.H](#)
- [Fl_Menu.cxx](#)
- [Fl_Menu_.cxx](#)
- [Fl_Menu_add.cxx](#)

31.83 Fl_Menu_Window Class Reference

The [Fl_Menu_Window](#) widget is a window type used for menus.

```
#include <Fl_Menu_Window.H>
```

Inheritance diagram for [Fl_Menu_Window](#):



Public Member Functions

- void [clear_overlay](#) ()
Tells FLTK to use normal drawing planes instead of overlay planes.
- void [erase](#) ()

- Erases the window, does nothing if HAVE_OVERLAY is not defined config.h.*

 - [Fl_Menu_Window](#) (int W, int H, const char *l=0)

Creates a new [Fl_Menu_Window](#) widget using the given size, and label string.
 - [Fl_Menu_Window](#) (int X, int Y, int W, int H, const char *l=0)

Creates a new [Fl_Menu_Window](#) widget using the given position, size, and label string.
 - void [flush](#) ()

Forces the window to be drawn, this window is also made current and calls [draw\(\)](#).
 - void [hide](#) ()

Removes the window from the screen.
 - unsigned int [overlay](#) ()

Tells if hardware overlay mode is set.
 - void [set_overlay](#) ()

Tells FLTK to use hardware overlay planes if they are available.
 - void [show](#) ()

Puts the window on the screen.
 - [~Fl_Menu_Window](#) ()

Destroys the window and all of its children.

Additional Inherited Members

31.83.1 Detailed Description

The [Fl_Menu_Window](#) widget is a window type used for menus.

By default the window is drawn in the hardware overlay planes if they are available so that the menu don't force the rest of the window to redraw.

31.83.2 Member Function Documentation

31.83.2.1 [clear_overlay\(\)](#)

```
void Fl_Menu_Window::clear_overlay ( ) [inline]
```

Tells FLTK to use normal drawing planes instead of overlay planes.

This is usually necessary if your menu contains multi-color pixmaps.

31.83.2.2 [hide\(\)](#)

```
void Fl_Menu_Window::hide ( ) [virtual]
```

Removes the window from the screen.

If the window is already hidden or has not been shown then this does nothing and is harmless.

Reimplemented from [Fl_Window](#).

31.83.2.3 [set_overlay\(\)](#)

```
void Fl_Menu_Window::set_overlay ( ) [inline]
```

Tells FLTK to use hardware overlay planes if they are available.

31.83.2.4 show()

```
void Fl_Menu_Window::show ( ) [virtual]
```

Puts the window on the screen.

Usually (on X) this has the side effect of opening the display.

If the window is already shown then it is restored and raised to the top. This is really convenient because your program can call `show()` at any time, even if the window is already up. It also means that `show()` serves the purpose of `raise()` in other toolkits.

`Fl_Window::show(int argc, char **argv)` is used for top-level windows and allows standard arguments to be parsed from the command-line.

Note

For some obscure reasons `Fl_Window::show()` resets the current group by calling `Fl_Group::current(0)`. The comments in the code say "get rid of very common user bug: forgot end()". Although this is true it may have unwanted side effects if you `show()` an unrelated window (maybe for an error message or warning) while building a window or any other group widget.

Todo Check if we can remove resetting the current group in a later FLTK version (after 1.3.x). This may break "already broken" programs though if they rely on this "feature".

See also

[Fl_Window::show\(int argc, char **argv\)](#)

Reimplemented from [Fl_Window](#).

The documentation for this class was generated from the following files:

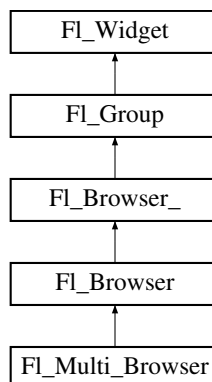
- `Fl_Menu_Window.H`
- `Fl_Menu_Window.cxx`

31.84 FI_Multi_Browser Class Reference

The `Fl_Multi_Browser` class is a subclass of `Fl_Browser` which lets the user select any set of the lines.

```
#include <Fl_Multi_Browser.H>
```

Inheritance diagram for `Fl_Multi_Browser`:



Public Member Functions

- `Fl_Multi_Browser` (int X, int Y, int W, int H, const char *L=0)
Creates a new `Fl_Multi_Browser` widget using the given position, size, and label string.

Additional Inherited Members

31.84.1 Detailed Description

The `Fl_Multi_Browser` class is a subclass of `Fl_Browser` which lets the user select any set of the lines.

The user interface is Macintosh style: clicking an item turns off all the others and selects that one, dragging selects all the items the mouse moves over, and ctrl + click (Cmd+click on the Mac OS platform) toggles the items. Shift + click extends the selection until the clicked item. This is different from how forms did it. Normally the callback is done when the user releases the mouse, but you can change this with [when\(\)](#). See [Fl_Browser](#) for methods to add and remove lines from the browser.

31.84.2 Constructor & Destructor Documentation

31.84.2.1 Fl_Multi_Browser()

```
Fl_Multi_Browser::Fl_Multi_Browser (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new [Fl_Multi_Browser](#) widget using the given position, size, and label string.

The default boxtype is FL_DOWN_BOX. The constructor specializes [Fl_Browser\(\)](#) by setting the type to FL_↔MULTI_BROWSER. The destructor destroys the widget and frees all memory that has been allocated.

The documentation for this class was generated from the following files:

- [Fl_Multi_Browser.H](#)
- [Fl_Browser.cxx](#)

31.85 Fl_Multi_Label Struct Reference

This struct allows multiple labels to be added to objects that might normally have only one label.

```
#include <Fl_Multi_Label.H>
```

Public Member Functions

- void [label](#) ([Fl_Menu_Item](#) *)
This method is used to associate a [Fl_Multi_Label](#) with a [Fl_Menu_Item](#).
- void [label](#) ([Fl_Widget](#) *)
This method is used to associate a [Fl_Multi_Label](#) with a [Fl_Widget](#).

Public Attributes

- const char * [labela](#)
Holds the "leftmost" of the two elements in the composite label.
- const char * [labelb](#)
Holds the "rightmost" of the two elements in the composite label.
- [uchar](#) [typea](#)
Holds the "type" of [labela](#).
- [uchar](#) [typeb](#)
Holds the "type" of [labelb](#).

31.85.1 Detailed Description

This struct allows multiple labels to be added to objects that might normally have only one label.

This struct allows a mixed text and/or graphics label to be applied to an object that would normally only have a single (usually text only) label.

Most regular FLTK widgets now support the ability to associate both images and text with a label but some special cases, notably the non-widget [Fl_Menu_Item](#) objects, do not. [Fl_Multi_Label](#) may be used to create menu items

that have an icon and text, which would not normally be possible for an [FI_Menu_Item](#). For example, [FI_Multi_Label](#) is used in the New->Code submenu in fluid, and others.

Each [FI_Multi_Label](#) holds two elements, `labela` and `labelb`; each may hold either a text label (`const char*`) or an image (`FI_Image*`). When displayed, `labela` is drawn first and `labelb` is drawn immediately to its right.

More complex labels might be constructed by setting `labelb` as another [FI_Multi_Label](#) and thus chaining up a series of label elements.

When assigning a label element to one of `labela` or `labelb`, they should be explicitly cast to (`const char*`) if they are not of that type already.

See also

[FI_Label](#) and [FI_Labeltype](#)

31.85.2 Member Data Documentation

31.85.2.1 `labela`

```
const char* Fl_Multi_Label::labela
```

Holds the "leftmost" of the two elements in the composite label.

Typically this would be assigned either a text string (`const char*`), a (`FI_Image*`) or a (`FI_Multi_Label*`).

31.85.2.2 `labelb`

```
const char* Fl_Multi_Label::labelb
```

Holds the "rightmost" of the two elements in the composite label.

Typically this would be assigned either a text string (`const char*`), a (`FI_Image*`) or a (`FI_Multi_Label*`).

31.85.2.3 `typea`

```
uchar Fl_Multi_Label::typea
```

Holds the "type" of `labela`.

Typically this is set to `FL_NORMAL_LABEL` for a text label, `_FL_IMAGE_LABEL` for an image (based on `FI_image`) or `_FL_MULTI_LABEL` if "chaining" multiple [FI_Multi_Label](#) elements together.

31.85.2.4 `typeb`

```
uchar Fl_Multi_Label::typeb
```

Holds the "type" of `labelb`.

Typically this is set to `FL_NORMAL_LABEL` for a text label, `_FL_IMAGE_LABEL` for an image (based on `FI_image`) or `_FL_MULTI_LABEL` if "chaining" multiple [FI_Multi_Label](#) elements together.

The documentation for this struct was generated from the following files:

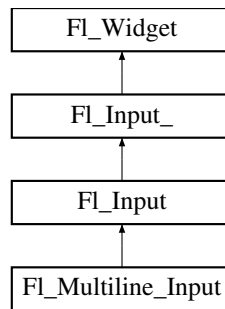
- `FI_Multi_Label.H`
- `FI_Multi_Label.cxx`

31.86 FI_Multiline_Input Class Reference

This input field displays '\n' characters as new lines rather than ^J, and accepts the Return, Tab, and up and down arrow keys.

```
#include <Fl_Multiline_Input.H>
```

Inheritance diagram for `FI_Multiline_Input`:



Public Member Functions

- [Fl_Multiline_Input](#) (int X, int Y, int W, int H, const char *l=0)

Creates a new [Fl_Multiline_Input](#) widget using the given position, size, and label string.

Additional Inherited Members

31.86.1 Detailed Description

This input field displays '\n' characters as new lines rather than ^J, and accepts the Return, Tab, and up and down arrow keys.

This is for editing multiline text.

This is far from the nirvana of text editors, and is probably only good for small bits of text, 10 lines at most. Note that this widget does not support scrollbars or per-character color control.

If you are presenting large amounts of text and need scrollbars or full color control of characters, you probably want [Fl_Text_Editor](#) instead.

In FLTK 1.3.x, the default behavior of the 'Tab' key was changed to support consistent focus navigation. To get the older FLTK 1.1.x behavior, set [Fl_Input_::tab_nav\(\)](#) to 0. Newer programs should consider using [Fl_Text_Editor](#).

31.86.2 Constructor & Destructor Documentation

31.86.2.1 Fl_Multiline_Input()

```

Fl_Multiline_Input::Fl_Multiline_Input (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
  
```

Creates a new [Fl_Multiline_Input](#) widget using the given position, size, and label string.

The default boxtype is FL_DOWN_BOX.

Inherited destructor destroys the widget and any value associated with it.

The documentation for this class was generated from the following files:

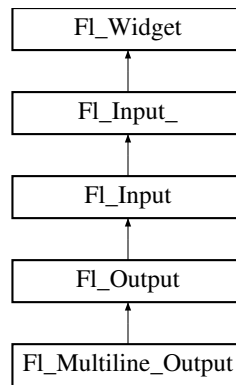
- [Fl_Multiline_Input.H](#)
- [Fl_Input.cxx](#)

31.87 Fl_Multiline_Output Class Reference

This widget is a subclass of [Fl_Output](#) that displays multiple lines of text.

```
#include <Fl_Multiline_Output.H>
```

Inheritance diagram for [Fl_Multiline_Output](#):



Public Member Functions

- [Fl_Multiline_Output](#) (int X, int Y, int W, int H, const char *l=0)
Creates a new [Fl_Multiline_Output](#) widget using the given position, size, and label string.

Additional Inherited Members

31.87.1 Detailed Description

This widget is a subclass of [Fl_Output](#) that displays multiple lines of text. It also displays tab characters as whitespace to the next column. Note that this widget does not support scrollbars, or per-character color control. If you are presenting large amounts of read-only text and need scrollbars, or full color control of characters, then use [Fl_Text_Display](#). If you want to display HTML text, use [Fl_Help_View](#).

31.87.2 Constructor & Destructor Documentation

31.87.2.1 Fl_Multiline_Output()

```

Fl_Multiline_Output::Fl_Multiline_Output (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
  
```

Creates a new [Fl_Multiline_Output](#) widget using the given position, size, and label string.

The default boxtype is FL_DOWN_BOX.

Inherited destructor destroys the widget and any value associated with it.

The documentation for this class was generated from the following files:

- Fl_Multiline_Output.H
- Fl_Input.cxx

31.88 Fl_Native_File_Chooser Class Reference

This class lets an FLTK application easily and consistently access the operating system's native file chooser.

```
#include <Fl_Native_File_Chooser.H>
```

Public Types

- enum [Option](#) {
[NO_OPTIONS](#) = 0x0000 , [SAVEAS_CONFIRM](#) = 0x0001 , [NEW_FOLDER](#) = 0x0002 , [PREVIEW](#) = 0x0004 ,
[USE_FILTER_EXT](#) = 0x0008 }

- enum `Type` {
`BROWSE_FILE = 0` , `BROWSE_DIRECTORY` , `BROWSE_MULTI_FILE` , `BROWSE_MULTI_DIRECTORY` ,
`BROWSE_SAVE_FILE` , `BROWSE_SAVE_DIRECTORY` }

Public Member Functions

- int `count` () const
Returns the number of filenames (or directory names) the user selected.
- const char * `directory` () const
Returns the current preset `directory()` value.
- void `directory` (const char *val)
Preset the directory the browser will show when opened.
- const char * `errmsg` () const
Returns a system dependent error message for the last method that failed.
- const char * `filename` () const
Return the filename the user chose.
- const char * `filename` (int i) const
Return one of the filenames the user selected.
- const char * `filter` () const
Returns the filter string last set.
- void `filter` (const char *f)
Sets the filename filters used for browsing.
- int `filter_value` () const
Returns which filter value was last selected by the user.
- void `filter_value` (int i)
Sets which filter will be initially selected.
- int `filters` () const
Gets how many filters were available, not including "All Files".
- `FI_Native_File_Chooser` (int val=`BROWSE_FILE`)
The constructor.
- int `options` () const
Gets the platform specific `FI_Native_File_Chooser::Option` flags.
- void `options` (int o)
Sets the platform specific chooser options to `val`.
- const char * `preset_file` () const
Get the preset filename.
- void `preset_file` (const char *f)
Sets the default filename for the chooser.
- int `show` ()
Post the chooser's dialog.
- const char * `title` () const
Get the title of the file chooser's dialog window.
- void `title` (const char *t)
Set the title of the file chooser's dialog window.
- int `type` () const
Gets the current `FI_Native_File_Chooser::Type` of browser.
- void `type` (int t)
Sets the current `FI_Native_File_Chooser::Type` of browser.
- `~FI_Native_File_Chooser` ()
Destructor.

Static Public Attributes

- static const char * [file_exists_message](#) = "File exists. Are you sure you want to overwrite?"

Localizable message.

31.88.1 Detailed Description

This class lets an FLTK application easily and consistently access the operating system's native file chooser. Some operating systems have very complex and specific file choosers that many users want access to specifically, instead of FLTK's default file chooser(s).

In cases where there is no native file browser, FLTK's own file browser is used instead.

To use this widget, use the following include in your code:

```
#include <FL/Fl_Native_File_Chooser.H>
```

The following example shows how to pick a single file:

```
// Create and post the local native file chooser
#include <FL/Fl_Native_File_Chooser.H>
[...
Fl_Native_File_Chooser fnfc;
fnfc.title("Pick a file");
fnfc.type(Fl_Native_File_Chooser::BROWSE_FILE);
fnfc.filter("Text\t*.txt\n"
           "C Files\t*.{cxx,h,c}");
fnfc.directory("/var/tmp"); // default directory to use
// Show native chooser
switch ( fnfc.show() ) {
  case -1: printf("ERROR: %s\n", fnfc.errmsg()); break; // ERROR
  case 1: printf("CANCEL\n"); break; // CANCEL
  default: printf("PICKED: %s\n", fnfc.filename()); break; // FILE CHOSEN
}
```

The [Fl_Native_File_Chooser](#) widget transmits UTF-8 encoded filenames to its user. It is recommended to open files that may have non-ASCII names with the [fl_fopen\(\)](#) or [fl_open\(\)](#) utility functions that handle these names in a cross-platform way (whereas the standard [fopen\(\)/open\(\)](#) functions fail on the MSWindows platform to open files with a non-ASCII name).

Platform Specific Caveats

- Under X windows, and if [FI::OPTION_FNFC_USES_GTK](#) has not been switched off, the widget attempts to use standard GTK file chooser dialogs if they are available at run-time on the platform, and falls back to use FLTK's [Fl_File_Chooser](#) if they are not. In the latter case, it's best if you call [Fl_File_Icon::load_system_icons\(\)](#) at the start of [main\(\)](#), to enable the nicer looking file browser widgets. Use the static public attributes of class [Fl_File_Chooser](#) to localize the browser.
- Some operating systems support certain OS specific options; see [Fl_Native_File_Chooser::options\(\)](#) for a list.



Figure 31.22 The Fl_Native_File_Chooser on different platforms

31.88.2 Member Enumeration Documentation

31.88.2.1 Option

```
enum Fl_Native_File_Chooser::Option
```

Enumerator

NO_OPTIONS	no options enabled
SAVEAS_CONFIRM	Show native 'Save As' overwrite confirm dialog.
NEW_FOLDER	Show 'New Folder' icon (if supported)
PREVIEW	enable preview mode (if supported)
USE_FILTER_EXT	Chooser filter pilots the output file extension (if supported)

31.88.2.2 Type

```
enum Fl_Native_File_Chooser::Type
```

Enumerator

BROWSE_FILE	browse files (lets user choose one file)
BROWSE_DIRECTORY	browse directories (lets user choose one directory)
BROWSE_MULTI_FILE	browse files (lets user choose multiple files)
BROWSE_MULTI_DIRECTORY	browse directories (lets user choose multiple directories)

Enumerator

BROWSE_SAVE_FILE	browse to save a file
BROWSE_SAVE_DIRECTORY	browse to save a directory

31.88.3 Constructor & Destructor Documentation

31.88.3.1 Fl_Native_File_Chooser()

```
Fl_Native_File_Chooser::Fl_Native_File_Chooser (
    int val = BROWSE_FILE )
```

The constructor.

Internally allocates the native widgets. Optional `val` presets the type of browser this will be, which can also be changed with `type()`.

31.88.3.2 ~Fl_Native_File_Chooser()

```
Fl_Native_File_Chooser::~Fl_Native_File_Chooser ( )
```

Destructor.

Deallocates any resources allocated to this widget.

31.88.4 Member Function Documentation

31.88.4.1 count()

```
int Fl_Native_File_Chooser::count ( ) const
```

Returns the number of filenames (or directory names) the user selected.

Example:

```
if ( fnfc->show() == 0 ) {
    // Print all filenames user selected
    for (int n=0; n<fnfc->count(); n++) {
        printf("%d) '%s'\n", n, fnfc->filename(n));
    }
}
```

31.88.4.2 directory()

```
void Fl_Native_File_Chooser::directory (
    const char * val )
```

Preset the directory the browser will show when opened.

If `val` is NULL, or no directory is specified, the chooser will attempt to use the last non-cancelled folder.

31.88.4.3 errmsg()

```
const char * Fl_Native_File_Chooser::errmsg ( ) const
```

Returns a system dependent error message for the last method that failed.

This message should at least be flagged to the user in a dialog box, or to some kind of error log. Contents will be valid only for methods that document `errmsg()` will have info on failures.

31.88.4.4 filename() [1/2]

```
const char * Fl_Native_File_Chooser::filename ( ) const
```

Return the filename the user chose.

Use this if only expecting a single filename. If more than one filename is expected, use `filename(int)` instead. Return value may be "" if no filename was chosen (eg. user cancelled).

31.88.4.5 filename() [2/2]

```
const char * Fl_Native_File_Chooser::filename (
    int i ) const
```

Return one of the filenames the user selected.

Use [count\(\)](#) to determine how many filenames the user selected.

Example:

```
if ( fnfc->show() == 0 ) {
    // Print all filenames user selected
    for (int n=0; n<fnfc->count(); n++ ) {
        printf("%d) '%s'\n", n, fnfc->filename(n));
    }
}
```

31.88.4.6 filter() [1/2]

```
const char * Fl_Native_File_Chooser::filter ( ) const
```

Returns the filter string last set.

Can be NULL if no filter was set.

31.88.4.7 filter() [2/2]

```
void Fl_Native_File_Chooser::filter (
    const char * f )
```

Sets the filename filters used for browsing.

The default is NULL, which browses all files.

The filter string can be any of:

- A single wildcard (eg. "*.txt")
- Multiple wildcards (eg. ".*{cxx,h,H}")
- A descriptive name followed by a "\t" and a wildcard (eg. "Text Files\t*.txt")
- A list of separate wildcards with a "\n" between each (eg. ".*{cxx,H}\n*.txt")
- A list of descriptive names and wildcards (eg. "C++ Files\t*.{cxx,H}\nTxt Files\t*.txt")

The format of each filter is a wildcard, or an optional user description followed by '\t' and the wildcard.

On most platforms, each filter is available to the user via a pulldown menu in the file chooser. The 'All Files' option is always available to the user.

31.88.4.8 filter_value() [1/2]

```
int Fl_Native_File_Chooser::filter_value ( ) const
```

Returns which filter value was last selected by the user.

This is only valid if the chooser returns success.

31.88.4.9 filter_value() [2/2]

```
void Fl_Native_File_Chooser::filter_value (
    int i )
```

Sets which filter will be initially selected.

The first filter is indexed as 0. If [filter_value\(\)==filters\(\)](#), then "All Files" was chosen. If [filter_value\(\) > filters\(\)](#), then a custom filter was set.

31.88.4.10 options()

```
void Fl_Native_File_Chooser::options (
    int o )
```

Sets the platform specific chooser options to `val`.

`val` is expected to be one or more [Fl_Native_File_Chooser::Option](#) flags ORed together. Some platforms have OS-specific functions that can be enabled/disabled via this method.

Flag	Description	Win	Mac	Other
<code>NEW_FOLDER</code>	Shows the 'New Folder' button.	Ignored	Used	Used
<code>PREVIEW</code>	Enables the 'Preview' mode by default.	Ignored	Ignored	Used
<code>SAVEAS_CONFIRM</code>	Confirm dialog if <code>BROWSE_SAVE_FILE</code> file exists.	Used	Used	Used
<code>USE_FILTER_EXT</code>	Chooser <code>filter</code> pilots the output file extension.	Ignored	Used	Used (GTK)

31.88.4.11 preset_file()

```
void Fl_Native_File_Chooser::preset_file (
    const char * f )
```

Sets the default filename for the chooser.

Use `directory()` to set the default directory. Mainly used to preset the filename for save dialogs, and on most platforms can be used for opening files as well.

31.88.4.12 show()

```
int Fl_Native_File_Chooser::show ( )
```

Post the chooser's dialog.

Blocks until dialog has been completed or cancelled.

Returns

- 0 – user picked a file
- 1 – user cancelled
- -1 – failed; `errmsg()` has reason

31.88.4.13 title() [1/2]

```
const char * Fl_Native_File_Chooser::title ( ) const
```

Get the title of the file chooser's dialog window.

Return value may be NULL if no title was set.

31.88.4.14 title() [2/2]

```
void Fl_Native_File_Chooser::title (
    const char * t )
```

Set the title of the file chooser's dialog window.

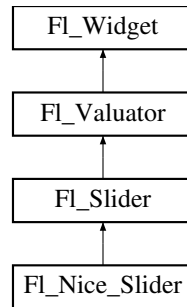
Can be NULL if no title desired. The default title varies according to the platform, so you are advised to set the title explicitly.

The documentation for this class was generated from the following files:

- [Fl_Native_File_Chooser.H](#)
- [Fl_Native_File_Chooser.cxx](#)
- [Fl_Native_File_Chooser_FLTK.cxx](#)

31.89 Fl_Nice_Slider Class Reference

Inheritance diagram for Fl_Nice_Slider:



Public Member Functions

- **Fl_Nice_Slider** (int X, int Y, int W, int H, const char *L=0)

Additional Inherited Members

The documentation for this class was generated from the following files:

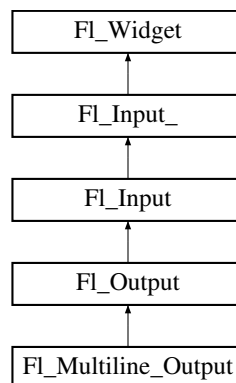
- Fl_Nice_Slider.H
- Fl_Slider.cxx

31.90 Fl_Output Class Reference

This widget displays a piece of text.

```
#include <Fl_Output.H>
```

Inheritance diagram for Fl_Output:



Public Member Functions

- **Fl_Output** (int X, int Y, int W, int H, const char *l=0)
Creates a new [Fl_Output](#) widget using the given position, size, and label string.

Additional Inherited Members

31.90.1 Detailed Description

This widget displays a piece of text.

When you set the [value\(\)](#) , [Fl_Output](#) does a strcpy() to its own storage, which is useful for program-generated values. The user may select portions of the text using the mouse and paste the contents into other fields or programs.

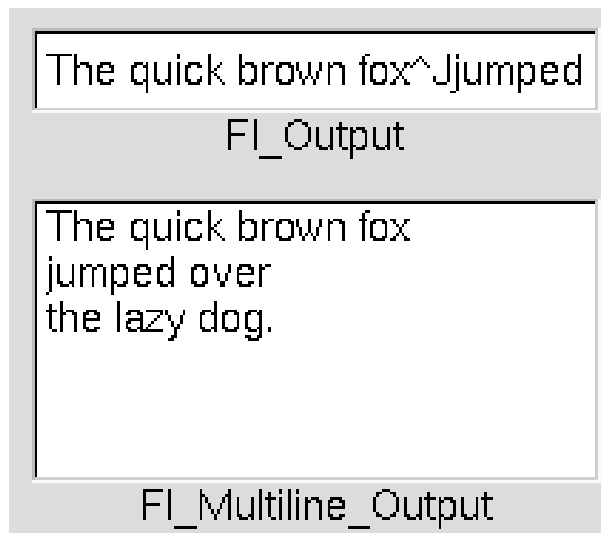


Figure 31.23 Fl_Output

There is a single subclass, [Fl_Multiline_Output](#), which allows you to display multiple lines of text. [Fl_Multiline_Output](#) does not provide scroll bars. If a more complete text editing widget is needed, use [Fl_Text_Display](#) instead. The text may contain any characters except `\0`, and will correctly display anything, using `^X` notation for unprintable control characters and `\nnn` notation for unprintable characters with the high bit set. It assumes the font can draw any characters in the ISO-Latin1 character set.

31.90.2 Constructor & Destructor Documentation

31.90.2.1 Fl_Output()

```
Fl_Output::Fl_Output (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new [Fl_Output](#) widget using the given position, size, and label string. The default boxtype is `FL_DOWN_BOX`.

Inherited destructor destroys the widget and any value associated with it.

The documentation for this class was generated from the following files:

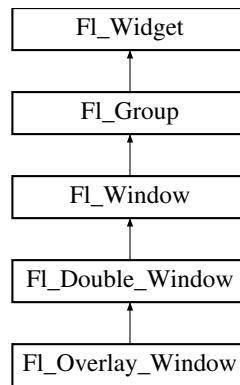
- [Fl_Output.H](#)
- [Fl_Input.cxx](#)

31.91 Fl_Overlay_Window Class Reference

This window provides double buffering and also the ability to draw the "overlay" which is another picture placed on top of the main image.

```
#include <Fl_Overlay_Window.H>
```

Inheritance diagram for [Fl_Overlay_Window](#):



Public Member Functions

- int [can_do_overlay](#) ()
Returns non-zero if there's hardware overlay support.
- void [flush](#) ()
Forces the window to be redrawn.
- void [hide](#) ()
Removes the window from the screen.
- void [redraw_overlay](#) ()
Call this to indicate that the overlay data has changed and needs to be redrawn.
- void [resize](#) (int, int, int, int)
Changes the size and position of the window.
- void [show](#) ()
Puts the window on the screen.
- void [show](#) (int a, char **b)
- [~FL_Overlay_Window](#) ()
Destroys the window and all child widgets.

Protected Member Functions

- virtual void [draw_overlay](#) ()=0
You must subclass [FL_Overlay_Window](#) and provide this method.
- [FL_Overlay_Window](#) (int W, int H, const char *l=0)
*See [FL_Overlay_Window::FL_Overlay_Window\(int X, int Y, int W, int H, const char *l=0\)](#)*
- [FL_Overlay_Window](#) (int X, int Y, int W, int H, const char *l=0)
Creates a new [FL_Overlay_Window](#) widget using the given position, size, and label (title) string.

Additional Inherited Members

31.91.1 Detailed Description

This window provides double buffering and also the ability to draw the "overlay" which is another picture placed on top of the main image.

The overlay is designed to be a rapidly-changing but simple graphic such as a mouse selection box. [FL_Overlay_Window](#) uses the overlay planes provided by your graphics hardware if they are available.

If no hardware support is found the overlay is simulated by drawing directly into the on-screen copy of the double-buffered window, and "erased" by copying the backbuffer over it again. This means the overlay will blink if you change the image in the window.

31.91.2 Constructor & Destructor Documentation

31.91.2.1 Fl_Overlay_Window()

```
Fl_Overlay_Window::Fl_Overlay_Window (
    int X,
    int Y,
    int W,
    int H,
    const char * I = 0 ) [protected]
```

Creates a new [Fl_Overlay_Window](#) widget using the given position, size, and label (title) string. If the positions (x,y) are not given, then the window manager will choose them.

31.91.3 Member Function Documentation

31.91.3.1 draw_overlay()

```
virtual void Fl_Overlay_Window::draw_overlay ( ) [protected], [pure virtual]
```

You must subclass [Fl_Overlay_Window](#) and provide this method.

It is just like a [draw\(\)](#) method, except it draws the overlay. The overlay will have already been "cleared" when this is called. You can use any of the routines described in [<FL/fl_draw.H>](#).

31.91.3.2 hide()

```
void Fl_Overlay_Window::hide ( ) [virtual]
```

Removes the window from the screen.

If the window is already hidden or has not been shown then this does nothing and is harmless.

Reimplemented from [Fl_Double_Window](#).

31.91.3.3 redraw_overlay()

```
void Fl_Overlay_Window::redraw_overlay ( )
```

Call this to indicate that the overlay data has changed and needs to be redrawn.

The overlay will be clear until the first time this is called, so if you want an initial display you must call this after calling [show\(\)](#).

31.91.3.4 resize()

```
void Fl_Overlay_Window::resize (
    int X,
    int Y,
    int W,
    int H ) [virtual]
```

Changes the size and position of the window.

If [shown\(\)](#) is true, these changes are communicated to the window server (which may refuse that size and cause a further resize). If [shown\(\)](#) is false, the size and position are used when [show\(\)](#) is called. See [Fl_Group](#) for the effect of resizing on the child widgets.

You can also call the [Fl_Widget](#) methods [size\(x,y\)](#) and [position\(w,h\)](#), which are inline wrappers for this virtual function.

A top-level window can not force, but merely suggest a position and size to the operating system. The window manager may not be willing or able to display a window at the desired position or with the given dimensions. It is up to the application developer to verify window parameters after the resize request.

Reimplemented from [Fl_Double_Window](#).

31.91.3.5 show()

```
void Fl_Overlay_Window::show ( ) [virtual]
```

Puts the window on the screen.

Usually (on X) this has the side effect of opening the display.

If the window is already shown then it is restored and raised to the top. This is really convenient because your program can call `show()` at any time, even if the window is already up. It also means that `show()` serves the purpose of `raise()` in other toolkits.

`Fl_Window::show(int argc, char **argv)` is used for top-level windows and allows standard arguments to be parsed from the command-line.

Note

For some obscure reasons `Fl_Window::show()` resets the current group by calling `Fl_Group::current(0)`. The comments in the code say "get rid of very common user bug: forgot end()". Although this is true it may have unwanted side effects if you `show()` an unrelated window (maybe for an error message or warning) while building a window or any other group widget.

Todo Check if we can remove resetting the current group in a later FLTK version (after 1.3.x). This may break "already broken" programs though if they rely on this "feature".

See also

[Fl_Window::show\(int argc, char **argv\)](#)

Reimplemented from [Fl_Double_Window](#).

The documentation for this class was generated from the following files:

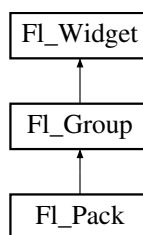
- [Fl_Overlay_Window.H](#)
- [Fl_Double_Window.cxx](#)
- [Fl_Overlay_Window.cxx](#)

31.92 Fl_Pack Class Reference

This widget was designed to add the functionality of compressing and aligning widgets.

```
#include <Fl_Pack.H>
```

Inheritance diagram for `Fl_Pack`:



Public Types

- enum { **VERTICAL** = 0 , **HORIZONTAL** = 1 }

Public Member Functions

- `Fl_Pack` (int *x*, int *y*, int *w*, int *h*, const char **l*=0)

Creates a new Fl_Pack widget using the given position, size, and label string.
- `uchar horizontal` () const

Same as Fl_Group::type()
- `int spacing` () const

Gets the number of extra pixels of blank space that are added between the children.
- `void spacing` (int *i*)

Sets the number of extra pixels of blank space that are added between the children.

Protected Member Functions

- void `draw()`
Draws the widget.

Additional Inherited Members

31.92.1 Detailed Description

This widget was designed to add the functionality of compressing and aligning widgets.

If `type()` is `Fl_Pack::HORIZONTAL` all the children are resized to the height of the `Fl_Pack`, and are moved next to each other horizontally. If `type()` is not `Fl_Pack::HORIZONTAL` then the children are resized to the width and are stacked below each other. Then the `Fl_Pack` resizes itself to surround the child widgets.

This widget is needed for the `Fl_Tabs`. In addition you may want to put the `Fl_Pack` inside an `Fl_Scroll`.

The resizable for `Fl_Pack` is set to `NULL` by default.

See also: `Fl_Group::resizable()`

31.92.2 Constructor & Destructor Documentation

31.92.2.1 Fl_Pack()

```
Fl_Pack::Fl_Pack (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new `Fl_Pack` widget using the given position, size, and label string.

The default boxtype is `FL_NO_BOX`.

The destructor *also deletes all the children*. This allows a whole tree to be deleted at once, without having to keep a pointer to all the children in the user code. A kludge has been done so the `Fl_Pack` and all of its children can be automatic (local) variables, but you must declare the `Fl_Pack` *first*, so that it is destroyed last.

31.92.3 Member Function Documentation

31.92.3.1 draw()

```
void Fl_Pack::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call `redraw()` instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own draw() method*, e.g. for an embedded scrollbar, you can do it (because `draw()` is virtual) like this:

```
Fl_Widget *s = &scroll;           // scroll is an embedded Fl_Scrollbar
s->draw();                          // calls Fl_Scrollbar::draw()
```

Reimplemented from `Fl_Group`.

The documentation for this class was generated from the following files:

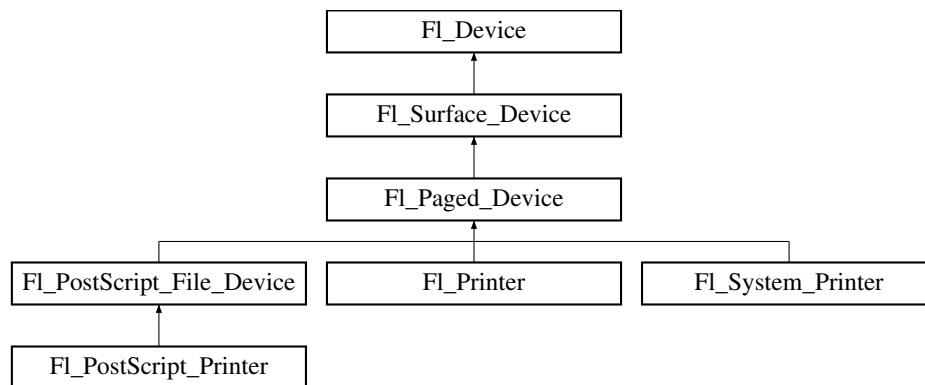
- `Fl_Pack.H`
- `Fl_Pack.cxx`

31.93 Fl_Paged_Device Class Reference

Represents page-structured drawing surfaces.

```
#include <Fl_Paged_Device.H>
```

Inheritance diagram for Fl_Paged_Device:



Classes

- struct [page_format](#)
width, height and name of a page format

Public Types

- enum [Page_Format](#) {
A0 , **A1** , **A2** , **A3** ,
A4 , **A5** , **A6** , **A7** ,
A8 , **A9** , **B0** , **B1** ,
B2 , **B3** , **B4** , **B5** ,
B6 , **B7** , **B8** , **B9** ,
B10 , **C5E** , **DLE** , **EXECUTIVE** ,
FOLIO , **LEDGER** , **LEGAL** , **LETTER** ,
TABLOID , **ENVELOPE** , **MEDIA** = 0x1000 }
Possible page formats.
- enum [Page_Layout](#) { **PORTRAIT** = 0 , **LANDSCAPE** = 0x100 , **REVERSED** = 0x200 , **ORIENTATION** = 0x300 }
Possible page layouts.

Public Member Functions

- const char * [class_name](#) ()
Returns the name of the class of this object.
- virtual void [end_job](#) (void)
To be called at the end of a print job.
- virtual int [end_page](#) (void)
To be called at the end of each page.
- virtual void [margins](#) (int *left, int *top, int *right, int *bottom)
Computes the dimensions of margins that lie between the printable page area and the full page.
- virtual void [origin](#) (int *x, int *y)
Computes the page coordinates of the current origin of graphics functions.
- virtual void [origin](#) (int x, int y)
Sets the position in page coordinates of the origin of graphics functions.
- virtual void [print_widget](#) ([Fl_Widget](#) *widget, int delta_x=0, int delta_y=0)
Draws the widget on the printed page.
- void [print_window](#) ([Fl_Window](#) *win, int x_offset=0, int y_offset=0)

- Prints a window with its title bar and frame if any.*

 - virtual void [print_window_part](#) ([FI_Window](#) *win, int x, int y, int w, int h, int delta_x=0, int delta_y=0)

Prints a rectangular part of an on-screen window.

 - virtual int [printable_rect](#) (int *w, int *h)

Computes the width and height of the printable area of the page.

 - virtual void [rotate](#) (float angle)

Rotates the graphics operations relatively to paper.

 - virtual void [scale](#) (float scale_x, float scale_y=0.)

Changes the scaling of page coordinates.

 - virtual int [start_job](#) (int pagecount, int *frompage=NULL, int *topage=NULL)

Starts a print job.

 - virtual int [start_page](#) (void)

Starts a new printed page.

 - virtual void [translate](#) (int x, int y)

Translates the current graphics origin accounting for the current rotation.

 - virtual void [untranslate](#) (void)

Undoes the effect of a previous [translate\(\)](#) call.

 - virtual [~FI_Paged_Device](#) ()

The destructor.

Static Public Attributes

- static const char * [class_id](#) = "FI_Paged_Device"
 - static const [page_format](#) [page_formats](#) [[NO_PAGE_FORMATS](#)]
- width, height and name of all elements of the enum [Page_Format](#).*

Protected Member Functions

- [FI_Paged_Device](#) ()
- The constructor.*

Protected Attributes

- int [x_offset](#)
- horizontal offset to the origin of graphics coordinates*
- int [y_offset](#)
- vertical offset to the origin of graphics coordinates*

Friends

- class [FI_Copy_Surface](#)
- class [FI_Image_Surface](#)

Additional Inherited Members

31.93.1 Detailed Description

Represents page-structured drawing surfaces.

This class has no public constructor: don't instantiate it; use [FI_Printer](#) or [FI_PostScript_File_Device](#) instead.

31.93.2 Member Enumeration Documentation

31.93.2.1 Page_Format

enum [Fl_Paged_Device::Page_Format](#)

Possible page formats.

All paper formats with pre-defined width and height.

Enumerator

A0	A0 format.
A4	A4 format.
LETTER	Letter format.

31.93.2.2 Page_Layout

enum [Fl_Paged_Device::Page_Layout](#)

Possible page layouts.

Enumerator

PORTRAIT	Portrait orientation.
LANDSCAPE	Landscape orientation.
REVERSED	Reversed orientation.
ORIENTATION	orientation

31.93.3 Member Function Documentation

31.93.3.1 class_name()

```
const char* Fl_Paged_Device::class_name ( ) [inline], [virtual]
```

Returns the name of the class of this object.

Use of the [class_name\(\)](#) function is discouraged because it will be removed from future FLTK versions.

The class of an instance of an [Fl_Device](#) subclass can be checked with code such as:

```
if ( instance->class_name() == Fl_Printer::class_id ) { ... }
```

Reimplemented from [Fl_Surface_Device](#).

Reimplemented in [Fl_Printer](#), [Fl_PostScript_Printer](#), [Fl_System_Printer](#), and [Fl_PostScript_File_Device](#).

31.93.3.2 end_page()

```
int Fl_Paged_Device::end_page (
    void ) [virtual]
```

To be called at the end of each page.

Returns

0 if OK, non-zero if any error.

Reimplemented in [Fl_Printer](#), [Fl_System_Printer](#), and [Fl_PostScript_File_Device](#).

31.93.3.3 margins()

```
void Fl_Paged_Device::margins (
    int * left,
    int * top,
```

```
int * right,
int * bottom ) [virtual]
```

Computes the dimensions of margins that lie between the printable page area and the full page. Values are in the same unit as that used by FLTK drawing functions. They are changed by [scale\(\)](#) calls.

Parameters

out	<i>left</i>	If non-null, *left is set to the left margin size.
out	<i>top</i>	If non-null, *top is set to the top margin size.
out	<i>right</i>	If non-null, *right is set to the right margin size.
out	<i>bottom</i>	If non-null, *bottom is set to the bottom margin size.

Reimplemented in [Fl_Printer](#), [Fl_System_Printer](#), and [Fl_PostScript_File_Device](#).

31.93.3.4 origin() [1/2]

```
void Fl_Paged_Device::origin (
    int * x,
    int * y ) [virtual]
```

Computes the page coordinates of the current origin of graphics functions.

Parameters

out	<i>x</i>	If non-null, *x is set to the horizontal page offset of graphics origin.
out	<i>y</i>	Same as above, vertically.

Reimplemented in [Fl_Printer](#), [Fl_System_Printer](#), and [Fl_PostScript_File_Device](#).

31.93.3.5 origin() [2/2]

```
void Fl_Paged_Device::origin (
    int x,
    int y ) [virtual]
```

Sets the position in page coordinates of the origin of graphics functions.

Arguments should be expressed relatively to the result of a previous [printable_rect\(\)](#) call. That is, `printable_rect(&w, &h); origin(w/2, 0);` sets the graphics origin at the top center of the page printable area. Origin() calls are not affected by [rotate\(\)](#) calls. Successive [origin\(\)](#) calls don't combine their effects.

Parameters

in	<i>x</i>	Horizontal position in page coordinates of the desired origin of graphics functions.
in	<i>y</i>	Same as above, vertically.

Reimplemented in [Fl_Printer](#), [Fl_System_Printer](#), and [Fl_PostScript_File_Device](#).

31.93.3.6 print_widget()

```
void Fl_Paged_Device::print_widget (
    Fl_Widget * widget,
    int delta_x = 0,
    int delta_y = 0 ) [virtual]
```

Draws the widget on the printed page.

The widget's position on the printed page is determined by the last call to [origin\(\)](#) and by the optional `delta_x` and `delta_y` arguments. Its dimensions are in points unless there was a previous call to [scale\(\)](#).

Parameters

in	<i>widget</i>	Any FLTK widget (e.g., standard, custom, window).
in	<i>delta</i> _↔ <i>_x</i>	Optional horizontal offset for positioning the widget relatively to the current origin of graphics functions.
in	<i>delta</i> _↔ <i>_y</i>	Same as above, vertically.

Reimplemented in [Fl_Printer](#).

31.93.3.7 print_window()

```
void Fl_Paged_Device::print_window (
    Fl_Window * win,
    int x_offset = 0,
    int y_offset = 0 )
```

Prints a window with its title bar and frame if any.

x_offset and *y_offset* are optional coordinates of where to position the window top left. Equivalent to [print_widget\(\)](#) if *win* is a subwindow or has no border. Use [Fl_Window::decorated_w\(\)](#) and [Fl_Window::decorated_h\(\)](#) to get the size of the printed window.

31.93.3.8 print_window_part()

```
void Fl_Paged_Device::print_window_part (
    Fl_Window * win,
    int x,
    int y,
    int w,
    int h,
    int delta_x = 0,
    int delta_y = 0 ) [virtual]
```

Prints a rectangular part of an on-screen window.

Parameters

<i>win</i>	The window from where to capture.
<i>x</i>	The rectangle left
<i>y</i>	The rectangle top
<i>w</i>	The rectangle width
<i>h</i>	The rectangle height
<i>delta</i> _↔ <i>_x</i>	Optional horizontal offset from current graphics origin where to print the captured rectangle.
<i>delta</i> _↔ <i>_y</i>	As above, vertically.

Reimplemented in [Fl_Printer](#).

31.93.3.9 printable_rect()

```
int Fl_Paged_Device::printable_rect (
    int * w,
    int * h ) [virtual]
```

Computes the width and height of the printable area of the page.

Values are in the same unit as that used by FLTK drawing functions, are unchanged by calls to [origin\(\)](#), but are changed by [scale\(\)](#) calls. Values account for the user-selected paper type and print orientation.

Returns

0 if OK, non-zero if any error

Reimplemented in [Fl_Printer](#), [Fl_System_Printer](#), and [Fl_PostScript_File_Device](#).

31.93.3.10 rotate()

```
void Fl_Paged_Device::rotate (
    float angle ) [virtual]
```

Rotates the graphics operations relatively to paper.

The rotation is centered on the current graphics origin. Successive [rotate\(\)](#) calls don't combine their effects.

Parameters

<i>angle</i>	Rotation angle in counter-clockwise degrees.
--------------	--

Reimplemented in [Fl_Printer](#), [Fl_System_Printer](#), and [Fl_PostScript_File_Device](#).

31.93.3.11 scale()

```
void Fl_Paged_Device::scale (
    float scale_x,
    float scale_y = 0. ) [virtual]
```

Changes the scaling of page coordinates.

This function also resets the origin of graphics functions at top left of printable page area. After a [scale\(\)](#) call, do a [printable_rect\(\)](#) call to get the new dimensions of the printable page area. Successive [scale\(\)](#) calls don't combine their effects.

Parameters

<i>scale_x</i>	Horizontal dimensions of plot are multiplied by this quantity.
<i>scale_y</i>	Same as above, vertically. The value 0. is equivalent to setting <code>scale_y = scale_x</code> . Thus, <code>scale(factor);</code> is equivalent to <code>scale(factor, factor);</code>

Reimplemented in [Fl_Printer](#), [Fl_System_Printer](#), and [Fl_PostScript_File_Device](#).

31.93.3.12 start_job()

```
int Fl_Paged_Device::start_job (
    int pagecount,
    int * frompage = NULL,
    int * topage = NULL ) [virtual]
```

Starts a print job.

Parameters

in	<i>pagecount</i>	the total number of pages of the job (or 0 if you don't know the number of pages)
out	<i>frompage</i>	if non-null, *frompage is set to the first page the user wants printed
out	<i>topage</i>	if non-null, *topage is set to the last page the user wants printed

Returns

0 if OK, non-zero if any error

Reimplemented in [Fl_PostScript_Printer](#), [Fl_Printer](#), [Fl_System_Printer](#), and [Fl_PostScript_File_Device](#).

31.93.3.13 start_page()

```
int Fl_Paged_Device::start_page (
    void ) [virtual]
```

Starts a new printed page.

The page coordinates are initially in points, i.e., 1/72 inch, and with origin at the top left of the printable page area.

Returns

0 if OK, non-zero if any error

Reimplemented in [Fl_Printer](#), [Fl_System_Printer](#), and [Fl_PostScript_File_Device](#).

31.93.3.14 translate()

```
void Fl_Paged_Device::translate (
    int x,
    int y ) [virtual]
```

Translates the current graphics origin accounting for the current rotation.

This function is only useful after a [rotate\(\)](#) call. Each [translate\(\)](#) call must be matched by an [untranslate\(\)](#) call. Successive [translate\(\)](#) calls add up their effects.

Reimplemented in [Fl_Printer](#), [Fl_System_Printer](#), and [Fl_PostScript_File_Device](#).

The documentation for this class was generated from the following files:

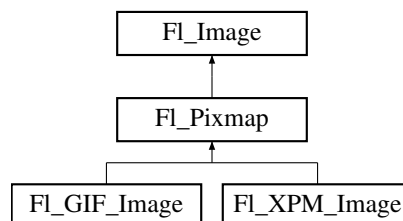
- [Fl_Paged_Device.H](#)
- [Fl_Paged_Device.cxx](#)

31.94 Fl_Pixmap Class Reference

The [Fl_Pixmap](#) class supports caching and drawing of colormap (pixmap) images, including transparency.

```
#include <Fl_Pixmap.H>
```

Inheritance diagram for [Fl_Pixmap](#):

**Public Member Functions**

- virtual void [color_average](#) ([Fl_Color](#) c, float i)
The [color_average\(\)](#) method averages the colors in the image with the FLTK color value c.
- [Fl_Image](#) * [copy](#) ()
- virtual [Fl_Image](#) * [copy](#) (int W, int H)
The [copy\(\)](#) method creates a copy of the specified image.
- virtual void [desaturate](#) ()
The [desaturate\(\)](#) method converts an image to grayscale.

- void **draw** (int X, int Y)
- virtual void **draw** (int X, int Y, int W, int H, int cx=0, int cy=0)
Draws the image with a bounding box.
- **Fl_Pixmap** (char *const *D)
The constructors create a new pixmap from the specified XPM data.
- **Fl_Pixmap** (const char *const *D)
The constructors create a new pixmap from the specified XPM data.
- **Fl_Pixmap** (const uchar *const *D)
The constructors create a new pixmap from the specified XPM data.
- **Fl_Pixmap** (uchar *const *D)
The constructors create a new pixmap from the specified XPM data.
- virtual void **label** (Fl_Menu_Item *m)
The label() methods are an obsolete way to set the image attribute of a widget or menu item.
- virtual void **label** (Fl_Widget *w)
The label() methods are an obsolete way to set the image attribute of a widget or menu item.
- virtual void **uncache** ()
If the image has been cached for display, delete the cache data.
- virtual **~Fl_Pixmap** ()
The destructor frees all memory and server resources that are used by the pixmap.

Public Attributes

- int **alloc_data**

Protected Member Functions

- void **measure** ()

Friends

- class **Fl_GDI_Graphics_Driver**
- class **Fl_GDI_Printer_Graphics_Driver**
- class **Fl_Quartz_Graphics_Driver**
- class **Fl_Xlib_Graphics_Driver**

Additional Inherited Members

31.94.1 Detailed Description

The [Fl_Pixmap](#) class supports caching and drawing of colormap (pixmap) images, including transparency.

31.94.2 Constructor & Destructor Documentation

31.94.2.1 Fl_Pixmap() [1/4]

```
Fl_Pixmap::Fl_Pixmap (
    char *const * D ) [inline], [explicit]
```

The constructors create a new pixmap from the specified XPM data.

31.94.2.2 Fl_Pixmap() [2/4]

```
Fl_Pixmap::Fl_Pixmap (
    uchar *const * D ) [inline], [explicit]
```

The constructors create a new pixmap from the specified XPM data.

31.94.2.3 Fl_Pixmap() [3/4]

```
Fl_Pixmap::Fl_Pixmap (
    const char *const * D ) [inline], [explicit]
```

The constructors create a new pixmap from the specified XPM data.

31.94.2.4 Fl_Pixmap() [4/4]

```
Fl_Pixmap::Fl_Pixmap (
    const uchar *const * D ) [inline], [explicit]
```

The constructors create a new pixmap from the specified XPM data.

31.94.3 Member Function Documentation**31.94.3.1 color_average()**

```
void Fl_Pixmap::color_average (
    Fl_Color c,
    float i ) [virtual]
```

The `color_average()` method averages the colors in the image with the FLTK color value `c`.

The `i` argument specifies the amount of the original image to combine with the color, so a value of 1.0 results in no color blend, and a value of 0.0 results in a constant image of the specified color.

An internal copy is made of the original image before changes are applied, to avoid modifying the original image.

Reimplemented from [Fl_Image](#).

31.94.3.2 copy()

```
Fl_Image * Fl_Pixmap::copy (
    int W,
    int H ) [virtual]
```

The `copy()` method creates a copy of the specified image.

If the width and height are provided, the image is resized to the specified size. The image should be deleted (or in the case of [Fl_Shared_Image](#), released) when you are done with it.

Reimplemented from [Fl_Image](#).

31.94.3.3 desaturate()

```
void Fl_Pixmap::desaturate ( ) [virtual]
```

The `desaturate()` method converts an image to grayscale.

If the image contains an alpha channel (depth = 4), the alpha channel is preserved.

An internal copy is made of the original image before changes are applied, to avoid modifying the original image.

Reimplemented from [Fl_Image](#).

31.94.3.4 draw()

```
void Fl_Pixmap::draw (
    int X,
    int Y,
    int W,
    int H,
    int cx = 0,
    int cy = 0 ) [virtual]
```

Draws the image with a bounding box.

Arguments *X*, *Y*, *W*, *H* specify a bounding box for the image, with the origin (upper-left corner) of the image offset by the *cx* and *cy* arguments.

In other words: `fl_push_clip(X, Y, W, H)` is applied, the image is drawn with its upper-left corner at *X-cx*, *Y-cy* and its own width and height, `fl_pop_clip()` is applied.

Reimplemented from [Fl_Image](#).

31.94.3.5 label() [1/2]

```
void Fl_Pixmap::label (
    Fl_Menu_Item * m ) [virtual]
```

The `label()` methods are an obsolete way to set the image attribute of a widget or menu item.

Use the `image()` or `deimage()` methods of the [Fl_Widget](#) and [Fl_Menu_Item](#) classes instead.

Reimplemented from [Fl_Image](#).

31.94.3.6 label() [2/2]

```
void Fl_Pixmap::label (
    Fl_Widget * widget ) [virtual]
```

The `label()` methods are an obsolete way to set the image attribute of a widget or menu item.

Use the `image()` or `deimage()` methods of the [Fl_Widget](#) and [Fl_Menu_Item](#) classes instead.

Reimplemented from [Fl_Image](#).

31.94.3.7 uncache()

```
void Fl_Pixmap::uncache ( ) [virtual]
```

If the image has been cached for display, delete the cache data.

This allows you to change the data used for the image and then redraw it without recreating an image object.

Reimplemented from [Fl_Image](#).

The documentation for this class was generated from the following files:

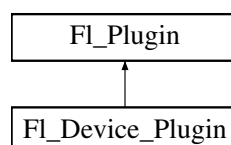
- [Fl_Pixmap.H](#)
- [Fl_Pixmap.cxx](#)

31.95 Fl_Plugin Class Reference

[Fl_Plugin](#) allows link-time and run-time integration of binary modules.

```
#include <Fl_Plugin.H>
```

Inheritance diagram for [Fl_Plugin](#):



Public Member Functions

- [FI_Plugin](#) (const char *klass, const char *name)
Create a plugin.
- virtual [~FI_Plugin](#) ()
Clear the plugin and remove it from the database.

31.95.1 Detailed Description

[FI_Plugin](#) allows link-time and run-time integration of binary modules.

[FI_Plugin](#) and [FI_Plugin_Manager](#) provide a small and simple solution for linking C++ classes at run-time, or optionally linking modules at compile time without the need to change the main application.

[FI_Plugin_Manager](#) uses static initialisation to create the plugin interface early during startup. Plugins are stored in a temporary database, organized in classes.

Plugins should derive a new class from [FI_Plugin](#) as a base:

```
class My_Plugin : public FI_Plugin {
public:
    My_Plugin() : FI_Plugin("effects", "blur") { }
    void do_something(...);
};
My_Plugin blur_plugin();
```

Plugins can be put into modules and either linked before distribution, or loaded from dynamically linkable files. An

[FI_Plugin_Manager](#) is used to list and access all currently loaded plugins.

```
FI_Plugin_Manager mgr("effects");
int i, n = mgr.plugins();
for (i=0; i<n; i++) {
    My_Plugin *pin = (My_Plugin*)mgr.plugin(i);
    pin->do_something();
}
```

31.95.2 Constructor & Destructor Documentation

31.95.2.1 FI_Plugin()

```
FI_Plugin::FI_Plugin (
    const char * klass,
    const char * name )
```

Create a plugin.

Parameters

in	<i>klass</i>	plugins are grouped in classes
in	<i>name</i>	every plugin should have a unique name

The documentation for this class was generated from the following files:

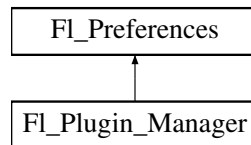
- [FI_Plugin.H](#)
- [FI_Preferences.cxx](#)

31.96 FI_Plugin_Manager Class Reference

[FI_Plugin_Manager](#) manages link-time and run-time plugin binaries.

```
#include <FI_Plugin.H>
```

Inheritance diagram for [FI_Plugin_Manager](#):



Public Member Functions

- [FI_Preferences::ID addPlugin](#) (const char *name, [FI_Plugin](#) *plugin)
This function adds a new plugin to the database.
- [FI_Plugin_Manager](#) (const char *klass)
Manage all plugins belonging to one class.
- [FI_Plugin](#) * [plugin](#) (const char *name)
Return the address of a plugin by name.
- [FI_Plugin](#) * [plugin](#) (int index)
Return the address of a plugin by index.
- int [plugins](#) ()
Return the number of plugins in the klass.
- [~FI_Plugin_Manager](#) ()
Remove the plugin manager.

Static Public Member Functions

- static int [load](#) (const char *filename)
Load a module from disk.
- static int [loadAll](#) (const char *filepath, const char *pattern=0)
Use this function to load a whole directory full of modules.
- static void [removePlugin](#) ([FI_Preferences::ID](#) id)
Remove any plugin.

Additional Inherited Members

31.96.1 Detailed Description

[FI_Plugin_Manager](#) manages link-time and run-time plugin binaries.

See also

[FI_Plugin](#)

31.96.2 Constructor & Destructor Documentation

31.96.2.1 [~FI_Plugin_Manager\(\)](#)

```
FI_Plugin_Manager::~FI_Plugin_Manager ( )
```

Remove the plugin manager.

Calling this does not remove the database itself or any plugins. It just removes the reference to the database.

31.96.3 Member Function Documentation

31.96.3.1 addPlugin()

```
Fl_Preferences::ID Fl_Plugin_Manager::addPlugin (
    const char * name,
    Fl_Plugin * plugin )
```

This function adds a new plugin to the database.

There is no need to call this function explicitly. Every [Fl_Plugin](#) constructor will call this function at initialization time.

31.96.3.2 load()

```
int Fl_Plugin_Manager::load (
    const char * filename ) [static]
```

Load a module from disk.

A module must be a dynamically linkable file for the given operating system. When loading a module, its +init function will be called which in turn calls the constructor of all statically initialized [Fl_Plugin](#) classes and adds them to the database.

31.96.3.3 removePlugin()

```
void Fl_Plugin_Manager::removePlugin (
    Fl_Preferences::ID id ) [static]
```

Remove any plugin.

There is no need to call this function explicitly. Every [Fl_Plugin](#) destructor will call this function at destruction time.

The documentation for this class was generated from the following files:

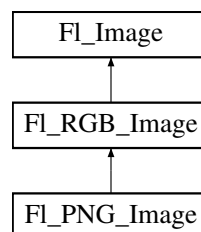
- [Fl_Plugin.H](#)
- [Fl_Preferences.cxx](#)

31.97 FI_PNG_Image Class Reference

The [Fl_PNG_Image](#) class supports loading, caching, and drawing of Portable Network Graphics (PNG) image files.

```
#include <Fl_PNG_Image.H>
```

Inheritance diagram for [Fl_PNG_Image](#):



Public Member Functions

- [Fl_PNG_Image](#) (const char *filename)
The constructor loads the named PNG image from the given png filename.
- [Fl_PNG_Image](#) (const char *name_png, const unsigned char *buffer, int datasize)
Constructor that reads a PNG image from memory.

Additional Inherited Members

31.97.1 Detailed Description

The [Fl_PNG_Image](#) class supports loading, caching, and drawing of Portable Network Graphics (PNG) image files. The class loads colormapped and full-color images and handles color- and alpha-based transparency.

31.97.2 Constructor & Destructor Documentation

31.97.2.1 FI_PNG_Image() [1/2]

```
Fl_PNG_Image::Fl_PNG_Image (
    const char * filename )
```

The constructor loads the named PNG image from the given png filename.

The destructor frees all memory and server resources that are used by the image.

Use `Fl_Image::fail()` to check if `FI_PNG_Image` failed to load. `fail()` returns `ERR_FILE_ACCESS` if the file could not be opened or read, `ERR_FORMAT` if the PNG format could not be decoded, and `ERR_NO_IMAGE` if the image could not be loaded for another reason.

Parameters

in	<i>filename</i>	Name of PNG file to read
----	-----------------	--------------------------

31.97.2.2 FI_PNG_Image() [2/2]

```
Fl_PNG_Image::Fl_PNG_Image (
    const char * name_png,
    const unsigned char * buffer,
    int maxsize )
```

Constructor that reads a PNG image from memory.

Construct an image from a block of memory inside the application. Fluid offers "binary Data" chunks as a great way to add image data into the C++ source code. `name_png` can be NULL. If a name is given, the image is added to the list of shared images (see: [FI_Shared_Image](#)) and will be available by that name.

Parameters

<i>name_png</i>	A name given to this image or NULL
<i>buffer</i>	Pointer to the start of the PNG image in memory
<i>maxsize</i>	Size in bytes of the memory buffer containing the PNG image

The documentation for this class was generated from the following files:

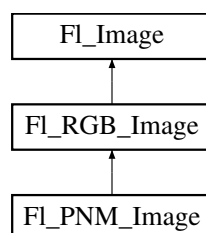
- `FI_PNG_Image.H`
- `FI_PNG_Image.cxx`

31.98 FI_PNM_Image Class Reference

The `FI_PNM_Image` class supports loading, caching, and drawing of Portable Anymap (PNM, PBM, PGM, PPM) image files.

```
#include <Fl_PNM_Image.H>
```

Inheritance diagram for `FI_PNM_Image`:



Public Member Functions

- [Fl_PNM_Image](#) (const char *filename)
The constructor loads the named PNM image.

Additional Inherited Members

31.98.1 Detailed Description

The [Fl_PNM_Image](#) class supports loading, caching, and drawing of Portable Anymap (PNM, PBM, PGM, PPM) image files.

The class loads bitmap, grayscale, and full-color images in both ASCII and binary formats.

31.98.2 Constructor & Destructor Documentation

31.98.2.1 Fl_PNM_Image()

```
Fl_PNM_Image::Fl_PNM_Image (
    const char * name )
```

The constructor loads the named PNM image.

The destructor frees all memory and server resources that are used by the image.

Use [Fl_Image::fail\(\)](#) to check if [Fl_PNM_Image](#) failed to load. [fail\(\)](#) returns `ERR_FILE_ACCESS` if the file could not be opened or read, `ERR_FORMAT` if the PNM format could not be decoded, and `ERR_NO_IMAGE` if the image could not be loaded for another reason.

The documentation for this class was generated from the following files:

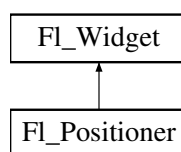
- [Fl_PNM_Image.H](#)
- [Fl_PNM_Image.cxx](#)

31.99 Fl_Positioner Class Reference

This class is provided for Forms compatibility.

```
#include <Fl_Positioner.H>
```

Inheritance diagram for [Fl_Positioner](#):



Public Member Functions

- [Fl_Positioner](#) (int x, int y, int w, int h, const char *l=0)
Creates a new [Fl_Positioner](#) widget using the given position, size, and label string.
- int [handle](#) (int)
Handles the specified event.
- int [value](#) (double, double)
Returns the current position in x and y.
- void [xbounds](#) (double, double)
Sets the X axis bounds.
- double [xmaximum](#) () const
Gets the X axis maximum.
- void [xmaximum](#) (double a)

- Same as `xbounds(xminimum(), a)`*
- double `xminimum` () const
Gets the X axis minimum.
- void `xminimum` (double a)
Same as `xbounds(a, xmaximum())`
- void `xstep` (double a)
Sets the stepping value for the X axis.
- double `xvalue` () const
Gets the X axis coordinate.
- int `xvalue` (double)
Sets the X axis coordinate.
- void `ybounds` (double, double)
Sets the Y axis bounds.
- double `ymaximum` () const
Gets the Y axis maximum.
- void `ymaximum` (double a)
Same as `ybounds(yminimum(), a)`
- double `yminimum` () const
Gets the Y axis minimum.
- void `yminimum` (double a)
Same as `ybounds(a, ymaximum())`
- void `ystep` (double a)
Sets the stepping value for the Y axis.
- double `yvalue` () const
Gets the Y axis coordinate.
- int `yvalue` (double)
Sets the Y axis coordinate.

Protected Member Functions

- void `draw` ()
Draws the widget.
- void `draw` (int, int, int, int)
- int `handle` (int, int, int, int, int)

Additional Inherited Members

31.99.1 Detailed Description

This class is provided for Forms compatibility.

It provides 2D input. It would be useful if this could be put atop another widget so that the crosshairs are on top, but this is not implemented. The color of the crosshairs is [selection_color\(\)](#).



Figure 31.24 FI_Positioner

31.99.2 Constructor & Destructor Documentation

31.99.2.1 Fl_Positioner()

```
Fl_Positioner::Fl_Positioner (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new [Fl_Positioner](#) widget using the given position, size, and label string. The default boxtype is FL_NO_BOX.

31.99.3 Member Function Documentation

31.99.3.1 draw()

```
void Fl_Positioner::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own draw() method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scroll; // scroll is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Implements [Fl_Widget](#).

31.99.3.2 handle()

```
int Fl_Positioner::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited handle() method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Widget](#).

The documentation for this class was generated from the following files:

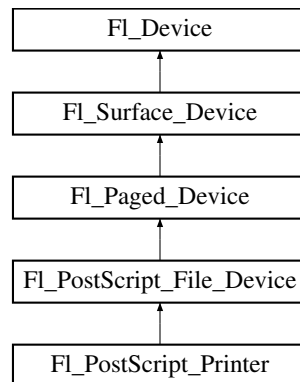
- [Fl_Positioner.H](#)
- [Fl_Positioner.cxx](#)

31.100 FI_PostScript_File_Device Class Reference

To send graphical output to a PostScript file.

```
#include <FI_PostScript.H>
```

Inheritance diagram for FI_PostScript_File_Device:



Public Member Functions

- `const char * class_name ()`
Returns the name of the class of this object.
- `void end_job (void)`
To be called at the end of a print job.
- `int end_page (void)`
To be called at the end of each page.
- `FI_PostScript_File_Device ()`
The constructor.
- `void margins (int *left, int *top, int *right, int *bottom)`
Computes the dimensions of margins that lie between the printable page area and the full page.
- `void origin (int *x, int *y)`
Computes the page coordinates of the current origin of graphics functions.
- `void origin (int x, int y)`
Sets the position in page coordinates of the origin of graphics functions.
- `int printable_rect (int *w, int *h)`
Computes the width and height of the printable area of the page.
- `void rotate (float angle)`
Rotates the graphics operations relatively to paper.
- `void scale (float scale_x, float scale_y=0.)`
Changes the scaling of page coordinates.
- `int start_job (FILE *ps_output, int pagecount, enum FI_Paged_Device::Page_Format format=FI_Paged_Device::A4, enum FI_Paged_Device::Page_Layout layout=FI_Paged_Device::PORTRAIT)`
Begins the session where all graphics requests will go to FILE pointer.
- `int start_job (int pagecount, enum FI_Paged_Device::Page_Format format=FI_Paged_Device::A4, enum FI_Paged_Device::Page_Layout layout=FI_Paged_Device::PORTRAIT)`
Begins the session where all graphics requests will go to a local PostScript file.
- `int start_job (int pagecount, int *from, int *to)`
Don't use with this class.
- `int start_page (void)`
Starts a new printed page.
- `void translate (int x, int y)`
Translates the current graphics origin accounting for the current rotation.

- void `untranslate` (void)
Undoes the effect of a previous `translate()` call.
- `~Fl_PostScript_File_Device` ()
The destructor.

Static Public Attributes

- static const char * `class_id` = "Fl_PostScript_File_Device"
- static const char * `file_chooser_title` = "Select a .ps file"
Label of the PostScript file chooser window.

Protected Member Functions

- `Fl_PostScript_Graphics_Driver` * `driver` ()
Returns the PostScript driver of this drawing surface.

Additional Inherited Members

31.100.1 Detailed Description

To send graphical output to a PostScript file.

This class is used exactly as the `Fl_Printer` class except for the `start_job()` call, two variants of which are usable and allow to specify what page format and layout are desired.

31.100.2 Member Function Documentation

31.100.2.1 `class_name()`

```
const char* Fl_PostScript_File_Device::class_name ( ) [inline], [virtual]
```

Returns the name of the class of this object.

Use of the `class_name()` function is discouraged because it will be removed from future FLTK versions.

The class of an instance of an `Fl_Device` subclass can be checked with code such as:

```
if ( instance->class_name() == Fl_Printer::class_id ) { ... }
```

Reimplemented from `Fl_Paged_Device`.

Reimplemented in `Fl_PostScript_Printer`.

31.100.2.2 `end_page()`

```
int Fl_PostScript_File_Device::end_page (
    void ) [virtual]
```

To be called at the end of each page.

Returns

0 if OK, non-zero if any error.

Reimplemented from `Fl_Paged_Device`.

31.100.2.3 `margins()`

```
void Fl_PostScript_File_Device::margins (
    int * left,
    int * top,
    int * right,
    int * bottom ) [virtual]
```

Computes the dimensions of margins that lie between the printable page area and the full page. Values are in the same unit as that used by FLTK drawing functions. They are changed by [scale\(\)](#) calls.

Parameters

out	<i>left</i>	If non-null, *left is set to the left margin size.
out	<i>top</i>	If non-null, *top is set to the top margin size.
out	<i>right</i>	If non-null, *right is set to the right margin size.
out	<i>bottom</i>	If non-null, *bottom is set to the bottom margin size.

Reimplemented from [Fl_Paged_Device](#).

31.100.2.4 origin() [1/2]

```
void Fl_PostScript_File_Device::origin (
    int * x,
    int * y ) [virtual]
```

Computes the page coordinates of the current origin of graphics functions.

Parameters

out	<i>x</i>	If non-null, *x is set to the horizontal page offset of graphics origin.
out	<i>y</i>	Same as above, vertically.

Reimplemented from [Fl_Paged_Device](#).

31.100.2.5 origin() [2/2]

```
void Fl_PostScript_File_Device::origin (
    int x,
    int y ) [virtual]
```

Sets the position in page coordinates of the origin of graphics functions.

Arguments should be expressed relatively to the result of a previous [printable_rect\(\)](#) call. That is, `printable_rect(&w, &h); origin(w/2, 0);` sets the graphics origin at the top center of the page printable area. Origin() calls are not affected by [rotate\(\)](#) calls. Successive [origin\(\)](#) calls don't combine their effects.

Parameters

in	<i>x</i>	Horizontal position in page coordinates of the desired origin of graphics functions.
in	<i>y</i>	Same as above, vertically.

Reimplemented from [Fl_Paged_Device](#).

31.100.2.6 printable_rect()

```
int Fl_PostScript_File_Device::printable_rect (
    int * w,
    int * h ) [virtual]
```

Computes the width and height of the printable area of the page.

Values are in the same unit as that used by FLTK drawing functions, are unchanged by calls to [origin\(\)](#), but are changed by [scale\(\)](#) calls. Values account for the user-selected paper type and print orientation.

Returns

0 if OK, non-zero if any error

Reimplemented from [Fl_Paged_Device](#).

31.100.2.7 rotate()

```
void Fl_PostScript_File_Device::rotate (
    float angle ) [virtual]
```

Rotates the graphics operations relatively to paper.

The rotation is centered on the current graphics origin. Successive [rotate\(\)](#) calls don't combine their effects.

Parameters

<i>angle</i>	Rotation angle in counter-clockwise degrees.
--------------	--

Reimplemented from [Fl_Paged_Device](#).

31.100.2.8 scale()

```
void Fl_PostScript_File_Device::scale (
    float scale_x,
    float scale_y = 0. ) [virtual]
```

Changes the scaling of page coordinates.

This function also resets the origin of graphics functions at top left of printable page area. After a [scale\(\)](#) call, do a [printable_rect\(\)](#) call to get the new dimensions of the printable page area. Successive [scale\(\)](#) calls don't combine their effects.

Parameters

<i>scale</i> <i>_x</i>	Horizontal dimensions of plot are multiplied by this quantity.
<i>scale</i> <i>_y</i>	Same as above, vertically. The value 0. is equivalent to setting <code>scale_y = scale_x</code> . Thus, <code>scale(factor);</code> is equivalent to <code>scale(factor, factor);</code>

Reimplemented from [Fl_Paged_Device](#).

31.100.2.9 start_job() [1/2]

```
int Fl_PostScript_File_Device::start_job (
    FILE * ps_output,
    int pagecount,
    enum Fl_Paged_Device::Page_Format format = Fl_Paged_Device::A4,
    enum Fl_Paged_Device::Page_Layout layout = Fl_Paged_Device::PORTRAIT )
```

Begins the session where all graphics requests will go to FILE pointer.

Parameters

<i>ps_output</i>	A writable FILE pointer that will receive PostScript output and that should not be closed until after end_job() has been called.
<i>pagecount</i>	The total number of pages to be created. Use 0 if this number is unknown when this function is called.
<i>format</i>	Desired page format.
<i>layout</i>	Desired page layout.

Returns

always 0.

31.100.2.10 start_job() [2/2]

```
int Fl_PostScript_File_Device::start_job (
    int pagecount,
    enum Fl_Paged_Device::Page_Format format = Fl_Paged_Device::A4,
    enum Fl_Paged_Device::Page_Layout layout = Fl_Paged_Device::PORTRAIT )
```

Begins the session where all graphics requests will go to a local PostScript file.

Opens a file dialog entitled with `Fl_PostScript_File_Device::file_chooser_title` to select an output PostScript file.

Parameters

<i>pagecount</i>	The total number of pages to be created. Use 0 if this number is unknown when this function is called.
<i>format</i>	Desired page format.
<i>layout</i>	Desired page layout.

Returns

0 if OK, 1 if user cancelled the file dialog, 2 if fopen failed on user-selected output file.

31.100.2.11 start_page()

```
int Fl_PostScript_File_Device::start_page (
    void ) [virtual]
```

Starts a new printed page.

The page coordinates are initially in points, i.e., 1/72 inch, and with origin at the top left of the printable page area.

Returns

0 if OK, non-zero if any error

Reimplemented from [Fl_Paged_Device](#).

31.100.2.12 translate()

```
void Fl_PostScript_File_Device::translate (
    int x,
    int y ) [virtual]
```

Translates the current graphics origin accounting for the current rotation.

This function is only useful after a [rotate\(\)](#) call. Each [translate\(\)](#) call must be matched by an [untranslate\(\)](#) call.

Successive [translate\(\)](#) calls add up their effects.

Reimplemented from [Fl_Paged_Device](#).

The documentation for this class was generated from the following files:

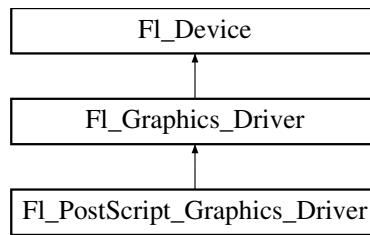
- [Fl_PostScript.H](#)
- [Fl_PostScript.cxx](#)

31.101 Fl_PostScript_Graphics_Driver Class Reference

PostScript graphical backend.

```
#include <Fl_PostScript.H>
```

Inheritance diagram for `Fl_PostScript_Graphics_Driver`:



Public Member Functions

- void `arc` (double x, double y, double r, double start, double a)
 - see `fl_arc(double x, double y, double r, double start, double end)`.*
- void `arc` (int x, int y, int w, int h, double a1, double a2)
 - see `fl_arc(int x, int y, int w, int h, double a1, double a2)`.*
- void `begin_complex_polygon` ()
 - see `fl_begin_complex_polygon()`.*
- void `begin_line` ()
 - see `fl_begin_line()`.*
- void `begin_loop` ()
 - see `fl_begin_loop()`.*
- void `begin_points` ()
 - see `fl_begin_points()`.*
- void `begin_polygon` ()
 - see `fl_begin_polygon()`.*
- void `circle` (double x, double y, double r)
 - see `fl_circle(double x, double y, double r)`.*
- const char * `class_name` ()
 - Returns the name of the class of this object.*
- int `clip_box` (int x, int y, int w, int h, int &X, int &Y, int &W, int &H)
 - see `fl_clip_box(int x, int y, int w, int h, int &X, int &Y, int &W, int &H)`.*
- int `locale_printf` (const char *format,...)
 - Shields output PostScript data from modifications of the current locale.*
- void `color` (Fl_Color c)
 - see `fl_color(Fl_Color c)`.*
- void `color` (uchar r, uchar g, uchar b)
 - see `fl_color(uchar r, uchar g, uchar b)`.*
- void `curve` (double x, double y, double x1, double y1, double x2, double y2, double x3, double y3)
 - see `fl_curve(double X0, double Y0, double X1, double Y1, double X2, double Y2, double X3, double Y3)`.*
- int `descent` ()
 - see `fl_descent()`.*
- void `draw` (const char *s, int nBytes, int x, int y)
 - see `fl_draw(const char *str, int n, int x, int y)`.*
- void `draw` (Fl_Bitmap *bitmap, int XP, int YP, int WP, int HP, int cx, int cy)
 - Draws an `Fl_Bitmap` object to the device.*
- void `draw` (Fl_Pixmap *pixmap, int XP, int YP, int WP, int HP, int cx, int cy)
 - Draws an `Fl_Pixmap` object to the device.*
- void `draw` (Fl_RGB_Image *rgb, int XP, int YP, int WP, int HP, int cx, int cy)
 - Draws an `Fl_RGB_Image` object to the device.*
- void `draw` (int angle, const char *str, int n, int x, int y)
 - see `fl_draw(int angle, const char *str, int n, int x, int y)`.*
- void `draw_image` (const uchar *d, int x, int y, int w, int h, int delta=3, int ldelta=0)

- see [fl_draw_image\(const uchar* buf, int X,int Y,int W,int H, int D, int L\)](#).
- void [draw_image](#) (FI_Draw_Image_Cb call, void *data, int x, int y, int w, int h, int delta=3)
 - see [fl_draw_image\(FI_Draw_Image_Cb cb, void* data, int X,int Y,int W,int H, int D\)](#).
- void [draw_image_mono](#) (const uchar *d, int x, int y, int w, int h, int delta=1, int ld=0)
 - see [fl_draw_image_mono\(const uchar* buf, int X,int Y,int W,int H, int D, int L\)](#).
- void [draw_image_mono](#) (FI_Draw_Image_Cb call, void *data, int x, int y, int w, int h, int delta=1)
 - see [fl_draw_image_mono\(FI_Draw_Image_Cb cb, void* data, int X,int Y,int W,int H, int D\)](#).
- int [draw_scaled](#) (FI_Image *img, int XP, int YP, int WP, int HP)
 - Draws an *FI_Image* scaled to width *W* & height *H* with top-left corner at *X,Y*.
- void [end_complex_polygon](#) ()
 - see [fl_end_complex_polygon\(\)](#).
- void [end_line](#) ()
 - see [fl_end_line\(\)](#).
- void [end_loop](#) ()
 - see [fl_end_loop\(\)](#).
- void [end_points](#) ()
 - see [fl_end_points\(\)](#).
- void [end_polygon](#) ()
 - see [fl_end_polygon\(\)](#).
- [FI_PostScript_Graphics_Driver](#) ()
 - The constructor.
- void [font](#) (int face, int size)
 - see [fl_font\(FI_Font face, FI_Fontsize size\)](#).
- void [gap](#) ()
 - see [fl_gap\(\)](#).
- int [height](#) ()
 - see [fl_height\(\)](#).
- void [line](#) (int x1, int y1, int x2, int y2)
 - see [fl_line\(int x, int y, int x1, int y1\)](#).
- void [line](#) (int x1, int y1, int x2, int y2, int x3, int y3)
 - see [fl_line\(int x, int y, int x1, int y1, int x2, int y2\)](#).
- void [line_style](#) (int style, int width=0, char *dashes=0)
 - see [fl_line_style\(int style, int width, char* dashes\)](#).
- void [loop](#) (int x0, int y0, int x1, int y1, int x2, int y2)
 - see [fl_loop\(int x0, int y0, int x1, int y1, int x2, int y2\)](#).
- void [loop](#) (int x0, int y0, int x1, int y1, int x2, int y2, int x3, int y3)
 - see [fl_loop\(int x0, int y0, int x1, int y1, int x2, int y2, int x3, int y3\)](#).
- int [not_clipped](#) (int x, int y, int w, int h)
 - see [fl_not_clipped\(int x, int y, int w, int h\)](#).
- void [pie](#) (int x, int y, int w, int h, double a1, double a2)
 - see [fl_pie\(int x, int y, int w, int h, double a1, double a2\)](#).
- void [point](#) (int x, int y)
 - see [fl_point\(int x, int y\)](#).
- void [polygon](#) (int x0, int y0, int x1, int y1, int x2, int y2)
 - see [fl_polygon\(int x0, int y0, int x1, int y1, int x2, int y2\)](#).
- void [polygon](#) (int x0, int y0, int x1, int y1, int x2, int y2, int x3, int y3)
 - see [fl_polygon\(int x0, int y0, int x1, int y1, int x2, int y2, int x3, int y3\)](#).
- void [pop_clip](#) ()
 - see [fl_pop_clip\(\)](#).
- void [push_clip](#) (int x, int y, int w, int h)
 - see [fl_push_clip\(int x, int y, int w, int h\)](#).

- void `push_no_clip` ()
see `fl_push_no_clip()`.
- void `rect` (int x, int y, int w, int h)
see `fl_rect(int x, int y, int w, int h)`.
- void `rectf` (int x, int y, int w, int h)
see `fl_rectf(int x, int y, int w, int h)`.
- void `rtl_draw` (const char *s, int n, int x, int y)
see `fl_rtl_draw(const char *str, int n, int x, int y)`.
- void `text_extents` (const char *c, int n, int &dx, int &dy, int &w, int &h)
see `fl_text_extents(const char*, int n, int& dx, int& dy, int& w, int& h)`.
- void `transformed_vertex` (double x, double y)
see `fl_transformed_vertex(double xf, double yf)`.
- void `vertex` (double x, double y)
see `fl_vertex(double x, double y)`.
- double `width` (const char *, int)
see `fl_width(const char *str, int n)`.
- double `width` (unsigned int u)
see `fl_width(unsigned int n)`.
- void `xyline` (int x, int y, int x1)
see `fl_xyline(int x, int y, int x1)`.
- void `xyline` (int x, int y, int x1, int y2)
see `fl_xyline(int x, int y, int x1, int y2)`.
- void `xyline` (int x, int y, int x1, int y2, int x3)
see `fl_xyline(int x, int y, int x1, int y2, int x3)`.
- void `yxline` (int x, int y, int y1)
see `fl_yxline(int x, int y, int y1)`.
- void `yxline` (int x, int y, int y1, int x2)
see `fl_yxline(int x, int y, int y1, int x2)`.
- void `yxline` (int x, int y, int y1, int x2, int y3)
see `fl_yxline(int x, int y, int y1, int x2, int y3)`.
- `~Fl_PostScript_Graphics_Driver` ()
The destructor.

Static Public Attributes

- static const char * `class_id` = "Fl_PostScript_Graphics_Driver"

Additional Inherited Members

31.101.1 Detailed Description

PostScript graphical backend.

PostScript text uses vectorial fonts when using the FLTK standard fonts

and the latin alphabet or a few other characters listed in the following table. The latin alphabet means all unicode characters between U+0020 and U+017F, or, in other words, the ASCII, Latin-1 Supplement and Latin Extended-A charts.

Char	Code-point	Name	Char	Code-point	Name	Char	Code-point	Name
<i>f</i>	U+0192	florin	,	U+201A	quotesingbase™		U+2122	trademark
^	U+02C6	circumflex	“	U+201C	quotedblleft		U+2202	partialdiff
˘	U+02C7	caron	”	U+201D	quotedblright		U+2206	Delta
˘	U+02D8	breve	„	U+201E	quotedblbase		U+2211	summation

Char	Code-point	Name	Char	Code-point	Name	Char	Code-point	Name
·	U+02D9	dotaccent	†	U+2020	dagger		U+221A	radical
	U+02DA	ring	‡	U+2021	daggerdbl		U+221E	infinity
ć	U+02DB	ogonek	•	U+2022	bullet		U+2260	notequal
~	U+02DC	tilde	...	U+2026	ellipsis		U+2264	lessequal
”	U+02DD	hungarumlaut	‰	U+2030	perthousand		U+2265	greaterequal
–	U+2013	endash	◀	U+2039	guilsingleft		U+25CA	lozenge
—	U+2014	emdash	▶	U+203A	guilsingright	fi	U+FB01	fi
‘	U+2018	quoteleft	/	U+2044	fraction	fl	U+FB02	fl
’	U+2019	quoteright	€	U+20AC	Euro		U+F8FF	apple (Mac OS only)

All other unicode characters or all other fonts (FL_FREE_FONT and above) are output as a bitmap. FLTK standard fonts are output using the corresponding PostScript standard fonts.

31.101.2 Member Function Documentation

31.101.2.1 class_name()

```
const char* Fl_PostScript_Graphics_Driver::class_name ( ) [inline], [virtual]
```

Returns the name of the class of this object.

Use of the `class_name()` function is discouraged because it will be removed from future FLTK versions.

The class of an instance of an `Fl_Device` subclass can be checked with code such as:

```
if ( instance->class_name() == Fl_Printer::class_id ) { ... }
```

Reimplemented from `Fl_Graphics_Driver`.

31.101.2.2 clocale_printf()

```
int Fl_PostScript_Graphics_Driver::clocale_printf (
    const char * format,
    ... )
```

Shields output PostScript data from modifications of the current locale.

It typically avoids PostScript errors caused if the current locale uses comma instead of dot as "decimal point".

Parameters

<i>format</i>	directives controlling output PostScript data
---------------	---

Returns

value returned by `vfprintf()` call

31.101.2.3 draw() [1/3]

```
void Fl_PostScript_Graphics_Driver::draw (
    Fl_Bitmap * bm,
    int XP,
    int YP,
    int WP,
    int HP,
```

```
int cx,  
int cy ) [virtual]
```

Draws an [Fl_Bitmap](#) object to the device.

Specifies a bounding box for the image, with the origin (upper left-hand corner) of the image offset by the cx and cy arguments.

Reimplemented from [Fl_Graphics_Driver](#).

31.101.2.4 draw() [2/3]

```
void Fl_PostScript_Graphics_Driver::draw (  
    Fl_Pixmap * pxm,  
    int XP,  
    int YP,  
    int WP,  
    int HP,  
    int cx,  
    int cy ) [virtual]
```

Draws an [Fl_Pixmap](#) object to the device.

Specifies a bounding box for the image, with the origin (upper left-hand corner) of the image offset by the cx and cy arguments.

Reimplemented from [Fl_Graphics_Driver](#).

31.101.2.5 draw() [3/3]

```
void Fl_PostScript_Graphics_Driver::draw (  
    Fl_RGB_Image * rgb,  
    int XP,  
    int YP,  
    int WP,  
    int HP,  
    int cx,  
    int cy ) [virtual]
```

Draws an [Fl_RGB_Image](#) object to the device.

Specifies a bounding box for the image, with the origin (upper left-hand corner) of the image offset by the cx and cy arguments.

Reimplemented from [Fl_Graphics_Driver](#).

31.101.2.6 draw_scaled()

```
int Fl_PostScript_Graphics_Driver::draw_scaled (  
    Fl_Image * img,  
    int X,  
    int Y,  
    int W,  
    int H ) [virtual]
```

Draws an [Fl_Image](#) scaled to width W & height H with top-left corner at X,Y.

Returns

zero when the graphics driver doesn't implement scaled drawing, non-zero if it does implement it.

Reimplemented from [Fl_Graphics_Driver](#).

The documentation for this class was generated from the following files:

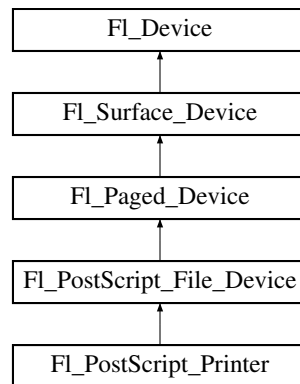
- [Fl_PostScript.H](#)
- [Fl_PostScript.cxx](#)

31.102 FI_PostScript_Printer Class Reference

Print support under Unix/Linux.

```
#include <Fl_Printer.H>
```

Inheritance diagram for FI_PostScript_Printer:



Public Member Functions

- `const char * class_name ()`
Returns the name of the class of this object.
- `int start_job (int pages, int *firstpage=NULL, int *lastpage=NULL)`
Starts a print job.

Static Public Attributes

- `static const char * class_id = FI_Printer::class_id`

Protected Member Functions

- `FI_PostScript_Printer (void)`
The constructor.

Friends

- class `FI_Printer`

Additional Inherited Members

31.102.1 Detailed Description

Print support under Unix/Linux.

Class `FI_PostScript_Printer` is implemented only on the Unix/Linux platform. It has no public constructor. Use `FI_Printer` instead that is cross-platform and has the same API.

31.102.2 Member Function Documentation

31.102.2.1 class_name()

```
const char* FI_PostScript_Printer::class_name ( ) [inline], [virtual]
```

Returns the name of the class of this object.

Use of the `class_name()` function is discouraged because it will be removed from future FLTK versions.

The class of an instance of an `FI_Device` subclass can be checked with code such as:

```
if ( instance->class_name() == FI_Printer::class_id ) { ... }
```

Reimplemented from [FI_PostScript_File_Device](#).

The documentation for this class was generated from the following files:

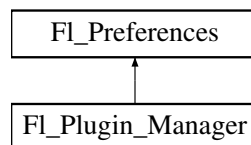
- [FI_Printer.H](#)
- [FI_PostScript.cxx](#)
- [FI_Printer.cxx](#)

31.103 FI_Preferences Class Reference

[FI_Preferences](#) provides methods to store user settings between application starts.

```
#include <FI_Preferences.H>
```

Inheritance diagram for FI_Preferences:



Classes

- struct [Entry](#)
- class [Name](#)
 - *'Name' provides a simple method to create numerical or more complex procedural names for entries and groups on the fly.*
- class [Node](#)
- class [RootNode](#)

Public Types

- typedef void * [ID](#)
 - *Every FI_Preferences-Group has a unique ID.*
- enum [Root](#) { [SYSTEM](#) =0 , [USER](#) }
 - *Define the scope of the preferences.*

Public Member Functions

- char [clear](#) ()
 - *Delete all groups and all entries.*
- char [deleteAllEntries](#) ()
 - *Delete all entries.*
- char [deleteAllGroups](#) ()
 - *Delete all groups.*
- char [deleteEntry](#) (const char *[entry](#))
 - *Deletes a single name/value pair.*
- char [deleteGroup](#) (const char *[group](#))
 - *Deletes a group.*
- int [entries](#) ()
 - *Returns the number of entries (name/value pairs) in a group.*
- const char * [entry](#) (int index)
 - *Returns the name of an entry.*
- char [entryExists](#) (const char *[key](#))
 - *Returns non-zero if an entry with this name exists.*

- [FI_Preferences](#) (const char *path, const char *vendor, const char *application)
Use this constructor to create or read a preferences file at an arbitrary position in the file system.
- [FI_Preferences](#) (const [FI_Preferences](#) &)
Create another reference to a Preferences group.
- [FI_Preferences](#) ([FI_Preferences](#) &parent, const char *group)
Generate or read a new group of entries within another group.
- [FI_Preferences](#) ([FI_Preferences](#) &parent, int groupIndex)
Open a child group using a given index.
- [FI_Preferences](#) ([FI_Preferences](#) *parent, const char *group)
Create or access a group of preferences using a name.
- [FI_Preferences](#) ([FI_Preferences](#) *parent, int groupIndex)
- [FI_Preferences](#) (ID id)
Create a new dataset access point using a dataset ID.
- [FI_Preferences](#) (Root root, const char *vendor, const char *application)
The constructor creates a group that manages name/value pairs and child groups.
- void [flush](#) ()
Writes all preferences to disk.
- char [get](#) (const char *entry, char *&value, const char *defaultValue)
Reads an entry from the group.
- char [get](#) (const char *entry, char *value, const char *defaultValue, int maxSize)
Reads an entry from the group.
- char [get](#) (const char *entry, double &value, double defaultValue)
Reads an entry from the group.
- char [get](#) (const char *entry, float &value, float defaultValue)
Reads an entry from the group.
- char [get](#) (const char *entry, int &value, int defaultValue)
Reads an entry from the group.
- char [get](#) (const char *entry, void *&value, const void *defaultValue, int defaultSize)
Reads an entry from the group.
- char [get](#) (const char *entry, void *value, const void *defaultValue, int defaultSize, int maxSize)
Reads an entry from the group.
- char [getUserdataPath](#) (char *path, int pathlen)
Creates a path that is related to the preferences file and that is usable for additional application data.
- const char * [group](#) (int num_group)
Returns the name of the Nth (num_group) group.
- char [groupExists](#) (const char *key)
Returns non-zero if a group with this name exists.
- int [groups](#) ()
Returns the number of groups that are contained within a group.
- [ID](#) [id](#) ()
Return an ID that can later be reused to open more references to this dataset.
- const char * [name](#) ()
Return the name of this entry.
- const char * [path](#) ()
Return the full path to this entry.
- char [set](#) (const char *entry, const char *value)
Sets an entry (name/value pair).
- char [set](#) (const char *entry, const void *value, int size)
Sets an entry (name/value pair).
- char [set](#) (const char *entry, double value)
Sets an entry (name/value pair).

- char [set](#) (const char *[entry](#), double value, int precision)
Sets an entry (name/value pair).
- char [set](#) (const char *[entry](#), float value)
Sets an entry (name/value pair).
- char [set](#) (const char *[entry](#), float value, int precision)
Sets an entry (name/value pair).
- char [set](#) (const char *[entry](#), int value)
Sets an entry (name/value pair).
- int [size](#) (const char *[entry](#))
Returns the size of the value part of an entry.
- virtual [~FL_Preferences](#) ()
The destructor removes allocated resources.

Static Public Member Functions

- static const char * [newUUID](#) ()
Returns a UUID as generated by the system.
- static char [remove](#) (ID id_)
Remove the group with this ID from a database.

Protected Attributes

- [Node](#) * [node](#)
- [RootNode](#) * [rootNode](#)

Friends

- class [Node](#)
- class [RootNode](#)

31.103.1 Detailed Description

[FL_Preferences](#) provides methods to store user settings between application starts.

It is similar to the Registry on WIN32 and Preferences on MacOS, and provides a simple configuration mechanism for UNIX.

[FL_Preferences](#) uses a hierarchy to store data. It bundles similar data into groups and manages entries into those groups as name/value pairs.

Preferences are stored in text files that can be edited manually. The file format is easy to read and relatively forgiving. Preferences files are the same on all platforms. User comments in preference files are preserved. Filenames are unique for each application by using a vendor/application naming scheme. The user must provide default values for all entries to ensure proper operation should preferences be corrupted or not yet exist.

Entries can be of any length. However, the size of each preferences file should be kept small for performance reasons. One application can have multiple preferences files. Extensive binary data however should be stored in separate files: see [getUserdataPath\(\)](#).

Note

Starting with FLTK 1.3, preference databases are expected to be in UTF-8 encoding. Previous databases were stored in the current character set or code page which renders them incompatible for text entries using international characters.

31.103.2 Member Typedef Documentation

31.103.2.1 ID

```
typedef void* Fl_Preferences::ID
```

Every Fl_Preferences-Group has a unique ID.

ID's can be retrieved from an Fl_Preferences-Group and can then be used to create more Fl_Preference references to the same data set, as long as the database remains open.

31.103.3 Member Enumeration Documentation

31.103.3.1 Root

```
enum Fl_Preferences::Root
```

Define the scope of the preferences.

Enumerator

SYSTEM	Preferences are used system-wide.
USER	Preferences apply only to the current user.

31.103.4 Constructor & Destructor Documentation

31.103.4.1 Fl_Preferences() [1/7]

```
Fl_Preferences::Fl_Preferences (
    Root root,
    const char * vendor,
    const char * application )
```

The constructor creates a group that manages name/value pairs and child groups.

Groups are ready for reading and writing at any time. The root argument is either [Fl_Preferences::USER](#) or [Fl_Preferences::SYSTEM](#).

This constructor creates the *base* instance for all following entries and reads existing databases into memory. The vendor argument is a unique text string identifying the development team or vendor of an application. A domain name or an EMail address are great unique names, e.g. "researchATmatthiasm.com" or "fltk.org". The application argument can be the working title or final name of your application. Both vendor and application must be valid relative UNIX pathnames and may contain '/'s to create deeper file structures.

A set of Preferences marked "run-time" exists exactly one per application and only as long as the application runs. It can be used as a database for volatile information. FLTK uses it to register plugins at run-time.

Parameters

in	<i>root</i>	can be USER or SYSTEM for user specific or system wide preferences
in	<i>vendor</i>	unique text describing the company or author of this file
in	<i>application</i>	unique text describing the application

31.103.4.2 Fl_Preferences() [2/7]

```
Fl_Preferences::Fl_Preferences (
    const char * path,
    const char * vendor,
    const char * application )
```

Use this constructor to create or read a preferences file at an arbitrary position in the file system.

The file name is generated in the form `path/application.prefs`. If `application` is `NULL`, `path` must contain the full file name.

Parameters

in	<i>path</i>	path to the directory that contains the preferences file
in	<i>vendor</i>	unique text describing the company or author of this file
in	<i>application</i>	unique text describing the application

31.103.4.3 Fl_Preferences() [3/7]

```
Fl_Preferences::Fl_Preferences (
    Fl_Preferences & parent,
    const char * group )
```

Generate or read a new group of entries within another group.

Use the `group` argument to name the group that you would like to access. `Group` can also contain a path to a group further down the hierarchy by separating group names with a forward slash '/'.

Parameters

in	<i>parent</i>	reference object for the new group
in	<i>group</i>	name of the group to access (may contain '/'s)

31.103.4.4 Fl_Preferences() [4/7]

```
Fl_Preferences::Fl_Preferences (
    Fl_Preferences * parent,
    const char * group )
```

Create or access a group of preferences using a name.

Parameters

in	<i>parent</i>	the parameter <code>parent</code> is a pointer to the parent group. <code>Parent</code> may be <code>NULL</code> . It then refers to an application internal database which exists only once, and remains in RAM only until the application quits. This database is used to manage plugins and other data indexes by strings.
in	<i>group</i>	a group name that is used as a key into the database

See also

[Fl_Preferences\(Fl_Preferences&, const char *group \)](#)

31.103.4.5 Fl_Preferences() [5/7]

```
Fl_Preferences::Fl_Preferences (
    Fl_Preferences & parent,
    int groupIndex )
```

Open a child group using a given index.

Use the `groupIndex` argument to find the group that you would like to access. If the given index is invalid (negative or too high), a new group is created with a UUID as a name.

The index needs to be fixed. It is currently backward. Index 0 points to the last member in the 'list' of preferences.

Parameters

in	<i>parent</i>	reference object for the new group
in	<i>groupIndex</i>	zero based index into child groups

31.103.4.6 FI_Preferences() [6/7]

```
Fl_Preferences::Fl_Preferences (
    Fl_Preferences * parent,
    int groupIndex )
```

See also

[FI_Preferences\(Fl_Preferences&, int groupIndex \)](#)

31.103.4.7 FI_Preferences() [7/7]

```
Fl_Preferences::Fl_Preferences (
    Fl_Preferences::ID id )
```

Create a new dataset access point using a dataset ID.

ID's are a great way to remember shortcuts to database entries that are deeply nested in a preferences database, as long as the database root is not deleted. An ID can be retrieved from any [FI_Preferences](#) dataset, and can then be used to create multiple new references to the same dataset.

ID's can be very helpful when put into the `user_data()` field of widget callbacks.

31.103.4.8 ~FI_Preferences()

```
Fl_Preferences::~~Fl_Preferences ( ) [virtual]
```

The destructor removes allocated resources.

When used on the *base* preferences group, the destructor flushes all changes to the preferences file and deletes all internal databases.

The destructor does not remove any data from the database. It merely deletes your reference to the database.

31.103.5 Member Function Documentation**31.103.5.1 deleteEntry()**

```
char Fl_Preferences::deleteEntry (
    const char * key )
```

Deletes a single name/value pair.

This function removes the entry `key` from the database.

Parameters

in	<i>key</i>	name of entry to delete
----	------------	-------------------------

Returns

0 if deleting the entry failed

31.103.5.2 deleteGroup()

```
char Fl_Preferences::deleteGroup (
    const char * group )
```

Deletes a group.

Removes a group and all keys and groups within that group from the database.

Parameters

in	<i>group</i>	name of the group to delete
----	--------------	-----------------------------

Returns

0 if call failed

31.103.5.3 entries()

```
int Fl_Preferences::entries ( )
```

Returns the number of entries (name/value pairs) in a group.

Returns

number of entries

31.103.5.4 entry()

```
const char * Fl_Preferences::entry (
    int index )
```

Returns the name of an entry.

There is no guaranteed order of entry names. The index must be within the range given by [entries\(\)](#).

Parameters

in	<i>index</i>	number indexing the requested entry
----	--------------	-------------------------------------

Returns

pointer to value cstring

31.103.5.5 entryExists()

```
char Fl_Preferences::entryExists (
    const char * key )
```

Returns non-zero if an entry with this name exists.

Parameters

in	<i>key</i>	name of entry that is searched for
----	------------	------------------------------------

Returns

0 if entry was not found

31.103.5.6 flush()

```
void Fl_Preferences::flush ( )
```

Writes all preferences to disk.

This function works only with the base preferences group. This function is rarely used as deleting the base preferences flushes automatically.

31.103.5.7 get() [1/7]

```
char Fl_Preferences::get (
    const char * key,
    char *& text,
    const char * defaultValue )
```

Reads an entry from the group.

A default value must be supplied. The return value indicates if the value was available (non-zero) or the default was used (0). [get\(\)](#) allocates memory of sufficient size to hold the value. The buffer must be free'd by the developer using 'free(value)'.

Parameters

in	<i>key</i>	name of entry
out	<i>text</i>	returned from preferences or default value if none was set
in	<i>defaultValue</i>	default value to be used if no preference was set

Returns

0 if the default value was used

31.103.5.8 get() [2/7]

```
char Fl_Preferences::get (
    const char * key,
    char * text,
    const char * defaultValue,
    int maxSize )
```

Reads an entry from the group.

A default value must be supplied. The return value indicates if the value was available (non-zero) or the default was used (0). 'maxSize' is the maximum length of text that will be read. The text buffer must allow for one additional byte for a trailing zero.

Parameters

in	<i>key</i>	name of entry
out	<i>text</i>	returned from preferences or default value if none was set
in	<i>defaultValue</i>	default value to be used if no preference was set
in	<i>maxSize</i>	maximum length of value plus one byte for a trailing zero

Returns

0 if the default value was used

31.103.5.9 get() [3/7]

```
char Fl_Preferences::get (
    const char * key,
    double & value,
    double defaultValue )
```

Reads an entry from the group.

A default value must be supplied. The return value indicates if the value was available (non-zero) or the default was used (0).

Parameters

in	<i>key</i>	name of entry
out	<i>value</i>	returned from preferences or default value if none was set
in	<i>defaultValue</i>	default value to be used if no preference was set

Returns

0 if the default value was used

31.103.5.10 get() [4/7]

```
char Fl_Preferences::get (
    const char * key,
    float & value,
    float defaultValue )
```

Reads an entry from the group.

A default value must be supplied. The return value indicates if the value was available (non-zero) or the default was used (0).

Parameters

in	<i>key</i>	name of entry
out	<i>value</i>	returned from preferences or default value if none was set
in	<i>defaultValue</i>	default value to be used if no preference was set

Returns

0 if the default value was used

31.103.5.11 get() [5/7]

```
char Fl_Preferences::get (
    const char * key,
    int & value,
    int defaultValue )
```

Reads an entry from the group.

A default value must be supplied. The return value indicates if the value was available (non-zero) or the default was used (0).

Parameters

in	<i>key</i>	name of entry
out	<i>value</i>	returned from preferences or default value if none was set
in	<i>defaultValue</i>	default value to be used if no preference was set

Returns

0 if the default value was used

31.103.5.12 get() [6/7]

```
char Fl_Preferences::get (
    const char * key,
    void *& data,
    const void * defaultValue,
    int defaultSize )
```

Reads an entry from the group.

A default value must be supplied. The return value indicates if the value was available (non-zero) or the default was used (0). [get\(\)](#) allocates memory of sufficient size to hold the value. The buffer must be free'd by the developer using 'free(value)'.

Parameters

in	<i>key</i>	name of entry
out	<i>data</i>	returned from preferences or default value if none was set
in	<i>defaultValue</i>	default value to be used if no preference was set
in	<i>defaultSize</i>	size of default value array

Returns

0 if the default value was used

31.103.5.13 get() [7/7]

```
char Fl_Preferences::get (
    const char * key,
    void * data,
    const void * defaultValue,
    int defaultSize,
    int maxSize )
```

Reads an entry from the group.

A default value must be supplied. The return value indicates if the value was available (non-zero) or the default was used (0). 'maxSize' is the maximum length of text that will be read.

Parameters

in	<i>key</i>	name of entry
out	<i>data</i>	value returned from preferences or default value if none was set
in	<i>defaultValue</i>	default value to be used if no preference was set
in	<i>defaultSize</i>	size of default value array
in	<i>maxSize</i>	maximum length of value

Returns

0 if the default value was used

Todo maxSize should receive the number of bytes that were read.

31.103.5.14 getUserdataPath()

```
char Fl_Preferences::getUserdataPath (
    char * path,
    int pathlen )
```

Creates a path that is related to the preferences file and that is usable for additional application data. This function creates a directory that is named after the preferences database without the .prefs extension and located in the same directory. It then fills the given buffer with the complete path name.

Example:

```
Fl_Preferences prefs( USER, "matthiasm.com", "test" );
char path[FL_PATH_MAX];
prefs.getUserdataPath( path );
..creates the preferences database in (MS Windows):
c:/Documents and Settings/matt/Application Data/matthiasm.com/test.prefs
..and returns the userdata path:
c:/Documents and Settings/matt/Application Data/matthiasm.com/test/
```

Parameters

out	<i>path</i>	buffer for user data path
in	<i>pathlen</i>	size of path buffer (should be at least FL_PATH_MAX)

Returns

0 if path was not created or pathname can't fit into buffer

31.103.5.15 group()

```
const char * Fl_Preferences::group (
    int num_group )
```

Returns the name of the Nth (num_group) group.

There is no guaranteed order of group names. The index must be within the range given by [groups\(\)](#).

Parameters

in	<i>num_group</i>	number indexing the requested group
----	------------------	-------------------------------------

Returns

'C' string pointer to the group name

31.103.5.16 groupExists()

```
char Fl_Preferences::groupExists (
    const char * key )
```

Returns non-zero if a group with this name exists.

Group names are relative to the Preferences node and can contain a path. "." describes the current node, "../" describes the topmost node. By preceding a groupname with a "../", its path becomes relative to the topmost node.

Parameters

in	<i>key</i>	name of group that is searched for
----	------------	------------------------------------

Returns

0 if no group by that name was found

31.103.5.17 groups()

```
int Fl_Preferences::groups ( )
```

Returns the number of groups that are contained within a group.

Returns

0 for no groups at all

31.103.5.18 newUUID()

```
const char * Fl_Preferences::newUUID ( ) [static]
```

Returns a UUID as generated by the system.

A UUID is a "universally unique identifier" which is commonly used in configuration files to create identities. A UUID in ASCII looks like this: 937C4900-51AA-4C11-8DD3-7AB59944F03E. It has always 36 bytes plus a trailing zero.

Returns

a pointer to a static buffer containing the new UUID in ASCII format. The buffer is overwritten during every call to this function!

31.103.5.19 set() [1/7]

```
char Fl_Preferences::set (
    const char * key,
    const char * text )
```

Sets an entry (name/value pair).

The return value indicates if there was a problem storing the data in memory. However it does not reflect if the value was actually stored in the preferences file.

Parameters

in	<i>key</i>	name of entry
in	<i>text</i>	set this entry to value

Returns

0 if setting the value failed

31.103.5.20 set() [2/7]

```
char Fl_Preferences::set (
    const char * key,
```

```

    const void * data,
    int dsize )

```

Sets an entry (name/value pair).

The return value indicates if there was a problem storing the data in memory. However it does not reflect if the value was actually stored in the preferences file.

Parameters

in	<i>key</i>	name of entry
in	<i>data</i>	set this entry to <i>value</i>
in	<i>dsize</i>	size of data array

Returns

0 if setting the value failed

31.103.5.21 set() [3/7]

```

char Fl_Preferences::set (
    const char * key,
    double value )

```

Sets an entry (name/value pair).

The return value indicates if there was a problem storing the data in memory. However it does not reflect if the value was actually stored in the preferences file.

Parameters

in	<i>key</i>	name of entry
in	<i>value</i>	set this entry to <i>value</i>

Returns

0 if setting the value failed

31.103.5.22 set() [4/7]

```

char Fl_Preferences::set (
    const char * key,
    double value,
    int precision )

```

Sets an entry (name/value pair).

The return value indicates if there was a problem storing the data in memory. However it does not reflect if the value was actually stored in the preferences file.

Parameters

in	<i>key</i>	name of entry
in	<i>value</i>	set this entry to <i>value</i>
in	<i>precision</i>	number of decimal digits to represent value

Returns

0 if setting the value failed

31.103.5.23 set() [5/7]

```
char Fl_Preferences::set (
    const char * key,
    float value )
```

Sets an entry (name/value pair).

The return value indicates if there was a problem storing the data in memory. However it does not reflect if the value was actually stored in the preferences file.

Parameters

in	<i>key</i>	name of entry
in	<i>value</i>	set this entry to <i>value</i>

Returns

0 if setting the value failed

31.103.5.24 set() [6/7]

```
char Fl_Preferences::set (
    const char * key,
    float value,
    int precision )
```

Sets an entry (name/value pair).

The return value indicates if there was a problem storing the data in memory. However it does not reflect if the value was actually stored in the preferences file.

Parameters

in	<i>key</i>	name of entry
in	<i>value</i>	set this entry to <i>value</i>
in	<i>precision</i>	number of decimal digits to represent value

Returns

0 if setting the value failed

31.103.5.25 set() [7/7]

```
char Fl_Preferences::set (
    const char * key,
    int value )
```

Sets an entry (name/value pair).

The return value indicates if there was a problem storing the data in memory. However it does not reflect if the value was actually stored in the preferences file.

Parameters

in	<i>key</i>	name of entry
----	------------	---------------

Parameters

in	value	set this entry to value
----	-------	-------------------------

Returns

0 if setting the value failed

31.103.5.26 size()

```
int Fl_Preferences::size (
    const char * key )
```

Returns the size of the value part of an entry.

Parameters

in	key	name of entry
----	-----	---------------

Returns

size of value

The documentation for this class was generated from the following files:

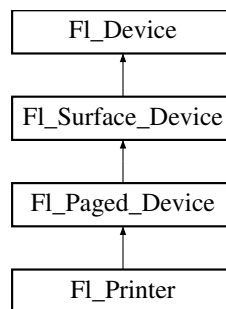
- Fl_Preferences.H
- Fl_Preferences.cxx

31.104 FI_Printer Class Reference

OS-independent print support.

```
#include <Fl_Printer.H>
```

Inheritance diagram for Fl_Printer:

**Public Member Functions**

- `const char * class_name ()`
Returns the name of the class of this object.
- `Fl_Graphics_Driver * driver (void)`
- `void end_job (void)`
To be called at the end of a print job.
- `int end_page (void)`
To be called at the end of each page.
- `Fl_Printer (void)`

- The constructor.*

 - void `margins` (int *left, int *top, int *right, int *bottom)
Computes the dimensions of margins that lie between the printable page area and the full page.
 - void `origin` (int *x, int *y)
Computes the page coordinates of the current origin of graphics functions.
 - void `origin` (int x, int y)
Sets the position in page coordinates of the origin of graphics functions.
 - void `print_widget` (FI_Widget *widget, int delta_x=0, int delta_y=0)
Draws the widget on the printed page.
 - void `print_window_part` (FI_Window *win, int x, int y, int w, int h, int delta_x=0, int delta_y=0)
Prints a rectangular part of an on-screen window.
 - int `printable_rect` (int *w, int *h)
Computes the width and height of the printable area of the page.
 - void `rotate` (float angle)
Rotates the graphics operations relatively to paper.
 - void `scale` (float scale_x, float scale_y=0.)
Changes the scaling of page coordinates.
 - void `set_current` (void)
Make this surface the current drawing surface.
 - int `start_job` (int pagecount, int *frompage=NULL, int *topage=NULL)
Starts a print job.
 - int `start_page` (void)
Starts a new printed page.
 - void `translate` (int x, int y)
Translates the current graphics origin accounting for the current rotation.
 - void `untranslate` (void)
Undoes the effect of a previous `translate()` call.
 - `~FI_Printer` (void)
The destructor.

Static Public Attributes

- static const char * `class_id` = "FI_Printer"

These attributes are effective under the Xlib platform only.

- static const char * `dialog_title` = "Print"
[this text may be customized at run-time]
- static const char * `dialog_printer` = "Printer:"
[this text may be customized at run-time]
- static const char * `dialog_range` = "Print Range"
[this text may be customized at run-time]
- static const char * `dialog_copies` = "Copies"
[this text may be customized at run-time]
- static const char * `dialog_all` = "All"
[this text may be customized at run-time]
- static const char * `dialog_pages` = "Pages"
[this text may be customized at run-time]
- static const char * `dialog_from` = "From:"
[this text may be customized at run-time]
- static const char * `dialog_to` = "To:"
[this text may be customized at run-time]
- static const char * `dialog_properties` = "Properties..."
[this text may be customized at run-time]
- static const char * `dialog_copyNo` = "# Copies:"

- *[this text may be customized at run-time]*
static const char * [dialog_print_button](#) = "Print"
- *[this text may be customized at run-time]*
static const char * [dialog_cancel_button](#) = "Cancel"
- *[this text may be customized at run-time]*
static const char * [dialog_print_to_file](#) = "Print To File"
- *[this text may be customized at run-time]*
static const char * [property_title](#) = "Printer Properties"
- *[this text may be customized at run-time]*
static const char * [property_pagesize](#) = "Page Size:"
- *[this text may be customized at run-time]*
static const char * [property_mode](#) = "Output Mode:"
- *[this text may be customized at run-time]*
static const char * [property_use](#) = "Use"
- *[this text may be customized at run-time]*
static const char * [property_save](#) = "Save"
- *[this text may be customized at run-time]*
static const char * [property_cancel](#) = "Cancel"

Additional Inherited Members

31.104.1 Detailed Description

OS-independent print support.

[Fl_Printer](#) allows to use all drawing, color, text, image, and clip FLTK functions, and to have them operate on printed page(s). There are two main, non exclusive, ways to use it.

- Print any widget (standard, custom, [Fl_Window](#), [Fl_Gl_Window](#)) as it appears on screen, with optional translation, scaling and rotation. This is done by calling [print_widget\(\)](#), [print_window\(\)](#) or [print_window_part\(\)](#).
- Use a series of FLTK graphics commands (e.g., font, text, lines, colors, clip, image) to compose a page appropriately shaped for printing.

In both cases, begin by [start_job\(\)](#), [start_page\(\)](#), [printable_rect\(\)](#) and [origin\(\)](#) calls and finish by [end_page\(\)](#) and [end_job\(\)](#) calls.

Example of use: print a widget centered in a page

```
#include <FL/Fl_Printer.H>
#include <FL/fl_draw.H>
int width, height;
Fl_Widget *widget = ... // a widget we want printed
Fl_Printer *printer = new Fl_Printer();
if (printer->start_job(1) == 0) {
    printer->start_page();
    printer->printable_rect(&width, &height);
    fl_color(FL_BLACK);
    fl_line_style(FL_SOLID, 2);
    fl_rect(0, 0, width, height);
    fl_font(FL_COURIER, 12);
    time_t now; time(&now); fl_draw(ctime(&now), 0, fl_height());
    printer->origin(width/2, height/2);
    printer->print_widget(widget, -widget->w()/2, -widget->h()/2);
    printer->end_page();
    printer->end_job();
}
delete printer;
```

Platform specifics

- Unix/Linux platforms: Unless it has been previously changed, the default paper size is A4. To change that, press the "Properties" button of the "Print" dialog window opened by an [Fl_Printer::start_job\(\)](#) call. This opens a "Printer Properties" window where it's possible to select the adequate paper size. Finally press the "Save" button therein to assign the chosen paper size to the chosen printer for this and all further print operations. Class [Fl_RGB_Image](#) prints but loses its transparency if it has one. See class [Fl_PostScript_Graphics_Driver](#) for a description of how UTF-8 strings appear in print. Use the static public attributes of this class to set the print dialog to other languages than English. For example, the "Printer:" dialog item [Fl_Printer::dialog_printer](#) can be set to French with:
`Fl_Printer::dialog_printer = "Imprimante:";`

before creation of the [Fl_Printer](#) object. Use [Fl_PostScript_File_Device::file_chooser_title](#) to customize the title of the file chooser dialog that opens when using the "Print To File" option of the print dialog.

- MSWindows platform: Transparent [Fl_RGB_Image](#) 's don't print with exact transparency on most printers. [Fl_RGB_Image](#) 's don't [rotate\(\)](#) well. A workaround is to use the [print_window_part\(\)](#) call.
- Mac OS X platform: all graphics requests print as on display.

31.104.2 Member Function Documentation

31.104.2.1 class_name()

```
const char* Fl_Printer::class_name ( ) [inline], [virtual]
```

Returns the name of the class of this object.

Use of the [class_name\(\)](#) function is discouraged because it will be removed from future FLTK versions.

The class of an instance of an [Fl_Device](#) subclass can be checked with code such as:

```
if ( instance->class_name() == Fl_Printer::class_id ) { ... }
```

Reimplemented from [Fl_Paged_Device](#).

31.104.2.2 end_page()

```
int Fl_Printer::end_page (
    void ) [virtual]
```

To be called at the end of each page.

Returns

0 if OK, non-zero if any error.

Reimplemented from [Fl_Paged_Device](#).

31.104.2.3 margins()

```
void Fl_Printer::margins (
    int * left,
    int * top,
    int * right,
    int * bottom ) [virtual]
```

Computes the dimensions of margins that lie between the printable page area and the full page.

Values are in the same unit as that used by FLTK drawing functions. They are changed by [scale\(\)](#) calls.

Parameters

out	<i>left</i>	If non-null, *left is set to the left margin size.
out	<i>top</i>	If non-null, *top is set to the top margin size.
out	<i>right</i>	If non-null, *right is set to the right margin size.
out	<i>bottom</i>	If non-null, *bottom is set to the bottom margin size.

Reimplemented from [Fl_Paged_Device](#).

31.104.2.4 origin() [1/2]

```
void Fl_Printer::origin (
    int * x,
    int * y ) [virtual]
```


Computes the page coordinates of the current origin of graphics functions.

Parameters

out	<i>x</i>	If non-null, * <i>x</i> is set to the horizontal page offset of graphics origin.
out	<i>y</i>	Same as above, vertically.

Reimplemented from [Fl_Paged_Device](#).

31.104.2.5 origin() [2/2]

```
void Fl_Printer::origin (
    int x,
    int y ) [virtual]
```

Sets the position in page coordinates of the origin of graphics functions.

Arguments should be expressed relatively to the result of a previous [printable_rect\(\)](#) call. That is, `printable_rect(&w, &h); origin(w/2, 0);` sets the graphics origin at the top center of the page printable area. [Origin\(\)](#) calls are not affected by [rotate\(\)](#) calls. Successive [origin\(\)](#) calls don't combine their effects.

Parameters

in	<i>x</i>	Horizontal position in page coordinates of the desired origin of graphics functions.
in	<i>y</i>	Same as above, vertically.

Reimplemented from [Fl_Paged_Device](#).

31.104.2.6 print_widget()

```
void Fl_Printer::print_widget (
    Fl_Widget * widget,
    int delta_x = 0,
    int delta_y = 0 ) [virtual]
```

Draws the widget on the printed page.

The widget's position on the printed page is determined by the last call to [origin\(\)](#) and by the optional `delta_x` and `delta_y` arguments. Its dimensions are in points unless there was a previous call to [scale\(\)](#).

Parameters

in	<i>widget</i>	Any FLTK widget (e.g., standard, custom, window).
in	<i>delta_x</i>	Optional horizontal offset for positioning the widget relatively to the current origin of graphics functions.
in	<i>delta_y</i>	Same as above, vertically.

Reimplemented from [Fl_Paged_Device](#).

31.104.2.7 print_window_part()

```
void Fl_Printer::print_window_part (
    Fl_Window * win,
    int x,
    int y,
    int w,
    int h,
```

```

    int delta_x = 0,
    int delta_y = 0 ) [virtual]

```

Prints a rectangular part of an on-screen window.

Parameters

<i>win</i>	The window from where to capture.
<i>x</i>	The rectangle left
<i>y</i>	The rectangle top
<i>w</i>	The rectangle width
<i>h</i>	The rectangle height
<i>delta</i> _↔ <i>_x</i>	Optional horizontal offset from current graphics origin where to print the captured rectangle.
<i>delta</i> _↔ <i>_y</i>	As above, vertically.

Reimplemented from [Fl_Paged_Device](#).

31.104.2.8 printable_rect()

```

int Fl_Printer::printable_rect (
    int * w,
    int * h ) [virtual]

```

Computes the width and height of the printable area of the page.

Values are in the same unit as that used by FLTK drawing functions, are unchanged by calls to [origin\(\)](#), but are changed by [scale\(\)](#) calls. Values account for the user-selected paper type and print orientation.

Returns

0 if OK, non-zero if any error

Reimplemented from [Fl_Paged_Device](#).

31.104.2.9 rotate()

```

void Fl_Printer::rotate (
    float angle ) [virtual]

```

Rotates the graphics operations relatively to paper.

The rotation is centered on the current graphics origin. Successive [rotate\(\)](#) calls don't combine their effects.

Parameters

<i>angle</i>	Rotation angle in counter-clockwise degrees.
--------------	--

Reimplemented from [Fl_Paged_Device](#).

31.104.2.10 scale()

```

void Fl_Printer::scale (
    float scale_x,
    float scale_y = 0. ) [virtual]

```

Changes the scaling of page coordinates.

This function also resets the origin of graphics functions at top left of printable page area. After a [scale\(\)](#) call, do a [printable_rect\(\)](#) call to get the new dimensions of the printable page area. Successive [scale\(\)](#) calls don't combine their effects.

Parameters

<code>scale_x</code>	Horizontal dimensions of plot are multiplied by this quantity.
<code>scale_y</code>	Same as above, vertically. The value 0. is equivalent to setting <code>scale_y = scale_x</code> . Thus, <code>scale(factor)</code> ; is equivalent to <code>scale(factor, factor)</code> ;

Reimplemented from [Fl_Paged_Device](#).

31.104.2.11 set_current()

```
void Fl_Printer::set_current (
    void ) [virtual]
```

Make this surface the current drawing surface.
This surface will receive all future graphics requests.
Reimplemented from [Fl_Surface_Device](#).

31.104.2.12 start_job()

```
int Fl_Printer::start_job (
    int pagecount,
    int * frompage = NULL,
    int * topage = NULL ) [virtual]
```

Starts a print job.

Opens a platform-specific dialog window allowing the user to set several options including the desired printer and the page orientation. Optionally, the user can also select a range of pages to be printed. This range is returned to the caller that is in charge of sending only these pages for printing.

Parameters

in	<code>pagecount</code>	the total number of pages of the job (or 0 if you don't know the number of pages)
out	<code>frompage</code>	if non-null, <code>*frompage</code> is set to the first page the user wants printed
out	<code>topage</code>	if non-null, <code>*topage</code> is set to the last page the user wants printed

Returns

0 if OK, non-zero if any error occurred or if the user cancelled the print request.

Reimplemented from [Fl_Paged_Device](#).

31.104.2.13 start_page()

```
int Fl_Printer::start_page (
    void ) [virtual]
```

Starts a new printed page.

The page coordinates are initially in points, i.e., 1/72 inch, and with origin at the top left of the printable page area.

Returns

0 if OK, non-zero if any error

Reimplemented from [Fl_Paged_Device](#).

31.104.2.14 translate()

```
void Fl_Printer::translate (
```

```
int x,
int y ) [virtual]
```

Translates the current graphics origin accounting for the current rotation.

This function is only useful after a [rotate\(\)](#) call. Each [translate\(\)](#) call must be matched by an [untranslate\(\)](#) call. Successive [translate\(\)](#) calls add up their effects.

Reimplemented from [Fl_Paged_Device](#).

The documentation for this class was generated from the following files:

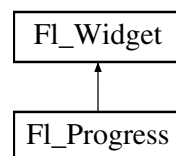
- [Fl_Printer.H](#)
- [Fl_Printer.cxx](#)

31.105 Fl_Progress Class Reference

Displays a progress bar for the user.

```
#include <Fl_Progress.H>
```

Inheritance diagram for Fl_Progress:



Public Member Functions

- [Fl_Progress](#) (int x, int y, int w, int h, const char *l=0)
 - The constructor creates the progress bar using the position, size, and label.*
- float [maximum](#) () const
 - Gets the maximum value in the progress widget.*
- void [maximum](#) (float v)
 - Sets the maximum value in the progress widget.*
- float [minimum](#) () const
 - Gets the minimum value in the progress widget.*
- void [minimum](#) (float v)
 - Sets the minimum value in the progress widget.*
- float [value](#) () const
 - Gets the current value in the progress widget.*
- void [value](#) (float v)
 - Sets the current value in the progress widget.*

Protected Member Functions

- virtual void [draw](#) ()
 - Draws the progress bar.*

Additional Inherited Members

31.105.1 Detailed Description

Displays a progress bar for the user.

31.105.2 Constructor & Destructor Documentation

31.105.2.1 Fl_Progress()

```
Fl_Progress::Fl_Progress (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

The constructor creates the progress bar using the position, size, and label.

You can set the background color with [color\(\)](#) and the progress bar color with [selection_color\(\)](#), or you can set both colors together with [color\(unsigned bg, unsigned sel\)](#).

The default colors are FL_BACKGROUND2_COLOR and FL_YELLOW, resp.

31.105.3 Member Function Documentation

31.105.3.1 maximum() [1/2]

```
float Fl_Progress::maximum ( ) const [inline]
```

Gets the maximum value in the progress widget.

31.105.3.2 maximum() [2/2]

```
void Fl_Progress::maximum (
    float v ) [inline]
```

Sets the maximum value in the progress widget.

31.105.3.3 minimum() [1/2]

```
float Fl_Progress::minimum ( ) const [inline]
```

Gets the minimum value in the progress widget.

31.105.3.4 minimum() [2/2]

```
void Fl_Progress::minimum (
    float v ) [inline]
```

Sets the minimum value in the progress widget.

31.105.3.5 value() [1/2]

```
float Fl_Progress::value ( ) const [inline]
```

Gets the current value in the progress widget.

31.105.3.6 value() [2/2]

```
void Fl_Progress::value (
    float v ) [inline]
```

Sets the current value in the progress widget.

The documentation for this class was generated from the following files:

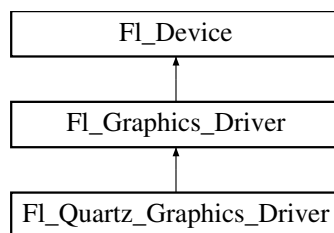
- `Fl_Progress.H`
- `Fl_Progress.cxx`

31.106 `Fl_Quartz_Graphics_Driver` Class Reference

The Mac OS X-specific graphics class.

```
#include <Fl_Device.H>
```

Inheritance diagram for `Fl_Quartz_Graphics_Driver`:



Public Member Functions

- `const char * class_name ()`
Returns the name of the class of this object.
- `void color (Fl_Color c)`
see `fl_color(Fl_Color c)`.
- `void color (uchar r, uchar g, uchar b)`
see `fl_color(uchar r, uchar g, uchar b)`.
- `void copy_offscreen (int x, int y, int w, int h, Fl_Offscreen pixmap, int srcx, int srcy)`
see `fl_copy_offscreen()`
- `int descent ()`
see `fl_descent()`.
- `void draw (const char *str, int n, int x, int y)`
*see `fl_draw(const char *str, int n, int x, int y)`.*
- `void draw (Fl_Bitmap *pixmap, int XP, int YP, int WP, int HP, int cx, int cy)`
Draws an `Fl_Bitmap` object to the device.
- `void draw (Fl_Pixmap *pixmap, int XP, int YP, int WP, int HP, int cx, int cy)`
Draws an `Fl_Pixmap` object to the device.
- `void draw (Fl_RGB_Image *img, int XP, int YP, int WP, int HP, int cx, int cy)`
Draws an `Fl_RGB_Image` object to the device.
- `void draw (int angle, const char *str, int n, int x, int y)`
*see `fl_draw(int angle, const char *str, int n, int x, int y)`.*
- `void draw_image (const uchar *buf, int X, int Y, int W, int H, int D=3, int L=0)`
see `fl_draw_image(const uchar buf, int X,int Y,int W,int H, int D, int L)`.*
- `void draw_image (Fl_Draw_Image_Cb cb, void *data, int X, int Y, int W, int H, int D=3)`
see `fl_draw_image(Fl_Draw_Image_Cb cb, void data, int X,int Y,int W,int H, int D)`.*
- `void draw_image_mono (const uchar *buf, int X, int Y, int W, int H, int D=1, int L=0)`
see `fl_draw_image_mono(const uchar buf, int X,int Y,int W,int H, int D, int L)`.*
- `void draw_image_mono (Fl_Draw_Image_Cb cb, void *data, int X, int Y, int W, int H, int D=1)`
see `fl_draw_image_mono(Fl_Draw_Image_Cb cb, void data, int X,int Y,int W,int H, int D)`.*
- `int draw_scaled (Fl_Image *img, int XP, int YP, int WP, int HP)`

- Draws an [Fl_Image](#) scaled to width W & height H with top-left corner at X,Y .*
- void [font](#) ([Fl_Font](#) face, [Fl_Fontsize](#) size)
see [fl_font\(Fl_Font face, Fl_Fontsize size\)](#).
 - int [height](#) ()
see [fl_height\(\)](#).
 - void [rtl_draw](#) (const char *str, int n, int x, int y)
*see [fl_rtl_draw\(const char *str, int n, int x, int y\)](#).*
 - void [text_extents](#) (const char *, int n, int &dx, int &dy, int &w, int &h)
see [fl_text_extents\(const char, int n, int& dx, int& dy, int& w, int& h\)](#).*
 - double [width](#) (const char *str, int n)
*see [fl_width\(const char *str, int n\)](#).*
 - double [width](#) (unsigned int c)
see [fl_width\(unsigned int n\)](#).

Static Public Attributes

- static const char * [class_id](#) = "Fl_Quartz_Graphics_Driver"

Additional Inherited Members

31.106.1 Detailed Description

The Mac OS X-specific graphics class.

This class is implemented only on the Mac OS X platform.

31.106.2 Member Function Documentation

31.106.2.1 [class_name\(\)](#)

```
const char* Fl_Quartz_Graphics_Driver::class_name ( ) [inline], [virtual]
```

Returns the name of the class of this object.

Use of the [class_name\(\)](#) function is discouraged because it will be removed from future FLTK versions.

The class of an instance of an [Fl_Device](#) subclass can be checked with code such as:

```
if ( instance->class_name() == Fl_Printer::class_id ) { ... }
```

Reimplemented from [Fl_Graphics_Driver](#).

31.106.2.2 [draw\(\)](#) [1/3]

```
void Fl_Quartz_Graphics_Driver::draw (
    Fl_Bitmap * bm,
    int XP,
    int YP,
    int WP,
    int HP,
    int cx,
    int cy ) [virtual]
```

Draws an [Fl_Bitmap](#) object to the device.

Specifies a bounding box for the image, with the origin (upper left-hand corner) of the image offset by the *cx* and *cy* arguments.

Reimplemented from [Fl_Graphics_Driver](#).

31.106.2.3 draw() [2/3]

```
void Fl_Quartz_Graphics_Driver::draw (
    Fl_Pixmap * pxm,
    int XP,
    int YP,
    int WP,
    int HP,
    int cx,
    int cy ) [virtual]
```

Draws an [Fl_Pixmap](#) object to the device.

Specifies a bounding box for the image, with the origin (upper left-hand corner) of the image offset by the cx and cy arguments.

Reimplemented from [Fl_Graphics_Driver](#).

31.106.2.4 draw() [3/3]

```
void Fl_Quartz_Graphics_Driver::draw (
    Fl_RGB_Image * rgb,
    int XP,
    int YP,
    int WP,
    int HP,
    int cx,
    int cy ) [virtual]
```

Draws an [Fl_RGB_Image](#) object to the device.

Specifies a bounding box for the image, with the origin (upper left-hand corner) of the image offset by the cx and cy arguments.

Reimplemented from [Fl_Graphics_Driver](#).

31.106.2.5 draw_scaled()

```
int Fl_Quartz_Graphics_Driver::draw_scaled (
    Fl_Image * img,
    int X,
    int Y,
    int W,
    int H ) [virtual]
```

Draws an [Fl_Image](#) scaled to width W & height H with top-left corner at X,Y.

Returns

zero when the graphics driver doesn't implement scaled drawing, non-zero if it does implement it.

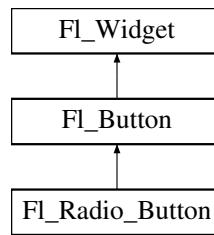
Reimplemented from [Fl_Graphics_Driver](#).

The documentation for this class was generated from the following files:

- [Fl_Device.H](#)
- [fl_color_mac.cxx](#)
- [Fl_Device.cxx](#)
- [Fl_Double_Window.cxx](#)
- [fl_draw_image_mac.cxx](#)

31.107 FI_Radio_Button Class Reference

Inheritance diagram for [FI_Radio_Button](#):



Public Member Functions

- [Fl_Radio_Button](#) (int X, int Y, int W, int H, const char *L=0)

The constructor creates the button using the given position, size, and label.

Additional Inherited Members

31.107.1 Constructor & Destructor Documentation

31.107.1.1 Fl_Radio_Button()

```

Fl_Radio_Button::Fl_Radio_Button (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
  
```

The constructor creates the button using the given position, size, and label. The Button [type\(\)](#) is set to FL_RADIO_BUTTON.

Parameters

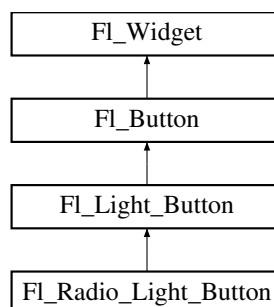
in	<i>X,Y,W,H</i>	position and size of the widget
in	<i>L</i>	widget label, default is no label

The documentation for this class was generated from the following files:

- Fl_Radio_Button.H
- Fl_Button.cxx

31.108 Fl_Radio_Light_Button Class Reference

Inheritance diagram for Fl_Radio_Light_Button:



Public Member Functions

- [Fl_Radio_Light_Button](#) (int X, int Y, int W, int H, const char *l=0)

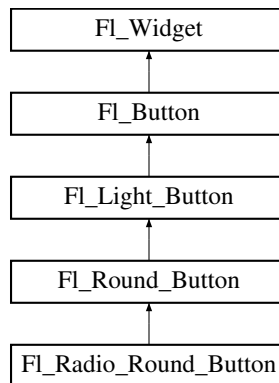
Additional Inherited Members

The documentation for this class was generated from the following files:

- [Fl_Radio_Light_Button.H](#)
- [Fl_Light_Button.cxx](#)

31.109 Fl_Radio_Round_Button Class Reference

Inheritance diagram for Fl_Radio_Round_Button:



Public Member Functions

- [Fl_Radio_Round_Button](#) (int X, int Y, int W, int H, const char *L=0)
Creates a new [Fl_Radio_Button](#) widget using the given position, size, and label string.

Additional Inherited Members

31.109.1 Constructor & Destructor Documentation

31.109.1.1 Fl_Radio_Round_Button()

```

Fl_Radio_Round_Button::Fl_Radio_Round_Button (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
  
```

Creates a new [Fl_Radio_Button](#) widget using the given position, size, and label string. The button [type\(\)](#) is set to FL_RADIO_BUTTON.

Parameters

in	<i>X, Y, W, H</i>	position and size of the widget
in	<i>L</i>	widget label, default is no label

The documentation for this class was generated from the following files:

- [Fl_Radio_Round_Button.H](#)

- [FI_Round_Button.cxx](#)

31.110 FI_Scroll::FI_Region_LRTB Struct Reference

A local struct to manage a region defined by left/right/top/bottom.

```
#include <FI_Scroll.H>
```

Public Attributes

- [int b](#)
(bottom "y" position, aka y2)
- [int l](#)
(left "x" position, aka x1)
- [int r](#)
(right "x" position, aka x2)
- [int t](#)
(top "y" position, aka y1)

31.110.1 Detailed Description

A local struct to manage a region defined by left/right/top/bottom.

The documentation for this struct was generated from the following file:

- [FI_Scroll.H](#)

31.111 FI_Scroll::FI_Region_XYWH Struct Reference

A local struct to manage a region defined by xywh.

```
#include <FI_Scroll.H>
```

Public Attributes

- [int h](#)
- [int w](#)
- [int x](#)
- [int y](#)

31.111.1 Detailed Description

A local struct to manage a region defined by xywh.

The documentation for this struct was generated from the following file:

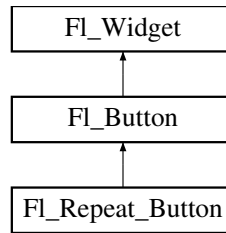
- [FI_Scroll.H](#)

31.112 FI_Repeat_Button Class Reference

The [FI_Repeat_Button](#) is a subclass of [FI_Button](#) that generates a callback when it is pressed and then repeatedly generates callbacks as long as it is held down.

```
#include <FI_Repeat_Button.H>
```

Inheritance diagram for [FI_Repeat_Button](#):



Public Member Functions

- void **deactivate** ()
- [Fl_Repeat_Button](#) (int X, int Y, int W, int H, const char *l=0)
Creates a new [Fl_Repeat_Button](#) widget using the given position, size, and label string.
- int **handle** (int)
Handles the specified event.

Additional Inherited Members

31.112.1 Detailed Description

The [Fl_Repeat_Button](#) is a subclass of [Fl_Button](#) that generates a callback when it is pressed and then repeatedly generates callbacks as long as it is held down.

The speed of the repeat is fixed and depends on the implementation.

31.112.2 Constructor & Destructor Documentation

31.112.2.1 Fl_Repeat_Button()

```

Fl_Repeat_Button::Fl_Repeat_Button (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
  
```

Creates a new [Fl_Repeat_Button](#) widget using the given position, size, and label string. The default boxtype is FL_UP_BOX. Deletes the button.

31.112.3 Member Function Documentation

31.112.3.1 handle()

```

int Fl_Repeat_Button::handle (
    int event ) [virtual]
  
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[FI_Event](#)

Reimplemented from [FI_Button](#).

The documentation for this class was generated from the following files:

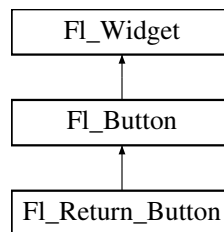
- FI_Repeat_Button.H
- FI_Repeat_Button.cxx

31.113 FI_Return_Button Class Reference

The [FI_Return_Button](#) is a subclass of [FI_Button](#) that generates a callback when it is pressed or when the user presses the Enter key.

```
#include <FI_Return_Button.H>
```

Inheritance diagram for [FI_Return_Button](#):



Public Member Functions

- [FI_Return_Button](#) (int X, int Y, int W, int H, const char *l=0)
Creates a new [FI_Return_Button](#) widget using the given position, size, and label string.
- int [handle](#) (int)
Handles the specified event.

Protected Member Functions

- void [draw](#) ()
Draws the widget.

Additional Inherited Members

31.113.1 Detailed Description

The [FI_Return_Button](#) is a subclass of [FI_Button](#) that generates a callback when it is pressed or when the user presses the Enter key.

A carriage-return symbol is drawn next to the button label.

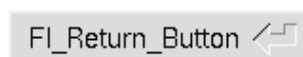


Figure 31.25 [FI_Return_Button](#)

31.113.2 Constructor & Destructor Documentation

31.113.2.1 Fl_Return_Button()

```
Fl_Return_Button::Fl_Return_Button (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new [Fl_Return_Button](#) widget using the given position, size, and label string. The default boxtype is FL_UP_BOX. The inherited destructor deletes the button.

31.113.3 Member Function Documentation

31.113.3.1 draw()

```
void Fl_Return_Button::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own draw() method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scroll; // scroll is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Reimplemented from [Fl_Button](#).

31.113.3.2 handle()

```
int Fl_Return_Button::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Button](#).

The documentation for this class was generated from the following files:

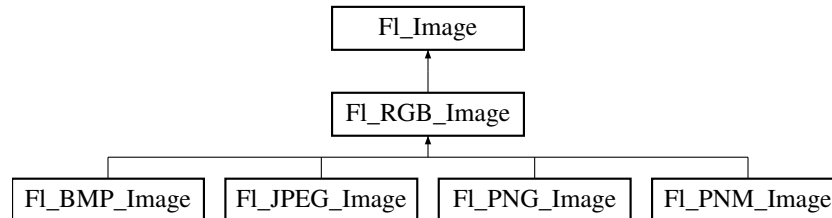
- [Fl_Return_Button.H](#)
- [Fl_Return_Button.cxx](#)

31.114 FI_RGB_Image Class Reference

The [FI_RGB_Image](#) class supports caching and drawing of full-color images with 1 to 4 channels of color information.

```
#include <Fl_Image.H>
```

Inheritance diagram for [FI_RGB_Image](#):



Public Member Functions

- virtual void [color_average](#) ([FI_Color](#) c, float i)
The [color_average\(\)](#) method averages the colors in the image with the FLTK color value c.
- [FI_Image](#) * [copy](#) ()
- virtual [FI_Image](#) * [copy](#) (int W, int H)
The [copy\(\)](#) method creates a copy of the specified image.
- virtual void [desaturate](#) ()
The [desaturate\(\)](#) method converts an image to grayscale.
- void [draw](#) (int X, int Y)
- virtual void [draw](#) (int X, int Y, int W, int H, int cx=0, int cy=0)
Draws the image with a bounding box.
- [FI_RGB_Image](#) (const [FI_Pixmap](#) *pxm, [FI_Color](#) bg=FL_GRAY)
The constructor creates a new RGBA image from the specified [FI_Pixmap](#).
- [FI_RGB_Image](#) (const [uchar](#) *bits, int W, int H, int D=3, int LD=0)
The constructor creates a new image from the specified data.
- virtual void [label](#) ([FI_Menu_Item](#) *m)
The [label\(\)](#) methods are an obsolete way to set the image attribute of a widget or menu item.
- virtual void [label](#) ([FI_Widget](#) *w)
The [label\(\)](#) methods are an obsolete way to set the image attribute of a widget or menu item.
- virtual void [uncache](#) ()
If the image has been cached for display, delete the cache data.
- virtual [~FI_RGB_Image](#) ()
The destructor frees all memory and server resources that are used by the image.

Static Public Member Functions

- static [size_t](#) [max_size](#) ()
Returns the maximum allowed image size in bytes when creating an [FI_RGB_Image](#) object.
- static void [max_size](#) ([size_t](#) size)
Sets the maximum allowed image size in bytes when creating an [FI_RGB_Image](#) object.

Public Attributes

- int [alloc_array](#)
If non-zero, the object's data array is delete[]'d when deleting the object.
- const [uchar](#) * [array](#)
Points to the start of the object's data array.

Friends

- class [FI_GDI_Graphics_Driver](#)
- class [FI_GDI_Printer_Graphics_Driver](#)
- class [FI_Quartz_Graphics_Driver](#)
- class [FI_Xlib_Graphics_Driver](#)

Additional Inherited Members

31.114.1 Detailed Description

The [FI_RGB_Image](#) class supports caching and drawing of full-color images with 1 to 4 channels of color information.

Images with an even number of channels are assumed to contain alpha information, which is used to blend the image with the contents of the screen.

[FI_RGB_Image](#) is defined in [<FL/FI_Image.H>](#), however for compatibility reasons [<FL/FI_RGB_Image.H>](#) should be included.

31.114.2 Constructor & Destructor Documentation

31.114.2.1 FI_RGB_Image() [1/2]

```
FI_RGB_Image::FI_RGB_Image (
    const uchar * bits,
    int W,
    int H,
    int D = 3,
    int LD = 0 )
```

The constructor creates a new image from the specified data.

The data array `bits` must contain sufficient data to provide $W * H * D$ image bytes and optional line padding, see `LD`.

`W` and `H` are the width and height of the image in pixels, resp.

`D` is the image depth and can be:

- `D=1`: each `uchar` in `bits[]` is a grayscale pixel value
- `D=2`: each `uchar` pair in `bits[]` is a grayscale + alpha pixel value
- `D=3`: each `uchar` triplet in `bits[]` is an R/G/B pixel value
- `D=4`: each `uchar` quad in `bits[]` is an R/G/B/A pixel value

`LD` specifies the line data size of the array, see [FI_Image::ld\(int\)](#). If `LD` is zero, then $W * D$ is assumed, otherwise `LD` must be greater than or equal to $W * D$ to account for (unused) extra data per line (padding).

The caller is responsible that the image data array `bits` persists as long as the image is used.

This constructor sets [FI_RGB_Image::alloc_array](#) to 0. To have the image object control the deallocation of the data array `bits`, set `alloc_array` to non-zero after construction.

Parameters

in	<i>bits</i>	The image data array.
in	<i>W</i>	The width of the image in pixels.
in	<i>H</i>	The height of the image in pixels.
in	<i>D</i>	The image depth, or 'number of channels' (default=3).
in	<i>LD</i>	Line data size (default=0).

See also

[Fl_Image::data\(\)](#), [Fl_Image::w\(\)](#), [Fl_Image::h\(\)](#), [Fl_Image::d\(\)](#), [Fl_Image::ld\(int\)](#)

31.114.2.2 Fl_RGB_Image() [2/2]

```
Fl_RGB_Image::Fl_RGB_Image (
    const Fl_Pixmap * pxm,
    Fl_Color bg = FL_GRAY )
```

The constructor creates a new RGBA image from the specified [Fl_Pixmap](#).

The RGBA image is built fully opaque except for the transparent area of the pixmap that is assigned the `bg` color with full transparency.

This constructor creates a new internal data array and sets [Fl_RGB_Image::alloc_array](#) to 1 so the data array is deleted when the image is destroyed.

31.114.3 Member Function Documentation

31.114.3.1 color_average()

```
void Fl_RGB_Image::color_average (
    Fl_Color c,
    float i ) [virtual]
```

The [color_average\(\)](#) method averages the colors in the image with the FLTK color value `c`.

The `i` argument specifies the amount of the original image to combine with the color, so a value of 1.0 results in no color blend, and a value of 0.0 results in a constant image of the specified color.

An internal copy is made of the original image before changes are applied, to avoid modifying the original image.

Reimplemented from [Fl_Image](#).

31.114.3.2 copy()

```
Fl_Image * Fl_RGB_Image::copy (
    int W,
    int H ) [virtual]
```

The [copy\(\)](#) method creates a copy of the specified image.

If the width and height are provided, the image is resized to the specified size. The image should be deleted (or in the case of [Fl_Shared_Image](#), released) when you are done with it.

Reimplemented from [Fl_Image](#).

31.114.3.3 desaturate()

```
void Fl_RGB_Image::desaturate ( ) [virtual]
```

The [desaturate\(\)](#) method converts an image to grayscale.

If the image contains an alpha channel (depth = 4), the alpha channel is preserved.

An internal copy is made of the original image before changes are applied, to avoid modifying the original image.

Reimplemented from [Fl_Image](#).

31.114.3.4 draw()

```
void Fl_RGB_Image::draw (
    int X,
    int Y,
    int W,
    int H,
```

```
int cx = 0,
int cy = 0 ) [virtual]
```

Draws the image with a bounding box.

Arguments X , Y , W , H specify a bounding box for the image, with the origin (upper-left corner) of the image offset by the cx and cy arguments.

In other words: `fl_push_clip(X,Y,W,H)` is applied, the image is drawn with its upper-left corner at $X-cx$, $Y-cy$ and its own width and height, `fl_pop_clip()` is applied.

Reimplemented from [Fl_Image](#).

31.114.3.5 label() [1/2]

```
void Fl_RGB_Image::label (
    Fl_Menu_Item * m ) [virtual]
```

The `label()` methods are an obsolete way to set the image attribute of a widget or menu item.

Use the `image()` or `deimage()` methods of the [Fl_Widget](#) and [Fl_Menu_Item](#) classes instead.

Reimplemented from [Fl_Image](#).

31.114.3.6 label() [2/2]

```
void Fl_RGB_Image::label (
    Fl_Widget * widget ) [virtual]
```

The `label()` methods are an obsolete way to set the image attribute of a widget or menu item.

Use the `image()` or `deimage()` methods of the [Fl_Widget](#) and [Fl_Menu_Item](#) classes instead.

Reimplemented from [Fl_Image](#).

31.114.3.7 max_size() [1/2]

```
static size_t Fl_RGB_Image::max_size ( ) [inline], [static]
```

Returns the maximum allowed image size in bytes when creating an [Fl_RGB_Image](#) object.

See also

```
void Fl_RGB_Image::max_size(size_t)
```

31.114.3.8 max_size() [2/2]

```
static void Fl_RGB_Image::max_size (
    size_t size ) [inline], [static]
```

Sets the maximum allowed image size in bytes when creating an [Fl_RGB_Image](#) object.

The image size in bytes of an [Fl_RGB_Image](#) object is the value of the product $w() * h() * d()$. If this product exceeds size, the created object of a derived class of [Fl_RGB_Image](#) won't be loaded with the image data. This does not apply to direct RGB image creation with `Fl_RGB_Image::Fl_RGB_Image(const uchar *bits, int W, int H, int D, int LD)`.

The default `max_size()` value is essentially infinite.

31.114.3.9 uncache()

```
void Fl_RGB_Image::uncache ( ) [virtual]
```

If the image has been cached for display, delete the cache data.

This allows you to change the data used for the image and then redraw it without recreating an image object.

Reimplemented from [Fl_Image](#).

The documentation for this class was generated from the following files:

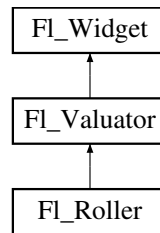
- [Fl_Image.H](#)
- [Fl_Image.cxx](#)

31.115 Fl_Roller Class Reference

The `Fl_Roller` widget is a "dolly" control commonly used to move 3D objects.

```
#include <Fl_Roller.H>
```

Inheritance diagram for `Fl_Roller`:



Public Member Functions

- `Fl_Roller` (int X, int Y, int W, int H, const char *L=0)
Creates a new `Fl_Roller` widget using the given position, size, and label string.
- int `handle` (int)
Handles the specified event.

Protected Member Functions

- void `draw` ()
Draws the widget.

Additional Inherited Members

31.115.1 Detailed Description

The `Fl_Roller` widget is a "dolly" control commonly used to move 3D objects.

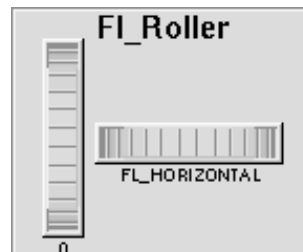


Figure 31.26 `Fl_Roller`

31.115.2 Constructor & Destructor Documentation

31.115.2.1 `Fl_Roller()`

```
Fl_Roller::Fl_Roller (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new `Fl_Roller` widget using the given position, size, and label string.

The default boxtype is `FL_NO_BOX`.

Inherited destructor destroys the valuator.

31.115.3 Member Function Documentation

31.115.3.1 draw()

```
void Fl_Roller::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own draw() method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scroll;           // scroll is an embedded Fl_Scrollbar
s->draw();                         // calls Fl_Scrollbar::draw()
```

Implements [Fl_Widget](#).

31.115.3.2 handle()

```
int Fl_Roller::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Widget](#).

The documentation for this class was generated from the following files:

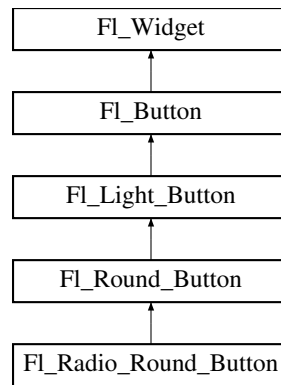
- [Fl_Roller.H](#)
- [Fl_Roller.cxx](#)

31.116 FI_Round_Button Class Reference

Buttons generate callbacks when they are clicked by the user.

```
#include <Fl_Round_Button.H>
```

Inheritance diagram for [Fl_Round_Button](#):



Public Member Functions

- `Fl_Round_Button` (int *x*, int *y*, int *w*, int *h*, const char **l*=0)
Creates a new `Fl_Round_Button` widget using the given position, size, and label string.

Additional Inherited Members

31.116.1 Detailed Description

Buttons generate callbacks when they are clicked by the user. You control exactly when and how by changing the values for `type()` and `when()`.

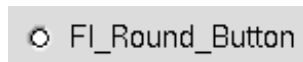


Figure 31.27 `Fl_Round_Button`

The `Fl_Round_Button` subclass display the "on" state by turning on a light, rather than drawing pushed in. The shape of the "light" is initially set to `FL_ROUND_DOWN_BOX`. The color of the light when on is controlled with `selection_color()`, which defaults to `FL_FOREGROUND_COLOR`.

31.116.2 Constructor & Destructor Documentation

31.116.2.1 `Fl_Round_Button()`

```

Fl_Round_Button::Fl_Round_Button (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
  
```

Creates a new `Fl_Round_Button` widget using the given position, size, and label string.

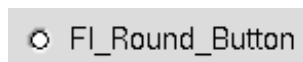


Figure 31.28 `Fl_Round_Button`

The `Fl_Round_Button` subclass displays the "ON" state by turning on a light, rather than drawing pushed in. The default box type is `FL_NO_BOX`, which draws the label w/o a box right of the checkmark. The shape of the "light" is set with `down_box()` and its default value is `FL_ROUND_DOWN_BOX`. The color of the light when on is controlled with `selection_color()`, which defaults to `FL_FOREGROUND_COLOR` (usually black).

Parameters

in	<i>X,Y,W,H</i>	position and size of the widget
in	<i>L</i>	widget label, default is no label

The documentation for this class was generated from the following files:

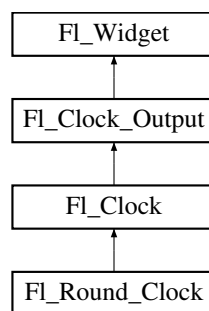
- `Fl_Round_Button.H`
- `Fl_Round_Button.cxx`

31.117 Fl_Round_Clock Class Reference

A clock widget of type `FL_ROUND_CLOCK`.

```
#include <Fl_Round_Clock.H>
```

Inheritance diagram for `Fl_Round_Clock`:



Public Member Functions

- [Fl_Round_Clock](#) (int X, int Y, int W, int H, const char *L=0)
Creates the clock widget, setting his type and box.

Additional Inherited Members

31.117.1 Detailed Description

A clock widget of type `FL_ROUND_CLOCK`.

Has no box.

The documentation for this class was generated from the following files:

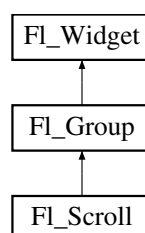
- `Fl_Round_Clock.H`
- `Fl_Clock.cxx`

31.118 Fl_Scroll Class Reference

This container widget lets you maneuver around a set of widgets much larger than your window.

```
#include <Fl_Scroll.H>
```

Inheritance diagram for `Fl_Scroll`:



Classes

- struct [FI_Region_LRTB](#)
A local struct to manage a region defined by left/right/top/bottom.
- struct [FI_Region_XYWH](#)
A local struct to manage a region defined by xywh.
- struct [FI_Scrollbar_Data](#)
A local struct to manage a scrollbar's xywh region and tab values.
- struct [ScrollInfo](#)
Structure to manage scrollbar and widget interior sizes.

Public Types

- enum {
HORIZONTAL = 1 , VERTICAL = 2 , BOTH = 3 , ALWAYS_ON = 4 ,
HORIZONTAL_ALWAYS = 5 , VERTICAL_ALWAYS = 6 , BOTH_ALWAYS = 7 }

Public Member Functions

- void [clear](#) ()
Clear all but the scrollbars...
- [FI_Scroll](#) (int X, int Y, int W, int H, const char *l=0)
Creates a new [FI_Scroll](#) widget using the given position, size, and label string.
- int [handle](#) (int)
Handles the specified event.
- void [resize](#) (int X, int Y, int W, int H)
Resizes the [FI_Scroll](#) widget and moves its children if necessary.
- void [scroll_to](#) (int, int)
Moves the contents of the scroll group to a new position.
- int [scrollbar_size](#) () const
Gets the current size of the scrollbars' troughs, in pixels.
- void [scrollbar_size](#) (int newSize)
*Sets the pixel size of the scrollbars' troughs to *newSize*, in pixels.*
- int [xposition](#) () const
Gets the current horizontal scrolling position.
- int [yposition](#) () const
Gets the current vertical scrolling position.

Public Attributes

- [FI_Scrollbar](#) **hscrollbar**
- [FI_Scrollbar](#) **scrollbar**

Protected Member Functions

- void [bbox](#) (int &, int &, int &, int &)
Returns the bounding box for the interior of the scrolling area, inside the scrollbars.
- void [draw](#) ()
Draws the widget.
- void [recalc_scrollbars](#) ([ScrollInfo](#) &si)
Calculate visibility/size/position of scrollbars, find children's bounding box.

Additional Inherited Members

31.118.1 Detailed Description

This container widget lets you maneuver around a set of widgets much larger than your window.

If the child widgets are larger than the size of this object then scrollbars will appear so that you can scroll over to them:

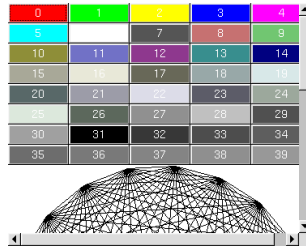


Figure 31.29 FI_Scroll

If all of the child widgets are packed together into a solid rectangle then you want to set `box()` to `FL_NO_BOX` or one of the `_FRAME` types. This will result in the best output. However, if the child widgets are a sparse arrangement you must set `box()` to a real `_BOX` type. This can result in some blinking during redrawing, but that can be solved by using a `FI_Double_Window`.

By default you can scroll in both directions, and the scrollbars disappear if the data will fit in the area of the scroll.

Use `FI_Scroll::type()` to change this as follows :

- 0 - No scrollbars
- `FI_Scroll::HORIZONTAL` - Only a horizontal scrollbar.
- `FI_Scroll::VERTICAL` - Only a vertical scrollbar.
- `FI_Scroll::BOTH` - The default is both scrollbars.
- `FI_Scroll::HORIZONTAL_ALWAYS` - Horizontal scrollbar always on, vertical always off.
- `FI_Scroll::VERTICAL_ALWAYS` - Vertical scrollbar always on, horizontal always off.
- `FI_Scroll::BOTH_ALWAYS` - Both always on.

Use `scrollbar.align(int)` (see void `FI_Widget::align(FI_Align)`) : to change what side the scrollbars are drawn on.

If the `FL_ALIGN_LEFT` bit is on, the vertical scrollbar is on the left. If the `FL_ALIGN_TOP` bit is on, the horizontal scrollbar is on the top. Note that only the alignment flags in scrollbar are considered. The flags in `hscrollbar` however are ignored.

This widget can also be used to pan around a single child widget "canvas". This child widget should be of your own class, with a `draw()` method that draws the contents. The scrolling is done by changing the `x()` and `y()` of the widget, so this child must use the `x()` and `y()` to position its drawing. To speed up drawing it should test `fl_not_clipped(int x,int y,int w,int h)` to find out if a particular area of the widget must be drawn.

Another very useful child is a single `FI_Pack`, which is itself a group that packs its children together and changes size to surround them. Filling the `FI_Pack` with `FI_Tabs` groups (and then putting normal widgets inside those) gives you a very powerful scrolling list of individually-openable panels.

Fluid lets you create these, but you can only lay out objects that fit inside the `FI_Scroll` without scrolling. Be sure to leave space for the scrollbars, as Fluid won't show these either.

You cannot use `FI_Window` as a child of this since the clipping is not conveyed to it when drawn, and it will draw over the scrollbars and neighboring objects.

31.118.2 Constructor & Destructor Documentation

31.118.2.1 Fl_Scroll()

```
Fl_Scroll::Fl_Scroll (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new [Fl_Scroll](#) widget using the given position, size, and label string.

The default boxtype is `FL_NO_BOX`.

The destructor *also deletes all the children*. This allows a whole tree to be deleted at once, without having to keep a pointer to all the children in the user code. A kludge has been done so the [Fl_Scroll](#) and all of its children can be automatic (local) variables, but you must declare the [Fl_Scroll](#) *first*, so that it is destroyed last.

31.118.3 Member Function Documentation

31.118.3.1 bbox()

```
void Fl_Scroll::bbox (
    int & X,
    int & Y,
    int & W,
    int & H ) [protected]
```

Returns the bounding box for the interior of the scrolling area, inside the scrollbars.

Currently this is only reliable after [draw\(\)](#), and before any resizing of the [Fl_Scroll](#) or any child widgets occur.

Todo The visibility of the scrollbars ought to be checked/calculated outside of the [draw\(\)](#) method (STR #1895).

31.118.3.2 draw()

```
void Fl_Scroll::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scroll;           // scroll is an embedded Fl_Scrollbar
s->draw();                         // calls Fl_Scrollbar::draw()
```

Reimplemented from [Fl_Group](#).

31.118.3.3 handle()

```
int Fl_Scroll::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[FI_Event](#)

Reimplemented from [FI_Group](#).

31.118.3.4 recalc_scrollbars()

```
void Fl_Scroll::recalc_scrollbars (
    ScrollInfo & si ) [protected]
```

Calculate visibility/size/position of scrollbars, find children's bounding box.

The `si` parameter will be filled with data from the calculations. Derived classes can make use of this call to figure out the scrolling area eg. during [resize\(\)](#) handling.

Parameters

in	<i>si</i>	– ScrollInfo structure
----	-----------	--

Returns

Structure containing the calculated info.

31.118.3.5 resize()

```
void Fl_Scroll::resize (
    int X,
    int Y,
    int W,
    int H ) [virtual]
```

Resizes the [FI_Scroll](#) widget and moves its children if necessary.

The [FI_Scroll](#) widget first resizes itself, and then it moves all its children if (and only if) the [FI_Scroll](#) widget has been moved. The children are moved by the same amount as the [FI_Scroll](#) widget has been moved, hence all children keep their relative positions.

Note

[FI_Scroll::resize\(\)](#) does **not** call [FI_Group::resize\(\)](#), and child widgets are **not** resized.

Since children of an [FI_Scroll](#) are not resized, the [resizable\(\)](#) widget is ignored (if it is set).

The scrollbars are moved to their proper positions, as given by [FI_Scroll::scrollbar.align\(\)](#), and switched on or off as necessary.

Note

Due to current (FLTK 1.3.x) implementation constraints some of this may effectively be postponed until the [FI_Scroll](#) is drawn the next time. This may change in a future release.

See also

[FI_Group::resizable\(\)](#)

[FI_Widget::resize\(int,int,int,int\)](#)

Reimplemented from [FI_Group](#).

31.118.3.6 scroll_to()

```
void Fl_Scroll::scroll_to (
    int X,
    int Y )
```

Moves the contents of the scroll group to a new position.

This is like moving the scrollbars of the [Fl_Scroll](#) around. For instance:

```
Fl_Scroll scroll (10,10,200,200);
Fl_Box b1 ( 10, 10,50,50,"b1"); // relative (x,y) = (0,0)
Fl_Box b2 ( 60, 60,50,50,"b2"); // relative (x,y) = (50,50)
Fl_Box b3 ( 60,110,50,50,"b3"); // relative (x,y) = (50,100)
// populate scroll with more children ...
scroll.end();
scroll.scroll_to(50,100);
```

will move the logical origin of the internal scroll area to (-50,-100) relative to the origin of the [Fl_Scroll](#) (10,10), i.e. [Fl_Box](#) b3 will be visible in the top left corner of the scroll area.

31.118.3.7 scrollbar_size() [1/2]

```
int Fl_Scroll::scrollbar_size ( ) const [inline]
```

Gets the current size of the scrollbars' troughs, in pixels.

If this value is zero (default), this widget will use the [Fl::scrollbar_size\(\)](#) value as the scrollbar's width.

Returns

Scrollbar size in pixels, or 0 if the global [Fl::scrollbar_size\(\)](#) is being used.

See also

[Fl::scrollbar_size\(int\)](#)

31.118.3.8 scrollbar_size() [2/2]

```
void Fl_Scroll::scrollbar_size (
    int newSize ) [inline]
```

Sets the pixel size of the scrollbars' troughs to `newSize`, in pixels.

Normally you should not need this method, and should use [Fl::scrollbar_size\(int\)](#) instead to manage the size of ALL your widgets' scrollbars. This ensures your application has a consistent UI, is the default behavior, and is normally what you want.

Only use THIS method if you really need to override the global scrollbar size. The need for this should be rare.

Setting `newSize` to the special value of 0 causes the widget to track the global [Fl::scrollbar_size\(\)](#), which is the default.

Parameters

in	<i>newSize</i>	Sets the scrollbar size in pixels. If 0 (default), scrollbar size tracks the global Fl::scrollbar_size()
----	----------------	---

See also

[Fl::scrollbar_size\(\)](#)

31.118.3.9 xposition()

```
int Fl_Scroll::xposition ( ) const [inline]
```

Gets the current horizontal scrolling position.

31.118.3.10 yposition()

```
int Fl_Scroll::yposition ( ) const [inline]
```

Gets the current vertical scrolling position.

The documentation for this class was generated from the following files:

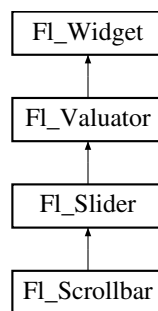
- Fl_Scroll.H
- Fl_Scroll.cxx

31.119 Fl_Scrollbar Class Reference

The [Fl_Scrollbar](#) widget displays a slider with arrow buttons at the ends of the scrollbar.

```
#include <Fl_Scrollbar.H>
```

Inheritance diagram for Fl_Scrollbar:



Public Member Functions

- [Fl_Scrollbar](#) (int X, int Y, int W, int H, const char *L=0)
Creates a new [Fl_Scrollbar](#) widget with given position, size, and label.
- int [handle](#) (int)
Handles the specified event.
- int [linesize](#) () const
Get the size of step, in lines, that the arrow keys move.
- void [linesize](#) (int i)
This number controls how big the steps are that the arrow keys do.
- int [value](#) () const
Gets the integer value (position) of the slider in the scrollbar.
- int [value](#) (int p)
Sets the value (position) of the slider in the scrollbar.
- int [value](#) (int pos, int windowSize, int first, int total)
Sets the position, size and range of the slider in the scrollbar.
- [~Fl_Scrollbar](#) ()
Destroys the Scrollbar.

Protected Member Functions

- void [draw](#) ()
Draws the widget.

Additional Inherited Members

31.119.1 Detailed Description

The `Fl_Scrollbar` widget displays a slider with arrow buttons at the ends of the scrollbar.

Clicking on the arrows move up/left and down/right by `linesize()`. Scrollbars also accept `FL_SHORTCUT` events: the arrows move by `linesize()`, and vertical scrollbars take Page Up/Down (they move by the page size minus `linesize()`) and Home/End (they jump to the top or bottom).

Scrollbars have `step(1)` preset (they always return integers). If desired you can set the `step()` to non-integer values. You will then have to use casts to get at the floating-point versions of `value()` from `Fl_Slider`.

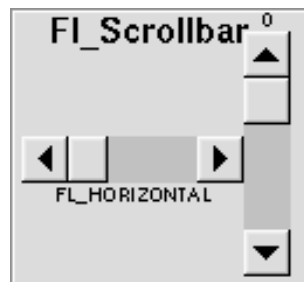


Figure 31.30 `Fl_Scrollbar`

31.119.2 Constructor & Destructor Documentation

31.119.2.1 `Fl_Scrollbar()`

```
Fl_Scrollbar::Fl_Scrollbar (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new `Fl_Scrollbar` widget with given position, size, and label. You need to do `type(FL_HORIZONTAL)` if you want a horizontal scrollbar.

31.119.3 Member Function Documentation

31.119.3.1 `draw()`

```
void Fl_Scrollbar::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call `redraw()` instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own `draw()` method*, e.g. for an embedded scrollbar, you can do it (because `draw()` is virtual) like this:

```
Fl_Widget *s = &scroll;           // scroll is an embedded Fl_Scrollbar
s->draw();                         // calls Fl_Scrollbar::draw()
```

Implements `Fl_Widget`.

31.119.3.2 `handle()`

```
int Fl_Scrollbar::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters

<i>in</i>	<i>event</i>	the kind of event received
-----------	--------------	----------------------------

Return values

<i>0</i>	if the event was not used or understood
<i>1</i>	if the event was used and can be deleted

See also

[FI_Event](#)

Reimplemented from [FI_Widget](#).

31.119.3.3 linesize()

```
void Fl_Scrollbar::linesize (
    int i ) [inline]
```

This number controls how big the steps are that the arrow keys do.

In addition page up/down move by the size last sent to [value\(\)](#) minus one [linesize\(\)](#). The default is 16.

31.119.3.4 value() [1/3]

```
int Fl_Scrollbar::value ( ) const [inline]
```

Gets the integer value (position) of the slider in the scrollbar.

You can get the floating point value with [FI_Slider::value\(\)](#).

See also

[Fl_Scrollbar::value\(int p\)](#)

[Fl_Scrollbar::value\(int pos, int size, int first, int total\)](#)

31.119.3.5 value() [2/3]

```
int Fl_Scrollbar::value (
    int p ) [inline]
```

Sets the value (position) of the slider in the scrollbar.

See also

[Fl_Scrollbar::value\(\)](#)

[Fl_Scrollbar::value\(int pos, int size, int first, int total\)](#)

31.119.3.6 value() [3/3]

```
int Fl_Scrollbar::value (
    int pos,
```

```

    int windowSize,
    int first,
    int total ) [inline]

```

Sets the position, size and range of the slider in the scrollbar.

Parameters

in	<i>pos</i>	position, first line displayed
in	<i>windowSize</i>	number of lines displayed
in	<i>first</i>	number of first line
in	<i>total</i>	total number of lines

You should call this every time your window changes size, your data changes size, or your scroll position changes (even if in response to a callback from this scrollbar). All necessary calls to [redraw\(\)](#) are done.

Calls [FI_Slider::scrollvalue\(int pos, int size, int first, int total\)](#).

The documentation for this class was generated from the following files:

- FI_Scrollbar.H
- FI_Scrollbar.cxx

31.120 FI_Scroll::FI_Scrollbar_Data Struct Reference

A local struct to manage a scrollbar's xywh region and tab values.

```
#include <FI_Scroll.H>
```

Public Attributes

- int [first](#)
scrollbar tab's "number of first line"
- int [h](#)
- int [pos](#)
scrollbar tab's "position of first line displayed"
- int [size](#)
scrollbar tab's "size of window in lines"
- int [total](#)
scrollbar tab's "total number of lines"
- int [w](#)
- int [x](#)
- int [y](#)

31.120.1 Detailed Description

A local struct to manage a scrollbar's xywh region and tab values.

The documentation for this struct was generated from the following file:

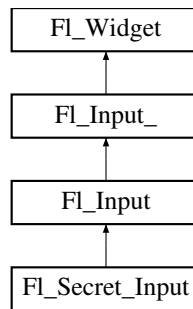
- FI_Scroll.H

31.121 FI_Secret_Input Class Reference

The [FI_Secret_Input](#) class is a subclass of [FI_Input](#) that displays its input as a string of placeholders.

```
#include <FI_Secret_Input.H>
```

Inheritance diagram for [FI_Secret_Input](#):



Public Member Functions

- [Fl_Secret_Input](#) (int X, int Y, int W, int H, const char *l=0)
Creates a new [Fl_Secret_Input](#) widget using the given position, size, and label string.
- int [handle](#) (int)
Handles the specified event.

Additional Inherited Members

31.121.1 Detailed Description

The [Fl_Secret_Input](#) class is a subclass of [Fl_Input](#) that displays its input as a string of placeholders. Depending on the platform this placeholder is either the asterisk (*) or the Unicode bullet character (U+2022). This subclass is usually used to receive passwords and other "secret" information.

31.121.2 Constructor & Destructor Documentation

31.121.2.1 Fl_Secret_Input()

```

Fl_Secret_Input::Fl_Secret_Input (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
  
```

Creates a new [Fl_Secret_Input](#) widget using the given position, size, and label string. The default boxtype is `FL_DOWN_BOX`. Inherited destructor destroys the widget and any value associated with it.

31.121.3 Member Function Documentation

31.121.3.1 handle()

```

int Fl_Secret_Input::handle (
    int event ) [virtual]
  
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget. When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise. Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Input](#).

The documentation for this class was generated from the following files:

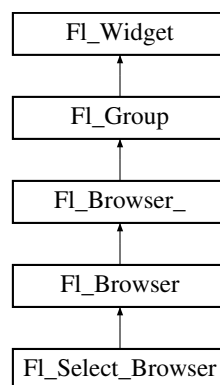
- Fl_Secret_Input.H
- Fl_Input.cxx

31.122 Fl_Select_Browser Class Reference

The class is a subclass of [Fl_Browser](#) which lets the user select a single item, or no items by clicking on the empty space.

```
#include <Fl_Select_Browser.H>
```

Inheritance diagram for Fl_Select_Browser:



Public Member Functions

- [Fl_Select_Browser](#) (int X, int Y, int W, int H, const char *L=0)

Creates a new [Fl_Select_Browser](#) widget using the given position, size, and label string.

Additional Inherited Members

31.122.1 Detailed Description

The class is a subclass of [Fl_Browser](#) which lets the user select a single item, or no items by clicking on the empty space.

As long as the mouse button is held down on an unselected item it is highlighted. Normally the callback is done when the user presses the mouse, but you can change this with [when\(\)](#).

See [Fl_Browser](#) for methods to add and remove lines from the browser.

31.122.2 Constructor & Destructor Documentation

31.122.2.1 FI_Select_Browser()

```
Fl_Select_Browser::Fl_Select_Browser (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new [FI_Select_Browser](#) widget using the given position, size, and label string.

The default boxtype is FL_DOWN_BOX. The constructor specializes [FI_Browser\(\)](#) by setting the type to FL_SELECT_BROWSER. The destructor destroys the widget and frees all memory that has been allocated.

The documentation for this class was generated from the following files:

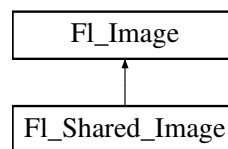
- [FI_Select_Browser.H](#)
- [FI_Browser.cxx](#)

31.123 FI_Shared_Image Class Reference

This class supports caching, loading, scaling, and drawing of image files.

```
#include <Fl_Shared_Image.H>
```

Inheritance diagram for [FI_Shared_Image](#):



Public Member Functions

- virtual void [color_average](#) ([FI_Color](#) c, float i)
 - The [color_average\(\)](#) method averages the colors in the image with the FLTK color value c.*
- [FI_Image](#) * [copy](#) ()
- virtual [FI_Image](#) * [copy](#) (int W, int H)
 - The [copy\(\)](#) method creates a copy of the specified image.*
- virtual void [desaturate](#) ()
 - The [desaturate\(\)](#) method converts an image to grayscale.*
- void [draw](#) (int X, int Y)
- virtual void [draw](#) (int X, int Y, int W, int H, int cx, int cy)
 - Draws the image with a bounding box.*
- const char * [name](#) ()
 - Returns the filename of the shared image.*
- int [original](#) ()
 - Returns whether this is an original image.*
- int [refcount](#) ()
 - Returns the number of references of this shared image.*
- void [release](#) ()
 - Releases and possibly destroys (if refcount <= 0) a shared image.*
- void [reload](#) ()
 - Reloads the shared image from disk.*
- void [scale](#) (int width, int height, int proportional=1, int can_expand=0)
 - Sets the drawing size of the shared image.*
- virtual void [uncache](#) ()
 - If the image has been cached for display, delete the cache data.*

Static Public Member Functions

- static void [add_handler](#) (FI_Shared_Handler f)
Adds a shared image handler, which is basically a test function for adding new formats.
- static [FI_Shared_Image](#) * [find](#) (const char *name, int W=0, int H=0)
Finds a shared image from its name and size specifications.
- static [FI_Shared_Image](#) * [get](#) (const char *name, int W=0, int H=0)
Find or load an image that can be shared by multiple widgets.
- static [FI_Shared_Image](#) * [get](#) ([FI_RGB_Image](#) *rgb, int own_it=1)
Builds a shared image from a pre-existing [FI_RGB_Image](#).
- static [FI_Shared_Image](#) ** [images](#) ()
Returns the [FI_Shared_Image](#) array.*
- static int [num_images](#) ()
Returns the total number of shared images in the array.
- static void [remove_handler](#) (FI_Shared_Handler f)
Removes a shared image handler.
- static void [scaling_algorithm](#) ([FI_RGB_Scaling](#) algorithm)
Sets what algorithm is used when resizing a source image.

Protected Member Functions

- void [add](#) ()
Adds a shared image to the image cache.
- [FI_Shared_Image](#) ()
Creates an empty shared image.
- [FI_Shared_Image](#) (const char *n, [FI_Image](#) *img=0)
Creates a shared image from its filename and its corresponding [FI_Image](#) img.*
- void [update](#) ()
- virtual [~FI_Shared_Image](#) ()
The destructor frees all memory and server resources that are used by the image.

Static Protected Member Functions

- static int [compare](#) ([FI_Shared_Image](#) **i0, [FI_Shared_Image](#) **i1)
Compares two shared images.

Protected Attributes

- int [alloc_image_](#)
- [FI_Image](#) * [image_](#)
- const char * [name_](#)
- int [original_](#)
- int [refcount_](#)

Static Protected Attributes

- static int [alloc_handlers_](#) = 0
- static int [alloc_images_](#) = 0
- static FI_Shared_Handler * [handlers_](#) = 0
- static [FI_Shared_Image](#) ** [images_](#) = 0
- static int [num_handlers_](#) = 0
- static int [num_images_](#) = 0

Friends

- class `FI_JPEG_Image`
- class `FI_PNG_Image`

Additional Inherited Members

31.123.1 Detailed Description

This class supports caching, loading, scaling, and drawing of image files.

Most applications will also want to link against the `fltk_images` library and call the `fl_register_images()` function to support standard image formats such as BMP, GIF, JPEG, and PNG.

Images can be requested (loaded) with `FI_Shared_Image::get()`, `find()`, and some other methods. All images are cached in an internal list of shared images and should be released when they are no longer needed. A `refcount` is used to determine if a released image is to be destroyed with `delete`.

See also

[FI_Shared_Image::get\(\)](#)

[FI_Shared_Image::find\(\)](#)

[FI_Shared_Image::release\(\)](#)

31.123.2 Constructor & Destructor Documentation

31.123.2.1 FI_Shared_Image() [1/2]

```
FI_Shared_Image::FI_Shared_Image ( ) [protected]
```

Creates an empty shared image.

The constructors create a new shared image record in the image cache.

The constructors are protected and cannot be used directly from a program. Use the [get\(\)](#) method instead.

31.123.2.2 FI_Shared_Image() [2/2]

```
FI_Shared_Image::FI_Shared_Image (
    const char * n,
    FI_Image * img = 0 ) [protected]
```

Creates a shared image from its filename and its corresponding `FI_Image*` `img`.

The constructors create a new shared image record in the image cache.

The constructors are protected and cannot be used directly from a program. Use the [get\(\)](#) method instead.

31.123.2.3 ~FI_Shared_Image()

```
FI_Shared_Image::~FI_Shared_Image ( ) [protected], [virtual]
```

The destructor frees all memory and server resources that are used by the image.

The destructor is protected and cannot be used directly from a program. Use the [FI_Shared_Image::release\(\)](#) method instead.

31.123.3 Member Function Documentation

31.123.3.1 add()

```
void FI_Shared_Image::add ( ) [protected]
```

Adds a shared image to the image cache.

This **protected** method adds an image to the cache, an ordered list of shared images. The cache is searched for a matching image whenever one is requested, for instance with [FI_Shared_Image::get\(\)](#) or [FI_Shared_Image::find\(\)](#).

31.123.3.2 color_average()

```
void Fl_Shared_Image::color_average (
    Fl_Color c,
    float i ) [virtual]
```

The `color_average()` method averages the colors in the image with the FLTK color value `c`.

The `i` argument specifies the amount of the original image to combine with the color, so a value of 1.0 results in no color blend, and a value of 0.0 results in a constant image of the specified color.

An internal copy is made of the original image before changes are applied, to avoid modifying the original image.

Reimplemented from [Fl_Image](#).

31.123.3.3 compare()

```
int Fl_Shared_Image::compare (
    Fl_Shared_Image ** i0,
    Fl_Shared_Image ** i1 ) [static], [protected]
```

Compares two shared images.

The order of comparison is:

1. Image name, usually the filename used to load it
2. Image width
3. Image height

A special case is considered if the width of one of the images is zero and the other image is marked `original`. In this case the images match, i.e. the comparison returns success (0).

An image is marked `original` if it was directly loaded from a file or from memory as opposed to copied and resized images.

This comparison is used in [Fl_Shared_Image::find\(\)](#) to find an image that matches the requested one or to find the position where a new image should be entered into the sorted list of shared images.

It is usually used in two steps:

1. search with exact width and height
2. if not found, search again with width = 0 (and height = 0)

The first step will only return a match if the image exists with the same width and height. The second step will match if there is an image marked `original` with the same name, regardless of width and height.

Returns

Whether the images match or their relative sort order (see text).

Return values

<code>0</code>	the images match
<code><0</code>	Image <code>i0</code> is <i>less</i> than image <code>i1</code>
<code>>0</code>	Image <code>i0</code> is <i>greater</i> than image <code>i1</code>

31.123.3.4 copy()

```
Fl_Image * Fl_Shared_Image::copy (
    int W,
    int H ) [virtual]
```

The `copy()` method creates a copy of the specified image.

If the width and height are provided, the image is resized to the specified size. The image should be deleted (or in

the case of [Fl_Shared_Image](#), released) when you are done with it.
Reimplemented from [Fl_Image](#).

31.123.3.5 desaturate()

```
void Fl_Shared_Image::desaturate ( ) [virtual]
```

The [desaturate\(\)](#) method converts an image to grayscale.

If the image contains an alpha channel (depth = 4), the alpha channel is preserved.

An internal copy is made of the original image before changes are applied, to avoid modifying the original image.

Reimplemented from [Fl_Image](#).

31.123.3.6 draw()

```
void Fl_Shared_Image::draw (
    int X,
    int Y,
    int W,
    int H,
    int cx,
    int cy ) [virtual]
```

Draws the image with a bounding box.

Arguments X, Y, W, H specify a bounding box for the image, with the origin (upper-left corner) of the image offset by the cx and cy arguments.

In other words: `fl_push_clip(X, Y, W, H)` is applied, the image is drawn with its upper-left corner at X-cx, Y-cy and its own width and height, `fl_pop_clip()` is applied.

Reimplemented from [Fl_Image](#).

31.123.3.7 find()

```
Fl_Shared_Image * Fl_Shared_Image::find (
    const char * name,
    int W = 0,
    int H = 0 ) [static]
```

Finds a shared image from its name and size specifications.

This uses a binary search in the image cache.

If the image name exists with the exact width W and height H, then it is returned.

If W == 0 and the image name exists with another size, then the **original** image with that name is returned.

In either case the refcount of the returned image is increased. The found image should be released with [Fl_Shared_Image::release\(\)](#) when no longer needed.

31.123.3.8 get() [1/2]

```
Fl_Shared_Image * Fl_Shared_Image::get (
    const char * name,
    int W = 0,
    int H = 0 ) [static]
```

Find or load an image that can be shared by multiple widgets.

If the image exists with the requested size, this image will be returned.

If the image exists, but only with another size, then a new copy with the requested size (width W and height H) will be created as a resized copy of the original image. The new image is added to the internal list of shared images.

If the image does not yet exist, then a new image of the proper dimension is created from the filename name. The original image from filename name is always added to the list of shared images in its original size. If the requested size differs, then the resized copy with width W and height H is also added to the list of shared images.

Note

If the sizes differ, then *two* images are created as mentioned above. This is intentional so the original image is cached and preserved. If you request the same image with another size later, then the **original** image will be found, copied, resized, and returned.

Shared JPEG and PNG images can also be created from memory by using their named memory access constructor. You should [release\(\)](#) the image when you're done with it.

Parameters

<i>name</i>	name of the image
<i>W,H</i>	desired size

See also

[FI_Shared_Image::find\(const char *name, int W, int H\)](#)

[FI_Shared_Image::release\(\)](#)

[FI_JPEG_Image::FI_JPEG_Image\(const char *name, const unsigned char *data\)](#)

[FI_PNG_Image::FI_PNG_Image](#) (const char *name_png, const unsigned char *buffer, int maxsize)

31.123.3.9 get() [2/2]

```
FI_Shared_Image * FI_Shared_Image::get (
    FI_RGB_Image * rgb,
    int own_it = 1 ) [static]
```

Builds a shared image from a pre-existing [FI_RGB_Image](#).

Parameters

in	<i>rgb</i>	an FI_RGB_Image used to build a new shared image.
in	<i>own_it</i>	1 if the shared image should delete <i>rgb</i> when it is itself deleted, 0 otherwise

Version

1.3.4

31.123.3.10 original()

```
int FI_Shared_Image::original ( ) [inline]
```

Returns whether this is an original image.

Images loaded from a file or from memory are marked *original* as opposed to images created as a copy of another image with different size (width or height).

Note

This is useful for debugging (rarely used in user code).

Since

FLTK 1.4.0

31.123.3.11 refcount()

```
int Fl_Shared_Image::refcount ( ) [inline]
```

Returns the number of references of this shared image.

When reference is below 1, the image is deleted.

31.123.3.12 release()

```
void Fl_Shared_Image::release ( )
```

Releases and possibly destroys (if `refcount <= 0`) a shared image.

In the latter case, it will reorganize the shared image array so that no hole will occur.

31.123.3.13 scale()

```
void Fl_Shared_Image::scale (
    int width,
    int height,
    int proportional = 1,
    int can_expand = 0 )
```

Sets the drawing size of the shared image.

This function gives the shared image its own size, independently from the size of the original image that is typically larger. This can be useful to draw a shared image on a drawing surface whose resolution is higher than the drawing unit for this surface: all pixels of the original image become available to fill an area of the drawing surface sized at `width, height`. Examples of such drawing surfaces: laser printers, PostScript files, PDF printers, retina displays on Apple hardware.

Parameters

<i>width,height</i>	maximum width and height (in drawing units) to use when drawing the shared image
<i>proportional</i>	if not null, keep the width and height of the shared image proportional to those of its original image
<i>can_expand</i>	if null, the width and height of the shared image will not exceed those of the original image

Version

1.3.4 and requires compiling with `FLTK_ABI_VERSION = 10304`

Example code: scale an image to fit in a box

```
Fl_Box *b = ... // a box
Fl_Shared_Image *shared = Fl_Shared_Image::get("/path/to/picture.jpeg"); // read a picture file
shared->scale(b->w(), b->h(), 1); // set the drawing size of the shared image to the size of the box
b->image(shared); // use the shared image as the box image
b->align(FL_ALIGN_INSIDE | FL_ALIGN_CENTER | FL_ALIGN_CLIP); // the image is to be drawn centered in the box
```

31.123.3.14 scaling_algorithm()

```
static void Fl_Shared_Image::scaling_algorithm (
    Fl_RGB_Scaling algorithm ) [inline], [static]
```

Sets what algorithm is used when resizing a source image.

The default algorithm is `FL_RGB_SCALING_BILINEAR`. Drawing an [Fl_Shared_Image](#) is sometimes performed by first resizing the source image and then drawing the resized copy. This occurs, e.g., when drawing to screen under Linux or MSWindows after having called [Fl_Shared_Image::scale\(\)](#). This function controls what method is used when the image to be resized is an [Fl_RGB_Image](#).

Version

1.3.4 and requires compiling with `FLTK_ABI_VERSION = 10304`

31.123.3.15 uncache()

```
void Fl_Shared_Image::uncache ( ) [virtual]
```

If the image has been cached for display, delete the cache data.

This allows you to change the data used for the image and then redraw it without recreating an image object.

Reimplemented from [Fl_Image](#).

The documentation for this class was generated from the following files:

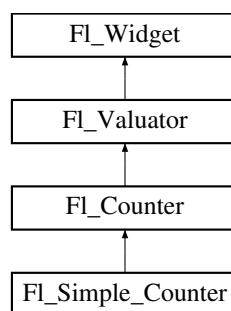
- [Fl_Shared_Image.H](#)
- [Fl_Shared_Image.cxx](#)

31.124 Fl_Simple_Counter Class Reference

This widget creates a counter with only 2 arrow buttons.

```
#include <Fl_Simple_Counter.H>
```

Inheritance diagram for Fl_Simple_Counter:



Public Member Functions

- [Fl_Simple_Counter](#) (int X, int Y, int W, int H, const char *L=0)

Additional Inherited Members

31.124.1 Detailed Description

This widget creates a counter with only 2 arrow buttons.

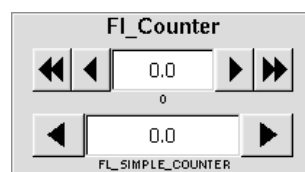


Figure 31.31 Fl_Simple_Counter

The documentation for this class was generated from the following files:

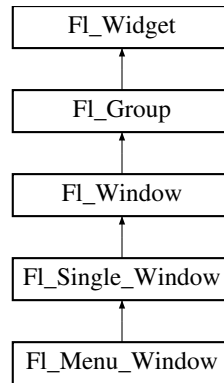
- [Fl_Simple_Counter.H](#)
- [Fl_Counter.cxx](#)

31.125 Fl_Single_Window Class Reference

This is the same as [Fl_Window](#).

```
#include <Fl_Single_Window.H>
```

Inheritance diagram for Fl_Single_Window:



Public Member Functions

- [FI_Single_Window](#) (int W, int H, const char *l=0)
Creates a new [FI_Single_Window](#) widget using the given size, and label (title) string.
- [FI_Single_Window](#) (int X, int Y, int W, int H, const char *l=0)
Creates a new [FI_Single_Window](#) widget using the given position, size, and label (title) string.
- void [flush](#) ()
Forces the window to be drawn, this window is also made current and calls [draw\(\)](#).
- int [make_current](#) ()
- void [show](#) ()
Puts the window on the screen.
- void [show](#) (int a, char **b)

Additional Inherited Members

31.125.1 Detailed Description

This is the same as [FI_Window](#).

However, it is possible that some implementations will provide double-buffered windows by default. This subclass can be used to force single-buffering. This may be useful for modifying existing programs that use incremental update, or for some types of image data, such as a movie flipbook.

31.125.2 Member Function Documentation

31.125.2.1 [show\(\)](#)

```
void FI_Single_Window::show ( ) [virtual]
```

Puts the window on the screen.

Usually (on X) this has the side effect of opening the display.

If the window is already shown then it is restored and raised to the top. This is really convenient because your program can call [show\(\)](#) at any time, even if the window is already up. It also means that [show\(\)](#) serves the purpose of [raise\(\)](#) in other toolkits.

[FI_Window::show\(int argc, char **argv\)](#) is used for top-level windows and allows standard arguments to be parsed from the command-line.

Note

For some obscure reasons [FI_Window::show\(\)](#) resets the current group by calling [FI_Group::current\(0\)](#). The comments in the code say "get rid of very common user bug: forgot end()". Although this is true it may have unwanted side effects if you [show\(\)](#) an unrelated window (maybe for an error message or warning) while building a window or any other group widget.

Todo Check if we can remove resetting the current group in a later FLTK version (after 1.3.x). This may break "already broken" programs though if they rely on this "feature".

See also

[FL_Window::show\(int argc, char **argv\)](#)

Reimplemented from [FL_Window](#).

The documentation for this class was generated from the following files:

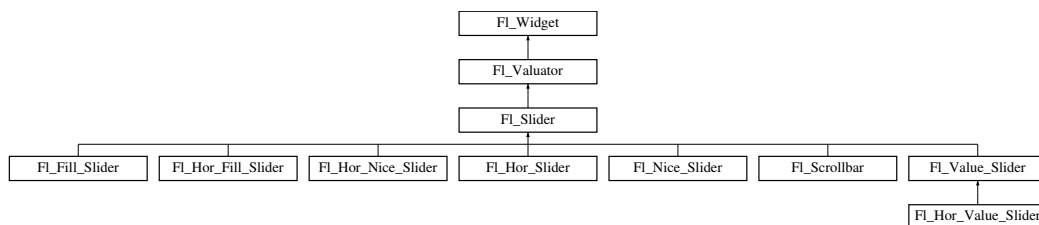
- [FL_Single_Window.H](#)
- [FL_Single_Window.cxx](#)

31.126 FL_Slider Class Reference

The [FL_Slider](#) widget contains a sliding knob inside a box.

```
#include <FL_Slider.H>
```

Inheritance diagram for [FL_Slider](#):



Public Member Functions

- void [bounds](#) (double a, double b)
Sets the minimum (a) and maximum (b) values for the valuator widget.
- [FL_Slider](#) (int X, int Y, int W, int H, const char *L=0)
Creates a new [FL_Slider](#) widget using the given position, size, and label string.
- [FL_Slider](#) (uchar t, int X, int Y, int W, int H, const char *L)
Creates a new [FL_Slider](#) widget using the given type, position, size, and label string.
- int [handle](#) (int)
Handles the specified event.
- int [scrollvalue](#) (int pos, int [size](#), int first, int total)
Sets the size and position of the sliding knob in the box.
- [FL_Boxtype slider](#) () const
Gets the slider box type.
- void [slider](#) ([FL_Boxtype](#) c)
Sets the slider box type.
- float [slider_size](#) () const
Get the dimensions of the moving piece of slider.
- void [slider_size](#) (double v)
Set the dimensions of the moving piece of slider.

Protected Member Functions

- void [draw](#) ()
Draws the widget.
- void [draw](#) (int, int, int, int)
- int [handle](#) (int, int, int, int, int)

Additional Inherited Members

31.126.1 Detailed Description

The `Fl_Slider` widget contains a sliding knob inside a box.

It is often used as a scrollbar. Moving the box all the way to the top/left sets it to the `minimum()`, and to the bottom/right to the `maximum()`. The `minimum()` may be greater than the `maximum()` to reverse the slider direction.

Use `void Fl_Widget::type(int)` to set how the slider is drawn, which can be one of the following:

- `FL_VERTICAL` - Draws a vertical slider (this is the default).
- `FL_HORIZONTAL` - Draws a horizontal slider.
- `FL_VERT_FILL_SLIDER` - Draws a filled vertical slider, useful as a progress or value meter.
- `FL_HOR_FILL_SLIDER` - Draws a filled horizontal slider, useful as a progress or value meter.
- `FL_VERT_NICE_SLIDER` - Draws a vertical slider with a nice looking control knob.
- `FL_HOR_NICE_SLIDER` - Draws a horizontal slider with a nice looking control knob.

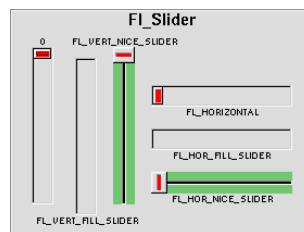


Figure 31.32 `Fl_Slider`

31.126.2 Constructor & Destructor Documentation

31.126.2.1 `Fl_Slider()`

```
Fl_Slider::Fl_Slider (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new `Fl_Slider` widget using the given position, size, and label string.

The default boxtype is `FL_DOWN_BOX`.

31.126.3 Member Function Documentation

31.126.3.1 `bounds()`

```
void Fl_Slider::bounds (
    double a,
    double b )
```

Sets the minimum (a) and maximum (b) values for the valuator widget.

if at least one of the values is changed, a partial redraw is asked.

31.126.3.2 draw()

```
void Fl_Slider::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scroll;           // scroll is an embedded Fl_Scrollbar
s->draw();                         // calls Fl_Scrollbar::draw()
```

Implements [Fl_Widget](#).

Reimplemented in [Fl_Value_Slider](#).

31.126.3.3 handle()

```
int Fl_Slider::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited `handle()` method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Widget](#).

Reimplemented in [Fl_Value_Slider](#).

31.126.3.4 scrollvalue()

```
int Fl_Slider::scrollvalue (
    int pos,
    int size,
    int first,
    int total )
```

Sets the size and position of the sliding knob in the box.

Parameters

in	<i>pos</i>	position of first line displayed
in	<i>size</i>	size of window in lines
in	<i>first</i>	number of first line
in	<i>total</i>	total number of lines Returns Fl_Valuator::value(p)

31.126.3.5 slider_size()

```
void Fl_Slider::slider_size (
    double v )
```

Set the dimensions of the moving piece of slider.

This is the fraction of the size of the entire widget. If you set this to 1 then the slider cannot move. The default value is .08.

For the "fill" sliders this is the size of the area around the end that causes a drag effect rather than causing the slider to jump to the mouse.

The documentation for this class was generated from the following files:

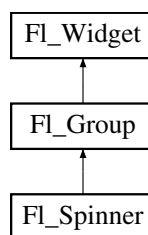
- Fl_Slider.H
- Fl_Slider.cxx

31.127 Fl_Spinner Class Reference

This widget is a combination of the input widget and repeat buttons.

```
#include <Fl_Spinner.H>
```

Inheritance diagram for Fl_Spinner:



Public Member Functions

- [Fl_Color](#) `color` () const
Return the background color of the spinner widget's input field.
- void `color` ([Fl_Color](#) v)
Change the background color of the spinner widget's input field.
- [Fl_Spinner](#) (int X, int Y, int W, int H, const char *L=0)
Creates a new [Fl_Spinner](#) widget using the given position, size, and label string.
- const char * `format` ()
Sets or returns the format string for the value.
- void `format` (const char *f)
Sets or returns the format string for the value.
- int `handle` (int event)
Handles the specified event.
- double `maximum` () const
Gets the maximum value of the widget.
- void `maximum` (double m)
Sets the maximum value of the widget.
- double `maximum` () const
Spelling mistakes retained for source compatibility.
- double `minimum` () const
Gets the minimum value of the widget.
- void `minimum` (double m)

- Sets the minimum value of the widget.*
- double `minimum` () const
 - Speling mistakes retained for source compatibility.*
- void `range` (double a, double b)
 - Sets the minimum and maximum values for the widget.*
- void `resize` (int X, int Y, int W, int H)
 - Resizes the `FI_Group` widget and all of its children.*
- `FI_Color` `selection_color` () const
 - Return the selection color of the spinner widget's input field.*
- void `selection_color` (`FI_Color` val)
 - Change the selection color of the spinner widget's input field.*
- double `step` () const
 - Sets or returns the amount to change the value when the user clicks a button.*
- void `step` (double s)
 - See double `FI_Spinner::step()` const.*
- `FI_Color` `textcolor` () const
 - Gets the color of the text in the input field.*
- void `textcolor` (`FI_Color` c)
 - Sets the color of the text in the input field.*
- `FI_Font` `textfont` () const
 - Gets the font of the text in the input field.*
- void `textfont` (`FI_Font` f)
 - Sets the font of the text in the input field.*
- `FI_Fontsize` `textsize` () const
 - Gets the size of the text in the input field.*
- void `textsize` (`FI_Fontsize` s)
 - Sets the size of the text in the input field.*
- `uchar` `type` () const
 - Gets the numeric representation in the input field.*
- void `type` (`uchar` v)
 - Sets the numeric representation in the input field.*
- double `value` () const
 - Gets the current value of the widget.*
- void `value` (double v)
 - Sets the current value of the widget.*

Protected Attributes

- `FI_Repeat_Button` `down_button_`
- `FI_Input` `input_`
- `FI_Repeat_Button` `up_button_`

Additional Inherited Members

31.127.1 Detailed Description

This widget is a combination of the input widget and repeat buttons. The user can either type into the input area or use the buttons to change the value.

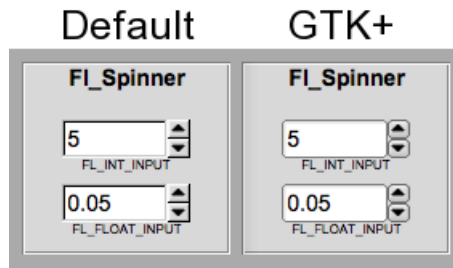


Figure 31.33 Fl_Spinner widget

31.127.2 Constructor & Destructor Documentation

31.127.2.1 Fl_Spinner()

```
Fl_Spinner::Fl_Spinner (
    int X,
    int Y,
    int W,
    int H,
    const char * L = 0 )
```

Creates a new [Fl_Spinner](#) widget using the given position, size, and label string. Inherited destructor Destroys the widget and any value associated with it.

31.127.3 Member Function Documentation

31.127.3.1 handle()

```
int Fl_Spinner::handle (
    int event ) [inline], [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Group](#).

31.127.3.2 maximum()

```
double Fl_Spinner::maximum ( ) const [inline]
```

Spelling mistakes retained for source compatibility.

Deprecated

31.127.3.3 minimum()

```
double Fl_Spinner::minimum ( ) const [inline]
```

Spelling mistakes retained for source compatibility.

Deprecated

31.127.3.4 resize()

```
void Fl_Spinner::resize (
    int X,
    int Y,
    int W,
    int H ) [inline], [virtual]
```

Resizes the [Fl_Group](#) widget and all of its children.

The [Fl_Group](#) widget first resizes itself, and then it moves and resizes all its children according to the rules documented for [Fl_Group::resizable\(Fl_Widget*\)](#)

See also

[Fl_Group::resizable\(Fl_Widget*\)](#)

[Fl_Group::resizable\(\)](#)

[Fl_Widget::resize\(int,int,int,int\)](#)

Reimplemented from [Fl_Group](#).

31.127.3.5 step()

```
double Fl_Spinner::step ( ) const [inline]
```

Sets or returns the amount to change the value when the user clicks a button.

Before setting step to a non-integer value, the spinner [type\(\)](#) should be changed to floating point.

31.127.3.6 type() [1/2]

```
uchar Fl_Spinner::type ( ) const [inline]
```

Gets the numeric representation in the input field.

See also

[Fl_Spinner::type\(uchar\)](#)

31.127.3.7 type() [2/2]

```
void Fl_Spinner::type (
    uchar v ) [inline]
```

Sets the numeric representation in the input field.

Valid values are FL_INT_INPUT and FL_FLOAT_INPUT. Also changes the [format\(\)](#) template. Setting a new spinner type via a superclass pointer will not work.

Note

type is not a virtual function.

31.127.3.8 value()

```
void Fl_Spinner::value (
    double v ) [inline]
```

Sets the current value of the widget.

Before setting value to a non-integer value, the spinner [type\(\)](#) should be changed to floating point.

The documentation for this class was generated from the following files:

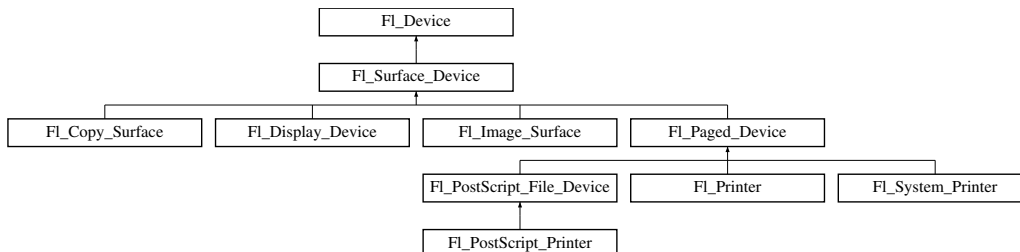
- Fl_Spinner.H
- Fl_Group.cxx

31.128 Fl_Surface_Device Class Reference

A drawing surface that's susceptible to receive graphical output.

```
#include <Fl_Device.H>
```

Inheritance diagram for Fl_Surface_Device:



Public Member Functions

- const char * [class_name](#) ()
Returns the name of the class of this object.
- [Fl_Graphics_Driver](#) * [driver](#) ()
Returns the graphics driver of this drawing surface.
- void [driver](#) ([Fl_Graphics_Driver](#) *graphics_driver)
Sets the graphics driver of this drawing surface.
- virtual void [set_current](#) (void)
Make this surface the current drawing surface.
- virtual ~[Fl_Surface_Device](#) ()
The destructor.

Static Public Member Functions

- static [Fl_Surface_Device](#) * [surface](#) ()
The current drawing surface.

Static Public Attributes

- static const char * `class_id` = "Fl_Surface_Device"

Protected Member Functions

- `Fl_Surface_Device` (`Fl_Graphics_Driver` *graphics_driver)
Constructor that sets the graphics driver to use for the created surface.

31.128.1 Detailed Description

A drawing surface that's susceptible to receive graphical output.

Any FLTK application has at any time a current drawing surface to which all drawing requests are directed. The current surface is given by `Fl_Surface_Device::surface()`. When `main()` begins running, the current drawing surface has been set to the computer's display, an instance of the `Fl_Display_Device` class.

A drawing surface other than the computer's display, is typically used as follows:

1. Create `surface`, an object from a particular `Fl_Surface_Device` derived class (e.g., `Fl_Copy_Surface`, `Fl_Printer`).
2. Memorize what is the current drawing surface with `Fl_Surface_Device *old_current = Fl_Surface_Device::surface();`
3. Call `surface->set_current();` to redirect all graphics requests to `surface` which becomes the new current drawing surface (not necessary with class `Fl_Printer` because it is done by `Fl_Printer::start_job()`).
4. At this point any of the [Drawing functions](#) (e.g., `fl_rect()`) or the [Color & Font functions](#) or [Drawing Images functions](#) (e.g., `fl_draw_image()`, `Fl_Image::draw()`) operates on the new current drawing surface. Certain drawing surfaces allow additional ways to draw to them (e.g., `Fl_Printer::print_widget()`, `Fl_Image_Surface::draw()`).
5. After all drawing requests have been performed, redirect graphics requests back to their previous destination with `old_current->set_current();`
6. Delete `surface`.

31.128.2 Member Function Documentation

31.128.2.1 class_name()

```
const char* Fl_Surface_Device::class_name ( ) [inline], [virtual]
```

Returns the name of the class of this object.

Use of the `class_name()` function is discouraged because it will be removed from future FLTK versions.

The class of an instance of an `Fl_Device` subclass can be checked with code such as:

```
if ( instance->class_name() == Fl_Printer::class_id ) { ... }
```

Reimplemented from `Fl_Device`.

Reimplemented in `Fl_Printer`, `Fl_PostScript_Printer`, `Fl_System_Printer`, `Fl_PostScript_File_Device`, `Fl_Paged_Device`, `Fl_Image_Surface`, and `Fl_Display_Device`.

31.128.2.2 set_current()

```
void Fl_Surface_Device::set_current (
    void ) [virtual]
```

Make this surface the current drawing surface.

This surface will receive all future graphics requests.

Reimplemented in `Fl_Printer`, `Fl_Image_Surface`, and `Fl_Copy_Surface`.

31.128.2.3 surface()

```
static Fl_Surface_Device* Fl_Surface_Device::surface ( ) [inline], [static]
```

The current drawing surface.

In other words, the [Fl_Surface_Device](#) object that currently receives all graphics output

The documentation for this class was generated from the following files:

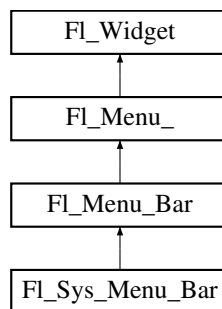
- [Fl_Device.H](#)
- [Fl_Device.cxx](#)

31.129 Fl_Sys_Menu_Bar Class Reference

A class to create, modify and delete menus that appear on Mac OS X in the menu bar at the top of the screen.

```
#include <Fl_Sys_Menu_Bar.H>
```

Inheritance diagram for [Fl_Sys_Menu_Bar](#):



Public Member Functions

- int [add](#) (const char *label, const char *shortcut, [Fl_Callback](#) *cb, void *user_data=0, int flags=0)
Adds a new menu item.
- int [add](#) (const char *label, int shortcut, [Fl_Callback](#) *, void *user_data=0, int flags=0)
Add a new menu item to the system menu bar.
- int [add](#) (const char *str)
Forms-compatible procedure to add items to the system menu bar.
- void [clear](#) ()
Set the [Fl_Menu_Item](#) array pointer to null, indicating a zero-length menu.
- int [clear_submenu](#) (int index)
Clears the specified submenu pointed to by index of all menu items.
- [Fl_Sys_Menu_Bar](#) (int x, int y, int w, int h, const char *l=0)
The constructor.
- void [global](#) ()
Make the shortcuts for this menu work no matter what window has the focus when you type it.
- int [insert](#) (int index, const char *label, const char *shortcut, [Fl_Callback](#) *cb, void *user_data=0, int flags=0)
Insert a new menu item.
- int [insert](#) (int index, const char *label, int shortcut, [Fl_Callback](#) *cb, void *user_data=0, int flags=0)
insert in the system menu bar a new menu item
- const [Fl_Menu_Item](#) * [menu](#) () const
Return the system menu's array of [Fl_Menu_Item](#)'s.
- void [menu](#) (const [Fl_Menu_Item](#) *m)
create a system menu bar using the given list of menu structs
- int [mode](#) (int i) const
Gets the flags of item i.
- void [mode](#) (int i, int fl)

- Sets the flags of item i.*

 - void `remove` (int n)
 - remove an item from the system menu bar*
 - void `replace` (int index, const char *name)
 - rename an item from the system menu bar*
 - void `setonly` (FI_Menu_Item *item)
 - Turns the radio item "on" for the menu item and turns "off" adjacent radio items of the same group.*
 - void `shortcut` (int i, int s)
 - Changes the shortcut of item i to n.*
 - void `update` ()
 - Updates the system menu after any change to its items.*
- `~FI_Sys_Menu_Bar` ()
 - The destructor.*

Protected Member Functions

- void `draw` ()
 - Draws the widget.*

Additional Inherited Members

31.129.1 Detailed Description

A class to create, modify and delete menus that appear on Mac OS X in the menu bar at the top of the screen.

On other than Mac OS X platforms, `FI_Sys_Menu_Bar` is a synonym of class `FI_Menu_Bar`.

To use this class, just replace `FI_Menu_Bar` by `FI_Sys_Menu_Bar`, and, on the Mac platform, a system menu at the top of the screen will be available. This menu will match an array of `FI_Menu_Item`'s exactly as with standard FLTK menus.

Changes to the menu state are immediately visible in the menubar when they are made using member functions of the `FI_Sys_Menu_Bar` class. Other changes (e.g., by a call to `FI_Menu_Item::set()`) should be followed by a call to `FI_Sys_Menu_Bar::update()` to be visible in the menubar across all platforms.

A few FLTK features are not supported by the Mac System menu:

- no symbolic labels
- no embossed labels
- no font sizes

You can configure a callback for the 'About' menu item to invoke your own code with `fl_mac_set_about()`.

31.129.2 Constructor & Destructor Documentation

31.129.2.1 FI_Sys_Menu_Bar()

```
FI_Sys_Menu_Bar::FI_Sys_Menu_Bar (
    int x,
    int y,
    int w,
    int h,
    const char * l = 0 )
```

The constructor.

On Mac OS X, all arguments are unused. On other platforms they are used as by `FI_Menu_Bar::FI_Menu_Bar()`.

31.129.3 Member Function Documentation

31.129.3.1 add() [1/3]

```
int Fl_Sys_Menu_Bar::add (
    const char * label,
    const char * shortcut,
    Fl_Callback * cb,
    void * user_data = 0,
    int flags = 0 ) [inline]
```

Adds a new menu item.

See also

[Fl_Menu_::add\(const char* label, int shortcut, Fl_Callback*, void *user_data=0, int flags=0\)](#)

31.129.3.2 add() [2/3]

```
int Fl_Sys_Menu_Bar::add (
    const char * label,
    int shortcut,
    Fl_Callback * cb,
    void * user_data = 0,
    int flags = 0 )
```

Add a new menu item to the system menu bar.

Parameters

<i>label</i>	- new menu item's label
<i>shortcut</i>	- new menu item's integer shortcut (can be 0 for none, or e.g. FL_ALT+'x')
<i>cb</i>	- callback to be invoked when item selected (can be 0 for none, in which case the menubar's callback() can be used instead)
<i>user_data</i>	- argument to the callback
<i>flags</i>	- item's flags, e.g. FL_MENU_TOGGLE , etc.

Returns

the index into the [menu\(\)](#) array, where the entry was added

See also

[Fl_Menu_::add\(const char* label, int shortcut, Fl_Callback *cb, void *user_data, int flags\)](#)

31.129.3.3 add() [3/3]

```
int Fl_Sys_Menu_Bar::add (
    const char * str )
```

Forms-compatible procedure to add items to the system menu bar.

Returns

the index into the [menu\(\)](#) array, where the entry was added

See also

[Fl_Menu_::add\(const char* str\)](#)

31.129.3.4 clear()

```
void Fl_Sys_Menu_Bar::clear ( )
```

Set the [Fl_Menu_Item](#) array pointer to null, indicating a zero-length menu.

See also

[Fl_Menu_::clear\(\)](#)

31.129.3.5 clear_submenu()

```
int Fl_Sys_Menu_Bar::clear_submenu (
    int index )
```

Clears the specified submenu pointed to by index of all menu items.

See also

[Fl_Menu_::clear_submenu\(int index\)](#)

31.129.3.6 draw()

```
void Fl_Sys_Menu_Bar::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scroll; // scroll is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Reimplemented from [Fl_Menu_Bar](#).

31.129.3.7 insert() [1/2]

```
int Fl_Sys_Menu_Bar::insert (
    int index,
    const char * label,
    const char * shortcut,
    Fl_Callback * cb,
    void * user_data = 0,
    int flags = 0 ) [inline]
```

Insert a new menu item.

See also

[Fl_Menu_::insert\(int index, const char* label, const char* shortcut, Fl_Callback *cb, void *user_data=0, int flags=0\)](#)

31.129.3.8 insert() [2/2]

```
int Fl_Sys_Menu_Bar::insert (
    int index,
    const char * label,
    int shortcut,
    Fl_Callback * cb,
    void * user_data = 0,
    int flags = 0 )
```

insert in the system menu bar a new menu item

Insert in the system menu bar a new menu item, with a title string, shortcut int, callback, argument to the callback, and flags.

Returns

the index into the `menu()` array, where the entry was inserted

See also

[FI_Menu_::insert\(int index, const char* label, int shortcut, FI_Callback *cb, void *user_data, int flags\)](#)

31.129.3.9 menu()

```
void Fl_Sys_Menu_Bar::menu (
    const FI_Menu_Item * m )
```

create a system menu bar using the given list of menu structs

Author

Matthias Melcher

Parameters

<i>m</i>	list of FI_Menu_Item
----------	--------------------------------------

31.129.3.10 mode()

```
void Fl_Sys_Menu_Bar::mode (
    int i,
    int fl ) [inline]
```

Sets the flags of item *i*.

See also

[FI_Menu_::mode\(int i, int fl\)](#)

31.129.3.11 remove()

```
void Fl_Sys_Menu_Bar::remove (
    int index )
```

remove an item from the system menu bar

Parameters

<i>index</i>	the index of the item to remove
--------------	---------------------------------

31.129.3.12 replace()

```
void Fl_Sys_Menu_Bar::replace (
    int index,
    const char * name )
```

rename an item from the system menu bar

Parameters

<i>index</i>	the index of the item to rename
<i>name</i>	the new item name as a UTF8 string

The documentation for this class was generated from the following files:

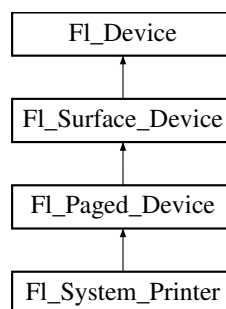
- FI_Sys_Menu_Bar.H
- FI_Sys_Menu_Bar.mm

31.130 FI_System_Printer Class Reference

Print support under MSWindows and Mac OS.

```
#include <FI_Printer.H>
```

Inheritance diagram for FI_System_Printer:



Public Member Functions

- const char * [class_name](#) ()
Returns the name of the class of this object.
- void [end_job](#) (void)
To be called at the end of a print job.
- int [end_page](#) (void)
To be called at the end of each page.
- void [margins](#) (int *left, int *top, int *right, int *bottom)
Computes the dimensions of margins that lie between the printable page area and the full page.
- void [origin](#) (int *x, int *y)
Computes the page coordinates of the current origin of graphics functions.
- void [origin](#) (int x, int y)
Sets the position in page coordinates of the origin of graphics functions.
- int [printable_rect](#) (int *w, int *h)
Computes the width and height of the printable area of the page.
- void [rotate](#) (float angle)
Rotates the graphics operations relatively to paper.
- void [scale](#) (float scale_x, float scale_y=0.)
Changes the scaling of page coordinates.
- int [start_job](#) (int pagecount, int *frompage=NULL, int *topage=NULL)
Starts a print job.
- int [start_page](#) (void)
Starts a new printed page.
- void [translate](#) (int x, int y)
Translates the current graphics origin accounting for the current rotation.

- void `untranslate` (void)
Undoes the effect of a previous `translate()` call.
- `~Fl_System_Printer` (void)
The destructor.

Static Public Attributes

- static const char * `class_id` = `Fl_Printer::class_id`

Protected Member Functions

- `Fl_System_Printer` (void)
The constructor.

Friends

- class `Fl_Printer`

Additional Inherited Members

31.130.1 Detailed Description

Print support under MSWindows and Mac OS.

Class `Fl_System_Printer` is implemented only on the MSWindows and Mac OS platforms. It has no public constructor. Use `Fl_Printer` instead that is cross-platform and has the same API.

31.130.2 Member Function Documentation

31.130.2.1 `class_name()`

```
const char* Fl_System_Printer::class_name ( ) [inline], [virtual]
```

Returns the name of the class of this object.

Use of the `class_name()` function is discouraged because it will be removed from future FLTK versions.

The class of an instance of an `Fl_Device` subclass can be checked with code such as:

```
if ( instance->class_name() == Fl_Printer::class_id ) { ... }
```

Reimplemented from `Fl_Paged_Device`.

31.130.2.2 `end_page()`

```
int Fl_System_Printer::end_page (
    void ) [virtual]
```

To be called at the end of each page.

Returns

0 if OK, non-zero if any error.

Reimplemented from `Fl_Paged_Device`.

31.130.2.3 `margins()`

```
void Fl_System_Printer::margins (
    int * left,
    int * top,
    int * right,
    int * bottom ) [virtual]
```

Computes the dimensions of margins that lie between the printable page area and the full page. Values are in the same unit as that used by FLTK drawing functions. They are changed by [scale\(\)](#) calls.

Parameters

out	<i>left</i>	If non-null, *left is set to the left margin size.
out	<i>top</i>	If non-null, *top is set to the top margin size.
out	<i>right</i>	If non-null, *right is set to the right margin size.
out	<i>bottom</i>	If non-null, *bottom is set to the bottom margin size.

Reimplemented from [Fl_Paged_Device](#).

31.130.2.4 origin() [1/2]

```
void Fl_System_Printer::origin (
    int * x,
    int * y ) [virtual]
```

Computes the page coordinates of the current origin of graphics functions.

Parameters

out	<i>x</i>	If non-null, *x is set to the horizontal page offset of graphics origin.
out	<i>y</i>	Same as above, vertically.

Reimplemented from [Fl_Paged_Device](#).

31.130.2.5 origin() [2/2]

```
void Fl_System_Printer::origin (
    int x,
    int y ) [virtual]
```

Sets the position in page coordinates of the origin of graphics functions.

Arguments should be expressed relatively to the result of a previous [printable_rect\(\)](#) call. That is, `printable_rect(&w, &h); origin(w/2, 0);` sets the graphics origin at the top center of the page printable area. Origin() calls are not affected by [rotate\(\)](#) calls. Successive [origin\(\)](#) calls don't combine their effects.

Parameters

in	<i>x</i>	Horizontal position in page coordinates of the desired origin of graphics functions.
in	<i>y</i>	Same as above, vertically.

Reimplemented from [Fl_Paged_Device](#).

31.130.2.6 printable_rect()

```
int Fl_System_Printer::printable_rect (
    int * w,
    int * h ) [virtual]
```

Computes the width and height of the printable area of the page.

Values are in the same unit as that used by FLTK drawing functions, are unchanged by calls to [origin\(\)](#), but are changed by [scale\(\)](#) calls. Values account for the user-selected paper type and print orientation.

Returns

0 if OK, non-zero if any error

Reimplemented from [Fl_Paged_Device](#).

31.130.2.7 rotate()

```
void Fl_System_Printer::rotate (
    float angle ) [virtual]
```

Rotates the graphics operations relatively to paper.

The rotation is centered on the current graphics origin. Successive [rotate\(\)](#) calls don't combine their effects.

Parameters

<i>angle</i>	Rotation angle in counter-clockwise degrees.
--------------	--

Reimplemented from [Fl_Paged_Device](#).

31.130.2.8 scale()

```
void Fl_System_Printer::scale (
    float scale_x,
    float scale_y = 0. ) [virtual]
```

Changes the scaling of page coordinates.

This function also resets the origin of graphics functions at top left of printable page area. After a [scale\(\)](#) call, do a [printable_rect\(\)](#) call to get the new dimensions of the printable page area. Successive [scale\(\)](#) calls don't combine their effects.

Parameters

<i>scale_x</i>	Horizontal dimensions of plot are multiplied by this quantity.
<i>scale_y</i>	Same as above, vertically. The value 0. is equivalent to setting <code>scale_y = scale_x</code> . Thus, <code>scale(factor);</code> is equivalent to <code>scale(factor, factor);</code>

Reimplemented from [Fl_Paged_Device](#).

31.130.2.9 start_job()

```
int Fl_System_Printer::start_job (
    int pagecount,
    int * frompage = NULL,
    int * topage = NULL ) [virtual]
```

Starts a print job.

Parameters

in	<i>pagecount</i>	the total number of pages of the job (or 0 if you don't know the number of pages)
out	<i>frompage</i>	if non-null, *frompage is set to the first page the user wants printed
out	<i>topage</i>	if non-null, *topage is set to the last page the user wants printed

Returns

0 if OK, non-zero if any error

Reimplemented from [Fl_Paged_Device](#).

31.130.2.10 start_page()

```
int Fl_System_Printer::start_page (
    void ) [virtual]
```

Starts a new printed page.

The page coordinates are initially in points, i.e., 1/72 inch, and with origin at the top left of the printable page area.

Returns

0 if OK, non-zero if any error

Reimplemented from [Fl_Paged_Device](#).

31.130.2.11 translate()

```
void Fl_System_Printer::translate (
    int x,
    int y ) [virtual]
```

Translates the current graphics origin accounting for the current rotation.

This function is only useful after a [rotate\(\)](#) call. Each [translate\(\)](#) call must be matched by an [untranslate\(\)](#) call.

Successive [translate\(\)](#) calls add up their effects.

Reimplemented from [Fl_Paged_Device](#).

The documentation for this class was generated from the following files:

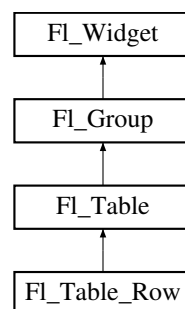
- [Fl_Printer.H](#)
- [Fl_Printer.cxx](#)

31.131 Fl_Table Class Reference

A table of widgets or other content.

```
#include <Fl_Table.H>
```

Inheritance diagram for Fl_Table:

**Public Types**

- enum [TableContext](#) {
 - [CONTEXT_NONE](#) = 0 , [CONTEXT_STARTPAGE](#) = 0x01 , [CONTEXT_ENDPAGE](#) = 0x02 , [CONTEXT_ROW_HEADER](#) = 0x04 ,
 - [CONTEXT_COL_HEADER](#) = 0x08 , [CONTEXT_CELL](#) = 0x10 , [CONTEXT_TABLE](#) = 0x20 , [CONTEXT_RC_RESIZE](#) = 0x40 }

The context bit flags for [Fl_Table](#) related callbacks.

Public Member Functions

- void **add** ([FI_Widget](#) &wgt)
- void **add** ([FI_Widget](#) *wgt)
- [FI_Widget](#) *const * **array** ()
- void **begin** ()
- void **callback** ([FI_Widget](#) *, void *)
Callbacks will be called depending on the setting of [FI_Widget::when\(\)](#).
- int **callback_col** ()
Returns the current column the event occurred on.
- [TableContext](#) **callback_context** ()
Returns the current 'table context'.
- int **callback_row** ()
Returns the current row the event occurred on.
- [FI_Widget](#) * **child** (int n) const
Returns the child widget by an index.
- int **children** () const
Returns the number of children in the table.
- virtual void **clear** ()
Clears the table to zero rows ([rows\(0\)](#)), zero columns ([cols\(0\)](#)), and clears any widgets ([table->clear\(\)](#)) that were added with [begin\(\)/end\(\)](#) or [add\(\)/insert\(\)/etc.](#)
- int **col_header** ()
Returns if column headers are enabled or not.
- void **col_header** (int flag)
Enable or disable column headers.
- [FI_Color](#) **col_header_color** ()
Gets the color for column headers.
- void **col_header_color** ([FI_Color](#) val)
Sets the color for column headers and redraws the table.
- int **col_header_height** ()
Gets the column header height.
- void **col_header_height** (int height)
Sets the height in pixels for column headers and redraws the table.
- int **col_position** ()
Returns the current column scroll position as a column number.
- void **col_position** (int col)
Sets the column scroll position to column 'col', and causes the screen to redraw.
- int **col_resize** ()
Returns if column resizing by the user is allowed.
- void **col_resize** (int flag)
Allows/disallows column resizing by the user.
- int **col_resize_min** ()
Returns the current column minimum resize value.
- void **col_resize_min** (int val)
Sets the current column minimum resize value.
- int **col_width** (int col)
Returns the current width of the specified column in pixels.
- void **col_width** (int col, int width)
Sets the width of the specified column in pixels, and the table is redrawn.
- void **col_width_all** (int width)
Convenience method to set the width of all columns to the same value, in pixels.
- int **cols** ()

- Get the number of columns in the table.*
- virtual void **cols** (int val)
- Set the number of columns in the table and redraw.*
- void **do_callback** (TableContext context, int row, int col)
- void **draw** (void)
- Draws the widget.*
- void **end** ()
- int **find** (const FI_Widget &wgt) const
- int **find** (const FI_Widget *wgt) const
- FI_Table (int X, int Y, int W, int H, const char *|=0)
- The constructor for the FI_Table.*
- void **get_selection** (int &row_top, int &col_left, int &row_bot, int &col_right)
- Gets the region of cells selected (highlighted).*
- void **init_sizes** ()
- void **insert** (FI_Widget &wgt, FI_Widget *w2)
- void **insert** (FI_Widget &wgt, int n)
- int **is_interactive_resize** ()
- Returns 1 if someone is interactively resizing a row or column.*
- int **is_selected** (int r, int c)
- See if the cell at row r and column c is selected.*
- int **move_cursor** (int R, int C)
- int **move_cursor** (int R, int C, int shiftselect)
- void **remove** (FI_Widget &wgt)
- void **resize** (int X, int Y, int W, int H)
- Changes the size of the FI_Table, causing it to redraw.*
- int **row_header** ()
- Returns if row headers are enabled or not.*
- void **row_header** (int flag)
- Enables/disables showing the row headers.*
- FI_Color **row_header_color** ()
- Returns the current row header color.*
- void **row_header_color** (FI_Color val)
- Sets the row header color and causes the screen to redraw.*
- int **row_header_width** ()
- Returns the current row header width (in pixels).*
- void **row_header_width** (int width)
- Sets the row header width to n and causes the screen to redraw.*
- int **row_height** (int row)
- Returns the current height of the specified row as a value in pixels.*
- void **row_height** (int row, int height)
- Sets the height of the specified row in pixels, and the table is redrawn.*
- void **row_height_all** (int height)
- Convenience method to set the height of all rows to the same value, in pixels.*
- int **row_position** ()
- Returns the current row scroll position as a row number.*
- void **row_position** (int row)
- Sets the row scroll position to 'row', and causes the screen to redraw.*
- int **row_resize** ()
- Returns if row resizing by the user is allowed.*
- void **row_resize** (int flag)
- Allows/disallows row resizing by the user.*

- int [row_resize_min](#) ()
Returns the current row minimum resize value.
- void [row_resize_min](#) (int val)
Sets the current row minimum resize value.
- int [rows](#) ()
Returns the number of rows in the table.
- virtual void [rows](#) (int val)
Sets the number of rows in the table, and the table is redrawn.
- int [scrollbar_size](#) () const
Gets the current size of the scrollbars' troughs, in pixels.
- void [scrollbar_size](#) (int newSize)
Sets the pixel size of the scrollbars' troughs to newSize, in pixels.
- void [set_selection](#) (int row_top, int col_left, int row_bot, int col_right)
Sets the region of cells to be selected (highlighted).
- int [tab_cell_nav](#) () const
Get state of table's 'Tab' key cell navigation flag.
- void [tab_cell_nav](#) (int val)
Flag to control if Tab navigates table cells or not.
- void [table_box](#) (FI_Boxtype val)
Sets the kind of box drawn around the data table, the default being FL_NO_BOX.
- [FI_Boxtype](#) [table_box](#) (void)
Returns the current box type used for the data table.
- int [top_row](#) ()
Returns the current top row shown in the table.
- void [top_row](#) (int row)
Sets which row should be at the top of the table, scrolling as necessary, and the table is redrawn.
- void [visible_cells](#) (int &r1, int &r2, int &c1, int &c2)
Returns the range of row and column numbers for all visible and partially visible cells in the table.
- void [when](#) (FI_When flags)
The [FI_Widget::when\(\)](#) function is used to set a group of flags, determining when the widget callback is called:
- [~FI_Table](#) ()
The destructor for the [FI_Table](#).

Protected Types

- enum **ResizeFlag** {
RESIZE_NONE = 0 , **RESIZE_COL_LEFT = 1** , **RESIZE_COL_RIGHT = 2** , **RESIZE_ROW_ABOVE = 3** ,
RESIZE_ROW_BELOW = 4 }

Protected Member Functions

- void [change_cursor](#) ([FI_Cursor](#) newcursor)
- long [col_scroll_position](#) (int col)
- [TableContext](#) [cursor2rowcol](#) (int &R, int &C, [ResizeFlag](#) &resizeflag)
- void [damage_zone](#) (int r1, int c1, int r2, int c2, int r3=0, int c3=0)
- virtual void [draw_cell](#) ([TableContext](#) context, int R=0, int C=0, int X=0, int Y=0, int W=0, int H=0)
Subclass should override this method to handle drawing the cells.
- int [find_cell](#) ([TableContext](#) context, int R, int C, int &X, int &Y, int &W, int &H)
- void [get_bounds](#) ([TableContext](#) context, int &X, int &Y, int &W, int &H)
- int [handle](#) (int e)
Handles the specified event.
- int [is_fltk_container](#) ()

- void `recalc_dimensions` ()
- void `redraw_range` (int topRow, int botRow, int leftCol, int rightCol)
- int `row_col_clamp` ([TableContext](#) context, int &R, int &C)
- long `row_scroll_position` (int row)
- void `table_resized` ()
- void `table_scrolled` ()

Static Protected Member Functions

- static void `scroll_cb` ([Fl_Widget](#) *, void *)

Protected Attributes

- int `botrow`
- int `current_col`
- int `current_row`
- [Fl_Scrollbar](#) * `hscrollbar`
- int `leftcol`
- int `leftcol_scrollpos`
- int `rightcol`
- int `select_col`
- int `select_row`
- [Fl_Scroll](#) * `table`
- int `table_h`
- int `table_w`
- int `tih`
- int `tiw`
- int `tix`
- int `tiy`
- int `toh`
- int `toprow`
- int `toprow_scrollpos`
- int `tow`
- int `tox`
- int `toy`
- [Fl_Scrollbar](#) * `vscrollbar`
- int `wih`
- int `wiw`
- int `wix`
- int `wiy`

Additional Inherited Members

31.131.1 Detailed Description

A table of widgets or other content.

This is the base class for table widgets.

To be useful it must be subclassed and several virtual functions defined. Normally applications use widgets derived from this widget, and do not use this widget directly; this widget is usually too low level to be used directly by applications.

This widget does *not* handle the data in the table. The `draw_cell()` method must be overridden by a subclass to manage drawing the contents of the cells.

This widget can be used in several ways:

- As a custom widget; see examples/table-simple.cxx and test/table.cxx. Very optimal for even extremely large tables.

- As a table made up of a single FLTK widget instanced all over the table, simulating a numeric spreadsheet. See `examples/table-spreadsheet.cxx` and `examples/table-spreadsheet-with-keyboard-nav.cxx`. Optimal for large tables.
- As a regular container of FLTK widgets, one widget per cell. See `examples/table-as-container.cxx`. *Not* recommended for large tables.

	A	B	C	D	E
000:	1000	1001	1002	1003	1004
001:	2000	2001	2002	2003	2004
002:	3000	3001	3002	3003	3004
003:	4000	4001	4002	4003	4004
004:	5000	5001	5002	5003	5004
005:	6000	6001	6002	6003	6004
006:	7000	7001	7002	7003	7004
007:	8000	8001	8002	8003	8004
008:	9000	9001	9002	9003	9004
009:	10000	10001	10002	10003	10004

Figure 31.34 table-simple example

	Column 0	Column 1	Column 2	Column 3	Column 4	Column 5
Row 0	0/0	0.1	0/2	0.3	0/4	0.5
Row 1	1/0	1.1	1/2	1.3	1/4	1.5
Row 2	2/0	2.1	2/2	2.3	2/4	2.5
Row 3	3/0	3.1	3/2	3.3	3/4	3.5
Row 4	4/0	4.1	4/2	4.3	4/4	4.5
Row 5	5/0	5.1	5/2	5.3	5/4	5.5
Row 6	6/0	6.1	6/2	6.3	6/4	6.5
Row 7	7/0	7.1	7/2	7.3	7/4	7.5

Figure 31.35 table-as-container example

When acting as part of a custom widget, events on the cells and/or headings generate callbacks when they are clicked by the user. You control when events are generated based on the setting for `Fl_Table::when()`.

When acting as a container for FLTK widgets, the FLTK widgets maintain themselves. Although the `draw_cell()` method must be overridden, its contents can be very simple. See the `draw_cell()` code in `examples/table-simple.cxx`.

The following variables are available to classes deriving from `Fl_Table`:

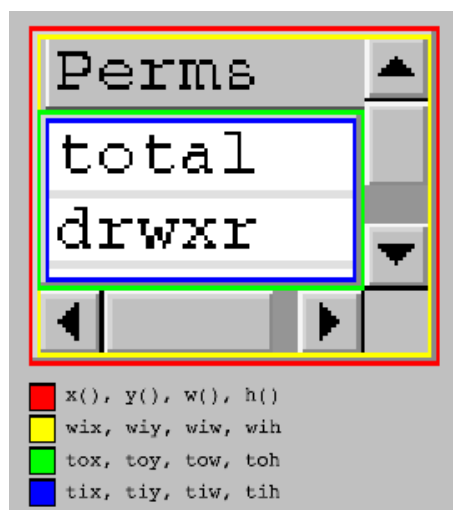


Figure 31.36 Fl_Table Dimensions

`x()/y()/w()/h()`

`Fl_Table` widget's outer dimension. The outer edge of the border of the `Fl_Table`. (Red in the diagram above)

wix/wiy/wiw/wih	Fl_Table widget's inner dimension. The inner edge of the border of the Fl_Table. eg. if the Fl_Table's box() is FL_NO_BOX, these values are the same as x()/y()/w()/h(). (Yellow in the diagram above)
tox/toy/tow/toh	The table's outer dimension. The outer edge of the border around the cells, but inside the row/col headings and scrollbars. (Green in the diagram above)
tix/tiy/tiw/tih	The table's inner dimension. The inner edge of the border around the cells, but inside the row/col headings and scrollbars. AKA the table's clip region. eg. if the table_box() is FL_↔ NO_BOX, these values are the same as tox/toy/tow/toh. (Blue in the diagram above)

CORE DEVELOPERS

- Greg Ercolano : 12/16/2002 - initial implementation 12/16/02. [Fl_Table](#), [Fl_Table_Row](#), docs.
- Jean-Marc Lienher : 02/22/2004 - added keyboard nav + mouse selection, and ported [Fl_Table](#) into fltk-utf8-1.1.4

OTHER CONTRIBUTORS

- Inspired by the Feb 2000 version of FLVW's Flvw_Table widget. Mucho thanks to those folks.
- Mister Satan : 04/07/2003 - MinGW porting mods, and singleinput.cxx; a cool [Fl_Input](#) oriented spreadsheet example
- Marek Paliwoda : 01/08/2003 - Porting mods for Borland
- Ori Berger : 03/16/2006 - Optimizations for >500k rows/cols

LICENSE

Greg added the following license to the original distribution of [Fl_Table](#). He kindly gave his permission to integrate [Fl_Table](#) and [Fl_Table_Row](#) into FLTK, allowing FLTK license to apply while his widgets are part of the library. If used on its own, this is the license that applies:

```
Fl_Table License
December 16, 2002
```

```
The Fl_Table library and included programs are provided under the terms
of the GNU Library General Public License (LGPL) with the following
exceptions:
```

```
1. Modifications to the Fl_Table configure script, config
header file, and makefiles by themselves to support
a specific platform do not constitute a modified or
derivative work.
```

```
The authors do request that such modifications be
contributed to the Fl_Table project - send all
contributions to "erco at seriss dot com".
```

```
2. Widgets that are subclassed from Fl_Table widgets do not
constitute a derivative work.
```

```
3. Static linking of applications and widgets to the
Fl_Table library does not constitute a derivative work
and does not require the author to provide source
code for the application or widget, use the shared
Fl_Table libraries, or link their applications or
widgets against a user-supplied version of Fl_Table.
```

```
If you link the application or widget to a modified
version of Fl_Table, then the changes to Fl_Table must be
provided under the terms of the LGPL in sections
1, 2, and 4.
```

```
4. You do not have to provide a copy of the Fl_Table license
with programs that are linked to the Fl_Table library, nor
```

do you have to identify the `Fl_Table` license in your program or documentation as required by section 6 of the LGPL.

However, programs must still identify their use of `Fl_Table`. The following example statement can be included in user documentation to satisfy this requirement:

```
[program/widget] is based in part on the work of
the Fl_Table project http://seriss.com/people/erco/fttk/Fl\_Table/
```

31.131.2 Member Enumeration Documentation

31.131.2.1 TableContext

enum `Fl_Table::TableContext`

The context bit flags for `Fl_Table` related callbacks. Used in `draw_cell()`, `callback()`, etc.

Enumerator

<code>CONTEXT_NONE</code>	no known context
<code>CONTEXT_STARTPAGE</code>	before a page is redrawn
<code>CONTEXT_ENDPAGE</code>	after a page is redrawn
<code>CONTEXT_ROW_HEADER</code>	in the row header
<code>CONTEXT_COL_HEADER</code>	in the col header
<code>CONTEXT_CELL</code>	in one of the cells
<code>CONTEXT_TABLE</code>	in a dead zone of table
<code>CONTEXT_RC_RESIZE</code>	column or row being resized

31.131.3 Constructor & Destructor Documentation

31.131.3.1 Fl_Table()

```
Fl_Table::Fl_Table (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

The constructor for the `Fl_Table`.

This creates an empty table with no rows or columns, with headers and row/column resize behavior disabled.

31.131.3.2 ~Fl_Table()

```
Fl_Table::~Fl_Table ( )
```

The destructor for the `Fl_Table`.

Destroys the table and its associated widgets.

31.131.4 Member Function Documentation

31.131.4.1 callback()

```
void Fl_Table::callback (
    Fl_Widget * ,
    void * )
```

Callbacks will be called depending on the setting of `Fl_Widget::when()`.

Callback functions should use the following functions to determine the context/row/column:

- `Fl_Table::callback_row()` returns current row
- `Fl_Table::callback_col()` returns current column
- `Fl_Table::callback_context()` returns current table context

`callback_row()` and `callback_col()` will be set to the row and column number the event occurred on. If someone clicked on a row header, `col` will be 0.

If someone clicked on a column header, `row` will be 0.

`callback_context()` will return one of the following:

<code>Fl_Table::CONTEXT_ROW_HEADER</code>	Someone clicked on a row header. Excludes resizing.
<code>Fl_Table::CONTEXT_COL_HEADER</code>	Someone clicked on a column header. Excludes resizing.
<code>Fl_Table::CONTEXT_CELL</code>	Someone clicked on a cell. To receive callbacks for FL_RELEASE events, you must set <code>when(FL_WHEN_RELEASE)</code> .
<code>Fl_Table::CONTEXT_RC_RESIZE</code>	Someone is resizing rows/columns either interactively, or via the <code>col_width()</code> or <code>row_height()</code> API. Use <code>is_interactive_resize()</code> to determine interactive resizing. If resizing a column, <code>R=0</code> and <code>C=column</code> being resized. If resizing a row, <code>C=0</code> and <code>R=row</code> being resized. NOTE: To receive resize events, you must set <code>when(FL_WHEN_CHANGED)</code> .

```
class MyTable : public Fl_Table {
[...]
```

```
private:
// Handle events that happen on the table
void event_callback2() {
    int R = callback_row(),           // row where event occurred
        C = callback_col();           // column where event occurred
    TableContext context = callback_context(); // which part of table
    fprintf(stderr, "callback: Row=%d Col=%d Context=%d Event=%d\n",
        R, C, (int)context, (int)Fl::event());
}
// Actual static callback
static void event_callback(Fl_Widget*, void* data) {
    MyTable *o = (MyTable*)data;
    o->event_callback2();
}

public:
// Constructor
MyTable() {
[...]
```

```
    table.callback(&event_callback, (void*)this); // setup callback
    table.when(FL_WHEN_CHANGED|FL_WHEN_RELEASE); // when to call it
}
};
```

31.131.4.2 callback_col()

```
int Fl_Table::callback_col ( ) [inline]
```

Returns the current column the event occurred on.

This function should only be used from within the user's callback function.

31.131.4.3 callback_context()

```
TableContext Fl_Table::callback_context ( ) [inline]
```

Returns the current 'table context'.

This function should only be used from within the user's callback function.

31.131.4.4 `callback_row()`

```
int Fl_Table::callback_row ( ) [inline]
```

Returns the current row the event occurred on.

This function should only be used from within the user's callback function.

31.131.4.5 `child()`

```
Fl_Widget* Fl_Table::child (
    int n ) const [inline]
```

Returns the child widget by an index.

When using the `Fl_Table` as a container for FLTK widgets, this method returns the widget pointer from the internal array of widgets in the container.

Typically used in loops, eg:

```
for ( int i=0; i<children(); i++ ) {
    Fl_Widget *w = child(i);
    [...]
}
```

31.131.4.6 `children()`

```
int Fl_Table::children ( ) const [inline]
```

Returns the number of children in the table.

When using the `Fl_Table` as a container for FLTK widgets, this method returns how many child widgets the table has.

See also

`child(int)`

31.131.4.7 `clear()`

```
virtual void Fl_Table::clear ( ) [inline], [virtual]
```

Clears the table to zero rows (`rows(0)`), zero columns (`cols(0)`), and clears any widgets (`table->clear()`) that were added with `begin()/end()` or `add()/insert()/etc.`

See also

`rows(int), cols(int)`

Reimplemented in `Fl_Table_Row`.

31.131.4.8 `col_header()`

```
void Fl_Table::col_header (
    int flag ) [inline]
```

Enable or disable column headers.

If changed, the table is redrawn.

31.131.4.9 `col_resize()`

```
void Fl_Table::col_resize (
    int flag ) [inline]
```

Allows/disallows column resizing by the user.

1=allow interactive resizing, 0=disallow interactive resizing. Since interactive resizing is done via the column headers, `col_header ()` must also be enabled to allow resizing.

31.131.4.10 col_resize_min()

```
void Fl_Table::col_resize_min (
    int val ) [inline]
```

Sets the current column minimum resize value.

This is used to prevent the user from interactively resizing any column to be smaller than 'pixels'. Must be a value ≥ 1 .

31.131.4.11 col_width()

```
void Fl_Table::col_width (
    int col,
    int width )
```

Sets the width of the specified column in pixels, and the table is redrawn.

[callback\(\)](#) will be invoked with CONTEXT_RC_RESIZE if the column's width was actually changed, and [when\(\)](#) is FL_WHEN_CHANGED.

31.131.4.12 col_width_all()

```
void Fl_Table::col_width_all (
    int width ) [inline]
```

Convenience method to set the width of all columns to the same value, in pixels.

The screen is redrawn.

31.131.4.13 draw()

```
void Fl_Table::draw (
    void ) [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scroll;           // scroll is an embedded Fl_Scrollbar
s->draw();                         // calls Fl_Scrollbar::draw()
```

Reimplemented from [Fl_Group](#).

31.131.4.14 draw_cell()

```
virtual void Fl_Table::draw_cell (
    TableContext context,
    int R = 0,
    int C = 0,
    int X = 0,
    int Y = 0,
    int W = 0,
    int H = 0 ) [inline], [protected], [virtual]
```

Subclass should override this method to handle drawing the cells.

This method will be called whenever the table is redrawn, once per cell.

Only cells that are completely (or partially) visible will be told to draw.

`context` will be one of the following:

[Fl_Table::CONTEXT_STARTPAGE](#)

When table, or parts of the table, are about to be redrawn. Use to initialize static data, such as font selections. R/C will be zero, X/Y/W/H will be the dimensions of the table's entire data area. (Useful for locking a database before accessing; see also [visible_cells\(\)](#))

Fl_Table::CONTEXT_ENDPAGE	When table has completed being redrawn. R/C will be zero, X/Y/W/H dimensions of table's data area. (Useful for unlocking a database after accessing)
Fl_Table::CONTEXT_ROW_HEADER	Whenever a row header cell needs to be drawn. R will be the row number of the header being redrawn, C will be zero, X/Y/W/H will be the fltk drawing area of the row header in the window
Fl_Table::CONTEXT_COL_HEADER	Whenever a column header cell needs to be drawn. R will be zero, C will be the column number of the header being redrawn, X/Y/W/H will be the fltk drawing area of the column header in the window
Fl_Table::CONTEXT_CELL	Whenever a data cell in the table needs to be drawn. R/C will be the row/column of the cell to be drawn, X/Y/W/H will be the fltk drawing area of the cell in the window
Fl_Table::CONTEXT_RC_RESIZE	Whenever table or row/column is resized or scrolled, either interactively or via col_width() or row_height() . R/C/X/Y/W/H will all be zero. Useful for fltk containers that need to resize or move the child fltk widgets.

`row` and `col` will be set to the row and column number of the cell being drawn. In the case of row headers, `col` will be 0. In the case of column headers, `row` will be 0.

`x/y/w/h` will be the position and dimensions of where the cell should be drawn.

In the case of custom widgets, a minimal [draw_cell\(\)](#) override might look like the following. With custom widgets it is up to the caller to handle drawing everything within the dimensions of the cell, including handling the selection color. Note all clipping must be handled as well; this allows drawing outside the dimensions of the cell if so desired for 'custom effects'.

```
// This is called whenever Fl_Table wants you to draw a cell
void MyTable::draw_cell(TableContext context, int R=0, int C=0, int X=0, int Y=0, int W=0, int H=0) {
    static char s[40];
    sprintf(s, "%d/%d", R, C); // text for each cell
    switch ( context ) {
        case CONTEXT_STARTPAGE: // Fl_Table telling us it's starting to draw page
            fl_font(FL_HELVETICA, 16);
            return;

        case CONTEXT_ROW_HEADER: // Fl_Table telling us to draw row/col headers
        case CONTEXT_COL_HEADER:
            fl_push_clip(X, Y, W, H);
            {
                fl_draw_box(FL_THIN_UP_BOX, X, Y, W, H, color());
                fl_color(FL_BLACK);
                fl_draw(s, X, Y, W, H, FL_ALIGN_CENTER);
            }
            fl_pop_clip();
            return;

        case CONTEXT_CELL: // Fl_Table telling us to draw cells
            fl_push_clip(X, Y, W, H);
            {
                // BG COLOR
                fl_color( row_selected(R) ? selection_color() : FL_WHITE);
                fl_rectf(X, Y, W, H);

                // TEXT
                fl_color(FL_BLACK);
                fl_draw(s, X, Y, W, H, FL_ALIGN_CENTER);

                // BORDER
                fl_color(FL_LIGHT2);
                fl_rect(X, Y, W, H);
            }
            fl_pop_clip();
            return;

        default:
            return;
    }
    //NOTREACHED
}
```


31.131.4.15 get_selection()

```
void Fl_Table::get_selection (
    int & row_top,
    int & col_left,
    int & row_bot,
    int & col_right )
```

Gets the region of cells selected (highlighted).

Parameters

in	<i>row_top</i>	Returns the top row of selection area
in	<i>col_left</i>	Returns the left column of selection area
in	<i>row_bot</i>	Returns the bottom row of selection area
in	<i>col_right</i>	Returns the right column of selection area

31.131.4.16 handle()

```
int Fl_Table::handle (
    int event ) [protected], [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Group](#).

Reimplemented in [Fl_Table_Row](#).

31.131.4.17 is_interactive_resize()

```
int Fl_Table::is_interactive_resize ( ) [inline]
```

Returns 1 if someone is interactively resizing a row or column.
You can currently call this only from within your [callback\(\)](#).

31.131.4.18 is_selected()

```
int Fl_Table::is_selected (
    int r,
    int c )
```

See if the cell at row *r* and column *c* is selected.

Returns

1 if the cell is selected, 0 if not.

31.131.4.19 row_header()

```
void Fl_Table::row_header (
    int flag ) [inline]
```

Enables/disables showing the row headers.

1=enabled, 0=disabled. If changed, the table is redrawn.

31.131.4.20 row_height()

```
void Fl_Table::row_height (
    int row,
    int height )
```

Sets the height of the specified row in pixels, and the table is redrawn.

[callback\(\)](#) will be invoked with `CONTEXT_RC_RESIZE` if the row's height was actually changed, and [when\(\)](#) is `FL_WHEN_CHANGED`.

31.131.4.21 row_height_all()

```
void Fl_Table::row_height_all (
    int height ) [inline]
```

Convenience method to set the height of all rows to the same value, in pixels.

The screen is redrawn.

31.131.4.22 row_resize()

```
void Fl_Table::row_resize (
    int flag ) [inline]
```

Allows/disallows row resizing by the user.

1=allow interactive resizing, 0=disallow interactive resizing. Since interactive resizing is done via the row headers, [row_header\(\)](#) must also be enabled to allow resizing.

31.131.4.23 row_resize_min()

```
void Fl_Table::row_resize_min (
    int val ) [inline]
```

Sets the current row minimum resize value.

This is used to prevent the user from interactively resizing any row to be smaller than 'pixels'. Must be a value ≥ 1 .

31.131.4.24 scrollbar_size() [1/2]

```
int Fl_Table::scrollbar_size ( ) const [inline]
```

Gets the current size of the scrollbars' troughs, in pixels.

If this value is zero (default), this widget will use the [Fl::scrollbar_size\(\)](#) value as the scrollbar's width.

Returns

Scrollbar size in pixels, or 0 if the global [Fl::scrollbar_size\(\)](#) is being used.

See also

[Fl::scrollbar_size\(int\)](#)

31.131.4.25 scrollbar_size() [2/2]

```
void Fl_Table::scrollbar_size (
    int newSize ) [inline]
```

Sets the pixel size of the scrollbars' troughs to `newSize`, in pixels.

Normally you should not need this method, and should use [Fl::scrollbar_size\(int\)](#) instead to manage the size of ALL your widgets' scrollbars. This ensures your application has a consistent UI, is the default behavior, and is normally what you want.

Only use THIS method if you really need to override the global scrollbar size. The need for this should be rare.

Setting `newSize` to the special value of 0 causes the widget to track the global [Fl::scrollbar_size\(\)](#), which is the default.

Parameters

in	<i>newSize</i>	Sets the scrollbar size in pixels. If 0 (default), scrollbar size tracks the global Fl::scrollbar_size()
----	----------------	---

See also

[Fl::scrollbar_size\(\)](#)

31.131.4.26 set_selection()

```
void Fl_Table::set_selection (
    int row_top,
    int col_left,
    int row_bot,
    int col_right )
```

Sets the region of cells to be selected (highlighted).

So for instance, `set_selection(0,0,0,0)` selects the top/left cell in the table. And `set_selection(0,0,1,1)` selects the four cells in rows 0 and 1, column 0 and 1.

Parameters

in	<i>row_top</i>	Top row of selection area
in	<i>col_left</i>	Left column of selection area
in	<i>row_bot</i>	Bottom row of selection area
in	<i>col_right</i>	Right column of selection area

31.131.4.27 tab_cell_nav() [1/2]

```
int Fl_Table::tab_cell_nav ( ) const [inline]
```

Get state of table's 'Tab' key cell navigation flag.

Returns

1 if Tab configured to navigate cells in table
0 to navigate widget focus (default)

See also

[tab_cell_nav\(int\)](#)

31.131.4.28 tab_cell_nav() [2/2]

```
void Fl_Table::tab_cell_nav (
    int val ) [inline]
```

Flag to control if Tab navigates table cells or not.

If on, Tab key navigates table cells. If off, Tab key navigates fltk widget focus. (default)

As of fltk 1.3, the default behavior of the Tab key is to navigate focus off of the current widget, and on to the next one. But in some applications, it's useful for Tab to be used to navigate cells in the [Fl_Table](#).

Parameters

in	val	
		If val is 1, Tab key navigates cells in table, not fltk widgets. If val is 0, Tab key will advance focus to the next fltk widget (default), and does not navigate cells in table.

31.131.4.29 table_box()

```
void Fl_Table::table_box (
    Fl_Boxtype val ) [inline]
```

Sets the kind of box drawn around the data table, the default being FL_NO_BOX.

Changing this value will cause the table to redraw.

31.131.4.30 top_row() [1/2]

```
int Fl_Table::top_row ( ) [inline]
```

Returns the current top row shown in the table.

This row may be partially obscured.

31.131.4.31 top_row() [2/2]

```
void Fl_Table::top_row (
    int row ) [inline]
```

Sets which row should be at the top of the table, scrolling as necessary, and the table is redrawn.

If the table cannot be scrolled that far, it is scrolled as far as possible.

31.131.4.32 visible_cells()

```
void Fl_Table::visible_cells (
    int & r1,
    int & r2,
    int & c1,
    int & c2 ) [inline]
```

Returns the range of row and column numbers for all visible and partially visible cells in the table.

These values can be used e.g. by your [draw_cell\(\)](#) routine during CONTEXT_STARTPAGE to figure out what cells are about to be redrawn for the purposes of locking the data from a database before it's drawn.

```

leftcol      rightcol
:            :
toprow ..  .-----:
|          |         |
|  V I S I B L E  |
|          |         |
|  T A B L E      |
|          |         |
botrow ..  '-----`
```

e.g. in a table where the visible rows are 5-20, and the visible columns are 100-120, then those variables would be:

- toprow = 5
- botrow = 20
- leftcol = 100

- `rightcol = 120`

31.131.4.33 when()

```
void Fl_Table::when (
    Fl_When flags )
```

The `Fl_Widget::when()` function is used to set a group of flags, determining when the widget callback is called:

<code>FL_WHEN_CHANGED</code>	<code>callback()</code> will be called when rows or columns are resized (interactively or via <code>col_width()</code> or <code>row_height()</code>), passing <code>CONTEXT_RC_RESIZE</code> via <code>callback_context()</code> .
<code>FL_WHEN_RELEASE</code>	<code>callback()</code> will be called during <code>FL_RELEASE</code> events, such as when someone releases a mouse button somewhere on the table.

The `callback()` routine is sent a `TableContext` that indicates the context the event occurred in, such as in a cell, in a header, or elsewhere on the table. When an event occurs in a cell or header, `callback_row()` and `callback_col()` can be used to determine the row and column. The callback can also look at the regular fltk event values (ie. `Fl::event()` and `Fl::event_button()`) to determine what kind of event is occurring.

The documentation for this class was generated from the following files:

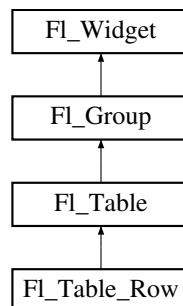
- `Fl_Table.H`
- `Fl_Table.cxx`

31.132 Fl_Table_Row Class Reference

A table with row selection capabilities.

```
#include <Fl_Table_Row.H>
```

Inheritance diagram for `Fl_Table_Row`:



Public Types

- enum `TableRowSelectMode` { `SELECT_NONE` , `SELECT_SINGLE` , `SELECT_MULTI` }

Public Member Functions

- void `clear ()`
Clears the table to zero rows (`rows(0)`), zero columns (`cols(0)`), and clears any widgets (`table->clear()`) that were added with `begin()/end()` or `add()/insert()/etc`.
- `Fl_Table_Row` (int X, int Y, int W, int H, const char *!=0)
The constructor for the `Fl_Table_Row`.
- int `row_selected` (int row)
Checks to see if 'row' is selected.
- int `rows ()`
- void `rows` (int val)

- Sets the number of rows in the table, and the table is redrawn.*

 - void [select_all_rows](#) (int flag=1)
 - This convenience function changes the selection state for all rows based on 'flag'.*
 - int [select_row](#) (int row, int flag=1)
 - Changes the selection state for 'row', depending on the value of 'flag'.*
 - TableRowSelectionMode **type** () const
 - void [type](#) (TableRowSelectionMode val)
 - Sets the table selection mode.*
 - [~FI_Table_Row](#) ()
 - The destructor for the [FI_Table_Row](#).*

Protected Member Functions

- int [find_cell](#) (TableContext context, int R, int C, int &X, int &Y, int &W, int &H)
- int [handle](#) (int event)
- Handles the specified event.*

Additional Inherited Members

31.132.1 Detailed Description

A table with row selection capabilities.

This class implements a simple table with the ability to select rows. This widget is similar to an [FI_Browser](#) with columns. Most methods of importance will be found in the [FI_Table](#) widget, such as [FI_Table::rows\(\)](#) and [FI_Table::cols\(\)](#).

To be useful it must be subclassed and at minimum the [draw_cell\(\)](#) method must be overridden to provide the content of the cells. This widget does *not* manage the cell's data content; it is up to the parent class's [draw_cell\(\)](#) method override to provide this.

Events on the cells and/or headings generate callbacks when they are clicked by the user. You control when events are generated based on the values you supply for [FI_Table::when\(\)](#).

31.132.2 Constructor & Destructor Documentation

31.132.2.1 FI_Table_Row()

```
FI_Table_Row::FI_Table_Row (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 ) [inline]
```

The constructor for the [FI_Table_Row](#).

This creates an empty table with no rows or columns, with headers and row/column resize behavior disabled.

31.132.2.2 ~FI_Table_Row()

```
FI_Table_Row::~FI_Table_Row ( ) [inline]
```

The destructor for the [FI_Table_Row](#).

Destroys the table and its associated widgets.

31.132.3 Member Function Documentation

31.132.3.1 clear()

```
void Fl_Table_Row::clear ( ) [inline], [virtual]
```

Clears the table to zero rows (`rows(0)`), zero columns (`cols(0)`), and clears any widgets (`table->clear()`) that were added with `begin()/end()` or `add()/insert()/etc.`

See also

[rows\(int\)](#), [cols\(int\)](#)

Reimplemented from [Fl_Table](#).

31.132.3.2 handle()

```
int Fl_Table_Row::handle (
    int event ) [protected], [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters

<code>in</code>	<code>event</code>	the kind of event received
-----------------	--------------------	----------------------------

Return values

<code>0</code>	if the event was not used or understood
<code>1</code>	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Table](#).

31.132.3.3 row_selected()

```
int Fl_Table_Row::row_selected (
    int row )
```

Checks to see if 'row' is selected.

Returns 1 if selected, 0 if not. You can change the selection of a row by clicking on it, or by using `select_row(row, flag)`

31.132.3.4 select_all_rows()

```
void Fl_Table_Row::select_all_rows (
    int flag = 1 )
```

This convenience function changes the selection state for *all* rows based on 'flag'.

0=deselect, 1=select, 2=toggle existing state.

31.132.3.5 select_row()

```
int Fl_Table_Row::select_row (
    int row,
    int flag = 1 )
```

Changes the selection state for 'row', depending on the value of 'flag'.
0=deselected, 1=select, 2=toggle existing state.

31.132.3.6 type()

```
void Fl_Table_Row::type (
    TableRowSelectMode val )
```

Sets the table selection mode.

- `Fl_Table_Row::SELECT_NONE` - No selection allowed
- `Fl_Table_Row::SELECT_SINGLE` - Only single rows can be selected
- `Fl_Table_Row::SELECT_MULTI` - Multiple rows can be selected

The documentation for this class was generated from the following files:

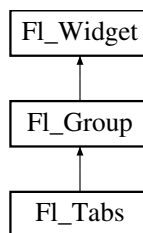
- `Fl_Table_Row.H`
- `Fl_Table_Row.cxx`

31.133 Fl_Tabs Class Reference

The `Fl_Tabs` widget is the "file card tabs" interface that allows you to put lots and lots of buttons and switches in a panel, as popularized by many toolkits.

```
#include <Fl_Tabs.H>
```

Inheritance diagram for `Fl_Tabs`:



Public Member Functions

- void `client_area` (int &rx, int &ry, int &rw, int &rh, int tabh=0)
Returns the position and size available to be used by its children.
- `Fl_Tabs` (int, int, int, int, const char * =0)
Creates a new `Fl_Tabs` widget using the given position, size, and label string.
- int `handle` (int)
Handles the specified event.
- `Fl_Widget * push` () const
Returns the tab group for the tab the user has currently down-clicked on and remains over until `FL_RELEASE`.
- int `push` (`Fl_Widget *`)
This is called by the tab widget's `handle()` method to set the tab group widget the user last `FL_PUSH`'ed on.
- `Fl_Widget * value` ()
Gets the currently visible widget/tab.
- int `value` (`Fl_Widget *`)
Sets the widget to become the current visible widget/tab.
- `Fl_Widget * which` (int event_x, int event_y)
Return the widget of the tab the user clicked on at `event_x/event_y`.

Protected Member Functions

- void `draw` ()
Draws the widget.
- void `redraw_tabs` ()

Additional Inherited Members

31.133.1 Detailed Description

The `Fl_Tabs` widget is the "file card tabs" interface that allows you to put lots and lots of buttons and switches in a panel, as popularized by many toolkits.

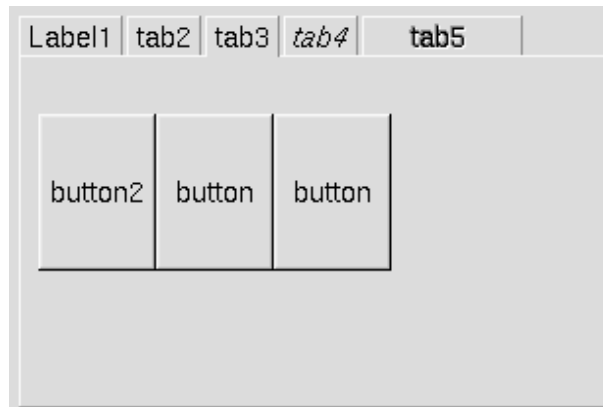


Figure 31.37 `Fl_Tabs`

Clicking the tab makes a child `visible()` by calling `show()` on it, and all other children are made invisible by calling `hide()` on them. Usually the children are `Fl_Group` widgets containing several widgets themselves.

Each child makes a card, and its `label()` is printed on the card tab, including the label font and style. The selection color of that child is used to color the tab, while the color of the child determines the background color of the pane.

The size of the tabs is controlled by the bounding box of the children (there should be some space between the children and the edge of the `Fl_Tabs`), and the tabs may be placed "inverted" on the bottom - this is determined by which gap is larger. It is easiest to lay this out in fluid, using the fluid browser to select each child group and resize them until the tabs look the way you want them to.

The background area behind and to the right of the tabs is "transparent", exposing the background detail of the parent. The value of `Fl_Tabs::box()` does not affect this area. So if `Fl_Tabs` is resized by itself without the parent, force the appropriate parent (visible behind the tabs) to `redraw()` to prevent artifacts.

See "Resizing Caveats" below on how to keep tab heights constant. See "Callback's Use Of `when()`" on how to control the details of how clicks invoke the `callback()`.

A typical use of the `Fl_Tabs` widget:

```
// Typical use of Fl_Tabs
Fl_Tabs *tabs = new Fl_Tabs(10,10,300,200);
{
    Fl_Group *grp1 = new Fl_Group(20,30,280,170,"Tab1");
    {
        ..widgets that go in tab#1..
    }
    grp1->end();
    Fl_Group *grp2 = new Fl_Group(20,30,280,170,"Tab2");
    {
        ..widgets that go in tab#2..
    }
    grp2->end();
}
tabs->end();
```

Default Appearance

The appearance of each "tab" is taken from the `label()` and `color()` of the child group corresponding to that "tab" and panel. Where the "tabs" appear depends on the position and size of the child groups that make up the panels within

the `Fl_Tab`, i.e. whether there is more space above or below them. The height of the "tabs" depends on how much free space is available.

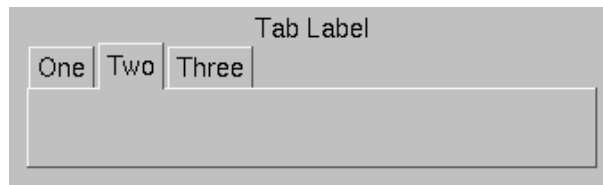


Figure 31.38 `Fl_Tabs` Default Appearance

Highlighting The Selected Tab

The selected "tab" can be highlighted further by setting the `selection_color()` of the `Fl_Tab` itself, e.g.

```
..
tabs = new Fl_Tabs(..);
tabs->selection_color(FL_DARK3);
..
```

The result of the above looks like:

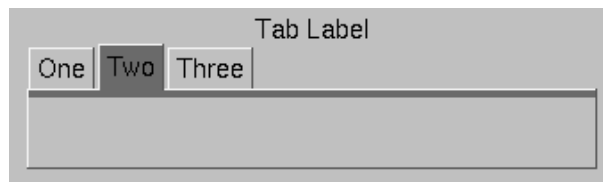


Figure 31.39 Highlighting the selected tab

Uniform Tab and Panel Appearance

In order to have uniform tab and panel appearance, not only must the `color()` and `selection_color()` for each child group be set, but also the `selection_color()` of the `Fl_Tab` itself any time a new "tab" is selected. This can be achieved within the `Fl_Tab` callback, e.g.

```
void MyTabCallback(Fl_Widget *w, void*) {
    Fl_Tabs *tabs = (Fl_Tabs*)w;
    // When tab changed, make sure it has same color as its group
    tabs->selection_color( (tab->value()->color() ) );
}
..
int main(..) {
    // Define tabs widget
    tabs = new Fl_Tabs(..);
    tabs->callback(MyTabCallback);
    // Create three tabs each colored differently
    grp1 = new Fl_Group(.. "One");
    grp1->color(9);
    grp1->selection_color(9);
    grp1->end();
    grp2 = new Fl_Group(.. "Two");
    grp2->color(10);
    grp2->selection_color(10);
    grp2->end();
    grp3 = new Fl_Group(.. "Three");
    grp3->color(14);
    grp3->selection_color(14);
    grp3->end();
    ..
    // Make sure default tab has same color as its group
    tabs->selection_color( (tab->value()->color() ) );
    ..
    return Fl::run();
}
```

The result of the above looks like:

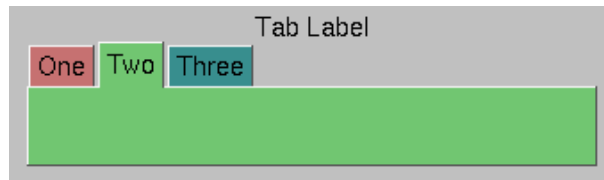


Figure 31.40 Fl_Tabs with uniform colors

Resizing Caveats

When `Fl_Tabs` is resized vertically, the default behavior scales the tab's height as well as its children. To keep the tab height constant during resizing, set the tab widget's `resizable()` to one of the tab's child groups, i.e.

```
tabs = new Fl_Tabs(..);
grp1 = new Fl_Group(..);
..
grp2 = new Fl_Group(..);
..
tabs->end();
tabs->resizable(grp1);           // keeps tab height constant
```

Callback's Use Of when()

As of FLTK 1.3.3, `Fl_Tabs()` supports the following flags for `when()`:

- `FL_WHEN_NEVER` – callback never invoked (all flags off)
- `FL_WHEN_CHANGED` – if flag set, invokes callback when a tab has been changed (on click or keyboard navigation)
- `FL_WHEN_NOT_CHANGED` – if flag set, invokes callback when the tabs remain unchanged (on click or keyboard navigation)
- `FL_WHEN_RELEASE` – if flag set, invokes callback on RELEASE of mouse button or keyboard navigation

Notes:

1. The above flags can be logically OR-ed (`|`) or added (`+`) to combine behaviors.
2. The default value for `when()` is `FL_WHEN_RELEASE` (inherited from `Fl_Widget`).
3. If `FL_WHEN_RELEASE` is the *only* flag specified, the behavior will be as if `(FL_WHEN_RELEASE|FL_WHEN_CHANGED)` was specified.
4. The value of `changed()` will be valid during the callback.
5. If both `FL_WHEN_CHANGED` and `FL_WHEN_NOT_CHANGED` are specified, the callback is invoked whether the tab has been changed or not. The `changed()` method can be used to determine the cause.
6. `FL_WHEN_NOT_CHANGED` can happen if someone clicks on an already selected tab, or if a keyboard navigation attempt results in no change to the tabs, such as using the arrow keys while at the left or right end of the tabs.

31.133.2 Constructor & Destructor Documentation

31.133.2.1 Fl_Tabs()

```
Fl_Tabs::Fl_Tabs (
    int X,
    int Y,
    int W,
    int H,
    const char * l = 0 )
```

Creates a new [Fl_Tabs](#) widget using the given position, size, and label string.

The default boxtype is FL_THIN_UP_BOX.

Use [add\(Fl_Widget*\)](#) to add each child, which are usually [Fl_Group](#) widgets. The children should be sized to stay away from the top or bottom edge of the [Fl_Tabs](#) widget, which is where the tabs will be drawn.

All children of [Fl_Tabs](#) should have the same size and exactly fit on top of each other. They should only leave space above or below where the tabs will go, but not on the sides. If the first child of [Fl_Tabs](#) is set to "resizable()", the riders will not resize when the tabs are resized.

The destructor *also deletes all the children*. This allows a whole tree to be deleted at once, without having to keep a pointer to all the children in the user code. A kludge has been done so the [Fl_Tabs](#) and all of its children can be automatic (local) variables, but you must declare the [Fl_Tabs](#) widget *first* so that it is destroyed last.

31.133.3 Member Function Documentation

31.133.3.1 client_area()

```
void Fl_Tabs::client_area (
    int & rx,
    int & ry,
    int & rw,
    int & rh,
    int tabh = 0 )
```

Returns the position and size available to be used by its children.

If there isn't any child yet the `tabh` parameter will be used to calculate the return values. This assumes that the children's labelsize is the same as the [Fl_Tabs](#)' labelsize and adds a small border.

If there are already children, the values of `child(0)` are returned, and `tabh` is ignored.

Note

Children should always use the same positions and sizes.

`tabh` can be one of

- 0: calculate label size, tabs on top
- -1: calculate label size, tabs on bottom
- > 0: use given `tabh` value, tabs on top (height = `tabh`)
- < -1: use given `tabh` value, tabs on bottom (height = `-tabh`)

Parameters

in	<i>tabh</i>	position and optional height of tabs (see above)
out	<i>rx,ry,rw,rh</i>	(x,y,w,h) of client area for children

Since

FLTK 1.3.0

31.133.3.2 draw()

```
void Fl_Tabs::draw ( ) [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scroll;           // scroll is an embedded Fl_Scrollbar
s->draw();                         // calls Fl_Scrollbar::draw()
```

Reimplemented from [Fl_Group](#).

31.133.3.3 handle()

```
int Fl_Tabs::handle (
    int event ) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters

in	<i>event</i>	the kind of event received
----	--------------	----------------------------

Return values

0	if the event was not used or understood
1	if the event was used and can be deleted

See also

[Fl_Event](#)

Reimplemented from [Fl_Group](#).

31.133.3.4 push() [1/2]

```
Fl_Widget* Fl_Tabs::push ( ) const [inline]
```

Returns the tab group for the tab the user has currently down-clicked on and remains over until FL_RELEASE.

Otherwise, returns NULL.

While the user is down-clicked on a tab, the return value is the tab group for that tab. But as soon as the user releases, or drags off the tab with the button still down, the return value will be NULL.

See also

[push\(Fl_Widget*\)](#).

31.133.3.5 push() [2/2]

```
int Fl_Tabs::push (
    Fl_Widget * o )
```

This is called by the tab widget's [handle\(\)](#) method to set the tab group widget the user last FL_PUSH'ed on.

Set back to zero on FL_RELEASE.

As of this writing, the value is mainly used by `draw_tab()` to determine whether or not to draw a 'down' box for the tab when it's clicked, and to turn it off if the user drags off it.

See also

[push\(\)](#).

31.133.3.6 value() [1/2]

```
Fl_Widget * Fl_Tabs::value ( )
```

Gets the currently visible widget/tab.

The `value()` is the first visible child (or the last child if none are visible) and this also hides any other children. This allows the tabs to be deleted, moved to other groups, and [show\(\)/hide\(\)](#) called without it screwing up.

31.133.3.7 value() [2/2]

```
int Fl_Tabs::value (
    Fl_Widget * newvalue )
```

Sets the widget to become the current visible widget/tab.

Setting the value hides all other children, and makes this one visible, if it is really a child.

Returns

- 1 if there was a change (new value different from previous),
- 0 if there was no change (new value already set)

31.133.3.8 which()

```
Fl_Widget * Fl_Tabs::which (
    int event_x,
    int event_y )
```

Return the widget of the tab the user clicked on at `event_x / event_y`.

This is used for event handling (clicks) and by fluid to pick tabs.

Returns

- The child widget of the tab the user clicked on, or
- 0 if there are no children or if the event is outside of the tabs area.

The documentation for this class was generated from the following files:

- `Fl_Tabs.H`
- `Fl_Tabs.cxx`

31.134 FI_Text_Buffer Class Reference

This class manages Unicode text displayed in one or more [FI_Text_Display](#) widgets.

```
#include <Fl_Text_Buffer.H>
```

Public Member Functions

- void [add_modify_callback](#) (`Fl_Text_Modify_Cb` bufModifiedCB, void *cbArg)
Adds a callback function that is called whenever the text buffer is modified.
- void [add_predelete_callback](#) (`Fl_Text_Predelete_Cb` bufPreDelCB, void *cbArg)
Adds a callback routine to be called before text is deleted from the buffer.
- char * [address](#) (int pos)
Convert a byte offset in buffer into a memory address.

- `const char * address` (int pos) const
Convert a byte offset in buffer into a memory address.
- `void append` (const char *t)
Appends the text string to the end of the buffer.
- `int appendfile` (const char *file, int buflen=128 *1024)
Appends the named file to the end of the buffer.
- `char byte_at` (int pos) const
Returns the raw byte at the specified position pos in the buffer.
- `void call_modify_callbacks` ()
Calls all modify callbacks that have been registered using the `add_modify_callback()` method.
- `void call_predelete_callbacks` ()
Calls the stored pre-delete callback procedure(s) for this buffer to update the changed area(s) on the screen and any other listeners.
- `void canUndo` (char flag=1)
Lets the undo system know if we can undo changes.
- `unsigned int char_at` (int pos) const
Returns the character at the specified position pos in the buffer.
- `void copy` (FI_Text_Buffer *fromBuf, int fromStart, int fromEnd, int toPos)
Copies text from another FI_Text_Buffer to this one.
- `int count_displayed_characters` (int lineStartPos, int targetPos) const
Count the number of displayed characters between buffer position lineStartPos and targetPos.
- `int count_lines` (int startPos, int endPos) const
Counts the number of newlines between startPos and endPos in buffer.
- `int findchar_backward` (int startPos, unsigned int searchChar, int *foundPos) const
Search backwards in buffer buf for character searchChar, starting with the character before startPos, returning the result in foundPos.
- `int findchar_forward` (int startPos, unsigned searchChar, int *foundPos) const
Finds the next occurrence of the specified character.
- `FI_Text_Buffer` (int requestedSize=0, int preferredGapSize=1024)
Create an empty text buffer of a pre-determined size.
- `int highlight` ()
Returns the highlighted text.
- `void highlight` (int start, int end)
Highlights the specified text within the buffer.
- `int highlight_position` (int *start, int *end)
Highlights the specified text between start and end within the buffer.
- `const FI_Text_Selection * highlight_selection` () const
Returns the current highlight selection.
- `char * highlight_text` ()
Returns the highlighted text.
- `void insert` (int pos, const char *text)
Inserts null-terminated string text at position pos.
- `int insertfile` (const char *file, int pos, int buflen=128 *1024)
Inserts a file at the specified position.
- `int length` () const
Returns the number of bytes in the buffer.
- `int line_end` (int pos) const
Finds and returns the position of the end of the line containing position pos (which is either a pointer to the newline character ending the line or a pointer to one character beyond the end of the buffer).
- `int line_start` (int pos) const
Returns the position of the start of the line containing position pos.

- char * [line_text](#) (int pos) const
Returns the text from the entire line containing the specified character position.
- int [loadfile](#) (const char *file, int buflen=128 *1024)
Loads a text file into the buffer.
- int [next_char](#) (int ix) const
Returns the index of the next character.
- int [next_char_clipped](#) (int ix) const
- int [outputfile](#) (const char *file, int start, int end, int buflen=128 *1024)
Writes the specified portions of the text buffer to a file.
- int [prev_char](#) (int ix) const
Returns the index of the previous character.
- int [prev_char_clipped](#) (int ix) const
- [FI_Text_Selection](#) * [primary_selection](#) ()
Returns the primary selection.
- const [FI_Text_Selection](#) * [primary_selection](#) () const
Returns the primary selection.
- void [remove](#) (int start, int end)
Deletes a range of characters in the buffer.
- void [remove_modify_callback](#) ([FI_Text_Modify_Cb](#) bufModifiedCB, void *cbArg)
Removes a modify callback.
- void [remove_predelete_callback](#) ([FI_Text_Predelete_Cb](#) predeICB, void *cbArg)
Removes a callback routine `bufPreDeleteCB` associated with argument `cbArg` to be called before text is deleted from the buffer.
- void [remove_secondary_selection](#) ()
Removes the text from the buffer corresponding to the secondary text selection object.
- void [remove_selection](#) ()
Removes the text in the primary selection.
- void [replace](#) (int start, int end, const char *text)
Deletes the characters between `start` and `end`, and inserts the null-terminated string `text` in their place in the buffer.
- void [replace_secondary_selection](#) (const char *text)
Replaces the text from the buffer corresponding to the secondary text selection object with the new string `text`.
- void [replace_selection](#) (const char *text)
Replaces the text in the primary selection.
- int [rewind_lines](#) (int startPos, int nLines)
Finds and returns the position of the first character of the line `nLines` backwards from `startPos` (not counting the character pointed to by `startpos` if that is a newline) in the buffer.
- int [savefile](#) (const char *file, int buflen=128 *1024)
Saves a text file from the current buffer.
- int [search_backward](#) (int startPos, const char *searchString, int *foundPos, int matchCase=0) const
Search backwards in buffer for string `searchString`, starting with the character at `startPos`, returning the result in `foundPos`.
- int [search_forward](#) (int startPos, const char *searchString, int *foundPos, int matchCase=0) const
Search forwards in buffer for string `searchString`, starting with the character `startPos`, and returning the result in `foundPos`.
- void [secondary_select](#) (int start, int end)
Selects a range of characters in the secondary selection.
- int [secondary_selected](#) ()
Returns a non-zero value if text has been selected in the secondary text selection, 0 otherwise.
- const [FI_Text_Selection](#) * [secondary_selection](#) () const
Returns the secondary selection.
- int [secondary_selection_position](#) (int *start, int *end)

- Returns the current selection in the secondary text selection object.*

 - char * [secondary_selection_text](#) ()

Returns the text in the secondary selection.
- void [secondary_unselect](#) ()

Clears any selection in the secondary text selection object.
- void [select](#) (int start, int end)

Selects a range of characters in the buffer.
- int [selected](#) () const

Returns a non-zero value if text has been selected, 0 otherwise.
- int [selection_position](#) (int *start, int *end)

Gets the selection position.
- char * [selection_text](#) ()

Returns the currently selected text.
- int [skip_displayed_characters](#) (int lineStartPos, int nChars)

*Count forward from buffer position *startPos* in displayed characters.*
- int [skip_lines](#) (int startPos, int nLines)

*Finds the first character of the line *nLines* forward from *startPos* in the buffer and returns its position.*
- int [tab_distance](#) () const

Gets the tab width.
- void [tab_distance](#) (int tabDist)

Set the hardware tab distance (width) used by all displays for this buffer, and used in computing offsets for rectangular selection operations.
- char * [text](#) () const

Get a copy of the entire contents of the text buffer.
- void [text](#) (const char *text)

Replaces the entire contents of the text buffer.
- char * [text_range](#) (int start, int end) const

Get a copy of a part of the text buffer.
- int [undo](#) (int *cp=0)

Undo text modification according to the undo variables or insert text from the undo buffer.
- void [unhighlight](#) ()

Unhighlights text in the buffer.
- void [unselect](#) ()

Cancel any previous selection on the primary text selection object.
- int [utf8_align](#) (int) const

Align an index into the buffer to the current or previous UTF-8 boundary.
- int [word_end](#) (int pos) const

Returns the position corresponding to the end of the word.
- int [word_start](#) (int pos) const

Returns the position corresponding to the start of the word.
- [~FI_Text_Buffer](#) ()

Frees a text buffer.

Public Attributes

- int [input_file_was_transcoded](#)

true if the loaded file has been transcoded to UTF-8.
- void(* [transcoding_warning_action](#))(FI_Text_Buffer *)

Pointer to a function called after reading a non UTF-8 encoded file.

Static Public Attributes

- static const char * [file_encoding_warning_message](#)
This message may be displayed using the [fl_alert\(\)](#) function when a file which was not UTF-8 encoded is input.

Protected Member Functions

- void [call_modify_callbacks](#) (int pos, int nDeleted, int nInserted, int nRestyled, const char *deletedText) const
Calls the stored modify callback procedure(s) for this buffer to update the changed area(s) on the screen and any other listeners.
- void [call_predelete_callbacks](#) (int pos, int nDeleted) const
Calls the stored pre-delete callback procedure(s) for this buffer to update the changed area(s) on the screen and any other listeners.
- int [insert_](#) (int pos, const char *text)
Internal (non-redisplaying) version of [insert\(\)](#).
- void [move_gap](#) (int pos)
Move the gap to start at a new position.
- void [realloc_with_gap](#) (int newGapStart, int newGapLen)
*Reallocates the text storage in the buffer to have a gap starting at *newGapStart* and a gap size of *newGapLen*, preserving the buffer's current contents.*
- void [redisplay_selection](#) ([FI_Text_Selection](#) *oldSelection, [FI_Text_Selection](#) *newSelection) const
Calls the stored redisplay procedure(s) for this buffer to update the screen for a change in a selection.
- void [remove_](#) (int start, int end)
Internal (non-redisplaying) version of [remove\(\)](#).
- void [remove_selection_](#) ([FI_Text_Selection](#) *sel)
*Removes the text from the buffer corresponding to *sel*.*
- void [replace_selection_](#) ([FI_Text_Selection](#) *sel, const char *text)
*Replaces the *text* in selection *sel*.*
- char * [selection_text_](#) ([FI_Text_Selection](#) *sel) const
- void [update_selections](#) (int pos, int nDeleted, int nInserted)
Updates all of the selections in the buffer for changes in the buffer's text.

Protected Attributes

- char * [mBuf](#)
allocated memory where the text is stored
- char [mCanUndo](#)
if this buffer is used for attributes, it must not do any undo calls
- void ** [mCbArgs](#)
caller arguments for modifyProcs above
- int [mCursorPosHint](#)
hint for reasonable cursor position after a buffer modification operation
- int [mGapEnd](#)
points to the first character after the gap
- int [mGapStart](#)
points to the first character of the gap
- [FI_Text_Selection](#) [mHighlight](#)
highlighted areas
- int [mLength](#)
*length of the text in the buffer (the length of the buffer itself must be calculated: *gapEnd* - *gapStart* + *length*)*
- [FI_Text_Modify_Cb](#) * [mModifyProcs](#)
procedures to call when buffer is modified to redisplay contents
- int [mNModifyProcs](#)

- number of modify-redisplay procs attached*
- int [mNPredeleteProcs](#)
 - number of pre-delete procs attached*
- void ** [mPredeleteCbArgs](#)
 - caller argument for pre-delete proc above*
- [Fl_Text_Predelete_Cb](#) * [mPredeleteProcs](#)
 - procedure to call before text is deleted from the buffer; at most one is supported.*
- int [mPreferredGapSize](#)
 - the default allocation for the text gap is 1024 bytes and should only be increased if frequent and large changes in buffer size are expected*
- [Fl_Text_Selection](#) [mPrimary](#)
 - highlighted areas*
- [Fl_Text_Selection](#) [mSecondary](#)
 - highlighted areas*
- int [mTabDist](#)
 - equiv.*

31.134.1 Detailed Description

This class manages Unicode text displayed in one or more [Fl_Text_Display](#) widgets.

All text in [Fl_Text_Buffer](#) must be encoded in UTF-8. All indices used in the function calls must be aligned to the start of a UTF-8 sequence. All indices and pointers returned will be aligned. All functions that return a single character will return that in an unsigned int in UCS-4 encoding.

The [Fl_Text_Buffer](#) class is used by the [Fl_Text_Display](#) and [Fl_Text_Editor](#) to manage complex text data and is based upon the excellent NEdit text editor engine - see <http://www.nedit.org/>.

31.134.2 Constructor & Destructor Documentation

31.134.2.1 Fl_Text_Buffer()

```
Fl_Text_Buffer::Fl_Text_Buffer (
    int requestedSize = 0,
    int preferredGapSize = 1024 )
```

Create an empty text buffer of a pre-determined size.

Parameters

<i>requestedSize</i>	use this to avoid unnecessary re-allocation if you know exactly how much the buffer will need to hold
<i>preferredGapSize</i>	Initial size for the buffer gap (empty space in the buffer where text might be inserted if the user is typing sequential characters)

31.134.3 Member Function Documentation

31.134.3.1 add_modify_callback()

```
void Fl_Text_Buffer::add_modify_callback (
    Fl_Text_Modify_Cb bufModifiedCB,
    void * cbArg )
```

Adds a callback function that is called whenever the text buffer is modified.

The callback function is declared as follows:

```
typedef void (*Fl_Text_Modify_Cb)(int pos, int nInserted, int nDeleted,  
    int nRestyled, const char* deletedText,  
    void* cbArg);
```

31.134.3.2 address() [1/2]

```
char* Fl_Text_Buffer::address (  
    int pos ) [inline]
```

Convert a byte offset in buffer into a memory address.

Parameters

<i>pos</i>	byte offset into buffer
------------	-------------------------

Returns

byte offset converted to a memory address

31.134.3.3 address() [2/2]

```
const char* Fl_Text_Buffer::address (  
    int pos ) const [inline]
```

Convert a byte offset in buffer into a memory address.

Parameters

<i>pos</i>	byte offset into buffer
------------	-------------------------

Returns

byte offset converted to a memory address

31.134.3.4 append()

```
void Fl_Text_Buffer::append (  
    const char * t ) [inline]
```

Appends the text string to the end of the buffer.

Parameters

<i>t</i>	UTF-8 encoded and nul terminated text
----------	---------------------------------------

31.134.3.5 appendfile()

```
int Fl_Text_Buffer::appendfile (  
    const char * file,  
    int buflen = 128*1024 ) [inline]
```

Appends the named file to the end of the buffer.

See also [insertfile\(\)](#).

31.134.3.6 byte_at()

```
char FI_Text_Buffer::byte_at (
    int pos ) const
```

Returns the raw byte at the specified position `pos` in the buffer.
Positions start at 0.

Parameters

<i>pos</i>	byte offset into buffer
------------	-------------------------

Returns

unencoded raw byte

31.134.3.7 char_at()

```
unsigned int FI_Text_Buffer::char_at (
    int pos ) const
```

Returns the character at the specified position `pos` in the buffer.
Positions start at 0.

Parameters

<i>pos</i>	byte offset into buffer, <code>pos</code> must be at a UTF-8 character boundary
------------	---

Returns

Unicode UCS-4 encoded character

31.134.3.8 copy()

```
void FI_Text_Buffer::copy (
    FI_Text_Buffer * fromBuf,
    int fromStart,
    int fromEnd,
    int toPos )
```

Copies text from another [FI_Text_Buffer](#) to this one.

Parameters

<i>fromBuf</i>	source text buffer, may be the same as this
<i>fromStart</i>	byte offset into buffer
<i>fromEnd</i>	byte offset into buffer
<i>toPos</i>	destination byte offset into buffer

31.134.3.9 count_displayed_characters()

```
int FI_Text_Buffer::count_displayed_characters (
    int lineStartPos,
    int targetPos ) const
```

Count the number of displayed characters between buffer position `lineStartPos` and `targetPos`.

Displayed characters are the characters shown on the screen to represent characters in the buffer, where tabs and control characters are expanded.

31.134.3.10 `count_lines()`

```
int Fl_Text_Buffer::count_lines (
    int startPos,
    int endPos ) const
```

Counts the number of newlines between `startPos` and `endPos` in buffer. The character at position `endPos` is not counted.

31.134.3.11 `findchar_backward()`

```
int Fl_Text_Buffer::findchar_backward (
    int startPos,
    unsigned int searchChar,
    int * foundPos ) const
```

Search backwards in buffer `buf` for character `searchChar`, starting with the character *before* `startPos`, returning the result in `foundPos`.

Returns 1 if found, 0 if not. The difference between this and [search_backward\(\)](#) is that it's optimized for single characters. The overall performance of the text widget is dependent on its ability to count lines quickly, hence searching for a single character: newline.

Parameters

<i>startPos</i>	byte offset to start position
<i>searchChar</i>	UCS-4 character that we want to find
<i>foundPos</i>	byte offset where the character was found

Returns

1 if found, 0 if not

31.134.3.12 `findchar_forward()`

```
int Fl_Text_Buffer::findchar_forward (
    int startPos,
    unsigned searchChar,
    int * foundPos ) const
```

Finds the next occurrence of the specified character.

Search forwards in buffer for character `searchChar`, starting with the character `startPos`, and returning the result in `foundPos`. Returns 1 if found, 0 if not. The difference between this and [search_forward\(\)](#) is that it's optimized for single characters. The overall performance of the text widget is dependent on its ability to count lines quickly, hence searching for a single character: newline.

Parameters

<i>startPos</i>	byte offset to start position
<i>searchChar</i>	UCS-4 character that we want to find
<i>foundPos</i>	byte offset where the character was found

Returns

1 if found, 0 if not

31.134.3.13 highlight()

```
int Fl_Text_Buffer::highlight ( ) [inline]
```

Returns the highlighted text.

When you are done with the text, free it using the `free()` function.

31.134.3.14 highlight_text()

```
char * Fl_Text_Buffer::highlight_text ( )
```

Returns the highlighted text.

When you are done with the text, free it using the `free()` function.

31.134.3.15 insert()

```
void Fl_Text_Buffer::insert (
    int pos,
    const char * text )
```

Inserts null-terminated string `text` at position `pos`.

Parameters

<i>pos</i>	insertion position as byte offset (must be UTF-8 character aligned)
<i>text</i>	UTF-8 encoded and nul terminated text

31.134.3.16 insert_()

```
int Fl_Text_Buffer::insert_ (
    int pos,
    const char * text ) [protected]
```

Internal (non-redisplaying) version of [insert\(\)](#).

Returns the length of text inserted (this is just `strlen(text)`, however this calculation can be expensive and the length will be required by any caller who will continue on to call `redisplay()`. `pos` must be contiguous with the existing text in the buffer (i.e. not past the end).

Returns

the number of bytes inserted

31.134.3.17 insertfile()

```
int Fl_Text_Buffer::insertfile (
    const char * file,
    int pos,
    int buflen = 128*1024 )
```

Inserts a file at the specified position.

Returns

- 0 on success
- non-zero on error (`strerror()` contains reason)
- 1 indicates open for read failed (no data loaded)
- 2 indicates error occurred while reading data (data was partially loaded)

File can be UTF-8 or CP1252 encoded. If the input file is not UTF-8 encoded, the `Fl_Text_Buffer` widget will contain data transcoded to UTF-8. By default, the message `Fl_Text_Buffer::file_encoding_warning_message` will warn the user about this.

See also

[input_file_was_transcoded](#) and [transcoding_warning_action](#).

31.134.3.18 length()

```
int Fl_Text_Buffer::length ( ) const [inline]
```

Returns the number of bytes in the buffer.

Returns

size of text in bytes

31.134.3.19 line_end()

```
int Fl_Text_Buffer::line_end (
    int pos ) const
```

Finds and returns the position of the end of the line containing position `pos` (which is either a pointer to the newline character ending the line or a pointer to one character beyond the end of the buffer).

Parameters

<i>pos</i>	byte index into buffer
------------	------------------------

Returns

byte offset to line end

31.134.3.20 line_start()

```
int Fl_Text_Buffer::line_start (
    int pos ) const
```

Returns the position of the start of the line containing position `pos`.

Parameters

<i>pos</i>	byte index into buffer
------------	------------------------

Returns

byte offset to line start

31.134.3.21 line_text()

```
char * Fl_Text_Buffer::line_text (
    int pos ) const
```

Returns the text from the entire line containing the specified character position. When you are done with the text, free it using the `free()` function.

Parameters

<i>pos</i>	byte index into buffer
------------	------------------------

Returns

copy of UTF-8 text, must be free'd

31.134.3.22 loadfile()

```
int Fl_Text_Buffer::loadfile (
    const char * file,
    int buflen = 128*1024 ) [inline]
```

Loads a text file into the buffer.

See also [insertfile\(\)](#).

31.134.3.23 next_char()

```
int Fl_Text_Buffer::next_char (
    int ix ) const
```

Returns the index of the next character.

Parameters

<i>ix</i>	index to the current character
-----------	--------------------------------

31.134.3.24 outputfile()

```
int Fl_Text_Buffer::outputfile (
    const char * file,
    int start,
    int end,
    int buflen = 128*1024 )
```

Writes the specified portions of the text buffer to a file.

Returns

- 0 on success
- non-zero on error (strerror() contains reason)
- 1 indicates open for write failed (no data saved)
- 2 indicates error occurred while writing data (data was partially saved)

See also

[savefile\(const char *file, int buflen\)](#)

31.134.3.25 prev_char()

```
int Fl_Text_Buffer::prev_char (
    int ix ) const
```

Returns the index of the previous character.

Parameters

<i>ix</i>	index to the current character
-----------	--------------------------------

31.134.3.26 remove()

```
void Fl_Text_Buffer::remove (
    int start,
    int end )
```

Deletes a range of characters in the buffer.

Parameters

<i>start</i>	byte offset to first character to be removed
<i>end</i>	byte offset to character after last character to be removed

31.134.3.27 remove_()

```
void Fl_Text_Buffer::remove_ (
    int start,
    int end ) [protected]
```

Internal (non-redisplaying) version of [remove\(\)](#).

Removes the contents of the buffer between *start* and *end* (and moves the gap to the site of the delete).

31.134.3.28 replace()

```
void Fl_Text_Buffer::replace (
    int start,
    int end,
    const char * text )
```

Deletes the characters between *start* and *end*, and inserts the null-terminated string *text* in their place in the buffer.

Parameters

<i>start</i>	byte offset to first character to be removed and new insert position
<i>end</i>	byte offset to character after last character to be removed
<i>text</i>	UTF-8 encoded and nul terminated text

31.134.3.29 rewind_lines()

```
int Fl_Text_Buffer::rewind_lines (
    int startPos,
    int nLines )
```

Finds and returns the position of the first character of the line *nLines* backwards from *startPos* (not counting the character pointed to by *startpos* if that is a newline) in the buffer.

nLines == 0 means find the beginning of the line.

31.134.3.30 savefile()

```
int Fl_Text_Buffer::savefile (
    const char * file,
    int buflen = 128*1024 ) [inline]
```

Saves a text file from the current buffer.

Returns

- 0 on success
- non-zero on error (`strerror()` contains reason)

- 1 indicates open for write failed (no data saved)
- 2 indicates error occurred while writing data (data was partially saved)

See also

[outfile\(const char *file, int start, int end, int buflen\)](#)

31.134.3.31 search_backward()

```
int Fl_Text_Buffer::search_backward (
    int startPos,
    const char * searchString,
    int * foundPos,
    int matchCase = 0 ) const
```

Search backwards in buffer for string `searchString`, starting with the character *at* `startPos`, returning the result in `foundPos`.

Returns 1 if found, 0 if not.

Parameters

<i>startPos</i>	byte offset to start position
<i>searchString</i>	UTF-8 string that we want to find
<i>foundPos</i>	byte offset where the string was found
<i>matchCase</i>	if set, match character case

Returns

1 if found, 0 if not

31.134.3.32 search_forward()

```
int Fl_Text_Buffer::search_forward (
    int startPos,
    const char * searchString,
    int * foundPos,
    int matchCase = 0 ) const
```

Search forwards in buffer for string `searchString`, starting with the character `startPos`, and returning the result in `foundPos`.

Returns 1 if found, 0 if not.

Parameters

<i>startPos</i>	byte offset to start position
<i>searchString</i>	UTF-8 string that we want to find
<i>foundPos</i>	byte offset where the string was found
<i>matchCase</i>	if set, match character case

Returns

1 if found, 0 if not

31.134.3.33 secondary_selection_text()

```
char * Fl_Text_Buffer::secondary_selection_text ( )
```

Returns the text in the secondary selection.

When you are done with the text, free it using the free() function.

31.134.3.34 selection_text()

```
char * Fl_Text_Buffer::selection_text ( )
```

Returns the currently selected text.

When you are done with the text, free it using the free() function.

31.134.3.35 skip_displayed_characters()

```
int Fl_Text_Buffer::skip_displayed_characters (
    int lineStartPos,
    int nChars )
```

Count forward from buffer position `startPos` in displayed characters.

Displayed characters are the characters shown on the screen to represent characters in the buffer, where tabs and control characters are expanded.

Parameters

<i>lineStartPos</i>	byte offset into buffer
<i>nChars</i>	number of bytes that are sent to the display

Returns

byte offset in input after all output bytes are sent

31.134.3.36 tab_distance()

```
int Fl_Text_Buffer::tab_distance ( ) const [inline]
```

Gets the tab width.

The tab width is measured in characters. The pixel position is calculated using an average character width.

31.134.3.37 text() [1/2]

```
char * Fl_Text_Buffer::text ( ) const
```

Get a copy of the entire contents of the text buffer.

Memory is allocated to contain the returned string, which the caller must free.

Returns

newly allocated text buffer - must be free'd, text is UTF-8

31.134.3.38 text() [2/2]

```
void Fl_Text_Buffer::text (
    const char * text )
```

Replaces the entire contents of the text buffer.

Parameters

<i>text</i>	Text must be valid UTF-8. If null, an empty string is substituted.
-------------	--

31.134.3.39 text_range()

```
char * Fl_Text_Buffer::text_range (
    int start,
    int end ) const
```

Get a copy of a part of the text buffer.

Return a copy of the text between `start` and `end` character positions from text buffer `buf`. Positions start at 0, and the range does not include the character pointed to by `end`. When you are done with the text, free it using the `free()` function.

Parameters

<i>start</i>	byte offset to first character
<i>end</i>	byte offset after last character in range

Returns

newly allocated text buffer - must be free'd, text is UTF-8

31.134.3.40 word_end()

```
int Fl_Text_Buffer::word_end (
    int pos ) const
```

Returns the position corresponding to the end of the word.

Parameters

<i>pos</i>	byte index into buffer
------------	------------------------

Returns

byte offset to word end

31.134.3.41 word_start()

```
int Fl_Text_Buffer::word_start (
    int pos ) const
```

Returns the position corresponding to the start of the word.

Parameters

<i>pos</i>	byte index into buffer
------------	------------------------

Returns

byte offset to word start

31.134.4 Member Data Documentation

31.134.4.1 file_encoding_warning_message

```
const char * Fl_Text_Buffer::file_encoding_warning_message [static]
```

Initial value:

```
=
"Displayed text contains the UTF-8 transcoding\n"
"of the input file which was not UTF-8 encoded.\n"
"Some changes may have occurred."
```

This message may be displayed using the [fl_alert\(\)](#) function when a file which was not UTF-8 encoded is input.

31.134.4.2 mTabDist

```
int Fl_Text_Buffer::mTabDist [protected]
```

equiv.

number of characters in a tab

31.134.4.3 transcoding_warning_action

```
void(* Fl_Text_Buffer::transcoding_warning_action) (Fl_Text_Buffer *)
```

Pointer to a function called after reading a non UTF-8 encoded file.

This function is called after reading a file if the file content was transcoded to UTF-8. Its default implementation calls [fl_alert\(\)](#) with the text of [file_encoding_warning_message](#). No warning message is displayed if this pointer is set to NULL. Use [input_file_was_transcoded](#) to be informed if file input required transcoding to UTF-8.

The documentation for this class was generated from the following files:

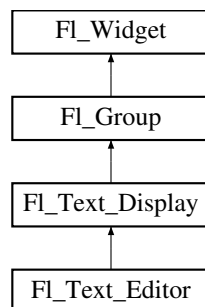
- [Fl_Text_Buffer.H](#)
- [Fl_Text_Buffer.cxx](#)

31.135 FI_Text_Display Class Reference

Rich text display widget.

```
#include <Fl_Text_Display.H>
```

Inheritance diagram for [Fl_Text_Display](#):



Classes

- struct [Style_Table_Entry](#)

This structure associates the color, font, and font size of a string to draw with an attribute mask matching attr.

Public Types

- enum {
[NORMAL_CURSOR](#) , [CARET_CURSOR](#) , [DIM_CURSOR](#) , [BLOCK_CURSOR](#) ,
[HEAVY_CURSOR](#) , [SIMPLE_CURSOR](#) }

text display cursor shapes enumeration

- enum { [CURSOR_POS](#) , [CHARACTER_POS](#) }

the character position is the left edge of a character, whereas the cursor is thought to be between the centers of two consecutive characters.

- enum {
DRAG_NONE = -2 , **DRAG_START_DND** = -1 , **DRAG_CHAR** = 0 , **DRAG_WORD** = 1 ,
DRAG_LINE = 2 }
- drag types - they match [Fl::event_clicks\(\)](#) so that single clicking to start a collection selects by character, double clicking selects by word and triple clicking selects by line.
- enum { [WRAP_NONE](#) , [WRAP_AT_COLUMN](#) , [WRAP_AT_PIXEL](#) , [WRAP_AT_BOUNDS](#) }
- wrap types - used in [wrap_mode\(\)](#)
- typedef void(* **Unfinished_Style_Cb**) (int, void *)

Public Member Functions

- [Fl_Text_Buffer](#) * [buffer](#) () const
Gets the current text buffer associated with the text widget.
- void [buffer](#) ([Fl_Text_Buffer](#) &buf)
Sets the current text buffer associated with the text widget.
- void [buffer](#) ([Fl_Text_Buffer](#) *buf)
Attach a text buffer to display, replacing the current buffer (if any)
- double [col_to_x](#) (double col) const
Convert a column number into an x pixel position.
- int [count_lines](#) (int start, int end, bool start_pos_is_line_start) const
Count the number of lines between two positions.
- [Fl_Color](#) [cursor_color](#) () const
Gets the text cursor color.
- void [cursor_color](#) ([Fl_Color](#) n)
Sets the text cursor color.
- void [cursor_style](#) (int style)
Sets the text cursor style.
- [Fl_Text_Display](#) (int X, int Y, int W, int H, const char *l=0)
Creates a new text display widget.
- virtual int [handle](#) (int e)
Event handling.
- void [hide_cursor](#) ()
Hides the text cursor.
- void [highlight_data](#) ([Fl_Text_Buffer](#) *styleBuffer, const [Style_Table_Entry](#) *styleTable, int nStyles, char unfinishedStyle, Unfinished_Style_Cb unfinishedHighlightCB, void *cbArg)
Attach (or remove) highlight information in text display and redisplay.
- int [in_selection](#) (int x, int y) const
Check if a pixel position is within the primary selection.
- void [insert](#) (const char *text)
Inserts "text" at the current cursor location.
- int [insert_position](#) () const
Gets the position of the text insertion cursor for text display.
- void [insert_position](#) (int newPos)
Sets the position of the text insertion cursor for text display.
- int [line_end](#) (int startPos, bool startPosIsLineStart) const
Returns the end of a line.
- int [line_start](#) (int pos) const
Return the beginning of a line.
- [Fl_Align](#) [linenumber_align](#) () const
Returns the alignment used for line numbers (if enabled).

- void `linenumber_align` (`FI_Align` val)
Set alignment for line numbers (if enabled).
- `FI_Color` `linenumber_bgcolor` () const
Returns the background color used for line numbers (if enabled).
- void `linenumber_bgcolor` (`FI_Color` val)
Set the background color used for line numbers (if enabled).
- `FI_Color` `linenumber_fgcolor` () const
Return the foreground color used for line numbers (if enabled).
- void `linenumber_fgcolor` (`FI_Color` val)
Set the foreground color used for line numbers (if enabled).
- `FI_Font` `linenumber_font` () const
Return the font used for line numbers (if enabled).
- void `linenumber_font` (`FI_Font` val)
Set the font used for line numbers (if enabled).
- const char * `linenumber_format` () const
Returns the line number printf() format string.
- void `linenumber_format` (const char *val)
Sets the printf() style format string used for line numbers.
- `FI_Fontsize` `linenumber_size` () const
Return the font size used for line numbers (if enabled).
- void `linenumber_size` (`FI_Fontsize` val)
Set the font size used for line numbers (if enabled).
- int `linenumber_width` () const
Return the screen area width provided for line numbers.
- void `linenumber_width` (int width)
Set width of screen area for line numbers.
- int `move_down` ()
Moves the current insert position down one line.
- int `move_left` ()
Moves the current insert position left one character.
- int `move_right` ()
Moves the current insert position right one character.
- int `move_up` ()
Moves the current insert position up one line.
- void `next_word` (void)
Moves the current insert position right one word.
- void `overstrike` (const char *text)
Replaces text at the current insert position.
- int `position_style` (int lineStartPos, int lineLen, int lineIndex) const
Find the correct style for a character.
- int `position_to_xy` (int pos, int *x, int *y) const
Convert a character index into a pixel position.
- void `previous_word` (void)
Moves the current insert position left one word.
- void `redisplay_range` (int start, int end)
Marks text from start to end as needing a redraw.
- virtual void `resize` (int X, int Y, int W, int H)
Change the size of the displayed text area.
- int `rewind_lines` (int startPos, int nLines)
Skip a number of lines back.
- void `scroll` (int topLineNum, int horizOffset)

- Scrolls the current buffer to start at the specified line and column.*

 - `Fl_Align scrollbar_align () const`

Gets the scrollbar alignment type.
 - `void scrollbar_align (Fl_Align a)`

Sets the scrollbar alignment type.
 - `int scrollbar_width () const`

Gets the width/height of the scrollbars.
 - `void scrollbar_width (int W)`

Sets the width/height of the scrollbars.
 - `int shortcut () const`
 - `void shortcut (int s)`
 - `void show_cursor (int b=1)`

Shows the text cursor.
 - `void show_insert_position ()`

Scrolls the text buffer to show the current insert position.
 - `int skip_lines (int startPos, int nLines, bool startPosIsLineStart)`

Skip a number of lines forward.
 - `Fl_Color textcolor () const`

Gets the default color of text in the widget.
 - `void textcolor (Fl_Color n)`

Sets the default color of text in the widget.
 - `Fl_Font textfont () const`

Gets the default font used when drawing text in the widget.
 - `void textfont (Fl_Font s)`

Sets the default font used when drawing text in the widget.
 - `Fl_Fontsize textsize () const`

Gets the default size of text in the widget.
 - `void textsize (Fl_Fontsize s)`

Sets the default size of text in the widget.
 - `int word_end (int pos) const`

Moves the insert position to the end of the current word.
 - `int word_start (int pos) const`

Moves the insert position to the beginning of the current word.
 - `void wrap_mode (int wrap, int wrap_margin)`

Set the new text wrap mode.
 - `int wrapped_column (int row, int column) const`

Nobody knows what this function does.
 - `int wrapped_row (int row) const`

Nobody knows what this function does.
 - `double x_to_col (double x) const`

Convert an x pixel position into a column number.
 - `~Fl_Text_Display ()`

Free a text display and release its associated memory.

Protected Types

- `enum { DRAW_LINE , FIND_INDEX , FIND_INDEX_FROM_ZERO , GET_WIDTH }`

Protected Member Functions

- void [absolute_top_line_number](#) (int oldFirstChar)
Line numbering stuff, currently unused.
- void [calc_last_char](#) ()
Update last display character index.
- void [calc_line_starts](#) (int startLine, int endLine)
Update the line start arrays.
- void [clear_rect](#) (int style, int x, int y, int width, int height) const
*Clear a rectangle with the appropriate background color for *style*.*
- void [display_insert](#) ()
Scroll the display to bring insertion cursor into view.
- virtual void [draw](#) ()
Draw the widget.
- void [draw_cursor](#) (int, int)
*Draw a cursor with top center at *X*, *Y*.*
- void [draw_line_numbers](#) (bool clearAll)
Refresh the line number area.
- void [draw_range](#) (int start, int end)
Draw a range of text.
- void [draw_string](#) (int style, int x, int y, int toX, const char *string, int nChars) const
Draw a text segment in a single style.
- void [draw_text](#) (int X, int Y, int W, int H)
Refresh a rectangle of the text display.
- void [draw_vline](#) (int visLineNum, int leftClip, int rightClip, int leftCharIndex, int rightCharIndex)
Draw a single line of text.
- int [empty_vlines](#) () const
Return true if there are lines visible with no corresponding buffer text.
- void [extend_range_for_styles](#) (int *start, int *end)
I don't know what this does!
- void [find_line_end](#) (int pos, bool start_pos_is_line_start, int *lineEnd, int *nextLineStart) const
Finds both the end of the current line and the start of the next line.
- void [find_wrap_range](#) (const char *deletedText, int pos, int nInserted, int nDeleted, int *modRangeStart, int *modRangeEnd, int *linesInserted, int *linesDeleted)
Wrapping calculations.
- int [find_x](#) (const char *s, int len, int style, int x) const
*Find the index of the character that lies at the given *x* position.*
- int [get_absolute_top_line_number](#) () const
Line numbering stuff, currently unused.
- int [handle_vline](#) (int mode, int lineStart, int lineLen, int leftChar, int rightChar, int topClip, int bottomClip, int leftClip, int rightClip) const
Universal pixel machine.
- int [longest_vline](#) () const
Find the longest line of all visible lines.
- void [maintain_absolute_top_line_number](#) (int state)
Line numbering stuff, currently unused.
- int [maintaining_absolute_top_line_number](#) () const
Line numbering stuff, currently unused.
- void [measure_deleted_lines](#) (int pos, int nDeleted)
Wrapping calculations.
- double [measure_proportional_character](#) (const char *s, int colNum, int pos) const

- Wrapping calculations.*

 - int [measure_vline](#) (int visLineNum) const
Returns the width in pixels of the displayed line pointed to by "visLineNum".
 - void [offset_line_starts](#) (int newTopLineNum)
Offset line start counters for a new vertical scroll position.
 - int [position_to_line](#) (int pos, int *lineNum) const
Convert a position index into a line number offset.
 - int [position_to_linecol](#) (int pos, int *lineNum, int *column) const
Find the line and column number of position *pos*.
 - void [reset_absolute_top_line_number](#) ()
Line numbering stuff, probably unused.
 - int [scroll_](#) (int topLineNum, int horizOffset)
Scrolls the current buffer to start at the specified line and column.
 - double [string_width](#) (const char *string, int length, int style) const
Find the width of a string in the font of a particular style.
 - void [update_h_scrollbar](#) ()
Update horizontal scrollbar.
 - void [update_line_starts](#) (int pos, int charsInserted, int charsDeleted, int linesInserted, int linesDeleted, int *scrolled)
Update line start arrays and variables.
 - void [update_v_scrollbar](#) ()
Update vertical scrollbar.
 - int [vline_length](#) (int visLineNum) const
Count number of bytes in a visible line.
 - int [wrap_uses_character](#) (int lineEndPos) const
Check if the line break is caused by a `\n` or by line wrapping.
 - void [wrapped_line_counter](#) (FI_Text_Buffer *buf, int startPos, int maxPos, int maxLines, bool startPosIs↵LineStart, int styleBufOffset, int *retPos, int *retLines, int *retLineStart, int *retLineEnd, bool countLast↵LineMissingNewLine=true) const
Wrapping calculations.
 - int [xy_to_position](#) (int x, int y, int PosType=CHARACTER_POS) const
Translate a pixel position into a character index.
 - void [xy_to_rowcol](#) (int x, int y, int *row, int *column, int PosType=CHARACTER_POS) const
Translate pixel coordinates into row and column.

Static Protected Member Functions

- static void [buffer_modified_cb](#) (int pos, int nInserted, int nDeleted, int nRestyled, const char *deletedText, void *cbArg)
This is called whenever the buffer is modified.
- static void [buffer_predelete_cb](#) (int pos, int nDeleted, void *cbArg)
This is called before any characters are deleted.
- static void [h_scrollbar_cb](#) (FI_Scrollbar *w, FI_Text_Display *d)
Callbacks for drag or valueChanged on horizontal scrollbar.
- static void [scroll_timer_cb](#) (void *)
Timer callback for scroll events.
- static void [v_scrollbar_cb](#) (FI_Scrollbar *w, FI_Text_Display *d)
Callbacks for drag or valueChanged on vertical scrollbar.

Protected Attributes

- int **damage_range1_end**
- int **damage_range1_start**
- int **damage_range2_end**
- int **damage_range2_start**
- int **display_insert_position_hint**
- int **dragging**
- int **dragPos**
- int **dragType**
- [FI_Align](#) **linenumber_align_**
- [FI_Color](#) **linenumber_bgcolor_**
- [FI_Color](#) **linenumber_fgcolor_**
- [FI_Font](#) **linenumber_font_**
- const char * **linenumber_format_**
- [FI_Fontsize](#) **linenumber_size_**
- int **mAbsTopLineNum**
- [FI_Text_Buffer](#) * **mBuffer**
- double **mColumnScale**
- int **mContinuousWrap**
- [FI_Color](#) **mCursor_color**
- int **mCursorOldY**
- int **mCursorOn**
- int **mCursorPos**
- int **mCursorPreferredXPos**
- int **mCursorStyle**
- int **mCursorToHint**
- int **mFirstChar**
- void * **mHighlightCBArg**
- int **mHorizOffset**
- int **mHorizOffsetHint**
- [FI_Scrollbar](#) * **mHScrollBar**
- int **mLastChar**
- int **mLineNumLeft**
- int **mLineNumWidth**
- int * **mLineStarts**
- int **mMaxsize**
- int **mModifyingTabDistance**
- int **mNBufferLines**
- int **mNeedAbsTopLineNum**
- int **mNLinesDeleted**
- int **mNStyles**
- int **mNVisibleLines**
- [FI_Text_Buffer](#) * **mStyleBuffer**
- const [Style_Table_Entry](#) * **mStyleTable**
- int **mSuppressResync**
- int **mTopLineNum**
- int **mTopLineNumHint**
- Unfinished_Style_Cb **mUnfinishedHighlightCB**
- char **mUnfinishedStyle**
- [FI_Scrollbar](#) * **mVScrollBar**
- int **mWrapMarginPix**
- [FI_Align](#) **scrollbar_align_**
- int **scrollbar_width_**
- int **shortcut_**

- ```
struct {
 int h
 int w
 int x
 int y
} text_area
```
- [FI\\_Color](#) `textcolor_`
- [FI\\_Font](#) `textfont_`
- [FI\\_Fontsize](#) `textsize_`

## Friends

- `void fl_text_drag_me (int pos, FI\_Text\_Display *d)`

## Additional Inherited Members

### 31.135.1 Detailed Description

Rich text display widget.

This is the FLTK text display widget. It allows the user to view multiple lines of text and supports highlighting, word wrap, mixes of font faces and colors, line numbers and scrolling. The buffer that is displayed in the widget is managed by the [FI\\_Text\\_Buffer](#) class. A single Text Buffer can be displayed by multiple Text Displays.

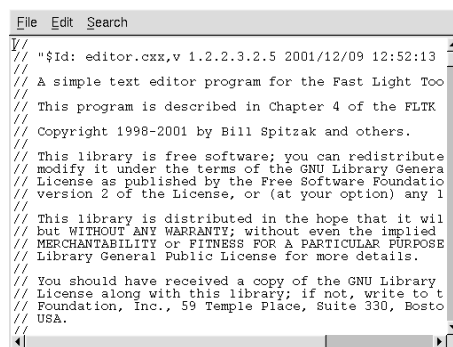


Figure 31.41 `FI_Text_Display` widget

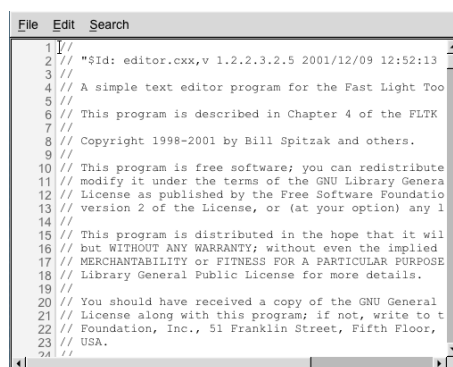


Figure 31.42 `FI_Text_Display` widget with line numbers enabled

## Example Use

```
#include <FL/FL_Text_Display.H>
```

```

..
int main() {
 ..
 Fl_Text_Buffer *buff = new Fl_Text_Buffer();
 Fl_Text_Display *disp = new Fl_Text_Display(10, 10, 640, 480);
 disp->buffer(buff); // attach text buffer to display widget
 buff->text("line one\nline two"); // add some text to buffer
 ..
}

```

## Features

- Word wrap: [wrap\\_mode\(\)](#), [wrapped\\_column\(\)](#), [wrapped\\_row\(\)](#)
- Font control: [textfont\(\)](#), [textsize\(\)](#), [textcolor\(\)](#)
- Font styling: [highlight\\_data\(\)](#)
- Cursor: [cursor\\_style\(\)](#), [show\\_cursor\(\)](#), [hide\\_cursor\(\)](#), [cursor\\_color\(\)](#)
- Line numbers: [linenumber\\_width\(\)](#), [linenumber\\_font\(\)](#), [linenumber\\_size\(\)](#), [linenumber\\_fgcolor\(\)](#), [linenumber\\_bgcolor\(\)](#), [linenumber\\_align\(\)](#), [linenumber\\_format\(\)](#)

Note that other features may be available via [Fl\\_Text\\_Editor](#) and [Fl\\_Text\\_Buffer](#) classes.

## Note

Line numbers were added in 1.3.3. To avoid breaking ABI, many of its options are read only. To adjust these features in 1.3.x, you must build FLTK with `FLTK_ABI_VERSION` set to 10303 or higher.

## 31.135.2 Member Enumeration Documentation

### 31.135.2.1 anonymous enum

anonymous enum  
text display cursor shapes enumeration

#### Enumerator

|               |                                              |
|---------------|----------------------------------------------|
| NORMAL_CURSOR | I-beam.                                      |
| CARET_CURSOR  | caret under the text                         |
| DIM_CURSOR    | dim I-beam                                   |
| BLOCK_CURSOR  | unfilled box under the current character     |
| HEAVY_CURSOR  | thick I-beam                                 |
| SIMPLE_CURSOR | as cursor as <a href="#">Fl_Input</a> cursor |

### 31.135.2.2 anonymous enum

anonymous enum  
wrap types - used in [wrap\\_mode\(\)](#)

#### Enumerator

|                |                                                 |
|----------------|-------------------------------------------------|
| WRAP_NONE      | don't wrap text at all                          |
| WRAP_AT_COLUMN | wrap text at the given text column              |
| WRAP_AT_PIXEL  | wrap text at a pixel position                   |
| WRAP_AT_BOUNDS | wrap text so that it fits into the widget width |

### 31.135.3 Constructor & Destructor Documentation

#### 31.135.3.1 Fl\_Text\_Display()

```
Fl_Text_Display::Fl_Text_Display (
 int X,
 int Y,
 int W,
 int H,
 const char * l = 0)
```

Creates a new text display widget.

##### Parameters

|                |                              |
|----------------|------------------------------|
| <i>X,Y,W,H</i> | position and size of widget  |
| <i>l</i>       | label text, defaults to none |

#### 31.135.3.2 ~Fl\_Text\_Display()

```
Fl_Text_Display::~Fl_Text_Display ()
```

Free a text display and release its associated memory.

Note, the text BUFFER that the text display displays is a separate entity and is not freed, nor are the style buffer or style table.

### 31.135.4 Member Function Documentation

#### 31.135.4.1 absolute\_top\_line\_number()

```
void Fl_Text_Display::absolute_top_line_number (
 int oldFirstChar) [protected]
```

Line numbering stuff, currently unused.

Re-calculate absolute top line number for a change in scroll position.

#### 31.135.4.2 buffer() [1/3]

```
Fl_Text_Buffer* Fl_Text_Display::buffer () const [inline]
```

Gets the current text buffer associated with the text widget.

Multiple text widgets can be associated with the same text buffer.

##### Returns

current text buffer

#### 31.135.4.3 buffer() [2/3]

```
void Fl_Text_Display::buffer (
 Fl_Text_Buffer & buf) [inline]
```

Sets the current text buffer associated with the text widget.

Multiple text widgets can be associated with the same text buffer.

##### Parameters

|            |                 |
|------------|-----------------|
| <i>buf</i> | new text buffer |
|------------|-----------------|

**31.135.4.4 buffer()** [3/3]

```
void Fl_Text_Display::buffer (
 Fl_Text_Buffer * buf)
```

Attach a text buffer to display, replacing the current buffer (if any)

**Parameters**

|            |                         |
|------------|-------------------------|
| <i>buf</i> | attach this text buffer |
|------------|-------------------------|

**31.135.4.5 buffer\_modified\_cb()**

```
void Fl_Text_Display::buffer_modified_cb (
 int pos,
 int nInserted,
 int nDeleted,
 int nRestyled,
 const char * deletedText,
 void * cbArg) [static], [protected]
```

This is called whenever the buffer is modified.

Callback attached to the text buffer to receive modification information

This callback can be used to adjust the display or update other setting. It is not advisable to change any buffers or text in this callback, or line counting may get out of sync.

**Parameters**

|                    |                                                               |
|--------------------|---------------------------------------------------------------|
| <i>pos</i>         | starting index of modification                                |
| <i>nInserted</i>   | number of bytes we inserted (must be UTF-8 aligned!)          |
| <i>nDeleted</i>    | number of bytes deleted (must be UTF-8 aligned!)              |
| <i>nRestyled</i>   | ??                                                            |
| <i>deletedText</i> | this is what was removed, must not be NULL if nDeleted is set |
| <i>cbArg</i>       | "this" pointer for static callback function                   |

**31.135.4.6 buffer\_predelete\_cb()**

```
void Fl_Text_Display::buffer_predelete_cb (
 int pos,
 int nDeleted,
 void * cbArg) [static], [protected]
```

This is called before any characters are deleted.

Callback attached to the text buffer to receive delete information before the modifications are actually made.

This callback can be used to adjust the display or update other setting. It is not advisable to change any buffers or text in this callback, or line counting may get out of sync.

**Parameters**

|                 |                                                         |
|-----------------|---------------------------------------------------------|
| <i>pos</i>      | starting index of deletion                              |
| <i>nDeleted</i> | number of bytes we will delete (must be UTF-8 aligned!) |
| <i>cbArg</i>    | "this" pointer for static callback function             |



**31.135.4.7 calc\_last\_char()**

```
void Fl_Text_Display::calc_last_char () [protected]
```

Update last display character index.

Given a [Fl\\_Text\\_Display](#) with a complete, up-to-date lineStarts array, update the lastChar entry to point to the last buffer position displayed.

**31.135.4.8 calc\_line\_starts()**

```
void Fl_Text_Display::calc_line_starts (
 int startLine,
 int endLine) [protected]
```

Update the line start arrays.

Scan through the text in the "textD"'s buffer and recalculate the line starts array values beginning at index "startLine" and continuing through (including) "endLine". It assumes that the line starts entry preceding "startLine" (or mFirstChar if startLine is 0) is good, and re-counts newlines to fill in the requested entries. Out of range values for "startLine" and "endLine" are acceptable.

**Parameters**

|                          |                                        |
|--------------------------|----------------------------------------|
| <i>startLine,endLine</i> | range of lines to scan as line numbers |
|--------------------------|----------------------------------------|

**31.135.4.9 clear\_rect()**

```
void Fl_Text_Display::clear_rect (
 int style,
 int X,
 int Y,
 int width,
 int height) const [protected]
```

Clear a rectangle with the appropriate background color for *style*.

**Parameters**

|                         |                                      |
|-------------------------|--------------------------------------|
| <i>style</i>            | index into style table               |
| <i>X,Y,width,height</i> | size and position of background area |

**31.135.4.10 col\_to\_x()**

```
double Fl_Text_Display::col_to_x (
 double col) const
```

Convert a column number into an x pixel position.

**Parameters**

|            |                                                     |
|------------|-----------------------------------------------------|
| <i>col</i> | an approximate column number based on the main font |
|------------|-----------------------------------------------------|

**Returns**

number of pixels from the left margin to the left of an average sized character

**31.135.4.11 count\_lines()**

```
int Fl_Text_Display::count_lines (
 int startPos,
 int endPos,
 bool startPosIsLineStart) const
```

Count the number of lines between two positions.

Same as [Fl\\_Text\\_Buffer::count\\_lines\(\)](#), but takes into account wrapping if wrapping is turned on. If the caller knows that `startPos` is at a line start, it can pass `startPosIsLineStart` as `True` to make the call more efficient by avoiding the additional step of scanning back to the last newline.

**Parameters**

|                            |                                       |
|----------------------------|---------------------------------------|
| <i>startPos</i>            | index to first character              |
| <i>endPos</i>              | index after last character            |
| <i>startPosIsLineStart</i> | avoid scanning back to the line start |

**Returns**

number of lines

**31.135.4.12 cursor\_color()** [1/2]

```
Fl_Color Fl_Text_Display::cursor_color () const [inline]
```

Gets the text cursor color.

**Returns**

cursor color

**31.135.4.13 cursor\_color()** [2/2]

```
void Fl_Text_Display::cursor_color (
 Fl_Color n) [inline]
```

Sets the text cursor color.

**Parameters**

|          |                  |
|----------|------------------|
| <i>n</i> | new cursor color |
|----------|------------------|

**31.135.4.14 cursor\_style()**

```
void Fl_Text_Display::cursor_style (
 int style)
```

Sets the text cursor style.

Sets the text cursor style to one of the following:

- [Fl\\_Text\\_Display::NORMAL\\_CURSOR](#) - Shows an I beam.
- [Fl\\_Text\\_Display::CARET\\_CURSOR](#) - Shows a caret under the text.
- [Fl\\_Text\\_Display::DIM\\_CURSOR](#) - Shows a dimmed I beam.
- [Fl\\_Text\\_Display::BLOCK\\_CURSOR](#) - Shows an unfilled box around the current character.

- [Fl\\_Text\\_Display::HEAVY\\_CURSOR](#) - Shows a thick I beam.

This call also switches the cursor on and may trigger a redraw.

#### Parameters

|              |                  |
|--------------|------------------|
| <i>style</i> | new cursor style |
|--------------|------------------|

#### 31.135.4.15 display\_insert()

```
void Fl_Text_Display::display_insert () [protected]
```

Scroll the display to bring insertion cursor into view.

Note: it would be nice to be able to do this without counting lines twice ([scroll\\_\(\)](#) counts them too) and/or to count from the most efficient starting point, but the efficiency of this routine is not as important to the overall performance of the text display.

**Todo** Unicode?

#### 31.135.4.16 draw()

```
void Fl_Text_Display::draw (
 void) [protected], [virtual]
```

Draw the widget.

This function tries to limit drawing to smaller areas if possible.

Reimplemented from [Fl\\_Group](#).

#### 31.135.4.17 draw\_cursor()

```
void Fl_Text_Display::draw_cursor (
 int X,
 int Y) [protected]
```

Draw a cursor with top center at X, Y.

#### Parameters

|             |                           |
|-------------|---------------------------|
| <i>X, Y</i> | cursor position in pixels |
|-------------|---------------------------|

#### 31.135.4.18 draw\_line\_numbers()

```
void Fl_Text_Display::draw_line_numbers (
 bool clearAll) [protected]
```

Refresh the line number area.

#### Parameters

|                 |                                                                                                                                                                                                             |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>clearAll</i> | – (currently unused) If False, only draws the line number text, does not clear the area behind it. If True, clears the area and redraws the text. Use False to avoid a 'flash' for single buffered windows. |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**31.135.4.19 draw\_range()**

```
void Fl_Text_Display::draw_range (
 int startpos,
 int endpos) [protected]
```

Draw a range of text.

Refresh all of the text between buffer positions `startpos` and `endpos` not including the character at the position `endpos`.

If `endpos` points beyond the end of the buffer, refresh the whole display after `startpos`, including blank lines which are not technically part of any range of characters.

**Parameters**

|                 |                                    |
|-----------------|------------------------------------|
| <i>startpos</i> | index of first character to draw   |
| <i>endpos</i>   | index after last character to draw |

**31.135.4.20 draw\_string()**

```
void Fl_Text_Display::draw_string (
 int style,
 int X,
 int Y,
 int toX,
 const char * string,
 int nChars) const [protected]
```

Draw a text segment in a single style.

Draw a string or blank area according to parameter `style`, using the appropriate colors and drawing method for that style, with top left corner at `X`, `Y`. If `style` says to draw text, use `string` as source of characters, and draw `nChars`, if `style` is FILL, erase rectangle where text would have drawn from `X` to `toX` and from `Y` to the maximum `y` extent of the current font(s).

**Parameters**

|               |                                                |
|---------------|------------------------------------------------|
| <i>style</i>  | index into style lookup table                  |
| <i>X,Y</i>    | drawing origin                                 |
| <i>toX</i>    | rightmost position if this is a fill operation |
| <i>string</i> | text if this is a drawing operation            |
| <i>nChars</i> | number of characters to draw                   |

**31.135.4.21 draw\_text()**

```
void Fl_Text_Display::draw_text (
 int left,
 int top,
 int width,
 int height) [protected]
```

Refresh a rectangle of the text display.

**Parameters**

|                     |                                                |
|---------------------|------------------------------------------------|
| <i>left,top</i>     | are in coordinates of the text drawing window. |
| <i>width,height</i> | size in pixels                                 |

**31.135.4.22 draw\_vline()**

```
void Fl_Text_Display::draw_vline (
 int visLineNum,
 int leftClip,
 int rightClip,
 int leftCharIndex,
 int rightCharIndex) [protected]
```

Draw a single line of text.

Draw the text on a single line represented by `visLineNum` (the number of lines down from the top of the display), limited by `leftClip` and `rightClip` window coordinates and `leftCharIndex` and `rightCharIndex` character positions (not including the character at position `rightCharIndex`).

**Parameters**

|                                            |                                                 |
|--------------------------------------------|-------------------------------------------------|
| <code>visLineNum</code>                    | index of line in the visible line number lookup |
| <code>leftClip, rightClip</code>           | pixel position of clipped area                  |
| <code>leftCharIndex, rightCharIndex</code> | index into line of segment that we want to draw |

**31.135.4.23 empty\_vlines()**

```
int Fl_Text_Display::empty_vlines () const [protected]
```

Return true if there are lines visible with no corresponding buffer text.

**Returns**

1 if there are empty lines

**31.135.4.24 extend\_range\_for\_styles()**

```
void Fl_Text_Display::extend_range_for_styles (
 int * startpos,
 int * endpos) [protected]
```

I don't know what this does!

Extend the range of a redraw request (from `*start` to `*end`) with additional redraw requests resulting from changes to the attached style buffer (which contains auxiliary information for coloring or styling text).

**Parameters**

|                       |    |
|-----------------------|----|
| <code>startpos</code> | ?? |
| <code>endpos</code>   | ?? |

**Todo** Unicode?

**31.135.4.25 find\_line\_end()**

```
void Fl_Text_Display::find_line_end (
 int startPos,
 bool startPosIsLineStart,
 int * lineEnd,
 int * nextLineStart) const [protected]
```

Finds both the end of the current line and the start of the next line.

Why? In continuous wrap mode, if you need to know both, figuring out one from the other can be expensive or error prone. The problem comes when there's a trailing space or tab just before the end of the buffer. To translate an end of line value to or from the next lines start value, you need to know whether the trailing space or tab is being used as a line break or just a normal character, and to find that out would otherwise require counting all the way back to the beginning of the line.

#### Parameters

|     |                            |  |
|-----|----------------------------|--|
|     | <i>startPos</i>            |  |
|     | <i>startPosIsLineStart</i> |  |
| out | <i>lineEnd</i>             |  |
| out | <i>nextLineStart</i>       |  |

#### 31.135.4.26 find\_wrap\_range()

```
void Fl_Text_Display::find_wrap_range (
 const char * deletedText,
 int pos,
 int nInserted,
 int nDeleted,
 int * modRangeStart,
 int * modRangeEnd,
 int * linesInserted,
 int * linesDeleted) [protected]
```

Wrapping calculations.

When continuous wrap is on, and the user inserts or deletes characters, wrapping can happen before and beyond the changed position. This routine finds the extent of the changes, and counts the deleted and inserted lines over that range. It also attempts to minimize the size of the range to what has to be counted and re-displayed, so the results can be useful both for delimiting where the line starts need to be recalculated, and for deciding what part of the text to redisplay.

#### Parameters

|                      |  |
|----------------------|--|
| <i>deletedText</i>   |  |
| <i>pos</i>           |  |
| <i>nInserted</i>     |  |
| <i>nDeleted</i>      |  |
| <i>modRangeStart</i> |  |
| <i>modRangeEnd</i>   |  |
| <i>linesInserted</i> |  |
| <i>linesDeleted</i>  |  |

#### 31.135.4.27 find\_x()

```
int Fl_Text_Display::find_x (
 const char * s,
 int len,
 int style,
 int x) const [protected]
```

Find the index of the character that lies at the given x position.

## Parameters

|              |                               |
|--------------|-------------------------------|
| <i>s</i>     | UTF-8 text string             |
| <i>len</i>   | length of string              |
| <i>style</i> | index into style lookup table |
| <i>x</i>     | position in pixels            |

## Returns

index into buffer

**31.135.4.28 get\_absolute\_top\_line\_number()**

```
int Fl_Text_Display::get_absolute_top_line_number () const [protected]
```

Line numbering stuff, currently unused.

Returns the absolute (non-wrapped) line number of the first line displayed. Returns 0 if the absolute top line number is not being maintained.

**31.135.4.29 handle\_vline()**

```
int Fl_Text_Display::handle_vline (
 int mode,
 int lineStartPos,
 int lineLen,
 int leftChar,
 int rightChar,
 int Y,
 int bottomClip,
 int leftClip,
 int rightClip) const [protected]
```

Universal pixel machine.

We use a single function that handles all line layout, measuring, and drawing

- draw a text range
- return the width of a text range in pixels
- return the index of a character that is at a pixel position

## Parameters

|    |                                        |                                                                                                     |
|----|----------------------------------------|-----------------------------------------------------------------------------------------------------|
| in | <i>mode</i>                            | DRAW_LINE, GET_WIDTH, FIND_INDEX                                                                    |
| in | <i>lineStartPos</i>                    | index of first character                                                                            |
| in | <i>lineLen</i>                         | size of string in bytes                                                                             |
| in | <i>leftChar, rightChar</i>             |                                                                                                     |
| in | <i>Y</i>                               | drawing position                                                                                    |
| in | <i>bottomClip, leftClip, rightClip</i> | stop work when we reach the clipped area. rightClip is the X position that we search in FIND_INDEX. |

## Return values

|  |                   |                                                              |
|--|-------------------|--------------------------------------------------------------|
|  | <i>DRAW_LINE</i>  | index of last drawn character                                |
|  | <i>GET_WIDTH</i>  | width in pixels of text segment if we would draw it          |
|  | <i>FIND_INDEX</i> | index of character at given x position in window coordinates |

## Return values

|                                   |                                                                             |
|-----------------------------------|-----------------------------------------------------------------------------|
| <code>FIND_INDEX_FROM_ZERO</code> | index of character at given x position without scrolling and widget offsets |
|-----------------------------------|-----------------------------------------------------------------------------|

**Todo** we need to handle hidden hyphens and tabs here!

we handle all styles and selections

we must provide code to get pixel positions of the middle of a character as well

### 31.135.4.30 highlight\_data()

```
void Fl_Text_Display::highlight_data (
 Fl_Text_Buffer * styleBuffer,
 const Style_Table_Entry * styleTable,
 int nStyles,
 char unfinishedStyle,
 Unfinished_Style_Cb unfinishedHighlightCB,
 void * cbArg)
```

Attach (or remove) highlight information in text display and redisplay.

Highlighting information consists of a style buffer which parallels the normal text buffer, but codes font and color information for the display; a style table which translates style buffer codes (indexed by buffer character - 'A') into fonts and colors; and a callback mechanism for as-needed highlighting, triggered by a style buffer entry of "unfinished↔ Style". Style buffer can trigger additional redisplay during a normal buffer modification if the buffer contains a primary [Fl\\_Text\\_Selection](#) (see `extendRangeForStyleMods` for more information on this protocol).

Style buffers, tables and their associated memory are managed by the caller.

Styles are ranged from 65 ('A') to 126.

## Parameters

|                              |                                                                                                                                                                                                   |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>styleBuffer</i>           | this buffer works in parallel to the text buffer. For every character in the text buffer, the style buffer has a byte at the same offset that contains an index into an array of possible styles. |
| <i>styleTable</i>            | a list of styles indexed by the style buffer                                                                                                                                                      |
| <i>nStyles</i>               | number of styles in the style table                                                                                                                                                               |
| <i>unfinishedStyle</i>       | if this style is found, the callback below is called                                                                                                                                              |
| <i>unfinishedHighlightCB</i> | if a character with an unfinished style is found, this callback will be called                                                                                                                    |
| <i>cbArg</i>                 | and optional argument for the callback above, usually a pointer to the Text Display.                                                                                                              |

### 31.135.4.31 in\_selection()

```
int Fl_Text_Display::in_selection (
 int X,
 int Y) const
```

Check if a pixel position is within the primary selection.

## Parameters

|                   |                        |
|-------------------|------------------------|
| <code>X, Y</code> | pixel position to test |
|-------------------|------------------------|



**Returns**

1 if position (X, Y) is inside of the primary [Fl\\_Text\\_Selection](#)

**31.135.4.32 insert()**

```
void Fl_Text_Display::insert (
 const char * text)
```

Inserts "text" at the current cursor location.

This has the same effect as inserting the text into the buffer using `BufInsert` and then moving the insert position after the newly inserted text, except that it's optimized to do less redrawing.

**Parameters**

|             |                             |
|-------------|-----------------------------|
| <i>text</i> | new text in UTF-8 encoding. |
|-------------|-----------------------------|

**31.135.4.33 insert\_position() [1/2]**

```
int Fl_Text_Display::insert_position () const [inline]
```

Gets the position of the text insertion cursor for text display.

**Returns**

insert position index into text buffer

**31.135.4.34 insert\_position() [2/2]**

```
void Fl_Text_Display::insert_position (
 int newPos)
```

Sets the position of the text insertion cursor for text display.

Move the insertion cursor in front of the character at `newPos`. This function may trigger a redraw.

**Parameters**

|               |                    |
|---------------|--------------------|
| <i>newPos</i> | new caret position |
|---------------|--------------------|

**31.135.4.35 line\_end()**

```
int Fl_Text_Display::line_end (
 int startPos,
 bool startPosIsLineStart) const
```

Returns the end of a line.

Same as `BufEndOfLine`, but takes into account line breaks when wrapping is turned on. If the caller knows that `startPos` is at a line start, it can pass "startPosIsLineStart" as `True` to make the call more efficient by avoiding the additional step of scanning back to the last newline.

Note that the definition of the end of a line is less clear when continuous wrap is on. With continuous wrap off, it's just a pointer to the newline that ends the line. When it's on, it's the character beyond the last **displayable** character on the line, where a whitespace character which has been "converted" to a newline for wrapping is not considered displayable. Also note that a line can be wrapped at a non-whitespace character if the line had no whitespace. In this case, this routine returns a pointer to the start of the next line. This is also consistent with the model used by `visLineLength`.

## Parameters

|                            |                                       |
|----------------------------|---------------------------------------|
| <i>startPos</i>            | index to starting character           |
| <i>startPosIsLineStart</i> | avoid scanning back to the line start |

## Returns

new position as index

**31.135.4.36 line\_start()**

```
int Fl_Text_Display::line_start (
 int pos) const
```

Return the beginning of a line.

Same as BufStartOfLine, but returns the character after last wrap point rather than the last newline.

## Parameters

|            |                             |
|------------|-----------------------------|
| <i>pos</i> | index to starting character |
|------------|-----------------------------|

## Returns

new position as index

**31.135.4.37 linenumbers\_align()**

```
void Fl_Text_Display::linenumbers_align (
 Fl_Align val)
```

Set alignment for line numbers (if enabled).

Valid values are FL\_ALIGN\_LEFT, FL\_ALIGN\_CENTER or FL\_ALIGN\_RIGHT.

## Version

1.3.3 ABI feature (ignored in 1.3.x unless FLTK\_ABI\_VERSION is 10303 or higher)

**31.135.4.38 linenumbers\_bgcolor()**

```
void Fl_Text_Display::linenumbers_bgcolor (
 Fl_Color val)
```

Set the background color used for line numbers (if enabled).

## Version

1.3.3 ABI feature (ignored in 1.3.x unless FLTK\_ABI\_VERSION is 10303 or higher)

**31.135.4.39 linenumbers\_fgcolor()**

```
void Fl_Text_Display::linenumbers_fgcolor (
 Fl_Color val)
```

Set the foreground color used for line numbers (if enabled).

## Version

1.3.3 ABI feature (ignored in 1.3.x unless FLTK\_ABI\_VERSION is 10303 or higher)

**31.135.4.40** `linenumber_font()`

```
void Fl_Text_Display::linenumber_font (
 Fl_Font val)
```

Set the font used for line numbers (if enabled).

**Version**

1.3.3 ABI feature (ignored in 1.3.x unless FLTK\_ABI\_VERSION is 10303 or higher)

**31.135.4.41** `linenumber_format()`

```
void Fl_Text_Display::linenumber_format (
 const char * val)
```

Sets the printf() style format string used for line numbers.

Default is "%d" for normal unpadded decimal integers.

An internal copy of `val` is allocated and managed; it is automatically freed whenever a new value is assigned, or when the widget is destroyed.

The value of `val` must *not* be NULL.

Example values:

```
- "%d" -- For normal line numbers without padding (Default)
- "%03d" -- For 000 padding
- "%x" -- For hexadecimal line numbers
- "%o" -- For octal line numbers
```

**Version**

1.3.3 ABI feature (ignored in 1.3.x unless FLTK\_ABI\_VERSION is 10303 or higher)

**31.135.4.42** `linenumber_size()`

```
void Fl_Text_Display::linenumber_size (
 Fl_Fontsize val)
```

Set the font size used for line numbers (if enabled).

**Version**

1.3.3 ABI feature (ignored in 1.3.x unless FLTK\_ABI\_VERSION is 10303 or higher)

**31.135.4.43** `linenumber_width()`

```
void Fl_Text_Display::linenumber_width (
 int width)
```

Set width of screen area for line numbers.

Use to also enable/disable line numbers. A value of 0 disables line numbering, values >0 enable the line number display.

**Parameters**

|                    |                                                                                                    |
|--------------------|----------------------------------------------------------------------------------------------------|
| <code>width</code> | The new width of the area for line numbers to appear, in pixels. 0 disables line numbers (default) |
|--------------------|----------------------------------------------------------------------------------------------------|

**31.135.4.44** `longest_vline()`

```
int Fl_Text_Display::longest_vline () const [protected]
```

Find the longest line of all visible lines.

#### Returns

the width of the longest visible line in pixels

#### 31.135.4.45 maintain\_absolute\_top\_line\_number()

```
void Fl_Text_Display::maintain_absolute_top_line_number (
 int state) [protected]
```

Line numbering stuff, currently unused.

In continuous wrap mode, internal line numbers are calculated after wrapping. A separate non-wrapped line count is maintained when line numbering is turned on. There is some performance cost to maintaining this line count, so normally absolute line numbers are not tracked if line numbering is off. This routine allows callers to specify that they still want this line count maintained (for use via TextDPosToLineAndCol). More specifically, this allows the line number reported in the statistics line to be calibrated in absolute lines, rather than post-wrapped lines.

#### 31.135.4.46 maintaining\_absolute\_top\_line\_number()

```
int Fl_Text_Display::maintaining_absolute_top_line_number () const [protected]
```

Line numbering stuff, currently unused.

Return true if a separate absolute top line number is being maintained (for displaying line numbers or showing in the statistics line).

#### 31.135.4.47 measure\_deleted\_lines()

```
void Fl_Text_Display::measure_deleted_lines (
 int pos,
 int nDeleted) [protected]
```

Wrapping calculations.

This is a stripped-down version of the findWrapRange() function above, intended to be used to calculate the number of "deleted" lines during a buffer modification. It is called *before* the modification takes place.

This function should only be called in continuous wrap mode with a non-fixed font width. In that case, it is impossible to calculate the number of deleted lines, because the necessary style information is no longer available *after* the modification. In other cases, we can still perform the calculation afterwards (possibly even more efficiently).

#### Parameters

|                 |  |
|-----------------|--|
| <i>pos</i>      |  |
| <i>nDeleted</i> |  |

#### 31.135.4.48 measure\_proportional\_character()

```
double Fl_Text_Display::measure_proportional_character (
 const char * s,
 int xPix,
 int pos) const [protected]
```

Wrapping calculations.

Measure the width in pixels of the first character of string "s" at a particular column "colNum" and buffer position "pos". This is for measuring characters in proportional or mixed-width highlighting fonts.

A note about proportional and mixed-width fonts: the mixed width and proportional font code in nedit does not get much use in general editing, because nedit doesn't allow per-language-mode fonts, and editing programs in a proportional font is usually a bad idea, so very few users would choose a proportional font as a default. There are still probably mixed-width syntax highlighting cases where things don't redraw properly for insertion/deletion, though static display and wrapping and resizing should now be solid because they are now used for online help display.

**Parameters**

|             |                                                    |
|-------------|----------------------------------------------------|
| <i>s</i>    | text string                                        |
| <i>xPix</i> | x pixel position needed for calculating tab widths |
| <i>pos</i>  | offset within string                               |

**Returns**

width of character in pixels

**31.135.4.49 measure\_vline()**

```
int Fl_Text_Display::measure_vline (
 int visLineNum) const [protected]
```

Returns the width in pixels of the displayed line pointed to by "visLineNum".

**Parameters**

|                   |                                |
|-------------------|--------------------------------|
| <i>visLineNum</i> | index into visible lines array |
|-------------------|--------------------------------|

**Returns**

width of line in pixels

**31.135.4.50 move\_down()**

```
int Fl_Text_Display::move_down ()
```

Moves the current insert position down one line.

**Returns**

1 if the cursor moved, 0 if the beginning of the text was reached

**31.135.4.51 move\_left()**

```
int Fl_Text_Display::move_left ()
```

Moves the current insert position left one character.

**Returns**

1 if the cursor moved, 0 if the beginning of the text was reached

**31.135.4.52 move\_right()**

```
int Fl_Text_Display::move_right ()
```

Moves the current insert position right one character.

**Returns**

1 if the cursor moved, 0 if the end of the text was reached

**31.135.4.53 move\_up()**

```
int Fl_Text_Display::move_up ()
```

Moves the current insert position up one line.

**Returns**

1 if the cursor moved, 0 if the beginning of the text was reached

**31.135.4.54 offset\_line\_starts()**

```
void Fl_Text_Display::offset_line_starts (
 int newTopLineNum) [protected]
```

Offset line start counters for a new vertical scroll position.

Offset the line starts array, mTopLineNum, mFirstChar and lastChar, for a new vertical scroll position given by new↵TopLineNum. If any currently displayed lines will still be visible, salvage the line starts values, otherwise, count lines from the nearest known line start (start or end of buffer, or the closest value in the mLineStarts array)

**Parameters**

|                      |                   |
|----------------------|-------------------|
| <i>newTopLineNum</i> | index into buffer |
|----------------------|-------------------|

**31.135.4.55 overstrike()**

```
void Fl_Text_Display::overstrike (
 const char * text)
```

Replaces text at the current insert position.

**Parameters**

|             |                            |
|-------------|----------------------------|
| <i>text</i> | new text in UTF-8 encoding |
|-------------|----------------------------|

**Todo** Unicode? Find out exactly what we do here and simplify.

**31.135.4.56 position\_style()**

```
int Fl_Text_Display::position_style (
 int lineStartPos,
 int lineLen,
 int lineIndex) const
```

Find the correct style for a character.

Determine the drawing method to use to draw a specific character from "buf". lineStartPos gives the character index where the line begins, lineIndex, the number of characters past the beginning of the line, and line↵Index the number of displayed characters past the beginning of the line. Passing lineStartPos of -1 returns the drawing style for "no text".

Why not just: position\_style(pos)? Because style applies to blank areas of the window beyond the text boundaries, and because this routine must also decide whether a position is inside of a rectangular [Fl\\_Text\\_Selection](#), and do so efficiently, without re-counting character positions from the start of the line.

Note that style is a somewhat incorrect name, drawing method would be more appropriate.

**Parameters**

|                     |                        |
|---------------------|------------------------|
| <i>lineStartPos</i> | beginning of this line |
|---------------------|------------------------|

## Parameters

|                  |                                   |
|------------------|-----------------------------------|
| <i>lineLen</i>   | number of bytes in line           |
| <i>lineIndex</i> | position of character within line |

## Returns

style for the given character

**31.135.4.57 position\_to\_line()**

```
int Fl_Text_Display::position_to_line (
 int pos,
 int * lineNum) const [protected]
```

Convert a position index into a line number offset.

Find the line number of position `pos` relative to the first line of displayed text. Returns 0 if the line is not displayed.

## Parameters

|     |                |    |
|-----|----------------|----|
|     | <i>pos</i>     | ?? |
| out | <i>lineNum</i> | ?? |

## Returns

??

**Todo** What does this do?

**31.135.4.58 position\_to\_linecol()**

```
int Fl_Text_Display::position_to_linecol (
 int pos,
 int * lineNum,
 int * column) const [protected]
```

Find the line and column number of position `pos`.

This only works for displayed lines. If the line is not displayed, the function returns 0 (without the `mLineStarts` array it could turn in to very long calculation involving scanning large amounts of text in the buffer). If continuous wrap mode is on, returns the absolute line number (as opposed to the wrapped line number which is used for scrolling).

## Parameters

|     |                |                                               |
|-----|----------------|-----------------------------------------------|
|     | <i>pos</i>     | character index                               |
| out | <i>lineNum</i> | absolute (unwrapped) line number              |
| out | <i>column</i>  | character offset to the beginning of the line |

## Returns

0 if `pos` is off screen, line number otherwise

**Todo** a column number makes little sense in the UTF-8/variable font width environment. We will have to further define what exactly we want to return. Please check the functions that call this particular function.

**31.135.4.59 position\_to\_xy()**

```
int Fl_Text_Display::position_to_xy (
 int pos,
 int * X,
 int * Y) const
```

Convert a character index into a pixel position.

Translate a buffer text position to the XY location where the top left of the cursor would be positioned to point to that character. Returns 0 if the position is not displayed because it is **vertically out** of view. If the position is horizontally out of view, returns the X coordinate where the position would be if it were visible.

**Parameters**

|     |             |                                       |
|-----|-------------|---------------------------------------|
|     | <i>pos</i>  | character index                       |
| out | <i>X, Y</i> | pixel position of character on screen |

**Returns**

0 if character vertically out of view, X & Y positions otherwise

**31.135.4.60 redisplay\_range()**

```
void Fl_Text_Display::redisplay_range (
 int startpos,
 int endpos)
```

Marks text from start to end as needing a redraw.

This function will trigger a damage event and later a redraw of parts of the widget.

**Parameters**

|                 |                                           |
|-----------------|-------------------------------------------|
| <i>startpos</i> | index of first character needing redraw   |
| <i>endpos</i>   | index after last character needing redraw |

**31.135.4.61 reset\_absolute\_top\_line\_number()**

```
void Fl_Text_Display::reset_absolute_top_line_number () [protected]
```

Line numbering stuff, probably unused.

Count lines from the beginning of the buffer to reestablish the absolute (non-wrapped) top line number. If mode is not continuous wrap, or the number is not being maintained, does nothing.

**31.135.4.62 resize()**

```
void Fl_Text_Display::resize (
 int X,
 int Y,
 int W,
 int H) [virtual]
```

Change the size of the displayed text area.

Calling this function will trigger a recalculation of all lines visible and of all scrollbar sizes.

**Parameters**

|                   |                                      |
|-------------------|--------------------------------------|
| <i>X, Y, W, H</i> | new position and size of this widget |
|-------------------|--------------------------------------|



Reimplemented from [Fl\\_Group](#).

### 31.135.4.63 `rewind_lines()`

```
int Fl_Text_Display::rewind_lines (
 int startPos,
 int nLines)
```

Skip a number of lines back.

Same as `BufCountBackwardNLines`, but takes into account line breaks when wrapping is turned on.

#### Parameters

|                 |                              |
|-----------------|------------------------------|
| <i>startPos</i> | index to starting character  |
| <i>nLines</i>   | number of lines to skip back |

#### Returns

new position as index

### 31.135.4.64 `scroll()`

```
void Fl_Text_Display::scroll (
 int topLineNum,
 int horizOffset)
```

Scrolls the current buffer to start at the specified line and column.

#### Parameters

|                    |                 |
|--------------------|-----------------|
| <i>topLineNum</i>  | top line number |
| <i>horizOffset</i> | column number   |

**Todo** Column numbers make little sense here.

### 31.135.4.65 `scroll_()`

```
int Fl_Text_Display::scroll_ (
 int topLineNum,
 int horizOffset) [protected]
```

Scrolls the current buffer to start at the specified line and column.

#### Parameters

|                    |                 |
|--------------------|-----------------|
| <i>topLineNum</i>  | top line number |
| <i>horizOffset</i> | in pixels       |

**Returns**

0 if nothing changed, 1 if we scrolled

**31.135.4.66 scroll\_timer\_cb()**

```
void Fl_Text_Display::scroll_timer_cb (
 void * user_data) [static], [protected]
```

Timer callback for scroll events.

This timer event scrolls the text view proportionally to how far the mouse pointer has left the text area. This allows for smooth scrolling without "wiggeling" the mouse.

**31.135.4.67 scrollbar\_align() [1/2]**

```
Fl_Align Fl_Text_Display::scrollbar_align () const [inline]
```

Gets the scrollbar alignment type.

**Returns**

scrollbar alignment

**31.135.4.68 scrollbar\_align() [2/2]**

```
void Fl_Text_Display::scrollbar_align (
 Fl_Align a) [inline]
```

Sets the scrollbar alignment type.

**Parameters**

|          |                         |
|----------|-------------------------|
| <i>a</i> | new scrollbar alignment |
|----------|-------------------------|

**31.135.4.69 scrollbar\_width() [1/2]**

```
int Fl_Text_Display::scrollbar_width () const [inline]
```

Gets the width/height of the scrollbars.

**Returns**

width of scrollbars

**31.135.4.70 scrollbar\_width() [2/2]**

```
void Fl_Text_Display::scrollbar_width (
 int W) [inline]
```

Sets the width/height of the scrollbars.

**Parameters**

|          |                     |
|----------|---------------------|
| <i>W</i> | width of scrollbars |
|----------|---------------------|

**31.135.4.71 shortcut()** [1/2]

```
int Fl_Text_Display::shortcut () const [inline]
```

**Todo** FIXME : get set methods pointing on shortcut\_ have no effects as shortcut\_ is unused in this class and derived!

**Returns**

the current shortcut key

**31.135.4.72 shortcut()** [2/2]

```
void Fl_Text_Display::shortcut (
 int s) [inline]
```

**Todo** FIXME : get set methods pointing on shortcut\_ have no effects as shortcut\_ is unused in this class and derived!

**Parameters**

|          |                      |
|----------|----------------------|
| <i>s</i> | the new shortcut key |
|----------|----------------------|

**31.135.4.73 show\_cursor()**

```
void Fl_Text_Display::show_cursor (
 int b = 1)
```

Shows the text cursor.

This function may trigger a redraw.

**Parameters**

|          |                                             |
|----------|---------------------------------------------|
| <i>b</i> | show(1) or hide(0) the text cursor (caret). |
|----------|---------------------------------------------|

**31.135.4.74 show\_insert\_position()**

```
void Fl_Text_Display::show_insert_position ()
```

Scrolls the text buffer to show the current insert position.

This function triggers a complete recalculation, ending in a call to [Fl\\_Text\\_Display::display\\_insert\(\)](#)

**31.135.4.75 skip\_lines()**

```
int Fl_Text_Display::skip_lines (
 int startPos,
 int nLines,
 bool startPosIsLineStart)
```

Skip a number of lines forward.

Same as BufCountForwardNLines, but takes into account line breaks when wrapping is turned on. If the caller knows that startPos is at a line start, it can pass "startPosIsLineStart" as True to make the call more efficient by avoiding the additional step of scanning back to the last newline.

## Parameters

|                            |                                       |
|----------------------------|---------------------------------------|
| <i>startPos</i>            | index to starting character           |
| <i>nLines</i>              | number of lines to skip ahead         |
| <i>startPosIsLineStart</i> | avoid scanning back to the line start |

## Returns

new position as index

**31.135.4.76 string\_width()**

```
double Fl_Text_Display::string_width (
 const char * string,
 int length,
 int style) const [protected]
```

Find the width of a string in the font of a particular style.

## Parameters

|               |                           |
|---------------|---------------------------|
| <i>string</i> | the text                  |
| <i>length</i> | number of bytes in string |
| <i>style</i>  | index into style table    |

## Returns

width of text segment in pixels

**31.135.4.77 textcolor() [1/2]**

```
Fl_Color Fl_Text_Display::textcolor () const [inline]
```

Gets the default color of text in the widget.

## Returns

text color unless overridden by a style

**31.135.4.78 textcolor() [2/2]**

```
void Fl_Text_Display::textcolor (
 Fl_Color n) [inline]
```

Sets the default color of text in the widget.

## Parameters

|          |                |
|----------|----------------|
| <i>n</i> | new text color |
|----------|----------------|

**31.135.4.79 textfont() [1/2]**

```
Fl_Font Fl_Text_Display::textfont () const [inline]
```

Gets the default font used when drawing text in the widget.

**Returns**

current text font face unless overridden by a style

**31.135.4.80 textfont() [2/2]**

```
void Fl_Text_Display::textfont (
 Fl_Font s) [inline]
```

Sets the default font used when drawing text in the widget.

**Parameters**

|   |                        |
|---|------------------------|
| s | default text font face |
|---|------------------------|

**31.135.4.81 textsize() [1/2]**

```
Fl_Fontsize Fl_Text_Display::textsize () const [inline]
```

Gets the default size of text in the widget.

**Returns**

current text height unless overridden by a style

**31.135.4.82 textsize() [2/2]**

```
void Fl_Text_Display::textsize (
 Fl_Fontsize s) [inline]
```

Sets the default size of text in the widget.

**Parameters**

|   |               |
|---|---------------|
| s | new text size |
|---|---------------|

**31.135.4.83 update\_h\_scrollbar()**

```
void Fl_Text_Display::update_h_scrollbar () [protected]
```

Update horizontal scrollbar.

Update the minimum, maximum, slider size, page increment, and value for the horizontal scrollbar.

**31.135.4.84 update\_line\_starts()**

```
void Fl_Text_Display::update_line_starts (
 int pos,
 int charsInserted,
 int charsDeleted,
 int linesInserted,
 int linesDeleted,
 int * scrolled) [protected]
```

Update line start arrays and variables.

Update the line starts array, mTopLineNum, mFirstChar and lastChar for this text display after a modification to the text buffer, given by the position `pos` where the change began, and the numbers of characters and lines inserted and deleted.

## Parameters

|     |                      |                                                   |
|-----|----------------------|---------------------------------------------------|
|     | <i>pos</i>           | index into buffer of recent changes               |
|     | <i>charsInserted</i> | number of bytes(!) inserted                       |
|     | <i>charsDeleted</i>  | number of bytes(!) deleted                        |
|     | <i>linesInserted</i> | number of lines                                   |
|     | <i>linesDeleted</i>  | number of lines                                   |
| out | <i>scrolled</i>      | set to 1 if the text display needs to be scrolled |

**31.135.4.85 update\_v\_scrollbar()**

```
void Fl_Text_Display::update_v_scrollbar () [protected]
```

Update vertical scrollbar.

Update the minimum, maximum, slider size, page increment, and value for the vertical scrollbar.

**31.135.4.86 vline\_length()**

```
int Fl_Text_Display::vline_length (
 int visLineNum) const [protected]
```

Count number of bytes in a visible line.

Return the length of a line (number of bytes) by examining entries in the line starts array rather than by scanning for newlines.

## Parameters

|                   |                                     |
|-------------------|-------------------------------------|
| <i>visLineNum</i> | index of line in visible line array |
|-------------------|-------------------------------------|

## Returns

number of bytes in this line

**31.135.4.87 word\_end()**

```
int Fl_Text_Display::word_end (
 int pos) const [inline]
```

Moves the insert position to the end of the current word.

## Parameters

|            |                                 |
|------------|---------------------------------|
| <i>pos</i> | start calculation at this index |
|------------|---------------------------------|

## Returns

index of first character after the end of the word

**31.135.4.88 word\_start()**

```
int Fl_Text_Display::word_start (
 int pos) const [inline]
```

Moves the insert position to the beginning of the current word.

## Parameters

|            |                                 |
|------------|---------------------------------|
| <i>pos</i> | start calculation at this index |
|------------|---------------------------------|

## Returns

beginning of the words

**31.135.4.89 wrap\_mode()**

```
void Fl_Text_Display::wrap_mode (
 int wrap,
 int wrapMargin)
```

Set the new text wrap mode.

If *wrap* mode is not zero, this call enables automatic word wrapping at column *wrapMargin*. Word-wrapping does not change the text buffer itself, only the way the text is displayed. Different Text Displays can have different wrap modes, even if they share the same Text Buffer.

## Parameters

|                   |                                                                                                                                                                                                                                                                                                                                                               |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>wrap</i>       | new wrap mode is WRAP_NONE (don't wrap text at all), WRAP_AT_COLUMN (wrap text at the given text column), WRAP_AT_PIXEL (wrap text at a pixel position), or WRAP_AT_BOUNDS (wrap text so that it fits into the widget width)                                                                                                                                  |
| <i>wrapMargin</i> | in WRAP_AT_COLUMN mode, text will wrap at the n'th character. For variable width fonts, an average character width is calculated. The column width is calculated using the current textfont or the first style when this function is called. If the font size changes, this function must be called again. In WRAP_AT_PIXEL mode, this is the pixel position. |

**Todo** we need new wrap modes to wrap at the window edge and based on pixel width or average character width.

**31.135.4.90 wrap\_uses\_character()**

```
int Fl_Text_Display::wrap_uses_character (
 int lineEndPos) const [protected]
```

Check if the line break is caused by a `\n` or by line wrapping.

Line breaks in continuous wrap mode usually happen at newlines or whitespace. This line-terminating character is not included in line width measurements and has a special status as a non-visible character. However, lines with no whitespace are wrapped without the benefit of a line terminating character, and this distinction causes endless trouble with all of the text display code which was originally written without continuous wrap mode and always expects to wrap at a newline character.

Given the position of the end of the line, as returned by `TextEndOfLine` or `BufEndOfLine`, this returns true if there is a line terminating character, and false if there's not. On the last character in the buffer, this function can't tell for certain whether a trailing space was used as a wrap point, and just guesses that it wasn't. So if an exact accounting is necessary, don't use this function.

## Parameters

|                   |                                         |
|-------------------|-----------------------------------------|
| <i>lineEndPos</i> | index of character where the line wraps |
|-------------------|-----------------------------------------|

## Returns

1 if a `\n` character causes the line wrap

**31.135.4.91 wrapped\_column()**

```
int Fl_Text_Display::wrapped_column (
 int row,
 int column) const
```

Nobody knows what this function does.

Correct a column number based on an unconstrained position (as returned by TextDXYToUnconstrainedPosition) to be relative to the last actual newline in the buffer before the row and column position given, rather than the last line start created by line wrapping. This is an adapter for rectangular selections and code written before continuous wrap mode, which thinks that the unconstrained column is the number of characters from the last newline. Obviously this is time consuming, because it involves character re-counting.

**Parameters**

|               |  |
|---------------|--|
| <i>row</i>    |  |
| <i>column</i> |  |

**Returns**

something unknown

**Todo** What does this do and how is it useful? Column numbers mean little in this context. Which functions depend on this one?

**Todo** Unicode?

**31.135.4.92 wrapped\_line\_counter()**

```
void Fl_Text_Display::wrapped_line_counter (
 Fl_Text_Buffer * buf,
 int startPos,
 int maxPos,
 int maxLines,
 bool startPosIsLineStart,
 int styleBufOffset,
 int * retPos,
 int * retLines,
 int * retLineStart,
 int * retLineEnd,
 bool countLastLineMissingNewLine = true) const [protected]
```

Wrapping calculations.

Count forward from startPos to either maxPos or maxLines (whichever is reached first), and return all relevant positions and line count. The provided textBuffer may differ from the actual text buffer of the widget. In that case it must be a (partial) copy of the actual text buffer and the styleBufOffset argument must indicate the starting position of the copy, to take into account the correct style information.

**Parameters**

|     |                            |                                                                                                                                        |
|-----|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| in  | <i>buf</i>                 | The text buffer to operate on                                                                                                          |
| in  | <i>startPos</i>            | Starting index position into the buffer                                                                                                |
| in  | <i>maxPos</i>              | Maximum index position into the buffer we'll reach                                                                                     |
| in  | <i>maxLines</i>            | Maximum number of lines we'll reach                                                                                                    |
| in  | <i>startPosIsLineStart</i> | Flag indicating if startPos is start of line. (If set, prevents our having to find the line start)                                     |
| in  | <i>styleBufOffset</i>      | Offset index position into style buffer.                                                                                               |
| out | <i>retPos</i>              | Position where counting ended. When counting lines, the position returned is the start of the line "maxLines" lines beyond "startPos". |



## Parameters

|     |                                    |                                         |
|-----|------------------------------------|-----------------------------------------|
| out | <i>retLines</i>                    | Number of line breaks counted           |
| out | <i>retLineStart</i>                | Start of the line where counting ended  |
| out | <i>retLineEnd</i>                  | End position of the last line traversed |
| out | <i>countLastLineMissingNewLine</i> |                                         |

**31.135.4.93 wrapped\_row()**

```
int Fl_Text_Display::wrapped_row (
 int row) const
```

Nobody knows what this function does.

Correct a row number from an unconstrained position (as returned by `TextDXYToUnconstrainedPosition`) to a straight number of newlines from the top line of the display. Because rectangular selections are based on newlines, rather than display wrapping, and anywhere a rectangular selection needs a row, it needs it in terms of un-wrapped lines.

## Parameters

|            |  |
|------------|--|
| <i>row</i> |  |
|------------|--|

## Returns

something unknown

**Todo** What does this do and how is it useful? Column numbers mean little in this context. Which functions depend on this one?

**31.135.4.94 x\_to\_col()**

```
double Fl_Text_Display::x_to_col (
 double x) const
```

Convert an x pixel position into a column number.

## Parameters

|          |                                       |
|----------|---------------------------------------|
| <i>x</i> | number of pixels from the left margin |
|----------|---------------------------------------|

## Returns

an approximate column number based on the main font

**31.135.4.95 xy\_to\_position()**

```
int Fl_Text_Display::xy_to_position (
 int X,
 int Y,
 int posType = CHARACTER_POS) const [protected]
```

Translate a pixel position into a character index.

Translate window coordinates to the nearest (insert cursor or character cell) text position. The parameter `posType` specifies how to interpret the position: `CURSOR_POS` means translate the coordinates to the nearest cursor position, and `CHARACTER_POS` means return the position of the character closest to (X, Y).

## Parameters

|                |                             |
|----------------|-----------------------------|
| <i>X, Y</i>    | pixel position              |
| <i>posType</i> | CURSOR_POS or CHARACTER_POS |

## Returns

index into text buffer

**31.135.4.96 xy\_to\_rowcol()**

```
void Fl_Text_Display::xy_to_rowcol (
 int X,
 int Y,
 int * row,
 int * column,
 int posType = CHARACTER_POS) const [protected]
```

Translate pixel coordinates into row and column.

Translate window coordinates to the nearest row and column number for positioning the cursor. This, of course, makes no sense when the font is proportional, since there are no absolute columns. The parameter *posType* specifies how to interpret the position: CURSOR\_POS means translate the coordinates to the nearest position between characters, and CHARACTER\_POS means translate the position to the nearest character cell.

## Parameters

|     |                    |                             |
|-----|--------------------|-----------------------------|
|     | <i>X, Y</i>        | pixel coordinates           |
| out | <i>row, column</i> | nearest row and column      |
|     | <i>posType</i>     | CURSOR_POS or CHARACTER_POS |

The documentation for this class was generated from the following files:

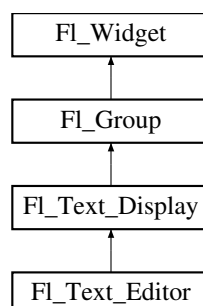
- Fl\_Text\_Display.H
- Fl\_Text\_Display.cxx

**31.136 Fl\_Text\_Editor Class Reference**

This is the FLTK text editor widget.

```
#include <Fl_Text_Editor.H>
```

Inheritance diagram for Fl\_Text\_Editor:

**Classes**

- struct [Key\\_Binding](#)

*Simple linked list item associating a key/state to a function.*

## Public Types

- typedef int(\* [Key\\_Func](#)) (int key, [FI\\_Text\\_Editor](#) \*editor)  
*Key function binding callback type.*

## Public Member Functions

- void [add\\_default\\_key\\_bindings](#) ([Key\\_Binding](#) \*\*list)  
*Adds all of the default editor key bindings to the specified key binding list.*
- void [add\\_key\\_binding](#) (int key, int state, [Key\\_Func](#) f)  
*Adds a key of state state with the function f.*
- void [add\\_key\\_binding](#) (int key, int state, [Key\\_Func](#) f, [Key\\_Binding](#) \*\*list)  
*Adds a key of state state with the function function to an arbitrary key binding list list.*
- [Key\\_Func](#) [bound\\_key\\_function](#) (int key, int state) const  
*Returns the function associated with a key binding.*
- [Key\\_Func](#) [bound\\_key\\_function](#) (int key, int state, [Key\\_Binding](#) \*list) const  
*Returns the function associated with a key binding.*
- void [default\\_key\\_function](#) ([Key\\_Func](#) f)  
*Sets the default key function for unassigned keys.*
- [FI\\_Text\\_Editor](#) (int X, int Y, int W, int H, const char \*|=0)  
*The constructor creates a new text editor widget.*
- virtual int [handle](#) (int e)  
*Event handling.*
- int [insert\\_mode](#) ()  
*Gets the current insert mode; if non-zero, new text is inserted before the current cursor position.*
- void [insert\\_mode](#) (int b)  
*Sets the current insert mode; if non-zero, new text is inserted before the current cursor position.*
- void [remove\\_all\\_key\\_bindings](#) ()  
*Removes all of the key bindings associated with the text editor or list.*
- void [remove\\_all\\_key\\_bindings](#) ([Key\\_Binding](#) \*\*list)  
*Removes all of the key bindings associated with the text editor or list.*
- void [remove\\_key\\_binding](#) (int key, int state)  
*Removes the key binding associated with the key "key" of state "state".*
- void [remove\\_key\\_binding](#) (int key, int state, [Key\\_Binding](#) \*\*list)  
*Removes the key binding associated with the key key of state state from the Key\_Binding list list.*
- int [tab\\_nav](#) () const  
*Check if Tab focus navigation is enabled.*
- void [tab\\_nav](#) (int val)  
*Enables or disables Tab key focus navigation.*

## Static Public Member Functions

- static int [kf\\_backspace](#) (int c, [FI\\_Text\\_Editor](#) \*e)  
*Does a backspace for key 'c' in the current buffer of editor 'e'.*
- static int [kf\\_c\\_s\\_move](#) (int c, [FI\\_Text\\_Editor](#) \*e)  
*Extends the current selection in the direction indicated by control key 'c' in editor 'e'.*
- static int [kf\\_copy](#) (int c, [FI\\_Text\\_Editor](#) \*e)  
*Does a copy of selected text or the current character in the current buffer of editor 'e'.*
- static int [kf\\_ctrl\\_move](#) (int c, [FI\\_Text\\_Editor](#) \*e)  
*Moves the current text cursor in the direction indicated by control key 'c' in editor 'e'.*
- static int [kf\\_cut](#) (int c, [FI\\_Text\\_Editor](#) \*e)  
*Does a cut of selected text in the current buffer of editor 'e'.*

- static int [kf\\_default](#) (int c, [FI\\_Text\\_Editor](#) \*e)  
*Inserts the text associated with key 'c' in editor 'e'.*
- static int [kf\\_delete](#) (int c, [FI\\_Text\\_Editor](#) \*e)  
*Does a delete of selected text or the current character in the current buffer of editor 'e'.*
- static int [kf\\_down](#) (int c, [FI\\_Text\\_Editor](#) \*e)  
*Moves the text cursor one line down for editor 'e'.*
- static int [kf\\_end](#) (int c, [FI\\_Text\\_Editor](#) \*e)  
*Moves the text cursor to the end of the current line in editor 'e'.*
- static int [kf\\_enter](#) (int c, [FI\\_Text\\_Editor](#) \*e)  
*Inserts a newline for key 'c' at the current cursor position in editor 'e'.*
- static int [kf\\_home](#) (int, [FI\\_Text\\_Editor](#) \*e)  
*Moves the text cursor to the beginning of the current line in editor 'e'.*
- static int [kf\\_ignore](#) (int c, [FI\\_Text\\_Editor](#) \*e)  
*Ignores the key 'c' in editor 'e'.*
- static int [kf\\_insert](#) (int c, [FI\\_Text\\_Editor](#) \*e)  
*Toggles the insert mode for editor 'e'.*
- static int [kf\\_left](#) (int c, [FI\\_Text\\_Editor](#) \*e)  
*Moves the text cursor one character to the left in editor 'e'.*
- static int [kf\\_m\\_s\\_move](#) (int c, [FI\\_Text\\_Editor](#) \*e)  
*Extends the current selection in the direction indicated by meta key 'c' in editor 'e'.*
- static int [kf\\_meta\\_move](#) (int c, [FI\\_Text\\_Editor](#) \*e)  
*Moves the current text cursor in the direction indicated by meta key 'c' in editor 'e'.*
- static int [kf\\_move](#) (int c, [FI\\_Text\\_Editor](#) \*e)  
*Moves the text cursor in the direction indicated by key 'c' in editor 'e'.*
- static int [kf\\_page\\_down](#) (int c, [FI\\_Text\\_Editor](#) \*e)  
*Moves the text cursor down one page for editor 'e'.*
- static int [kf\\_page\\_up](#) (int c, [FI\\_Text\\_Editor](#) \*e)  
*Moves the text cursor up one page for editor 'e'.*
- static int [kf\\_paste](#) (int c, [FI\\_Text\\_Editor](#) \*e)  
*Does a paste of selected text in the current buffer of editor 'e'.*
- static int [kf\\_right](#) (int c, [FI\\_Text\\_Editor](#) \*e)  
*Moves the text cursor one character to the right for editor 'e'.*
- static int [kf\\_select\\_all](#) (int c, [FI\\_Text\\_Editor](#) \*e)  
*Selects all text in the current buffer in editor 'e'.*
- static int [kf\\_shift\\_move](#) (int c, [FI\\_Text\\_Editor](#) \*e)  
*Extends the current selection in the direction of key 'c' in editor 'e'.*
- static int [kf\\_undo](#) (int c, [FI\\_Text\\_Editor](#) \*e)  
*Undo last edit in the current buffer of editor 'e'.*
- static int [kf\\_up](#) (int c, [FI\\_Text\\_Editor](#) \*e)  
*Moves the text cursor one line up for editor 'e'.*

### Protected Member Functions

- int [handle\\_key](#) ()  
*Handles a key press in the editor.*
- void [maybe\\_do\\_callback](#) ()  
*does or does not a callback according to [changed\(\)](#) and [when\(\)](#) settings*

### Static Protected Attributes

- static [Key\\_Binding](#) \* [global\\_key\\_bindings](#)  
*Global key binding list.*

## Additional Inherited Members

### 31.136.1 Detailed Description

This is the FLTK text editor widget.

It allows the user to edit multiple lines of text and supports highlighting and scrolling. The buffer that is displayed in the widget is managed by the [Fl\\_Text\\_Buffer](#) class.

### 31.136.2 Member Function Documentation

#### 31.136.2.1 add\_key\_binding()

```
void Fl_Text_Editor::add_key_binding (
 int key,
 int state,
 Key_Func function,
 Key_Binding ** list)
```

Adds a key of state `state` with the function `function` to an arbitrary key binding list `list`.

This can be used in derived classes to add global key bindings by using the global (static) [Key\\_Binding](#) list [Fl\\_Text\\_Editor::global\\_key\\_bindings](#).

#### 31.136.2.2 insert\_mode() [1/2]

```
int Fl_Text_Editor::insert_mode () [inline]
```

Gets the current insert mode; if non-zero, new text is inserted before the current cursor position.

Otherwise, new text replaces text at the current cursor position.

#### 31.136.2.3 insert\_mode() [2/2]

```
void Fl_Text_Editor::insert_mode (
 int b) [inline]
```

Sets the current insert mode; if non-zero, new text is inserted before the current cursor position.

Otherwise, new text replaces text at the current cursor position.

#### 31.136.2.4 kf\_backspace()

```
int Fl_Text_Editor::kf_backspace (
 int c,
 Fl_Text_Editor * e) [static]
```

Does a backspace for key 'c' in the current buffer of editor 'e'.

Any current selection is deleted. Otherwise, the character left is deleted and the cursor moved. The key value 'c' is currently unused.

#### 31.136.2.5 kf\_c\_s\_move()

```
int Fl_Text_Editor::kf_c_s_move (
 int c,
 Fl_Text_Editor * e) [static]
```

Extends the current selection in the direction indicated by control key 'c' in editor 'e'.

See also

[kf\\_ctrl\\_move\(\)](#).

**31.136.2.6 kf\_copy()**

```
int Fl_Text_Editor::kf_copy (
 int c,
 Fl_Text_Editor * e) [static]
```

Does a copy of selected text or the current character in the current buffer of editor 'e'.  
The key value 'c' is currently unused.

**31.136.2.7 kf\_ctrl\_move()**

```
int Fl_Text_Editor::kf_ctrl_move (
 int c,
 Fl_Text_Editor * e) [static]
```

Moves the current text cursor in the direction indicated by control key 'c' in editor 'e'.

Supported values for 'c' are currently:

```
FL_Home -- moves the cursor to the beginning of the document
FL_End -- moves the cursor to the end of the document
FL_Left -- moves the cursor left one word
FL_Right -- moves the cursor right one word
FL_Up -- scrolls up one line, without moving cursor
FL_Down -- scrolls down one line, without moving cursor
FL_Page_Up -- moves the cursor to the beginning of the top line on the current page
FL_Page_Down -- moves the cursor to the beginning of the last line on the current page
```

**31.136.2.8 kf\_cut()**

```
int Fl_Text_Editor::kf_cut (
 int c,
 Fl_Text_Editor * e) [static]
```

Does a cut of selected text in the current buffer of editor 'e'.  
The key value 'c' is currently unused.

**31.136.2.9 kf\_default()**

```
int Fl_Text_Editor::kf_default (
 int c,
 Fl_Text_Editor * e) [static]
```

Inserts the text associated with key 'c' in editor 'e'.  
Honors the current selection and insert/overstrike mode.

**31.136.2.10 kf\_delete()**

```
int Fl_Text_Editor::kf_delete (
 int c,
 Fl_Text_Editor * e) [static]
```

Does a delete of selected text or the current character in the current buffer of editor 'e'.  
The key value 'c' is currently unused.

**31.136.2.11 kf\_down()**

```
int Fl_Text_Editor::kf_down (
 int c,
 Fl_Text_Editor * e) [static]
```

Moves the text cursor one line down for editor 'e'.  
Same as kf\_move(FL\_Down, e). The key value 'c' is currently unused.

**31.136.2.12 kf\_end()**

```
int Fl_Text_Editor::kf_end (
 int c,
 Fl_Text_Editor * e) [static]
```

Moves the text cursor to the end of the current line in editor 'e'.  
Same as `kf_move(FL_End, e)`. The key value 'c' is currently unused.

#### 31.136.2.13 `kf_enter()`

```
int Fl_Text_Editor::kf_enter (
 int c,
 Fl_Text_Editor * e) [static]
```

Inserts a newline for key 'c' at the current cursor position in editor 'e'.  
The key value 'c' is currently unused.

#### 31.136.2.14 `kf_home()`

```
int Fl_Text_Editor::kf_home (
 int ,
 Fl_Text_Editor * e) [static]
```

Moves the text cursor to the beginning of the current line in editor 'e'.  
Same as `kf_move(FL_Home, e)`. The key value 'c' is currently unused.

#### 31.136.2.15 `kf_ignore()`

```
int Fl_Text_Editor::kf_ignore (
 int c,
 Fl_Text_Editor * e) [static]
```

Ignores the key 'c' in editor 'e'.

This method can be used as a keyboard binding to disable a key that might otherwise be handled or entered as text.  
An example would be disabling `FL_Escape`, so that it isn't added to the buffer when invoked by the user.

#### 31.136.2.16 `kf_insert()`

```
int Fl_Text_Editor::kf_insert (
 int c,
 Fl_Text_Editor * e) [static]
```

Toggles the insert mode for editor 'e'.  
The key value 'c' is currently unused.

#### 31.136.2.17 `kf_left()`

```
int Fl_Text_Editor::kf_left (
 int c,
 Fl_Text_Editor * e) [static]
```

Moves the text cursor one character to the left in editor 'e'.  
Same as `kf_move(FL_Left, e)`. The key value 'c' is currently unused.

#### 31.136.2.18 `kf_m_s_move()`

```
int Fl_Text_Editor::kf_m_s_move (
 int c,
 Fl_Text_Editor * e) [static]
```

Extends the current selection in the direction indicated by meta key 'c' in editor 'e'.

See also

[kf\\_meta\\_move\(\)](#).

**31.136.2.19 kf\_meta\_move()**

```
int Fl_Text_Editor::kf_meta_move (
 int c,
 Fl_Text_Editor * e) [static]
```

Moves the current text cursor in the direction indicated by meta key 'c' in editor 'e'.

Supported values for 'c' are currently:

```
FL_Up -- moves cursor to the beginning of the current document
FL_Down -- moves cursor to the end of the current document
FL_Left -- moves the cursor to the beginning of the current line
FL_Right -- moves the cursor to the end of the current line
```

**31.136.2.20 kf\_move()**

```
int Fl_Text_Editor::kf_move (
 int c,
 Fl_Text_Editor * e) [static]
```

Moves the text cursor in the direction indicated by key 'c' in editor 'e'.

Supported values for 'c' are currently:

```
FL_Home -- moves the cursor to the beginning of the current line
FL_End -- moves the cursor to the end of the current line
FL_Left -- moves the cursor left one character
FL_Right -- moves the cursor right one character
FL_Up -- moves the cursor up one line
FL_Down -- moves the cursor down one line
FL_Page_Up -- moves the cursor up one page
FL_Page_Down -- moves the cursor down one page
```

**31.136.2.21 kf\_page\_down()**

```
int Fl_Text_Editor::kf_page_down (
 int c,
 Fl_Text_Editor * e) [static]
```

Moves the text cursor down one page for editor 'e'.

Same as kf\_move(FL\_Page\_Down, e). The key value 'c' is currently unused.

**31.136.2.22 kf\_page\_up()**

```
int Fl_Text_Editor::kf_page_up (
 int c,
 Fl_Text_Editor * e) [static]
```

Moves the text cursor up one page for editor 'e'.

Same as kf\_move(FL\_Page\_Up, e). The key value 'c' is currently unused.

**31.136.2.23 kf\_paste()**

```
int Fl_Text_Editor::kf_paste (
 int c,
 Fl_Text_Editor * e) [static]
```

Does a paste of selected text in the current buffer of editor 'e'.

Any current selection is replaced with the pasted content. The key value 'c' is currently unused.

**31.136.2.24 kf\_right()**

```
int Fl_Text_Editor::kf_right (
 int c,
 Fl_Text_Editor * e) [static]
```

Moves the text cursor one character to the right for editor 'e'.

Same as kf\_move(FL\_Right, e). The key value 'c' is currently unused.



**31.136.2.25 kf\_select\_all()**

```
int Fl_Text_Editor::kf_select_all (
 int c,
 Fl_Text_Editor * e) [static]
```

Selects all text in the current buffer in editor 'e'.  
The key value 'c' is currently unused.

**31.136.2.26 kf\_shift\_move()**

```
int Fl_Text_Editor::kf_shift_move (
 int c,
 Fl_Text_Editor * e) [static]
```

Extends the current selection in the direction of key 'c' in editor 'e'.

See also

[kf\\_move\(\)](#)

**31.136.2.27 kf\_undo()**

```
int Fl_Text_Editor::kf_undo (
 int c,
 Fl_Text_Editor * e) [static]
```

Undo last edit in the current buffer of editor 'e'.  
Also deselects previous selection. The key value 'c' is currently unused.

**31.136.2.28 kf\_up()**

```
int Fl_Text_Editor::kf_up (
 int c,
 Fl_Text_Editor * e) [static]
```

Moves the text cursor one line up for editor 'e'.  
Same as `kf_move(FL_Up, e)`. The key value 'c' is currently unused.

**31.136.2.29 remove\_key\_binding()**

```
void Fl_Text_Editor::remove_key_binding (
 int key,
 int state,
 Key_Binding ** list)
```

Removes the key binding associated with the key `key` of state `state` from the [Key\\_Binding](#) list `list`.  
This can be used in derived classes to remove global key bindings by using the global (static) [Key\\_Binding](#) list `Fl_Text_Editor::global_key_bindings`.

**31.136.2.30 tab\_nav()** [1/2]

```
int Fl_Text_Editor::tab_nav () const
```

Check if Tab focus navigation is enabled.  
If disabled (default), hitting Tab inserts a tab character into the editor buffer.  
If enabled, hitting Tab navigates focus to the next widget, and Shift-Tab navigates focus to the previous widget.

Returns

if Tab inserts tab characters or moves the focus

Return values

|   |                                      |
|---|--------------------------------------|
| 0 | Tab inserts tab characters (default) |
| 1 | Tab navigation is enabled.           |

**See also**

[tab\\_nav\(int\)](#), [Fl::OPTION\\_ARROW\\_FOCUS](#).

**Version**

1.3.4 ABI feature

**31.136.2.31 tab\_nav()** [2/2]

```
void Fl_Text_Editor::tab_nav (
 int val)
```

Enables or disables Tab key focus navigation.

When disabled (default), tab characters are inserted into [Fl\\_Text\\_Editor](#). Only the mouse can change focus. This behavior is desirable when [Fl\\_Text\\_Editor](#) is used, e.g. in a source code editor.

When enabled, Tab navigates focus to the next widget, and Shift-Tab navigates focus to the previous widget. This behavior is desirable when [Fl\\_Text\\_Editor](#) is used e.g. in a database input form.

Currently, this method is implemented as a convenience method that adjusts the key bindings for the Tab key. This implementation detail may change in the future. Know that changing the editor's key bindings for Tab and Shift-Tab may affect tab navigation.

**Parameters**

|    |     |                                                                                                 |
|----|-----|-------------------------------------------------------------------------------------------------|
| in | val | If val is 0, Tab inserts a tab character (default).<br>If val is 1, Tab navigates widget focus. |
|----|-----|-------------------------------------------------------------------------------------------------|

**See also**

[tab\\_nav\(\)](#), [Fl::OPTION\\_ARROW\\_FOCUS](#).

**Version**

1.3.4 ABI feature

**31.136.3 Member Data Documentation****31.136.3.1 global\_key\_bindings**

```
Key_Binding* Fl_Text_Editor::global_key_bindings [static], [protected]
```

Global key binding list.

Derived classes can add key bindings for all [Fl\\_Text\\_Editor](#) widgets by adding a [Key\\_Binding](#) to this list.

**See also**

[add\\_key\\_binding\(int key, int state, Key\\_Func f, Key\\_Binding\\*\\* list\)](#);

The documentation for this class was generated from the following files:

- [Fl\\_Text\\_Editor.H](#)
- [Fl\\_Text\\_Editor.cxx](#)

**31.137 Fl\_Text\_Selection Class Reference**

This is an internal class for [Fl\\_Text\\_Buffer](#) to manage text selections.

```
#include <Fl_Text_Buffer.H>
```

## Public Member Functions

- int [end](#) () const  
*Return the byte offset to the character after the last selected character.*
- int [includes](#) (int pos) const  
*Return true if position *pos* with indentation *dispIndex* is in the [Fl\\_Text\\_Selection](#).*
- int [position](#) (int \*start, int \*end) const  
*Return the positions of this selection.*
- bool [selected](#) () const  
*Returns true if any text is selected.*
- void [selected](#) (bool b)  
*Modify the 'selected' flag.*
- void [set](#) (int start, int end)  
*Set the selection range.*
- int [start](#) () const  
*Return the byte offset to the first selected character.*
- void [update](#) (int pos, int nDeleted, int nInserted)  
*Updates a selection after text was modified.*

## Protected Attributes

- int [mEnd](#)  
*byte offset to the character after the last selected character*
- bool [mSelected](#)  
*this flag is set if any text is selected*
- int [mStart](#)  
*byte offset to the first selected character*

## Friends

- class [Fl\\_Text\\_Buffer](#)

### 31.137.1 Detailed Description

This is an internal class for [Fl\\_Text\\_Buffer](#) to manage text selections.

This class works correctly with UTF-8 strings assuming that the parameters for all calls are on character boundaries.

### 31.137.2 Member Function Documentation

#### 31.137.2.1 [end\(\)](#)

```
int Fl_Text_Selection::end () const [inline]
```

Return the byte offset to the character after the last selected character.

#### Returns

byte offset

#### 31.137.2.2 [position\(\)](#)

```
int Fl_Text_Selection::position (
 int * start,
 int * end) const
```

Return the positions of this selection.

## Parameters

|              |                                                           |
|--------------|-----------------------------------------------------------|
| <i>start</i> | return byte offset to first selected character            |
| <i>end</i>   | return byte offset pointing after last selected character |

## Returns

true if selected

**31.137.2.3 selected()** [1/2]

```
bool Fl_Text_Selection::selected () const [inline]
```

Returns true if any text is selected.

## Returns

a non-zero number if any text has been selected, or 0 if no text is selected.

**31.137.2.4 selected()** [2/2]

```
void Fl_Text_Selection::selected (
 bool b) [inline]
```

Modify the 'selected' flag.

## Parameters

|          |          |
|----------|----------|
| <i>b</i> | new flag |
|----------|----------|

**31.137.2.5 set()**

```
void Fl_Text_Selection::set (
 int start,
 int end)
```

Set the selection range.

## Parameters

|              |                                                    |
|--------------|----------------------------------------------------|
| <i>start</i> | byte offset to first selected character            |
| <i>end</i>   | byte offset pointing after last selected character |

**31.137.2.6 start()**

```
int Fl_Text_Selection::start () const [inline]
```

Return the byte offset to the first selected character.

## Returns

byte offset

### 31.137.2.7 update()

```
void Fl_Text_Selection::update (
 int pos,
 int nDeleted,
 int nInserted)
```

Updates a selection after text was modified.

Updates an individual selection for changes in the corresponding text

#### Parameters

|                  |                                                           |
|------------------|-----------------------------------------------------------|
| <i>pos</i>       | byte offset into text buffer at which the change occurred |
| <i>nDeleted</i>  | number of bytes deleted from the buffer                   |
| <i>nInserted</i> | number of bytes inserted into the buffer                  |

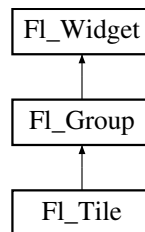
The documentation for this class was generated from the following files:

- Fl\_Text\_Buffer.H
- Fl\_Text\_Buffer.cxx

## 31.138 Fl\_Tile Class Reference

The [Fl\\_Tile](#) class lets you resize its children by dragging the border between them.

Inheritance diagram for Fl\_Tile:



### Public Member Functions

- [Fl\\_Tile](#) (int X, int Y, int W, int H, const char \*L=0)  
*Creates a new [Fl\\_Tile](#) widget using the given position, size, and label string.*
- int [handle](#) (int event)  
*Handles the specified event.*
- void [position](#) (int oldx, int oldy, int newx, int newy)  
*Drags the intersection at (oldx,oldy) to (newx,newy).*
- void [resize](#) (int X, int Y, int W, int H)  
*Resizes the [Fl\\_Tile](#) widget and its children.*

### Additional Inherited Members

#### 31.138.1 Detailed Description

The [Fl\\_Tile](#) class lets you resize its children by dragging the border between them.

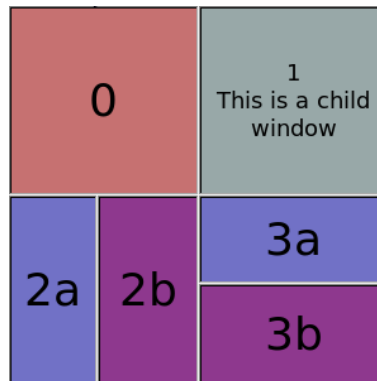


Figure 31.43 FL\_Tile

For the tiling to work correctly, the children of an `FL_Tile` must cover the entire area of the widget, but not overlap. This means that all children must touch each other at their edges, and no gaps can be left inside the `FL_Tile`.

`FL_Tile` does not normally draw any graphics of its own. The "borders" which can be seen in the snapshot above are actually part of the children. Their boxtypes have been set to `FL_DOWN_BOX` creating the impression of "ridges" where the boxes touch. What you see are actually two adjacent `FL_DOWN_BOX`'s drawn next to each other. All neighboring widgets share the same edge - the widget's thick borders make it appear as though the widgets aren't actually touching, but they are. If the edges of adjacent widgets do not touch, then it will be impossible to drag the corresponding edges.

`FL_Tile` allows objects to be resized to zero dimensions. To prevent this you can use the `resizable()` to limit where corners can be dragged to. For more information see note below.

Even though objects can be resized to zero sizes, they must initially have non-zero sizes so the `FL_Tile` can figure out their layout. If desired, call `position()` after creating the children but before displaying the window to set the borders where you want.

**Note on `resizable(FL_Widget &w)`:** The "resizable" child widget (which should be invisible) limits where the borders can be dragged to. All dragging will be limited inside the resizable widget's borders. If you don't set it, it will be possible to drag the borders right to the edges of the `FL_Tile` widget, and thus resize objects on the edges to zero width or height. When the entire `FL_Tile` widget is resized, the `resizable()` widget will keep its border distance to all borders the same (this is normal resize behavior), so that you can effectively set a border width that will never change. To ensure correct event delivery to all child widgets the `resizable()` widget must be the first child of the `FL_Tile` widget group. Otherwise some events (e.g. `FL_MOVE` and `FL_ENTER`) might be consumed by the `resizable()` widget so that they are lost for widgets covered (overlapped) by the `resizable()` widget.

#### Note

You can still resize widgets **inside** the `resizable()` to zero width and/or height, i.e. box **2b** above to zero width and box **3a** to zero height.

#### See also

`void FL_Group::resizable(FL_Widget &w)`

Example for `resizable` with 20 pixel border distance:

```
int dx = 20, dy = dx;
FL_Tile tile(50,50,300,300);
// create resizable() box first
FL_Box r(tile.x()+dx,tile.y()+dy,tile.w()-2*dx,tile.h()-2*dy);
tile.resizable(r);
// ... create widgets inside tile (see test/tile.cxx) ...
tile.end();
```

See also the complete example program in `test/tile.cxx`.

## 31.138.2 Constructor & Destructor Documentation

### 31.138.2.1 FL\_Tile()

```
FL_Tile::FL_Tile (
 int X,
```

```

 int Y,
 int W,
 int H,
 const char * L = 0)

```

Creates a new [Fl\\_Tile](#) widget using the given position, size, and label string.

The default boxtype is `FL_NO_BOX`.

The destructor *also deletes all the children*. This allows a whole tree to be deleted at once, without having to keep a pointer to all the children in the user code. A kludge has been done so the [Fl\\_Tile](#) and all of its children can be automatic (local) variables, but you must declare the [Fl\\_Tile](#) *first*, so that it is destroyed last.

See also

class [Fl\\_Group](#)

### 31.138.3 Member Function Documentation

#### 31.138.3.1 handle()

```

int Fl_Tile::handle (
 int event) [virtual]

```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

Parameters

|    |              |                            |
|----|--------------|----------------------------|
| in | <i>event</i> | the kind of event received |
|----|--------------|----------------------------|

Return values

|   |                                          |
|---|------------------------------------------|
| 0 | if the event was not used or understood  |
| 1 | if the event was used and can be deleted |

See also

[Fl\\_Event](#)

Reimplemented from [Fl\\_Group](#).

#### 31.138.3.2 position()

```

void Fl_Tile::position (
 int oldx,
 int oldy,
 int newx,
 int newy)

```

Drags the intersection at (oldx,oldy) to (newx,newy).

This redraws all the necessary children.

Pass zero as oldx or oldy to disable drag in that direction.

#### 31.138.3.3 resize()

```

void Fl_Tile::resize (
 int X,

```

```

 int Y,
 int W,
 int H) [virtual]

```

Resizes the `Fl_Tile` widget and its children.

`Fl_Tile` implements its own `resize()` method. It does not use `Fl_Group::resize()` to resize itself and its children.

Enlarging works by just moving the lower-right corner and resizing the bottom and right border widgets accordingly. Shrinking the `Fl_Tile` works in the opposite way by shrinking the bottom and right border widgets, unless they are reduced to zero width or height, resp. or to their minimal sizes defined by the `resizable()` widget. In this case other widgets will be shrunk as well.

See the `Fl_Tile` class documentation about how the `resizable()` works.

Reimplemented from `Fl_Group`.

The documentation for this class was generated from the following files:

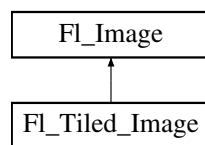
- `Fl_Tile.H`
- `Fl_Tile.cxx`

## 31.139 Fl\_Tiled\_Image Class Reference

This class supports tiling of images over a specified area.

```
#include <Fl_Tiled_Image.H>
```

Inheritance diagram for `Fl_Tiled_Image`:



### Public Member Functions

- virtual void `color_average` (`Fl_Color` c, float i)
 

*The `color_average()` method averages the colors in the image with the FLTK color value c.*
- `Fl_Image * copy` ()
- virtual `Fl_Image * copy` (int W, int H)
 

*The `copy()` method creates a copy of the specified image.*
- virtual void `desaturate` ()
 

*The `desaturate()` method converts an image to grayscale.*
- void `draw` (int X, int Y)
- virtual void `draw` (int X, int Y, int W, int H, int cx, int cy)
 

*Draws a tiled image.*
- `Fl_Tiled_Image` (`Fl_Image *i`, int W=0, int H=0)
 

*The constructors create a new tiled image containing the specified image.*
- `Fl_Image * image` ()
 

*Gets The image that is tiled.*
- virtual `~Fl_Tiled_Image` ()
 

*The destructor frees all memory and server resources that are used by the tiled image.*

### Protected Attributes

- int `alloc_image_`
- `Fl_Image * image_`



## Additional Inherited Members

### 31.139.1 Detailed Description

This class supports tiling of images over a specified area.

The source (tile) image is **not** copied unless you call the [color\\_average\(\)](#), [desaturate\(\)](#), or [inactive\(\)](#) methods.

### 31.139.2 Constructor & Destructor Documentation

#### 31.139.2.1 Fl\_Tiled\_Image()

```
Fl_Tiled_Image::Fl_Tiled_Image (
 Fl_Image * i,
 int W = 0,
 int H = 0)
```

The constructors create a new tiled image containing the specified image. Use a width and height of 0 to tile the whole window/widget.

#### Note

Due to implementation constraints in FLTK 1.3.3 and later width and height of 0 may not work as expected when used as background image in widgets other than windows. You may need to center and clip the image (label) and set the label type to `FL_NORMAL_LABEL`. Doing so will let the tiled image fill the whole widget as its background image. Other combinations of label flags may or may not work.

```
#include "bg.xpm"
Fl_Pixmap *bg_xpm = new Fl_Pixmap(bg_xpm);
Fl_Tiled_Image *bg_tiled = new Fl_Tiled_Image(bg_xpm,0,0);
Fl_Box *box = new Fl_Box(40,40,300,100,"");
box->box(FL_UP_BOX);
box->labeltype(FL_NORMAL_LABEL);
box->align(FL_ALIGN_INSIDE | FL_ALIGN_CENTER | FL_ALIGN_CLIP);
box->image(bg_tiled);
```

#### Note

Setting an image (label) for a window may not work as expected due to implementation constraints in FLTK 1.3.x and maybe later. The reason is the way [Fl::scheme\(\)](#) initializes the window's label type and image. A possible workaround is to use another [Fl\\_Group](#) as the only child widget and to set the background image for this group as described above.

**Todo** Fix [Fl\\_Tiled\\_Image](#) as background image for widgets and windows and fix the implementation of [Fl::scheme\(const char \\*\)](#).

### 31.139.3 Member Function Documentation

#### 31.139.3.1 color\_average()

```
void Fl_Tiled_Image::color_average (
 Fl_Color c,
 float i) [virtual]
```

The [color\\_average\(\)](#) method averages the colors in the image with the FLTK color value `c`.

The `i` argument specifies the amount of the original image to combine with the color, so a value of 1.0 results in no color blend, and a value of 0.0 results in a constant image of the specified color.

An internal copy is made of the original image before changes are applied, to avoid modifying the original image.

Reimplemented from [Fl\\_Image](#).

### 31.139.3.2 copy()

```
Fl_Image * Fl_Tiled_Image::copy (
 int W,
 int H) [virtual]
```

The copy() method creates a copy of the specified image.

If the width and height are provided, the image is resized to the specified size. The image should be deleted (or in the case of [Fl\\_Shared\\_Image](#), released) when you are done with it.

Reimplemented from [Fl\\_Image](#).

### 31.139.3.3 desaturate()

```
void Fl_Tiled_Image::desaturate () [virtual]
```

The [desaturate\(\)](#) method converts an image to grayscale.

If the image contains an alpha channel (depth = 4), the alpha channel is preserved.

An internal copy is made of the original image before changes are applied, to avoid modifying the original image.

Reimplemented from [Fl\\_Image](#).

### 31.139.3.4 draw()

```
void Fl_Tiled_Image::draw (
 int X,
 int Y,
 int W,
 int H,
 int cx,
 int cy) [virtual]
```

Draws a tiled image.

Tiled images can be used as background images for widgets and windows. However, due to implementation constraints, you must take care when setting label types and alignment flags. Only certain combinations work as expected, others may yield unexpected results and undefined behavior.

This draw method can draw multiple copies of one image in an area given by X, Y, W, H.

The optional arguments cx and cy can be used to crop the image starting at offsets (cx, cy). cx and cy must be >= 0 (negative values are ignored). If one of the values is greater than the image width or height resp. (cx >= [image\(\)->w\(\)](#) or cy >= [image\(\)->h\(\)](#)) nothing is drawn, because the resulting image would be empty.

After calculating the resulting image size the image is drawn as often as necessary to fill the given area, starting at the top left corner.

If both W and H are 0 the image is repeated as often as necessary to fill the entire window, unless there is a valid clip region. If you want to fill only one particular widget's background, then you should either set a clip region in your [draw\(\)](#) method or use the label alignment flags [FL\\_ALIGN\\_INSIDE](#)|[FL\\_ALIGN\\_CLIP](#) to make sure the image is clipped.

This may be improved in a later version of the library.

Reimplemented from [Fl\\_Image](#).

The documentation for this class was generated from the following files:

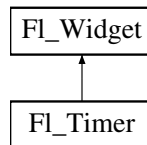
- [Fl\\_Tiled\\_Image.H](#)
- [Fl\\_Tiled\\_Image.cxx](#)

## 31.140 FI\_Timer Class Reference

This is provided only to emulate the Forms Timer widget.

```
#include <Fl_Timer.H>
```

Inheritance diagram for [Fl\\_Timer](#):



## Public Member Functions

- char [direction](#) () const  
*Gets or sets the direction of the timer.*
- void [direction](#) (char d)  
*Gets or sets the direction of the timer.*
- [Fl\\_Timer](#) (uchar t, int x, int y, int w, int h, const char \*l)  
*Creates a new [Fl\\_Timer](#) widget using the given type, position, size, and label string.*
- int [handle](#) (int)  
*Handles the specified event.*
- char [suspended](#) () const  
*Gets or sets whether the timer is suspended.*
- void [suspended](#) (char d)  
*Gets or sets whether the timer is suspended.*
- double [value](#) () const  
*See void [Fl\\_Timer::value\(double\)](#)*
- void [value](#) (double)  
*Sets the current timer value.*
- [~Fl\\_Timer](#) ()  
*Destroys the timer and removes the timeout.*

## Protected Member Functions

- void [draw](#) ()  
*Draws the widget.*

## Additional Inherited Members

### 31.140.1 Detailed Description

This is provided only to emulate the Forms Timer widget. It works by making a timeout callback every 1/5 second. This is wasteful and inaccurate if you just want something to happen a fixed time in the future. You should directly call [Fl::add\\_timeout\(\)](#) instead.

### 31.140.2 Constructor & Destructor Documentation

#### 31.140.2.1 Fl\_Timer()

```

Fl_Timer::Fl_Timer (
 uchar t,
 int X,
 int Y,
 int W,
 int H,
 const char * l)

```

Creates a new [Fl\\_Timer](#) widget using the given type, position, size, and label string. The type parameter can be any of the following symbolic constants:

- `FL_NORMAL_TIMER` - The timer just does the callback and displays the string "Timer" in the widget.
- `FL_VALUE_TIMER` - The timer does the callback and displays the current timer value in the widget.
- `FL_HIDDEN_TIMER` - The timer just does the callback and does not display anything.

### 31.140.3 Member Function Documentation

#### 31.140.3.1 `direction()` [1/2]

```
char Fl_Timer::direction () const [inline]
```

Gets or sets the direction of the timer.

If the direction is zero then the timer will count up, otherwise it will count down from the initial `value()`.

#### 31.140.3.2 `direction()` [2/2]

```
void Fl_Timer::direction (
 char d) [inline]
```

Gets or sets the direction of the timer.

If the direction is zero then the timer will count up, otherwise it will count down from the initial `value()`.

#### 31.140.3.3 `draw()`

```
void Fl_Timer::draw () [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call `redraw()` instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own `draw()` method*, e.g. for an embedded scrollbar, you can do it (because `draw()` is virtual) like this:

```
Fl_Widget *s = &scroll; // scroll is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Implements `Fl_Widget`.

#### 31.140.3.4 `handle()`

```
int Fl_Timer::handle (
 int event) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited `handle()` method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

##### Parameters

|    |              |                            |
|----|--------------|----------------------------|
| in | <i>event</i> | the kind of event received |
|----|--------------|----------------------------|

##### Return values

|   |                                          |
|---|------------------------------------------|
| 0 | if the event was not used or understood  |
| 1 | if the event was used and can be deleted |

See also

[Fl\\_Event](#)

Reimplemented from [Fl\\_Widget](#).

### 31.140.3.5 suspended()

```
char Fl_Timer::suspended () const [inline]
```

Gets or sets whether the timer is suspended.

The documentation for this class was generated from the following files:

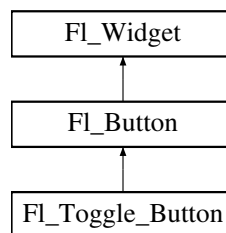
- [Fl\\_Timer.H](#)
- [forms\\_timer.cxx](#)

## 31.141 Fl\_Toggle\_Button Class Reference

The toggle button is a push button that needs to be clicked once to toggle on, and one more time to toggle off.

```
#include <Fl_Toggle_Button.H>
```

Inheritance diagram for Fl\_Toggle\_Button:



### Public Member Functions

- [Fl\\_Toggle\\_Button](#) (int X, int Y, int W, int H, const char \*l=0)

*Creates a new [Fl\\_Toggle\\_Button](#) widget using the given position, size, and label string.*

### Additional Inherited Members

#### 31.141.1 Detailed Description

The toggle button is a push button that needs to be clicked once to toggle on, and one more time to toggle off.

The [Fl\\_Toggle\\_Button](#) subclass displays the "on" state by drawing a pushed-in button.

Buttons generate callbacks when they are clicked by the user. You control exactly when and how by changing the values for [type\(\)](#) and [when\(\)](#).

#### 31.141.2 Constructor & Destructor Documentation

##### 31.141.2.1 Fl\_Toggle\_Button()

```
Fl_Toggle_Button::Fl_Toggle_Button (
 int X,
 int Y,
 int W,
 int H,
 const char * L = 0)
```

Creates a new [FL\\_Toggle\\_Button](#) widget using the given position, size, and label string. The constructor creates the button using the given position, size, and label. The inherited destructor deletes the toggle button. The Button [type\(\)](#) is set to `FL_TOGGLE_BUTTON`.

#### Parameters

|    |                |                                   |
|----|----------------|-----------------------------------|
| in | <i>X,Y,W,H</i> | position and size of the widget   |
| in | <i>L</i>       | widget label, default is no label |

The documentation for this class was generated from the following files:

- [FL\\_Toggle\\_Button.H](#)
- [FL\\_Button.cxx](#)

## 31.142 FL\_Tooltip Class Reference

The [FL\\_Tooltip](#) class provides tooltip support for all FLTK widgets.

```
#include <Fl_Tooltip.H>
```

### Static Public Member Functions

- static [FL\\_Color](#) [color](#) ()  
*Gets the background color for tooltips.*
- static void [color](#) ([FL\\_Color](#) c)  
*Sets the background color for tooltips.*
- static [FL\\_Widget](#) \* [current](#) ()  
*Gets the current widget target.*
- static void [current](#) ([FL\\_Widget](#) \*)  
*Sets the current widget target.*
- static float [delay](#) ()  
*Gets the tooltip delay.*
- static void [delay](#) (float f)  
*Sets the tooltip delay.*
- static void [disable](#) ()  
*Same as enable(0), disables tooltips on all widgets.*
- static void [enable](#) (int b=1)  
*Enables tooltips on all widgets (or disables if b is false).*
- static int [enabled](#) ()  
*Returns non-zero if tooltips are enabled.*
- static void [enter\\_area](#) ([FL\\_Widget](#) \*w, int X, int Y, int W, int H, const char \*tip)  
*You may be able to use this to provide tooltips for internal pieces of your widget.*
- static [FL\\_Font](#) [font](#) ()  
*Gets the typeface for the tooltip text.*
- static void [font](#) ([FL\\_Font](#) i)  
*Sets the typeface for the tooltip text.*
- static float [hoverdelay](#) ()  
*Gets the tooltip hover delay, the delay between tooltips.*
- static void [hoverdelay](#) (float f)  
*Sets the tooltip hover delay, the delay between tooltips.*
- static int [margin\\_height](#) ()  
*Gets the amount of extra space above and below the tooltip's text.*
- static void [margin\\_height](#) (int v)

- Sets the amount of extra space above and below the tooltip's text.*

  - static int `margin_width` ()

*Gets the amount of extra space left/right of the tooltip's text.*

  - static void `margin_width` (int v)

*Sets the amount of extra space left/right of the tooltip's text.*

  - static `FL_Fontsize` `size` ()

*Gets the size of the tooltip text.*

  - static void `size` (`FL_Fontsize` s)

*Sets the size of the tooltip text.*

  - static `FL_Color` `textcolor` ()

*Gets the color of the text in the tooltip.*

  - static void `textcolor` (`FL_Color` c)

*Sets the color of the text in the tooltip.*

  - static int `wrap_width` ()

*Gets the maximum width for tooltip's text before it word wraps.*

  - static void `wrap_width` (int v)

*Sets the maximum width for tooltip's text before it word wraps.*

## Static Public Attributes

- static void(\* `enter` )(`FL_Widget` \*w) = nothing
- static void(\* `exit` )(`FL_Widget` \*w) = nothing

## Friends

- void `FL_Widget::copy_tooltip` (const char \*)
- void `FL_Widget::tooltip` (const char \*)

### 31.142.1 Detailed Description

The `FL_Tooltip` class provides tooltip support for all FLTK widgets. It contains only static methods.

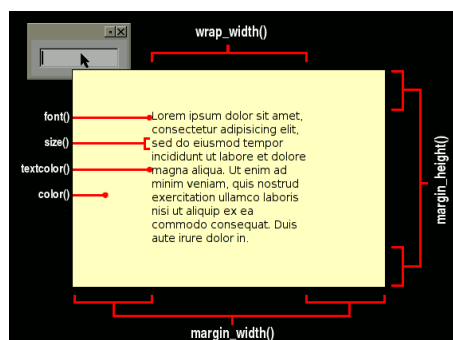


Figure 31.44 FL\_Tooltip Options

### 31.142.2 Member Function Documentation

#### 31.142.2.1 `color()` [1/2]

```
static FL_Color FL_Tooltip::color () [inline], [static]
```

Gets the background color for tooltips.

The default background color is a pale yellow.

### 31.142.2.2 color() [2/2]

```
static void Fl_Tooltip::color (
 Fl_Color c) [inline], [static]
```

Sets the background color for tooltips.

The default background color is a pale yellow.

### 31.142.2.3 current()

```
void Fl_Tooltip::current (
 Fl_Widget * w) [static]
```

Sets the current widget target.

Acts as though `enter(widget)` was done but does not pop up a tooltip. This is useful to prevent a tooltip from reappearing when a modal overlapping window is deleted. FLTK does this automatically when you click the mouse button.

### 31.142.2.4 delay() [1/2]

```
static float Fl_Tooltip::delay () [inline], [static]
```

Gets the tooltip delay.

The default delay is 1.0 seconds.

### 31.142.2.5 delay() [2/2]

```
static void Fl_Tooltip::delay (
 float f) [inline], [static]
```

Sets the tooltip delay.

The default delay is 1.0 seconds.

### 31.142.2.6 disable()

```
static void Fl_Tooltip::disable () [inline], [static]
```

Same as `enable(0)`, disables tooltips on all widgets.

### 31.142.2.7 enable()

```
static void Fl_Tooltip::enable (
 int b = 1) [inline], [static]
```

Enables tooltips on all widgets (or disables if `b` is false).

### 31.142.2.8 enabled()

```
static int Fl_Tooltip::enabled () [inline], [static]
```

Returns non-zero if tooltips are enabled.

### 31.142.2.9 enter\_area()

```
void Fl_Tooltip::enter_area (
 Fl_Widget * wid,
 int x,
 int y,
```



```
int w,
int h,
const char * t) [static]
```

You may be able to use this to provide tooltips for internal pieces of your widget.

Call this after setting `Fl::belowmouse()` to your widget (because that calls the above `enter()` method). Then figure out what thing the mouse is pointing at, and call this with the widget (this pointer is used to remove the tooltip if the widget is deleted or hidden, and to locate the tooltip), the rectangle surrounding the area, relative to the top-left corner of the widget (used to calculate where to put the tooltip), and the text of the tooltip (which must be a pointer to static data as it is not copied).

#### 31.142.2.10 font() [1/2]

```
static Fl_Font Fl_Tooltip::font () [inline], [static]
```

Gets the typeface for the tooltip text.

#### 31.142.2.11 font() [2/2]

```
static void Fl_Tooltip::font (
 Fl_Font i) [inline], [static]
```

Sets the typeface for the tooltip text.

#### 31.142.2.12 hoverdelay() [1/2]

```
static float Fl_Tooltip::hoverdelay () [inline], [static]
```

Gets the tooltip hover delay, the delay between tooltips.

The default delay is 0.2 seconds.

#### 31.142.2.13 hoverdelay() [2/2]

```
static void Fl_Tooltip::hoverdelay (
 float f) [inline], [static]
```

Sets the tooltip hover delay, the delay between tooltips.

The default delay is 0.2 seconds.

#### 31.142.2.14 margin\_height() [1/2]

```
static int Fl_Tooltip::margin_height () [inline], [static]
```

Gets the amount of extra space above and below the tooltip's text.

Default is 3.

#### 31.142.2.15 margin\_height() [2/2]

```
static void Fl_Tooltip::margin_height (
 int v) [inline], [static]
```

Sets the amount of extra space above and below the tooltip's text.

Default is 3.

#### 31.142.2.16 margin\_width() [1/2]

```
static int Fl_Tooltip::margin_width () [inline], [static]
```

Gets the amount of extra space left/right of the tooltip's text.

Default is 3.

### 31.142.2.17 `margin_width()` [2/2]

```
static void Fl_Tooltip::margin_width (
 int v) [inline], [static]
```

Sets the amount of extra space left/right of the tooltip's text.  
Default is 3.

### 31.142.2.18 `size()` [1/2]

```
static Fl_Fontsize Fl_Tooltip::size () [inline], [static]
```

Gets the size of the tooltip text.

### 31.142.2.19 `size()` [2/2]

```
static void Fl_Tooltip::size (
 Fl_Fontsize s) [inline], [static]
```

Sets the size of the tooltip text.

### 31.142.2.20 `textcolor()` [1/2]

```
static Fl_Color Fl_Tooltip::textcolor () [inline], [static]
```

Gets the color of the text in the tooltip.  
The default is black.

### 31.142.2.21 `textcolor()` [2/2]

```
static void Fl_Tooltip::textcolor (
 Fl_Color c) [inline], [static]
```

Sets the color of the text in the tooltip.  
The default is black.

### 31.142.2.22 `wrap_width()` [1/2]

```
static int Fl_Tooltip::wrap_width () [inline], [static]
```

Gets the maximum width for tooltip's text before it word wraps.  
Default is 400.

### 31.142.2.23 `wrap_width()` [2/2]

```
static void Fl_Tooltip::wrap_width (
 int v) [inline], [static]
```

Sets the maximum width for tooltip's text before it word wraps.  
Default is 400.

The documentation for this class was generated from the following files:

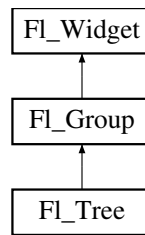
- `Fl_Tooltip.H`
- `Fl.cxx`
- `Fl_Tooltip.cxx`

## 31.143 `Fl_Tree` Class Reference

Tree widget.

```
#include <Fl_Tree.H>
```

Inheritance diagram for `Fl_Tree`:



## Public Member Functions

- [FL\\_Tree\\_Item](#) \* [add](#) (const char \*path, [FL\\_Tree\\_Item](#) \*newitem=0)  
*Adds a new item, given a menu style 'path'.*
- [FL\\_Tree\\_Item](#) \* [add](#) ([FL\\_Tree\\_Item](#) \*parent\_item, const char \*name)  
*Add a new child item labeled 'name' to the specified 'parent\_item'.*
- void [calc\\_dimensions](#) ()  
*Recalculate widget dimensions and scrollbar visibility, normally managed automatically.*
- void [calc\\_tree](#) ()  
*Recalculates the tree's sizes and scrollbar visibility, normally managed automatically.*
- [FL\\_Tree\\_Item](#) \* [callback\\_item](#) ()  
*Gets the item that caused the callback.*
- void [callback\\_item](#) ([FL\\_Tree\\_Item](#) \*item)  
*Sets the item that was changed for this callback.*
- [FL\\_Tree\\_Reason](#) [callback\\_reason](#) () const  
*Gets the reason for this callback.*
- void [callback\\_reason](#) ([FL\\_Tree\\_Reason](#) reason)  
*Sets the reason for this callback.*
- void [clear](#) ()  
*Clear the entire tree's children, including the root.*
- void [clear\\_children](#) ([FL\\_Tree\\_Item](#) \*item)  
*Clear all the children for 'item'.*
- int [close](#) (const char \*path, int docallback=1)  
*Closes the item specified by 'path'.*
- int [close](#) ([FL\\_Tree\\_Item](#) \*item, int docallback=1)  
*Closes the specified 'item'.*
- [FL\\_Image](#) \* [closeicon](#) () const  
*Returns the icon to be used as the 'close' icon.*
- void [closeicon](#) ([FL\\_Image](#) \*val)  
*Sets the icon to be used as the 'close' icon.*
- [FL\\_Color](#) [connectorcolor](#) () const  
*Get the connector color used for tree connection lines.*
- void [connectorcolor](#) ([FL\\_Color](#) val)  
*Set the connector color used for tree connection lines.*
- [FL\\_Tree\\_Connector](#) [connectorstyle](#) () const  
*Returns the line drawing style for inter-connecting items.*
- void [connectorstyle](#) ([FL\\_Tree\\_Connector](#) val)  
*Sets the line drawing style for inter-connecting items.*
- int [connectorwidth](#) () const  
*Gets the width of the horizontal connection lines (in pixels) that appear to the left of each tree item's label.*
- void [connectorwidth](#) (int val)  
*Sets the width of the horizontal connection lines (in pixels) that appear to the left of each tree item's label.*
- int [deselect](#) (const char \*path, int docallback=1)

- Deselect an item specified by 'path'.*

  - int `deselect` (`FI_Tree_Item` \*item, int docallback=1)

*Deselect the specified item.*
- int `deselect_all` (`FI_Tree_Item` \*item=0, int docallback=1)

*Deselect 'item' and all its children.*
- void `display` (`FI_Tree_Item` \*item)

*Displays 'item', scrolling the tree as necessary.*
- int `displayed` (`FI_Tree_Item` \*item)

*See if 'item' is currently displayed on-screen (visible within the widget).*
- void `draw` ()

*Standard FLTK `draw()` method, handles drawing the tree widget.*
- int `extend_selection` (`FI_Tree_Item` \*from, `FI_Tree_Item` \*to, int val=1, bool visible=false)

*Extend a selection between 'from' and 'to' depending on 'visible'.*
- int `extend_selection_dir` (`FI_Tree_Item` \*from, `FI_Tree_Item` \*to, int dir, int val, bool visible)

*Extend the selection between and including 'from' and 'to' depending on direction 'dir', 'val', and 'visible'.*
- `FI_Tree_Item` \* `find_clicked` (int yonly=0)

*Non-const version of `FI_Tree::find_clicked(int yonly) const`.*
- const `FI_Tree_Item` \* `find_clicked` (int yonly=0) const

*Find the item that was last clicked on.*
- `FI_Tree_Item` \* `find_item` (const char \*path)

*Non-const version of `FI_Tree::find_item(const char *path) const`.*
- const `FI_Tree_Item` \* `find_item` (const char \*path) const

*Find the item, given a menu style path, e.g.*
- `FI_Tree_Item` \* `first` ()

*Returns the first item in the tree, or 0 if none.*
- `FI_Tree_Item` \* `first_selected_item` ()

*Returns the first selected item in the tree.*
- `FI_Tree_Item` \* `first_visible` ()

*Returns the first `open()`, visible item in the tree, or 0 if none.*
- `FI_Tree_Item` \* `first_visible_item` ()

*Returns the first `open()`, visible item in the tree, or 0 if none.*
- `FI_Tree` (int X, int Y, int W, int H, const char \*L=0)

*Constructor.*
- `FI_Tree_Item` \* `get_item_focus` () const

*Get the item that currently has keyboard focus.*
- int `get_selected_items` (`FI_Tree_Item_Array` &ret\_items)

*Returns the currently selected items as an array of 'ret\_items'.*
- int `handle` (int e)

*Standard FLTK event handler for this widget.*
- int `hposition` () const

*Returns the horizontal scroll position as a pixel offset.*
- void `hposition` (int pos)

*Sets the horizontal scroll offset to position 'pos'.*
- `FI_Tree_Item` \* `insert` (`FI_Tree_Item` \*item, const char \*name, int pos)

*Insert a new item 'name' into 'item's children at position 'pos'.*
- `FI_Tree_Item` \* `insert_above` (`FI_Tree_Item` \*above, const char \*name)

*Inserts a new item 'name' above the specified `FI_Tree_Item` 'above'.*
- int `is_close` (const char \*path) const

*See if item specified by 'path' is closed.*
- int `is_close` (`FI_Tree_Item` \*item) const

- See if the specified 'item' is closed.*

  - int [is\\_hscroll\\_visible](#) () const
    - See if the horizontal scrollbar is currently visible.*
  - int [is\\_open](#) (const char \*path) const
    - See if item specified by 'path' is open.*
  - int [is\\_open](#) (FI\_Tree\_Item \*item) const
    - See if 'item' is open.*
  - int [is\\_scrollbar](#) (FI\_Widget \*w)
    - See if widget 'w' is one of the FI\_Tree widget's scrollbars.*
  - int [is\\_selected](#) (const char \*path)
    - See if item specified by 'path' is selected.*
  - int [is\\_selected](#) (FI\_Tree\_Item \*item) const
    - See if the specified 'item' is selected.*
  - int [is\\_vscroll\\_visible](#) () const
    - See if the vertical scrollbar is currently visible.*
  - [FI\\_Tree\\_Item \\* item\\_clicked](#) ()
    - Return the item that was last clicked.*
  - [FI\\_Tree\\_Item\\_Draw\\_Mode item\\_draw\\_mode](#) () const
    - Get the 'item draw mode' used for the tree.*
  - void [item\\_draw\\_mode](#) (FI\_Tree\_Item\_Draw\_Mode mode)
    - Set the 'item draw mode' used for the tree to 'mode'.*
  - void [item\\_draw\\_mode](#) (int mode)
    - Set the 'item draw mode' used for the tree to integer 'mode'.*
  - void [item\\_labelbgcolor](#) (FI\_Color val)
    - Set the default label background color used for creating new items.*
  - [FI\\_Color item\\_labelbgcolor](#) (void) const
    - Get the default label background color used for creating new items.*
  - void [item\\_labelfgcolor](#) (FI\_Color val)
    - Set the default label foreground color used for creating new items.*
  - [FI\\_Color item\\_labelfgcolor](#) (void) const
    - Get the default label foreground color used for creating new items.*
  - [FI\\_Font item\\_labelfont](#) () const
    - Get the default font face used for creating new items.*
  - void [item\\_labelfont](#) (FI\_Font val)
    - Set the default font face used for creating new items.*
  - [FI\\_Fontsize item\\_labelsize](#) () const
    - Get the default label fontsize used for creating new items.*
  - void [item\\_labelsize](#) (FI\_Fontsize val)
    - Set the default label font size used for creating new items.*
  - int [item\\_pathname](#) (char \*pathname, int pathnamelen, const FI\_Tree\_Item \*item) const
    - Return 'pathname' of size 'pathnamelen' for the specified 'item'.*
  - [FI\\_Tree\\_Item\\_Reselect\\_Mode item\\_reselect\\_mode](#) () const
    - Returns the current item re/selection mode.*
  - void [item\\_reselect\\_mode](#) (FI\_Tree\_Item\_Reselect\_Mode mode)
    - Sets the item re/selection mode.*
  - int [labelmarginleft](#) () const
    - Get the amount of white space (in pixels) that should appear to the left of the label text.*
  - void [labelmarginleft](#) (int val)
    - Set the amount of white space (in pixels) that should appear to the left of the label text.*
  - [FI\\_Tree\\_Item \\* last](#) ()
    - Returns the last item in the tree.*

- `FI_Tree_Item * last_selected_item ()`  
Returns the last selected item in the tree.
- `FI_Tree_Item * last_visible ()`  
Returns the last *open()*, visible item in the tree.
- `FI_Tree_Item * last_visible_item ()`  
Returns the last *open()*, visible item in the tree.
- `int linespacing () const`  
Get the amount of white space (in pixels) that should appear between items in the tree.
- `void linespacing (int val)`  
Sets the amount of white space (in pixels) that should appear between items in the tree.
- `void load (class FI_Preferences &)`  
Load FLTK preferences.
- `int marginbottom () const`  
Get the amount of white space (in pixels) that should appear below the last visible item when the vertical scroller is scrolled to the bottom.
- `void marginbottom (int val)`  
Sets the amount of white space (in pixels) that should appear below the last visible item when the vertical scroller is scrolled to the bottom.
- `int marginleft () const`  
Get the amount of white space (in pixels) that should appear between the widget's left border and the tree's contents.
- `void marginleft (int val)`  
Set the amount of white space (in pixels) that should appear between the widget's left border and the left side of the tree's contents.
- `int margintop () const`  
Get the amount of white space (in pixels) that should appear between the widget's top border and the top of the tree's contents.
- `void margintop (int val)`  
Sets the amount of white space (in pixels) that should appear between the widget's top border and the top of the tree's contents.
- `FI_Tree_Item * next (FI_Tree_Item *item=0)`  
Return the next item after *'item'*, or 0 if no more items.
- `FI_Tree_Item * next_item (FI_Tree_Item *item, int dir=FL_Down, bool visible=false)`  
Returns next item after *'item'* in direction *'dir'* depending on *'visible'*.
- `FI_Tree_Item * next_selected_item (FI_Tree_Item *item=0, int dir=FL_Down)`  
Returns the next selected item above or below *'item'*, depending on *'dir'*.
- `FI_Tree_Item * next_visible_item (FI_Tree_Item *start, int dir)`  
Returns next *open()*, visible item above (*dir==FL\_Up*) or below (*dir==FL\_Down*) the specified *'item'*, or 0 if no more items.
- `int open (const char *path, int docallback=1)`  
Opens the item specified by *'path'*.
- `int open (FI_Tree_Item *item, int docallback=1)`  
Open the specified *'item'*.
- `void open_toggle (FI_Tree_Item *item, int docallback=1)`  
Toggle the open state of *'item'*.
- `int openchild_marginbottom () const`  
Get the amount of white space (in pixels) that should appear below an open child tree's contents.
- `void openchild_marginbottom (int val)`  
Set the amount of white space (in pixels) that should appear below an open child tree's contents.
- `FI_Image * openicon () const`  
Returns the icon to be used as the *'open'* icon.
- `void openicon (FI_Image *val)`  
Sets the icon to be used as the *'open'* icon.

- const [FI\\_Tree\\_Prefs](#) & **prefs** () const
- [FI\\_Tree\\_Item](#) \* **prev** ([FI\\_Tree\\_Item](#) \*item=0)  
*Return the previous item before 'item', or 0 if no more items.*
- void **recalc\_tree** ()  
*Schedule tree to recalc the entire tree size.*
- int **remove** ([FI\\_Tree\\_Item](#) \*item)  
*Remove the specified 'item' from the tree.*
- void **resize** (int, int, int, int)  
*Resizes the [FI\\_Group](#) widget and all of its children.*
- [FI\\_Tree\\_Item](#) \* **root** ()  
*Returns the root item.*
- void **root** ([FI\\_Tree\\_Item](#) \*newitem)  
*Sets the root item to 'newitem'.*
- void **root\_label** (const char \*new\_label)  
*Set the label for the root item to 'new\_label'.*
- int **scrollbar\_size** () const  
*Gets the default size of scrollbars' troughs for this widget in pixels.*
- void **scrollbar\_size** (int size)  
*Sets the pixel size of the scrollbars' troughs to 'size' for this widget, in pixels.*
- int **select** (const char \*path, int docallback=1)  
*Select the item specified by 'path'.*
- int **select** ([FI\\_Tree\\_Item](#) \*item, int docallback=1)  
*Select the specified 'item'.*
- int **select\_all** ([FI\\_Tree\\_Item](#) \*item=0, int docallback=1)  
*Select 'item' and all its children.*
- int **select\_only** ([FI\\_Tree\\_Item](#) \*selitem, int docallback=1)  
*Select only the specified item, deselecting all others that might be selected.*
- void **select\_toggle** ([FI\\_Tree\\_Item](#) \*item, int docallback=1)  
*Toggle the select state of the specified 'item'.*
- [FI\\_Boxtype](#) **selectbox** () const  
*Sets the style of box used to draw selected items.*
- void **selectbox** ([FI\\_Boxtype](#) val)  
*Gets the style of box used to draw selected items.*
- [FI\\_Tree\\_Select](#) **selectmode** () const  
*Gets the tree's current selection mode.*
- void **selectmode** ([FI\\_Tree\\_Select](#) val)  
*Sets the tree's selection mode.*
- void **set\_item\_focus** ([FI\\_Tree\\_Item](#) \*item)  
*Set the item that currently should have keyboard focus.*
- void **show\_item** ([FI\\_Tree\\_Item](#) \*item)  
*Adjust the vertical scrollbar to show 'item' at the top of the display IF it is currently off-screen (for instance [show\\_item\\_top\(\)](#)).*
- void **show\_item** ([FI\\_Tree\\_Item](#) \*item, int yoff)  
*Adjust the vertical scrollbar so that 'item' is visible 'yoff' pixels from the top of the [FI\\_Tree](#) widget's display.*
- void **show\_item\_bottom** ([FI\\_Tree\\_Item](#) \*item)  
*Adjust the vertical scrollbar so that 'item' is at the bottom of the display.*
- void **show\_item\_middle** ([FI\\_Tree\\_Item](#) \*item)  
*Adjust the vertical scrollbar so that 'item' is in the middle of the display.*
- void **show\_item\_top** ([FI\\_Tree\\_Item](#) \*item)  
*Adjust the vertical scrollbar so that 'item' is at the top of the display.*
- void **show\_self** ()

- Print the tree as 'ascii art' to stdout.*

  - int [showcollapse](#) () const
    - Returns 1 if the collapse icon is enabled, 0 if not.*
  - void [showcollapse](#) (int val)
    - Set if we should show the collapse icon or not.*
  - int [showroot](#) () const
    - Returns 1 if the root item is to be shown, or 0 if not.*
  - void [showroot](#) (int val)
    - Set if the root item should be shown or not.*
  - [FI\\_Tree\\_Sort](#) sortorder () const
    - Set the default sort order used when items are added to the tree.*
  - void [sortorder](#) ([FI\\_Tree\\_Sort](#) val)
    - Gets the sort order used to add items to the tree.*
  - [FI\\_Image](#) \* [usericon](#) () const
    - Returns the [FI\\_Image](#) being used as the default user icon for all newly created items.*
  - void [usericon](#) ([FI\\_Image](#) \*val)
    - Sets the [FI\\_Image](#) to be used as the default user icon for all newly created items.*
  - int [usericonmarginleft](#) () const
    - Get the amount of white space (in pixels) that should appear to the left of the usericon.*
  - void [usericonmarginleft](#) (int val)
    - Set the amount of white space (in pixels) that should appear to the left of the usericon.*
  - int [vposition](#) () const
    - Returns the vertical scroll position as a pixel offset.*
  - void [vposition](#) (int pos)
    - Sets the vertical scroll offset to position 'pos'.*
  - int [widgetmarginleft](#) () const
    - Get the amount of white space (in pixels) that should appear to the left of the child fltk widget (if any).*
  - void [widgetmarginleft](#) (int val)
    - Set the amount of white space (in pixels) that should appear to the left of the child fltk widget (if any).*
  - [~FI\\_Tree](#) ()
    - Destructor.*

## Protected Member Functions

- void [do\\_callback\\_for\\_item](#) ([FI\\_Tree\\_Item](#) \*item, [FI\\_Tree\\_Reason](#) reason)
  - Do the callback for the specified 'item' using 'reason', setting the [callback\\_item\(\)](#) and [callback\\_reason\(\)](#).*
- void [item\\_clicked](#) ([FI\\_Tree\\_Item](#) \*val)
  - Set the item that was last clicked.*

## Protected Attributes

- [FI\\_Scrollbar](#) \* [\\_hscroll](#)
  - Horizontal scrollbar.*
- int [\\_tih](#)
  - Tree widget inner xywh dimension: inside borders + scrollbars.*
- int [\\_tiw](#)
- int [\\_tix](#)
- int [\\_tiy](#)
- int [\\_toh](#)
  - Tree widget outer xywh dimension: outside scrollbars, inside widget border.*
- int [\\_tow](#)
- int [\\_tox](#)



- `int _toy`
- `int _tree_h`  
the calculated height of the entire tree hierarchy. See `calc_tree()`
- `int _tree_w`  
the calculated width of the entire tree hierarchy. See `calc_tree()`
- `Fl_Scrollbar * _vscroll`  
Vertical scrollbar.

## Friends

- class `Fl_Tree_Item`

## Additional Inherited Members

### 31.143.1 Detailed Description

Tree widget.

```
\image html tree-simple.png "Fl_Tree example program"
\image latex tree-simple.png "Fl_Tree example program" width=4cm

Fl_Tree // Top level widget
|--- Fl_Tree_Item // Items in the tree
|--- Fl_Tree_Prefs // Preferences for the tree
| |--- Fl_Tree_Connector (enum) // Connection modes
| |--- Fl_Tree_Select (enum) // Selection modes
| |--- Fl_Tree_Sort (enum) // Sort behavior
```

Similar to `Fl_Browser`, `Fl_Tree` is a browser of `Fl_Tree_Item`'s arranged in a parented hierarchy, or 'tree'. Subtrees can be expanded or closed. Items can be added, deleted, inserted, sorted and re-ordered.

The tree items may also contain other FLTK widgets, like buttons, input fields, or even "custom" widgets.

The `callback()` is invoked depending on the value of `when()`:

- `FL_WHEN_RELEASE` -- callback invoked when left mouse button is released on an item
- `FL_WHEN_CHANGED` -- callback invoked when left mouse changes selection state

The simple way to define a tree:

```
#include <FL/Fl_Tree.H>
[...
Fl_Tree tree(X,Y,W,H);
tree.begin();
tree.add("Flintstones/Fred");
tree.add("Flintstones/Wilma");
tree.add("Flintstones/Pebbles");
tree.add("Simpsons/Homer");
tree.add("Simpsons/Marge");
tree.add("Simpsons/Bart");
tree.add("Simpsons/Lisa");
tree.end();
```

## FEATURES

- Items can be added with `add()`,
- removed with `remove()`,
- completely cleared with `clear()`,
- inserted with `insert()` and `insert_above()`,
- selected/deselected with `select()` and `deselect()`,
- open/closed with `open()` and `close()`,
- positioned on the screen with `show_item_top()`, `show_item_middle()` and `show_item_bottom()`,
- item children can be swapped around with `Fl_Tree_Item::swap_children()`,
- sorting can be controlled when items are `add()`ed via `sortorder()`.
- You can walk the entire tree with `first()` and `next()`.
- You can walk visible items with `first_visible_item()` and `next_visible_item()`.
- You can walk selected items with `first_selected_item()` and `next_selected_item()`.
- Items can be found by their pathname using `find_item(const char*)`, and an item's pathname can be found with `item_pathname()`.
- The selected items' colors are controlled by `selection_color()` (inherited from `Fl_Widget`).
- A hook is provided to allow you to redefine how item's labels are drawn via `Fl_Tree::item_draw_callback()`.

## SELECTION OF ITEMS

The tree can have different selection behaviors controlled by `selectmode()`. The background color used for selected items is the `FL_Tree::selection_color()`. The foreground color for selected items is controlled internally with `fl_contrast()`.

## CHILD WIDGETS

FLTK widgets (including custom widgets) can be assigned to tree items via `FL_Tree_Item::widget()`.

When an `FL_Tree_Item::widget()` is defined, the default behavior is for the widget() to be shown in place of the item's label (if it has one). Only the widget()'s width will be used; the widget()'s `x()` and `y()` position will be managed by the tree, and the `h()` will track the item's height. This default behavior can be altered (ABI 1.3.1): Setting `FL_Tree::item_draw_mode()`'s `FL_TREE_ITEM_DRAW_LABEL_AND_WIDGET` flag causes the label + widget to be displayed together in that order, and adding the `FL_TREE_ITEM_HEIGHT_FROM_WIDGET` flag causes widget's height to define the widget()'s height.

## ICONS

The tree's open/close icons can be redefined with `FL_Tree::openicon()`, `FL_Tree::closeicon()`. User icons can either be changed globally with `FL_Tree::usericon()`, or on a per-item basis with `FL_Tree_Item::usericon()`.

Various default preferences can be globally manipulated via `FL_Tree_Prefs`, including colors, margins, icons, connection lines, etc.

## FONTS AND COLORS

When adding new items to the tree, the new items get the defaults for fonts and colors from:

- `FL_Tree::item_labelfont()` – The default item label font (default: `FL_HELVETICA`)
- `FL_Tree::item_labelsize()` – The default item label size (default: `FL_NORMAL_SIZE`)
- `FL_Tree::item_labelfgcolor()` – The default item label foreground color (default: `FL_FOREGROUND_↔COLOR`)
- `FL_Tree::item_labelbgcolor()` – The default item label background color (default: `0xffffffff`, which tree uses as 'transparent')

Each item (`FL_Tree_Item`) inherits a copy of these font/color attributes when created, and each item has its own methods to let the app change these values on a per-item basis using methods of the same name:

- `FL_Tree_Item::labelfont()` – The item's label font (default: `FL_HELVETICA`)
- `FL_Tree_Item::labelsize()` – The item's label size (default: `FL_NORMAL_SIZE`)
- `FL_Tree_Item::labelfgcolor()` – The item's label foreground color (default: `FL_FOREGROUND_COLOR`)
- `FL_Tree_Item::labelbgcolor()` – The item's label background color (default: `0xffffffff`, which uses the tree's own bg color)

## CALLBACKS

The tree's `callback()` will be invoked when items change state or are open/closed. `when()` controls when mouse/keyboard events invoke the callback. `callback_item()` and `callback_reason()` can be used to determine the cause of the callback. e.g.

```

void MyTreeCallback(Fl_Widget *w, void *data) {
 Fl_Tree *tree = (Fl_Tree*)w;
 Fl_Tree_Item *item = (Fl_Tree_Item*)tree->callback_item(); // get selected item
 switch (tree->callback_reason()) {
 case FL_TREE_REASON_SELECTED: [...]
 case FL_TREE_REASON_DESELECTED: [...]
 case FL_TREE_REASON_RESELECTED: [...]
 case FL_TREE_REASON_OPENED: [...]
 case FL_TREE_REASON_CLOSED: [...]
 }
}

```

## SIMPLE EXAMPLES

To find all the selected items:

```

for (Fl_Tree_Item *i=first_selected_item(); i; i=next_selected_item(i))
 printf("Item %s is selected\n", i->label());

```

To get an item's full menu pathname, use `Fl_Tree::item_pathname()`, e.g.

```

char pathname[256] = "???";
tree->item_pathname(pathname, sizeof(pathname), item); // eg. "Parent/Child/Item"

```

To walk all the items of the tree from top to bottom:

```

// Walk all the items in the tree, and print their labels
for (Fl_Tree_Item *item = tree->first(); item; item = tree->next(item)) {
 printf("Item: %s\n", item->label());
}

```

To recursively walk all the children of a particular item, define a function that uses recursion:

```

// Find all of the item's children and print an indented report of their labels
void my_print_all_children(Fl_Tree_Item *item, int indent=0) {
 for (int t=0; t<item->children(); t++) {
 printf("%*s Item: %s\n", indent, "", item->child(t)->label());
 my_print_all_children(item->child(t), indent+4); // recurse
 }
}

```

To change the default label font and color when creating new items:

```

tree = new Fl_Tree(..);
tree->item_labelfont(FL_COURIER); // Use Courier font for all new items
tree->item_labelfgcolor(FL_RED); // Use red color for labels of all new items
[...];
// Now create the items in the tree using the above defaults.
tree->add("Aaa");
tree->add("Bbb");
[...];

```

To change the font and color of all existing items in the tree:

```

// Change the font and color of all items currently in the tree
for (Fl_Tree_Item *item = tree->first(); item; item = tree->next(item)) {
 item->labelfont(FL_COURIER);
 item->labelcolor(FL_RED);
}

```

## DISPLAY DESCRIPTION

The following image shows the tree's various visual elements and the methods that control them:

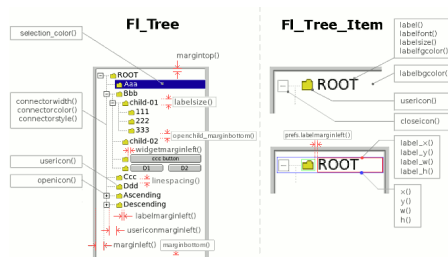


Figure 31.45 Fl\_Tree elements

The following shows the protected dimension variables 'tree inner' (tix..) and 'tree outer' (tox..):

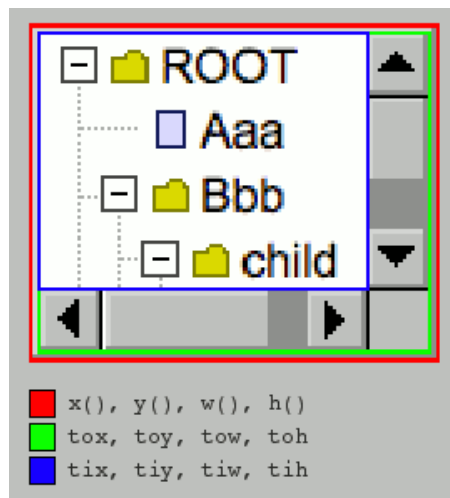


Figure 31.46 FL\_Tree inner/outer dimensions

#### KEYBOARD BINDINGS

The following table lists keyboard bindings for navigating the tree:

Table 31.466 Keyboard bindings.

| Keyboard                                                  | FL_TREE_SELECT_↔<br>MULTI         | FL_TREE_SELECT_↔<br>SINGLE  | FL_TREE_SELECT_↔<br>NONE    |
|-----------------------------------------------------------|-----------------------------------|-----------------------------|-----------------------------|
| <b>Ctrl-A</b> (Linux/Windows)<br><b>Command-A</b> (Mac)   | Select all items.                 | N/A                         | N/A                         |
| <b>Space</b>                                              | Selects item.                     | Selects item.               | N/A                         |
| <b>Ctrl-Space</b>                                         | Toggle item.                      | Toggle item.                | N/A                         |
| <b>Shift-Space</b>                                        | Extends selection from last item. | Selects item.               | N/A                         |
| <b>Enter,</b><br><b>Ctrl-Enter,</b><br><b>Shift-Enter</b> | Toggles open/close                | Toggles open/close          | Toggles open/close          |
| <b>Right / Left</b>                                       | Open/Close item.                  | Open/Close item.            | Open/Close item.            |
| <b>Up / Down</b>                                          | Move focus box up/down.           | Move focus box up/down.     | N/A                         |
| <b>Shift-Up / Shift-Down</b>                              | Extend selection up/down.         | Move focus up/down.         | N/A                         |
| <b>Home / End</b>                                         | Move to top/bottom of tree.       | Move to top/bottom of tree. | Move to top/bottom of tree. |
| <b>PageUp / PageDown</b>                                  | Page up/down.                     | Page up/down.               | Page up/down.               |

#### 31.143.2 Member Function Documentation

**31.143.2.1 add()** [1/2]

```
Fl_Tree_Item * Fl_Tree::add (
 const char * path,
 Fl_Tree_Item * item = 0)
```

Adds a new item, given a menu style 'path'.

Any parent nodes that don't already exist are created automatically. Adds the item based on the value of [sortorder\(\)](#). If 'item' is NULL, a new item is created.

To specify items or submenus that contain slashes ('/' or '\') use an escape character to protect them, e.g.

```
tree->add("/Holidays/Photos/12\\25\\2010"); // Adds item "12/25/2010"
tree->add("/Pathnames/c:\\\\Program Files\\\\MyApp"); // Adds item "c:\Program Files\MyApp"
```

**Parameters**

|    |             |                                                                                                          |
|----|-------------|----------------------------------------------------------------------------------------------------------|
| in | <i>path</i> | The path to the item, e.g. "Flintstone/Fred".                                                            |
| in | <i>item</i> | The new item to be added. If NULL, a new item is created with a name that is the last element in 'path'. |

**Returns**

The new item added, or 0 on error.

**Version**

1.3.3

**31.143.2.2 add()** [2/2]

```
Fl_Tree_Item * Fl_Tree::add (
 Fl_Tree_Item * parent_item,
 const char * name)
```

Add a new child item labeled 'name' to the specified 'parent\_item'.

**Parameters**

|    |                    |                                                                        |
|----|--------------------|------------------------------------------------------------------------|
| in | <i>parent_item</i> | The parent item the new child item will be added to. Must not be NULL. |
| in | <i>name</i>        | The label for the new item                                             |

**Returns**

The new item added.

**Version**

1.3.0 release

**31.143.2.3 calc\_dimensions()**

```
void Fl_Tree::calc_dimensions ()
```

Recalculate widget dimensions and scrollbar visibility, normally managed automatically.

Low overhead way to update the tree widget's outer/inner dimensions and re-determine scrollbar visibility based on these changes without recalculating the entire size of the tree data.

Assumes that either the tree's size in `_tree_w/_tree_h` are correct so that scrollbar visibility can be calculated easily, or are both zero indicating scrollbar visibility can't be calculated yet.

This method is called when the widget is [resize\(\)](#)ed or if the scrollbar's sizes are changed (affects tree widget's inner dimensions `tix/y/w/h`), and also used by [calc\\_tree\(\)](#).

## Version

## 1.3.3 ABI feature

**31.143.2.4 calc\_tree()**

```
void Fl_Tree::calc_tree ()
```

Recalculates the tree's sizes and scrollbar visibility, normally managed automatically.  
On return:

- `_tree_w` will be the overall pixel width of the entire viewable tree
- `_tree_h` will be the overall pixel height ""
- scrollbar visibility and pan sizes are updated
- internal `_tix/_tiy/_tiw/_tih` dimensions are updated

`_tree_w/_tree_h` include the tree's margins (e.g. [marginleft\(\)](#)), whether items are open or closed, label contents and font sizes, etc.

The tree hierarchy's size is managed separately from the widget's size as an optimization; this way [resize\(\)](#) on the widget doesn't involve recalculating the tree's hierarchy needlessly, as widget size has no bearing on the tree hierarchy.

The tree hierarchy's size only changes when items are added/removed, open/closed, label contents or font sizes changed, margins changed, etc.

This calculation involves walking the *entire* tree from top to bottom, potentially a slow calculation if the tree has many items (potentially hundreds of thousands), and should therefore be called sparingly.

For this reason, [recalc\\_tree\(\)](#) is used as a way to /schedule/ calculation when changes affect the tree hierarchy's size.

Apps may want to call this method directly if the app makes changes to the tree's geometry, then immediately needs to work with the tree's new dimensions before an actual redraw (and recalc) occurs. (This use by an app should only rarely be needed)

**31.143.2.5 callback\_item()** [1/2]

```
Fl_Tree_Item * Fl_Tree::callback_item ()
```

Gets the item that caused the callback.

The [callback\(\)](#) can use this value to see which item changed.

**31.143.2.6 callback\_item()** [2/2]

```
void Fl_Tree::callback_item (
 Fl_Tree_Item * item)
```

Sets the item that was changed for this callback.

Used internally to pass the item that invoked the callback.

**31.143.2.7 callback\_reason()** [1/2]

```
Fl_Tree_Reason Fl_Tree::callback_reason () const
```

Gets the reason for this callback.

The [callback\(\)](#) can use this value to see why it was called. Example:

```
void MyTreeCallback(Fl_Widget *w, void *userdata) {
 Fl_Tree *tree = (Fl_Tree*)w;
 Fl_Tree_Item *item = tree->callback_item(); // the item changed (can be NULL if more than one item
 was changed!)
 switch (tree->callback_reason()) { // reason callback was invoked
 case FL_TREE_REASON_OPENED: ..item was opened..
 case FL_TREE_REASON_CLOSED: ..item was closed..
 case FL_TREE_REASON_SELECTED: ..item was selected..
 case FL_TREE_REASON_RESELECTED: ..item was reselected (double-clicked, etc)..
 case FL_TREE_REASON_DESELECTED: ..item was deselected..
 }
}
```

**See also**

[item\\_reselect\\_mode\(\)](#) – enables `FL_TREE_REASON_RESELECTED` events

**31.143.2.8 callback\_reason()** [2/2]

```
void Fl_Tree::callback_reason (
 Fl_Tree_Reason reason)
```

Sets the reason for this callback.

Used internally to pass the reason the callback was invoked.

**31.143.2.9 clear()**

```
void Fl_Tree::clear ()
```

Clear the entire tree's children, including the root.

The tree will be left completely empty.

**31.143.2.10 clear\_children()**

```
void Fl_Tree::clear_children (
 Fl_Tree_Item * item)
```

Clear all the children for 'item'.

Item may not be NULL.

**31.143.2.11 close()** [1/2]

```
int Fl_Tree::close (
 const char * path,
 int docallback = 1)
```

Closes the item specified by 'path'.

Invokes the callback depending on the value of optional parameter 'docallback'.

Handles calling [redraw\(\)](#) if anything changed.

Items or submenus that themselves contain slashes ('/' or '\') should be escaped, e.g. `close("Holidays/12\25\2010")`.

The callback can use [callback\\_item\(\)](#) and [callback\\_reason\(\)](#) respectively to determine the item changed and the reason the callback was called.

**Parameters**

|    |                   |                                                                                                                                                                                                                                                                                                                                              |
|----|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| in | <i>path</i>       | – the tree item's pathname (e.g. "Flintstones/Fred")                                                                                                                                                                                                                                                                                         |
| in | <i>docallback</i> | – A flag that determines if the <a href="#">callback()</a> is invoked or not: <ul style="list-style-type: none"> <li>• 0 - <a href="#">callback()</a> is not invoked</li> <li>• 1 - <a href="#">callback()</a> is invoked if item changed (default), <a href="#">callback_reason()</a> will be <code>FL_TREE_REASON_CLOSED</code></li> </ul> |

**Returns**

- 1 – OK: item closed
- 0 – OK: item was already closed, no change
- -1 – ERROR: item was not found

**See also**

[open\(\)](#), [close\(\)](#), [is\\_open\(\)](#), [is\\_close\(\)](#), [callback\\_item\(\)](#), [callback\\_reason\(\)](#)

**31.143.2.12 close()** [2/2]

```
int Fl_Tree::close (
 Fl_Tree_Item * item,
 int docallback = 1)
```

Closes the specified 'item'.

Invokes the callback depending on the value of optional parameter 'docallback'.

Handles calling `redraw()` if anything changed.

The callback can use `callback_item()` and `callback_reason()` respectively to determine the item changed and the reason the callback was called.

#### Parameters

|    |                   |                                                                                                                                                                                                                                                                                                                                  |
|----|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| in | <i>item</i>       | – the item to be closed. Must not be NULL.                                                                                                                                                                                                                                                                                       |
| in | <i>docallback</i> | – A flag that determines if the <code>callback()</code> is invoked or not: <ul style="list-style-type: none"> <li>• 0 - <code>callback()</code> is not invoked</li> <li>• 1 - <code>callback()</code> is invoked if item changed (default), <code>callback_reason()</code> will be <code>FL_TREE_REASON_CLOSED</code></li> </ul> |

#### Returns

- 1 – item was closed
- 0 – item was already closed, no change

#### See also

[open\(\)](#), [close\(\)](#), [is\\_open\(\)](#), [is\\_close\(\)](#), [callback\\_item\(\)](#), [callback\\_reason\(\)](#)

#### 31.143.2.13 `closeicon()` [1/2]

```
Fl_Image * Fl_Tree::closeicon () const
```

Returns the icon to be used as the 'close' icon.

If none was set, the internal default is returned, a simple '[-]' icon.

#### 31.143.2.14 `closeicon()` [2/2]

```
void Fl_Tree::closeicon (
 Fl_Image * val)
```

Sets the icon to be used as the 'close' icon.

This overrides the built in default '[-]' icon.

#### Parameters

|    |            |                                                         |
|----|------------|---------------------------------------------------------|
| in | <i>val</i> | – The new image, or zero to use the default '[-]' icon. |
|----|------------|---------------------------------------------------------|

#### 31.143.2.15 `connectorstyle()`

```
void Fl_Tree::connectorstyle (
 Fl_Tree_Connector val)
```

Sets the line drawing style for inter-connecting items.

See [Fl\\_Tree\\_Connector](#) for possible values.

#### 31.143.2.16 `deselect()` [1/2]

```
int Fl_Tree::deselect (
 const char * path,
 int docallback = 1)
```



Deselect an item specified by 'path'.

Invokes the callback depending on the value of optional parameter 'docallback'.

Handles calling [redraw\(\)](#) if anything changed.

Items or submenus that themselves contain slashes ('/' or '\') should be escaped, e.g. `deselect("← Holidays/12\25\2010")`.

The callback can use [callback\\_item\(\)](#) and [callback\\_reason\(\)](#) respectively to determine the item changed and the reason the callback was called.

#### Parameters

|    |                   |                                                                                                                                                                                                                                                                                                                                                                |
|----|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| in | <i>path</i>       | – the tree item's pathname (e.g. "Flintstones/Fred")                                                                                                                                                                                                                                                                                                           |
| in | <i>docallback</i> | – A flag that determines if the <a href="#">callback()</a> is invoked or not: <ul style="list-style-type: none"> <li>• 0 - the <a href="#">callback()</a> is not invoked</li> <li>• 1 - the <a href="#">callback()</a> is invoked if item changed state (default), <a href="#">callback_reason()</a> will be <code>FL_TREE_REASON_DESELECTED</code></li> </ul> |

#### Returns

- 1 - OK: item's state was changed
- 0 - OK: item was already deselected, no change was made
- -1 - ERROR: item was not found

#### 31.143.2.17 `deselect()` [2/2]

```
int Fl_Tree::deselect (
 Fl_Tree_Item * item,
 int docallback = 1)
```

Deselect the specified `item`.

Invokes the callback depending on the value of optional parameter 'docallback'.

Handles calling [redraw\(\)](#) if anything changed.

The callback can use [callback\\_item\(\)](#) and [callback\\_reason\(\)](#) respectively to determine the item changed and the reason the callback was called.

#### Parameters

|    |                   |                                                                                                                                                                                                                                                                                                                                                                |
|----|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| in | <i>item</i>       | – the item to be deselected. Must not be NULL.                                                                                                                                                                                                                                                                                                                 |
| in | <i>docallback</i> | – A flag that determines if the <a href="#">callback()</a> is invoked or not: <ul style="list-style-type: none"> <li>• 0 - the <a href="#">callback()</a> is not invoked</li> <li>• 1 - the <a href="#">callback()</a> is invoked if item changed state (default), <a href="#">callback_reason()</a> will be <code>FL_TREE_REASON_DESELECTED</code></li> </ul> |

#### Returns

- 0 - item was already deselected, no change was made
- 1 - item's state was changed

#### 31.143.2.18 `deselect_all()`

```
int Fl_Tree::deselect_all (
 Fl_Tree_Item * item = 0,
 int docallback = 1)
```

Deselect `'item'` and all its children.

If item is NULL, `first()` is used.

Invokes the callback depending on the value of optional parameter `'docallback'`.

Handles calling `redraw()` if anything changed.

The callback can use `callback_item()` and `callback_reason()` respectively to determine the item changed and the reason the callback was called.

#### Parameters

|    |                   |                                                                                                                                                                                                                                                                                                                                                               |
|----|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| in | <i>item</i>       | The item that will be deselected (along with all its children). If NULL, <code>first()</code> is used.                                                                                                                                                                                                                                                        |
| in | <i>docallback</i> | – A flag that determines if the <code>callback()</code> is invoked or not: <ul style="list-style-type: none"> <li>• 0 - the <code>callback()</code> is not invoked</li> <li>• 1 - the <code>callback()</code> is invoked for each item that changed state (default), <code>callback_reason()</code> will be <code>FL_TREE_REASON_DESELECTED</code></li> </ul> |

#### Returns

Count of how many items were actually changed to the deselected state.

#### 31.143.2.19 display()

```
void Fl_Tree::display (
 Fl_Tree_Item * item)
```

Displays `'item'`, scrolling the tree as necessary.

#### Parameters

|    |             |                                                                  |
|----|-------------|------------------------------------------------------------------|
| in | <i>item</i> | The item to be displayed. If NULL, <code>first()</code> is used. |
|----|-------------|------------------------------------------------------------------|

#### 31.143.2.20 displayed()

```
int Fl_Tree::displayed (
 Fl_Tree_Item * item)
```

See if `'item'` is currently displayed on-screen (visible within the widget).

This can be used to detect if the item is scrolled off-screen. Checks to see if the item's vertical position is within the top and bottom edges of the display window. This does NOT take into account the `hide()` / `show()` or `open()` / `close()` status of the item.

#### Parameters

|    |             |                                                                |
|----|-------------|----------------------------------------------------------------|
| in | <i>item</i> | The item to be checked. If NULL, <code>first()</code> is used. |
|----|-------------|----------------------------------------------------------------|

#### Returns

1 if displayed, 0 if scrolled off screen or no items are in tree.

#### 31.143.2.21 extend\_selection()

```
int Fl_Tree::extend_selection (
 Fl_Tree_Item * from,
 Fl_Tree_Item * to,
```

```
int val = 1,
bool visible = false)
```

Extend a selection between 'from' and 'to' depending on 'visible'.

Similar to the more efficient [extend\\_selection\\_dir\(Fl\\_Tree\\_Item\\*,Fl\\_Tree\\_Item\\*,int dir,int val,bool vis\)](#) method, but direction (up or down) doesn't need to be known.

We're less efficient because we search the tree for to/from, then operate on items in between. The more efficient method avoids the "search", but necessitates a direction to be specified to find 'to'.

Used by SHIFT-click to extend a selection between two items inclusive.

Handles calling [redraw\(\)](#) if anything changed.

#### Parameters

|    |                |                                                                                                         |
|----|----------------|---------------------------------------------------------------------------------------------------------|
| in | <i>from</i>    | Starting item                                                                                           |
| in | <i>to</i>      | Ending item                                                                                             |
| in | <i>val</i>     | Select or deselect items (0=deselect, 1=select, 2=toggle)                                               |
| in | <i>visible</i> | true=affect only <a href="#">open()</a> , visible items,<br>false=affect open or closed items (default) |

#### Returns

The number of items whose selection states were changed, if any.

#### Version

1.3.3 ABI feature

### 31.143.2.22 extend\_selection\_dir()

```
int Fl_Tree::extend_selection_dir (
 Fl_Tree_Item * from,
 Fl_Tree_Item * to,
 int dir,
 int val,
 bool visible)
```

Extend the selection between and including 'from' and 'to' depending on direction 'dir', 'val', and 'visible'.

Efficient: does not walk entire tree; starts with 'from' and stops at 'to' while moving in direction 'dir'. Dir must be specified though. If dir cannot be known in advance, such as during SHIFT-click operations, the method [extend\\_selection\(Fl\\_Tree\\_Item\\*,Fl\\_Tree\\_Item\\*,int,bool\)](#) should be used. Handles calling [redraw\(\)](#) if anything changed.

#### Parameters

|    |                |                                                                                                         |
|----|----------------|---------------------------------------------------------------------------------------------------------|
| in | <i>from</i>    | Starting item                                                                                           |
| in | <i>to</i>      | Ending item                                                                                             |
| in | <i>dir</i>     | Direction to extend selection (FL_Up or FL_Down)                                                        |
| in | <i>val</i>     | 0=deselect, 1=select, 2=toggle                                                                          |
| in | <i>visible</i> | true=affect only <a href="#">open()</a> , visible items,<br>false=affect open or closed items (default) |

#### Returns

The number of items whose selection states were changed, if any.

## Version

1.3.3

**31.143.2.23 find\_clicked()**

```
const Fl_Tree_Item * Fl_Tree::find_clicked (
 int yonly = 0) const
```

Find the item that was last clicked on.

You should use [callback\\_item\(\)](#) instead, which is fast, and is meant to be used within a callback to determine the item clicked.

This method walks the entire tree looking for the first item that is under the mouse. (The value of the 'yonly' flag affects whether both x and y events are checked, or just y)

Use this method /only/ if you've subclassed [Fl\\_Tree](#), and are receiving events before [Fl\\_Tree](#) has been able to process and update [callback\\_item\(\)](#).

## Parameters

|    |              |                                                                                              |
|----|--------------|----------------------------------------------------------------------------------------------|
| in | <i>yonly</i> | – 0: check both event's X and Y values. – 1: only check event's Y value, don't care about X. |
|----|--------------|----------------------------------------------------------------------------------------------|

## Returns

The item clicked, or NULL if no item was under the current event.

## Version

1.3.0

1.3.3 ABI feature: added yonly parameter

**31.143.2.24 find\_item()**

```
const Fl_Tree_Item * Fl_Tree::find_item (
 const char * path) const
```

Find the item, given a menu style path, e.g.

"/Parent/Child/item". There is both a const and non-const version of this method. Const version allows pure const methods to use this method to do lookups without causing compiler errors.

To specify items or submenus that contain slashes ('/' or '\') use an escape character to protect them, e.g.

```
tree->add("/Holidays/Photos/12\\25\\2010"); // Adds item "12/25/2010"
tree->add("/Pathnames/c:\\\\Program Files\\\\MyApp"); // Adds item "c:\Program Files\MyApp"
```

## Parameters

|    |             |                                                                  |
|----|-------------|------------------------------------------------------------------|
| in | <i>path</i> | – the tree item's pathname to be found (e.g. "Flintstones/Fred") |
|----|-------------|------------------------------------------------------------------|

## Returns

The item, or NULL if not found.

## See also

[item\\_pathname\(\)](#)

**31.143.2.25 first()**

```
Fl_Tree_Item * Fl_Tree::first ()
```

Returns the first item in the tree, or 0 if none.

Use this to walk the tree in the forward direction, e.g.

```
for (Fl_Tree_Item *item = tree->first(); item; item = tree->next(item))
 printf("Item: %s\n", item->label());
```

#### Returns

First item in tree, or 0 if none (tree empty).

#### See also

[first\(\)](#), [next\(\)](#), [last\(\)](#), [prev\(\)](#)

### 31.143.2.26 first\_selected\_item()

```
Fl_Tree_Item * Fl_Tree::first_selected_item ()
```

Returns the first selected item in the tree.

Use this to walk the tree from top to bottom looking for all the selected items, e.g.

```
// Walk tree forward, from top to bottom
for (Fl_Tree_Item *i=tree->first_selected_item(); i; i=tree->next_selected_item(i))
 printf("Selected item: %s\n", i->label());
```

#### Returns

The first selected item, or 0 if none.

#### See also

[first\\_selected\\_item\(\)](#), [last\\_selected\\_item\(\)](#), [next\\_selected\\_item\(\)](#)

### 31.143.2.27 first\_visible()

```
Fl_Tree_Item * Fl_Tree::first_visible ()
```

Returns the first [open\(\)](#), visible item in the tree, or 0 if none.

**Deprecated** in 1.3.3 ABI – use [first\\_visible\\_item\(\)](#) instead.

### 31.143.2.28 first\_visible\_item()

```
Fl_Tree_Item * Fl_Tree::first_visible_item ()
```

Returns the first [open\(\)](#), visible item in the tree, or 0 if none.

#### Returns

First visible item in tree, or 0 if none.

#### See also

[first\\_visible\\_item\(\)](#), [last\\_visible\\_item\(\)](#), [next\\_visible\\_item\(\)](#)

#### Version

1.3.3

**31.143.2.29 get\_selected\_items()**

```
int Fl_Tree::get_selected_items (
 Fl_Tree_Item_Array & ret_items)
```

Returns the currently selected items as an array of 'ret\_items'.

Example:

```
// Get selected items as an array
Fl_Tree_Item_Array items;
tree->get_selected_items(items);
// Manipulate the returned array
for (int t=0; t<items.total(); t++) {
 Fl_Tree_Item &item = items[t];
 ..do stuff with each selected item..
}
```

Parameters

|     |                  |                                       |
|-----|------------------|---------------------------------------|
| out | <i>ret_items</i> | The returned array of selected items. |
|-----|------------------|---------------------------------------|

Returns

The number of items in the returned array.

See also

[first\\_selected\\_item\(\)](#), [next\\_selected\\_item\(\)](#)

Version

1.3.3 ABI feature

**31.143.2.30 handle()**

```
int Fl_Tree::handle (
 int e) [virtual]
```

Standard FLTK event handler for this widget.

**Todo** add [Fl\\_Widget\\_Tracker](#) (see [Fl\\_Browser\\_cxx::handle\(\)](#))

Reimplemented from [Fl\\_Group](#).

**31.143.2.31 hposition() [1/2]**

```
int Fl_Tree::hposition () const
```

Returns the horizontal scroll position as a pixel offset.

The position returned is how many pixels of the tree are scrolled off the left edge of the screen.

See also

[hposition\(int\)](#), [vposition\(\)](#), [vposition\(int\)](#)

Note

Must be using FLTK ABI 1.3.3 or higher for this to be effective.

**31.143.2.32 hposition() [2/2]**

```
void Fl_Tree::hposition (
 int pos)
```

Sets the horizontal scroll offset to position 'pos'.

The position is how many pixels of the tree are scrolled off the left edge of the screen.

## Parameters

|    |            |                                                          |
|----|------------|----------------------------------------------------------|
| in | <i>pos</i> | The vertical position (in pixels) to scroll the tree to. |
|----|------------|----------------------------------------------------------|

## See also

[hposition\(\)](#), [vposition\(\)](#), [vposition\(int\)](#)

## Note

Must be using FLTK ABI 1.3.3 or higher for this to be effective.

**31.143.2.33 insert()**

```
Fl_Tree_Item * Fl_Tree::insert (
 Fl_Tree_Item * item,
 const char * name,
 int pos)
```

Insert a new item 'name' into 'item's children at position 'pos'.

If *pos* is out of range the new item is

- prepended if *pos* < 0 or
- appended if *pos* > `item->children()`.

Note: *pos* == `children()` is not considered out of range: the item is appended to the child list. Example:

```
tree->add("Aaa/000"); // "000" is index 0 in Aaa's children
tree->add("Aaa/111"); // "111" is index 1 in Aaa's children
tree->add("Aaa/222"); // "222" is index 2 in Aaa's children
..
// How to use insert() to insert a new item between Aaa/111 + Aaa/222
Fl_Tree_Item *item = tree->find_item("Aaa"); // get parent item Aaa
if (item) tree->insert(item, "New item", 2); // insert as a child of Aaa at index #2
```

## Parameters

|    |             |                                                               |
|----|-------------|---------------------------------------------------------------|
| in | <i>item</i> | The existing item to insert new child into. Must not be NULL. |
| in | <i>name</i> | The label for the new item                                    |
| in | <i>pos</i>  | The position of the new item in the child list                |

## Returns

The new item added.

## See also

[insert\\_above\(\)](#)

**31.143.2.34 insert\_above()**

```
Fl_Tree_Item * Fl_Tree::insert_above (
 Fl_Tree_Item * above,
 const char * name)
```

Inserts a new item 'name' above the specified `Fl_Tree_Item` 'above'.

## Example:

```
tree->add("Aaa/000"); // "000" is index 0 in Aaa's children
tree->add("Aaa/111"); // "111" is index 1 in Aaa's children
tree->add("Aaa/222"); // "222" is index 2 in Aaa's children
..
// How to use insert_above() to insert a new item above Aaa/222
```

```
Fl_Tree_Item *item = tree->find_item("Aaa/222"); // get item Aaa/222
if (item) tree->insert_above(item, "New item"); // insert new item above it
```



## Parameters

|    |              |                                                                  |
|----|--------------|------------------------------------------------------------------|
| in | <i>above</i> | – the item above which to insert the new item. Must not be NULL. |
| in | <i>name</i>  | – the name of the new item                                       |

## Returns

The new item added, or 0 if 'above' could not be found.

## See also

[insert\(\)](#)

**31.143.2.35 is\_close() [1/2]**

```
int Fl_Tree::is_close (
 const char * path) const
```

See if item specified by 'path' is closed.

Items or submenus that themselves contain slashes (/ or \) should be escaped, e.g. `is_close("Holidays/12\25\2010")`.

## Parameters

|    |             |                                                      |
|----|-------------|------------------------------------------------------|
| in | <i>path</i> | – the tree item's pathname (e.g. "Flintstones/Fred") |
|----|-------------|------------------------------------------------------|

## Returns

- 1 - OK: item is closed
- 0 - OK: item is open
- -1 - ERROR: item was not found

**31.143.2.36 is\_close() [2/2]**

```
int Fl_Tree::is_close (
 Fl_Tree_Item * item) const
```

See if the specified 'item' is closed.

## Parameters

|    |             |                                            |
|----|-------------|--------------------------------------------|
| in | <i>item</i> | – the item to be tested. Must not be NULL. |
|----|-------------|--------------------------------------------|

## Returns

- 1 : item is closed
- 0 : item is open

**31.143.2.37 is\_hscroll\_visible()**

```
int Fl_Tree::is_hscroll_visible () const
```

See if the horizontal scrollbar is currently visible.

**Returns**

1 if scrollbar visible, 0 if not.

**Note**

Must be using FLTK ABI 1.3.3 or higher for this to be effective.

**31.143.2.38 is\_open() [1/2]**

```
int Fl_Tree::is_open (
 const char * path) const
```

See if item specified by 'path' is open.

Items or submenus that themselves contain slashes ('/' or '\') should be escaped, e.g. `is_open("← Holidays/12\25\2010")`.

Items that are 'open' are themselves not necessarily visible; one of the item's parents might be closed.

**Parameters**

|           |             |                                                      |
|-----------|-------------|------------------------------------------------------|
| <i>in</i> | <i>path</i> | – the tree item's pathname (e.g. "Flintstones/Fred") |
|-----------|-------------|------------------------------------------------------|

**Returns**

- 1 - OK: item is open
- 0 - OK: item is closed
- -1 - ERROR: item was not found

**See also**

[Fl\\_Tree\\_Item::visible\\_r\(\)](#)

**31.143.2.39 is\_open() [2/2]**

```
int Fl_Tree::is_open (
 Fl_Tree_Item * item) const
```

See if 'item' is open.

Items that are 'open' are themselves not necessarily visible; one of the item's parents might be closed.

**Parameters**

|           |             |                                            |
|-----------|-------------|--------------------------------------------|
| <i>in</i> | <i>item</i> | – the item to be tested. Must not be NULL. |
|-----------|-------------|--------------------------------------------|

**Returns**

- 1 : item is open
- 0 : item is closed

**31.143.2.40 is\_scrollbar()**

```
int Fl_Tree::is_scrollbar (
 Fl_Widget * w)
```

See if widget 'w' is one of the [Fl\\_Tree](#) widget's scrollbars.

Use this to skip over the scrollbars when walking the [child\(\)](#) array. Example:

```
for (int i=0; i<tree->children(); i++) { // walk children
 Fl_Widget *w = tree->child(i);
 if (tree->is_scrollbar(w)) continue; // skip scrollbars
 ..do work here..
}
```

**Parameters**

|    |          |                |
|----|----------|----------------|
| in | <i>w</i> | Widget to test |
|----|----------|----------------|

**Returns**

1 if *w* is a scrollbar, 0 if not.

**Todo** should be const

**31.143.2.41 is\_selected() [1/2]**

```
int Fl_Tree::is_selected (
 const char * path)
```

See if item specified by 'path' is selected.

Items or submenus that themselves contain slashes (/ or \) should be escaped, e.g. `is_selected("← Holidays/12\25\2010")`.

**Parameters**

|    |             |                                                      |
|----|-------------|------------------------------------------------------|
| in | <i>path</i> | – the tree item's pathname (e.g. "Flintstones/Fred") |
|----|-------------|------------------------------------------------------|

**Returns**

- 1 : item selected
- 0 : item deselected
- -1 : item was not found

**31.143.2.42 is\_selected() [2/2]**

```
int Fl_Tree::is_selected (
 Fl_Tree_Item * item) const
```

See if the specified 'item' is selected.

**Parameters**

|    |             |                                            |
|----|-------------|--------------------------------------------|
| in | <i>item</i> | – the item to be tested. Must not be NULL. |
|----|-------------|--------------------------------------------|

**Returns**

- 1 : item selected
- 0 : item deselected

**31.143.2.43 is\_vscroll\_visible()**

```
int Fl_Tree::is_vscroll_visible () const
```

See if the vertical scrollbar is currently visible.

**Returns**

1 if scrollbar visible, 0 if not.

**31.143.2.44 item\_clicked() [1/2]**

```
Fl_Tree_Item * Fl_Tree::item_clicked ()
```

Return the item that was last clicked.

Valid only from within the [callback\(\)](#).

**Returns**

The item clicked, or 0 if none. 0 may also be used to indicate several items were clicked/changed.

**Deprecated** in 1.3.3 ABI – use [callback\\_item\(\)](#) instead.

**31.143.2.45 item\_clicked() [2/2]**

```
void Fl_Tree::item_clicked (
 Fl_Tree_Item * item) [protected]
```

Set the item that was last clicked.

Should only be used by subclasses needing to change this value. Normally [Fl\\_Tree](#) manages this value.

**Deprecated** in 1.3.3 ABI – use [callback\\_item\(\)](#) instead.

**31.143.2.46 item\_draw\_mode() [1/3]**

```
Fl_Tree_Item_Draw_Mode Fl_Tree::item_draw_mode () const
```

Get the 'item draw mode' used for the tree.

**Version**

1.3.1 ABI feature

**31.143.2.47 item\_draw\_mode() [2/3]**

```
void Fl_Tree::item_draw_mode (
 Fl_Tree_Item_Draw_Mode mode)
```

Set the 'item draw mode' used for the tree to 'mode'.

This affects how items in the tree are drawn, such as when a [widget\(\)](#) is defined. See [Fl\\_Tree\\_Item\\_Draw\\_Mode](#) for possible values.

**Version**

1.3.1 ABI feature

**31.143.2.48 item\_draw\_mode() [3/3]**

```
void Fl_Tree::item_draw_mode (
 int mode)
```

Set the 'item draw mode' used for the tree to integer 'mode'.

This affects how items in the tree are drawn, such as when a [widget\(\)](#) is defined. See [Fl\\_Tree\\_Item\\_Draw\\_Mode](#) for possible values.

**Version**

1.3.1 ABI feature

**31.143.2.49 item\_labelbgcolor()** [1/2]

```
void Fl_Tree::item_labelbgcolor (
 Fl_Color val)
```

Set the default label background color used for creating new items.

A special case is made for color 0xffffffff (default) which is treated as 'transparent'. To change the background color on a per-item basis, use [Fl\\_Tree\\_Item::labelbgcolor\(Fl\\_Color\)](#)

**31.143.2.50 item\_labelbgcolor()** [2/2]

```
Fl_Color Fl_Tree::item_labelbgcolor (
 void) const
```

Get the default label background color used for creating new items.

If the color is 0xffffffff, it is 'transparent'.

**31.143.2.51 item\_labelfgcolor()**

```
void Fl_Tree::item_labelfgcolor (
 Fl_Color val)
```

Set the default label foreground color used for creating new items.

To change the foreground color on a per-item basis, use [Fl\\_Tree\\_Item::labelfgcolor\(Fl\\_Color\)](#)

**31.143.2.52 item\_labelfont()**

```
void Fl_Tree::item_labelfont (
 Fl_Font val)
```

Set the default font face used for creating new items.

To change the font face on a per-item basis, use [Fl\\_Tree\\_Item::labelfont\(Fl\\_Font\)](#)

**31.143.2.53 item\_labelsize()**

```
void Fl_Tree::item_labelsize (
 Fl_Fontsize val)
```

Set the default label font size used for creating new items.

To change the font size on a per-item basis, use [Fl\\_Tree\\_Item::labelsize\(Fl\\_Fontsize\)](#)

**31.143.2.54 item\_pathname()**

```
int Fl_Tree::item_pathname (
 char * pathname,
 int pathnamelen,
 const Fl_Tree_Item * item) const
```

Return 'pathname' of size 'pathnamelen' for the specified 'item'.

If 'item' is NULL, [root\(\)](#) is used.

The tree's root will be included in the pathname if [showroot\(\)](#) is on.

Menu items or submenus that contain slashes ('/' or '\') in their names will be escaped with a backslash. This is symmetrical with the [add\(\)](#) function which uses the same escape pattern to set names.

**Parameters**

|     |                    |                                                                      |
|-----|--------------------|----------------------------------------------------------------------|
| out | <i>pathname</i>    | The string to use to return the pathname                             |
| in  | <i>pathnamelen</i> | The maximum length of the string (including NULL). Must not be zero. |
| in  | <i>item</i>        | The item whose pathname is to be returned.                           |

**Returns**

- 0 : OK (*pathname* returns the item's pathname)
- -1 : item not found (*pathname*="")
- -2 : *pathname* not large enough (*pathname*="")

See also

[find\\_item\(\)](#)

### 31.143.2.55 `item_reselect_mode()` [1/2]

```
Fl_Tree_Item_Reselect_Mode Fl_Tree::item_reselect_mode () const
```

Returns the current item re/selection mode.

Version

1.3.1 ABI feature

### 31.143.2.56 `item_reselect_mode()` [2/2]

```
void Fl_Tree::item_reselect_mode (
 Fl_Tree_Item_Reselect_Mode mode)
```

Sets the item re/selection mode.

See [Fl\\_Tree\\_Item\\_Reselect\\_Mode](#) for possible values.

Version

1.3.1 ABI feature

### 31.143.2.57 `last()`

```
Fl_Tree_Item * Fl_Tree::last ()
```

Returns the last item in the tree.

This can be used to walk the tree in reverse, e.g.

```
for (Fl_Tree_Item *item = tree->last(); item; item = tree->prev())
 printf("Item: %s\n", item->label());
```

Returns

Last item in the tree, or 0 if none (tree empty).

See also

[first\(\)](#), [next\(\)](#), [last\(\)](#), [prev\(\)](#)

### 31.143.2.58 `last_selected_item()`

```
Fl_Tree_Item * Fl_Tree::last_selected_item ()
```

Returns the last selected item in the tree.

Use this to walk the tree in reverse from bottom to top looking for all the selected items, e.g.

```
// Walk tree in reverse, from bottom to top
for (Fl_Tree_Item *i=tree->last_selected_item(); i; i=tree->next_selected_item(i, FL_Up))
 printf("Selected item: %s\n", i->label());
```

Returns

The last selected item, or 0 if none.

See also

[first\\_selected\\_item\(\)](#), [last\\_selected\\_item\(\)](#), [next\\_selected\\_item\(\)](#)

Version

1.3.3

**31.143.2.59 last\_visible()**

`Fl_Tree_Item * Fl_Tree::last_visible ( )`  
 Returns the last [open\(\)](#), visible item in the tree.

**Deprecated** in 1.3.3 – use [last\\_visible\\_item\(\)](#) instead.

**31.143.2.60 last\_visible\_item()**

`Fl_Tree_Item * Fl_Tree::last_visible_item ( )`  
 Returns the last [open\(\)](#), visible item in the tree.

**Returns**

Last visible item in the tree, or 0 if none.

**See also**

[first\\_visible\\_item\(\)](#), [last\\_visible\\_item\(\)](#), [next\\_visible\\_item\(\)](#)

**Version**

1.3.3

**31.143.2.61 load()**

```
void Fl_Tree::load (
 class Fl_Preferences & prefs)
```

Load FLTK preferences.

Read a preferences database into the tree widget.

A preferences database is a hierarchical collection of data which can be directly loaded into the tree view for inspection.

**Parameters**

|                 |                    |                                             |
|-----------------|--------------------|---------------------------------------------|
| <code>in</code> | <code>prefs</code> | the <a href="#">Fl_Preferences</a> database |
|-----------------|--------------------|---------------------------------------------|

**31.143.2.62 next()**

```
Fl_Tree_Item * Fl_Tree::next (
 Fl_Tree_Item * item = 0)
```

Return the next item after 'item', or 0 if no more items.

Use this code to walk the entire tree:

```
for (Fl_Tree_Item *i = tree->first(); i; i = tree->next(i))
 printf("Item: %s\n", i->label());
```

**Parameters**

|                 |                   |                                                            |
|-----------------|-------------------|------------------------------------------------------------|
| <code>in</code> | <code>item</code> | The item to use to find the next item. If NULL, returns 0. |
|-----------------|-------------------|------------------------------------------------------------|

**Returns**

Next item in tree, or 0 if at last item.

See also

[first\(\)](#), [next\(\)](#), [last\(\)](#), [prev\(\)](#)

### 31.143.2.63 next\_item()

```
Fl_Tree_Item * Fl_Tree::next_item (
 Fl_Tree_Item * item,
 int dir = FL_Down,
 bool visible = false)
```

Returns next item after 'item' in direction 'dir' depending on 'visible'.

Next item will be above (if dir==FL\_Up) or below (if dir==FL\_Down). If 'visible' is true, only items whose parents are [open\(\)](#) will be returned. If 'visible' is false, even items whose parents are [close\(\)](#)ed will be returned.

If item is 0, the return value will be the result of this truth table:

|              | visible=true                         | visible=false           |
|--------------|--------------------------------------|-------------------------|
| dir=FL_Up:   | <a href="#">last_visible_item()</a>  | <a href="#">last()</a>  |
| dir=FL_Down: | <a href="#">first_visible_item()</a> | <a href="#">first()</a> |

Example use:

```
// Walk down the tree showing open(), visible items
for (Fl_Tree_Item *i=tree->first_visible_item(); i; i=tree->next_item(i, FL_Down, true))
 printf("Item: %s\n", i->label());
// Walk up the tree showing open(), visible items
for (Fl_Tree_Item *i=tree->last_visible_item(); i; i=tree->next_item(i, FL_Up, true))
 printf("Item: %s\n", i->label());
// Walk down the tree showing all items (open or closed)
for (Fl_Tree_Item *i=tree->first(); i; i=tree->next_item(i, FL_Down, false))
 printf("Item: %s\n", i->label());
// Walk up the tree showing all items (open or closed)
for (Fl_Tree_Item *i=tree->last(); i; i=tree->next_item(i, FL_Up, false))
 printf("Item: %s\n", i->label());
```

Parameters

|    |                |                                                                                                         |
|----|----------------|---------------------------------------------------------------------------------------------------------|
| in | <i>item</i>    | The item to use to find the next item. If NULL, returns 0.                                              |
| in | <i>dir</i>     | Can be FL_Up or FL_Down (default=FL_Down or 'next')                                                     |
| in | <i>visible</i> | true=return only <a href="#">open()</a> , visible items,<br>false=return open or closed items (default) |

Returns

Next item in tree in the direction and visibility specified, or 0 if no more items of specified visibility in that direction.

See also

[first\(\)](#), [last\(\)](#), [next\(\)](#),  
[first\\_visible\\_item\(\)](#), [last\\_visible\\_item\(\)](#), [next\\_visible\\_item\(\)](#),  
[first\\_selected\\_item\(\)](#), [last\\_selected\\_item\(\)](#), [next\\_selected\\_item\(\)](#)

Version

1.3.3



**31.143.2.64 next\_selected\_item()**

```
Fl_Tree_Item * Fl_Tree::next_selected_item (
 Fl_Tree_Item * item = 0,
 int dir = FL_Down)
```

Returns the next selected item above or below 'item', depending on 'dir'.

If 'item' is 0, search starts at either [first\(\)](#) or [last\(\)](#), depending on 'dir': [first\(\)](#) if 'dir' is FL\_Down (default), [last\(\)](#) if 'dir' is FL\_Up.

Use this to walk the tree looking for all the selected items, e.g.

```
// Walk down the tree (forwards)
for (Fl_Tree_Item *i=tree->first_selected_item(); i; i=tree->next_selected_item(i, FL_Down))
 printf("Item: %s\n", i->label());
// Walk up the tree (backwards)
for (Fl_Tree_Item *i=tree->last_selected_item(); i; i=tree->next_selected_item(i, FL_Up))
 printf("Item: %s\n", i->label());
```

**Parameters**

|    |             |                                                                                                                                                                       |
|----|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| in | <i>item</i> | The item above or below which we'll find the next selected item. If NULL, <a href="#">first()</a> is used if FL_Down, <a href="#">last()</a> if FL_Up. (default=NULL) |
| in | <i>dir</i>  | The direction to go. FL_Up for moving up the tree, FL_Down for down the tree (default)                                                                                |

**Returns**

The next selected item, or 0 if there are no more selected items.

**See also**

[first\\_selected\\_item\(\)](#), [last\\_selected\\_item\(\)](#), [next\\_selected\\_item\(\)](#)

**Version**

1.3.3

**31.143.2.65 next\_visible\_item()**

```
Fl_Tree_Item * Fl_Tree::next_visible_item (
 Fl_Tree_Item * item,
 int dir)
```

Returns next [open\(\)](#), visible item above (dir==FL\_Up) or below (dir==FL\_Down) the specified 'item', or 0 if no more items.

If 'item' is 0, returns [last\(\)](#) if 'dir' is FL\_Up, or [first\(\)](#) if dir is FL\_Down.

```
// Walk down the tree (forwards)
for (Fl_Tree_Item *i=tree->first_visible_item(); i; i=tree->next_visible_item(i, FL_Down))
 printf("Item: %s\n", i->label());
// Walk up the tree (backwards)
for (Fl_Tree_Item *i=tree->last_visible_item(); i; i=tree->next_visible_item(i, FL_Up))
 printf("Item: %s\n", i->label());
```

**Parameters**

|    |             |                                                             |
|----|-------------|-------------------------------------------------------------|
| in | <i>item</i> | The item above/below which we'll find the next visible item |
| in | <i>dir</i>  | The direction to search. Can be FL_Up or FL_Down.           |

**Returns**

The item found, or 0 if there's no visible items above/below the specified item.

## Version

1.3.3

**31.143.2.66 open()** [1/2]

```
int Fl_Tree::open (
 const char * path,
 int docallback = 1)
```

Opens the item specified by 'path'.

This causes the item's children (if any) to be shown.

Invokes the callback depending on the value of optional parameter 'docallback'.

Handles calling [redraw\(\)](#) if anything changed.

Items or submenus that themselves contain slashes ('/' or '\') should be escaped, e.g. `open("Holidays/12\25\2010")`.

The callback can use [callback\\_item\(\)](#) and [callback\\_reason\(\)](#) respectively to determine the item changed and the reason the callback was called.

## Parameters

|    |                   |                                                                                                                                                                                                                                                                                                                                              |
|----|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| in | <i>path</i>       | – the tree item's pathname (e.g. "Flintstones/Fred")                                                                                                                                                                                                                                                                                         |
| in | <i>docallback</i> | – A flag that determines if the <a href="#">callback()</a> is invoked or not: <ul style="list-style-type: none"> <li>• 0 - <a href="#">callback()</a> is not invoked</li> <li>• 1 - <a href="#">callback()</a> is invoked if item changed (default), <a href="#">callback_reason()</a> will be <code>FL_TREE_REASON_OPENED</code></li> </ul> |

## Returns

- 1 – OK: item opened
- 0 – OK: item was already open, no change
- -1 – ERROR: item was not found

## See also

[open\(\)](#), [close\(\)](#), [is\\_open\(\)](#), [is\\_close\(\)](#), [callback\\_item\(\)](#), [callback\\_reason\(\)](#)

**31.143.2.67 open()** [2/2]

```
int Fl_Tree::open (
 Fl_Tree_Item * item,
 int docallback = 1)
```

Open the specified 'item'.

This causes the item's children (if any) to be shown.

Invokes the callback depending on the value of optional parameter 'docallback'.

Handles calling [redraw\(\)](#) if anything changed.

The callback can use [callback\\_item\(\)](#) and [callback\\_reason\(\)](#) respectively to determine the item changed and the reason the callback was called.

## Parameters

|    |                   |                                                                                                                                                                                                                                                                                                                                              |
|----|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| in | <i>item</i>       | – the item to be opened. Must not be NULL.                                                                                                                                                                                                                                                                                                   |
| in | <i>docallback</i> | – A flag that determines if the <a href="#">callback()</a> is invoked or not: <ul style="list-style-type: none"> <li>• 0 - <a href="#">callback()</a> is not invoked</li> <li>• 1 - <a href="#">callback()</a> is invoked if item changed (default), <a href="#">callback_reason()</a> will be <code>FL_TREE_REASON_OPENED</code></li> </ul> |

## Returns

- 1 – item was opened
- 0 – item was already open, no change

## See also

[open\(\)](#), [close\(\)](#), [is\\_open\(\)](#), [is\\_close\(\)](#), [callback\\_item\(\)](#), [callback\\_reason\(\)](#)

**31.143.2.68 open\_toggle()**

```
void Fl_Tree::open_toggle (
 Fl_Tree_Item * item,
 int docallback = 1)
```

Toggle the open state of 'item'.

Invokes the callback depending on the value of optional parameter 'docallback'.

Handles calling [redraw\(\)](#) if anything changed.

The callback can use [callback\\_item\(\)](#) and [callback\\_reason\(\)](#) respectively to determine the item changed and the reason the callback was called.

## Parameters

|    |                   |                                                                                                                                                                                                                                                                                                                                                 |
|----|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| in | <i>item</i>       | – the item whose open state is to be toggled. Must not be NULL.                                                                                                                                                                                                                                                                                 |
| in | <i>docallback</i> | – A flag that determines if the <a href="#">callback()</a> is invoked or not: <ul style="list-style-type: none"> <li>• 0 - <a href="#">callback()</a> is not invoked</li> <li>• 1 - <a href="#">callback()</a> is invoked (default), <a href="#">callback_reason()</a> will be either FL_TREE_REASON_OPENED or FL_TREE_REASON_CLOSED</li> </ul> |

## See also

[open\(\)](#), [close\(\)](#), [is\\_open\(\)](#), [is\\_close\(\)](#), [callback\\_item\(\)](#), [callback\\_reason\(\)](#)

**31.143.2.69 openicon() [1/2]**

```
Fl_Image * Fl_Tree::openicon () const
```

Returns the icon to be used as the 'open' icon.

If none was set, the internal default is returned, a simple '[+]' icon.

**31.143.2.70 openicon() [2/2]**

```
void Fl_Tree::openicon (
 Fl_Image * val)
```

Sets the icon to be used as the 'open' icon.

This overrides the built in default '[+]' icon.

## Parameters

|    |            |                                                         |
|----|------------|---------------------------------------------------------|
| in | <i>val</i> | – The new image, or zero to use the default '[+]' icon. |
|----|------------|---------------------------------------------------------|

**31.143.2.71 prev()**

```
Fl_Tree_Item * Fl_Tree::prev (
 Fl_Tree_Item * item = 0)
```

Return the previous item before 'item', or 0 if no more items.

This can be used to walk the tree in reverse, e.g.

```
for (Fl_Tree_Item *item = tree->first(); item; item = tree->prev(item))
 printf("Item: %s\n", item->label());
```

**Parameters**

|    |             |                                                                |
|----|-------------|----------------------------------------------------------------|
| in | <i>item</i> | The item to use to find the previous item. If NULL, returns 0. |
|----|-------------|----------------------------------------------------------------|

**Returns**

Previous item in tree, or 0 if at first item.

**See also**

[first\(\)](#), [next\(\)](#), [last\(\)](#), [prev\(\)](#)

**31.143.2.72 recalc\_tree()**

```
void Fl_Tree::recalc_tree ()
```

Schedule tree to recalc the entire tree size.

**Note**

Must be using FLTK ABI 1.3.3 or higher for this to be effective.

**31.143.2.73 remove()**

```
int Fl_Tree::remove (
 Fl_Tree_Item * item)
```

Remove the specified 'item' from the tree.

*item* may not be NULL. If it has children, all those are removed too. If item being removed has focus, no item will have focus.

**Returns**

0 if done, -1 if 'item' not found.

**31.143.2.74 resize()**

```
void Fl_Tree::resize (
 int X,
 int Y,
 int W,
 int H) [virtual]
```

Resizes the [Fl\\_Group](#) widget and all of its children.

The [Fl\\_Group](#) widget first resizes itself, and then it moves and resizes all its children according to the rules documented for [Fl\\_Group::resizable\(Fl\\_Widget\\*\)](#)

**See also**

[Fl\\_Group::resizable\(Fl\\_Widget\\*\)](#)

[Fl\\_Group::resizable\(\)](#)

[Fl\\_Widget::resize\(int,int,int,int\)](#)

Reimplemented from [Fl\\_Group](#).

**31.143.2.75 root()**

```
void Fl_Tree::root (
 Fl_Tree_Item * newitem)
```

Sets the root item to 'newitem'.

If a root item already exists, [clear\(\)](#) is called first to clear it before replacing it with newitem. Use this to install a custom item (derived from [Fl\\_Tree\\_Item](#)) as the root of the tree. This allows the derived class to implement custom drawing by overriding [Fl\\_Tree\\_Item::draw\\_item\\_content\(\)](#).

**Version**

1.3.3

**31.143.2.76 root\_label()**

```
void Fl_Tree::root_label (
 const char * new_label)
```

Set the label for the root item to 'new\_label'.

Makes an internally managed copy of 'new\_label'.

**31.143.2.77 scrollbar\_size()** [1/2]

```
int Fl_Tree::scrollbar_size () const
```

Gets the default size of scrollbars' troughs for this widget in pixels.

If this value is zero (default), this widget will use the global [Fl::scrollbar\\_size\(\)](#) value as the scrollbar's width.

**Returns**

Scrollbar size in pixels, or 0 if the global [Fl::scrollbar\\_size\(\)](#) is being used.

**See also**

[Fl::scrollbar\\_size\(int\)](#)

**31.143.2.78 scrollbar\_size()** [2/2]

```
void Fl_Tree::scrollbar_size (
 int size)
```

Sets the pixel size of the scrollbars' troughs to 'size' for this widget, in pixels.

Normally you should not need this method, and should use the global [Fl::scrollbar\\_size\(int\)](#) instead to manage the size of ALL your widgets' scrollbars. This ensures your application has a consistent UI, and is the default behavior. Normally this is what you want.

Only use this method if you really need to override just THIS instance of the widget's scrollbar size. (This need should be rare.)

Setting *size* to the special value of 0 causes the widget to track the global [Fl::scrollbar\\_size\(\)](#), which is the default.

**Parameters**

|    |             |                                                                                                                             |
|----|-------------|-----------------------------------------------------------------------------------------------------------------------------|
| in | <i>size</i> | Sets the scrollbar size in pixels.<br>If 0 (default), scrollbar size tracks the global <a href="#">Fl::scrollbar_size()</a> |
|----|-------------|-----------------------------------------------------------------------------------------------------------------------------|

See also

[Fl::scrollbar\\_size\(\)](#)

### 31.143.2.79 `select()` [1/2]

```
int Fl_Tree::select (
 const char * path,
 int dcallback = 1)
```

Select the item specified by 'path'.

Invokes the callback depending on the value of optional parameter 'dcallback'.

Handles calling [redraw\(\)](#) if anything changed.

Items or submenus that themselves contain slashes ('/' or '\') should be escaped, e.g. `select("← Holidays/12\25\2010")`.

The callback can use [callback\\_item\(\)](#) and [callback\\_reason\(\)](#) respectively to determine the item changed and the reason the callback was called.

#### Parameters

|    |                  |                                                                                                                                                                                                                                                                                                                                                              |
|----|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| in | <i>path</i>      | – the tree item's pathname (e.g. "Flintstones/Fred")                                                                                                                                                                                                                                                                                                         |
| in | <i>dcallback</i> | – A flag that determines if the <a href="#">callback()</a> is invoked or not: <ul style="list-style-type: none"> <li>• 0 - the <a href="#">callback()</a> is not invoked</li> <li>• 1 - the <a href="#">callback()</a> is invoked if item changed state (default), <a href="#">callback_reason()</a> will be <code>FL_TREE_REASON_SELECTED</code></li> </ul> |

#### Returns

- 1 : OK: item's state was changed
- 0 : OK: item was already selected, no change was made
- -1 : ERROR: item was not found

### 31.143.2.80 `select()` [2/2]

```
int Fl_Tree::select (
 Fl_Tree_Item * item,
 int dcallback = 1)
```

Select the specified 'item'.

Use '[deselect\(\)](#)' to deselect it.

Invokes the callback depending on the value of optional parameter `dcallback`.

Handles calling [redraw\(\)](#) if anything changed.

The callback can use [callback\\_item\(\)](#) and [callback\\_reason\(\)](#) respectively to determine the item changed and the reason the callback was called.

#### Parameters

|    |                  |                                                                                                                                                                                                                                                                                                                                                    |
|----|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| in | <i>item</i>      | – the item to be selected. Must not be NULL.                                                                                                                                                                                                                                                                                                       |
| in | <i>dcallback</i> | – A flag that determines if the <a href="#">callback()</a> is invoked or not: <ul style="list-style-type: none"> <li>• 0 - the <a href="#">callback()</a> is not invoked</li> <li>• 1 - the <a href="#">callback()</a> is invoked if item changed state, <a href="#">callback_reason()</a> will be <code>FL_TREE_REASON_SELECTED</code></li> </ul> |

**Returns**

- 1 - item's state was changed
- 0 - item was already selected, no change was made

**31.143.2.81 select\_all()**

```
int Fl_Tree::select_all (
 Fl_Tree_Item * item = 0,
 int docalback = 1)
```

Select 'item' and all its children.

If item is NULL, [first\(\)](#) is used.

Invokes the callback depending on the value of optional parameter 'docalback'.

Handles calling [redraw\(\)](#) if anything changed.

The callback can use [callback\\_item\(\)](#) and [callback\\_reason\(\)](#) respectively to determine the item changed and the reason the callback was called.

**Parameters**

|    |                  |                                                                                                                                                                                                                                                                                                                                                            |
|----|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| in | <i>item</i>      | The item that will be selected (along with all its children). If NULL, <a href="#">first()</a> is used.                                                                                                                                                                                                                                                    |
| in | <i>docalback</i> | – A flag that determines if the <a href="#">callback()</a> is invoked or not: <ul style="list-style-type: none"> <li>• 0 - the <a href="#">callback()</a> is not invoked</li> <li>• 1 - the <a href="#">callback()</a> is invoked for each item that changed state (default), <a href="#">callback_reason()</a> will be FL_TREE_REASON_SELECTED</li> </ul> |

**Returns**

Count of how many items were actually changed to the selected state.

**31.143.2.82 select\_only()**

```
int Fl_Tree::select_only (
 Fl_Tree_Item * selitem,
 int docalback = 1)
```

Select only the specified item, deselecting all others that might be selected.

If 'selitem' is 0, [first\(\)](#) is used.

Invokes the callback depending on the value of optional parameter 'docalback'.

Handles calling [redraw\(\)](#) if anything changed.

The callback can use [callback\\_item\(\)](#) and [callback\\_reason\(\)](#) respectively to determine the item changed and the reason the callback was called.

**Parameters**

|    |                  |                                                                                                                                                                                                                                                                                                                                                                                                |
|----|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| in | <i>selitem</i>   | The item to be selected. If NULL, <a href="#">first()</a> is used.                                                                                                                                                                                                                                                                                                                             |
| in | <i>docalback</i> | – A flag that determines if the <a href="#">callback()</a> is invoked or not: <ul style="list-style-type: none"> <li>• 0 - the <a href="#">callback()</a> is not invoked</li> <li>• 1 - the <a href="#">callback()</a> is invoked for each item that changed state (default), <a href="#">callback_reason()</a> will be either FL_TREE_REASON_SELECTED or FL_TREE_REASON_DESELECTED</li> </ul> |

**Returns**

The number of items whose selection states were changed, if any.

**31.143.2.83 select\_toggle()**

```
void Fl_Tree::select_toggle (
 Fl_Tree_Item * item,
 int dcallback = 1)
```

Toggle the select state of the specified 'item'.

Invokes the callback depending on the value of optional parameter 'dcallback'.

Handles calling [redraw\(\)](#) if anything changed.

The callback can use [callback\\_item\(\)](#) and [callback\\_reason\(\)](#) respectively to determine the item changed and the reason the callback was called.

**Parameters**

|    |                  |                                                                                                                                                                                                                                                                                                                                                               |
|----|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| in | <i>item</i>      | – the item to be selected. Must not be NULL.                                                                                                                                                                                                                                                                                                                  |
| in | <i>dcallback</i> | – A flag that determines if the <a href="#">callback()</a> is invoked or not: <ul style="list-style-type: none"> <li>• 0 - the <a href="#">callback()</a> is not invoked</li> <li>• 1 - the <a href="#">callback()</a> is invoked (default), <a href="#">callback_reason()</a> will be either FL_TREE_REASON_SELECTED or FL_TREE_REASON_DESELECTED</li> </ul> |

**31.143.2.84 selectbox() [1/2]**

```
Fl_Boxtype Fl_Tree::selectbox () const
```

Sets the style of box used to draw selected items.

This is an fltk [Fl\\_Boxtype](#). The default is influenced by FLTK's current [Fl::scheme\(\)](#)

**31.143.2.85 selectbox() [2/2]**

```
void Fl_Tree::selectbox (
 Fl_Boxtype val)
```

Gets the style of box used to draw selected items.

This is an fltk [Fl\\_Boxtype](#). The default is influenced by FLTK's current [Fl::scheme\(\)](#)

**31.143.2.86 selectmode() [1/2]**

```
Fl_Tree_Select Fl_Tree::selectmode () const
```

Gets the tree's current selection mode.

See [Fl\\_Tree\\_Select](#) for possible values.

**31.143.2.87 selectmode() [2/2]**

```
void Fl_Tree::selectmode (
 Fl_Tree_Select val)
```

Sets the tree's selection mode.

See [Fl\\_Tree\\_Select](#) for possible values.

**31.143.2.88 set\_item\_focus()**

```
void Fl_Tree::set_item_focus (
 Fl_Tree_Item * item)
```

Set the item that currently should have keyboard focus.



Handles calling [redraw\(\)](#) to update the focus box (if it is visible).

#### Parameters

|                 |                   |                                                                 |
|-----------------|-------------------|-----------------------------------------------------------------|
| <code>in</code> | <code>item</code> | The item that should take focus. If NULL, none will have focus. |
|-----------------|-------------------|-----------------------------------------------------------------|

#### 31.143.2.89 [show\\_item\(\)](#) [1/2]

```
void Fl_Tree::show_item (
 Fl_Tree_Item * item)
```

Adjust the vertical scrollbar to show 'item' at the top of the display IF it is currently off-screen (for instance [show\\_item\\_top\(\)](#)).

If it is already on-screen, no change is made.

#### Parameters

|                 |                   |                                                                 |
|-----------------|-------------------|-----------------------------------------------------------------|
| <code>in</code> | <code>item</code> | The item to be shown. If NULL, <a href="#">first()</a> is used. |
|-----------------|-------------------|-----------------------------------------------------------------|

#### See also

[show\\_item\\_top\(\)](#), [show\\_item\\_middle\(\)](#), [show\\_item\\_bottom\(\)](#)

#### 31.143.2.90 [show\\_item\(\)](#) [2/2]

```
void Fl_Tree::show_item (
 Fl_Tree_Item * item,
 int yoff)
```

Adjust the vertical scrollbar so that 'item' is visible 'yoff' pixels from the top of the [Fl\\_Tree](#) widget's display. For instance, yoff=0 will position the item at the top.

If yoff is larger than the vertical scrollbar's limit, the value will be clipped. So if yoff=100, but scrollbar's max is 50, then 50 will be used.

#### Parameters

|                 |                   |                                                                 |
|-----------------|-------------------|-----------------------------------------------------------------|
| <code>in</code> | <code>item</code> | The item to be shown. If NULL, <a href="#">first()</a> is used. |
| <code>in</code> | <code>yoff</code> | The pixel offset from the top for the displayed position.       |

#### See also

[show\\_item\\_top\(\)](#), [show\\_item\\_middle\(\)](#), [show\\_item\\_bottom\(\)](#)

#### 31.143.2.91 [show\\_item\\_bottom\(\)](#)

```
void Fl_Tree::show_item_bottom (
 Fl_Tree_Item * item)
```

Adjust the vertical scrollbar so that 'item' is at the bottom of the display.

#### Parameters

|                 |                   |                                                                 |
|-----------------|-------------------|-----------------------------------------------------------------|
| <code>in</code> | <code>item</code> | The item to be shown. If NULL, <a href="#">first()</a> is used. |
|-----------------|-------------------|-----------------------------------------------------------------|

**31.143.2.92 show\_item\_middle()**

```
void Fl_Tree::show_item_middle (
 Fl_Tree_Item * item)
```

Adjust the vertical scrollbar so that 'item' is in the middle of the display.

**Parameters**

|    |             |                                                                 |
|----|-------------|-----------------------------------------------------------------|
| in | <i>item</i> | The item to be shown. If NULL, <a href="#">first()</a> is used. |
|----|-------------|-----------------------------------------------------------------|

**31.143.2.93 show\_item\_top()**

```
void Fl_Tree::show_item_top (
 Fl_Tree_Item * item)
```

Adjust the vertical scrollbar so that 'item' is at the top of the display.

**Parameters**

|    |             |                                                                 |
|----|-------------|-----------------------------------------------------------------|
| in | <i>item</i> | The item to be shown. If NULL, <a href="#">first()</a> is used. |
|----|-------------|-----------------------------------------------------------------|

**31.143.2.94 show\_self()**

```
void Fl_Tree::show_self ()
```

Print the tree as 'ascii art' to stdout.  
Used mainly for debugging.

**Todo** should be const

**Version**

1.3.0

**31.143.2.95 showcollapse() [1/2]**

```
int Fl_Tree::showcollapse () const
```

Returns 1 if the collapse icon is enabled, 0 if not.

**See also**

[showcollapse\(int\)](#)

**31.143.2.96 showcollapse() [2/2]**

```
void Fl_Tree::showcollapse (
 int val)
```

Set if we should show the collapse icon or not.

If collapse icons are disabled, the user will not be able to interactively collapse items in the tree, unless the application provides some other means via [open\(\)](#) and [close\(\)](#).

**Parameters**

|    |            |                                                                |
|----|------------|----------------------------------------------------------------|
| in | <i>val</i> | 1: shows collapse icons (default),<br>0: hides collapse icons. |
|----|------------|----------------------------------------------------------------|

**31.143.2.97 showroot()**

```
void Fl_Tree::showroot (
 int val)
```

Set if the root item should be shown or not.

**Parameters**

|    |     |                                                             |
|----|-----|-------------------------------------------------------------|
| in | val | 1 – show the root item (default)<br>0 – hide the root item. |
|----|-----|-------------------------------------------------------------|

**31.143.2.98 sortorder()**

```
Fl_Tree_Sort Fl_Tree::sortorder () const
```

Set the default sort order used when items are added to the tree.

See [Fl\\_Tree\\_Sort](#) for possible values.

**31.143.2.99 usericon() [1/2]**

```
Fl_Image * Fl_Tree::usericon () const
```

Returns the [Fl\\_Image](#) being used as the default user icon for all newly created items.

Returns zero if no icon has been set, which is the default.

**31.143.2.100 usericon() [2/2]**

```
void Fl_Tree::usericon (
 Fl_Image * val)
```

Sets the [Fl\\_Image](#) to be used as the default user icon for all newly created items.

If you want to specify user icons on a per-item basis, use [Fl\\_Tree\\_Item::usericon\(\)](#) instead.

**Parameters**

|    |     |                                                            |
|----|-----|------------------------------------------------------------|
| in | val | – The new image to be used, or zero to disable user icons. |
|----|-----|------------------------------------------------------------|

**31.143.2.101 vposition() [1/2]**

```
int Fl_Tree::vposition () const
```

Returns the vertical scroll position as a pixel offset.

The position returned is how many pixels of the tree are scrolled off the top edge of the screen.

**See also**

[vposition\(int\)](#), [hposition\(\)](#), [hposition\(int\)](#)

**31.143.2.102 vposition() [2/2]**

```
void Fl_Tree::vposition (
 int pos)
```

Sets the vertical scroll offset to position 'pos'.

The position is how many pixels of the tree are scrolled off the top edge of the screen.

## Parameters

|                 |                  |                                                          |
|-----------------|------------------|----------------------------------------------------------|
| <code>in</code> | <code>pos</code> | The vertical position (in pixels) to scroll the tree to. |
|-----------------|------------------|----------------------------------------------------------|

## See also

[vposition\(\)](#), [hposition\(\)](#), [hposition\(int\)](#)

The documentation for this class was generated from the following files:

- [Fl\\_Tree.H](#)
- [Fl\\_Tree.cxx](#)

## 31.144 Fl\_Tree\_Item Class Reference

Tree widget item.

```
#include <Fl_Tree_Item.H>
```

### Public Member Functions

- void [activate](#) (int val=1)  
*Change the item's activation state to the optionally specified 'val'.*
- [Fl\\_Tree\\_Item](#) \* [add](#) (const [Fl\\_Tree\\_Prefs](#) &prefs, char \*\*arr)  
*Descend into the path specified by 'arr', and add a new child there.*
- [Fl\\_Tree\\_Item](#) \* [add](#) (const [Fl\\_Tree\\_Prefs](#) &prefs, char \*\*arr, [Fl\\_Tree\\_Item](#) \*newitem)  
*Descend into path specified by 'arr' and add 'newitem' there.*
- [Fl\\_Tree\\_Item](#) \* [add](#) (const [Fl\\_Tree\\_Prefs](#) &prefs, const char \*new\_label)  
*Add a new child to this item with the name 'new\_label' and defaults from 'prefs'.*
- [Fl\\_Tree\\_Item](#) \* [add](#) (const [Fl\\_Tree\\_Prefs](#) &prefs, const char \*new\_label, [Fl\\_Tree\\_Item](#) \*newitem)  
*Add 'item' as immediate child with 'new\_label' and defaults from 'prefs'.*
- [Fl\\_Tree\\_Item](#) \* [child](#) (int index)  
*Return the child item for the given 'index'.*
- const [Fl\\_Tree\\_Item](#) \* [child](#) (int t) const  
*Return the const child item for the given 'index'.*
- int [children](#) () const  
*Return the number of children this item has.*
- void [clear\\_children](#) ()  
*Clear all the children for this item.*
- void [close](#) ()  
*Close this item and all its children.*
- void [deactivate](#) ()  
*Deactivate the item; the callback() won't be invoked when clicked.*
- [Fl\\_Tree\\_Item](#) \* [deparent](#) (int index)  
*Deparent child at index position 'pos'.*
- int [depth](#) () const  
*Returns how many levels deep this item is in the hierarchy.*
- void [deselect](#) ()  
*Disable the item's selection state.*
- int [deselect\\_all](#) ()  
*Deselect item and all its children.*
- void [draw](#) (int X, int &Y, int W, [Fl\\_Tree\\_Item](#) \*itemfocus, int &tree\_item\_xmax, int lastchild=1, int render=1)  
*Draw this item and its children.*
- virtual int [draw\\_item\\_content](#) (int render)

- Draw the item content.*

  - int `event_on_collapse_icon` (const `FI_Tree_Prefs &prefs`) const  
*Was the event on the 'collapse' button of this item?*
  - int `event_on_label` (const `FI_Tree_Prefs &prefs`) const  
*Was event on the `label()` of this item?*
  - int `find_child` (const char \*name)  
*Return the index of the immediate child of this item that has the label 'name'.*
  - int `find_child` (`FI_Tree_Item *item`)  
*Find the index number for the specified 'item' in the current item's list of children.*
  - `FI_Tree_Item * find_child_item` (char \*\*arr)  
*Non-const version of `FI_Tree_Item::find_child_item(char **arr) const`.*
  - const `FI_Tree_Item * find_child_item` (char \*\*arr) const  
*Find child item by descending array 'arr' of names.*
  - `FI_Tree_Item * find_child_item` (const char \*name)  
*Non-const version of `FI_Tree_Item::find_child_item(const char *name) const`.*
  - const `FI_Tree_Item * find_child_item` (const char \*name) const  
*Return the /immediate/ child of current item that has the label 'name'.*
  - `FI_Tree_Item * find_clicked` (const `FI_Tree_Prefs &prefs`, int yonly=0)  
*Non-const version of `FI_Tree_Item::find_clicked(const FI_Tree_Prefs&,int) const`.*
  - const `FI_Tree_Item * find_clicked` (const `FI_Tree_Prefs &prefs`, int yonly=0) const  
*Find the item that the last event was over.*
  - `FI_Tree_Item * find_item` (char \*\*arr)  
*Non-const version of `FI_Tree_Item::find_item(char **names) const`.*
  - const `FI_Tree_Item * find_item` (char \*\*arr) const  
*Find item by descending array of 'names'.*
  - `FI_Tree_Item` (const `FI_Tree_Item *o`)  
*Copy constructor.*
  - `FI_Tree_Item` (const `FI_Tree_Prefs &prefs`)  
*Constructor.*
  - `FI_Tree_Item` (`FI_Tree *tree`)  
*Constructor.*
  - int `h` () const  
*The item's height.*
  - int `has_children` () const  
*See if this item has children.*
  - `FI_Tree_Item * insert` (const `FI_Tree_Prefs &prefs`, const char \*new\_label, int pos=0)  
*Insert a new item named 'new\_label' into current item's children at a specified position 'pos'.*
  - `FI_Tree_Item * insert_above` (const `FI_Tree_Prefs &prefs`, const char \*new\_label)  
*Insert a new item named 'new\_label' above this item.*
  - char `is_activated` () const  
*See if the item is activated.*
  - char `is_active` () const  
*See if the item is activated. Alias for `is_activated()`.*
  - int `is_close` () const  
*See if the item is 'closed'.*
  - int `is_open` () const  
*See if the item is 'open'.*
  - int `is_root` () const  
*Is this item the root of the tree?*
  - char `is_selected` () const  
*See if the item is selected.*

- `int is_visible () const`  
*See if the item is visible.*
- `const char * label () const`  
*Return the label.*
- `void label (const char *val)`  
*Set the label to 'name'.*
- `int label_h () const`  
*The item's label height.*
- `int label_w () const`  
*The item's maximum label width to right edge of FI\_Tree's inner width within scrollbars.*
- `int label_x () const`  
*The item's label x position relative to the window.*
- `int label_y () const`  
*The item's label y position relative to the window.*
- `FI_Color labelbgcolor () const`  
*Return item's label background text color.*
- `void labelbgcolor (FI_Color val)`  
*Set item's label background color.*
- `FI_Color labelcolor () const`  
*Return item's label text color. Alias for `labelfgcolor()` const).*
- `void labelcolor (FI_Color val)`  
*Set item's label text color. Alias for `labelfgcolor(FI_Color)`.*
- `FI_Color labelfgcolor () const`  
*Return item's label foreground text color.*
- `void labelfgcolor (FI_Color val)`  
*Set item's label foreground text color.*
- `FI_Font labelfont () const`  
*Get item's label font face.*
- `void labelfont (FI_Font val)`  
*Set item's label font face.*
- `FI_Fontsize labelsize () const`  
*Get item's label font size.*
- `void labelsize (FI_Fontsize val)`  
*Set item's label font size.*
- `int move (FI_Tree_Item *item, int op=0, int pos=0)`  
*Move the current item above/below/into the specified 'item', where 'op' determines the type of move:*
- `int move (int to, int from)`  
*Move the item 'from' to sibling position of 'to'.*
- `int move_above (FI_Tree_Item *item)`  
*Move the current item above the specified 'item'.*
- `int move_below (FI_Tree_Item *item)`  
*Move the current item below the specified 'item'.*
- `int move_into (FI_Tree_Item *item, int pos=0)`  
*Parent the current item as a child of the specified 'item'.*
- `FI_Tree_Item * next ()`  
*Return the next item in the tree.*
- `FI_Tree_Item * next_displayed (FI_Tree_Prefs &prefs)`  
*Same as `next_visible()`.*
- `FI_Tree_Item * next_sibling ()`  
*Return this item's next sibling.*
- `FI_Tree_Item * next_visible (FI_Tree_Prefs &prefs)`

- Return the next [open\(\)](#), [visible\(\)](#) item.*

  - void [open](#) ()
- Open this item and all its children.*

  - void [open\\_toggle](#) ()
- Toggle the item's open/closed state.*

  - [FI\\_Tree\\_Item](#) \* [parent](#) ()

*Return the parent for this item. Returns NULL if we are the root.*

  - const [FI\\_Tree\\_Item](#) \* [parent](#) () const

*Return the const parent for this item. Returns NULL if we are the root.*

  - void [parent](#) ([FI\\_Tree\\_Item](#) \*val)

*Set the parent for this item.*

  - const [FI\\_Tree\\_Prefs](#) & [prefs](#) () const

*Return the parent tree's prefs.*

  - [FI\\_Tree\\_Item](#) \* [prev](#) ()

*Return the previous item in the tree.*

  - [FI\\_Tree\\_Item](#) \* [prev\\_displayed](#) ([FI\\_Tree\\_Prefs](#) &prefs)

*Same as [prev\\_visible\(\)](#).*

  - [FI\\_Tree\\_Item](#) \* [prev\\_sibling](#) ()

*Return this item's previous sibling.*

  - [FI\\_Tree\\_Item](#) \* [prev\\_visible](#) ([FI\\_Tree\\_Prefs](#) &prefs)

*Return the previous [open\(\)](#), [visible\(\)](#) item.*

  - int [remove\\_child](#) (const char \*new\_label)

*Remove immediate child (and its children) by its label 'name'.*

  - int [remove\\_child](#) ([FI\\_Tree\\_Item](#) \*item)

*Remove 'item' from the current item's children.*

  - int [reparent](#) ([FI\\_Tree\\_Item](#) \*newchild, int index)

*Reparent specified item as a child of ourself at position 'pos'.*

  - [FI\\_Tree\\_Item](#) \* [replace](#) ([FI\\_Tree\\_Item](#) \*new\_item)

*Replace the current item with a new item.*

  - [FI\\_Tree\\_Item](#) \* [replace\\_child](#) ([FI\\_Tree\\_Item](#) \*olditem, [FI\\_Tree\\_Item](#) \*newitem)

*Replace existing child 'olditem' with 'newitem'.*

  - void [select](#) (int val=1)

*Change the item's selection state to the optionally specified 'val'.*

  - int [select\\_all](#) ()

*Select item and all its children.*

  - void [select\\_toggle](#) ()

*Toggle the item's selection state.*

  - void [show\\_self](#) (const char \*indent="") const

*Print the tree as 'ascii art' to stdout.*

  - int [swap\\_children](#) ([FI\\_Tree\\_Item](#) \*a, [FI\\_Tree\\_Item](#) \*b)

*Swap two of our immediate children, given item pointers.*

  - void [swap\\_children](#) (int ax, int bx)

*Swap two of our children, given two child index values 'ax' and 'bx'.*

  - [FI\\_Tree](#) \* [tree](#) ()

*Return the tree for this item.*

  - const [FI\\_Tree](#) \* [tree](#) () const

*Return the tree for this item.*

  - void [update\\_prev\\_next](#) (int index)

*Update our [\\_prev\\_sibling](#) and [\\_next\\_sibling](#) pointers to point to neighbors given *index* as being our current position in the parent's item array.*

  - void \* [user\\_data](#) () const

- Retrieve the user-data value that has been assigned to the item.*

  - void `user_data` (void \*data)

*Set a user-data value for the item.*
- `FI_Image * userdeicon` () const
 

*Return the deactivated version of the user icon, if any.*
- void `userdeicon` (`FI_Image *val`)
 

*Set the usericon to draw when the item is deactivated.*
- `FI_Image * usericon` () const
 

*Get the item's user icon as an `FI_Image`. Returns '0' if disabled.*
- void `usericon` (`FI_Image *val`)
 

*Set the item's user icon to an `FI_Image`.*
- int `visible` () const
 

*See if the item is visible. Alias for `is_visible()`.*
- int `visible_r` () const
 

*See if item and all its parents are `open()` and `visible()`.*
- int `w` () const
 

*The entire item's width to right edge of `FI_Tree`'s inner width within scrollbars.*
- `FI_Widget * widget` () const
 

*Return FLTK widget assigned to this item.*
- void `widget` (`FI_Widget *val`)
 

*Assign an FLTK widget to this item.*
- int `x` () const
 

*The item's x position relative to the window.*
- int `y` () const
 

*The item's y position relative to the window.*

## Protected Member Functions

- void `_init` (const `FI_Tree_Prefs &prefs`, `FI_Tree *tree`)
- int `calc_item_height` (const `FI_Tree_Prefs &prefs`) const
 

*Return the item's 'visible' height.*
- void `draw_horizontal_connector` (int x1, int x2, int y, const `FI_Tree_Prefs &prefs`)
 

*Internal: Horizontal connector line based on preference settings.*
- void `draw_vertical_connector` (int x, int y1, int y2, const `FI_Tree_Prefs &prefs`)
 

*Internal: Vertical connector line based on preference settings.*
- `FI_Color drawbgcolor` () const
 

*Returns the recommended background color used for drawing this item.*
- `FI_Color drawfgcolor` () const
 

*Returns the recommended foreground color used for drawing this item.*
- void `hide_widgets` ()
 

*Internal: Hide the FLTK `widget()` for this item and all children.*
- int `is_flag` (unsigned short val) const
 

*See if flag set. Returns 0 or 1.*
- void `recalc_tree` ()
 

*Call this when our geometry is changed.*
- void `set_flag` (unsigned short flag, int val)
 

*Set a flag to an on or off value. val is 0 or 1.*
- void `show_widgets` ()
 

*Internal: Show the FLTK `widget()` for this item and all children.*



### 31.144.1 Detailed Description

Tree widget item.

This class is a single tree item, and manages all of the item's attributes. [FI\\_Tree\\_Item](#) is used by [FI\\_Tree](#), which is comprised of many instances of [FI\\_Tree\\_Item](#).

[FI\\_Tree\\_Item](#) is hierarchical; it dynamically manages an [FI\\_Tree\\_Item\\_Array](#) of children that are themselves instances of [FI\\_Tree\\_Item](#). Each item can have zero or more children. When an item has children, [close\(\)](#) and [open\(\)](#) can be used to hide or show them.

Items have their own attributes; font size, face, color. Items maintain their own hierarchy of children.

When you make changes to items, you'll need to tell the tree to [redraw\(\)](#) for the changes to show up.

New 1.3.3 ABI feature: You can define custom items by either adding a custom widget to the item with [FI\\_Tree\\_Item::widget\(\)](#), or override the [draw\\_item\\_content\(\)](#) method if you want to just redefine how the label is drawn.

The following shows the [FI\\_Tree\\_Item](#)'s dimensions, useful when overriding the [draw\\_item\\_content\(\)](#) method:

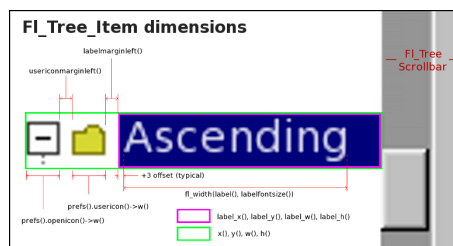


Figure 31.47 [FI\\_Tree\\_Item](#)'s internal dimensions.

### 31.144.2 Constructor & Destructor Documentation

#### 31.144.2.1 [FI\\_Tree\\_Item\(\)](#) [1/2]

```
Fl_Tree_Item::Fl_Tree_Item (
 const Fl_Tree_Prefs & prefs)
```

Constructor.

Makes a new instance of [FI\\_Tree\\_Item](#) using defaults from 'prefs'.

**Deprecated** in 1.3.3 ABI – you must use [FI\\_Tree\\_Item\(Fl\\_Tree\\*\)](#) for proper horizontal scrollbar behavior.

#### 31.144.2.2 [FI\\_Tree\\_Item\(\)](#) [2/2]

```
Fl_Tree_Item::Fl_Tree_Item (
 Fl_Tree * tree)
```

Constructor.

Makes a new instance of [FI\\_Tree\\_Item](#) for 'tree'.

This must be used instead of the older, deprecated [FI\\_Tree\\_Item\(Fl\\_Tree\\_Prefs\)](#) constructor for proper horizontal scrollbar calculation.

Version

1.3.3 ABI feature

### 31.144.3 Member Function Documentation

#### 31.144.3.1 [activate\(\)](#)

```
void Fl_Tree_Item::activate (
 int val = 1) [inline]
```

Change the item's activation state to the optionally specified 'val'.

When deactivated, the item will be 'grayed out'; the callback() won't be invoked if the user clicks on the label. If a [widget\(\)](#) is associated with the item, its activation state will be changed as well.

If 'val' is not specified, the item will be activated.

### 31.144.3.2 add() [1/4]

```
Fl_Tree_Item * Fl_Tree_Item::add (
 const Fl_Tree_Prefs & prefs,
 char ** arr)
```

Descend into the path specified by 'arr', and add a new child there.

Should be used only by [Fl\\_Tree](#)'s internals. Adds the item based on the value of prefs.sortorder().

#### Returns

the item added.

#### Version

1.3.0 release

### 31.144.3.3 add() [2/4]

```
Fl_Tree_Item * Fl_Tree_Item::add (
 const Fl_Tree_Prefs & prefs,
 char ** arr,
 Fl_Tree_Item * newitem)
```

Descend into path specified by 'arr' and add 'newitem' there.

Should be used only by [Fl\\_Tree](#)'s internals. If item is NULL, a new item is created. Adds the item based on the value of prefs.sortorder().

#### Returns

the item added.

#### Version

1.3.3 ABI feature

### 31.144.3.4 add() [3/4]

```
Fl_Tree_Item * Fl_Tree_Item::add (
 const Fl_Tree_Prefs & prefs,
 const char * new_label)
```

Add a new child to this item with the name 'new\_label' and defaults from 'prefs'.

An internally managed copy is made of the label string. Adds the item based on the value of prefs.sortorder().

#### Returns

the item added

#### Version

1.3.0 release

**31.144.3.5 add()** [4/4]

```
Fl_Tree_Item * Fl_Tree_Item::add (
 const Fl_Tree_Prefs & prefs,
 const char * new_label,
 Fl_Tree_Item * item)
```

Add 'item' as immediate child with 'new\_label' and defaults from 'prefs'.

If 'item' is NULL, a new item is created. An internally managed copy is made of the label string. Adds the item based on the value of prefs.sortorder().

**Returns**

the item added

**Version**

1.3.3

**31.144.3.6 calc\_item\_height()**

```
int Fl_Tree_Item::calc_item_height (
 const Fl_Tree_Prefs & prefs) const [protected]
```

Return the item's 'visible' height.

Takes into account the item's:

- visibility (if `lis_visible()`, returns 0)
- `labelfont()` height: if `label()` != NULL
- `widget()` height: if `widget()` != NULL
- `openicon()` height (if not NULL)
- `usericon()` height (if not NULL) Does NOT include `Fl_Tree::linespacing()`;

**Returns**

maximum pixel height

**31.144.3.7 child()**

```
const Fl_Tree_Item * Fl_Tree_Item::child (
 int t) const
```

Return the const child item for the given 'index'.

Return const child item for the specified 'index'.

**31.144.3.8 deactivate()**

```
void Fl_Tree_Item::deactivate () [inline]
```

Deactivate the item; the callback() won't be invoked when clicked.

Same as activate(0)

**31.144.3.9 deparent()**

```
Fl_Tree_Item * Fl_Tree_Item::deparent (
 int pos)
```

Deparent child at index position 'pos'.

This creates an "orphaned" item that is still allocated, but has no parent or siblings. Normally the caller would want to immediately reparent the orphan elsewhere.

A successfully orphaned item will have its `parent()` and `prev_sibling()/next_sibling()` set to NULL.

**Returns**

- pointer to orphaned item on success
- NULL on error (could not deparent the item)

**31.144.3.10 depth()**

```
int Fl_Tree_Item::depth () const
```

Returns how many levels deep this item is in the hierarchy.

For instance; root has a depth of zero, and its immediate children would have a depth of 1, and so on. Use e.g. for determining the horizontal indent of this item during drawing.

**31.144.3.11 deselect\_all()**

```
int Fl_Tree_Item::deselect_all () [inline]
```

Deselect item and all its children.

Returns count of how many items were in the 'selected' state, ie. how many items were "changed".

**31.144.3.12 draw()**

```
void Fl_Tree_Item::draw (
 int X,
 int & Y,
 int W,
 Fl_Tree_Item * itemfocus,
 int & tree_item_xmax,
 int lastchild = 1,
 int render = 1)
```

Draw this item and its children.

**Parameters**

|         |                       |                                                                                                                            |
|---------|-----------------------|----------------------------------------------------------------------------------------------------------------------------|
| in      | <i>X</i>              | Horizontal position for item being drawn                                                                                   |
| in, out | <i>Y</i>              | Vertical position for item being drawn, returns new position for next item                                                 |
| in      | <i>W</i>              | Recommended width for item                                                                                                 |
| in      | <i>itemfocus</i>      | The tree's current focus item (if any)                                                                                     |
| in, out | <i>tree_item_xmax</i> | The tree's running xmax (right-most edge so far). Mainly used by parent tree when render==0 to calculate tree's max width. |
| in      | <i>lastchild</i>      | Is this item the last child in a subtree?                                                                                  |
| in      | <i>render</i>         | Whether or not to render the item: 0: no rendering, just calculate size w/out drawing. 1: render item as well as size calc |

**Version**

1.3.3 ABI feature: modified parameters

**31.144.3.13 draw\_horizontal\_connector()**

```
void Fl_Tree_Item::draw_horizontal_connector (
 int x1,
 int x2,
 int y,
 const Fl_Tree_Prefs & prefs) [protected]
```

Internal: Horizontal connector line based on preference settings.

## Parameters

|    |              |                                                       |
|----|--------------|-------------------------------------------------------|
| in | <i>x1</i>    | The left hand X position of the horizontal connector  |
| in | <i>x2</i>    | The right hand X position of the horizontal connector |
| in | <i>y</i>     | The vertical position of the horizontal connector     |
| in | <i>prefs</i> | The <a href="#">Fl_Tree</a> prefs                     |

## 31.144.3.14 draw\_item\_content()

```
int Fl_Tree_Item::draw_item_content (
 int render) [virtual]
```

Draw the item content.

This method can be overridden to implement custom drawing by filling the `label_[xywh]()` area with content.

A minimal example of how to override `draw_item_content()` and draw just a normal item's background and label ourselves:

```
class MyTreeItem : public Fl_Tree_Item {
public:
 MyTreeItem() { }
 ~MyTreeItem() { }
 // DRAW OUR CUSTOM CONTENT FOR THE ITEM
 int draw_item_content(int render) {
 // Our item's dimensions + text content
 int X=label_x(), Y=label_y(), W=label_w(), H=label_h();
 const char *text = label() ? label() : "";
 // Rendering? Do any drawing that's needed
 if (render) {
 // Draw bg -- a filled rectangle
 fl_color(drawbgcolor()); fl_rectf(X,Y,W,H);
 // Draw label
 fl_font(labelfont(), labelsize()); // use item's label font/size
 fl_color(drawfgcolor()); // use recommended fg color
 fl_draw(text, X,Y,W,H, FL_ALIGN_LEFT); // draw the item's label
 }
 // Rendered or not, we must calculate content's max X position
 int lw=0, lh=0;
 fl_measure(text, lw, lh); // get width of label text
 return X + lw; // return X + label width
 }
};
```

You can draw anything you want inside `draw_item_content()` using any of the `fl_draw.H` functions, as long as it's within the label's `xywh` area.

To add instances of your custom item to the tree, you can use:

```
// Example #1: using add()
MyTreeItem *bart = new MyTreeItem(..); // class derived from Fl_Tree_Item
tree->add("/Simpsons/Bart", bart); // Add item as /Simpsons/Bart
```

..or you can insert or replace existing items:

```
// Example #2: using replace()
MyTreeItem *marge = new MyTreeItem(..); // class derived from Fl_Tree_Item
item = tree->add("/Simpsons/Marge"); // create item
item->replace(mi); // replace it with our own
```

## Parameters

|    |               |                                                                                                                                                                             |
|----|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| in | <i>render</i> | Whether we should render content (1), or just tally the geometry (0). <a href="#">Fl_Tree</a> may want only to find the widest item in the tree for scrollbar calculations. |
|----|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Returns

the right-most X coordinate, or 'xmax' of content we drew, i.e. the "scrollable" content. The tree uses the largest xmax to determine the maximum width of the tree's content (needed for e.g. computing the horizontal scrollbar's size).

## Version

1.3.3 ABI feature

**31.144.3.15 draw\_vertical\_connector()**

```
void Fl_Tree_Item::draw_vertical_connector (
 int x,
 int y1,
 int y2,
 const Fl_Tree_Prefs & prefs) [protected]
```

Internal: Vertical connector line based on preference settings.

**Parameters**

|    |              |                                          |
|----|--------------|------------------------------------------|
| in | <i>x</i>     | The x position of the vertical connector |
| in | <i>y1</i>    | The top of the vertical connector        |
| in | <i>y2</i>    | The bottom of the vertical connector     |
| in | <i>prefs</i> | The <a href="#">Fl_Tree</a> prefs        |

**31.144.3.16 drawbgcolor()**

```
Fl_Color Fl_Tree_Item::drawbgcolor () const [protected]
```

Returns the recommended background color used for drawing this item.

**See also**

[draw\\_item\\_content\(\)](#)

**Version**

1.3.3 ABI

**31.144.3.17 drawfgcolor()**

```
Fl_Color Fl_Tree_Item::drawfgcolor () const [protected]
```

Returns the recommended foreground color used for drawing this item.

**See also**

[draw\\_item\\_content\(\)](#)

**Version**

1.3.3 ABI ABI

**31.144.3.18 find\_child() [1/2]**

```
int Fl_Tree_Item::find_child (
 const char * name)
```

Return the index of the immediate child of this item that has the label 'name'.

**Returns**

index of found item, or -1 if not found.

**Version**

1.3.0 release

**31.144.3.19 find\_child()** [2/2]

```
int Fl_Tree_Item::find_child (
 Fl_Tree_Item * item)
```

Find the index number for the specified 'item' in the current item's list of children.

**Returns**

the index, or -1 if not found.

**31.144.3.20 find\_child\_item()** [1/2]

```
const Fl_Tree_Item * Fl_Tree_Item::find_child_item (
 char ** arr) const
```

Find child item by descending array 'arr' of names.

Does not include self in search. Only [Fl\\_Tree](#) should need this method.

**Returns**

item, or 0 if not found

**Version**

1.3.0 release

**31.144.3.21 find\_child\_item()** [2/2]

```
const Fl_Tree_Item * Fl_Tree_Item::find_child_item (
 const char * name) const
```

Return the /immediate/ child of current item that has the label 'name'.

**Returns**

const found item, or 0 if not found.

**Version**

1.3.3

**31.144.3.22 find\_clicked()**

```
const Fl_Tree_Item * Fl_Tree_Item::find_clicked (
 const Fl_Tree_Prefs & prefs,
 int yonly = 0) const
```

Find the item that the last event was over.

If 'yonly' is 1, only check event's y value, don't care about x.

**Parameters**

|    |              |                                                                                              |
|----|--------------|----------------------------------------------------------------------------------------------|
| in | <i>prefs</i> | The parent tree's <a href="#">Fl_Tree_Prefs</a>                                              |
| in | <i>yonly</i> | - 0: check both event's X and Y values. - 1: only check event's Y value, don't care about X. |

**Returns**

pointer to clicked item, or NULL if none found

## Version

1.3.3 ABI feature

**31.144.3.23 find\_item()**

```
const Fl_Tree_Item * Fl_Tree_Item::find_item (
 char ** names) const
```

Find item by descending array of 'names'.

Includes self in search. Only [Fl\\_Tree](#) should need this method. Use [Fl\\_Tree::find\\_item\(\)](#) instead.

## Returns

const item, or 0 if not found

**31.144.3.24 hide\_widgets()**

```
void Fl_Tree_Item::hide_widgets () [protected]
```

Internal: Hide the FLTK [widget\(\)](#) for this item and all children.

Used by [close\(\)](#) to hide widgets.

**31.144.3.25 insert()**

```
Fl_Tree_Item * Fl_Tree_Item::insert (
 const Fl_Tree_Prefs & prefs,
 const char * new_label,
 int pos = 0)
```

Insert a new item named 'new\_label' into current item's children at a specified position 'pos'.

If pos is out of range the new item is

- prepended if pos < 0 or
- appended if pos > item->[children\(\)](#).

## Returns

the new item inserted

## See also

[Fl\\_Tree::insert\(\)](#)

**31.144.3.26 insert\_above()**

```
Fl_Tree_Item * Fl_Tree_Item::insert_above (
 const Fl_Tree_Prefs & prefs,
 const char * new_label)
```

Insert a new item named 'new\_label' above this item.

## Returns

the new item inserted, or 0 if an error occurred.

**31.144.3.27 label()**

```
void Fl_Tree_Item::label (
 const char * name)
```

Set the label to 'name'.

Makes and manages an internal copy of 'name'.



### 31.144.3.28 label\_h()

```
int Fl_Tree_Item::label_h () const [inline]
```

The item's label height.

#### Version

1.3.3

### 31.144.3.29 label\_w()

```
int Fl_Tree_Item::label_w () const [inline]
```

The item's maximum label width to right edge of [Fl\\_Tree](#)'s inner width within scrollbars.

#### Version

1.3.3

### 31.144.3.30 label\_x()

```
int Fl_Tree_Item::label_x () const [inline]
```

The item's label x position relative to the window.

#### Version

1.3.3

### 31.144.3.31 label\_y()

```
int Fl_Tree_Item::label_y () const [inline]
```

The item's label y position relative to the window.

#### Version

1.3.3

### 31.144.3.32 labelbgcolor() [1/2]

```
Fl_Color Fl_Tree_Item::labelbgcolor () const [inline]
```

Return item's label background text color.

If the color is 0xffffffff, the default behavior is the parent tree's bg color will be used. (An overloaded [draw\\_item\\_content\(\)](#) can override this behavior.)

### 31.144.3.33 labelbgcolor() [2/2]

```
void Fl_Tree_Item::labelbgcolor (
 Fl_Color val) [inline]
```

Set item's label background color.

A special case is made for color 0xffffffff which uses the parent tree's bg color.

### 31.144.3.34 move() [1/2]

```
int Fl_Tree_Item::move (
 Fl_Tree_Item * item,
 int op = 0,
 int pos = 0)
```

Move the current item above/below/into the specified 'item', where 'op' determines the type of move:

- 0: move above 'item' ('pos' ignored)
- 1: move below 'item' ('pos' ignored)
- 2: move into 'item' as a child (at optional position 'pos')

#### Returns

0 on success. a negative number on error:

- -1: one of the items has no parent
- -2: item's index could not be determined
- -3: bad 'op'
- -4: index range error
- -5: could not deparent
- -6: could not reparent at 'pos'
- (Other return values reserved for future use.)

#### 31.144.3.35 move() [2/2]

```
int Fl_Tree_Item::move (
 int to,
 int from)
```

Move the item 'from' to sibling position of 'to'.

#### Returns

- 0: Success
- -1: range error (e.g. if 'to' or 'from' out of range).
- (Other return values reserved for future use)

#### 31.144.3.36 move\_above()

```
int Fl_Tree_Item::move_above (
 Fl_Tree_Item * item)
```

Move the current item above the specified 'item'.  
This is the equivalent of calling `move(item,0,0)`.

#### Returns

0 on success.  
On error returns a negative value; see [move\(Fl\\_Tree\\_Item\\*,int,int\)](#) for possible error codes.

#### 31.144.3.37 move\_below()

```
int Fl_Tree_Item::move_below (
 Fl_Tree_Item * item)
```

Move the current item below the specified 'item'.  
This is the equivalent of calling `move(item,1,0)`.

#### Returns

0 on success.  
On error returns a negative value; see [move\(Fl\\_Tree\\_Item\\*,int,int\)](#) for possible error codes.

### 31.144.3.38 move\_into()

```
int Fl_Tree_Item::move_into (
 Fl_Tree_Item * item,
 int pos = 0)
```

Parent the current item as a child of the specified 'item'.

This is the equivalent of calling `move(item,2,pos)`.

#### Returns

0 on success.

On error returns a negative value; see `move(Fl_Tree_Item*,int,int)` for possible error codes.

### 31.144.3.39 next()

```
Fl_Tree_Item * Fl_Tree_Item::next ()
```

Return the next item in the tree.

This method can be used to walk the tree forward. For an example of how to use this method, see `Fl_Tree::first()`.

#### Returns

the next item in the tree, or 0 if there's no more items.

### 31.144.3.40 next\_displayed()

```
Fl_Tree_Item * Fl_Tree_Item::next_displayed (
 Fl_Tree_Prefs & prefs)
```

Same as `next_visible()`.

**Deprecated** in 1.3.3 for confusing name, use `next_visible()` instead

### 31.144.3.41 next\_sibling()

```
Fl_Tree_Item * Fl_Tree_Item::next_sibling ()
```

Return this item's next sibling.

Moves to the next item below us at the same level (sibling). Use this to move down the tree without changing `depth()`. effectively skipping over this item's children/descendents.

#### Returns

item's next sibling, or 0 if none.

### 31.144.3.42 next\_visible()

```
Fl_Tree_Item * Fl_Tree_Item::next_visible (
 Fl_Tree_Prefs & prefs)
```

Return the next `open()`, `visible()` item.

(If this item has children and is closed, children are skipped)

This method can be used to walk the tree forward, skipping items that are not currently open/visible to the user.

#### Returns

the next `open()` `visible()` item below us, or 0 if there's no more items.

#### Version

1.3.3

**31.144.3.43 parent()**

```
void Fl_Tree_Item::parent (
 Fl_Tree_Item * val) [inline]
```

Set the parent for this item.  
Should only be used by [Fl\\_Tree](#)'s internals.

**31.144.3.44 prefs()**

```
const Fl_Tree_Prefs & Fl_Tree_Item::prefs () const
```

Return the parent tree's prefs.

**Returns**

a reference to the parent tree's [Fl\\_Tree\\_Prefs](#)

**Version**

1.3.3 ABI feature

**31.144.3.45 prev()**

```
Fl_Tree_Item * Fl_Tree_Item::prev ()
```

Return the previous item in the tree.

This method can be used to walk the tree backwards. For an example of how to use this method, see [Fl\\_Tree::last\(\)](#).

**Returns**

the previous item in the tree, or 0 if there's no item above this one (hit the root).

**31.144.3.46 prev\_displayed()**

```
Fl_Tree_Item * Fl_Tree_Item::prev_displayed (
 Fl_Tree_Prefs & prefs)
```

Same as [prev\\_visible\(\)](#).

**Deprecated** in 1.3.3 for confusing name, use [prev\\_visible\(\)](#)

**31.144.3.47 prev\_sibling()**

```
Fl_Tree_Item * Fl_Tree_Item::prev_sibling ()
```

Return this item's previous sibling.

Moves to the previous item above us at the same level (sibling). Use this to move up the tree without changing [depth\(\)](#).

**Returns**

This item's previous sibling, or 0 if none.

**31.144.3.48 prev\_visible()**

```
Fl_Tree_Item * Fl_Tree_Item::prev_visible (
 Fl_Tree_Prefs & prefs)
```

Return the previous [open\(\)](#), [visible\(\)](#) item.

(If this item above us has children and is closed, its children are skipped)

This method can be used to walk the tree backward, skipping items that are not currently open/visible to the user.

**Returns**

the previous [open\(\)](#) [visible\(\)](#) item above us, or 0 if there's no more items.

**31.144.3.49 recalc\_tree()**

```
void Fl_Tree_Item::recalc_tree () [protected]
```

Call this when our geometry is changed.

(Font size, label contents, etc) Schedules tree to recalculate itself, as changes to us may affect tree widget's scrollbar visibility and tab sizes.

**Version**

1.3.3 ABI

**31.144.3.50 remove\_child() [1/2]**

```
int Fl_Tree_Item::remove_child (
 const char * name)
```

Remove immediate child (and its children) by its label 'name'.

If more than one item matches 'name', only the first matching item is removed.

**Parameters**

|    |             |                                                 |
|----|-------------|-------------------------------------------------|
| in | <i>name</i> | The label name of the immediate child to remove |
|----|-------------|-------------------------------------------------|

**Returns**

0 if removed, -1 if not found.

**Version**

1.3.3

**31.144.3.51 remove\_child() [2/2]**

```
int Fl_Tree_Item::remove_child (
 Fl_Tree_Item * item)
```

Remove 'item' from the current item's children.

**Returns**

0 if removed, -1 if item not an immediate child.

**31.144.3.52 reparent()**

```
int Fl_Tree_Item::reparent (
 Fl_Tree_Item * newchild,
 int pos)
```

Reparent specified item as a child of ourself at position 'pos'.

Typically 'newchild' was recently orphaned with [deparent\(\)](#).

**Returns**

- 0: on success
- -1: on error (e.g. if 'pos' out of range) with no changes made.

**31.144.3.53 replace()**

```
Fl_Tree_Item * Fl_Tree_Item::replace (
 Fl_Tree_Item * newitem)
```

Replace the current item with a new item.

The current item is destroyed if successful. No checks are made to see if an item with the same name exists.

This method can be used to, for example, install 'custom' items into the tree derived from [Fl\\_Tree\\_Item](#); see [draw\\_item\\_content\(\)](#).

**Parameters**

|    |                |                                          |
|----|----------------|------------------------------------------|
| in | <i>newitem</i> | The new item to replace the current item |
|----|----------------|------------------------------------------|

**Returns**

*newitem* on success, NULL if could not be replaced.

**See also**

[Fl\\_Tree\\_Item::draw\\_item\\_content\(\)](#), [Fl\\_Tree::root\(Fl\\_Tree\\_Item\\*\)](#)

**Version**

1.3.3 ABI feature

**31.144.3.54 replace\_child()**

```
Fl_Tree_Item * Fl_Tree_Item::replace_child (
 Fl_Tree_Item * olditem,
 Fl_Tree_Item * newitem)
```

Replace existing child 'olditem' with 'newitem'.

The 'olditem' is destroyed if successful. Can be used to put custom items (derived from [Fl\\_Tree\\_Item](#)) into the tree. No checks are made to see if an item with the same name exists.

**Parameters**

|    |                |                                             |
|----|----------------|---------------------------------------------|
| in | <i>olditem</i> | The item to be found and replaced           |
| in | <i>newitem</i> | The new item to take the place of 'olditem' |

**Returns**

*newitem* on success and 'olditem' is destroyed. NULL on error if 'olditem' was not found as an immediate child.

**See also**

[replace\(\)](#), [Fl\\_Tree\\_Item::draw\(\)](#)

**Version**

1.3.3 ABI feature

**31.144.3.55 select()**

```
void Fl_Tree_Item::select (
 int val = 1) [inline]
```

Change the item's selection state to the optionally specified 'val'.

If 'val' is not specified, the item will be selected.

**31.144.3.56 select\_all()**

```
int Fl_Tree_Item::select_all () [inline]
```

Select item and all its children.

Returns count of how many items were in the 'deselected' state, ie. how many items were "changed".

**31.144.3.57 show\_self()**

```
void Fl_Tree_Item::show_self (
 const char * indent = "") const
```

Print the tree as 'ascii art' to stdout.

Used mainly for debugging.

**31.144.3.58 show\_widgets()**

```
void Fl_Tree_Item::show_widgets () [protected]
```

Internal: Show the FLTK [widget\(\)](#) for this item and all children.

Used by [open\(\)](#) to re-show widgets that were hidden by a previous [close\(\)](#)

**31.144.3.59 swap\_children() [1/2]**

```
int Fl_Tree_Item::swap_children (
 Fl_Tree_Item * a,
 Fl_Tree_Item * b)
```

Swap two of our immediate children, given item pointers.

Use e.g. for sorting.

This method is SLOW because it involves linear lookups.

For speed, use [swap\\_children\(int,int\)](#) instead.

**Parameters**

|    |     |                                                                                              |
|----|-----|----------------------------------------------------------------------------------------------|
| in | a,b | The item ptrs of the two items to swap. Both must be immediate children of the current item. |
|----|-----|----------------------------------------------------------------------------------------------|

**Returns**

- 0 : OK
- -1 : failed: item 'a' or 'b' is not our child.

**31.144.3.60 swap\_children() [2/2]**

```
void Fl_Tree_Item::swap_children (
 int ax,
 int bx)
```

Swap two of our children, given two child index values 'ax' and 'bx'.

Use e.g. for sorting.

This method is FAST, and does not involve lookups.

No range checking is done on either index value.

**Parameters**

|    |       |                                |
|----|-------|--------------------------------|
| in | ax,bx | the index of the items to swap |
|----|-------|--------------------------------|

**31.144.3.61 tree() [1/2]**

```
Fl_Tree* Fl_Tree_Item::tree () [inline]
```

Return the tree for this item.

#### Version

1.3.4 (ABI feature)

### 31.144.3.62 tree() [2/2]

```
const Fl_Tree* Fl_Tree_Item::tree () const [inline]
```

Return the tree for this item.

#### Version

1.3.3 (ABI feature)

### 31.144.3.63 update\_prev\_next()

```
void Fl_Tree_Item::update_prev_next (
 int index)
```

Update our `_prev_sibling` and `_next_sibling` pointers to point to neighbors given `index` as being our current position in the parent's item array.

Call this whenever items in the array are added/removed/moved/swapped/etc.

#### Parameters

|                 |                    |                                                                                                                                  |
|-----------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------|
| <code>in</code> | <code>index</code> | Our index# in the parent.<br>Special case if <code>index=-1</code> : become an orphan; null out all parent/sibling associations. |
|-----------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------|

### 31.144.3.64 userdeicon() [1/2]

```
Fl_Image* Fl_Tree_Item::userdeicon () const [inline]
```

Return the deactivated version of the user icon, if any.

Returns 0 if none.

### 31.144.3.65 userdeicon() [2/2]

```
void Fl_Tree_Item::userdeicon (
 Fl_Image * val) [inline]
```

Set the usericon to draw when the item is deactivated.

Use '0' to disable. No internal copy is made; caller must manage icon's memory.

To create a typical 'grayed out' version of your usericon image, you can do the following:

```
// Create tree + usericon for items
Fl_Tree *tree = new Fl_Tree(..);
Fl_Image *usr_icon = new Fl_Pixmap(..); // your usericon
Fl_Image *de_icon = usr_icon->copy(); // make a copy, and..
de_icon->inactive(); // make it 'grayed out'
...
for (..) { // item loop..
 item = tree->add("..."); // create new item
 item->usericon(usr_icon); // assign usericon to items
 item->userdeicon(de_icon); // assign userdeicon to items
 ..
}
```

In the above example, the app should 'delete' the two icons when they're no longer needed (e.g. after the tree is destroyed)

#### Version

1.3.4



### 31.144.3.66 usericon()

```
void FI_Tree_Item::usericon (
 FI_Image * val) [inline]
```

Set the item's user icon to an [FI\\_Image](#).

Use '0' to disable. No internal copy is made, caller must manage icon's memory.

Note, if you expect your items to be deactivated(), use [userdeicon\(FI\\_Image\\*\)](#) to set up a 'grayed out' version of your icon to be used for display.

See also

[userdeicon\(FI\\_Image\\*\)](#)

### 31.144.3.67 visible\_r()

```
int FI_Tree_Item::visible_r () const
```

See if item and all its parents are [open\(\)](#) and [visible\(\)](#).

Returns

1 – item and its parents are [open\(\)](#) and [visible\(\)](#) 0 – item (or one of its parents) are invisible or [close\(\)](#)ed.

The documentation for this class was generated from the following files:

- [FI\\_Tree\\_Item.H](#)
- [FI\\_Tree\\_Item.cxx](#)

## 31.145 FI\_Tree\_Item\_Array Class Reference

Manages an array of [FI\\_Tree\\_Item](#) pointers.

```
#include <FI_Tree_Item_Array.H>
```

### Public Member Functions

- void [add](#) ([FI\\_Tree\\_Item](#) \*val)
 

*Add an item\* to the end of the array.*
- void [clear](#) ()
 

*Clear the entire array.*
- int [deparent](#) (int pos)
 

*Deparent item at 'pos' from our list of children.*
- [FI\\_Tree\\_Item\\_Array](#) (const [FI\\_Tree\\_Item\\_Array](#) \*o)
 

*Copy constructor. Makes new copy of array, with new instances of each item.*
- [FI\\_Tree\\_Item\\_Array](#) (int new\_chunksize=10)
 

*Constructor; creates an empty array.*
- void [insert](#) (int pos, [FI\\_Tree\\_Item](#) \*new\_item)
 

*Insert an item at index position pos.*
- int [manage\\_item\\_destroy](#) () const
- void [manage\\_item\\_destroy](#) (int val)
 

*Option to control if FI\_Tree\_Item\_Array's destructor will also destroy the FI\_Tree\_Item's.*
- int [move](#) (int to, int from)
 

*Move item at 'from' to new position 'to' in the array.*
- [FI\\_Tree\\_Item](#) \* [operator\[\]](#) (int i)
 

*Return the item and index i.*
- const [FI\\_Tree\\_Item](#) \* [operator\[\]](#) (int i) const
 

*Const version of operator[](int i)*
- int [remove](#) ([FI\\_Tree\\_Item](#) \*item)

- Remove the item from the array.*

  - void `remove` (int index)
- Remove the item at.*

  - int `reparent` (Fl\_Tree\_Item \*item, Fl\_Tree\_Item \*newparent, int pos)
- Reparent specified item as a child of ourself.*

  - void `replace` (int pos, Fl\_Tree\_Item \*new\_item)
- Replace the item at index with newitem.*

  - void `swap` (int ax, int bx)
- Swap the two items at index positions ax and bx.*

  - int `total` () const
- Return the total items in the array, or 0 if empty.*

  - `~Fl_Tree_Item_Array` ()
- Destructor. Calls each item's destructor, destroys internal \_items array.*

### 31.145.1 Detailed Description

Manages an array of `Fl_Tree_Item` pointers.

Because FLTK 1.x.x. has mandated that templates and STL not be used, we use this class to dynamically manage the arrays.

None of the methods do range checking on index values; the caller must be sure that index values are within the range  $0 < \text{index} < \text{total}()$  (unless otherwise noted).

### 31.145.2 Constructor & Destructor Documentation

#### 31.145.2.1 Fl\_Tree\_Item\_Array()

```
Fl_Tree_Item_Array::Fl_Tree_Item_Array (
 int new_chunksize = 10)
```

Constructor; creates an empty array.

The optional 'chunksize' can be specified to optimize memory allocation for potentially large arrays. Default chunksize is 10.

### 31.145.3 Member Function Documentation

#### 31.145.3.1 add()

```
void Fl_Tree_Item_Array::add (
 Fl_Tree_Item * val)
```

Add an item\* to the end of the array.

Assumes the item was created with 'new', and will remain allocated.. Fl\_Tree\_Item\_Array will handle calling the item's destructor when the array is cleared or the item remove()'ed.

#### 31.145.3.2 clear()

```
void Fl_Tree_Item_Array::clear ()
```

Clear the entire array.

Each item will be deleted (destructors will be called), and the array will be cleared. total() will return 0.

**31.145.3.3 deparent()**

```
int Fl_Tree_Item_Array::deparent (
 int pos)
```

Deparent item at 'pos' from our list of children.

Similar to a [remove\(\)](#) without the destruction of the item. This creates an orphaned item (still allocated, has no parent) which soon after is typically reparented elsewhere.

\returns 0 on success, -1 on error (e.g. if \p 'pos' out of range)

**31.145.3.4 insert()**

```
void Fl_Tree_Item_Array::insert (
 int pos,
 Fl_Tree_Item * new_item)
```

Insert an item at index position pos.

Handles enlarging array if needed, total increased by 1.

If \p pos >= total(), the item is appended to the array.

If \p pos < 0, the item is prepended (works like pos == 0).

**31.145.3.5 manage\_item\_destroy()**

```
void Fl_Tree_Item_Array::manage_item_destroy (
 int val) [inline]
```

Option to control if [Fl\\_Tree\\_Item\\_Array](#)'s destructor will also destroy the [Fl\\_Tree\\_Item](#)'s.

If set: items and item array is destroyed. If clear: only the item array is destroyed, not items themselves.

**31.145.3.6 move()**

```
int Fl_Tree_Item_Array::move (
 int to,
 int from)
```

Move item at 'from' to new position 'to' in the array.

Due to how the moving an item shuffles the array around, a positional 'move' implies things that may not be obvious:

- When 'from' moved lower in tree, appears BELOW item that was at 'to'.
- When 'from' moved higher in tree, appears ABOVE item that was at 'to'.

**Returns**

0 on success, -1 on range error (e.g. if 'to' or 'from' out of range)

**31.145.3.7 remove() [1/2]**

```
int Fl_Tree_Item_Array::remove (
 Fl_Tree_Item * item)
```

Remove the item from the array.

\returns 0 if removed, or -1 if the item was not in the array.

**31.145.3.8 remove() [2/2]**

```
void Fl_Tree_Item_Array::remove (
 int index)
```

Remove the item at.

## Parameters

|    |              |                                                                                               |
|----|--------------|-----------------------------------------------------------------------------------------------|
| in | <i>index</i> | from the array.<br>The item will be delete'd (if non-NULL), so its destructor will be called. |
|----|--------------|-----------------------------------------------------------------------------------------------|

**31.145.3.9 reparent()**

```
int Fl_Tree_Item_Array::reparent (
 Fl_Tree_Item * item,
 Fl_Tree_Item * newparent,
 int pos)
```

Reparent specified item as a child of ourself.  
Typically 'newchild' was recently orphaned with [deparent\(\)](#).

\returns 0 on success, -1 on error (e.g. if \p 'pos' out of range)

**31.145.3.10 replace()**

```
void Fl_Tree_Item_Array::replace (
 int index,
 Fl_Tree_Item * newitem)
```

Replace the item at `index` with `newitem`.

Old item at `index` position will be destroyed, and the new item will take it's place, and stitched into the linked list.  
The documentation for this class was generated from the following files:

- [Fl\\_Tree\\_Item\\_Array.H](#)
- [Fl\\_Tree\\_Item\\_Array.cxx](#)

**31.146 FI\_Tree\_Prefs Class Reference**

Tree widget's preferences.

```
#include <Fl_Tree_Prefs.H>
```

**Public Member Functions**

- [Fl\\_Image](#) \* [closedeicon](#) () const  
*Return the deactivated version of the close icon, if any.*
- [Fl\\_Image](#) \* [closeicon](#) () const  
*Gets the default 'close' icon Returns the Fl\_Image\* of the icon, or 0 if none.*
- void [closeicon](#) ([Fl\\_Image](#) \*val)  
*Sets the icon to be used as the 'close' icon.*
- [Fl\\_Color](#) [connectorcolor](#) () const  
*Get the connector color used for tree connection lines.*
- void [connectorcolor](#) ([Fl\\_Color](#) val)  
*Set the connector color used for tree connection lines.*
- [Fl\\_Tree\\_Connector](#) [connectorstyle](#) () const  
*Get the connector style.*
- void [connectorstyle](#) ([Fl\\_Tree\\_Connector](#) val)  
*Set the connector style.*
- void [connectorstyle](#) (int val)  
*Set the connector style [integer].*

- int [connectorwidth](#) () const  
*Get the tree connection line's width.*
- void [connectorwidth](#) (int val)  
*Set the tree connection line's width.*
- void [do\\_item\\_draw\\_callback](#) ([FI\\_Tree\\_Item](#) \*o) const
- [FI\\_Tree\\_Prefs](#) ()  
*FI\_Tree\_Prefs constructor.*
- [FI\\_Tree\\_Item\\_Draw\\_Callback](#) \* [item\\_draw\\_callback](#) () const
- void [item\\_draw\\_callback](#) ([FI\\_Tree\\_Item\\_Draw\\_Callback](#) \*cb, void \*data=0)
- [FI\\_Tree\\_Item\\_Draw\\_Mode](#) [item\\_draw\\_mode](#) () const  
*Get the 'item draw mode' used for the tree.*
- void [item\\_draw\\_mode](#) ([FI\\_Tree\\_Item\\_Draw\\_Mode](#) val)  
*Set the 'item draw mode' used for the tree to val.*
- void \* [item\\_draw\\_user\\_data](#) () const
- [FI\\_Color](#) [item\\_labelbgcolor](#) () const  
*Get the default label background color.*
- void [item\\_labelbgcolor](#) ([FI\\_Color](#) val)  
*Set the default label background color.*
- [FI\\_Color](#) [item\\_labelfgcolor](#) () const  
*Get the default label foreground color.*
- void [item\\_labelfgcolor](#) ([FI\\_Color](#) val)  
*Set the default label foreground color.*
- [FI\\_Font](#) [item\\_labelfont](#) () const  
*Return the label's font.*
- void [item\\_labelfont](#) ([FI\\_Font](#) val)  
*Set the label's font to val.*
- [FI\\_Fontsize](#) [item\\_labelsize](#) () const  
*Return the label's size in pixels.*
- void [item\\_labelsize](#) ([FI\\_Fontsize](#) val)  
*Set the label's size in pixels to val.*
- [FI\\_Tree\\_Item\\_Reselect\\_Mode](#) [item\\_reselect\\_mode](#) () const  
*Returns the current item re/selection mode.*
- void [item\\_reselect\\_mode](#) ([FI\\_Tree\\_Item\\_Reselect\\_Mode](#) mode)  
*Sets the item re/selection mode.*
- [FI\\_Color](#) [labelbgcolor](#) () const  
*Obsolete: Get the default label background color. Please use [item\\_labelbgcolor\(\)](#) instead.*
- void [labelbgcolor](#) ([FI\\_Color](#) val)  
*Obsolete: Set the default label background color. Please use [item\\_labelbgcolor\(FI\\_Color\)](#) instead.*
- [FI\\_Color](#) [labelfgcolor](#) () const  
*Obsolete: Get the default label foreground color. Please use [item\\_labelfgcolor\(\)](#) instead.*
- void [labelfgcolor](#) ([FI\\_Color](#) val)  
*Obsolete: Set the default label foreground color. Please use [item\\_labelfgcolor\(FI\\_Color\)](#) instead.*
- [FI\\_Font](#) [labelfont](#) () const  
*Obsolete: Return the label's font. Please use [item\\_labelfont\(\)](#) instead.*
- void [labelfont](#) ([FI\\_Font](#) val)  
*Obsolete: Set the label's font to val. Please use [item\\_labelfont\(FI\\_Font\)](#) instead.*
- int [labelmarginleft](#) () const  
*Get the label's left margin value in pixels.*
- void [labelmarginleft](#) (int val)  
*Set the label's left margin value in pixels.*
- [FI\\_Fontsize](#) [labelsizesize](#) () const

- Obsolete: Return the label's size in pixels. Please use `item_labelsize()` instead.*

  - void `labelsize` (`FI_Fontsize` val)
- Obsolete: Set the label's size in pixels to `val`. Please use `item_labelsize(FI_Fontsize)` instead.*

  - int `linespacing` () const

*Get the line spacing value in pixels.*

  - void `linespacing` (int val)

*Set the line spacing value in pixels.*
- int `marginbottom` () const

*Get the bottom margin's value in pixels.*

  - void `marginbottom` (int val)

*Set the bottom margin's value in pixels This is the extra distance the vertical scroller lets you travel.*
- int `marginleft` () const

*Get the left margin's value in pixels.*

  - void `marginleft` (int val)

*Set the left margin's value in pixels.*
- int `marginright` () const

*Get the right margin's value in pixels.*

  - void `marginright` (int val)

*Set the right margin's value in pixels.*
- int `marginbottom` () const

*Get the margin below an open child in pixels.*

  - void `marginbottom` (int val)

*Set the margin below an open child in pixels.*
- `FI_Image` \* `opendeicon` () const

*Return the deactivated version of the open icon, if any.*
- `FI_Image` \* `openicon` () const

*Get the current default 'open' icon.*

  - void `openicon` (`FI_Image` \*val)

*Sets the default icon to be used as the 'open' icon when items are add()ed to the tree.*
- `FI_Boxtype` `selectbox` () const

*Get the default selection box's box drawing style as an `FI_Boxtype`.*

  - void `selectbox` (`FI_Boxtype` val)

*Set the default selection box's box drawing style to `val`.*
- `FI_Tree_Select` `selectmode` () const

*Get the selection mode used for the tree.*

  - void `selectmode` (`FI_Tree_Select` val)

*Set the selection mode used for the tree to `val`.*
- char `showcollapse` () const

*Returns 1 if the collapse icon is enabled, 0 if not.*

  - void `showcollapse` (int val)

*Set if we should show the collapse icon or not.*
- int `showroot` () const

*Returns 1 if the root item is to be shown, or 0 if not.*

  - void `showroot` (int val)

*Set if the root item should be shown or not.*
- `FI_Tree_Sort` `sortorder` () const

*Get the default sort order value.*

  - void `sortorder` (`FI_Tree_Sort` val)

*Set the default sort order value.*
- `FI_Image` \* `userdeicon` () const

*Return the deactivated version of the user icon, if any.*

- `Fl_Image * usericon () const`  
*Gets the default 'user icon' (default is 0)*
- `void usericon (Fl_Image *val)`  
*Sets the default 'user icon' Returns the Fl\_Image\* of the icon, or 0 if none (default).*
- `int usericonmarginleft () const`  
*Get the user icon's left margin value in pixels.*
- `void usericonmarginleft (int val)`  
*Set the user icon's left margin value in pixels.*
- `int widgetmarginleft () const`  
*Get the widget()'s left margin value in pixels.*
- `void widgetmarginleft (int val)`  
*Set the widget's left margin value in pixels.*
- `~Fl_Tree_Prefs ()`  
*Fl\_Tree\_Prefs destructor.*

### 31.146.1 Detailed Description

Tree widget's preferences.

[Fl\\_Tree](#)'s Preferences class.

This class manages the [Fl\\_Tree](#)'s defaults. You should probably be using the methods in [Fl\\_Tree](#) instead of trying to accessing tree's preferences settings directly.

### 31.146.2 Member Function Documentation

#### 31.146.2.1 closeicon()

```
Fl_Image* Fl_Tree_Prefs::closeicon () const [inline]
```

Return the deactivated version of the close icon, if any.

Returns 0 if none.

#### 31.146.2.2 closeicon()

```
void Fl_Tree_Prefs::closeicon (
 Fl_Image * val)
```

Sets the icon to be used as the 'close' icon.

This overrides the built in default '[' icon.

#### Parameters

|                 |                  |                                                       |
|-----------------|------------------|-------------------------------------------------------|
| <code>in</code> | <code>val</code> | – The new image, or zero to use the default '[' icon. |
|-----------------|------------------|-------------------------------------------------------|

#### 31.146.2.3 item\_draw\_mode()

```
void Fl_Tree_Prefs::item_draw_mode (
 Fl_Tree_Item_Draw_Mode val) [inline]
```

Set the 'item draw mode' used for the tree to `val`.

This affects how items in the tree are drawn, such as when a `widget()` is defined. See [Fl\\_Tree\\_Item\\_Draw\\_Mode](#) for possible values.

#### 31.146.2.4 item\_labelbgcolor() [1/2]

```
Fl_Color Fl_Tree_Prefs::item_labelbgcolor (
 void) const [inline]
```

Get the default label background color.  
This returns the `Fl_Tree::color()` unless `item_labelbgcolor()` has been set explicitly.

#### 31.146.2.5 `item_labelbgcolor()` [2/2]

```
void Fl_Tree_Prefs::item_labelbgcolor (
 Fl_Color val) [inline]
```

Set the default label background color.  
Once set, overrides the default behavior of using `Fl_Tree::color()`.

#### 31.146.2.6 `marginbottom()`

```
int Fl_Tree_Prefs::marginbottom () const [inline]
```

Get the bottom margin's value in pixels.  
This is the extra distance the vertical scroller lets you travel.

#### 31.146.2.7 `opendeicon()`

```
Fl_Image* Fl_Tree_Prefs::opendeicon () const [inline]
```

Return the deactivated version of the open icon, if any.  
Returns 0 if none.

#### 31.146.2.8 `openicon()` [1/2]

```
Fl_Image* Fl_Tree_Prefs::openicon () const [inline]
```

Get the current default 'open' icon.  
Returns the `Fl_Image*` of the icon, or 0 if none.

#### 31.146.2.9 `openicon()` [2/2]

```
void Fl_Tree_Prefs::openicon (
 Fl_Image * val)
```

Sets the default icon to be used as the 'open' icon when items are add()ed to the tree.  
This overrides the built in default '[+]' icon.

##### Parameters

|                 |                  |                                                         |
|-----------------|------------------|---------------------------------------------------------|
| <code>in</code> | <code>val</code> | – The new image, or zero to use the default '[+]' icon. |
|-----------------|------------------|---------------------------------------------------------|

#### 31.146.2.10 `selectmode()`

```
void Fl_Tree_Prefs::selectmode (
 Fl_Tree_Select val) [inline]
```

Set the selection mode used for the tree to `val`.  
This affects how items in the tree are selected when clicked on and dragged over by the mouse. See `Fl_Tree_Select` for possible values.

#### 31.146.2.11 `showcollapse()`

```
void Fl_Tree_Prefs::showcollapse (
 int val) [inline]
```

Set if we should show the collapse icon or not.  
If collapse icons are disabled, the user will not be able to interactively collapse items in the tree, unless the application provides some other means via `open()` and `close()`.



## Parameters

|    |     |                                                                |
|----|-----|----------------------------------------------------------------|
| in | val | 1: shows collapse icons (default),<br>0: hides collapse icons. |
|----|-----|----------------------------------------------------------------|

**31.146.2.12 showroot()**

```
void Fl_Tree_Prefs::showroot (
 int val) [inline]
```

Set if the root item should be shown or not.

## Parameters

|    |     |                                                             |
|----|-----|-------------------------------------------------------------|
| in | val | 1 – show the root item (default)<br>0 – hide the root item. |
|----|-----|-------------------------------------------------------------|

**31.146.2.13 sortorder()**

```
void Fl_Tree_Prefs::sortorder (
 Fl_Tree_Sort val) [inline]
```

Set the default sort order value.

Defines the order new items appear when add()ed to the tree. See Fl\_Tree\_Sort for possible values.

**31.146.2.14 userdeicon()**

```
Fl_Image* Fl_Tree_Prefs::userdeicon () const [inline]
```

Return the deactivated version of the user icon, if any.

Returns 0 if none.

The documentation for this class was generated from the following files:

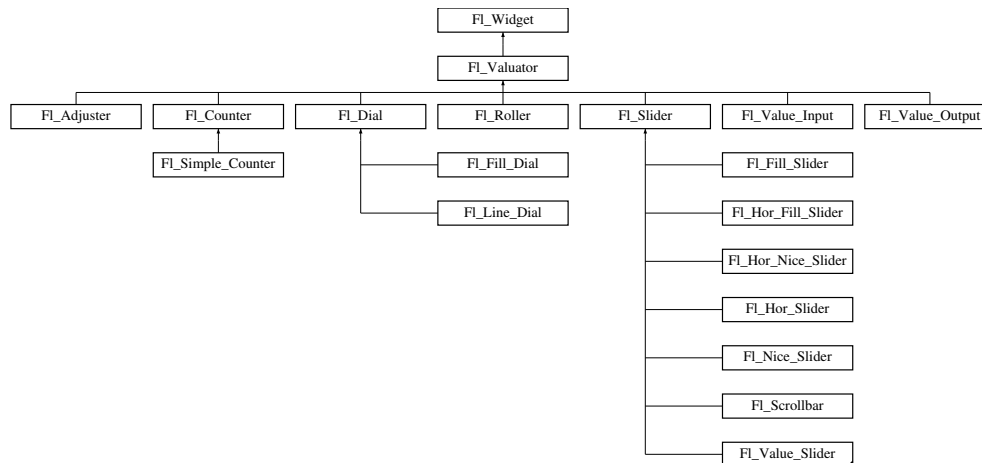
- [Fl\\_Tree\\_Prefs.H](#)
- [Fl\\_Tree\\_Prefs.cxx](#)

**31.147 Fl\_Valuator Class Reference**

The [Fl\\_Valuator](#) class controls a single floating-point value and provides a consistent interface to set the value, range, and step, and insures that callbacks are done the same for every object.

```
#include <Fl_Valuator.H>
```

Inheritance diagram for Fl\_Valuator:



## Public Member Functions

- void **bounds** (double a, double b)  
*Sets the minimum (a) and maximum (b) values for the valuator widget.*
- double **clamp** (double)  
*Clamps the passed value to the valuator range.*
- virtual int **format** (char \*)  
*Uses internal rules to format the fields numerical value into the character array pointed to by the passed parameter.*
- double **increment** (double, int)  
*Adds n times the step value to the passed value.*
- double **maximum** () const  
*Gets the maximum value for the valuator.*
- void **maximum** (double a)  
*Sets the maximum value for the valuator.*
- double **minimum** () const  
*Gets the minimum value for the valuator.*
- void **minimum** (double a)  
*Sets the minimum value for the valuator.*
- void **precision** (int digits)  
*Sets the step value to  $1.0 / 10^{\text{digits}}$ .*
- void **range** (double a, double b)  
*Sets the minimum and maximum values for the valuator.*
- double **round** (double)  
*Round the passed value to the nearest step increment.*
- double **step** () const  
*Gets or sets the step value.*
- void **step** (double a, int b)  
*See double [FL\\_Valuator::step\(\)](#) const*
- void **step** (double s)  
*See double [FL\\_Valuator::step\(\)](#) const.*
- void **step** (int a)  
*See double [FL\\_Valuator::step\(\)](#) const*
- double **value** () const  
*Gets the floating point(double) value.*
- int **value** (double)  
*Sets the current value.*

## Protected Member Functions

- `FI_Valuator` (int X, int Y, int W, int H, const char \*L)  
Creates a new `FI_Valuator` widget using the given position, size, and label string.
- void `handle_drag` (double newvalue)  
Called during a drag operation, after an `FL_WHEN_CHANGED` event is received and before the callback.
- void `handle_push` ()  
Stores the current value in the previous value.
- void `handle_release` ()  
Called after an `FL_WHEN_RELEASE` event is received and before the callback.
- int `horizontal` () const  
Tells if the valuator is an `FL_HORIZONTAL` one.
- double `previous_value` () const  
Gets the previous floating point value before an event changed it.
- void `set_value` (double v)  
Sets the current floating point value.
- double `softclamp` (double)  
Clamps the value, but accepts v if the previous value is not already out of range.
- virtual void `value_damage` ()  
Asks for partial redraw.

## Additional Inherited Members

### 31.147.1 Detailed Description

The `FI_Valuator` class controls a single floating-point value and provides a consistent interface to set the value, range, and step, and insures that callbacks are done the same for every object. There are probably more of these classes in FLTK than any others:

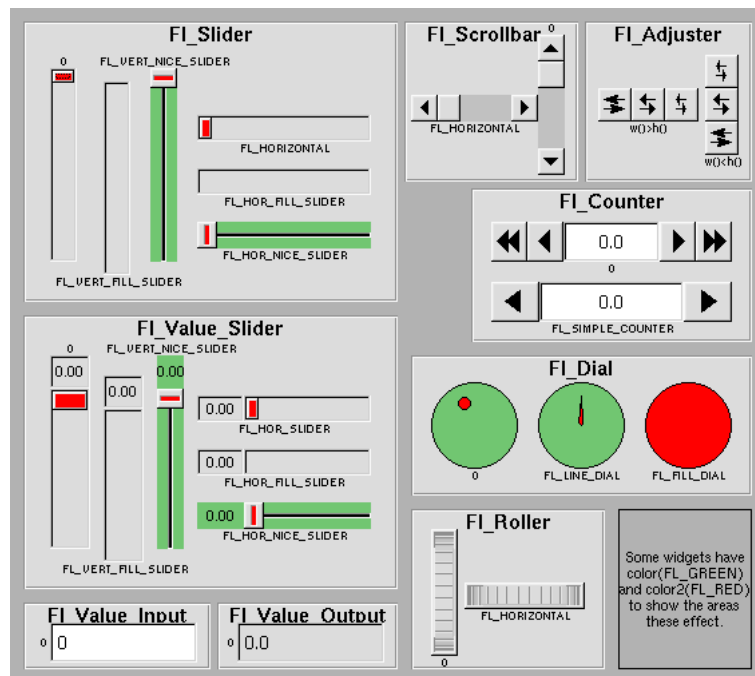


Figure 31.48 Valuator derived from `FI_Valuator`s

In the above diagram each box surrounds an actual subclass. These are further differentiated by setting the `type()` of the widget to the symbolic value labeling the widget. The ones labelled "0" are the default versions with a `type(0)`. For consistency the symbol `FL_VERTICAL` is defined as zero.

## 31.147.2 Constructor & Destructor Documentation

### 31.147.2.1 Fl\_Valuator()

```
Fl_Valuator::Fl_Valuator (
 int X,
 int Y,
 int W,
 int H,
 const char * L) [protected]
```

Creates a new [Fl\\_Valuator](#) widget using the given position, size, and label string. The default boxtype is FL\_NO\_BOX.

## 31.147.3 Member Function Documentation

### 31.147.3.1 format()

```
int Fl_Valuator::format (
 char * buffer) [virtual]
```

Uses internal rules to format the fields numerical value into the character array pointed to by the passed parameter. The actual format used depends on the current step value. If the step value has been set to zero then a %g format is used. If the step value is non-zero, then a %.\*f format is used, where the precision is calculated to show sufficient digits for the current step value. An integer step value, such as 1 or 1.0, gives a precision of 0, so the formatted value will appear as an integer.

This method is used by the `Fl_Valuator_...` group of widgets to format the current value into a text string. The return value is the length of the formatted text. The formatted value is written into `buffer`. `buffer` should have space for at least 128 bytes.

You may override this function to create your own text formatting.

### 31.147.3.2 increment()

```
double Fl_Valuator::increment (
 double v,
 int n)
```

Adds `n` times the step value to the passed value.

If step was set to zero it uses `fabs(maximum() - minimum()) / 100`.

### 31.147.3.3 maximum() [1/2]

```
double Fl_Valuator::maximum () const [inline]
```

Gets the maximum value for the valuator.

### 31.147.3.4 maximum() [2/2]

```
void Fl_Valuator::maximum (
 double a) [inline]
```

Sets the maximum value for the valuator.

### 31.147.3.5 minimum() [1/2]

```
double Fl_Valuator::minimum () const [inline]
```

Gets the minimum value for the valuator.

### 31.147.3.6 minimum() [2/2]

```
void Fl_Valuator::minimum (
 double a) [inline]
```

Sets the minimum value for the valuator.

### 31.147.3.7 precision()

```
void Fl_Valuator::precision (
 int digits)
```

Sets the step value to  $1.0 / 10^{\text{digits}}$ .

Precision `digits` is limited to 0...9 to avoid internal overflow errors. Values outside this range are clamped.

#### Note

For negative values of `digits` the step value is set to  $A = 1.0$  and  $B = 1$ , i.e.  $1.0/1 = 1$ .

### 31.147.3.8 range()

```
void Fl_Valuator::range (
 double a,
 double b) [inline]
```

Sets the minimum and maximum values for the valuator.

When the user manipulates the widget, the value is limited to this range. This clamping is done *after* rounding to the step value (this makes a difference if the range is not a multiple of the step).

The minimum may be greater than the maximum. This has the effect of "reversing" the object so the larger values are in the opposite direction. This also switches which end of the filled sliders is filled.

Some widgets consider this a "soft" range. This means they will stop at the range, but if the user releases and grabs the control again and tries to move it further, it is allowed.

The range may affect the display. You must [redraw\(\)](#) the widget after changing the range.

### 31.147.3.9 round()

```
double Fl_Valuator::round (
 double v)
```

Round the passed value to the nearest step increment.

Does nothing if step is zero.

### 31.147.3.10 step()

```
double Fl_Valuator::step () const [inline]
```

Gets or sets the step value.

As the user moves the mouse the value is rounded to the nearest multiple of the step value. This is done *before* clamping it to the range. For most widgets the default step is zero.

For precision the step is stored as the ratio of a double  $A$  and an integer  $B = A/B$ . You can set these values directly. Currently setting a floating point value sets the nearest  $A/1$  or  $1/B$  value possible.

### 31.147.3.11 value() [1/2]

```
double Fl_Valuator::value () const [inline]
```

Gets the floating point(double) value.

See int [value\(double\)](#)

### 31.147.3.12 value() [2/2]

```
int Fl_Valuator::value (
 double v)
```

Sets the current value.

The new value is *not* clamped or otherwise changed before storing it. Use [clamp\(\)](#) or [round\(\)](#) to modify the value before calling [value\(\)](#). The widget is redrawn if the new value is different than the current one. The initial value is zero.

[changed\(\)](#) will return true if the user has moved the slider, but it will be turned off by [value\(x\)](#) and just before doing a callback (the callback can turn it back on if desired).

The documentation for this class was generated from the following files:

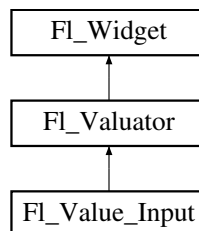
- [Fl\\_Valuator.H](#)
- [Fl\\_Valuator.cxx](#)

## 31.148 Fl\_Value\_Input Class Reference

The [Fl\\_Value\\_Input](#) widget displays a numeric value.

```
#include <Fl_Value_Input.H>
```

Inheritance diagram for [Fl\\_Value\\_Input](#):



### Public Member Functions

- [Fl\\_Color cursor\\_color](#) () const  
*Gets the color of the text cursor.*
- void [cursor\\_color](#) ([Fl\\_Color](#) n)  
*Sets the color of the text cursor.*
- [Fl\\_Value\\_Input](#) (int x, int y, int w, int h, const char \*l=0)  
*Creates a new [Fl\\_Value\\_Input](#) widget using the given position, size, and label string.*
- int [handle](#) (int)  
*Handles the specified event.*
- void [resize](#) (int, int, int, int)  
*Changes the size or position of the widget.*
- int [shortcut](#) () const  
*Returns the current shortcut key for the Input.*
- void [shortcut](#) (int s)  
*Sets the shortcut key to s.*
- char [soft](#) () const  
*If "soft" is turned on, the user is allowed to drag the value outside the range.*
- void [soft](#) (char s)  
*See void [Fl\\_Value\\_Input::soft\(char s\)](#)*
- [Fl\\_Color textcolor](#) () const  
*Gets the color of the text in the value box.*
- void [textcolor](#) ([Fl\\_Color](#) n)  
*Sets the color of the text in the value box.*
- [Fl\\_Font textfont](#) () const

- Gets the typeface of the text in the value box.*

  - void `textfont` (`Fl_Font` s)

*Sets the typeface of the text in the value box.*
- `Fl_Fontsize` `textsize` () const

*Gets the size of the text in the value box.*
- void `textsize` (`Fl_Fontsize` s)

*Sets the size of the text in the value box.*

## Public Attributes

- `Fl_Input` `input`

## Protected Member Functions

- void `draw` ()
- Draws the widget.*

## Additional Inherited Members

### 31.148.1 Detailed Description

The `Fl_Value_Input` widget displays a numeric value.

The user can click in the text field and edit it - there is in fact a hidden `Fl_Input` widget with type(`FL_FLOAT_INPUT`) or type(`FL_INT_INPUT`) in there - and when they hit return or tab the value updates to what they typed and the callback is done.

If `step()` is non-zero and integral, then the range of numbers is limited to integers instead of floating point numbers. As well as displaying the value as an integer, typed input is also limited to integer values, even if the hidden `Fl_Input` widget is of type(`FL_FLOAT_INPUT`).

If `step()` is non-zero, the user can also drag the mouse across the object and thus slide the value. The left button moves one `step()` per pixel, the middle by 10 `step()`, and the right button by 100 \* `step()`. It is therefore impossible to select text by dragging across it, although clicking can still move the insertion cursor.

If `step()` is non-zero and integral, then the range of numbers are limited to integers instead of floating point values.

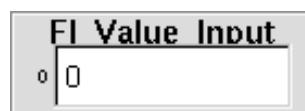


Figure 31.49 Fl\_Value\_Input

### 31.148.2 Constructor & Destructor Documentation

#### 31.148.2.1 Fl\_Value\_Input()

```
Fl_Value_Input::Fl_Value_Input (
 int X,
 int Y,
 int W,
 int H,
 const char * l = 0)
```

Creates a new `Fl_Value_Input` widget using the given position, size, and label string. The default boxtype is `FL_DOWN_BOX`.

### 31.148.3 Member Function Documentation

**31.148.3.1 cursor\_color()** [1/2]

```
Fl_Color Fl_Value_Input::cursor_color () const [inline]
```

Gets the color of the text cursor.

The text cursor is black by default.

**31.148.3.2 cursor\_color()** [2/2]

```
void Fl_Value_Input::cursor_color (
 Fl_Color n) [inline]
```

Sets the color of the text cursor.

The text cursor is black by default.

**31.148.3.3 draw()**

```
void Fl_Value_Input::draw () [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scroll; // scroll is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Implements [Fl\\_Widget](#).

**31.148.3.4 handle()**

```
int Fl_Value_Input::handle (
 int event) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

**Parameters**

|    |              |                            |
|----|--------------|----------------------------|
| in | <i>event</i> | the kind of event received |
|----|--------------|----------------------------|

**Return values**

|   |                                          |
|---|------------------------------------------|
| 0 | if the event was not used or understood  |
| 1 | if the event was used and can be deleted |

**See also**

[Fl\\_Event](#)

Reimplemented from [Fl\\_Widget](#).

**31.148.3.5 resize()**

```
void Fl_Value_Input::resize (
 int x,
 int y,
 int w,
 int h) [virtual]
```



Changes the size or position of the widget.

This is a virtual function so that the widget may implement its own handling of resizing. The default version does *not* call the `redraw()` method, but instead relies on the parent widget to do so because the parent may know a faster way to update the display, such as scrolling from the old position.

Some window managers under X11 call `resize()` a lot more often than needed. Please verify that the position or size of a widget did actually change before doing any extensive calculations.

`position(X, Y)` is a shortcut for `resize(X, Y, w(), h())`, and `size(W, H)` is a shortcut for `resize(x(), y(), W, H)`.

#### Parameters

|    |            |                                            |
|----|------------|--------------------------------------------|
| in | <i>x,y</i> | new position relative to the parent window |
| in | <i>w,h</i> | new size                                   |

#### See also

[position\(int,int\)](#), [size\(int,int\)](#)

Reimplemented from [Fl\\_Widget](#).

#### 31.148.3.6 shortcut() [1/2]

```
int Fl_Value_Input::shortcut () const [inline]
```

Returns the current shortcut key for the Input.

#### See also

[Fl\\_Value\\_Input::shortcut\(int\)](#)

#### 31.148.3.7 shortcut() [2/2]

```
void Fl_Value_Input::shortcut (
 int s) [inline]
```

Sets the shortcut key to *s*.

Setting this overrides the use of '&' in the [label\(\)](#). The value is a bitwise OR of a key and a set of shift flags, for example `FL_ALT | 'a'`, `FL_ALT | (FL_F + 10)`, or just `'a'`. A value of 0 disables the shortcut.

The key can be any value returned by [Fl::event\\_key\(\)](#), but will usually be an ASCII letter. Use a lower-case letter unless you require the shift key to be held down.

The shift flags can be any set of values accepted by [Fl::event\\_state\(\)](#). If the bit is on that shift key must be pushed. Meta, Alt, Ctrl, and Shift must be off if they are not in the shift flags (zero for the other bits indicates a "don't care" setting).

#### 31.148.3.8 soft()

```
char Fl_Value_Input::soft () const [inline]
```

If "soft" is turned on, the user is allowed to drag the value outside the range.

If they drag the value to one of the ends, let go, then grab again and continue to drag, they can get to any value. The default is true.

#### 31.148.3.9 textcolor()

```
Fl_Color Fl_Value_Input::textcolor () const [inline]
```

Gets the color of the text in the value box.

**31.148.3.10 textfont()** [1/2]

```
Fl_Font Fl_Value_Input::textfont () const [inline]
```

Gets the typeface of the text in the value box.

**31.148.3.11 textfont()** [2/2]

```
void Fl_Value_Input::textfont (
 Fl_Font s) [inline]
```

Sets the typeface of the text in the value box.

**31.148.3.12 textsize()** [1/2]

```
Fl_Fontsize Fl_Value_Input::textsize () const [inline]
```

Gets the size of the text in the value box.

**31.148.3.13 textsize()** [2/2]

```
void Fl_Value_Input::textsize (
 Fl_Fontsize s) [inline]
```

Sets the size of the text in the value box.

The documentation for this class was generated from the following files:

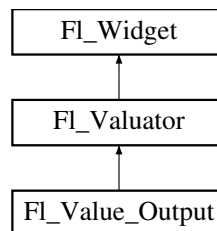
- Fl\_Value\_Input.H
- Fl\_Value\_Input.cxx

**31.149 FI\_Value\_Output Class Reference**

The [Fl\\_Value\\_Output](#) widget displays a floating point value.

```
#include <Fl_Value_Output.H>
```

Inheritance diagram for Fl\_Value\_Output:

**Public Member Functions**

- [Fl\\_Value\\_Output](#) (int *x*, int *y*, int *w*, int *h*, const char \**l*=0)
  - Creates a new Fl\_Value\_Output widget using the given position, size, and label string.*
- int [handle](#) (int)
  - Handles the specified event.*
- uchar [soft](#) ( ) const
  - If "soft" is turned on, the user is allowed to drag the value outside the range.*
- void [soft](#) (uchar *s*)

If "soft" is turned on, the user is allowed to drag the value outside the range.

- [FI\\_Color](#) `textcolor` () const  
Sets the color of the text in the value box.
- void `textcolor` ([FI\\_Color](#) s)  
Gets the color of the text in the value box.
- [FI\\_Font](#) `textfont` () const  
Gets the typeface of the text in the value box.
- void `textfont` ([FI\\_Font](#) s)  
Sets the typeface of the text in the value box.
- [FI\\_Fontsize](#) `textsize` () const  
Gets the size of the text in the value box.
- void `textsize` ([FI\\_Fontsize](#) s)

## Protected Member Functions

- void `draw` ()  
Draws the widget.

## Additional Inherited Members

### 31.149.1 Detailed Description

The [FI\\_Value\\_Output](#) widget displays a floating point value.

If `step()` is not zero, the user can adjust the value by dragging the mouse left and right. The left button moves one `step()` per pixel, the middle by  $10 * \text{step}()$ , and the right button by  $100 * \text{step}()$ .

This is much lighter-weight than [FI\\_Value\\_Input](#) because it contains no text editing code or character buffer.

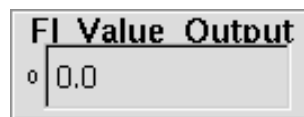


Figure 31.50 FI\_Value\_Output

### 31.149.2 Constructor & Destructor Documentation

#### 31.149.2.1 FI\_Value\_Output()

```
FI_Value_Output::FI_Value_Output (
 int X,
 int Y,
 int W,
 int H,
 const char * l = 0)
```

Creates a new [FI\\_Value\\_Output](#) widget using the given position, size, and label string.

The default boxtype is `FL_NO_BOX`.

Inherited destructor destroys the Valuator.

### 31.149.3 Member Function Documentation

### 31.149.3.1 draw()

```
void Fl_Value_Output::draw () [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scroll; // scroll is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Implements [Fl\\_Widget](#).

### 31.149.3.2 handle()

```
int Fl_Value_Output::handle (
 int event) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

#### Parameters

|    |              |                            |
|----|--------------|----------------------------|
| in | <i>event</i> | the kind of event received |
|----|--------------|----------------------------|

#### Return values

|   |                                          |
|---|------------------------------------------|
| 0 | if the event was not used or understood  |
| 1 | if the event was used and can be deleted |

#### See also

[Fl\\_Event](#)

Reimplemented from [Fl\\_Widget](#).

### 31.149.3.3 soft() [1/2]

```
uchar Fl_Value_Output::soft () const [inline]
```

If "soft" is turned on, the user is allowed to drag the value outside the range.

If they drag the value to one of the ends, let go, then grab again and continue to drag, they can get to any value. Default is one.

### 31.149.3.4 soft() [2/2]

```
void Fl_Value_Output::soft (
 uchar s) [inline]
```

If "soft" is turned on, the user is allowed to drag the value outside the range.

If they drag the value to one of the ends, let go, then grab again and continue to drag, they can get to any value. Default is one.

### 31.149.3.5 textcolor() [1/2]

```
Fl_Color Fl_Value_Output::textcolor () const [inline]
```

Sets the color of the text in the value box.

### 31.149.3.6 textcolor() [2/2]

```
void Fl_Value_Output::textcolor (
 Fl_Color s) [inline]
```

Gets the color of the text in the value box.

### 31.149.3.7 textfont() [1/2]

```
Fl_Font Fl_Value_Output::textfont () const [inline]
```

Gets the typeface of the text in the value box.

### 31.149.3.8 textfont() [2/2]

```
void Fl_Value_Output::textfont (
 Fl_Font s) [inline]
```

Sets the typeface of the text in the value box.

### 31.149.3.9 textsize()

```
Fl_Fontsize Fl_Value_Output::textsize () const [inline]
```

Gets the size of the text in the value box.

The documentation for this class was generated from the following files:

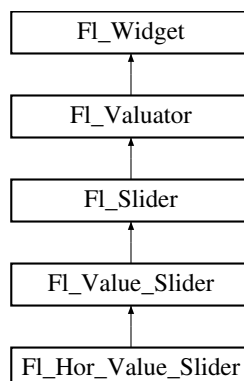
- Fl\_Value\_Output.H
- Fl\_Value\_Output.cxx

## 31.150 Fl\_Value\_Slider Class Reference

The [Fl\\_Value\\_Slider](#) widget is a [Fl\\_Slider](#) widget with a box displaying the current value.

```
#include <Fl_Value_Slider.H>
```

Inheritance diagram for [Fl\\_Value\\_Slider](#):



## Public Member Functions

- `Fl_Value_Slider` (int *x*, int *y*, int *w*, int *h*, const char \**l*=0)
 

Creates a new `Fl_Value_Slider` widget using the given position, size, and label string.
- int `handle` (int)
 

Handles the specified event.
- `Fl_Color` `textcolor` () const
 

Gets the color of the text in the value box.
- void `textcolor` (`Fl_Color` *s*)
 

Sets the color of the text in the value box.
- `Fl_Font` `textfont` () const
 

Gets the typeface of the text in the value box.
- void `textfont` (`Fl_Font` *s*)
 

Sets the typeface of the text in the value box.
- `Fl_Fontsize` `textsize` () const
 

Gets the size of the text in the value box.
- void `textsize` (`Fl_Fontsize` *s*)
 

Sets the size of the text in the value box.

## Protected Member Functions

- void `draw` ()
 

Draws the widget.

## Additional Inherited Members

### 31.150.1 Detailed Description

The `Fl_Value_Slider` widget is a `Fl_Slider` widget with a box displaying the current value.

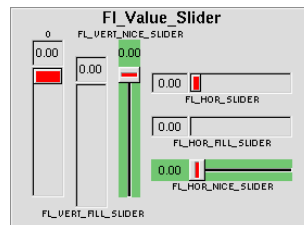


Figure 31.51 `Fl_Value_Slider`

### 31.150.2 Constructor & Destructor Documentation

#### 31.150.2.1 `Fl_Value_Slider()`

```
Fl_Value_Slider::Fl_Value_Slider (
 int X,
 int Y,
 int W,
 int H,
 const char * l = 0)
```

Creates a new `Fl_Value_Slider` widget using the given position, size, and label string. The default boxtype is `FL_DOWN_BOX`.

### 31.150.3 Member Function Documentation

#### 31.150.3.1 draw()

```
void Fl_Value_Slider::draw () [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own draw() method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scroll; // scroll is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Reimplemented from [Fl\\_Slider](#).

#### 31.150.3.2 handle()

```
int Fl_Value_Slider::handle (
 int event) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

##### Parameters

|    |              |                            |
|----|--------------|----------------------------|
| in | <i>event</i> | the kind of event received |
|----|--------------|----------------------------|

##### Return values

|   |                                          |
|---|------------------------------------------|
| 0 | if the event was not used or understood  |
| 1 | if the event was used and can be deleted |

##### See also

[Fl\\_Event](#)

Reimplemented from [Fl\\_Slider](#).

#### 31.150.3.3 textcolor() [1/2]

```
Fl_Color Fl_Value_Slider::textcolor () const [inline]
```

Gets the color of the text in the value box.

#### 31.150.3.4 textcolor() [2/2]

```
void Fl_Value_Slider::textcolor (
 Fl_Color s) [inline]
```

Sets the color of the text in the value box.

### 31.150.3.5 `textfont()` [1/2]

```
Fl_Font Fl_Value_Slider::textfont () const [inline]
```

Gets the typeface of the text in the value box.

### 31.150.3.6 `textfont()` [2/2]

```
void Fl_Value_Slider::textfont (
 Fl_Font s) [inline]
```

Sets the typeface of the text in the value box.

### 31.150.3.7 `textsize()` [1/2]

```
Fl_Fontsize Fl_Value_Slider::textsize () const [inline]
```

Gets the size of the text in the value box.

### 31.150.3.8 `textsize()` [2/2]

```
void Fl_Value_Slider::textsize (
 Fl_Fontsize s) [inline]
```

Sets the size of the text in the value box.

The documentation for this class was generated from the following files:

- `Fl_Value_Slider.H`
- `Fl_Value_Slider.cxx`

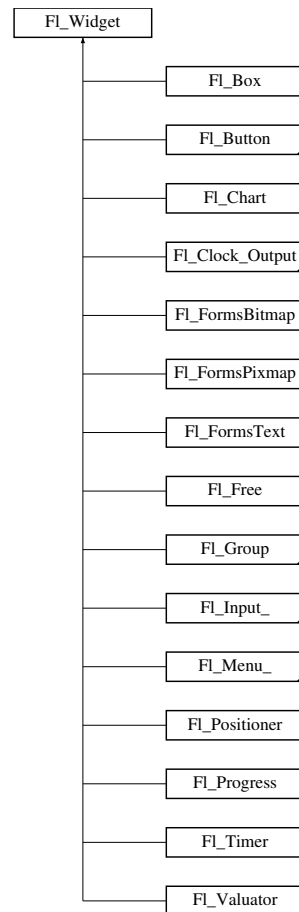
## 31.151 `Fl_Widget` Class Reference

`Fl_Widget` is the base class for all widgets in FLTK.

```
#include <Fl_Widget.H>
```

Inheritance diagram for `Fl_Widget`:





## Public Member Functions

- void `_clear_fullscreen` ()
- void `_set_fullscreen` ()
- void `activate` ()
  - Activates the widget.*
- unsigned int `active` () const
  - Returns whether the widget is active.*
- int `active_r` () const
  - Returns whether the widget and all of its parents are active.*
- `FL_Align` `align` () const
  - Gets the label alignment.*
- void `align` (`FL_Align` alignment)
- long `argument` () const
  - Gets the current user data (long) argument that is passed to the callback function.*
- void `argument` (long v)
  - Sets the current user data (long) argument that is passed to the callback function.*
- virtual class `FL_Gl_Window` \* `as_gl_window` ()
  - Returns an `FL_Gl_Window` pointer if this widget is an `FL_Gl_Window`.*
- virtual `FL_Group` \* `as_group` ()
  - Returns an `FL_Group` pointer if this widget is an `FL_Group`.*
- virtual `FL_Window` \* `as_window` ()
  - Returns an `FL_Window` pointer if this widget is an `FL_Window`.*
- `FL_Boxtype` `box` () const

- Gets the box type of the widget.*

  - void `box` (`FI_Boxtype` new\_box)
- Sets the box type for the widget.*

  - `FI_Callback_p` `callback` () const
- Gets the current callback function for the widget.*

  - void `callback` (`FI_Callback` \*cb)
- Sets the current callback function for the widget.*

  - void `callback` (`FI_Callback` \*cb, void \*p)
- Sets the current callback function for the widget.*

  - void `callback` (`FI_Callback0` \*cb)
- Sets the current callback function for the widget.*

  - void `callback` (`FI_Callback1` \*cb, long p=0)
- Sets the current callback function for the widget.*

  - unsigned int `changed` () const
- Checks if the widget value changed since the last callback.*

  - void `clear_active` ()
- Marks the widget as inactive without sending events or changing focus.*

  - void `clear_changed` ()
- Marks the value of the widget as unchanged.*

  - void `clear_damage` (`uchar` c=0)
- Clears or sets the damage flags.*

  - void `clear_output` ()
- Sets a widget to accept input.*

  - void `clear_visible` ()
- Hides the widget.*

  - void `clear_visible_focus` ()
- Disables keyboard focus navigation with this widget.*

  - `FI_Color` `color` () const
- Gets the background color of the widget.*

  - void `color` (`FI_Color` bg)
- Sets the background color of the widget.*

  - void `color` (`FI_Color` bg, `FI_Color` sel)
- Sets the background and selection color of the widget.*

  - `FI_Color` `color2` () const
- For back compatibility only.*

  - void `color2` (unsigned a)
- For back compatibility only.*

  - int `contains` (const `FI_Widget` \*w) const
- Checks if w is a child of this widget.*

  - void `copy_label` (const char \*new\_label)
- Sets the current label.*

  - void `copy_tooltip` (const char \*text)
- Sets the current tooltip text.*

  - `uchar` `damage` () const
- Returns non-zero if `draw()` needs to be called.*

  - void `damage` (`uchar` c)
- Sets the damage bits for the widget.*

  - void `damage` (`uchar` c, int x, int y, int w, int h)
- Sets the damage bits for an area inside the widget.*

  - int `damage_resize` (int, int, int, int)
- Internal use only.*

- void `deactivate` ()  
*Deactivates the widget.*
- `Fl_Image * deimage` ()  
*Gets the image that is used as part of the widget label.*
- const `Fl_Image * deimage` () const
- void `deimage` (`Fl_Image &img`)  
*Sets the image to use as part of the widget label.*
- void `deimage` (`Fl_Image *img`)  
*Sets the image to use as part of the widget label.*
- void `do_callback` ()  
*Calls the widget callback.*
- void `do_callback` (`Fl_Widget *o`, long arg)  
*Calls the widget callback.*
- void `do_callback` (`Fl_Widget *o`, void \*arg=0)  
*Calls the widget callback.*
- virtual void `draw` ()=0  
*Draws the widget.*
- void `draw_label` (int, int, int, int, `Fl_Align`) const  
*Draws the label in an arbitrary bounding box with an arbitrary alignment.*
- int `h` () const  
*Gets the widget height.*
- virtual int `handle` (int event)  
*Handles the specified event.*
- virtual void `hide` ()  
*Makes a widget invisible.*
- `Fl_Image * image` ()  
*Gets the image that is used as part of the widget label.*
- const `Fl_Image * image` () const
- void `image` (`Fl_Image &img`)  
*Sets the image to use as part of the widget label.*
- void `image` (`Fl_Image *img`)  
*Sets the image to use as part of the widget label.*
- int `inside` (const `Fl_Widget *wgt`) const  
*Checks if this widget is a child of wgt.*
- int `is_label_copied` () const  
*Returns whether the current label was assigned with `copy_label()`.*
- const char \* `label` () const  
*Gets the current label text.*
- void `label` (const char \*text)  
*Sets the current label pointer.*
- void `label` (`Fl_Labeltype a`, const char \*b)  
*Shortcut to set the label text and type in one call.*
- `Fl_Color labelcolor` () const  
*Gets the label color.*
- void `labelcolor` (`Fl_Color c`)  
*Sets the label color.*
- `Fl_Font labelfont` () const  
*Gets the font to use.*
- void `labelfont` (`Fl_Font f`)  
*Sets the font to use.*
- `Fl_Fontsize labelsize` () const

- Gets the font size in pixels.*
- void `labelsize` (`FI_Fontsize` pix)
  - Sets the font size in pixels.*
- `FI_Labeltype` `labeltype` () const
  - Gets the label type.*
- void `labeltype` (`FI_Labeltype` a)
  - Sets the label type.*
- void `measure_label` (int &ww, int &hh) const
  - Sets width ww and height hh accordingly with the label size.*
- unsigned int `output` () const
  - Returns if a widget is used for output only.*
- `FI_Group` \* `parent` () const
  - Returns a pointer to the parent widget.*
- void `parent` (`FI_Group` \*p)
  - Internal use only - "for hacks only".*
- void `position` (int X, int Y)
  - Repositions the window or widget.*
- void `redraw` ()
  - Schedules the drawing of the widget.*
- void `redraw_label` ()
  - Schedules the drawing of the label.*
- virtual void `resize` (int x, int y, int w, int h)
  - Changes the size or position of the widget.*
- `FI_Color` `selection_color` () const
  - Gets the selection color.*
- void `selection_color` (`FI_Color` a)
  - Sets the selection color.*
- void `set_active` ()
  - Marks the widget as active without sending events or changing focus.*
- void `set_changed` ()
  - Marks the value of the widget as changed.*
- void `set_output` ()
  - Sets a widget to output only.*
- void `set_visible` ()
  - Makes the widget visible.*
- void `set_visible_focus` ()
  - Enables keyboard focus navigation with this widget.*
- virtual void `show` ()
  - Makes a widget visible.*
- void `size` (int W, int H)
  - Changes the size of the widget.*
- int `take_focus` ()
  - Gives the widget the keyboard focus.*
- unsigned int `takeevents` () const
  - Returns if the widget is able to take events.*
- int `test_shortcut` ()
  - Returns true if the widget's label contains the entered '&x' shortcut.*
- const char \* `tooltip` () const
  - Gets the current tooltip text.*
- void `tooltip` (const char \*text)
  - Sets the current tooltip text.*

- `Fl_Window * top_window ()` const  
*Returns a pointer to the top-level window for the widget.*
- `Fl_Window * top_window_offset (int &xoff, int &yoff)` const  
*Finds the x/y offset of the current widget relative to the top-level window.*
- `uchar type ()` const  
*Gets the widget type.*
- `void type (uchar t)`  
*Sets the widget type.*
- `int use_accents_menu ()`  
*Returns non zero if MAC\_USE\_ACCENTS\_MENU flag is set, 0 otherwise.*
- `void * user_data ()` const  
*Gets the user data for this widget.*
- `void user_data (void *v)`  
*Sets the user data for this widget.*
- `unsigned int visible ()` const  
*Returns whether a widget is visible.*
- `unsigned int visible_focus ()`  
*Checks whether this widget has a visible focus.*
- `void visible_focus (int v)`  
*Modifies keyboard focus navigation.*
- `int visible_r ()` const  
*Returns whether a widget and all its parents are visible.*
- `int w ()` const  
*Gets the widget width.*
- `Fl_When when ()` const  
*Returns the conditions under which the callback is called.*
- `void when (uchar i)`  
*Sets the flags used to decide when a callback is called.*
- `Fl_Window * window ()` const  
*Returns a pointer to the nearest parent window up the widget hierarchy.*
- `int x ()` const  
*Gets the widget position in its window.*
- `int y ()` const  
*Gets the widget position in its window.*
- `virtual ~Fl_Widget ()`  
*Destroys the widget.*

### Static Public Member Functions

- `static void default_callback (Fl_Widget *cb, void *d)`  
*The default callback for all widgets that don't set a callback.*
- `static unsigned int label_shortcut (const char *t)`  
*Returns the Unicode value of the '&x' shortcut in a given text.*
- `static int test_shortcut (const char *, const bool require_alt=false)`  
*Returns true if the given text t contains the entered '&x' shortcut.*

## Protected Types

- enum {
  - `INACTIVE = 1<<0` , `INVISIBLE = 1<<1` , `OUTPUT = 1<<2` , `NOBORDER = 1<<3` ,
  - `FORCE_POSITION = 1<<4` , `NON_MODAL = 1<<5` , `SHORTCUT_LABEL = 1<<6` , `CHANGED = 1<<7`
  - ,
  - `OVERRIDE = 1<<8` , `VISIBLE_FOCUS = 1<<9` , `COPIED_LABEL = 1<<10` , `CLIP_CHILDREN = 1<<11`
  - ,
  - `MENU_WINDOW = 1<<12` , `TOOLTIP_WINDOW = 1<<13` , `MODAL = 1<<14` , `NO_OVERLAY = 1<<15`
  - ,
  - `GROUP_RELATIVE = 1<<16` , `COPIED_TOOLTIP = 1<<17` , `FULLSCREEN = 1<<18` , `MAC_USE_ACCENTS_MENU = 1<<19` ,
  - `USERFLAG3 = 1<<29` , `USERFLAG2 = 1<<30` , `USERFLAG1 = 1<<31` }

*flags possible values enumeration.*

## Protected Member Functions

- void `clear_flag` (unsigned int c)
  - Clears a flag in the flags mask.*
- void `draw_backdrop` () const
  - If `FL_ALIGN_IMAGE_BACKDROP` is set, the image or deimage will be drawn.*
- void `draw_box` () const
  - Draws the widget box according its box style.*
- void `draw_box` (FI\_Boxtype t, FI\_Color c) const
  - Draws a box of type t, of color c at the widget's position and size.*
- void `draw_box` (FI\_Boxtype t, int x, int y, int w, int h, FI\_Color c) const
  - Draws a box of type t, of color c at the position X,Y and size W,H.*
- void `draw_focus` ()
  - draws a focus rectangle around the widget*
- void `draw_focus` (FI\_Boxtype t, int x, int y, int w, int h) const
  - Draws a focus box for the widget at the given position and size.*
- void `draw_label` () const
  - Draws the widget's label at the defined label position.*
- void `draw_label` (int, int, int, int) const
  - Draws the label in an arbitrary bounding box.*
- `FI_Widget` (int x, int y, int w, int h, const char \*label=0L)
  - Creates a widget at the given position and size.*
- unsigned int `flags` () const
  - Gets the widget flags mask.*
- void `h` (int v)
  - Internal use only.*
- void `set_flag` (unsigned int c)
  - Sets a flag in the flags mask.*
- void `w` (int v)
  - Internal use only.*
- void `x` (int v)
  - Internal use only.*
- void `y` (int v)
  - Internal use only.*

## Friends

- class `FI_Group`

### 31.151.1 Detailed Description

[FL\\_Widget](#) is the base class for all widgets in FLTK.

You can't create one of these because the constructor is not public. However you can subclass it.

All "property" accessing methods, such as [color\(\)](#), [parent\(\)](#), or [argument\(\)](#) are implemented as trivial inline functions and thus are as fast and small as accessing fields in a structure. Unless otherwise noted, the property setting methods such as [color\(n\)](#) or [label\(s\)](#) are also trivial inline functions, even if they change the widget's appearance. It is up to the user code to call [redraw\(\)](#) after these.

### 31.151.2 Member Enumeration Documentation

#### 31.151.2.1 anonymous enum

anonymous enum [protected]

flags possible values enumeration.

See [activate\(\)](#), [output\(\)](#), [visible\(\)](#), [changed\(\)](#), [set\\_visible\\_focus\(\)](#)

Enumerator

|                      |                                                                                                                                                                           |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| INACTIVE             | the widget can't receive focus, and is disabled but potentially visible                                                                                                   |
| INVISIBLE            | the widget is not drawn, but can receive a few special events                                                                                                             |
| OUTPUT               | for output only                                                                                                                                                           |
| NOBORDER             | don't draw a decoration ( <a href="#">FL_Window</a> )                                                                                                                     |
| FORCE_POSITION       | don't let the window manager position the window ( <a href="#">FL_Window</a> )                                                                                            |
| NON_MODAL            | this is a hovering toolbar window ( <a href="#">FL_Window</a> )                                                                                                           |
| SHORTCUT_LABEL       | the label contains a shortcut we need to draw                                                                                                                             |
| CHANGED              | the widget value changed                                                                                                                                                  |
| OVERRIDE             | position window on top ( <a href="#">FL_Window</a> )                                                                                                                      |
| VISIBLE_FOCUS        | accepts keyboard focus navigation if the widget can have the focus                                                                                                        |
| COPIED_LABEL         | the widget label is internally copied, its destruction is handled by the widget                                                                                           |
| CLIP_CHILDREN        | all drawing within this widget will be clipped ( <a href="#">FL_Group</a> )                                                                                               |
| MENU_WINDOW          | a temporary popup window, dismissed by clicking outside ( <a href="#">FL_Window</a> )                                                                                     |
| TOOLTIP_WINDOW       | a temporary popup, transparent to events, and dismissed easily ( <a href="#">FL_Window</a> )                                                                              |
| MODAL                | a window blocking input to all other winows ( <a href="#">FL_Window</a> )                                                                                                 |
| NO_OVERLAY           | window not using a hardware overlay plane ( <a href="#">FL_Menu_Window</a> )                                                                                              |
| GROUP_RELATIVE       | Reserved, not implemented. DO NOT USE.                                                                                                                                    |
| COPIED_TOOLTIP       | the widget tooltip is internally copied, its destruction is handled by the widget                                                                                         |
| FULLSCREEN           | a fullscreen window ( <a href="#">FL_Window</a> )                                                                                                                         |
| MAC_USE_ACCENTS_MENU | On the Mac OS platform, pressing and holding a key on the keyboard opens an accented-character menu window ( <a href="#">FL_Input_</a> , <a href="#">FL_Text_Editor</a> ) |
| USERFLAG3            | reserved for 3rd party extensions                                                                                                                                         |
| USERFLAG2            | reserved for 3rd party extensions                                                                                                                                         |
| USERFLAG1            | reserved for 3rd party extensions                                                                                                                                         |

### 31.151.3 Constructor & Destructor Documentation

### 31.151.3.1 Fl\_Widget()

```
Fl_Widget::Fl_Widget (
 int x,
 int y,
 int w,
 int h,
 const char * label = 0L) [protected]
```

Creates a widget at the given position and size.

The [Fl\\_Widget](#) is a protected constructor, but all derived widgets have a matching public constructor. It takes a value for [x\(\)](#), [y\(\)](#), [w\(\)](#), [h\(\)](#), and an optional value for [label\(\)](#).

#### Parameters

|    |              |                                                             |
|----|--------------|-------------------------------------------------------------|
| in | <i>x,y</i>   | the position of the widget relative to the enclosing window |
| in | <i>w,h</i>   | size of the widget in pixels                                |
| in | <i>label</i> | optional text for the widget label                          |

### 31.151.3.2 ~Fl\_Widget()

```
Fl_Widget::~~Fl_Widget () [virtual]
```

Destroys the widget.

Destroys the widget, taking care of throwing focus before if any.

Destroying single widgets is not very common. You almost always want to destroy the parent group instead, which will destroy all of the child widgets and groups in that group.

#### Since

FLTK 1.3, the widget's destructor removes the widget from its parent group, if it is member of a group.

Destruction removes the widget from any parent group! And groups when destroyed destroy all their children. This is convenient and fast.

## 31.151.4 Member Function Documentation

### 31.151.4.1 activate()

```
void Fl_Widget::activate ()
```

Activates the widget.

Changing this value will send `FL_ACTIVATE` to the widget if [active\\_r\(\)](#) is true.

#### See also

[active\(\)](#), [active\\_r\(\)](#), [deactivate\(\)](#)

### 31.151.4.2 active()

```
unsigned int Fl_Widget::active () const [inline]
```

Returns whether the widget is active.

#### Return values

|   |                           |
|---|---------------------------|
| 0 | if the widget is inactive |
|---|---------------------------|



See also

[active\\_r\(\)](#), [activate\(\)](#), [deactivate\(\)](#)

#### 31.151.4.3 active\_r()

```
int Fl_Widget::active_r () const
```

Returns whether the widget and all of its parents are active.

Return values

|   |                                                   |
|---|---------------------------------------------------|
| 0 | if this or any of the parent widgets are inactive |
|---|---------------------------------------------------|

See also

[active\(\)](#), [activate\(\)](#), [deactivate\(\)](#)

#### 31.151.4.4 align() [1/2]

```
Fl_Align Fl_Widget::align () const [inline]
```

Gets the label alignment.

Returns

label alignment

See also

[label\(\)](#), [align\(Fl\\_Align\)](#), [Fl\\_Align](#)

#### 31.151.4.5 align() [2/2]

```
void Fl_Widget::align (
 Fl_Align alignment) [inline]
```

Sets the label alignment.

This controls how the label is displayed next to or inside the widget. The default value is FL\_ALIGN\_CENTER, which centers the label inside the widget.

Parameters

|    |                  |                     |
|----|------------------|---------------------|
| in | <i>alignment</i> | new label alignment |
|----|------------------|---------------------|

See also

[align\(\)](#), [Fl\\_Align](#)

#### 31.151.4.6 argument() [1/2]

```
long Fl_Widget::argument () const [inline]
```

Gets the current user data (long) argument that is passed to the callback function.

**Todo** The user data value must be implemented using *intptr\_t* or similar to avoid 64-bit machine incompatibilities.

### 31.151.4.7 argument() [2/2]

```
void Fl_Widget::argument (
 long v) [inline]
```

Sets the current user data (long) argument that is passed to the callback function.

**Todo** The user data value must be implemented using *intptr\_t* or similar to avoid 64-bit machine incompatibilities.

### 31.151.4.8 as\_gl\_window()

```
virtual class Fl_Gl_Window* Fl_Widget::as_gl_window () [inline], [virtual]
```

Returns an [Fl\\_Gl\\_Window](#) pointer if this widget is an [Fl\\_Gl\\_Window](#).

Use this method if you have a widget (pointer) and need to know whether this widget is derived from [Fl\\_Gl\\_Window](#).

If it returns non-NULL, then the widget in question is derived from [Fl\\_Gl\\_Window](#).

#### Return values

|             |                                                                   |
|-------------|-------------------------------------------------------------------|
| <i>NULL</i> | if this widget is not derived from <a href="#">Fl_Gl_Window</a> . |
|-------------|-------------------------------------------------------------------|

#### Note

This method is provided to avoid `dynamic_cast`.

#### See also

[Fl\\_Widget::as\\_group\(\)](#), [Fl\\_Widget::as\\_window\(\)](#)

Reimplemented in [Fl\\_Gl\\_Window](#).

### 31.151.4.9 as\_group()

```
virtual Fl_Group* Fl_Widget::as_group () [inline], [virtual]
```

Returns an [Fl\\_Group](#) pointer if this widget is an [Fl\\_Group](#).

Use this method if you have a widget (pointer) and need to know whether this widget is derived from [Fl\\_Group](#). If it returns non-NULL, then the widget in question is derived from [Fl\\_Group](#), and you can use the returned pointer to access its children or other [Fl\\_Group](#)-specific methods.

#### Example:

```
void my_callback (Fl_Widget *w, void *) {
 Fl_Group *g = w->as_group();
 if (g)
 printf ("This group has %d children\n",g->children());
 else
 printf ("This widget is not a group!\n");
}
```

#### Return values

|             |                                                               |
|-------------|---------------------------------------------------------------|
| <i>NULL</i> | if this widget is not derived from <a href="#">Fl_Group</a> . |
|-------------|---------------------------------------------------------------|

#### Note

This method is provided to avoid `dynamic_cast`.

#### See also

[Fl\\_Widget::as\\_window\(\)](#), [Fl\\_Widget::as\\_gl\\_window\(\)](#)

Reimplemented in [Fl\\_Group](#).

**31.151.4.10 as\_window()**

```
virtual FI_Window* FI_Widget::as_window () [inline], [virtual]
```

Returns an [FI\\_Window](#) pointer if this widget is an [FI\\_Window](#).

Use this method if you have a widget (pointer) and need to know whether this widget is derived from [FI\\_Window](#). If it returns non-NULL, then the widget in question is derived from [FI\\_Window](#), and you can use the returned pointer to access its children or other [FI\\_Window](#)-specific methods.

**Return values**

|             |                                                                |
|-------------|----------------------------------------------------------------|
| <i>NULL</i> | if this widget is not derived from <a href="#">FI_Window</a> . |
|-------------|----------------------------------------------------------------|

**Note**

This method is provided to avoid `dynamic_cast`.

**See also**

[FI\\_Widget::as\\_group\(\)](#), [FI\\_Widget::as\\_gl\\_window\(\)](#)

Reimplemented in [FI\\_Window](#).

**31.151.4.11 box() [1/2]**

```
FI_Boxtype FI_Widget::box () const [inline]
```

Gets the box type of the widget.

**Returns**

the current box type

**See also**

[box\(FI\\_Boxtype\)](#), [FI\\_Boxtype](#)

**31.151.4.12 box() [2/2]**

```
void FI_Widget::box (
 FI_Boxtype new_box) [inline]
```

Sets the box type for the widget.

This identifies a routine that draws the background of the widget. See [FI\\_Boxtype](#) for the available types. The default depends on the widget, but is usually [FL\\_NO\\_BOX](#) or [FL\\_UP\\_BOX](#).

**Parameters**

|    |                |                  |
|----|----------------|------------------|
| in | <i>new_box</i> | the new box type |
|----|----------------|------------------|

**See also**

[box\(\)](#), [FI\\_Boxtype](#)

**31.151.4.13 callback() [1/5]**

```
FI_Callback_p FI_Widget::callback () const [inline]
```

Gets the current callback function for the widget.

Each widget has a single callback.

**Returns**

current callback

**31.151.4.14 callback()** [2/5]

```
void Fl_Widget::callback (
 Fl_Callback * cb) [inline]
```

Sets the current callback function for the widget.  
Each widget has a single callback.

**Parameters**

|    |           |              |
|----|-----------|--------------|
| in | <i>cb</i> | new callback |
|----|-----------|--------------|

**31.151.4.15 callback()** [3/5]

```
void Fl_Widget::callback (
 Fl_Callback * cb,
 void * p) [inline]
```

Sets the current callback function for the widget.  
Each widget has a single callback.

**Parameters**

|    |           |              |
|----|-----------|--------------|
| in | <i>cb</i> | new callback |
| in | <i>p</i>  | user data    |

**31.151.4.16 callback()** [4/5]

```
void Fl_Widget::callback (
 Fl_Callback0 * cb) [inline]
```

Sets the current callback function for the widget.  
Each widget has a single callback.

**Parameters**

|    |           |              |
|----|-----------|--------------|
| in | <i>cb</i> | new callback |
|----|-----------|--------------|

**31.151.4.17 callback()** [5/5]

```
void Fl_Widget::callback (
 Fl_Callback1 * cb,
 long p = 0) [inline]
```

Sets the current callback function for the widget.  
Each widget has a single callback.

**Parameters**

|    |           |              |
|----|-----------|--------------|
| in | <i>cb</i> | new callback |
| in | <i>p</i>  | user data    |

**31.151.4.18 changed()**

```
unsigned int Fl_Widget::changed () const [inline]
```

Checks if the widget value changed since the last callback.

"Changed" is a flag that is turned on when the user changes the value stored in the widget. This is only used by subclasses of [Fl\\_Widget](#) that store values, but is in the base class so it is easier to scan all the widgets in a panel and [do\\_callback\(\)](#) on the changed ones in response to an "OK" button.

Most widgets turn this flag off when they do the callback, and when the program sets the stored value.

**Return values**

|                |                             |
|----------------|-----------------------------|
| <code>0</code> | if the value did not change |
|----------------|-----------------------------|

**See also**

[set\\_changed\(\)](#), [clear\\_changed\(\)](#)

**31.151.4.19 clear\_active()**

```
void Fl_Widget::clear_active () [inline]
```

Marks the widget as inactive without sending events or changing focus.

This is mainly for specialized use, for normal cases you want [deactivate\(\)](#).

**See also**

[deactivate\(\)](#)

**31.151.4.20 clear\_changed()**

```
void Fl_Widget::clear_changed () [inline]
```

Marks the value of the widget as unchanged.

**See also**

[changed\(\)](#), [set\\_changed\(\)](#)

**31.151.4.21 clear\_damage()**

```
void Fl_Widget::clear_damage (
 uchar c = 0) [inline]
```

Clears or sets the damage flags.

Damage flags are cleared when parts of the widget drawing is repaired.

The optional argument `c` specifies the bits that **are set** after the call (default: 0) and **not** the bits that are cleared!

**Note**

Therefore it is possible to set damage bits with this method, but this should be avoided. Use [damage\(uchar\)](#) instead.

**Parameters**

|    |                |                                          |
|----|----------------|------------------------------------------|
| in | <code>c</code> | new bitmask of damage flags (default: 0) |
|----|----------------|------------------------------------------|

See also

[damage\(uchar\)](#), [damage\(\)](#)

#### 31.151.4.22 clear\_output()

```
void Fl_Widget::clear_output () [inline]
```

Sets a widget to accept input.

See also

[set\\_output\(\)](#), [output\(\)](#)

#### 31.151.4.23 clear\_visible()

```
void Fl_Widget::clear_visible () [inline]
```

Hides the widget.

You must still redraw the parent to see a change in the window. Normally you want to use the [hide\(\)](#) method instead.

#### 31.151.4.24 clear\_visible\_focus()

```
void Fl_Widget::clear_visible_focus () [inline]
```

Disables keyboard focus navigation with this widget.

Normally, all widgets participate in keyboard focus navigation.

See also

[set\\_visible\\_focus\(\)](#), [visible\\_focus\(\)](#), [visible\\_focus\(int\)](#)

#### 31.151.4.25 color() [1/3]

```
Fl_Color Fl_Widget::color () const [inline]
```

Gets the background color of the widget.

Returns

current background color

See also

[color\(Fl\\_Color\)](#), [color\(Fl\\_Color, Fl\\_Color\)](#)

#### 31.151.4.26 color() [2/3]

```
void Fl_Widget::color (
 Fl_Color bg) [inline]
```

Sets the background color of the widget.

The color is passed to the box routine. The color is either an index into an internal table of RGB colors or an RGB color value generated using [fl\\_rgb\\_color\(\)](#).

The default for most widgets is FL\_BACKGROUND\_COLOR. Use [Fl::set\\_color\(\)](#) to redefine colors in the color map.

Parameters

|    |    |                  |
|----|----|------------------|
| in | bg | background color |
|----|----|------------------|

See also

[color\(\)](#), [color\(Fl\\_Color, Fl\\_Color\)](#), [selection\\_color\(Fl\\_Color\)](#)

#### 31.151.4.27 color() [3/3]

```
void Fl_Widget::color (
 Fl_Color bg,
 Fl_Color sel) [inline]
```

Sets the background and selection color of the widget.  
The two color form sets both the background and selection colors.

Parameters

|    |            |                  |
|----|------------|------------------|
| in | <i>bg</i>  | background color |
| in | <i>sel</i> | selection color  |

See also

[color\(unsigned\)](#), [selection\\_color\(unsigned\)](#)

#### 31.151.4.28 color2() [1/2]

```
Fl_Color Fl_Widget::color2 () const [inline]
```

For back compatibility only.

**Deprecated** Use [selection\\_color\(\)](#) instead.

#### 31.151.4.29 color2() [2/2]

```
void Fl_Widget::color2 (
 unsigned a) [inline]
```

For back compatibility only.

**Deprecated** Use [selection\\_color\(unsigned\)](#) instead.

#### 31.151.4.30 contains()

```
int Fl_Widget::contains (
 const Fl_Widget * w) const
```

Checks if *w* is a child of this widget.

Parameters

|    |          |                        |
|----|----------|------------------------|
| in | <i>w</i> | potential child widget |
|----|----------|------------------------|

**Returns**

Returns 1 if *w* is a child of this widget, or is equal to this widget. Returns 0 if *w* is NULL.

**31.151.4.31 copy\_label()**

```
void Fl_Widget::copy_label (
 const char * new_label)
```

Sets the current label.

Unlike [label\(\)](#), this method allocates a copy of the label string instead of using the original string pointer.

The internal copy will automatically be freed whenever you assign a new label or when the widget is destroyed.

**Parameters**

|    |                  |                    |
|----|------------------|--------------------|
| in | <i>new_label</i> | the new label text |
|----|------------------|--------------------|

**See also**

[label\(\)](#)

**31.151.4.32 copy\_tooltip()**

```
void Fl_Widget::copy_tooltip (
 const char * text)
```

Sets the current tooltip text.

Unlike [tooltip\(\)](#), this method allocates a copy of the tooltip string instead of using the original string pointer.

The internal copy will automatically be freed whenever you assign a new tooltip or when the widget is destroyed.

If no tooltip is set, the tooltip of the parent is inherited. Setting a tooltip for a group and setting no tooltip for a child will show the group's tooltip instead. To avoid this behavior, you can set the child's tooltip to an empty string ("").

**Parameters**

|    |             |                                                         |
|----|-------------|---------------------------------------------------------|
| in | <i>text</i> | New tooltip text (an internal copy is made and managed) |
|----|-------------|---------------------------------------------------------|

**See also**

[tooltip\(const char\\*\)](#), [tooltip\(\)](#)

**31.151.4.33 damage()** [1/3]

```
uchar Fl_Widget::damage () const [inline]
```

Returns non-zero if [draw\(\)](#) needs to be called.

The damage value is actually a bit field that the widget subclass can use to figure out what parts to draw.

**Returns**

a bitmap of flags describing the kind of damage to the widget

**See also**

[damage\(uchar\)](#), [clear\\_damage\(uchar\)](#)



**31.151.4.34 damage()** [2/3]

```
void Fl_Widget::damage (
 uchar c)
```

Sets the damage bits for the widget.  
Setting damage bits will schedule the widget for the next redraw.

**Parameters**

|    |   |                         |
|----|---|-------------------------|
| in | c | bitmask of flags to set |
|----|---|-------------------------|

**See also**

[damage\(\)](#), [clear\\_damage\(uchar\)](#)

**31.151.4.35 damage()** [3/3]

```
void Fl_Widget::damage (
 uchar c,
 int x,
 int y,
 int w,
 int h)
```

Sets the damage bits for an area inside the widget.  
Setting damage bits will schedule the widget for the next redraw.

**Parameters**

|    |         |                         |
|----|---------|-------------------------|
| in | c       | bitmask of flags to set |
| in | x,y,w,h | size of damaged area    |

**See also**

[damage\(\)](#), [clear\\_damage\(uchar\)](#)

**31.151.4.36 deactivate()**

```
void Fl_Widget::deactivate ()
```

Deactivates the widget.

Inactive widgets will be drawn "grayed out", e.g. with less contrast than the active widget. Inactive widgets will not receive any keyboard or mouse button events. Other events (including FL\_ENTER, FL\_MOVE, FL\_LEAVE, FL\_SHORTCUT, and others) will still be sent. A widget is only active if [active\(\)](#) is true on it *and all of its parents*.

Changing this value will send FL\_DEACTIVATE to the widget if [active\\_r\(\)](#) is true.

Currently you cannot deactivate [Fl\\_Window](#) widgets.

**See also**

[activate\(\)](#), [active\(\)](#), [active\\_r\(\)](#)

**31.151.4.37 default\_callback()**

```
void Fl_Widget::default_callback (
 Fl_Widget * cb,
 void * d) [static]
```

The default callback for all widgets that don't set a callback.

This callback function puts a pointer to the widget on the queue returned by [Fl::readqueue\(\)](#).

Relying on the default callback and reading the callback queue with [Fl::readqueue\(\)](#) is not recommended. If you need a callback, you should set one with [Fl\\_Widget::callback\(Fl\\_Callback \\*cb, void \\*data\)](#) or one of its variants.

#### Parameters

|    |           |                                         |
|----|-----------|-----------------------------------------|
| in | <i>cb</i> | the widget given to the callback        |
| in | <i>d</i>  | user data associated with that callback |

#### See also

[callback\(\)](#), [do\\_callback\(\)](#), [Fl::readqueue\(\)](#)

#### 31.151.4.38 deimage() [1/3]

```
Fl_Image* Fl_Widget::deimage () [inline]
```

Gets the image that is used as part of the widget label.

This image is used when drawing the widget in the inactive state.

#### Returns

the current image for the deactivated widget

#### 31.151.4.39 deimage() [2/3]

```
void Fl_Widget::deimage (
 Fl_Image & img) [inline]
```

Sets the image to use as part of the widget label.

This image is used when drawing the widget in the inactive state.

#### Parameters

|    |            |                                          |
|----|------------|------------------------------------------|
| in | <i>img</i> | the new image for the deactivated widget |
|----|------------|------------------------------------------|

#### 31.151.4.40 deimage() [3/3]

```
void Fl_Widget::deimage (
 Fl_Image * img) [inline]
```

Sets the image to use as part of the widget label.

This image is used when drawing the widget in the inactive state.

#### Parameters

|    |            |                                          |
|----|------------|------------------------------------------|
| in | <i>img</i> | the new image for the deactivated widget |
|----|------------|------------------------------------------|

**31.151.4.41 do\_callback()** [1/3]

```
void Fl_Widget::do_callback () [inline]
```

Calls the widget callback.

Causes a widget to invoke its callback function with default arguments.

See also

[callback\(\)](#)

**31.151.4.42 do\_callback()** [2/3]

```
void Fl_Widget::do_callback (
 Fl_Widget * o,
 long arg) [inline]
```

Calls the widget callback.

Causes a widget to invoke its callback function with arbitrary arguments.

Parameters

|    |            |                                                             |
|----|------------|-------------------------------------------------------------|
| in | <i>o</i>   | call the callback with <i>o</i> as the widget argument      |
| in | <i>arg</i> | call the callback with <i>arg</i> as the user data argument |

See also

[callback\(\)](#)

**31.151.4.43 do\_callback()** [3/3]

```
void Fl_Widget::do_callback (
 Fl_Widget * o,
 void * arg = 0)
```

Calls the widget callback.

Causes a widget to invoke its callback function with arbitrary arguments.

Parameters

|    |            |                                                        |
|----|------------|--------------------------------------------------------|
| in | <i>o</i>   | call the callback with <i>o</i> as the widget argument |
| in | <i>arg</i> | use <i>arg</i> as the user data argument               |

See also

[callback\(\)](#)

**31.151.4.44 draw()**

```
virtual void Fl_Widget::draw () [pure virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own [draw\(\)](#) method*, e.g. for an embedded scrollbar, you can do it (because [draw\(\)](#) is virtual) like this:

```
Fl_Widget *s = &scroll; // scroll is an embedded Fl_Scrollbar
```

```
s->draw(); // calls Fl_Scrollbar::draw()
```

Implemented in [Fl\\_Table](#), [Fl\\_Glut\\_Window](#), [Fl\\_FormsText](#), [Fl\\_Window](#), [Fl\\_Value\\_Slider](#), [Fl\\_Value\\_Output](#), [Fl\\_Value\\_Input](#), [Fl\\_Tree](#), [Fl\\_Timer](#), [Fl\\_Text\\_Display](#), [Fl\\_Tabs](#), [Fl\\_Sys\\_Menu\\_Bar](#), [Fl\\_Slider](#), [Fl\\_Scrollbar](#), [Fl\\_Scroll](#), [Fl\\_Roller](#), [Fl\\_Return\\_Button](#), [Fl\\_Progress](#), [Fl\\_Positioner](#), [Fl\\_Pack](#), [Fl\\_Menu\\_Button](#), [Fl\\_Menu\\_Bar](#), [Fl\\_Light\\_Button](#), [Fl\\_Input](#), [Fl\\_Help\\_View](#), [Fl\\_Group](#), [Fl\\_Gl\\_Window](#), [Fl\\_Free](#), [Fl\\_FormsPixmap](#), [Fl\\_FormsBitmap](#), [Fl\\_File\\_Input](#), [Fl\\_Dial](#), [Fl\\_Counter](#), [Fl\\_Clock\\_Output](#), [Fl\\_Choice](#), [Fl\\_Chart](#), [Fl\\_Cairo\\_Window](#), [Fl\\_Button](#), [Fl\\_Browser\\_](#), [Fl\\_Box](#), and [Fl\\_Adjuster](#).

#### 31.151.4.45 [draw\\_label\(\)](#) [1/3]

```
void Fl_Widget::draw_label () const [protected]
```

Draws the widget's label at the defined label position.

This is the normal call for a widget's [draw\(\)](#) method.

#### 31.151.4.46 [draw\\_label\(\)](#) [2/3]

```
void Fl_Widget::draw_label (
 int X,
 int Y,
 int W,
 int H) const [protected]
```

Draws the label in an arbitrary bounding box.

[draw\(\)](#) can use this instead of [draw\\_label\(void\)](#) to change the bounding box

#### 31.151.4.47 [draw\\_label\(\)](#) [3/3]

```
void Fl_Widget::draw_label (
 int X,
 int Y,
 int W,
 int H,
 Fl_Align a) const
```

Draws the label in an arbitrary bounding box with an arbitrary alignment.

Anybody can call this to force the label to draw anywhere.

#### 31.151.4.48 [h\(\)](#) [1/2]

```
int Fl_Widget::h () const [inline]
```

Gets the widget height.

##### Returns

the height of the widget in pixels.

#### 31.151.4.49 [h\(\)](#) [2/2]

```
void Fl_Widget::h (
 int v) [inline], [protected]
```

Internal use only.

Use [position\(int,int\)](#), [size\(int,int\)](#) or [resize\(int,int,int,int\)](#) instead.

#### 31.151.4.50 [handle\(\)](#)

```
int Fl_Widget::handle (
 int event) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise. Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee retval.

#### Parameters

|    |              |                            |
|----|--------------|----------------------------|
| in | <i>event</i> | the kind of event received |
|----|--------------|----------------------------|

#### Return values

|   |                                          |
|---|------------------------------------------|
| 0 | if the event was not used or understood  |
| 1 | if the event was used and can be deleted |

#### See also

[Fl\\_Event](#)

Reimplemented in [Fl\\_Glut\\_Window](#), [Fl\\_Window](#), [Fl\\_Value\\_Slider](#), [Fl\\_Value\\_Output](#), [Fl\\_Value\\_Input](#), [Fl\\_Timer](#), [Fl\\_Tabs](#), [Fl\\_Slider](#), [Fl\\_Secret\\_Input](#), [Fl\\_Scrollbar](#), [Fl\\_Scroll](#), [Fl\\_Roller](#), [Fl\\_Return\\_Button](#), [Fl\\_Repeat\\_Button](#), [Fl\\_Positioner](#), [Fl\\_Menu\\_Button](#), [Fl\\_Menu\\_Bar](#), [Fl\\_Light\\_Button](#), [Fl\\_Input](#), [Fl\\_Help\\_View](#), [Fl\\_Group](#), [Fl\\_Gl\\_Window](#), [Fl\\_Dial](#), [Fl\\_Counter](#), [Fl\\_Clock](#), [Fl\\_Choice](#), [Fl\\_Check\\_Browser](#), [Fl\\_Button](#), [Fl\\_Box](#), [Fl\\_Adjuster](#), [Fl\\_Tile](#), [Fl\\_Table\\_Row](#), [Fl\\_Spinner](#), [Fl\\_File\\_Input](#), [Fl\\_Browser\\_](#), [Fl\\_Tree](#), [Fl\\_Text\\_Editor](#), [Fl\\_Text\\_Display](#), [Fl\\_Table](#), and [Fl\\_Free](#).

#### 31.151.4.51 hide()

```
void Fl_Widget::hide () [virtual]
Makes a widget invisible.
```

#### See also

[show\(\)](#), [visible\(\)](#), [visible\\_r\(\)](#)

Reimplemented in [Fl\\_Window](#), [Fl\\_Overlay\\_Window](#), [Fl\\_Menu\\_Window](#), [Fl\\_Gl\\_Window](#), [Fl\\_Double\\_Window](#), and [Fl\\_Browser](#).

#### 31.151.4.52 image() [1/3]

```
Fl_Image* Fl_Widget::image () [inline]
Gets the image that is used as part of the widget label.
This image is used when drawing the widget in the active state.
```

#### Returns

the current image

#### 31.151.4.53 image() [2/3]

```
void Fl_Widget::image (
 Fl_Image & img) [inline]
Sets the image to use as part of the widget label.
This image is used when drawing the widget in the active state.
```

#### Parameters

|    |            |                             |
|----|------------|-----------------------------|
| in | <i>img</i> | the new image for the label |
|----|------------|-----------------------------|

**31.151.4.54 image()** [3/3]

```
void Fl_Widget::image (
 Fl_Image * img) [inline]
```

Sets the image to use as part of the widget label.  
This image is used when drawing the widget in the active state.

**Parameters**

|    |            |                             |
|----|------------|-----------------------------|
| in | <i>img</i> | the new image for the label |
|----|------------|-----------------------------|

**31.151.4.55 inside()**

```
int Fl_Widget::inside (
 const Fl_Widget * wgt) const [inline]
```

Checks if this widget is a child of *wgt*.  
Returns 1 if this widget is a child of *wgt*, or is equal to *wgt*. Returns 0 if *wgt* is NULL.

**Parameters**

|    |            |                             |
|----|------------|-----------------------------|
| in | <i>wgt</i> | the possible parent widget. |
|----|------------|-----------------------------|

**See also**

[contains\(\)](#)

**31.151.4.56 is\_label\_copied()**

```
int Fl_Widget::is_label_copied () const [inline]
```

Returns whether the current label was assigned with [copy\\_label\(\)](#).  
This can be useful for temporarily overwriting the widget's label and restoring it later.

**Return values**

|   |                                                                |
|---|----------------------------------------------------------------|
| 0 | current label was assigned with <a href="#">label()</a> .      |
| 1 | current label was assigned with <a href="#">copy_label()</a> . |

**31.151.4.57 label()** [1/3]

```
const char* Fl_Widget::label () const [inline]
```

Gets the current label text.

**Returns**

a pointer to the current label text

**See also**

[label\(const char \\*\)](#), [copy\\_label\(const char \\*\)](#)

**31.151.4.58 label()** [2/3]

```
void Fl_Widget::label (
 const char * text)
```

Sets the current label pointer.

The label is shown somewhere on or next to the widget. The passed pointer is stored unchanged in the widget (the string is *not* copied), so if you need to set the label to a formatted value, make sure the buffer is static, global, or allocated. The [copy\\_label\(\)](#) method can be used to make a copy of the label string automatically.

**Parameters**

|    |             |                           |
|----|-------------|---------------------------|
| in | <i>text</i> | pointer to new label text |
|----|-------------|---------------------------|

**See also**

[copy\\_label\(\)](#)

**31.151.4.59 label()** [3/3]

```
void Fl_Widget::label (
 Fl_Labeltype a,
 const char * b) [inline]
```

Shortcut to set the label text and type in one call.

**See also**

[label\(const char \\*\)](#), [labeltype\(Fl\\_Labeltype\)](#)

**31.151.4.60 label\_shortcut()**

```
unsigned int Fl_Widget::label_shortcut (
 const char * t) [static]
```

Returns the Unicode value of the '&x' shortcut in a given text.

The given text *t* (usually a widget's label or a menu text) is searched for a '&x' shortcut label, and if found, the Unicode value (code point) of the '&x' shortcut is returned.

**Parameters**

|          |                                            |
|----------|--------------------------------------------|
| <i>t</i> | text or label to search for '&x' shortcut. |
|----------|--------------------------------------------|

**Returns**

Unicode (UCS-4) value of shortcut in *t* or 0.

**Note**

Internal use only.

**31.151.4.61 labelcolor()** [1/2]

```
Fl_Color Fl_Widget::labelcolor () const [inline]
```

Gets the label color.

The default color is FL\_FOREGROUND\_COLOR.

**Returns**

the current label color

**31.151.4.62 labelcolor()** [2/2]

```
void Fl_Widget::labelcolor (
 Fl_Color c) [inline]
```

Sets the label color.

The default color is FL\_FOREGROUND\_COLOR.

**Parameters**

|    |          |                     |
|----|----------|---------------------|
| in | <i>c</i> | the new label color |
|----|----------|---------------------|

**31.151.4.63 labelfont()** [1/2]

```
Fl_Font Fl_Widget::labelfont () const [inline]
```

Gets the font to use.

Fonts are identified by indexes into a table. The default value uses a Helvetica typeface (Arial for Microsoft® Windows®). The function [Fl::set\\_font\(\)](#) can define new typefaces.

**Returns**

current font used by the label

**See also**

[Fl\\_Font](#)

**31.151.4.64 labelfont()** [2/2]

```
void Fl_Widget::labelfont (
 Fl_Font f) [inline]
```

Sets the font to use.

Fonts are identified by indexes into a table. The default value uses a Helvetica typeface (Arial for Microsoft® Windows®). The function [Fl::set\\_font\(\)](#) can define new typefaces.

**Parameters**

|    |          |                            |
|----|----------|----------------------------|
| in | <i>f</i> | the new font for the label |
|----|----------|----------------------------|

**See also**

[Fl\\_Font](#)

**31.151.4.65 labelsize()** [1/2]

```
Fl_Fontsize Fl_Widget::labelsize () const [inline]
```

Gets the font size in pixels.

The default size is 14 pixels.



**Returns**

the current font size

**31.151.4.66 labelsizе()** [2/2]

```
void Fl_Widget::labelsizе (
 Fl_Fontsize pix) [inline]
```

Sets the font size in pixels.

**Parameters**

|    |            |                   |
|----|------------|-------------------|
| in | <i>pix</i> | the new font size |
|----|------------|-------------------|

**See also**

[Fl\\_Fontsize labelsizе\(\)](#)

**31.151.4.67 labeltypе()** [1/2]

```
Fl_Labeltype Fl_Widget::labeltypе () const [inline]
```

Gets the label type.

**Returns**

the current label type.

**See also**

[Fl\\_Labeltype](#)

**31.151.4.68 labeltypе()** [2/2]

```
void Fl_Widget::labeltypе (
 Fl_Labeltype a) [inline]
```

Sets the label type.

The label type identifies the function that draws the label of the widget. This is generally used for special effects such as embossing or for using the [label\(\)](#) pointer as another form of data such as an icon. The value `FL_NORMAL_LABEL` prints the label as plain text.

**Parameters**

|    |          |                |
|----|----------|----------------|
| in | <i>a</i> | new label type |
|----|----------|----------------|

**See also**

[Fl\\_Labeltype](#)

**31.151.4.69 measure\_label()**

```
void Fl_Widget::measure_label (
 int & ww,
 int & hh) const [inline]
```

Sets width `ww` and height `hh` accordingly with the label size.  
 Labels with images will return `w()` and `h()` of the image.  
 This calls `fl_measure()` internally. For more information about the arguments `ww` and `hh` and word wrapping

See also

[fl\\_measure\(const char\\*, int&, int&, int\)](#)

#### 31.151.4.70 output()

```
unsigned int Fl_Widget::output () const [inline]
```

Returns if a widget is used for output only.

`output()` means the same as `!active()` except it does not change how the widget is drawn. The widget will not receive any events. This is useful for making scrollbars or buttons that work as displays rather than input devices.

Return values

|   |                                            |
|---|--------------------------------------------|
| 0 | if the widget is used for input and output |
|---|--------------------------------------------|

See also

[set\\_output\(\)](#), [clear\\_output\(\)](#)

#### 31.151.4.71 parent() [1/2]

```
Fl_Group* Fl_Widget::parent () const [inline]
```

Returns a pointer to the parent widget.

Usually this is a [Fl\\_Group](#) or [Fl\\_Window](#).

Return values

|      |                             |
|------|-----------------------------|
| NULL | if the widget has no parent |
|------|-----------------------------|

See also

[Fl\\_Group::add\(Fl\\_Widget\\*\)](#)

#### 31.151.4.72 parent() [2/2]

```
void Fl_Widget::parent (
 Fl_Group * p) [inline]
```

Internal use only - "for hacks only".

It is **STRONGLY recommended** not to use this method, because it short-circuits [Fl\\_Group](#)'s normal widget adding and removing methods, if the widget is already a child widget of another [Fl\\_Group](#).

Use [Fl\\_Group::add\(Fl\\_Widget\\*\)](#) and/or [Fl\\_Group::remove\(Fl\\_Widget\\*\)](#) instead.

#### 31.151.4.73 position()

```
void Fl_Widget::position (
 int X,
 int Y) [inline]
```

Repositions the window or widget.

`position(X, Y)` is a shortcut for `resize(X, Y, w(), h())`.

## Parameters

|    |     |                                            |
|----|-----|--------------------------------------------|
| in | X,Y | new position relative to the parent window |
|----|-----|--------------------------------------------|

## See also

[resize\(int,int,int,int\)](#), [size\(int,int\)](#)

**31.151.4.74 redraw()**

```
void Fl_Widget::redraw ()
```

Schedules the drawing of the widget.

Marks the widget as needing its [draw\(\)](#) routine called.

**31.151.4.75 redraw\_label()**

```
void Fl_Widget::redraw_label ()
```

Schedules the drawing of the label.

Marks the widget or the parent as needing a redraw for the label area of a widget.

**31.151.4.76 resize()**

```
void Fl_Widget::resize (
 int x,
 int y,
 int w,
 int h) [virtual]
```

Changes the size or position of the widget.

This is a virtual function so that the widget may implement its own handling of resizing. The default version does *not* call the [redraw\(\)](#) method, but instead relies on the parent widget to do so because the parent may know a faster way to update the display, such as scrolling from the old position.

Some window managers under X11 call [resize\(\)](#) a lot more often than needed. Please verify that the position or size of a widget did actually change before doing any extensive calculations.

position(X, Y) is a shortcut for [resize\(X, Y, w\(\), h\(\)\)](#), and size(W, H) is a shortcut for [resize\(x\(\), y\(\), W, H\)](#).

## Parameters

|    |     |                                            |
|----|-----|--------------------------------------------|
| in | x,y | new position relative to the parent window |
| in | w,h | new size                                   |

## See also

[position\(int,int\)](#), [size\(int,int\)](#)

Reimplemented in [Fl\\_Value\\_Input](#), [Fl\\_Tree](#), [Fl\\_Overlay\\_Window](#), [Fl\\_Input\\_](#), [Fl\\_Help\\_View](#), [Fl\\_Group](#), [Fl\\_Gl\\_Window](#), [Fl\\_Double\\_Window](#), [Fl\\_Window](#), [Fl\\_Tile](#), [Fl\\_Text\\_Display](#), [Fl\\_Table](#), [Fl\\_Spinner](#), [Fl\\_Scroll](#), [Fl\\_Input\\_Choice](#), and [Fl\\_Browser\\_](#).

**31.151.4.77 selection\_color()** [1/2]

```
Fl_Color Fl_Widget::selection_color () const [inline]
```

Gets the selection color.

## Returns

the current selection color

See also

[selection\\_color\(Fl\\_Color\)](#), [color\(Fl\\_Color, Fl\\_Color\)](#)

### 31.151.4.78 selection\_color() [2/2]

```
void Fl_Widget::selection_color (
 Fl_Color a) [inline]
```

Sets the selection color.

The selection color is defined for Forms compatibility and is usually used to color the widget when it is selected, although some widgets use this color for other purposes. You can set both colors at once with [color\(Fl\\_Color bg, Fl\\_Color sel\)](#).

Parameters

|    |   |                         |
|----|---|-------------------------|
| in | a | the new selection color |
|----|---|-------------------------|

See also

[selection\\_color\(\)](#), [color\(Fl\\_Color, Fl\\_Color\)](#)

### 31.151.4.79 set\_active()

```
void Fl_Widget::set_active () [inline]
```

Marks the widget as active without sending events or changing focus.

This is mainly for specialized use, for normal cases you want [activate\(\)](#).

See also

[activate\(\)](#)

### 31.151.4.80 set\_changed()

```
void Fl_Widget::set_changed () [inline]
```

Marks the value of the widget as changed.

See also

[changed\(\)](#), [clear\\_changed\(\)](#)

### 31.151.4.81 set\_output()

```
void Fl_Widget::set_output () [inline]
```

Sets a widget to output only.

See also

[output\(\)](#), [clear\\_output\(\)](#)

### 31.151.4.82 set\_visible()

```
void Fl_Widget::set_visible () [inline]
```

Makes the widget visible.

You must still redraw the parent widget to see a change in the window. Normally you want to use the [show\(\)](#) method instead.

**31.151.4.83 set\_visible\_focus()**

```
void Fl_Widget::set_visible_focus () [inline]
```

Enables keyboard focus navigation with this widget.

Note, however, that this will not necessarily mean that the widget will accept focus, but for widgets that can accept focus, this method enables it if it has been disabled.

See also

[visible\\_focus\(\)](#), [clear\\_visible\\_focus\(\)](#), [visible\\_focus\(int\)](#)

**31.151.4.84 show()**

```
void Fl_Widget::show () [virtual]
```

Makes a widget visible.

An invisible widget never gets redrawn and does not get keyboard or mouse events, but can receive a few other events like FL\_SHOW.

The [visible\(\)](#) method returns true if the widget is set to be visible. The [visible\\_r\(\)](#) method returns true if the widget and all of its parents are visible. A widget is only visible if [visible\(\)](#) is true on it *and all of its parents*.

Changing it will send FL\_SHOW or FL\_HIDE events to the widget. *Do not change it if the parent is not visible, as this will send false FL\_SHOW or FL\_HIDE events to the widget.* [redraw\(\)](#) is called if necessary on this or the parent.

See also

[hide\(\)](#), [visible\(\)](#), [visible\\_r\(\)](#)

Reimplemented in [Fl\\_Window](#), [Fl\\_Single\\_Window](#), [Fl\\_Overlay\\_Window](#), [Fl\\_Menu\\_Window](#), [Fl\\_Gl\\_Window](#), [Fl\\_Double\\_Window](#), and [Fl\\_Browser](#).

**31.151.4.85 size()**

```
void Fl_Widget::size (
 int W,
 int H) [inline]
```

Changes the size of the widget.

`size(W, H)` is a shortcut for `resize(x(), y(), W, H)`.

Parameters

|    |            |          |
|----|------------|----------|
| in | <i>W,H</i> | new size |
|----|------------|----------|

See also

[position\(int,int\)](#), [resize\(int,int,int,int\)](#)

**31.151.4.86 take\_focus()**

```
int Fl_Widget::take_focus ()
```

Gives the widget the keyboard focus.

Tries to make this widget be the [Fl::focus\(\)](#) widget, by first sending it an FL\_FOCUS event, and if it returns non-zero, setting [Fl::focus\(\)](#) to this widget. You should use this method to assign the focus to a widget.

Returns

true if the widget accepted the focus.

**31.151.4.87 takeevents()**

```
unsigned int Fl_Widget::takeevents () const [inline]
```

Returns if the widget is able to take events.

This is the same as ([active\(\)](#) && ![output\(\)](#) && [visible\(\)](#)) but is faster.

**Return values**

|   |                               |
|---|-------------------------------|
| 0 | if the widget takes no events |
|---|-------------------------------|

**31.151.4.88 test\_shortcut()** [1/2]

```
int Fl_Widget::test_shortcut ()
```

Returns true if the widget's label contains the entered '&x' shortcut.

This method must only be called in [handle\(\)](#) methods or callbacks after a keypress event (usually FL\_KEYDOWN or FL\_SHORTCUT). The widget's label is searched for a '&x' shortcut, and if found, this is compared with the entered key value.

[Fl::event\\_text\(\)](#) is used to get the entered key value.

**Returns**

true, if the entered text matches the widget's '&x' shortcut, false (0) otherwise.

**Note**

Internal use only.

**31.151.4.89 test\_shortcut()** [2/2]

```
int Fl_Widget::test_shortcut (
 const char * t,
 const bool require_alt = false) [static]
```

Returns true if the given text *t* contains the entered '&x' shortcut.

This method must only be called in [handle\(\)](#) methods or callbacks after a keypress event (usually FL\_KEYDOWN or FL\_SHORTCUT). The given text *t* (usually a widget's label or menu text) is searched for a '&x' shortcut, and if found, this is compared with the entered key value.

[Fl::event\\_text\(\)](#) is used to get the entered key value. [Fl::event\\_state\(\)](#) is used to get the Alt modifier, if *require\_alt* is true.

**Parameters**

|                    |                                            |
|--------------------|--------------------------------------------|
| <i>t</i>           | text or label to search for '&x' shortcut. |
| <i>require_alt</i> | if true: match only if Alt key is pressed. |

**Returns**

true, if the entered text matches the '&x' shortcut in *t* false (0) otherwise.

**Note**

Internal use only.

**31.151.4.90 tooltip()** [1/2]

```
const char* Fl_Widget::tooltip () const [inline]
```

Gets the current tooltip text.

**Returns**

a pointer to the tooltip text or NULL

**See also**

[tooltip\(const char\\*\)](#), [copy\\_tooltip\(const char\\*\)](#)

**31.151.4.91 tooltip() [2/2]**

```
void Fl_Widget::tooltip (
 const char * text)
```

Sets the current tooltip text.

Sets a string of text to display in a popup tooltip window when the user hovers the mouse over the widget. The string is *not* copied, so make sure any formatted string is stored in a static, global, or allocated buffer. If you want a copy made and managed for you, use the [copy\\_tooltip\(\)](#) method, which will manage the tooltip string automatically. If no tooltip is set, the tooltip of the parent is inherited. Setting a tooltip for a group and setting no tooltip for a child will show the group's tooltip instead. To avoid this behavior, you can set the child's tooltip to an empty string ("").

**Parameters**

|    |             |                                    |
|----|-------------|------------------------------------|
| in | <i>text</i> | New tooltip text (no copy is made) |
|----|-------------|------------------------------------|

**See also**

[copy\\_tooltip\(const char\\*\)](#), [tooltip\(\)](#)

**31.151.4.92 top\_window()**

```
Fl_Window * Fl_Widget::top_window () const
```

Returns a pointer to the top-level window for the widget.

In other words, the 'window manager window' that contains this widget. This method differs from [window\(\)](#) in that it won't return sub-windows (if there are any).

**Returns**

the top-level window, or NULL if no top-level window is associated with this widget.

**See also**

[window\(\)](#)

**31.151.4.93 top\_window\_offset()**

```
Fl_Window * Fl_Widget::top_window_offset (
 int & xoff,
 int & yoff) const
```

Finds the x/y offset of the current widget relative to the top-level window.

**Parameters**

|     |                  |                        |
|-----|------------------|------------------------|
| out | <i>xoff,yoff</i> | Returns the x/y offset |
|-----|------------------|------------------------|

**Returns**

the top-level window (or NULL for a widget that's not in any window)

**31.151.4.94 type()** [1/2]

```
uchar Fl_Widget::type () const [inline]
```

Gets the widget type.

Returns the widget type value, which is used for Forms compatibility and to simulate RTTI.

**Todo** Explain "simulate RTTI" (currently only used to decide if a widget is a window, i.e. `type() >= FL_WINDOW` ?).  
Is `type()` really used in a way that ensures "Forms compatibility" ?

**31.151.4.95 type()** [2/2]

```
void Fl_Widget::type (
 uchar t) [inline]
```

Sets the widget type.

This is used for Forms compatibility.

**31.151.4.96 user\_data()** [1/2]

```
void* Fl_Widget::user_data () const [inline]
```

Gets the user data for this widget.

Gets the current user data (void \*) argument that is passed to the callback function.

**Returns**

user data as a pointer

**31.151.4.97 user\_data()** [2/2]

```
void Fl_Widget::user_data (
 void * v) [inline]
```

Sets the user data for this widget.

Sets the new user data (void \*) argument that is passed to the callback function.

**Parameters**

|    |   |               |
|----|---|---------------|
| in | v | new user data |
|----|---|---------------|

**31.151.4.98 visible()**

```
unsigned int Fl_Widget::visible () const [inline]
```

Returns whether a widget is visible.

**Return values**

|   |                                                 |
|---|-------------------------------------------------|
| 0 | if the widget is not drawn and hence invisible. |
|---|-------------------------------------------------|



See also

[show\(\)](#), [hide\(\)](#), [visible\\_r\(\)](#)

#### 31.151.4.99 visible\_focus() [1/2]

```
unsigned int Fl_Widget::visible_focus () [inline]
```

Checks whether this widget has a visible focus.

Return values

|   |                                      |
|---|--------------------------------------|
| 0 | if this widget has no visible focus. |
|---|--------------------------------------|

See also

[visible\\_focus\(int\)](#), [set\\_visible\\_focus\(\)](#), [clear\\_visible\\_focus\(\)](#)

#### 31.151.4.100 visible\_focus() [2/2]

```
void Fl_Widget::visible_focus (
 int v) [inline]
```

Modifies keyboard focus navigation.

Parameters

|    |   |                            |
|----|---|----------------------------|
| in | v | set or clear visible focus |
|----|---|----------------------------|

See also

[set\\_visible\\_focus\(\)](#), [clear\\_visible\\_focus\(\)](#), [visible\\_focus\(\)](#)

#### 31.151.4.101 visible\_r()

```
int Fl_Widget::visible_r () const
```

Returns whether a widget and all its parents are visible.

Return values

|   |                                                    |
|---|----------------------------------------------------|
| 0 | if the widget or any of its parents are invisible. |
|---|----------------------------------------------------|

See also

[show\(\)](#), [hide\(\)](#), [visible\(\)](#)

#### 31.151.4.102 w() [1/2]

```
int Fl_Widget::w () const [inline]
```

Gets the widget width.

Returns

the width of the widget in pixels.

**31.151.4.103 w()** [2/2]

```
void Fl_Widget::w (
 int v) [inline], [protected]
```

Internal use only.

Use [position\(int,int\)](#), [size\(int,int\)](#) or [resize\(int,int,int,int\)](#) instead.

**31.151.4.104 when()** [1/2]

```
Fl_When Fl_Widget::when () const [inline]
```

Returns the conditions under which the callback is called.

You can set the flags with [when\(uchar\)](#), the default value is FL\_WHEN\_RELEASE.

**Returns**

set of flags

**See also**

[when\(uchar\)](#)

**31.151.4.105 when()** [2/2]

```
void Fl_Widget::when (
 uchar i) [inline]
```

Sets the flags used to decide when a callback is called.

This controls when callbacks are done. The following values are useful, the default value is FL\_WHEN\_RELEASE:

- 0: The callback is not done, but [changed\(\)](#) is turned on.
- FL\_WHEN\_CHANGED: The callback is done each time the text is changed by the user.
- FL\_WHEN\_RELEASE: The callback will be done when this widget loses the focus, including when the window is unmapped. This is a useful value for text fields in a panel where doing the callback on every change is wasteful. However the callback will also happen if the mouse is moved out of the window, which means it should not do anything visible (like pop up an error message). You might do better setting this to zero, and scanning all the items for [changed\(\)](#) when the OK button on a panel is pressed.
- FL\_WHEN\_ENTER\_KEY: If the user types the Enter key, the entire text is selected, and the callback is done if the text has changed. Normally the Enter key will navigate to the next field (or insert a newline for a [Fl\\_Multiline\\_Input](#)) - this changes the behavior.
- FL\_WHEN\_ENTER\_KEY|FL\_WHEN\_NOT\_CHANGED: The Enter key will do the callback even if the text has not changed. Useful for command fields. [Fl\\_Widget::when\(\)](#) is a set of bitflags used by subclasses of [Fl\\_Widget](#) to decide when to do the callback.

If the value is zero then the callback is never done. Other values are described in the individual widgets. This field is in the base class so that you can scan a panel and [do\\_callback\(\)](#) on all the ones that don't do their own callbacks in response to an "OK" button.

**Parameters**

|    |          |              |
|----|----------|--------------|
| in | <i>i</i> | set of flags |
|----|----------|--------------|

**31.151.4.106 window()**

```
Fl_Window * Fl_Widget::window () const
```

Returns a pointer to the nearest parent window up the widget hierarchy.

This will return sub-windows if there are any, or the parent window if there's no sub-windows. If this widget IS the top-level window, NULL is returned.

#### Return values

|      |                                              |
|------|----------------------------------------------|
| NULL | if no window is associated with this widget. |
|------|----------------------------------------------|

#### Note

for an [Fl\\_Window](#) widget, this returns its *parent* window (if any), not *this* window.

#### See also

[top\\_window\(\)](#)

#### 31.151.4.107 x() [1/2]

```
int Fl_Widget::x () const [inline]
```

Gets the widget position in its window.

#### Returns

the x position relative to the window

#### 31.151.4.108 x() [2/2]

```
void Fl_Widget::x (
 int v) [inline], [protected]
```

Internal use only.

Use [position\(int,int\)](#), [size\(int,int\)](#) or [resize\(int,int,int,int\)](#) instead.

#### 31.151.4.109 y() [1/2]

```
int Fl_Widget::y () const [inline]
```

Gets the widget position in its window.

#### Returns

the y position relative to the window

#### 31.151.4.110 y() [2/2]

```
void Fl_Widget::y (
 int v) [inline], [protected]
```

Internal use only.

Use [position\(int,int\)](#), [size\(int,int\)](#) or [resize\(int,int,int,int\)](#) instead.

The documentation for this class was generated from the following files:

- [Fl\\_Widget.H](#)
- [Fl.cxx](#)
- [fl\\_boxtype.cxx](#)
- [fl\\_labeltype.cxx](#)
- [fl\\_shortcut.cxx](#)
- [Fl\\_Tooltip.cxx](#)
- [Fl\\_Widget.cxx](#)
- [Fl\\_Window.cxx](#)

## 31.152 FL\_Widget\_Tracker Class Reference

This class should be used to control safe widget deletion.

```
#include <Fl.H>
```

### Public Member Functions

- `int deleted ()`  
Returns 1, if the watched widget has been deleted.
- `int exists ()`  
Returns 1, if the watched widget exists (has not been deleted).
- `FL_Widget_Tracker (FL_Widget *wi)`  
The constructor adds a widget to the watch list.
- `FL_Widget * widget ()`  
Returns a pointer to the watched widget.
- `~FL_Widget_Tracker ()`  
The destructor removes a widget from the watch list.

### 31.152.1 Detailed Description

This class should be used to control safe widget deletion.

You can use an `FL_Widget_Tracker` object to watch another widget, if you need to know, if this widget has been deleted during a callback.

This simplifies the use of the "safe widget deletion" methods `Fl::watch_widget_pointer()` and `Fl::release_widget_pointer()` and makes their use more reliable, because the destructor automatically releases the widget pointer from the widget watch list.

It is intended to be used as an automatic (local/stack) variable, such that the automatic destructor is called when the object's scope is left. This ensures that no stale widget pointers are left in the widget watch list (see example below).

You can also create `FL_Widget_Tracker` objects with `new`, but then it is your responsibility to delete the object (and thus remove the widget pointer from the watch list) when it is not needed any more.

Example:

```
int MyClass::handle (int event) {
 if (...) {
 FL_Widget_Tracker wp(this); // watch myself
 do_callback(); // call the callback
 if (wp.deleted()) return 1; // exit, if deleted
 // Now we are sure that the widget has not been deleted.
 // It is safe to access the widget
 clear_changed(); // access the widget
 }
}
```

### 31.152.2 Member Function Documentation

#### 31.152.2.1 deleted()

```
int FL_Widget_Tracker::deleted () [inline]
```

Returns 1, if the watched widget has been deleted.

This is a convenience method. You can also use something like

```
if (wp.widget() == 0) // ...
```

where `wp` is an `FL_Widget_Tracker` object.

#### 31.152.2.2 exists()

```
int FL_Widget_Tracker::exists () [inline]
```

Returns 1, if the watched widget exists (has not been deleted).

This is a convenience method. You can also use something like

```
if (wp.widget() != 0) // ...
```

where `wp` is an [Fl\\_Widget\\_Tracker](#) object.

### 31.152.2.3 widget()

```
Fl_Widget* Fl_Widget_Tracker::widget () [inline]
```

Returns a pointer to the watched widget.

This pointer is `NULL`, if the widget has been deleted.

The documentation for this class was generated from the following files:

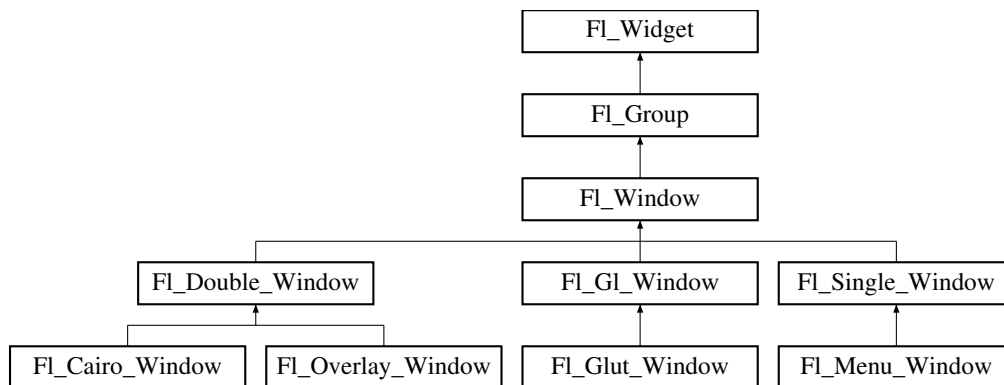
- [Fl.H](#)
- [Fl.cxx](#)

## 31.153 Fl\_Window Class Reference

This widget produces an actual window.

```
#include <Fl_Window.H>
```

Inheritance diagram for `Fl_Window`:



### Classes

- struct [shape\\_data\\_type](#)  
*Data supporting a non-rectangular window shape.*

### Public Member Functions

- virtual [Fl\\_Window](#) \* [as\\_window](#) ()  
*Returns an [Fl\\_Window](#) pointer if this widget is an [Fl\\_Window](#).*
- unsigned int [border](#) () const  
*See void [Fl\\_Window::border\(int\)](#)*
- void [border](#) (int b)  
*Sets whether or not the window manager border is around the window.*
- void [clear\\_border](#) ()  
*Fast inline function to turn the window manager border off.*
- void [clear\\_modal\\_states](#) ()  
*Clears the "modal" flags and converts a "modal" or "non-modal" window back into a "normal" window.*
- void [copy\\_label](#) (const char \*a)  
*Sets the window titlebar label to a copy of a character string.*
- void [cursor](#) (const [Fl\\_RGB\\_Image](#) \*, int, int)  
*Changes the cursor for this window.*
- void [cursor](#) ([Fl\\_Cursor](#) c, [Fl\\_Color](#), [Fl\\_Color](#)=`FL_WHITE`)  
*For back compatibility only.*

- void `cursor` (`FI_Cursor`)  
*Changes the cursor for this window.*
- int `decorated_h` ()  
*Returns the window height including any window title bar and any frame added by the window manager.*
- int `decorated_w` ()  
*Returns the window width including any frame added by the window manager.*
- void `default_cursor` (`FI_Cursor` c, `FI_Color`, `FI_Color=FL_WHITE`)  
*For back compatibility only.*
- void `default_cursor` (`FI_Cursor`)  
*Sets the default window cursor.*
- `FI_Window` (int w, int h, const char \*title=0)  
*Creates a window from the given size and title.*
- `FI_Window` (int x, int y, int w, int h, const char \*title=0)  
*Creates a window from the given position, size and title.*
- void `free_position` ()  
*Undoes the effect of a previous `resize()` or `show()` so that the next time `show()` is called the window manager is free to position the window.*
- void `fullscreen` ()  
*Makes the window completely fill one or more screens, without any window manager border visible.*
- unsigned int `fullscreen_active` () const  
*Returns non zero if FULLSCREEN flag is set, 0 otherwise.*
- void `fullscreen_off` ()  
*Turns off any side effects of `fullscreen()`*
- void `fullscreen_off` (int X, int Y, int W, int H)  
*Turns off any side effects of `fullscreen()` and does `resize(x,y,w,h)`.*
- void `fullscreen_screens` (int top, int bottom, int left, int right)  
*Sets which screens should be used when this window is in fullscreen mode.*
- virtual int `handle` (int)  
*Handles the specified event.*
- virtual void `hide` ()  
*Removes the window from the screen.*
- void `hotspot` (const `FI_Widget` &p, int offscreen=0)  
*See void `FI_Window::hotspot(int x, int y, int offscreen = 0)`*
- void `hotspot` (const `FI_Widget` \*, int offscreen=0)  
*See void `FI_Window::hotspot(int x, int y, int offscreen = 0)`*
- void `hotspot` (int x, int y, int offscreen=0)  
*Positions the window so that the mouse is pointing at the given position, or at the center of the given widget, which may be the window itself.*
- const void \* `icon` () const  
*Gets the current icon window target dependent data.*
- void `icon` (const `FI_RGB_Image` \*)  
*Sets or resets a single window icon.*
- void `icon` (const void \*ic)  
*Sets the current icon window target dependent data.*
- void `iconize` ()  
*Iconifies the window.*
- const char \* `iconlabel` () const  
*See void `FI_Window::iconlabel(const char*)`*
- void `iconlabel` (const char \*)  
*Sets the icon label.*

- void `icons` (const `Fl_RGB_Image` \*[], int)
  - Sets the window icons.*
- const char \* `label` () const
  - See void `Fl_Window::label(const char*)`*
- void `label` (const char \*)
  - Sets the window title bar label.*
- void `label` (const char \*label, const char \*iconlabel)
  - Sets the icon label.*
- void `make_current` ()
  - Sets things up so that the drawing functions in `<FL/fl_draw.H>` will go into this window.*
- unsigned int `menu_window` () const
  - Returns true if this window is a menu window.*
- unsigned int `modal` () const
  - Returns true if this window is modal.*
- unsigned int `non_modal` () const
  - Returns true if this window is modal or non-modal.*
- unsigned int `override` () const
  - Returns non zero if `FL_OVERRIDE` flag is set, 0 otherwise.*
- virtual void `resize` (int X, int Y, int W, int H)
  - Changes the size and position of the window.*
- void `set_menu_window` ()
  - Marks the window as a menu window.*
- void `set_modal` ()
  - A "modal" window, when `shown()`, will prevent any events from being delivered to other windows in the same program, and will also remain on top of the other windows (if the X window manager supports the "transient for" property).*
- void `set_non_modal` ()
  - A "non-modal" window (terminology borrowed from Microsoft Windows) acts like a `modal()` one in that it remains on top, but it has no effect on event delivery.*
- void `set_override` ()
  - Activates the flags `NOBORDER|FL_OVERRIDE`.*
- void `set_tooltip_window` ()
  - Marks the window as a tooltip window.*
- void `shape` (const `Fl_Image` &b)
  - Set the window's shape with an `Fl_Image`.*
- void `shape` (const `Fl_Image` \*img)
  - Assigns a non-rectangular shape to the window.*
- virtual void `show` ()
  - Puts the window on the screen.*
- void `show` (int argc, char \*\*argv)
  - Puts the window on the screen and parses command-line arguments.*
- int `shown` ()
  - Returns non-zero if `show()` has been called (but not `hide()`).*
- void `size_range` (int minw, int minh, int maxw=0, int maxh=0, int dw=0, int dh=0, int aspect=0)
  - Sets the allowable range the user can resize this window to.*
- unsigned int `tooltip_window` () const
  - Returns true if this window is a tooltip window.*
- void `wait_for_expose` ()
  - Waits for the window to be displayed after calling `show()`.*
- int `x_root` () const
  - Gets the x position of the window on the screen.*

- const char \* [xclass](#) () const  
*Returns the xclass for this window, or a default.*
- void [xclass](#) (const char \*c)  
*Sets the xclass for this window.*
- int [y\\_root](#) () const  
*Gets the y position of the window on the screen.*
- virtual [~FI\\_Window](#) ()  
*The destructor also deletes all the children.*

## Static Public Member Functions

- static [FI\\_Window](#) \* [current](#) ()  
*Returns the last window that was made current.*
- static void [default\\_callback](#) ([FI\\_Window](#) \*, void \*v)  
*Back compatibility: Sets the default callback v for win to call on close event.*
- static void [default\\_icon](#) (const [FI\\_RGB\\_Image](#) \*)  
*Sets a single default window icon.*
- static void [default\\_icons](#) (const [FI\\_RGB\\_Image](#) \*[], int)  
*Sets the default window icons.*
- static const char \* [default\\_xclass](#) ()  
*Returns the default xclass.*
- static void [default\\_xclass](#) (const char \*)  
*Sets the default window xclass.*

## Protected Member Functions

- virtual void [draw](#) ()  
*Draws the widget.*
- virtual void [flush](#) ()  
*Forces the window to be drawn, this window is also made current and calls [draw\(\)](#).*
- int [force\\_position](#) () const  
*Returns the internal state of the window's FORCE\_POSITION flag.*
- void [force\\_position](#) (int force)  
*Sets an internal flag that tells FLTK and the window manager to honor position requests.*
- void [free\\_icons](#) ()  
*Deletes all icons previously attached to the window.*

## Protected Attributes

- [shape\\_data\\_type](#) \* [shape\\_data\\_](#)  
*non-null means the window has a non-rectangular shape*

## Static Protected Attributes

- static [FI\\_Window](#) \* [current\\_](#)  
*Stores the last window that was made current.*

## Friends

- class [FI\\_X](#)



## Additional Inherited Members

### 31.153.1 Detailed Description

This widget produces an actual window.

This can either be a main window, with a border and title and all the window management controls, or a "subwindow" inside a window. This is controlled by whether or not the window has a [parent\(\)](#).

Once you create a window, you usually add children [Fl\\_Widget](#)'s to it by using `window->add(child)` for each new widget. See [Fl\\_Group](#) for more information on how to add and remove children.

There are several subclasses of [Fl\\_Window](#) that provide double-buffering, overlay, menu, and OpenGL support.

The window's callback is done if the user tries to close a window using the window manager and [Fl::modal\(\)](#) is zero or equal to the window. [Fl\\_Window](#) has a default callback that calls [Fl\\_Window::hide\(\)](#).

### 31.153.2 Constructor & Destructor Documentation

#### 31.153.2.1 Fl\_Window() [1/2]

```
Fl_Window::Fl_Window (
 int w,
 int h,
 const char * title = 0)
```

Creates a window from the given size and title.

If [Fl\\_Group::current\(\)](#) is not NULL, the window is created as a subwindow of the parent window.

The (w,h) form of the constructor creates a top-level window and asks the window manager to position the window.

The (x,y,w,h) form of the constructor either creates a subwindow or a top-level window at the specified location (x,y), subject to window manager configuration. If you do not specify the position of the window, the window manager will pick a place to show the window or allow the user to pick a location. Use [position\(x,y\)](#) or [hotspot\(\)](#) before calling [show\(\)](#) to request a position on the screen. See [Fl\\_Window::resize\(\)](#) for some more details on positioning windows. Top-level windows initially have [visible\(\)](#) set to 0 and [parent\(\)](#) set to NULL. Subwindows initially have [visible\(\)](#) set to 1 and [parent\(\)](#) set to the parent window pointer.

[Fl\\_Widget::box\(\)](#) defaults to FL\_FLAT\_BOX. If you plan to completely fill the window with children widgets you should change this to FL\_NO\_BOX. If you turn the window border off you may want to change this to FL\_UP\_BOX.

See also

[Fl\\_Window\(int x, int y, int w, int h, const char\\* title\)](#)

#### 31.153.2.2 Fl\_Window() [2/2]

```
Fl_Window::Fl_Window (
 int x,
 int y,
 int w,
 int h,
 const char * title = 0)
```

Creates a window from the given position, size and title.

See also

[Fl\\_Window\(int w, int h, const char \\*title\)](#)

#### 31.153.2.3 ~Fl\_Window()

```
Fl_Window::~Fl_Window () [virtual]
```

The destructor *also deletes all the children*.

This allows a whole tree to be deleted at once, without having to keep a pointer to all the children in the user code. A kludge has been done so the `Fl_Window` and all of its children can be automatic (local) variables, but you must declare the `Fl_Window` *first* so that it is destroyed last.

### 31.153.3 Member Function Documentation

#### 31.153.3.1 `as_window()`

```
virtual Fl_Window* Fl_Window::as_window () [inline], [virtual]
```

Returns an `Fl_Window` pointer if this widget is an `Fl_Window`.

Use this method if you have a widget (pointer) and need to know whether this widget is derived from `Fl_Window`. If it returns non-NULL, then the widget in question is derived from `Fl_Window`, and you can use the returned pointer to access its children or other `Fl_Window`-specific methods.

#### Return values

|      |                                                             |
|------|-------------------------------------------------------------|
| NULL | if this widget is not derived from <code>Fl_Window</code> . |
|------|-------------------------------------------------------------|

#### Note

This method is provided to avoid `dynamic_cast`.

#### See also

[Fl\\_Widget::as\\_group\(\)](#), [Fl\\_Widget::as\\_gl\\_window\(\)](#)

Reimplemented from [Fl\\_Widget](#).

#### 31.153.3.2 `border()`

```
void Fl_Window::border (
 int b)
```

Sets whether or not the window manager border is around the window.

The default value is true. `void border(int)` can be used to turn the border on and off. *Under most X window managers this does not work after `show()` has been called, although SGI's 4DWM does work.*

#### 31.153.3.3 `clear_border()`

```
void Fl_Window::clear_border () [inline]
```

Fast inline function to turn the window manager border off.

It only works before `show()` is called.

#### 31.153.3.4 `clear_modal_states()`

```
void Fl_Window::clear_modal_states () [inline]
```

Clears the "modal" flags and converts a "modal" or "non-modal" window back into a "normal" window.

Note that there are *three* states for a window: modal, non-modal, and normal.

You can not change the "modality" of a window whilst it is shown, so it is necessary to first `hide()` the window, change its "modality" as required, then re-show the window for the new state to take effect.

This method can also be used to change a "modal" window into a "non-modal" one. On several supported platforms, the "modal" state over-rides the "non-modal" state, so the "modal" state must be cleared before the window can be set into the "non-modal" state. In general, the following sequence should work:

```
win->hide();
win->clear_modal_states();
//Set win to new state as desired, or leave "normal", e.g...
win->set_non_modal();
win->show();
```

**Note**

Under some window managers, the sequence of hiding the window and changing its modality will often cause it to be re-displayed at a different position when it is subsequently shown. This is an irritating feature but appears to be unavoidable at present. As a result we would advise to use this method only when absolutely necessary.

**See also**

void [set\\_modal\(\)](#), void [set\\_non\\_modal\(\)](#)

**31.153.3.5 current()**

```
Fl_Window * Fl_Window::current () [static]
```

Returns the last window that was made current.

**See also**

[Fl\\_Window::make\\_current\(\)](#)

**31.153.3.6 cursor() [1/3]**

```
void Fl_Window::cursor (
 const Fl_RGB_Image * image,
 int hotx,
 int hoty)
```

Changes the cursor for this window.

This always calls the system, if you are changing the cursor a lot you may want to keep track of how you set it in a static variable and call this only if the new cursor is different.

The default cursor will be used if the provided image cannot be used as a cursor.

**See also**

[cursor\(Fl\\_Cursor\)](#), [default\\_cursor\(\)](#)

**31.153.3.7 cursor() [2/3]**

```
void Fl_Window::cursor (
 Fl_Cursor c,
 Fl_Color ,
 Fl_Color = FL_WHITE)
```

For back compatibility only.

Same as [Fl\\_Window::cursor\(Fl\\_Cursor\)](#)

**31.153.3.8 cursor() [3/3]**

```
void Fl_Window::cursor (
 Fl_Cursor c)
```

Changes the cursor for this window.

This always calls the system, if you are changing the cursor a lot you may want to keep track of how you set it in a static variable and call this only if the new cursor is different.

The type `Fl_Cursor` is an enumeration defined in [<FL/Enumerations.H>](#).

**See also**

[cursor\(const Fl\\_RGB\\_Image\\*, int, int\)](#), [default\\_cursor\(\)](#)

**31.153.3.9 decorated\_h()**

```
int Fl_Window::decorated_h ()
```

Returns the window height including any window title bar and any frame added by the window manager. Same as [h\(\)](#) if applied to a subwindow.

**31.153.3.10 decorated\_w()**

```
int Fl_Window::decorated_w ()
```

Returns the window width including any frame added by the window manager. Same as [w\(\)](#) if applied to a subwindow.

**31.153.3.11 default\_cursor() [1/2]**

```
void Fl_Window::default_cursor (
 Fl_Cursor c,
 Fl_Color ,
 Fl_Color = FL_WHITE)
```

For back compatibility only.  
same as [Fl\\_Window::default\\_cursor\(Fl\\_Cursor\)](#)

**31.153.3.12 default\_cursor() [2/2]**

```
void Fl_Window::default_cursor (
 Fl_Cursor c)
```

Sets the default window cursor.  
This is the cursor that will be used after the mouse pointer leaves a widget with a custom cursor set.

See also

[cursor\(const Fl\\_RGB\\_Image\\*, int, int\), default\\_cursor\(\)](#)

**31.153.3.13 default\_icon()**

```
void Fl_Window::default_icon (
 const Fl_RGB_Image * icon) [static]
```

Sets a single default window icon.  
If *icon* is NULL the current default icons are removed.

Parameters

|    |             |                                                           |
|----|-------------|-----------------------------------------------------------|
| in | <i>icon</i> | default icon for all windows subsequently created or NULL |
|----|-------------|-----------------------------------------------------------|

See also

[Fl\\_Window::default\\_icons\(const Fl\\_RGB\\_Image \\*\[\], int\)](#)

[Fl\\_Window::icon\(const Fl\\_RGB\\_Image \\*\)](#)

[Fl\\_Window::icons\(const Fl\\_RGB\\_Image \\*\[\], int\)](#)

**31.153.3.14 default\_icons()**

```
void Fl_Window::default_icons (
 const Fl_RGB_Image * icons[],
 int count) [static]
```

Sets the default window icons.

The default icons are used for all windows that don't have their own icons set before `show()` is called. You can change the default icons whenever you want, but this only affects windows that are created (and shown) after this call.

The given images in `icons` are copied. You can use a local variable or free the images immediately after this call.

#### Parameters

|    |              |                                                                                       |
|----|--------------|---------------------------------------------------------------------------------------|
| in | <i>icons</i> | default icons for all windows subsequently created                                    |
| in | <i>count</i> | number of images in <code>icons</code> . Set to 0 to remove the current default icons |

#### See also

[Fl\\_Window::default\\_icon\(const Fl\\_RGB\\_Image \\*\)](#)

[Fl\\_Window::icon\(const Fl\\_RGB\\_Image \\*\)](#)

[Fl\\_Window::icons\(const Fl\\_RGB\\_Image \\*\[\], int\)](#)

#### 31.153.3.15 default\_xclass() [1/2]

```
const char * Fl_Window::default_xclass () [static]
```

Returns the default xclass.

#### See also

[Fl\\_Window::default\\_xclass\(const char \\*\)](#)

#### 31.153.3.16 default\_xclass() [2/2]

```
void Fl_Window::default_xclass (
 const char * xc) [static]
```

Sets the default window xclass.

The default xclass is used for all windows that don't have their own xclass set before `show()` is called. You can change the default xclass whenever you want, but this only affects windows that are created (and shown) after this call.

The given string `xc` is copied. You can use a local variable or free the string immediately after this call.

If you don't call this, the default xclass for all windows will be "FLTK". You can reset the default xclass by specifying NULL for `xc`.

If you call [Fl\\_Window::xclass\(const char \\*\)](#) for any window, then this also sets the default xclass, unless it has been set before.

#### Parameters

|    |           |                                                     |
|----|-----------|-----------------------------------------------------|
| in | <i>xc</i> | default xclass for all windows subsequently created |
|----|-----------|-----------------------------------------------------|

#### See also

[Fl\\_Window::xclass\(const char \\*\)](#)

#### 31.153.3.17 draw()

```
void Fl_Window::draw () [protected], [virtual]
```

Draws the widget.

Never call this function directly. FLTK will schedule redrawing whenever needed. If your widget must be redrawn as soon as possible, call [redraw\(\)](#) instead.

Override this function to draw your own widgets.

If you ever need to call another widget's draw method *from within your own `draw()` method*, e.g. for an embedded scrollbar, you can do it (because `draw()` is virtual) like this:

```
Fl_Widget *s = &scroll; // scroll is an embedded Fl_Scrollbar
s->draw(); // calls Fl_Scrollbar::draw()
```

Reimplemented from [Fl\\_Group](#).

Reimplemented in [Fl\\_Glut\\_Window](#), [Fl\\_Gl\\_Window](#), and [Fl\\_Cairo\\_Window](#).

### 31.153.3.18 `force_position()` [1/2]

```
int Fl_Window::force_position () const [inline], [protected]
```

Returns the internal state of the window's FORCE\_POSITION flag.

Return values

|   |                |
|---|----------------|
| 1 | if flag is set |
| 0 | otherwise      |

See also

[force\\_position\(int\)](#)

### 31.153.3.19 `force_position()` [2/2]

```
void Fl_Window::force_position (
 int force) [inline], [protected]
```

Sets an internal flag that tells FLTK and the window manager to honor position requests.

This is used internally and should not be needed by user code.

Parameters

|    |              |                                                 |
|----|--------------|-------------------------------------------------|
| in | <i>force</i> | 1 to set the FORCE_POSITION flag, 0 to clear it |
|----|--------------|-------------------------------------------------|

### 31.153.3.20 `free_icons()`

```
void Fl_Window::free_icons () [protected]
```

Deletes all icons previously attached to the window.

See also

[Fl\\_Window::icons\(const Fl\\_RGB\\_Image \\*icons\[\], int count\)](#)

### 31.153.3.21 `free_position()`

```
void Fl_Window::free_position () [inline]
```

Undoes the effect of a previous `resize()` or `show()` so that the next time `show()` is called the window manager is free to position the window.

This is for Forms compatibility only.

**Deprecated** please use `force_position(0)` instead

**31.153.3.22 fullscreen()**

```
void Fl_Window::fullscreen ()
```

Makes the window completely fill one or more screens, without any window manager border visible.

You must use [fullscreen\\_off\(\)](#) to undo this.

**Note**

On some platforms, this can result in the keyboard being grabbed. The window may also be recreated, meaning [hide\(\)](#) and [show\(\)](#) will be called.

**See also**

void [Fl\\_Window::fullscreen\\_screens\(\)](#)

**31.153.3.23 fullscreen\_screens()**

```
void Fl_Window::fullscreen_screens (
 int top,
 int bottom,
 int left,
 int right)
```

Sets which screens should be used when this window is in fullscreen mode.

The window will be resized to the top of the screen with index `top`, the bottom of the screen with index `bottom`, etc.

If this method is never called, or if any argument is  $< 0$ , then the window will be resized to fill the screen it is currently on.

**See also**

void [Fl\\_Window::fullscreen\(\)](#)

**31.153.3.24 handle()**

```
int Fl_Window::handle (
 int event) [virtual]
```

Handles the specified event.

You normally don't call this method directly, but instead let FLTK do it when the user interacts with the widget.

When implemented in a widget, this function must return 0 if the widget does not use the event or 1 otherwise.

Most of the time, you want to call the inherited [handle\(\)](#) method in your overridden method so that you don't short-circuit events that you don't handle. In this last case you should return the callee `retval`.

**Parameters**

|                 |                    |                            |
|-----------------|--------------------|----------------------------|
| <code>in</code> | <code>event</code> | the kind of event received |
|-----------------|--------------------|----------------------------|

**Return values**

|                |                                          |
|----------------|------------------------------------------|
| <code>0</code> | if the event was not used or understood  |
| <code>1</code> | if the event was used and can be deleted |

**See also**

[Fl\\_Event](#)

Reimplemented from [Fl\\_Group](#).

Reimplemented in [Fl\\_Glut\\_Window](#), and [Fl\\_Gl\\_Window](#).

### 31.153.3.25 `hide()`

```
void Fl_Window::hide () [virtual]
```

Removes the window from the screen.

If the window is already hidden or has not been shown then this does nothing and is harmless.

Reimplemented from [Fl\\_Widget](#).

Reimplemented in [Fl\\_Overlay\\_Window](#), [Fl\\_Menu\\_Window](#), [Fl\\_Gl\\_Window](#), and [Fl\\_Double\\_Window](#).

### 31.153.3.26 `hotspot()`

```
void Fl_Window::hotspot (
 int x,
 int y,
 int offscreen = 0)
```

Positions the window so that the mouse is pointing at the given position, or at the center of the given widget, which may be the window itself.

If the optional offscreen parameter is non-zero, then the window is allowed to extend off the screen (this does not work with some X window managers).

See also

[position\(\)](#)

### 31.153.3.27 `icon()` [1/3]

```
const void * Fl_Window::icon () const
```

Gets the current icon window target dependent data.

**Deprecated** in 1.3.3

### 31.153.3.28 `icon()` [2/3]

```
void Fl_Window::icon (
 const Fl_RGB_Image * icon)
```

Sets or resets a single window icon.

A window icon *can* be changed while the window is shown, but this *may* be platform and/or window manager dependent. To be sure that the window displays the correct window icon you should always set the icon before the window is shown.

If a window icon has not been set for a particular window, then the default window icon (see links below) or the system default icon will be used.

Parameters

|                 |                   |                                                  |
|-----------------|-------------------|--------------------------------------------------|
| <code>in</code> | <code>icon</code> | icon for this window, NULL to reset window icon. |
|-----------------|-------------------|--------------------------------------------------|

See also

[Fl\\_Window::default\\_icon\(const Fl\\_RGB\\_Image \\*\)](#)

[Fl\\_Window::default\\_icons\(const Fl\\_RGB\\_Image \\*\[\], int\)](#)

[Fl\\_Window::icons\(const Fl\\_RGB\\_Image \\*\[\], int\)](#)



**31.153.3.29 icon()** [3/3]

```
void Fl_Window::icon (
 const void * ic)
```

Sets the current icon window target dependent data.

**Deprecated** in 1.3.3

**31.153.3.30 iconize()**

```
void Fl_Window::iconize ()
```

Iconifies the window.

If you call this when [shown\(\)](#) is false it will [show\(\)](#) it as an icon. If the window is already iconified this does nothing. Call [show\(\)](#) to restore the window.

When a window is iconified/restored (either by these calls or by the user) the [handle\(\)](#) method is called with FL\_HIDE and FL\_SHOW events and [visible\(\)](#) is turned on and off.

There is no way to control what is drawn in the icon except with the string passed to [Fl\\_Window::xclass\(\)](#). You should not rely on window managers displaying the icons.

**31.153.3.31 icons()**

```
void Fl_Window::icons (
 const Fl_RGB_Image * icons[],
 int count)
```

Sets the window icons.

You may set multiple window icons with different sizes. Dependent on the platform and system settings the best (or the first) icon will be chosen.

The given images in `icons` are copied. You can use a local variable or free the images immediately after this call. If `count` is zero, current icons are removed. If `count` is greater than zero (must not be negative), then `icons[]` must contain at least `count` valid image pointers (not NULL). Otherwise the behavior is undefined.

**Parameters**

|    |              |                                                                               |
|----|--------------|-------------------------------------------------------------------------------|
| in | <i>icons</i> | icons for this window                                                         |
| in | <i>count</i> | number of images in <code>icons</code> . Set to 0 to remove the current icons |

**See also**

[Fl\\_Window::default\\_icon\(const Fl\\_RGB\\_Image \\*\)](#)

[Fl\\_Window::default\\_icons\(const Fl\\_RGB\\_Image \\*\[\], int\)](#)

[Fl\\_Window::icon\(const Fl\\_RGB\\_Image \\*\)](#)

**31.153.3.32 make\_current()**

```
void Fl_Window::make_current ()
```

Sets things up so that the drawing functions in [<FL/fl\\_draw.H>](#) will go into this window.

This is useful for incremental update of windows, such as in an idle callback, which will make your program behave much better if it draws a slow graphic. **Danger: incremental update is very hard to debug and maintain!**

This method only works for the [Fl\\_Window](#) and [Fl\\_Gl\\_Window](#) derived classes.

**31.153.3.33 modal()**

```
unsigned int Fl_Window::modal () const [inline]
```

Returns true if this window is modal.

**31.153.3.34** `resize()`

```
virtual void Fl_Window::resize (
 int X,
 int Y,
 int W,
 int H) [virtual]
```

Changes the size and position of the window.

If `shown()` is true, these changes are communicated to the window server (which may refuse that size and cause a further resize). If `shown()` is false, the size and position are used when `show()` is called. See [Fl\\_Group](#) for the effect of resizing on the child widgets.

You can also call the [Fl\\_Widget](#) methods `size(x,y)` and `position(w,h)`, which are inline wrappers for this virtual function.

A top-level window can not force, but merely suggest a position and size to the operating system. The window manager may not be willing or able to display a window at the desired position or with the given dimensions. It is up to the application developer to verify window parameters after the resize request.

Reimplemented from [Fl\\_Group](#).

Reimplemented in [Fl\\_Overlay\\_Window](#), [Fl\\_Gl\\_Window](#), and [Fl\\_Double\\_Window](#).

**31.153.3.35** `set_menu_window()`

```
void Fl_Window::set_menu_window () [inline]
```

Marks the window as a menu window.

This is intended for internal use, but it can also be used if you write your own menu handling. However, this is not recommended.

This flag is used for correct "parenting" of windows in communication with the windowing system. Modern X window managers can use different flags to distinguish menu and tooltip windows from normal windows.

This must be called before the window is shown and cannot be changed later.

**31.153.3.36** `set_modal()`

```
void Fl_Window::set_modal () [inline]
```

A "modal" window, when `shown()`, will prevent any events from being delivered to other windows in the same program, and will also remain on top of the other windows (if the X window manager supports the "transient for" property).

Several modal windows may be shown at once, in which case only the last one shown gets events. You can see which window (if any) is modal by calling [Fl::modal\(\)](#).

**31.153.3.37** `set_non_modal()`

```
void Fl_Window::set_non_modal () [inline]
```

A "non-modal" window (terminology borrowed from Microsoft Windows) acts like a [modal\(\)](#) one in that it remains on top, but it has no effect on event delivery.

There are *three* states for a window: modal, non-modal, and normal.

**31.153.3.38** `set_tooltip_window()`

```
void Fl_Window::set_tooltip_window () [inline]
```

Marks the window as a tooltip window.

This is intended for internal use, but it can also be used if you write your own tooltip handling. However, this is not recommended.

This flag is used for correct "parenting" of windows in communication with the windowing system. Modern X window managers can use different flags to distinguish menu and tooltip windows from normal windows.

This must be called before the window is shown and cannot be changed later.

**Note**

Since [Fl\\_Tooltip\\_Window](#) is derived from [Fl\\_Menu\\_Window](#), this also **clears** the [menu\\_window\(\)](#) state.

**31.153.3.39 shape()** [1/2]

```
void Fl_Window::shape (
 const Fl_Image & b) [inline]
```

Set the window's shape with an [Fl\\_Image](#).

See also

```
void shape(const Fl_Image* img)
```

**31.153.3.40 shape()** [2/2]

```
void Fl_Window::shape (
 const Fl_Image * img)
```

Assigns a non-rectangular shape to the window.

This function gives an arbitrary shape (not just a rectangular region) to an [Fl\\_Window](#). An [Fl\\_Image](#) of any dimension can be used as mask; it is rescaled to the window's dimension as needed.

The layout and widgets inside are unaware of the mask shape, and most will act as though the window's rectangular bounding box is available to them. It is up to you to make sure they adhere to the bounds of their masking shape.

The `img` argument can be an [Fl\\_Bitmap](#), [Fl\\_Pixmap](#), [Fl\\_RGB\\_Image](#) or [Fl\\_Shared\\_Image](#):

- With [Fl\\_Bitmap](#) or [Fl\\_Pixmap](#), the shaped window covers the image part where bitmap bits equal one, or where the pixmap is not fully transparent.
- With an [Fl\\_RGB\\_Image](#) with an alpha channel (depths 2 or 4), the shaped window covers the image part that is not fully transparent.
- With an [Fl\\_RGB\\_Image](#) of depth 1 (gray-scale) or 3 (RGB), the shaped window covers the non-black image part.
- With an [Fl\\_Shared\\_Image](#), the shape is determined by rules above applied to the underlying image. The shared image should not have been scaled through [Fl\\_Shared\\_Image::scale\(\)](#).

Platform details:

- On the unix/linux platform, the SHAPE extension of the X server is required. This function does control the shape of [Fl\\_Gl\\_Window](#) instances.
- On the MSWindows platform, this function does nothing with class [Fl\\_Gl\\_Window](#).
- On the Mac platform, OS version 10.4 or above is required. An 8-bit shape-mask is used when `img` is an [Fl\\_RGB\\_Image](#): with depths 2 or 4, the image alpha channel becomes the shape mask such that areas with alpha = 0 are out of the shaped window; with depths 1 or 3, white and black are in and out of the shaped window, respectively, and other colors give intermediate masking scores. This function does nothing with class [Fl\\_Gl\\_Window](#).

The window borders and caption created by the window system are turned off by default. They can be re-enabled by calling `Fl_Window::border(1)`.

A usage example is found at `example/shapedwindow.cxx`.

Version

1.3.3 (and requires compilation with `FLTK_ABI_VERSION >= 10303`)

**31.153.3.41 show()** [1/2]

```
virtual void Fl_Window::show () [virtual]
```

Puts the window on the screen.

Usually (on X) this has the side effect of opening the display.

If the window is already shown then it is restored and raised to the top. This is really convenient because your program can call `show()` at any time, even if the window is already up. It also means that `show()` serves the purpose of `raise()` in other toolkits.

`Fl_Window::show(int argc, char **argv)` is used for top-level windows and allows standard arguments to be parsed from the command-line.

**Note**

For some obscure reasons `Fl_Window::show()` resets the current group by calling `Fl_Group::current(0)`. The comments in the code say "get rid of very common user bug: forgot end()". Although this is true it may have unwanted side effects if you `show()` an unrelated window (maybe for an error message or warning) while building a window or any other group widget.

**Todo** Check if we can remove resetting the current group in a later FLTK version (after 1.3.x). This may break "already broken" programs though if they rely on this "feature".

**See also**

[Fl\\_Window::show\(int argc, char \\*\\*argv\)](#)

Reimplemented from [Fl\\_Widget](#).

Reimplemented in [Fl\\_Single\\_Window](#), [Fl\\_Overlay\\_Window](#), [Fl\\_Menu\\_Window](#), [Fl\\_Gl\\_Window](#), and [Fl\\_Double\\_Window](#).

**31.153.3.42 show()** [2/2]

```
void Fl_Window::show (
 int argc,
 char ** argv)
```

Puts the window on the screen and parses command-line arguments.

Usually (on X) this has the side effect of opening the display.

This form should be used for top-level windows, at least for the first (main) window. It allows standard arguments to be parsed from the command-line. You can use `argc` and `argv` from `main(int argc, char **argv)` for this call.

The first call also sets up some system-specific internal variables like the system colors.

**Todo** explain which system parameters are set up.

**Parameters**

|             |                                                                |
|-------------|----------------------------------------------------------------|
| <i>argc</i> | command-line argument count, usually from <code>main()</code>  |
| <i>argv</i> | command-line argument vector, usually from <code>main()</code> |

**See also**

virtual void [Fl\\_Window::show\(\)](#)

**31.153.3.43 shown()**

```
int Fl_Window::shown () [inline]
```

Returns non-zero if `show()` has been called (but not `hide()`).

You can tell if a window is iconified with `(w->shown() && !w->visible())`.

**31.153.3.44 size\_range()**

```
void Fl_Window::size_range (
 int minw,
 int minh,
 int maxw = 0,
 int maxh = 0,
 int dw = 0,
 int dh = 0,
 int aspect = 0) [inline]
```

Sets the allowable range the user can resize this window to.

This only works for top-level windows.

- `minw` and `minh` are the smallest the window can be. Either value must be greater than 0.
- `maxw` and `maxh` are the largest the window can be. If either is *equal* to the minimum then you cannot resize in that direction. If either is zero then FLTK picks a maximum size in that direction such that the window will fill the screen.
- `dw` and `dh` are size increments. The window will be constrained to widths of `minw + N * dw`, where `N` is any non-negative integer. If these are less or equal to 1 they are ignored (this is ignored on WIN32).
- `aspect` is a flag that indicates that the window should preserve its aspect ratio. This only works if both the maximum and minimum have the same aspect ratio (ignored on WIN32 and by many X window managers).

If this function is not called, FLTK tries to figure out the range from the setting of `resizable()`:

- If `resizable()` is NULL (this is the default) then the window cannot be resized and the resize border and max-size control will not be displayed for the window.
- If either dimension of `resizable()` is less than 100, then that is considered the minimum size. Otherwise the `resizable()` has a minimum size of 100.
- If either dimension of `resizable()` is zero, then that is also the maximum size (so the window cannot resize in that direction).

It is undefined what happens if the current size does not fit in the constraints passed to `size_range()`.

### 31.153.3.45 wait\_for\_expose()

```
void Fl_Window::wait_for_expose ()
```

Waits for the window to be displayed after calling `show()`.

`Fl_Window::show()` is not guaranteed to show and draw the window on all platforms immediately. Instead this is done in the background; particularly on X11 it will take a few messages (client server roundtrips) to display the window. Usually this small delay doesn't matter, but in some cases you may want to have the window instantiated and displayed synchronously.

Currently (as of FLTK 1.3.4) this method has an effect on X11 and Mac OS. On Windows, `show()` is always synchronous. The effect of `show()` varies with versions of Mac OS X: early versions have the window appear on the screen when `show()` returns, later versions don't. If you want to write portable code and need this synchronous `show()` feature, add `win->wait_for_expose()` on all platforms, and FLTK will just do the right thing.

This method can be used for displaying splash screens before calling `Fl::run()` or for having exact control over which window has the focus after calling `show()`.

If the window is not `shown()`, this method does nothing.

#### Note

Depending on the platform and window manager `wait_for_expose()` may not guarantee that the window is fully drawn when it is called. Under X11 it may only make sure that the window is **mapped**, i.e. the internal (OS dependent) window object was created (and maybe shown on the desktop as an empty frame or something like that). You may need to call `Fl::flush()` after `wait_for_expose()` to make sure the window and all its widgets are drawn and thus visible.

FLTK does the best it can do to make sure that all widgets get drawn if you call `wait_for_expose()` and `Fl::flush()`. However, dependent on the window manager it can not be guaranteed that this does always happen synchronously. The only guaranteed behavior that all widgets are eventually drawn is if the FLTK event loop is run continuously, for instance with `Fl::run()`.

#### See also

virtual void `Fl_Window::show()`

Example code for displaying a window before calling `Fl::run()`

```
Fl_Double_Window win = new Fl_Double_Window(...);
// do more window initialization here ...
win->show(); // show window
win->wait_for_expose(); // wait, until displayed
Fl::flush(); // make sure everything gets drawn
// do more initialization work that needs some time here ...
Fl::run(); // start FLTK event loop
```

Note that the window will not be responsive until the event loop is started with `Fl::run()`.

**31.153.3.46 xclass()** [1/2]

```
const char * Fl_Window::xclass () const
```

Returns the xclass for this window, or a default.

See also

[Fl\\_Window::default\\_xclass\(const char \\*\)](#)

[Fl\\_Window::xclass\(const char \\*\)](#)

**31.153.3.47 xclass()** [2/2]

```
void Fl_Window::xclass (
 const char * xc)
```

Sets the xclass for this window.

A string used to tell the system what type of window this is. Mostly this identifies the picture to draw in the icon. This only works if called *before* calling [show\(\)](#).

*Under X*, this is turned into a XA\_WM\_CLASS pair by truncating at the first non-alphanumeric character and capitalizing the first character, and the second one if the first is 'x'. Thus "foo" turns into "foo, Foo", and "xprog.1" turns into "xprog, XProg".

*Under Microsoft Windows*, this string is used as the name of the WNDCLASS structure, though it is not clear if this can have any visible effect.

Since

FLTK 1.3 the passed string is copied. You can use a local variable or free the string immediately after this call. Note that FLTK 1.1 stores the *pointer* without copying the string.

If the default xclass has not yet been set, this also sets the default xclass for all windows created subsequently.

See also

[Fl\\_Window::default\\_xclass\(const char \\*\)](#)

**31.153.4 Member Data Documentation****31.153.4.1 current\_**

```
Fl_Window* Fl_Window::current_ [static], [protected]
```

Stores the last window that was made current.

See [current\(\)](#) const

The documentation for this class was generated from the following files:

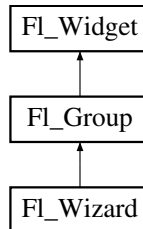
- [Fl\\_Window.H](#)
- [Fl.cxx](#)
- [Fl\\_arg.cxx](#)
- [fl\\_cursor.cxx](#)
- [Fl\\_Window.cxx](#)
- [Fl\\_Window\\_fullscreen.cxx](#)
- [Fl\\_Window\\_hotspot.cxx](#)
- [Fl\\_Window\\_iconize.cxx](#)
- [Fl\\_Window\\_shape.cxx](#)

## 31.154 Fl\_Wizard Class Reference

This widget is based off the [Fl\\_Tabs](#) widget, but instead of displaying tabs it only changes "tabs" under program control.

```
#include <Fl_Wizard.H>
```

Inheritance diagram for Fl\_Wizard:



### Public Member Functions

- [Fl\\_Wizard](#) (int, int, int, int, const char \* = 0)  
*The constructor creates the [Fl\\_Wizard](#) widget at the specified position and size.*
- void [next](#) ()  
*This method shows the next child of the wizard.*
- void [prev](#) ()  
*Shows the previous child.*
- [Fl\\_Widget \\* value](#) ()  
*Gets the current visible child widget.*
- void [value](#) ([Fl\\_Widget \\*](#))  
*Sets the child widget that is visible.*

### Additional Inherited Members

#### 31.154.1 Detailed Description

This widget is based off the [Fl\\_Tabs](#) widget, but instead of displaying tabs it only changes "tabs" under program control.

Its primary purpose is to support "wizards" that step a user through configuration or troubleshooting tasks.

As with [Fl\\_Tabs](#), wizard panes are composed of child (usually [Fl\\_Group](#)) widgets. Navigation buttons must be added separately.

#### 31.154.2 Constructor & Destructor Documentation

##### 31.154.2.1 Fl\_Wizard()

```
Fl_Wizard::Fl_Wizard (
 int xx,
 int yy,
 int ww,
 int hh,
 const char * l = 0)
```

The constructor creates the [Fl\\_Wizard](#) widget at the specified position and size.

The inherited destructor destroys the widget and its children.

#### 31.154.3 Member Function Documentation

### 31.154.3.1 next()

```
void Fl_Wizard::next ()
```

This method shows the next child of the wizard.

If the last child is already visible, this function does nothing.

The documentation for this class was generated from the following files:

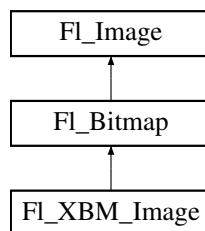
- Fl\_Wizard.H
- Fl\_Wizard.cxx

## 31.155 Fl\_XBM\_Image Class Reference

The [Fl\\_XBM\\_Image](#) class supports loading, caching, and drawing of X Bitmap (XBM) bitmap files.

```
#include <Fl_XBM_Image.H>
```

Inheritance diagram for Fl\_XBM\_Image:



### Public Member Functions

- [Fl\\_XBM\\_Image](#) (const char \*filename)

*The constructor loads the named XBM file from the given name filename.*

### Additional Inherited Members

#### 31.155.1 Detailed Description

The [Fl\\_XBM\\_Image](#) class supports loading, caching, and drawing of X Bitmap (XBM) bitmap files.

#### 31.155.2 Constructor & Destructor Documentation

##### 31.155.2.1 Fl\_XBM\_Image()

```
Fl_XBM_Image::Fl_XBM_Image (
 const char * name)
```

The constructor loads the named XBM file from the given name filename.

The destructor frees all memory and server resources that are used by the image.

The documentation for this class was generated from the following files:

- Fl\_XBM\_Image.H
- Fl\_XBM\_Image.cxx

## 31.156 Fl\_XColor Struct Reference

### Public Attributes

- unsigned char **b**
- unsigned char **g**
- unsigned char **mapped**



- unsigned long **pixel**
- unsigned char **r**

The documentation for this struct was generated from the following file:

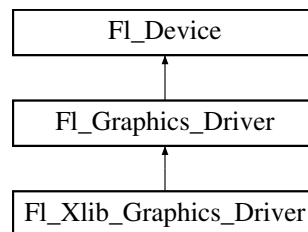
- Fl\_XColor.H

## 31.157 Fl\_Xlib\_Graphics\_Driver Class Reference

The Xlib-specific graphics class.

```
#include <Fl_Device.H>
```

Inheritance diagram for Fl\_Xlib\_Graphics\_Driver:



### Public Member Functions

- const char \* [class\\_name](#) ()  
*Returns the name of the class of this object.*
- void [color](#) (Fl\_Color c)  
*see [fl\\_color\(Fl\\_Color c\)](#).*
- void [color](#) (uchar r, uchar g, uchar b)  
*see [fl\\_color\(uchar r, uchar g, uchar b\)](#).*
- void [copy\\_offscreen](#) (int x, int y, int w, int h, Fl\_Offscreen pixmap, int srcx, int srcy)  
*see [fl\\_copy\\_offscreen\(\)](#)*
- int [descent](#) ()  
*see [fl\\_descent\(\)](#).*
- void [draw](#) (const char \*str, int n, int x, int y)  
*see [fl\\_draw\(const char \\*str, int n, int x, int y\)](#).*
- void [draw](#) (Fl\_Bitmap \*pixmap, int XP, int YP, int WP, int HP, int cx, int cy)  
*Draws an [Fl\\_Bitmap](#) object to the device.*
- void [draw](#) (Fl\_Pixmap \*pixmap, int XP, int YP, int WP, int HP, int cx, int cy)  
*Draws an [Fl\\_Pixmap](#) object to the device.*
- void [draw](#) (Fl\_RGB\_Image \*img, int XP, int YP, int WP, int HP, int cx, int cy)  
*Draws an [Fl\\_RGB\\_Image](#) object to the device.*
- void [draw](#) (int angle, const char \*str, int n, int x, int y)  
*see [fl\\_draw\(int angle, const char \\*str, int n, int x, int y\)](#).*
- void [draw\\_image](#) (const uchar \*buf, int X, int Y, int W, int H, int D=3, int L=0)  
*see [fl\\_draw\\_image\(const uchar\\* buf, int X,int Y,int W,int H, int D, int L\)](#).*
- void [draw\\_image](#) (Fl\_Draw\_Image\_Cb cb, void \*data, int X, int Y, int W, int H, int D=3)  
*see [fl\\_draw\\_image\(Fl\\_Draw\\_Image\\_Cb cb, void\\* data, int X,int Y,int W,int H, int D\)](#).*
- void [draw\\_image\\_mono](#) (const uchar \*buf, int X, int Y, int W, int H, int D=1, int L=0)  
*see [fl\\_draw\\_image\\_mono\(const uchar\\* buf, int X,int Y,int W,int H, int D, int L\)](#).*
- void [draw\\_image\\_mono](#) (Fl\_Draw\_Image\_Cb cb, void \*data, int X, int Y, int W, int H, int D=1)  
*see [fl\\_draw\\_image\\_mono\(Fl\\_Draw\\_Image\\_Cb cb, void\\* data, int X,int Y,int W,int H, int D\)](#).*
- void [font](#) (Fl\_Font face, Fl\_Fontsize size)

- see fl\_font(Fl\_Font face, Fl\_Fontsize size).*
- int `height` ()
  - see fl\_height().*
- void `rtl_draw` (const char \*str, int n, int x, int y)
  - see fl\_rtl\_draw(const char \*str, int n, int x, int y).*
- void `text_extents` (const char \*, int n, int &dx, int &dy, int &w, int &h)
  - see fl\_text\_extents(const char\*, int n, int& dx, int& dy, int& w, int& h).*
- double `width` (const char \*str, int n)
  - see fl\_width(const char \*str, int n).*
- double `width` (unsigned int c)
  - see fl\_width(unsigned int n).*

### Static Public Attributes

- static const char \* `class_id` = "Fl\_Xlib\_Graphics\_Driver"

### Additional Inherited Members

#### 31.157.1 Detailed Description

The Xlib-specific graphics class.

This class is implemented only on the Xlib platform.

#### 31.157.2 Member Function Documentation

##### 31.157.2.1 class\_name()

```
const char* Fl_Xlib_Graphics_Driver::class_name () [inline], [virtual]
```

Returns the name of the class of this object.

Use of the `class_name()` function is discouraged because it will be removed from future FLTK versions.

The class of an instance of an `Fl_Device` subclass can be checked with code such as:

```
if (instance->class_name() == Fl_Printer::class_id) { ... }
```

Reimplemented from `Fl_Graphics_Driver`.

##### 31.157.2.2 draw() [1/3]

```
void Fl_Xlib_Graphics_Driver::draw (
 Fl_Bitmap * bm,
 int XP,
 int YP,
 int WP,
 int HP,
 int cx,
 int cy) [virtual]
```

Draws an `Fl_Bitmap` object to the device.

Specifies a bounding box for the image, with the origin (upper left-hand corner) of the image offset by the `cx` and `cy` arguments.

Reimplemented from `Fl_Graphics_Driver`.

### 31.157.2.3 draw() [2/3]

```
void Fl_Xlib_Graphics_Driver::draw (
 Fl_Pixmap * p $_{$ xm,
 int XP,
 int YP,
 int WP,
 int HP,
 int cx,
 int cy) [virtual]
```

Draws an [Fl\\_Pixmap](#) object to the device.

Specifies a bounding box for the image, with the origin (upper left-hand corner) of the image offset by the cx and cy arguments.

Reimplemented from [Fl\\_Graphics\\_Driver](#).

### 31.157.2.4 draw() [3/3]

```
void Fl_Xlib_Graphics_Driver::draw (
 Fl_RGB_Image * rgb,
 int XP,
 int YP,
 int WP,
 int HP,
 int cx,
 int cy) [virtual]
```

Draws an [Fl\\_RGB\\_Image](#) object to the device.

Specifies a bounding box for the image, with the origin (upper left-hand corner) of the image offset by the cx and cy arguments.

Reimplemented from [Fl\\_Graphics\\_Driver](#).

The documentation for this class was generated from the following files:

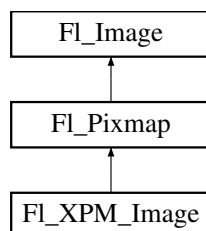
- [Fl\\_Device.H](#)
- [Fl\\_Bitmap.cxx](#)
- [fl\\_color.cxx](#)
- [Fl\\_Device.cxx](#)
- [fl\\_draw\\_image.cxx](#)
- [Fl\\_Image.cxx](#)
- [Fl\\_Pixmap.cxx](#)

## 31.158 FI\_XPM\_Image Class Reference

The [Fl\\_XPM\\_Image](#) class supports loading, caching, and drawing of X Pixmap (XPM) images, including transparency.

```
#include <Fl_XPM_Image.H>
```

Inheritance diagram for [Fl\\_XPM\\_Image](#):



## Public Member Functions

- [Fl\\_XPM\\_Image](#) (const char \*filename)  
*The constructor loads the XPM image from the name filename.*

## Additional Inherited Members

### 31.158.1 Detailed Description

The [Fl\\_XPM\\_Image](#) class supports loading, caching, and drawing of X Pixmap (XPM) images, including transparency.

### 31.158.2 Constructor & Destructor Documentation

#### 31.158.2.1 Fl\_XPM\_Image()

```
Fl_XPM_Image::Fl_XPM_Image (
 const char * name)
```

The constructor loads the XPM image from the name filename.

The destructor frees all memory and server resources that are used by the image.

The documentation for this class was generated from the following files:

- Fl\_XPM\_Image.H
- Fl\_XPM\_Image.cxx

## 31.159 Fl\_Text\_Editor::Key\_Binding Struct Reference

Simple linked list item associating a key/state to a function.

```
#include <Fl_Text_Editor.H>
```

### Public Attributes

- [Key\\_Func](#) function  
*associated function*
- int [key](#)  
*the key pressed*
- [Key\\_Binding](#) \* [next](#)  
*next key binding in the list*
- int [state](#)  
*the state of key modifiers*

#### 31.159.1 Detailed Description

Simple linked list item associating a key/state to a function.

The documentation for this struct was generated from the following file:

- Fl\_Text\_Editor.H

## 31.160 Fl\_Graphics\_Driver::matrix Struct Reference

A 2D coordinate transformation matrix.

```
#include <Fl_Device.H>
```

## Public Attributes

- double **a**
- double **b**
- double **c**
- double **d**
- double **x**
- double **y**

### 31.160.1 Detailed Description

A 2D coordinate transformation matrix.

The documentation for this struct was generated from the following file:

- [Fl\\_Device.H](#)

## 31.161 Fl\_Preferences::Name Class Reference

'Name' provides a simple method to create numerical or more complex procedural names for entries and groups on the fly.

```
#include <Fl_Preferences.H>
```

## Public Member Functions

- [Name](#) (const char \*format,...)  
*Creates a group name or entry name on the fly.*
- [Name](#) (unsigned int n)  
*Creates a group name or entry name on the fly.*
- [operator const char \\* \(\)](#)  
*Return the [Name](#) as a "C" string.*

### 31.161.1 Detailed Description

'Name' provides a simple method to create numerical or more complex procedural names for entries and groups on the fly.

Example: `prefs.set(Fl_Preferences::Name("File%d",i),file[i]);`

See `test/preferences.cxx` as a sample for writing arrays into preferences.

'Name' is actually implemented as a class inside [Fl\\_Preferences](#). It casts into `const char*` and gets automatically destroyed after the enclosing call ends.

### 31.161.2 Constructor & Destructor Documentation

#### 31.161.2.1 Name() [1/2]

```
Fl_Preferences::Name::Name (
 unsigned int n)
```

Creates a group name or entry name on the fly.

This version creates a simple unsigned integer as an entry name.

```
int n, i;
Fl_Preferences prev(appPrefs, "PreviousFiles");
prev.get("n", 0);
for (i=0; i<n; i++)
 prev.get(Fl_Preferences::Name(i), prevFile[i], "");
```

### 31.161.2.2 Name() [2/2]

```
Fl_Preferences::Name::Name (
 const char * format,
 ...)
```

Creates a group name or entry name on the fly.

This version creates entry names as in 'printf'.

```
int n, i;
Fl_Preferences prefs(USER, "matthiasm.com", "test");
prev.get("nFiles", 0);
for (i=0; i<n; i++)
 prev.get(Fl_Preferences::Name("File%d", i), prevFile[i], "");
```

The documentation for this class was generated from the following files:

- Fl\_Preferences.H
- Fl\_Preferences.cxx

## 31.162 Fl\_Preferences::Node Class Reference

### Public Member Functions

- void **add** (const char \*line)
- [Node](#) \* **addChild** (const char \*path)
- const char \* **child** (int ix)
- [Node](#) \* **childNodes** (int ix)
- void **deleteAllChildren** ()
- void **deleteAllEntries** ()
- char **deleteEntry** (const char \*name)
- char **dirty** ()
- [Entry](#) & **entry** (int i)
- [Node](#) \* **find** (const char \*path)
- [RootNode](#) \* **findRoot** ()
- const char \* **get** (const char \*name)
- int **getEntry** (const char \*name)
- const char \* **name** ()
- int **nChildren** ()
- int **nEntry** ()
- [Node](#) (const char \*path)
- [Node](#) \* **parent** ()
- const char \* **path** ()
- char **remove** ()
- [Node](#) \* **search** (const char \*path, int offset=0)
- void **set** (const char \*line)
- void **set** (const char \*name, const char \*value)
- void **setParent** ([Node](#) \*parent)
- void **setRoot** ([RootNode](#) \*r)
- int **write** (FILE \*f)

### Static Public Attributes

- static int **lastEntrySet** = -1

The documentation for this class was generated from the following files:

- Fl\_Preferences.H
- Fl\_Preferences.cxx

## 31.163 FI\_Paged\_Device::page\_format Struct Reference

width, height and name of a page format

```
#include <Fl_Paged_Device.H>
```

### Public Attributes

- int [height](#)  
*height in points*
- const char \* [name](#)  
*format name*
- int [width](#)  
*width in points*

### 31.163.1 Detailed Description

width, height and name of a page format

The documentation for this struct was generated from the following file:

- [FI\\_Paged\\_Device.H](#)

## 31.164 FI\_Preferences::RootNode Class Reference

### Public Member Functions

- char [getPath](#) (char \*[path](#), int pathlen)
- int [read](#) ()
- [RootNode](#) ([FI\\_Preferences](#) \*)
- [RootNode](#) ([FI\\_Preferences](#) \*, const char \*[path](#), const char \*[vendor](#), const char \*[application](#))
- [RootNode](#) ([FI\\_Preferences](#) \*, [Root](#) root, const char \*[vendor](#), const char \*[application](#))
- int [write](#) ()

The documentation for this class was generated from the following files:

- [FI\\_Preferences.H](#)
- [FI\\_Preferences.cxx](#)

## 31.165 FI\_Scroll::ScrollInfo Struct Reference

Structure to manage scrollbar and widget interior sizes.

```
#include <Fl_Scroll.H>
```

### Public Attributes

- [FI\\_Region\\_LRTB](#) [child](#)  
*child bounding box: left/right/top/bottom*
- int [hneeded](#)  
*horizontal scrollbar visibility*
- [FI\\_Scrollbar\\_Data](#) [hscroll](#)  
*horizontal scrollbar region + values*
- [FI\\_Region\\_XYWH](#) [innerbox](#)  
*widget's inner box, excluding scrollbars*
- [FI\\_Region\\_XYWH](#) [innerchild](#)  
*widget's inner box, including scrollbars*
- int [scrollsize](#)

- *the effective scrollbar thickness (local or global)*
- int [vneeded](#)  
*vertical scrollbar visibility*
- [FI\\_Scrollbar\\_Data](#) [vscroll](#)  
*vertical scrollbar region + values*

### 31.165.1 Detailed Description

Structure to manage scrollbar and widget interior sizes.

This is filled out by [recalc\\_scrollbars\(\)](#) for use in calculations that need to know the visible scroll area size, etc.

#### Note

Availability in FLTK\_ABI\_VERSION 10303 or higher.

The documentation for this struct was generated from the following file:

- [FI\\_Scroll.H](#)

## 31.166 FI\_Window::shape\_data\_type Struct Reference

Data supporting a non-rectangular window shape.

```
#include <Fl_Window.H>
```

### Public Attributes

- int [lh\\_](#)  
*height of shape image*
- int [lw\\_](#)  
*width of shape image*
- [FI\\_Image](#) \* [shape\\_](#)  
*shape image*
- [FI\\_Bitmap](#) \* [todelete\\_](#)  
*auxiliary bitmap image*

### 31.166.1 Detailed Description

Data supporting a non-rectangular window shape.

The documentation for this struct was generated from the following file:

- [FI\\_Window.H](#)

## 31.167 FI\_Text\_Display::Style\_Table\_Entry Struct Reference

This structure associates the color, font, and font size of a string to draw with an attribute mask matching attr.

```
#include <Fl_Text_Display.H>
```

### Public Attributes

- unsigned [attr](#)  
*currently unused (this may be change in the future)*
- [FI\\_Color](#) [color](#)  
*text color*
- [FI\\_Font](#) [font](#)  
*text font*
- [FI\\_Fontsize](#) [size](#)  
*text font size*



### 31.167.1 Detailed Description

This structure associates the color, font, and font size of a string to draw with an attribute mask matching attr. There must be one entry for each style that can be used in an [FI\\_Text\\_Display](#) for displaying text. The style table is an array of struct [Style\\_Table\\_Entry](#).

The style table is associated with an [FI\\_Text\\_Display](#) by using [FI\\_Text\\_Display::highlight\\_data\(\)](#).

See also

[FI\\_Text\\_Display::highlight\\_data\(\)](#)

The documentation for this struct was generated from the following file:

- FI\_Text\_Display.H



# Chapter 32

## File Documentation

### 32.1 Enumerations.H File Reference

This file contains type definitions and general enumerations.

```
#include <FL/abi-version.h>
#include "Fl_Export.H"
#include "fl_types.h"
```

#### Macros

##### Mouse and Keyboard Events

This and the following constants define the non-ASCII keys on the keyboard for FL\_KEYBOARD and FL\_SHORTCUT events.

```
\todo FL_Button and FL_key... constants could be structured better
 (use an enum or some doxygen grouping ?)
```

```
\sa Fl::event_key() and Fl::get_key(int) (use ascii letters for all other keys):
```

- `#define FL_Alt_L 0xfe9`  
*The left alt key.*
- `#define FL_Alt_R 0xfea`  
*The right alt key.*
- `#define FL_Back 0xEF26 /* Like back on a browser */`
- `#define FL_BackSpace 0xf08`  
*The backspace key.*
- `#define FL_Button 0xfee8`  
*A mouse button; use FL\_Button + n for mouse button n.*
- `#define FL_Caps_Lock 0xfe5`  
*The caps lock key.*
- `#define FL_Control_L 0xfe3`  
*The lefthand control key.*
- `#define FL_Control_R 0xfe4`  
*The righthand control key.*
- `#define FL_Delete 0xffff`  
*The delete key.*
- `#define FL_Down 0xff54`  
*The down arrow key.*
- `#define FL_Eisu 0xff2f`  
*The Eisu key of JIS keyboards.*
- `#define FL_End 0xff57`  
*The end key.*
- `#define FL_Enter 0xff0d`  
*The enter key.*

- `#define FL_Escape 0xff1b`  
*The escape key.*
- `#define FL_F 0xffbd`  
*One of the function keys; use FL\_F + n for function key n.*
- `#define FL_F_Last 0xffe0`  
*The last function key; use to range-check function keys.*
- `#define FL_Favorites 0xEF30 /* Show favorite locations */`
- `#define FL_Forward 0xEF27 /* Like forward on a browser */`
- `#define FL_Help 0xff68`  
*The 'help' key on Mac keyboards.*
- `#define FL_Home 0xff50`  
*The home key.*
- `#define FL_Home_Page 0xEF18 /* Display user's home page */`
- `#define FL_Insert 0xff63`  
*The insert key.*
- `#define FL_Iso_Key 0xff0c`  
*The additional key of ISO keyboards.*
- `#define FL_JIS_Underscore 0xff31`  
*The underscore key of JIS keyboards.*
- `#define FL_Kana 0xff2e`  
*The Kana key of JIS keyboards.*
- `#define FL_KP 0xff80`  
*One of the keypad numbers; use FL\_KP + 'n' for digit n.*
- `#define FL_KP_Enter 0xff8d`  
*The enter key on the keypad, same as FL\_KP+'r'.*
- `#define FL_KP_Last 0xffbd`  
*The last keypad key; use to range-check keypad.*
- `#define FL_Left 0xff51`  
*The left arrow key.*
- `#define FL_Mail 0xEF19 /* Invoke user's mail program */`
- `#define FL_Media_Next 0xEF17 /* Next track */`
- `#define FL_Media_Play 0xEF14 /* Start playing of audio */`
- `#define FL_Media_Prev 0xEF16 /* Previous track */`
- `#define FL_Media_Stop 0xEF15 /* Stop playing audio */`
- `#define FL_Menu 0xff67`  
*The menu key.*
- `#define FL_Meta_L 0xffe7`  
*The left meta/Windows key.*
- `#define FL_Meta_R 0xffe8`  
*The right meta/Windows key.*
- `#define FL_Num_Lock 0xff7f`  
*The num lock key.*
- `#define FL_Page_Down 0xff56`  
*The page-down key.*
- `#define FL_Page_Up 0xff55`  
*The page-up key.*
- `#define FL_Pause 0xff13`  
*The pause key.*
- `#define FL_Print 0xff61`  
*The print (or print-screen) key.*
- `#define FL_Refresh 0xEF29 /* Refresh the page */`
- `#define FL_Right 0xff53`  
*The right arrow key.*
- `#define FL_Scroll_Lock 0xff14`  
*The scroll lock key.*
- `#define FL_Search 0xEF1B /* Search */`
- `#define FL_Shift_L 0xffe1`  
*The lefthand shift key.*
- `#define FL_Shift_R 0xffe2`  
*The righthand shift key.*

- #define **FL\_Sleep** 0xEF2F /\* Put system to sleep \*/
- #define **FL\_Stop** 0xEF28 /\* Stop current operation \*/
- #define **FL\_Tab** 0xFF09  
*The tab key.*
- #define **FL\_Up** 0xFF52  
*The up arrow key.*
- #define **FL\_Volume\_Down** 0xEF11 /\* Volume control down \*/
- #define **FL\_Volume\_Mute** 0xEF12 /\* Mute sound from the system \*/
- #define **FL\_Volume\_Up** 0xEF13 /\* Volume control up \*/
- #define **FL\_Yen** 0xFF30  
*The Yen key of JIS keyboards.*

### Mouse Buttons

These constants define the button numbers for FL\_PUSH and FL\_RELEASE events.

```
\sa Fl::event_button()
```

- #define **FL\_LEFT\_MOUSE** 1  
*The left mouse button.*
- #define **FL\_MIDDLE\_MOUSE** 2  
*The middle mouse button.*
- #define **FL\_RIGHT\_MOUSE** 3  
*The right mouse button.*

### Event States

The following constants define bits in the Fl::event\_state() value.

- #define **FL\_ALT** 0x00080000  
*One of the alt keys is down.*
- #define **FL\_BUTTON**(n) (0x00800000 << (n))  
*Mouse button n (n > 0) is pushed.*
- #define **FL\_BUTTON1** 0x01000000  
*Mouse button 1 is pushed.*
- #define **FL\_BUTTON2** 0x02000000  
*Mouse button 2 is pushed.*
- #define **FL\_BUTTON3** 0x04000000  
*Mouse button 3 is pushed.*
- #define **FL\_BUTTONS** 0x7f000000  
*Any mouse button is pushed.*
- #define **FL\_CAPS\_LOCK** 0x00020000  
*The caps lock is on.*
- #define **FL\_COMMAND** **FL\_CTRL**  
*An alias for FL\_CTRL on WIN32 and X11, or FL\_META on MacOS X.*
- #define **FL\_CONTROL** **FL\_META**  
*An alias for FL\_META on WIN32 and X11, or FL\_CTRL on MacOS X.*
- #define **FL\_CTRL** 0x00040000  
*One of the ctrl keys is down.*
- #define **FL\_KEY\_MASK** 0x0000ffff  
*All keys are 16 bit for now.*
- #define **FL\_META** 0x00400000  
*One of the meta/Windows keys is down.*
- #define **FL\_NUM\_LOCK** 0x00100000  
*The num lock is on.*
- #define **FL\_SCROLL\_LOCK** 0x00800000  
*The scroll lock is on.*
- #define **FL\_SHIFT** 0x00010000  
*One of the shift keys is down.*

## Enumerations

### When Conditions

- enum `Fl_When` {  
`FL_WHEN_NEVER` = 0 , `FL_WHEN_CHANGED` = 1 , `FL_WHEN_NOT_CHANGED` = 2 , `FL_WHEN_RELEASE`  
= 4 ,  
`FL_WHEN_RELEASE_ALWAYS` = 6 , `FL_WHEN_ENTER_KEY` = 8 , `FL_WHEN_ENTER_KEY_ALWAYS`  
=10 , `FL_WHEN_ENTER_KEY_CHANGED` =11 }

*These constants determine when a callback is performed.*

## Version Numbers

FLTK defines some constants to help the programmer to find out, for which FLTK version a program is compiled.

The following constants are defined:

- #define `FL_ABI_VERSION` `FL_API_VERSION`  
*The FLTK ABI (Application Binary Interface) version number as an int.*
- #define `FL_API_VERSION` (`FL_MAJOR_VERSION`\*10000 + `FL_MINOR_VERSION`\*100 + `FL_PATCH_VERSION`)  
*The FLTK API version number as an int.*
- enum `Fl_Event` {  
`FL_NO_EVENT` = 0 , `FL_PUSH` = 1 , `FL_RELEASE` = 2 , `FL_ENTER` = 3 ,  
`FL_LEAVE` = 4 , `FL_DRAG` = 5 , `FL_FOCUS` = 6 , `FL_UNFOCUS` = 7 ,  
`FL_KEYDOWN` = 8 , `FL_KEYBOARD` = 8 , `FL_KEYUP` = 9 , `FL_CLOSE` = 10 ,  
`FL_MOVE` = 11 , `FL_SHORTCUT` = 12 , `FL_DEACTIVATE` = 13 , `FL_ACTIVATE` = 14 ,  
`FL_HIDE` = 15 , `FL_SHOW` = 16 , `FL_PASTE` = 17 , `FL_SELECTIONCLEAR` = 18 ,  
`FL_MOUSEWHEEL` = 19 , `FL_DND_ENTER` = 20 , `FL_DND_DRAG` = 21 , `FL_DND_LEAVE` = 22 ,  
`FL_DND_RELEASE` = 23 , `FL_SCREEN_CONFIGURATION_CHANGED` = 24 , `FL_FULLSCREEN` = 25 ,  
`FL_ZOOM_GESTURE` = 26 }
- *Every time a user moves the mouse pointer, clicks a button, or presses a key, an event is generated and sent to your application.*
- #define `FL_MAJOR_VERSION` 1  
*The major release version of this FLTK library.*
- #define `FL_MINOR_VERSION` 3  
*The minor release version for this library.*
- #define `FL_PATCH_VERSION` 8  
*The patch version for this library.*
- #define `FL_VERSION`  
*The FLTK version number as a double.*
- #define `FLTK_ABI_VERSION` `FL_ABI_VERSION`

## Box Types

FLTK standard box types

This enum defines the standard box types included with FLTK.

`FL_NO_BOX` means nothing is drawn at all, so whatever is already on the screen remains. The `FL_..._FRAME` types only draw their edges, leaving the interior unchanged. The blue color in Figure 1 is the area that is not drawn by the frame types.

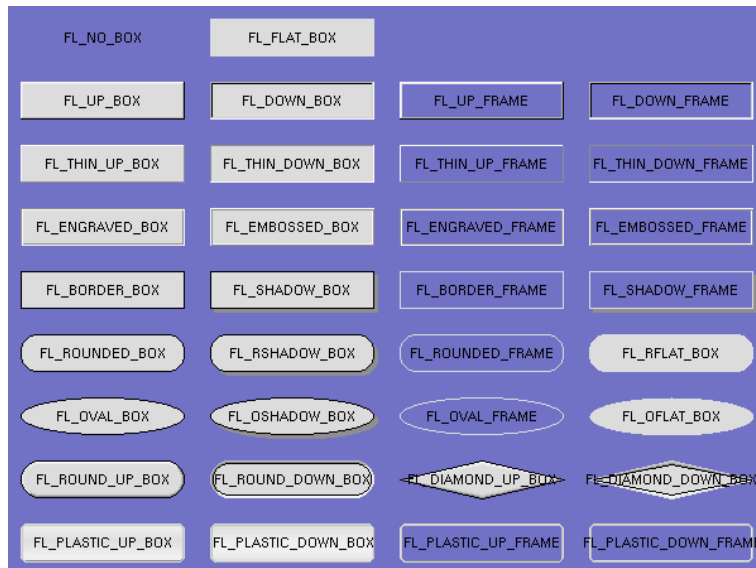


Figure 32.1 FLTK standard box types

**Todo** Description of boxtypes is incomplete. See below for the defined enum `Fl_Boxtype`.

See also

`src/Fl_get_system_colors.cxx`

- `Fl_Boxtype fl_box` (`Fl_Boxtype b`)

*Get the filled version of a frame.*

- enum `Fl_Boxtype` {
  - `FL_NO_BOX = 0`, `FL_FLAT_BOX`, `FL_UP_BOX`, `FL_DOWN_BOX`,
  - `FL_UP_FRAME`, `FL_DOWN_FRAME`, `FL_THIN_UP_BOX`, `FL_THIN_DOWN_BOX`,
  - `FL_THIN_UP_FRAME`, `FL_THIN_DOWN_FRAME`, `FL_ENGRAVED_BOX`, `FL_EMBOSSED_BOX`,
  - `FL_ENGRAVED_FRAME`, `FL_EMBOSSED_FRAME`, `FL_BORDER_BOX`, `_FL_SHADOW_BOX`,
  - `FL_BORDER_FRAME`, `_FL_SHADOW_FRAME`, `_FL_ROUNDED_BOX`, `_FL_RSHADOW_BOX`,
  - `_FL_ROUNDED_FRAME`, `_FL_RFLAT_BOX`, `_FL_ROUND_UP_BOX`, `_FL_ROUND_DOWN_BOX`,
  - `_FL_DIAMOND_UP_BOX`, `_FL_DIAMOND_DOWN_BOX`, `_FL_OVAL_BOX`, `_FL_OSHADOW_BOX`,
  - `_FL_OVAL_FRAME`, `_FL_OFLAT_BOX`, `_FL_PLASTIC_UP_BOX`, `_FL_PLASTIC_DOWN_BOX`,
  - `_FL_PLASTIC_UP_FRAME`, `_FL_PLASTIC_DOWN_FRAME`, `_FL_PLASTIC_THIN_UP_BOX`,
  - `_FL_PLASTIC_THIN_DOWN_BOX`,
  - `_FL_PLASTIC_ROUND_UP_BOX`, `_FL_PLASTIC_ROUND_DOWN_BOX`, `_FL_GTK_UP_BOX`,
  - `_FL_GTK_DOWN_BOX`,
  - `_FL_GTK_UP_FRAME`, `_FL_GTK_DOWN_FRAME`, `_FL_GTK_THIN_UP_BOX`, `_FL_GTK_THIN_DOWN_BOX`,
  - ,
  - `_FL_GTK_THIN_UP_FRAME`, `_FL_GTK_THIN_DOWN_FRAME`, `_FL_GTK_ROUND_UP_BOX`,
  - `_FL_GTK_ROUND_DOWN_BOX`,
  - `_FL_GLEAM_UP_BOX`, `_FL_GLEAM_DOWN_BOX`, `_FL_GLEAM_UP_FRAME`, `_FL_GLEAM_DOWN_FRAME`,
  - ,
  - `_FL_GLEAM_THIN_UP_BOX`, `_FL_GLEAM_THIN_DOWN_BOX`, `_FL_GLEAM_ROUND_UP_BOX`,
  - `_FL_GLEAM_ROUND_DOWN_BOX`,
  - `FL_FREE_BOXTYPE` }
- `#define FL_CIRCLE_BOX FL_ROUND_DOWN_BOX`
- `FL_EXPORT Fl_Boxtype fl_define_FL_DIAMOND_BOX ()`
- `Fl_Labeltype FL_EXPORT fl_define_FL_EMBOSSED_LABEL ()`
- `Fl_Labeltype FL_EXPORT fl_define_FL_ENGRAVED_LABEL ()`
- `FL_EXPORT Fl_Boxtype fl_define_FL_GLEAM_UP_BOX ()`
- `FL_EXPORT Fl_Boxtype fl_define_FL_GTK_UP_BOX ()`
- `FL_EXPORT Fl_Boxtype fl_define_FL_OVAL_BOX ()`

- `FL_EXPORT FI_Boxtype fl_define_FL_PLASTIC_UP_BOX ()`
- `FL_EXPORT FI_Boxtype fl_define_FL_RFLAT_BOX ()`
- `FL_EXPORT FI_Boxtype fl_define_FL_ROUND_UP_BOX ()`
- `FL_EXPORT FI_Boxtype fl_define_FL_ROUNDED_BOX ()`
- `FL_EXPORT FI_Boxtype fl_define_FL_RSHADOW_BOX ()`
- `FL_EXPORT FI_Boxtype fl_define_FL_SHADOW_BOX ()`
- `FI_Labeltype FL_EXPORT fl_define_FL_SHADOW_LABEL ()`
- `#define FL_DIAMOND_BOX FL_DIAMOND_DOWN_BOX`
- `#define FL_DIAMOND_DOWN_BOX (FI_Boxtype)(fl_define_FL_DIAMOND_BOX()+1)`
- `#define FL_DIAMOND_UP_BOX fl_define_FL_DIAMOND_BOX()`
- `FI_Boxtype fl_down (FI_Boxtype b)`  
*Get the "pressed" or "down" version of a box.*
- `#define FL_EMBOSSSED_LABEL fl_define_FL_EMBOSSSED_LABEL()`
- `#define FL_ENGRAVED_LABEL fl_define_FL_ENGRAVED_LABEL()`
- `FI_Boxtype fl_frame (FI_Boxtype b)`  
*Get the unfilled, frame only version of a box.*
- `#define FL_FRAME FL_ENGRAVED_FRAME`
- `#define FL_FRAME_BOX FL_ENGRAVED_BOX`
- `#define FL_GLEAM_DOWN_BOX (FI_Boxtype)(fl_define_FL_GLEAM_UP_BOX()+1)`
- `#define FL_GLEAM_DOWN_FRAME (FI_Boxtype)(fl_define_FL_GLEAM_UP_BOX()+3)`
- `#define FL_GLEAM_ROUND_DOWN_BOX (FI_Boxtype)(fl_define_FL_GLEAM_UP_BOX()+7)`
- `#define FL_GLEAM_ROUND_UP_BOX (FI_Boxtype)(fl_define_FL_GLEAM_UP_BOX()+6)`
- `#define FL_GLEAM_THIN_DOWN_BOX (FI_Boxtype)(fl_define_FL_GLEAM_UP_BOX()+5)`
- `#define FL_GLEAM_THIN_UP_BOX (FI_Boxtype)(fl_define_FL_GLEAM_UP_BOX()+4)`
- `#define FL_GLEAM_UP_BOX fl_define_FL_GLEAM_UP_BOX()`
- `#define FL_GLEAM_UP_FRAME (FI_Boxtype)(fl_define_FL_GLEAM_UP_BOX()+2)`
- `#define FL_GTK_DOWN_BOX (FI_Boxtype)(fl_define_FL_GTK_UP_BOX()+1)`
- `#define FL_GTK_DOWN_FRAME (FI_Boxtype)(fl_define_FL_GTK_UP_BOX()+3)`
- `#define FL_GTK_ROUND_DOWN_BOX (FI_Boxtype)(fl_define_FL_GTK_UP_BOX()+9)`
- `#define FL_GTK_ROUND_UP_BOX (FI_Boxtype)(fl_define_FL_GTK_UP_BOX()+8)`
- `#define FL_GTK_THIN_DOWN_BOX (FI_Boxtype)(fl_define_FL_GTK_UP_BOX()+5)`
- `#define FL_GTK_THIN_DOWN_FRAME (FI_Boxtype)(fl_define_FL_GTK_UP_BOX()+7)`
- `#define FL_GTK_THIN_UP_BOX (FI_Boxtype)(fl_define_FL_GTK_UP_BOX()+4)`
- `#define FL_GTK_THIN_UP_FRAME (FI_Boxtype)(fl_define_FL_GTK_UP_BOX()+6)`
- `#define FL_GTK_UP_BOX fl_define_FL_GTK_UP_BOX()`
- `#define FL_GTK_UP_FRAME (FI_Boxtype)(fl_define_FL_GTK_UP_BOX()+2)`
- `enum FI_Labeltype {`  
`FL_NORMAL_LABEL = 0 , FL_NO_LABEL , _FL_SHADOW_LABEL , _FL_ENGRAVED_LABEL ,`  
`_FL_EMBOSSSED_LABEL , _FL_MULTI_LABEL , _FL_ICON_LABEL , _FL_IMAGE_LABEL ,`  
`FL_FREE_LABELTYPE }`
- *The labeltype() method sets the type of the label.*
- `#define FL_OFLAT_BOX (FI_Boxtype)(fl_define_FL_OVAL_BOX()+3)`
- `#define FL_OSHADOW_BOX (FI_Boxtype)(fl_define_FL_OVAL_BOX()+1)`
- `#define FL_OVAL_BOX fl_define_FL_OVAL_BOX()`
- `#define FL_OVAL_FRAME (FI_Boxtype)(fl_define_FL_OVAL_BOX()+2)`
- `#define FL_PLASTIC_DOWN_BOX (FI_Boxtype)(fl_define_FL_PLASTIC_UP_BOX()+1)`
- `#define FL_PLASTIC_DOWN_FRAME (FI_Boxtype)(fl_define_FL_PLASTIC_UP_BOX()+3)`
- `#define FL_PLASTIC_ROUND_DOWN_BOX (FI_Boxtype)(fl_define_FL_PLASTIC_UP_BOX()+7)`
- `#define FL_PLASTIC_ROUND_UP_BOX (FI_Boxtype)(fl_define_FL_PLASTIC_UP_BOX()+6)`
- `#define FL_PLASTIC_THIN_DOWN_BOX (FI_Boxtype)(fl_define_FL_PLASTIC_UP_BOX()+5)`
- `#define FL_PLASTIC_THIN_UP_BOX (FI_Boxtype)(fl_define_FL_PLASTIC_UP_BOX()+4)`
- `#define FL_PLASTIC_UP_BOX fl_define_FL_PLASTIC_UP_BOX()`
- `#define FL_PLASTIC_UP_FRAME (FI_Boxtype)(fl_define_FL_PLASTIC_UP_BOX()+2)`
- `#define FL_RFLAT_BOX fl_define_FL_RFLAT_BOX()`



- #define **FL\_ROUND\_DOWN\_BOX** ([Fl\\_Boxtype](#))(fl\_define\_FL\_ROUND\_UP\_BOX()+1)
- #define **FL\_ROUND\_UP\_BOX** fl\_define\_FL\_ROUND\_UP\_BOX()
- #define **FL\_ROUNDED\_BOX** fl\_define\_FL\_ROUNDED\_BOX()
- #define **FL\_ROUNDED\_FRAME** ([Fl\\_Boxtype](#))(fl\_define\_FL\_ROUNDED\_BOX()+2)
- #define **FL\_RSHADOW\_BOX** fl\_define\_FL\_RSHADOW\_BOX()
- #define **FL\_SHADOW\_BOX** fl\_define\_FL\_SHADOW\_BOX()
- #define **FL\_SHADOW\_FRAME** ([Fl\\_Boxtype](#))(fl\_define\_FL\_SHADOW\_BOX()+2)
- #define **FL\_SHADOW\_LABEL** fl\_define\_FL\_SHADOW\_LABEL()
- #define **FL\_SYMBOL\_LABEL** **FL\_NORMAL\_LABEL**

*Sets the current label type and return its corresponding Fl\_Labeltype value.*

## Colors

The Fl\_Color type holds an FLTK color value.

Colors are either 8-bit indexes into a [virtual colormap](#) or 24-bit RGB color values. (See [Colors](#) for the default FLTK colormap)

Color indices occupy the lower 8 bits of the value, while RGB colors occupy the upper 24 bits, for a byte organization of RGBI.

```
Fl_Color => 0xrrggbbii
 | | | |
 | | | +---- index between 0 and 255
 | | +----- blue color component (8 bit)
 | +----- green component (8 bit)
 +----- red component (8 bit)
```

A color can have either an index or an rgb value. Colors with rgb set and an index >0 are reserved for special use.

- const [Fl\\_Color](#) **FL\_BACKGROUND2\_COLOR** = 7  
*the default background color for text, list, and valuator widgets*
- const [Fl\\_Color](#) **FL\_BACKGROUND\_COLOR** = 49
- const [Fl\\_Color](#) **FL\_BLACK** = 56
- const [Fl\\_Color](#) **FL\_BLUE** = 216
- typedef unsigned int [Fl\\_Color](#)  
*An FLTK color value; see also [Colors](#)*
- FL\_EXPORT [Fl\\_Color](#) fl\_color\_average ([Fl\\_Color](#) c1, [Fl\\_Color](#) c2, float weight)  
*Returns the weighted average color between the two given colors.*
- #define **FL\_COLOR\_CUBE** ([Fl\\_Color](#))56
- [Fl\\_Color](#) fl\_color\_cube (int r, int g, int b)  
*Returns a color out of the color cube.*
- FL\_EXPORT [Fl\\_Color](#) fl\_contrast ([Fl\\_Color](#) fg, [Fl\\_Color](#) bg)  
*Returns a color that contrasts with the background color.*
- const [Fl\\_Color](#) **FL\_CYAN** = 223
- const [Fl\\_Color](#) **FL\_DARK1** = 47
- const [Fl\\_Color](#) **FL\_DARK2** = 45
- const [Fl\\_Color](#) **FL\_DARK3** = 39
- const [Fl\\_Color](#) **FL\_DARK\_BLUE** = 136
- const [Fl\\_Color](#) **FL\_DARK\_CYAN** = 140
- const [Fl\\_Color](#) **FL\_DARK\_GREEN** = 60
- const [Fl\\_Color](#) **FL\_DARK\_MAGENTA** = 152
- const [Fl\\_Color](#) **FL\_DARK\_RED** = 72
- const [Fl\\_Color](#) **FL\_DARK\_YELLOW** = 76
- [Fl\\_Color](#) fl\_darker ([Fl\\_Color](#) c)  
*Returns a darker version of the specified color.*

- const `FI_Color FL_FOREGROUND_COLOR` = 0  
*the default foreground color (0) used for labels and text*
- #define `FL_FREE_COLOR` (`FI_Color`)16
- #define `FL_GRAY` `FL_BACKGROUND_COLOR`
- const `FI_Color FL_GRAY0` = 32
- #define `FL_GRAY_RAMP` (`FI_Color`)32
- `FI_Color fl_gray_ramp` (int i)  
*Returns a gray color value from black (i == 0) to white (i == FL\_NUM\_GRAY - 1).*
- const `FI_Color FL_GREEN` = 63
- `FL_EXPORT FI_Color fl_inactive` (`FI_Color` c)  
*Returns the inactive, dimmed version of the given color.*
- const `FI_Color FL_INACTIVE_COLOR` = 8  
*the inactive foreground color*
- const `FI_Color FL_LIGHT1` = 50
- const `FI_Color FL_LIGHT2` = 52
- const `FI_Color FL_LIGHT3` = 54
- `FI_Color fl_lighter` (`FI_Color` c)  
*Returns a lighter version of the specified color.*
- const `FI_Color FL_MAGENTA` = 248
- #define `FL_NUM_BLUE` 5
- #define `FL_NUM_FREE_COLOR` 16
- #define `FL_NUM_GRAY` 24
- #define `FL_NUM_GREEN` 8
- #define `FL_NUM_RED` 5
- const `FI_Color FL_RED` = 88
- `FI_Color fl_rgb_color` (`uchar` g)  
*Returns the 24-bit color value closest to g (grayscale).*
- `FI_Color fl_rgb_color` (`uchar` r, `uchar` g, `uchar` b)  
*Returns the 24-bit color value closest to r, g, b.*
- const `FI_Color FL_SELECTION_COLOR` = 15  
*the default selection/highlight color*
- const `FI_Color FL_WHITE` = 255
- const `FI_Color FL_YELLOW` = 95

## Cursors

- enum { `FL_READ` = 1 , `FL_WRITE` = 4 , `FL_EXCEPT` = 8 }
- FD "when" conditions.*
- enum `FI_Cursor` {  
`FL_CURSOR_DEFAULT` = 0 , `FL_CURSOR_ARROW` = 35 , `FL_CURSOR_CROSS` = 66 , `FL_CURSOR_WAIT` = 76 ,  
`FL_CURSOR_INSERT` = 77 , `FL_CURSOR_HAND` = 31 , `FL_CURSOR_HELP` = 47 , `FL_CURSOR_MOVE` = 27 ,  
`FL_CURSOR_NS` = 78 , `FL_CURSOR_WE` = 79 , `FL_CURSOR_NWSE` = 80 , `FL_CURSOR_NESW` = 81 ,  
`FL_CURSOR_N` = 70 , `FL_CURSOR_NE` = 69 , `FL_CURSOR_E` = 49 , `FL_CURSOR_SE` = 8 ,  
`FL_CURSOR_S` = 9 , `FL_CURSOR_SW` = 7 , `FL_CURSOR_W` = 36 , `FL_CURSOR_NW` = 68 ,  
`FL_CURSOR_NONE` = 255 }
- The following constants define the mouse cursors that are available in FLTK.*
- enum `FI_Damage` {  
`FL_DAMAGE_CHILD` = 0x01 , `FL_DAMAGE_EXPOSE` = 0x02 , `FL_DAMAGE_SCROLL` = 0x04 ,  
`FL_DAMAGE_OVERLAY` = 0x08 ,  
`FL_DAMAGE_USER1` = 0x10 , `FL_DAMAGE_USER2` = 0x20 , `FL_DAMAGE_ALL` = 0x80 }
- Damage masks.*
- #define `FL_IMAGE_WITH_ALPHA` 0x40000000

- enum `Fl_Mode` {  
**FL\_RGB = 0**, **FL\_INDEX = 1**, **FL\_SINGLE = 0**, **FL\_DOUBLE = 2**,  
**FL\_ACCUM = 4**, **FL\_ALPHA = 8**, **FL\_DEPTH = 16**, **FL\_STENCIL = 32**,  
**FL\_RGB8 = 64**, **FL\_MULTISAMPLE = 128**, **FL\_STEREO = 256**, **FL\_FAKE\_SINGLE = 512**,  
**FL\_OPENGL3 = 1024** }

*visual types and `Fl_Gl_Window::mode()` (values match `Glut`)*

## Alignment Flags

Flags to control the label alignment.

This controls how the label is displayed next to or inside the widget. The default value is `FL_ALIGN_CENTER` (0) for most widgets, which centers the label inside the widget.

Flags can be or'd to achieve a combination of alignments, but there are some "magic values" (e.g. combinations of TOP and BOTTOM and of LEFT and RIGHT) that have special meanings (see below). For instance:

`FL_ALIGN_TOP_LEFT == (FL_ALIGN_TOP|FL_ALIGN_LEFT) != FL_ALIGN_LEFT_TOP.`

Outside alignments (`FL_ALIGN_INSIDE` is not set):

```

TOP_LEFT TOP TOP_RIGHT
+-----+
LEFT_TOP | | RIGHT_TOP
| | |
LEFT | | RIGHT
| | |
LEFT_BOTTOM | | RIGHT_BOTTOM
+-----+

```

Inside alignments (`FL_ALIGN_INSIDE` is set):

```

TOP_LEFT TOP TOP_RIGHT
+-----+
|TOP_LEFT TOP TOP_RIGHT|
| | |
|LEFT CENTER RIGHT|
| | |
|BOTTOM_LEFT BOTTOM BOTTOM_RIGHT|
+-----+

```

See also

[FL\\_ALIGN\\_CENTER](#), etc.

- typedef unsigned `Fl_Align`  
*FLTK type for alignment control.*
- const `Fl_Align FL_ALIGN_BOTTOM = (Fl_Align)2`  
*Align the label at the bottom of the widget.*
- const `Fl_Align FL_ALIGN_BOTTOM_LEFT = FL_ALIGN_BOTTOM | FL_ALIGN_LEFT`
- const `Fl_Align FL_ALIGN_BOTTOM_RIGHT = FL_ALIGN_BOTTOM | FL_ALIGN_RIGHT`
- const `Fl_Align FL_ALIGN_CENTER = (Fl_Align)0`  
*Align the label horizontally in the middle.*
- const `Fl_Align FL_ALIGN_CLIP = (Fl_Align)64`  
*All parts of the label that are larger than the widget will not be drawn .*
- const `Fl_Align FL_ALIGN_IMAGE_BACKDROP = (Fl_Align)0x0200`  
*If the label contains an image, draw the image or deimage in the background.*
- const `Fl_Align FL_ALIGN_IMAGE_MASK = 0x0320`
- const `Fl_Align FL_ALIGN_IMAGE_NEXT_TO_TEXT = (Fl_Align)0x0100`  
*If the label contains an image, draw the text to the right of the image.*
- const `Fl_Align FL_ALIGN_IMAGE_OVER_TEXT = (Fl_Align)0x0000`  
*If the label contains an image, draw the text below the image.*
- const `Fl_Align FL_ALIGN_INSIDE = (Fl_Align)16`  
*Draw the label inside of the widget.*
- const `Fl_Align FL_ALIGN_LEFT = (Fl_Align)4`  
*Align the label at the left of the widget.*
- const `Fl_Align FL_ALIGN_LEFT_BOTTOM = 0x000d`
- const `Fl_Align FL_ALIGN_LEFT_TOP = 0x0007`
- const `Fl_Align FL_ALIGN_NOWRAP = (Fl_Align)0`

- const `FI_Align FL_ALIGN_POSITION_MASK` = 0x000f
- const `FI_Align FL_ALIGN_RIGHT` = (`FI_Align`)8  
*Align the label to the right of the widget.*
- const `FI_Align FL_ALIGN_RIGHT_BOTTOM` = 0x000e
- const `FI_Align FL_ALIGN_RIGHT_TOP` = 0x000b
- const `FI_Align FL_ALIGN_TEXT_NEXT_TO_IMAGE` = (`FI_Align`)0x0120  
*If the label contains an image, draw the text to the left of the image.*
- const `FI_Align FL_ALIGN_TEXT_OVER_IMAGE` = (`FI_Align`)0x0020  
*If the label contains an image, draw the text on top of the image.*
- const `FI_Align FL_ALIGN_TOP` = (`FI_Align`)1  
*Align the label at the top of the widget.*
- const `FI_Align FL_ALIGN_TOP_LEFT` = `FL_ALIGN_TOP` | `FL_ALIGN_LEFT`
- const `FI_Align FL_ALIGN_TOP_RIGHT` = `FL_ALIGN_TOP` | `FL_ALIGN_RIGHT`
- const `FI_Align FL_ALIGN_WRAP` = (`FI_Align`)128  
*Wrap text that does not fit the width of the widget.*

## Font Numbers

The following constants define the standard FLTK fonts:

- const `FI_Font FL_BOLD` = 1  
*add this to helvetica, courier, or times*
- const `FI_Font FL_BOLD_ITALIC` = 3  
*add this to helvetica, courier, or times*
- const `FI_Font FL_COURIER` = 4  
*Courier normal.*
- const `FI_Font FL_COURIER_BOLD` = 5  
*Courier bold.*
- const `FI_Font FL_COURIER_BOLD_ITALIC` = 7  
*Courier bold-italic.*
- const `FI_Font FL_COURIER_ITALIC` = 6  
*Courier italic.*
- typedef int `FI_Font`  
*A font number is an index into the internal font table.*
- typedef int `FI_Fontsize`  
*Size of a font in pixels.*
- const `FI_Font FL_FREE_FONT` = 16  
*first one to allocate*
- const `FI_Font FL_HELVETICA` = 0  
*Helvetica (or Arial) normal (0)*
- const `FI_Font FL_HELVETICA_BOLD` = 1  
*Helvetica (or Arial) bold.*
- const `FI_Font FL_HELVETICA_BOLD_ITALIC` = 3  
*Helvetica (or Arial) bold-oblique.*
- const `FI_Font FL_HELVETICA_ITALIC` = 2  
*Helvetica (or Arial) oblique.*
- const `FI_Font FL_ITALIC` = 2  
*add this to helvetica, courier, or times*
- FL\_EXPORT `FI_Fontsize FL_NORMAL_SIZE`  
*normal font size*
- const `FI_Font FL_SCREEN` = 13  
*Default monospaced screen font.*

- const `FL_Font FL_SCREEN_BOLD` = 14  
*Default monospaced bold screen font.*
- const `FL_Font FL_SYMBOL` = 12  
*Standard symbol font.*
- const `FL_Font FL_TIMES` = 8  
*Times roman.*
- const `FL_Font FL_TIMES_BOLD` = 9  
*Times roman bold.*
- const `FL_Font FL_TIMES_BOLD_ITALIC` = 11  
*Times roman bold-italic.*
- const `FL_Font FL_TIMES_ITALIC` = 10  
*Times roman italic.*
- const `FL_Font FL_ZAPF_DINGBATS` = 15  
*Zapf-dingbats font.*

### 32.1.1 Detailed Description

This file contains type definitions and general enumerations.

### 32.1.2 Macro Definition Documentation

#### 32.1.2.1 FL\_ABI\_VERSION

```
#define FL_ABI_VERSION FL_API_VERSION
```

The FLTK ABI (Application Binary Interface) version number as an *int*.

`FL_ABI_VERSION` is an *int* that describes the major, minor, and patch ABI version numbers in the same format as `FL_API_VERSION`.

The ABI version number `FL_ABI_VERSION` is usually the same as the API version `FL_API_VERSION` with the last two digits set to '00'.

FLTK retains the ABI (Application Binary Interface) during patch releases of the same major and minor versions. Examples:

| FLTK Version | <code>FL_API_VERSION</code> | <code>FL_ABI_VERSION</code> | <code>FL_VERSION</code> (deprecated) |
|--------------|-----------------------------|-----------------------------|--------------------------------------|
| 1.3.0        | 10300                       | 10300                       | 1.0300                               |
| 1.3.4        | 10304                       | 10300                       | 1.0304                               |

Version 1.2.3 is actually stored as 10203 to allow for more than 9 minor and patch releases.

The `FL_MAJOR_VERSION`, `FL_MINOR_VERSION`, and `FL_PATCH_VERSION` constants give the integral values for the major, minor, and patch releases respectively.

To enable new ABI-breaking features in patch releases you can configure FLTK to use a higher `FL_ABI_VERSION`.

See also

`README.abi-version.txt`

#### 32.1.2.2 FL\_API\_VERSION

```
#define FL_API_VERSION (FL_MAJOR_VERSION*10000 + FL_MINOR_VERSION*100 + FL_PATCH_VERSION)
```

The FLTK API version number as an *int*.

`FL_API_VERSION` is an *int* that describes the major, minor, and patch version numbers.

Version 1.2.3 is actually stored as 10203 to allow for more than 9 minor and patch releases.

The `FL_MAJOR_VERSION`, `FL_MINOR_VERSION`, and `FL_PATCH_VERSION` constants give the integral values for the major, minor, and patch releases respectively.

**Note**

FL\_API\_VERSION is intended to replace the deprecated *double* FL\_VERSION.

**See also**

[Fl::api\\_version\(\)](#)

**32.1.2.3 FL\_MAJOR\_VERSION**

```
#define FL_MAJOR_VERSION 1
```

The major release version of this FLTK library.

**See also**

[FL\\_VERSION](#)

**32.1.2.4 FL\_MINOR\_VERSION**

```
#define FL_MINOR_VERSION 3
```

The minor release version for this library.

FLTK remains mostly source-code compatible between minor version changes.

**32.1.2.5 FL\_PATCH\_VERSION**

```
#define FL_PATCH_VERSION 8
```

The patch version for this library.

FLTK remains binary compatible between patches.

**32.1.2.6 FL\_VERSION**

```
#define FL_VERSION
```

**Value:**

```
((double)FL_MAJOR_VERSION + \
(double)FL_MINOR_VERSION * 0.01 + \
(double)FL_PATCH_VERSION * 0.0001)
```

The FLTK version number as a *double*.

FL\_VERSION is a *double* that describes the major, minor, and patch version numbers.

Version 1.2.3 is actually stored as 1.0203 to allow for more than 9 minor and patch releases.

**Deprecated** This *double* version number is retained for compatibility with existing program code. New code should use *int* FL\_API\_VERSION instead. FL\_VERSION is deprecated because comparisons of floating point values may fail due to rounding errors. However, there are currently no plans to remove this deprecated constant.

FL\_VERSION is equivalent to  $(double)FL\_API\_VERSION / 10000$ .

**See also**

[Fl::version\(\)](#) (deprecated as well)

[FL\\_API\\_VERSION](#)

[Fl::api\\_version\(\)](#)

**32.1.3 Typedef Documentation**

### 32.1.3.1 Fl\_Fontsize

```
typedef int Fl_Fontsize
```

Size of a font in pixels.

This is the approximate height of a font in pixels.

## 32.1.4 Enumeration Type Documentation

### 32.1.4.1 anonymous enum

```
anonymous enum
```

FD "when" conditions.

Enumerator

|           |                                                              |
|-----------|--------------------------------------------------------------|
| FL_READ   | Call the callback when there is data to be read.             |
| FL_WRITE  | Call the callback when data can be written without blocking. |
| FL_EXCEPT | Call the callback if an exception occurs on the file.        |

### 32.1.4.2 Fl\_Boxtype

```
enum Fl_Boxtype
```

Enumerator

|                    |                                                |
|--------------------|------------------------------------------------|
| FL_NO_BOX          | nothing is drawn at all, this box is invisible |
| FL_FLAT_BOX        | a flat box                                     |
| FL_UP_BOX          | see figure 1                                   |
| FL_DOWN_BOX        | see figure 1                                   |
| FL_UP_FRAME        | see figure 1                                   |
| FL_DOWN_FRAME      | see figure 1                                   |
| FL_THIN_UP_BOX     | see figure 1                                   |
| FL_THIN_DOWN_BOX   | see figure 1                                   |
| FL_THIN_UP_FRAME   | see figure 1                                   |
| FL_THIN_DOWN_FRAME | see figure 1                                   |
| FL_ENGRAVED_BOX    | see figure 1                                   |
| FL_EMBOSSSED_BOX   | see figure 1                                   |
| FL_ENGRAVED_FRAME  | see figure 1                                   |
| FL_EMBOSSSED_FRAME | see figure 1                                   |
| FL_BORDER_BOX      | see figure 1                                   |
| _FL_SHADOW_BOX     | see figure 1                                   |
| FL_BORDER_FRAME    | see figure 1                                   |
| _FL_SHADOW_FRAME   | see figure 1                                   |
| _FL_ROUNDED_BOX    | see figure 1                                   |
| _FL_RSHADOW_BOX    | see figure 1                                   |
| _FL_ROUNDED_FRAME  | see figure 1                                   |
| _FL_RFLAT_BOX      | see figure 1                                   |
| _FL_ROUND_UP_BOX   | see figure 1                                   |
| _FL_ROUND_DOWN_BOX | see figure 1                                   |
| _FL_DIAMOND_UP_BOX | see figure 1                                   |

## Enumerator

|                                         |                                                       |
|-----------------------------------------|-------------------------------------------------------|
| <code>_FL_DIAMOND_DOWN_BOX</code>       | see figure 1                                          |
| <code>_FL_OVAL_BOX</code>               | see figure 1                                          |
| <code>_FL_OSHADOW_BOX</code>            | see figure 1                                          |
| <code>_FL_OVAL_FRAME</code>             | see figure 1                                          |
| <code>_FL_OFLAT_BOX</code>              | see figure 1                                          |
| <code>_FL_PLASTIC_UP_BOX</code>         | plastic version of <code>FL_UP_BOX</code>             |
| <code>_FL_PLASTIC_DOWN_BOX</code>       | plastic version of <code>FL_DOWN_BOX</code>           |
| <code>_FL_PLASTIC_UP_FRAME</code>       | plastic version of <code>FL_UP_FRAME</code>           |
| <code>_FL_PLASTIC_DOWN_FRAME</code>     | plastic version of <code>FL_DOWN_FRAME</code>         |
| <code>_FL_PLASTIC_THIN_UP_BOX</code>    | plastic version of <code>FL_THIN_UP_BOX</code>        |
| <code>_FL_PLASTIC_THIN_DOWN_BOX</code>  | plastic version of <code>FL_THIN_DOWN_BOX</code>      |
| <code>_FL_PLASTIC_ROUND_UP_BOX</code>   | plastic version of <code>FL_ROUND_UP_BOX</code>       |
| <code>_FL_PLASTIC_ROUND_DOWN_BOX</code> | plastic version of <code>FL_ROUND_DOWN_BOX</code>     |
| <code>_FL_GTK_UP_BOX</code>             | gtk+ version of <code>FL_UP_BOX</code>                |
| <code>_FL_GTK_DOWN_BOX</code>           | gtk+ version of <code>FL_DOWN_BOX</code>              |
| <code>_FL_GTK_UP_FRAME</code>           | gtk+ version of <code>FL_UP_FRAME</code>              |
| <code>_FL_GTK_DOWN_FRAME</code>         | gtk+ version of <code>FL_DOWN_FRAME</code>            |
| <code>_FL_GTK_THIN_UP_BOX</code>        | gtk+ version of <code>FL_THIN_UP_BOX</code>           |
| <code>_FL_GTK_THIN_DOWN_BOX</code>      | gtk+ version of <code>FL_THIN_DOWN_BOX</code>         |
| <code>_FL_GTK_THIN_UP_FRAME</code>      | gtk+ version of <code>FL_THIN_UP_FRAME</code>         |
| <code>_FL_GTK_THIN_DOWN_FRAME</code>    | gtk+ version of <code>FL_THIN_DOWN_FRAME</code>       |
| <code>_FL_GTK_ROUND_UP_BOX</code>       | gtk+ version of <code>FL_ROUND_UP_BOX</code>          |
| <code>_FL_GTK_ROUND_DOWN_BOX</code>     | gtk+ version of <code>FL_ROUND_DOWN_BOX</code>        |
| <code>_FL_GLEAM_UP_BOX</code>           | gleam version of <code>FL_UP_BOX</code>               |
| <code>_FL_GLEAM_DOWN_BOX</code>         | gleam version of <code>FL_DOWN_BOX</code>             |
| <code>_FL_GLEAM_UP_FRAME</code>         | gleam version of <code>FL_UP_FRAME</code>             |
| <code>_FL_GLEAM_DOWN_FRAME</code>       | gleam version of <code>FL_DOWN_FRAME</code>           |
| <code>_FL_GLEAM_THIN_UP_BOX</code>      | gleam version of <code>FL_THIN_UP_BOX</code>          |
| <code>_FL_GLEAM_THIN_DOWN_BOX</code>    | gleam version of <code>FL_THIN_DOWN_BOX</code>        |
| <code>_FL_GLEAM_ROUND_UP_BOX</code>     | gleam version of <code>FL_ROUND_UP_BOX</code>         |
| <code>_FL_GLEAM_ROUND_DOWN_BOX</code>   | gleam version of <code>FL_ROUND_DOWN_BOX</code>       |
| <code>FL_FREE_BOXTYPE</code>            | the first free box type for creation of new box types |

**32.1.4.3 Fl\_Cursor**

enum `Fl_Cursor`

The following constants define the mouse cursors that are available in FLTK.

Cursors are provided by the system when available, or bitmaps built into FLTK as a fallback.

**Todo** enum `Fl_Cursor` needs maybe an image.

## Enumerator

|                                |                                       |
|--------------------------------|---------------------------------------|
| <code>FL_CURSOR_DEFAULT</code> | the default cursor, usually an arrow. |
| <code>FL_CURSOR_ARROW</code>   | an arrow pointer.                     |
| <code>FL_CURSOR_CROSS</code>   | crosshair.                            |
| <code>FL_CURSOR_WAIT</code>    | busy indicator (e.g. hourglass).      |



## Enumerator

|                  |                          |
|------------------|--------------------------|
| FL_CURSOR_INSERT | I-beam.                  |
| FL_CURSOR_HAND   | pointing hand.           |
| FL_CURSOR_HELP   | question mark pointer.   |
| FL_CURSOR_MOVE   | 4-pointed arrow or hand. |
| FL_CURSOR_NS     | up/down resize.          |
| FL_CURSOR_WE     | left/right resize.       |
| FL_CURSOR_NWSE   | diagonal resize.         |
| FL_CURSOR_NESW   | diagonal resize.         |
| FL_CURSOR_N      | upwards resize.          |
| FL_CURSOR_NE     | upwards, right resize.   |
| FL_CURSOR_E      | rightwards resize.       |
| FL_CURSOR_SE     | downwards, right resize. |
| FL_CURSOR_S      | downwards resize.        |
| FL_CURSOR_SW     | downwards, left resize.  |
| FL_CURSOR_W      | leftwards resize.        |
| FL_CURSOR_NW     | upwards, left resize.    |
| FL_CURSOR_NONE   | invisible.               |

**32.1.4.4 Fl\_Damage**

enum [Fl\\_Damage](#)

Damage masks.

## Enumerator

|                   |                                                    |
|-------------------|----------------------------------------------------|
| FL_DAMAGE_CHILD   | A child needs to be redrawn.                       |
| FL_DAMAGE_EXPOSE  | The window was exposed.                            |
| FL_DAMAGE_SCROLL  | The <a href="#">Fl_Scroll</a> widget was scrolled. |
| FL_DAMAGE_OVERLAY | The overlay planes need to be redrawn.             |
| FL_DAMAGE_USER1   | First user-defined damage bit.                     |
| FL_DAMAGE_USER2   | Second user-defined damage bit.                    |
| FL_DAMAGE_ALL     | Everything needs to be redrawn.                    |

**32.1.4.5 Fl\_Event**

enum [Fl\\_Event](#)

Every time a user moves the mouse pointer, clicks a button, or presses a key, an event is generated and sent to your application.

Events can also come from other programs like the window manager.

Events are identified by the integer argument passed to the [Fl\\_Widget::handle\(\)](#) virtual method. Other information about the most recent event is stored in static locations and acquired by calling the `Fl::event_*` methods. This static information remains valid until the next event is read from the window system, so it is ok to look at it outside of the `handle()` method.

Event numbers can be converted to their actual names using the `fl_eventnames[]` array defined in `#include <FL/names.h>`

See also

[Fl::event\\_text\(\)](#), [Fl::event\\_key\(\)](#), class [Fl::](#)

#### Enumerator

|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FL_NO_EVENT | No event.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| FL_PUSH     | <p>A mouse button has gone down with the mouse pointing at this widget. You can find out what button by calling <a href="#">Fl::event_button()</a>. You find out the mouse position by calling <a href="#">Fl::event_x()</a> and <a href="#">Fl::event_y()</a>.</p> <p>A widget indicates that it "wants" the mouse click by returning non-zero from its <a href="#">Fl_Widget::handle()</a> method. It will then become the <a href="#">Fl::pushed()</a> widget and will get FL_DRAG and the matching FL_RELEASE events.</p> <p>If <a href="#">Fl_Widget::handle()</a> returns zero then FLTK will try sending the FL_PUSH to another widget.</p>                                                            |
| FL_RELEASE  | <p>A mouse button has been released. You can find out what button by calling <a href="#">Fl::event_button()</a>.</p> <p>In order to receive the FL_RELEASE event, the widget must return non-zero when handling FL_PUSH.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| FL_ENTER    | <p>The mouse has been moved to point at this widget. This can be used for highlighting feedback. If a widget wants to highlight or otherwise track the mouse, it indicates this by returning non-zero from its <a href="#">handle()</a> method. It then becomes the <a href="#">Fl::belowmouse()</a> widget and will receive FL_MOVE and FL_LEAVE events.</p>                                                                                                                                                                                                                                                                                                                                                 |
| FL_LEAVE    | <p>The mouse has moved out of the widget. In order to receive the FL_LEAVE event, the widget must return non-zero when handling FL_ENTER.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| FL_DRAG     | <p>The mouse has moved with a button held down. The current button state is in <a href="#">Fl::event_state()</a>. The mouse position is in <a href="#">Fl::event_x()</a> and <a href="#">Fl::event_y()</a>.</p> <p>In order to receive FL_DRAG events, the widget must return non-zero when handling FL_PUSH.</p>                                                                                                                                                                                                                                                                                                                                                                                             |
| FL_FOCUS    | <p>This indicates an <i>attempt</i> to give a widget the keyboard focus. If a widget wants the focus, it should change itself to display the fact that it has the focus, and return non-zero from its <a href="#">handle()</a> method. It then becomes the <a href="#">Fl::focus()</a> widget and gets FL_KEYDOWN, FL_KEYUP, and FL_UNFOCUS events. The focus will change either because the window manager changed which window gets the focus, or because the user tried to navigate using tab, arrows, or other keys. You can check <a href="#">Fl::event_key()</a> to figure out why it moved. For navigation it will be the key pressed and for interaction with the window manager it will be zero.</p> |
| FL_UNFOCUS  | <p>This event is sent to the previous <a href="#">Fl::focus()</a> widget when another widget gets the focus or the window loses focus.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

## Enumerator

|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FL_KEYDOWN    | <p>A key was pressed (FL_KEYDOWN) or released (FL_KEYUP). FL_KEYBOARD is a synonym for FL_KEYDOWN. The key can be found in <a href="#">Fl::event_key()</a>. The text that the key should insert can be found with <a href="#">Fl::event_text()</a> and its length is in <a href="#">Fl::event_length()</a>. If you use the key handle() should return 1. If you return zero then FLTK assumes you ignored the key and will then attempt to send it to a parent widget. If none of them want it, it will change the event into a FL_SHORTCUT event.</p> <p>To receive FL_KEYBOARD events you must also respond to the FL_FOCUS and FL_UNFOCUS events.</p> <p>If you are writing a text-editing widget you may also want to call the <a href="#">Fl::compose()</a> function to translate individual keystrokes into non-ASCII characters.</p> <p>FL_KEYUP events are sent to the widget that currently has focus. This is not necessarily the same widget that received the corresponding FL_KEYDOWN event because focus may have changed between events.</p> |
| FL_KEYBOARD   | <p>Equivalent to FL_KEYDOWN.</p> <p><b>See also</b></p> <p><a href="#">FL_KEYDOWN</a></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| FL_KEYUP      | <p>Key release event.</p> <p><b>See also</b></p> <p><a href="#">FL_KEYDOWN</a></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| FL_CLOSE      | <p>The user clicked the close button of a window. This event is used internally only to trigger the callback of <a href="#">Fl_Window</a> derived classed. The default callback closes the window calling <a href="#">Fl_Window::hide()</a>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| FL_MOVE       | <p>The mouse has moved without any mouse buttons held down. This event is sent to the <a href="#">Fl::belowmouse()</a> widget. In order to receive FL_MOVE events, the widget must return non-zero when handling FL_ENTER.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| FL_SHORTCUT   | <p>If the <a href="#">Fl::focus()</a> widget is zero or ignores an FL_KEYBOARD event then FLTK tries sending this event to every widget it can, until one of them returns non-zero. FL_SHORTCUT is first sent to the <a href="#">Fl::belowmouse()</a> widget, then its parents and siblings, and eventually to every widget in the window, trying to find an object that returns non-zero. FLTK tries really hard to not to ignore any keystrokes!</p> <p>You can also make "global" shortcuts by using <a href="#">Fl::add_handler()</a>. A global shortcut will work no matter what windows are displayed or which one has the focus.</p>                                                                                                                                                                                                                                                                                                                                                                                                                 |
| FL_DEACTIVATE | <p>This widget is no longer active, due to <a href="#">Fl_Widget::deactivate()</a> being called on it or one of its parents. <a href="#">Fl_Widget::active()</a> may still be true after this, the widget is only active if <a href="#">Fl_Widget::active()</a> is true on it and all its parents (use <a href="#">Fl_Widget::active_r()</a> to check this).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| FL_ACTIVATE   | <p>This widget is now active, due to <a href="#">Fl_Widget::activate()</a> being called on it or one of its parents.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

## Enumerator

|                                 |                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FL_HIDE                         | This widget is no longer visible, due to <code>Fl_Widget::hide()</code> being called on it or one of its parents, or due to a parent window being minimized. <code>Fl_Widget::visible()</code> may still be true after this, but the widget is visible only if <code>visible()</code> is true for it and all its parents (use <code>Fl_Widget::visible_r()</code> to check this).       |
| FL_SHOW                         | This widget is visible again, due to <code>Fl_Widget::show()</code> being called on it or one of its parents, or due to a parent window being restored. Child <code>Fl_Windows</code> respond to this by actually creating the window if not done already, so if you subclass a window, be sure to pass <code>FL_SHOW</code> to the base class <code>Fl_Widget::handle()</code> method! |
| FL_PASTE                        | You should get this event some time after you call <code>Fl::paste()</code> . The contents of <code>Fl::event_text()</code> is the text to insert and the number of characters is in <code>Fl::event_length()</code> .                                                                                                                                                                  |
| FL_SELECTIONCLEAR               | The <code>Fl::selection_owner()</code> will get this event before the selection is moved to another widget. This indicates that some other widget or program has claimed the selection. Motif programs used this to clear the selection indication. Most modern programs ignore this.                                                                                                   |
| FL_MOUSEWHEEL                   | The user has moved the mouse wheel. The <code>Fl::event_dx()</code> and <code>Fl::event_dy()</code> methods can be used to find the amount to scroll horizontally and vertically.                                                                                                                                                                                                       |
| FL_DND_ENTER                    | The mouse has been moved to point at this widget. A widget that is interested in receiving drag'n'drop data must return 1 to receive <code>FL_DND_DRAG</code> , <code>FL_DND_LEAVE</code> and <code>FL_DND_RELEASE</code> events.                                                                                                                                                       |
| FL_DND_DRAG                     | The mouse has been moved inside a widget while dragging data. A widget that is interested in receiving drag'n'drop data should indicate the possible drop position.                                                                                                                                                                                                                     |
| FL_DND_LEAVE                    | The mouse has moved out of the widget.                                                                                                                                                                                                                                                                                                                                                  |
| FL_DND_RELEASE                  | The user has released the mouse button dropping data into the widget. If the widget returns 1, it will receive the data in the immediately following <code>FL_PASTE</code> event.                                                                                                                                                                                                       |
| FL_SCREEN_CONFIGURATION_CHANGED | The screen configuration (number, positions) was changed. Use <code>Fl::add_handler()</code> to be notified of this event.                                                                                                                                                                                                                                                              |
| FL_FULLSCREEN                   | The fullscreen state of the window has changed.                                                                                                                                                                                                                                                                                                                                         |
| FL_ZOOM_GESTURE                 | The user has made a zoom/pinch/magnification gesture. The <code>Fl::event_dy()</code> method can be used to find magnification amount, <code>Fl::event_x()</code> and <code>Fl::event_y()</code> are set as well.                                                                                                                                                                       |

## 32.1.4.6 Fl\_Labeltype

enum `Fl_Labeltype`

The `labeltype()` method sets the type of the label.

The following standard label types are included:

**Todo** The doxygen comments are incomplete, and some labeltypes start with an underscore. Also, there are three external functions undocumented (yet):

- `fl_define_FL_SHADOW_LABEL()`
- `fl_define_FL_ENGRAVED_LABEL()`
- `fl_define_FL_EMBOSSED_LABEL()`

## Enumerator

|                     |                                                                               |
|---------------------|-------------------------------------------------------------------------------|
| FL_NORMAL_LABEL     | draws the text (0)                                                            |
| FL_NO_LABEL         | does nothing                                                                  |
| _FL_SHADOW_LABEL    | draws a drop shadow under the text                                            |
| _FL_ENGRAVED_LABEL  | draws edges as though the text is engraved                                    |
| _FL_EMBOSSSED_LABEL | draws edges as though the text is raised                                      |
| _FL_MULTI_LABEL     | draws a composite label<br><br>See also<br><br><a href="#">Fl_Multi_Label</a> |
| _FL_ICON_LABEL      | draws the icon associated with the text                                       |
| _FL_IMAGE_LABEL     | the label displays an "icon" based on a <a href="#">Fl_Image</a>              |
| FL_FREE_LABELTYPE   | first free labeltype to use for creating own labeltypes                       |

## 32.1.4.7 Fl\_When

enum [Fl\\_When](#)

These constants determine when a callback is performed.

See also

[Fl\\_Widget::when\(\)](#);

**Todo** doxygen comments for values are incomplete and maybe wrong or unclear

## Enumerator

|                           |                                                                                        |
|---------------------------|----------------------------------------------------------------------------------------|
| FL_WHEN_NEVER             | Never call the callback.                                                               |
| FL_WHEN_CHANGED           | Do the callback only when the widget value changes.                                    |
| FL_WHEN_NOT_CHANGED       | Do the callback whenever the user interacts with the widget.                           |
| FL_WHEN_RELEASE           | Do the callback when the button or key is released and the value changes.              |
| FL_WHEN_RELEASE_ALWAYS    | Do the callback when the button or key is released, even if the value doesn't change.  |
| FL_WHEN_ENTER_KEY         | Do the callback when the user presses the ENTER key and the value changes.             |
| FL_WHEN_ENTER_KEY_ALWAYS  | Do the callback when the user presses the ENTER key, even if the value doesn't change. |
| FL_WHEN_ENTER_KEY_CHANGED | ?                                                                                      |

## 32.1.5 Function Documentation

## 32.1.5.1 fl\_box()

```
Fl_Boxtype fl_box (
 Fl_Boxtype b) [inline]
```

Get the filled version of a frame.

If no filled version of a given frame exists, the behavior of this function is undefined and some random box or frame is returned.

### 32.1.5.2 fl\_color\_cube()

```
Fl_Color fl_color_cube (
 int r,
 int g,
 int b) [inline]
```

Returns a color out of the color cube.

`r` must be in the range 0 to FL\_NUM\_RED (5) minus 1, `g` must be in the range 0 to FL\_NUM\_GREEN (8) minus 1, `b` must be in the range 0 to FL\_NUM\_BLUE (5) minus 1.

To get the closest color to a 8-bit set of R,G,B values use:

```
fl_color_cube(R * (FL_NUM_RED - 1) / 255,
 G * (FL_NUM_GREEN - 1) / 255,
 B * (FL_NUM_BLUE - 1) / 255);
```

### 32.1.5.3 fl\_down()

```
Fl_Boxtype fl_down (
 Fl_Boxtype b) [inline]
```

Get the "pressed" or "down" version of a box.

If no "down" version of a given box exists, the behavior of this function is undefined and some random box or frame is returned.

### 32.1.5.4 fl\_frame()

```
Fl_Boxtype fl_frame (
 Fl_Boxtype b) [inline]
```

Get the unfilled, frame only version of a box.

If no frame version of a given box exists, the behavior of this function is undefined and some random box or frame is returned.

### 32.1.5.5 fl\_gray\_ramp()

```
Fl_Color fl_gray_ramp (
 int i) [inline]
```

Returns a gray color value from black (`i == 0`) to white (`i == FL_NUM_GRAY - 1`).

FL\_NUM\_GRAY is defined to be 24 in the current FLTK release. To get the closest FLTK gray value to an 8-bit grayscale color 'I' use:

```
fl_gray_ramp(I * (FL_NUM_GRAY - 1) / 255)
```

## 32.1.6 Variable Documentation

### 32.1.6.1 FL\_ALIGN\_LEFT

```
const Fl_Align FL_ALIGN_LEFT = (Fl_Align)4
```

Align the label at the left of the widget.

Inside labels appear left-justified starting at the left side of the widget, outside labels are right-justified and drawn to the left of the widget.

### 32.1.6.2 FL\_ALIGN\_TOP

```
const Fl_Align FL_ALIGN_TOP = (Fl_Align)1
```

Align the label at the top of the widget.

Inside labels appear below the top, outside labels are drawn on top of the widget.

### 32.1.6.3 FL\_NORMAL\_SIZE

```
FL_EXPORT Fl_Fontsize FL_NORMAL_SIZE [extern]
```

normal font size

normal font size

## 32.2 filename.H File Reference

File names and URI utility functions.

```
#include "Fl_Export.H"
#include <sys/types.h>
#include <dirent.h>
```

### Macros

- #define **fl\_dirent\_h\_cyclic\_include**
- #define **FL\_FILENAME\_H**
- #define **FL\_PATH\_MAX** 2048  
*all path buffers should use this length*

### Typedefs

- typedef int() **Fl\_File\_Sort\_F**(struct dirent \*\*, struct dirent \*\*)  
*File sorting function.*

### Functions

- FL\_EXPORT void **fl\_decode\_uri** (char \*uri)  
*Decodes a URL-encoded string.*
- FL\_EXPORT int **fl\_filename\_absolute** (char \*to, int tolen, const char \*from)  
*Makes a filename absolute from a relative filename.*
- FL\_EXPORT int **fl\_filename\_expand** (char \*to, int tolen, const char \*from)  
*Expands a filename containing shell variables and tilde (~).*
- FL\_EXPORT const char \* **fl\_filename\_ext** (const char \*buf)  
*Gets the extensions of a filename.*
- FL\_EXPORT void **fl\_filename\_free\_list** (struct dirent \*\*\*l, int n)  
*Free the list of filenames that is generated by **fl\_filename\_list**().*
- FL\_EXPORT int **fl\_filename\_isdir** (const char \*name)  
*Determines if a file exists and is a directory from its filename.*
- FL\_EXPORT int **fl\_filename\_list** (const char \*d, struct dirent \*\*\*l, **Fl\_File\_Sort\_F** \*s=fl\_numericsort)  
*Portable and const-correct wrapper for the scandir() function.*
- FL\_EXPORT int **fl\_filename\_match** (const char \*name, const char \*pattern)  
*Checks if a string *s* matches a pattern *p*.*
- FL\_EXPORT const char \* **fl\_filename\_name** (const char \*filename)  
*Gets the file name from a path.*
- FL\_EXPORT int **fl\_filename\_relative** (char \*to, int tolen, const char \*from)  
*Makes a filename relative to the current working directory.*
- FL\_EXPORT char \* **fl\_filename\_setext** (char \*to, int tolen, const char \*ext)  
*Replaces the extension in *buf* of *max*.*
- FL\_EXPORT int **fl\_open\_uri** (const char \*uri, char \*msg, int msglen)  
*Opens the specified Uniform Resource Identifier (URI).*

#### 32.2.1 Detailed Description

File names and URI utility functions.

## 32.3 Fl.H File Reference

Fl static class.

```
#include <FL/Fl_Export.H>
#include <FL/Fl_Cairo.H>
#include "fl_utf8.h"
#include "Enumerations.H"
```

### Classes

- class [Fl](#)

The *Fl* is the FLTK global (static) class containing state information and global methods for the current application.
- class [Fl\\_Widget\\_Tracker](#)

This class should be used to control safe widget deletion.

### Macros

- #define [Fl\\_Object Fl\\_Widget](#)

for back compatibility - use *Fl\_Widget*!
- #define [FL\\_SOCKET](#) int

### Typedefs

- typedef void(\* [Fl\\_Abort\\_Handler](#)) (const char \*format,...)
 

Signature of *set\_abort* functions passed as parameters.
- typedef int(\* [Fl\\_Args\\_Handler](#)) (int argc, char \*\*argv, int &i)
 

Signature of *args* functions passed as parameters.
- typedef void(\* [Fl\\_Atclose\\_Handler](#)) ([Fl\\_Window](#) \*window, void \*data)
 

Signature of *set\_atclose* functions passed as parameters.
- typedef void(\* [Fl\\_Awake\\_Handler](#)) (void \*data)
 

Signature of some wakeup callback functions passed as parameters.
- typedef void() [Fl\\_Box\\_Draw\\_F](#)(int x, int y, int w, int h, [Fl\\_Color](#) color)
 

Signature of some box drawing functions passed as parameters.
- typedef void(\* [Fl\\_Clipboard\\_Notify\\_Handler](#)) (int source, void \*data)
 

Signature of *add\_clipboard\_notify* functions passed as parameters.
- typedef int(\* [Fl\\_Event\\_Dispatch](#)) (int event, [Fl\\_Window](#) \*w)
 

Signature of *event\_dispatch* functions passed as parameters.
- typedef int(\* [Fl\\_Event\\_Handler](#)) (int event)
 

Signature of *add\_handler* functions passed as parameters.
- typedef void(\* [Fl\\_FD\\_Handler](#)) (FL\_SOCKET fd, void \*data)
 

Signature of *add\_fd* functions passed as parameters.
- typedef void(\* [Fl\\_Idle\\_Handler](#)) (void \*data)
 

Signature of *add\_idle* callback functions passed as parameters.
- typedef void() [Fl\\_Label\\_Draw\\_F](#)(const [Fl\\_Label](#) \*label, int x, int y, int w, int h, [Fl\\_Align](#) align)
 

Signature of some label drawing functions passed as parameters.
- typedef void() [Fl\\_Label\\_Measure\\_F](#)(const [Fl\\_Label](#) \*label, int &width, int &height)
 

Signature of some label measurement functions passed as parameters.
- typedef void(\* [Fl\\_Old\\_Idle\\_Handler](#)) ()
 

Signature of *set\_idle* callback functions passed as parameters.
- typedef int(\* [Fl\\_System\\_Handler](#)) (void \*event, void \*data)
 

Signature of *add\_system\_handler* functions passed as parameters.
- typedef void(\* [Fl\\_Timeout\\_Handler](#)) (void \*data)
 

Signature of some timeout callback functions passed as parameters.



## Variables

- FL\_EXPORT const char \* [fl\\_local\\_alt](#)  
*string pointer used in shortcuts, you can change it to another language*
- FL\_EXPORT const char \* [fl\\_local\\_ctrl](#)  
*string pointer used in shortcuts, you can change it to another language*
- FL\_EXPORT const char \* [fl\\_local\\_meta](#)  
*string pointer used in shortcuts, you can change it to another language*
- FL\_EXPORT const char \* [fl\\_local\\_shift](#)  
*string pointer used in shortcuts, you can change it to another language*

### 32.3.1 Detailed Description

Fl static class.

## 32.4 fl\_arc.cxx File Reference

Utility functions for drawing arcs and circles.

```
#include <FL/fl_draw.H>
#include <FL/math.h>
```

### 32.4.1 Detailed Description

Utility functions for drawing arcs and circles.

## 32.5 fl\_arci.cxx File Reference

Utility functions for drawing circles using integers.

```
#include <FL/fl_draw.H>
#include <FL/x.H>
#include <config.h>
```

### 32.5.1 Detailed Description

Utility functions for drawing circles using integers.

## 32.6 fl\_ask.cxx File Reference

Utility Functions for Common Dialogs.

```
#include <stdio.h>
#include <stdarg.h>
#include "flstring.h"
#include <FL/Fl.H>
#include <FL/fl_ask.H>
#include <FL/Fl_Box.H>
#include <FL/Fl_Button.H>
#include <FL/Fl_Return_Button.H>
#include <FL/Fl_Window.H>
#include <FL/Fl_Input.H>
#include <FL/Fl_Secret_Input.H>
#include <FL/x.H>
#include <FL/fl_draw.H>
```

## Functions

- void `fl_alert` (const char \*fmt,...)  
*Shows an alert message dialog box.*
- int `fl_ask` (const char \*fmt,...)  
*Shows a dialog displaying the `fmt` message, this dialog features 2 yes/no buttons.*
- void `fl_beep` (int type)  
*Emits a system beep message.*
- int `fl_choice` (const char \*fmt, const char \*b0, const char \*b1, const char \*b2,...)  
*Shows a dialog displaying the printf style `fmt` message, this dialog features up to 3 customizable choice buttons.*
- int `fl_choice_n` (const char \*fmt, const char \*b0, const char \*b1, const char \*b2,...)  
*Like `fl_choice()` but with extended (negative) return values.*
- const char \* `fl_input` (const char \*fmt, const char \*defstr,...)  
*Shows an input dialog displaying the `fmt` message.*
- void `fl_message` (const char \*fmt,...)  
*Shows an information message dialog box.*
- void `fl_message_hotspot` (int enable)  
*Sets whether or not to move the common message box used in many common dialogs like `fl_message()`, `fl_alert()`, `fl_ask()`, `fl_choice()`, `fl_input()`, `fl_password()` to follow the mouse pointer.*
- int `fl_message_hotspot` (void)  
*Gets whether or not to move the common message box used in many common dialogs like `fl_message()`, `fl_alert()`, `fl_ask()`, `fl_choice()`, `fl_input()`, `fl_password()` to follow the mouse pointer.*
- `Fl_Widget *` `fl_message_icon` ()  
*Gets the `Fl_Box` icon container of the current default dialog used in many common dialogs like `fl_message()`, `fl_alert()`, `fl_ask()`, `fl_choice()`, `fl_input()`, `fl_password()`*
- void `fl_message_title` (const char \*title)  
*Sets the title of the dialog window used in many common dialogs.*
- void `fl_message_title_default` (const char \*title)  
*Sets the default title of the dialog window used in many common dialogs.*
- const char \* `fl_password` (const char \*fmt, const char \*defstr,...)  
*Shows an input dialog displaying the `fmt` message.*

## Variables

- const char \* `fl_cancel` = "Cancel"  
*string pointer used in common dialogs, you can change it to another language*
- const char \* `fl_close` = "Close"  
*string pointer used in common dialogs, you can change it to another language*
- `Fl_Font` `fl_message_font` = `FL_HELVETICA`
- `Fl_Fontsize` `fl_message_size` = -1
- const char \* `fl_no` = "No"  
*string pointer used in common dialogs, you can change it to another language*
- const char \* `fl_ok` = "OK"  
*string pointer used in common dialogs, you can change it to another language*
- const char \* `fl_yes` = "Yes"  
*string pointer used in common dialogs, you can change it to another language*

### 32.6.1 Detailed Description

Utility Functions for Common Dialogs.

## 32.7 fl\_ask.H File Reference

API for common dialogs.

```
#include "Enumerations.H"
```

### Macros

- `#define __fl_attr(x)`

### Enumerations

- enum `Fl_Beep` {  
`FL_BEEP_DEFAULT = 0`, `FL_BEEP_MESSAGE`, `FL_BEEP_ERROR`, `FL_BEEP_QUESTION`,  
`FL_BEEP_PASSWORD`, `FL_BEEP_NOTIFICATION` }

*Different system beeps available.*

### Functions

- `FL_EXPORT void FL_EXPORT void fl_alert` (const char \*,...) `__fl_attr((__format__ (__printf__`
- `FL_EXPORT void FL_EXPORT void FL_EXPORT int fl_ask` (const char \*,...) `__fl_attr((__format__ (__printf__`
- `FL_EXPORT void fl_beep` (int type=`FL_BEEP_DEFAULT`)  
*Emits a system beep message.*
- `FL_EXPORT int fl_choice` (const char \*q, const char \*b0, const char \*b1, const char \*b2,...) `__fl_attr((__format__ (__printf__`
- `FL_EXPORT int FL_EXPORT const char FL_EXPORT const char FL_EXPORT int fl_choice_n` (const char \*q, const char \*b0, const char \*b1, const char \*b2,...) `__fl_attr((__format__ (__printf__`
- `FL_EXPORT int FL_EXPORT const char * fl_input` (const char \*label, const char \*deflt=0,...) `__fl_attr((__format__ (__printf__`
- `FL_EXPORT void fl_message` (const char \*,...) `__fl_attr((__format__ (__printf__`
- void `fl_message_font` (`Fl_Font` f, `Fl_Fontsize` s)
- `FL_EXPORT void fl_message_hotspot` (int enable)  
*Sets whether or not to move the common message box used in many common dialogs like `fl_message()`, `fl_alert()`, `fl_ask()`, `fl_choice()`, `fl_input()`, `fl_password()` to follow the mouse pointer.*
- `FL_EXPORT int fl_message_hotspot` (void)  
*Gets whether or not to move the common message box used in many common dialogs like `fl_message()`, `fl_alert()`, `fl_ask()`, `fl_choice()`, `fl_input()`, `fl_password()` to follow the mouse pointer.*
- `FL_EXPORT int FL_EXPORT const char FL_EXPORT const char FL_EXPORT int FL_EXPORT Fl_Widget * fl_message_icon` ()  
*Gets the `Fl_Box` icon container of the current default dialog used in many common dialogs like `fl_message()`, `fl_alert()`, `fl_ask()`, `fl_choice()`, `fl_input()`, `fl_password()`*
- `FL_EXPORT void fl_message_title` (const char \*title)  
*Sets the title of the dialog window used in many common dialogs.*
- `FL_EXPORT void fl_message_title_default` (const char \*title)  
*Sets the default title of the dialog window used in many common dialogs.*
- `FL_EXPORT int FL_EXPORT const char FL_EXPORT const char * fl_password` (const char \*label, const char \*deflt=0,...) `__fl_attr((__format__ (__printf__`

### Variables

- `FL_EXPORT void FL_EXPORT void FL_EXPORT int __deprecated__`
- `FL_EXPORT const char * fl_cancel`  
*string pointer used in common dialogs, you can change it to another language*
- `FL_EXPORT const char * fl_close`

*string pointer used in common dialogs, you can change it to another language*

- FL\_EXPORT [Fl\\_Font](#) **fl\_message\_font\_**
- FL\_EXPORT [Fl\\_Fontsize](#) **fl\_message\_size\_**
- FL\_EXPORT const char \* [fl\\_no](#)

*string pointer used in common dialogs, you can change it to another language*

- FL\_EXPORT const char \* [fl\\_ok](#)

*string pointer used in common dialogs, you can change it to another language*

- FL\_EXPORT const char \* [fl\\_yes](#)

*string pointer used in common dialogs, you can change it to another language*

### 32.7.1 Detailed Description

API for common dialogs.

### 32.7.2 Enumeration Type Documentation

#### 32.7.2.1 Fl\_Beep

enum [Fl\\_Beep](#)

Different system beeps available.

See also

[fl\\_beep\(int\)](#)

Enumerator

|                      |                    |
|----------------------|--------------------|
| FL_BEEP_DEFAULT      | Default beep.      |
| FL_BEEP_MESSAGE      | Message beep.      |
| FL_BEEP_ERROR        | Error beep.        |
| FL_BEEP_QUESTION     | Question beep.     |
| FL_BEEP_PASSWORD     | Password beep.     |
| FL_BEEP_NOTIFICATION | Notification beep. |

## 32.8 fl\_boxtype.cxx File Reference

drawing code for common box types.

```
#include <FL/Fl.H>
#include <FL/Fl_Widget.H>
#include <FL/fl_draw.H>
#include <config.h>
```

### Macros

- #define **D1** BORDER\_WIDTH
- #define **D2** (BORDER\_WIDTH+BORDER\_WIDTH)
- #define [fl\\_border\\_box](#) [fl\\_rectbound](#)

*allow consistent naming*

## Functions

- void `fl_border_frame` (int x, int y, int w, int h, [FI\\_Color](#) c)  
*Draws a frame of type FL\_BORDER\_FRAME.*
- void `fl_down_box` (int x, int y, int w, int h, [FI\\_Color](#) c)  
*Draws a box of type FL\_DOWN\_BOX.*
- void `fl_down_frame` (int x, int y, int w, int h, [FI\\_Color](#))  
*Draws a frame of type FL\_DOWN\_FRAME.*
- void `fl_draw_box` ([FI\\_Boxtype](#) t, int x, int y, int w, int h, [FI\\_Color](#) c)  
*Draws a box using given type, position, size and color.*
- void `fl_embossed_box` (int x, int y, int w, int h, [FI\\_Color](#) c)  
*Draws a box of type FL\_EMBOSSED\_BOX.*
- void `fl_embossed_frame` (int x, int y, int w, int h, [FI\\_Color](#))  
*Draws a frame of type FL\_EMBOSSED\_FRAME.*
- void `fl_engraved_box` (int x, int y, int w, int h, [FI\\_Color](#) c)  
*Draws a box of type FL\_ENGRAVED\_BOX.*
- void `fl_engraved_frame` (int x, int y, int w, int h, [FI\\_Color](#))  
*Draws a frame of type FL\_ENGRAVED\_FRAME.*
- void `fl_flat_box` (int x, int y, int w, int h, [FI\\_Color](#) c)  
*Draws a box of type FL\_FLAT\_BOX.*
- void `fl_frame` (const char \*s, int x, int y, int w, int h)  
*Draws a series of line segments around the given box.*
- void `fl_frame2` (const char \*s, int x, int y, int w, int h)  
*Draws a series of line segments around the given box.*
- const [uchar](#) \* `fl_gray_ramp` ()
- void `fl_internal_boxtype` ([FI\\_Boxtype](#) t, [FI\\_Box\\_Draw\\_F](#) \*f)  
*Sets the drawing function for a given box type.*
- void `fl_no_box` (int, int, int, int, [FI\\_Color](#))  
*Draws a box of type FL\_NO\_BOX.*
- void `fl_rectbound` (int x, int y, int w, int h, [FI\\_Color](#) bgcolor)  
*Draws a bounded rectangle with a given position, size and color.*
- void `fl_thin_down_box` (int x, int y, int w, int h, [FI\\_Color](#) c)  
*Draws a box of type FL\_THIN\_DOWN\_BOX.*
- void `fl_thin_down_frame` (int x, int y, int w, int h, [FI\\_Color](#))  
*Draws a frame of type FL\_THIN\_DOWN\_FRAME.*
- void `fl_thin_up_box` (int x, int y, int w, int h, [FI\\_Color](#) c)  
*Draws a box of type FL\_THIN\_UP\_BOX.*
- void `fl_thin_up_frame` (int x, int y, int w, int h, [FI\\_Color](#))  
*Draws a frame of type FL\_THIN\_UP\_FRAME.*
- void `fl_up_box` (int x, int y, int w, int h, [FI\\_Color](#) c)  
*Draws a box of type FL\_UP\_BOX.*
- void `fl_up_frame` (int x, int y, int w, int h, [FI\\_Color](#))  
*Draws a frame of type FL\_UP\_FRAME.*

### 32.8.1 Detailed Description

drawing code for common box types.

### 32.8.2 Function Documentation

### 32.8.2.1 fl\_internal\_boxtype()

```
void fl_internal_boxtype (
 Fl_Boxtype t,
 Fl_Box_Draw_F * f)
```

Sets the drawing function for a given box type.

#### Parameters

|    |          |                      |
|----|----------|----------------------|
| in | <i>t</i> | box type             |
| in | <i>f</i> | box drawing function |

### 32.8.2.2 fl\_rectbound()

```
void fl_rectbound (
 int x,
 int y,
 int w,
 int h,
 Fl_Color bgcolor)
```

Draws a bounded rectangle with a given position, size and color. Equivalent to drawing a box of type FL\_BORDER\_BOX.

## 32.9 fl\_color.cxx File Reference

Color handling.

```
#include "Fl_XColor.H"
#include <FL/Fl.H>
#include <FL/x.H>
#include <FL/fl_draw.H>
#include "fl_cmap.h"
```

### Macros

- `#define fl_overlay 0`  
*HAVE\_OVERLAY* determines whether *fl\_overlay* is variable or defined as 0.

### Functions

- `Fl_Color fl_color_average (Fl_Color color1, Fl_Color color2, float weight)`  
*Returns the weighted average color between the two given colors.*
- `Fl_Color fl_contrast (Fl_Color fg, Fl_Color bg)`  
*Returns a color that contrasts with the background color.*
- `Fl_Color fl_inactive (Fl_Color c)`  
*Returns the inactive, dimmed version of the given color.*
- `ulong fl_xpixel (Fl_Color i)`  
*Returns the X pixel number used to draw the given FLTK color index.*
- `ulong fl_xpixel (uchar r, uchar g, uchar b)`  
*Returns the X pixel number used to draw the given rgb color.*

## Variables

- [uchar fl\\_bluemask](#)  
*color mask used in current color map handling*
- [int fl\\_blueshift](#)  
*color shift used in current color map handling*
- [int fl\\_extrashift](#)  
*color shift used in current color map handling*
- [uchar fl\\_greenmask](#)  
*color mask used in current color map handling*
- [int fl\\_greenshift](#)  
*color shift used in current color map handling*
- [uchar fl\\_redmask](#)  
*color mask used in current color map handling*
- [int fl\\_redshift](#)  
*color shift used in current color map handling*
- [FL\\_XColor fl\\_xmap](#) [1][256]  
*HAVE\_OVERLAY determines whether fl\_xmap is one or two planes.*

### 32.9.1 Detailed Description

Color handling.

## 32.10 FL\_Color\_Chooser.H File Reference

[FL\\_Color\\_Chooser](#) widget .

```
#include <FL/Fl_Group.H>
#include <FL/Fl_Box.H>
#include <FL/Fl_Return_Button.H>
#include <FL/Fl_Choice.H>
#include <FL/Fl_Value_Input.H>
```

## Classes

- class [FL\\_Color\\_Chooser](#)  
*The [FL\\_Color\\_Chooser](#) widget provides a standard RGB color chooser.*

### 32.10.1 Detailed Description

[FL\\_Color\\_Chooser](#) widget .

## 32.11 FL\_compose.cxx File Reference

Utility functions to support text input.

```
#include <FL/Fl.H>
#include <FL/x.H>
```

## Variables

- [XIC fl\\_xim\\_ic](#)

### 32.11.1 Detailed Description

Utility functions to support text input.

## 32.12 fl\_curve.cxx File Reference

Utility for drawing Bezier curves, adding the points to the current fl\_begin/fl\_vertex/fl\_end path.

```
#include <FL/fl_draw.H>
#include <math.h>
```

### 32.12.1 Detailed Description

Utility for drawing Bezier curves, adding the points to the current fl\_begin/fl\_vertex/fl\_end path.

Incremental math implementation: I very much doubt this is optimal! From Foley/vanDam page 511. If anybody has a better algorithm, please send it!

## 32.13 FI\_Device.H File Reference

declaration of classes [FI\\_Device](#), [FI\\_Graphics\\_Driver](#), [FI\\_Surface\\_Device](#), [FI\\_Display\\_Device](#), [FI\\_Device\\_Plugin](#).

```
#include <FL/x.H>
#include <FL/Fl_Plugin.H>
#include <FL/Fl_Image.H>
#include <FL/Fl_Bitmap.H>
#include <FL/Fl_Pixmap.H>
#include <FL/Fl_RGB_Image.H>
#include <stdlib.h>
```

### Classes

- class [FI\\_Device](#)  
*All graphical output devices and all graphics systems.*
- class [FI\\_Device\\_Plugin](#)  
*This plugin socket allows the integration of new device drivers for special window or screen types.*
- class [FI\\_Display\\_Device](#)  
*A display to which the computer can draw.*
- class [FI\\_GDI\\_Graphics\\_Driver](#)  
*The MSWindows-specific graphics class.*
- class [FI\\_GDI\\_Printer\\_Graphics\\_Driver](#)  
*The graphics driver used when printing on MSWindows.*
- class [FI\\_Graphics\\_Driver](#)  
*A virtual class subclassed for each graphics driver FLTK uses.*
- class [FI\\_Quartz\\_Graphics\\_Driver](#)  
*The Mac OS X-specific graphics class.*
- class [FI\\_Surface\\_Device](#)  
*A drawing surface that's susceptible to receive graphical output.*
- class [FI\\_Xlib\\_Graphics\\_Driver](#)  
*The Xlib-specific graphics class.*
- struct [FI\\_Graphics\\_Driver::matrix](#)  
*A 2D coordinate transformation matrix.*



## Macros

- `#define FL_MATRIX_STACK_SIZE 32`
- `#define FL_REGION_STACK_SIZE 10`
- `#define XPOINT XPoint`

## Typedefs

- typedef short **COORD\_T**
- typedef void(\* [Fl\\_Draw\\_Image\\_Cb](#)) (void \*data, int x, int y, int w, **uchar** \*buf)  
*signature of image generation callback function.*

## Variables

- `FL_EXPORT Fl_Graphics_Driver * fl_graphics_driver`  
*Points to the driver that currently receives all graphics requests.*

### 32.13.1 Detailed Description

declaration of classes [Fl\\_Device](#), [Fl\\_Graphics\\_Driver](#), [Fl\\_Surface\\_Device](#), [Fl\\_Display\\_Device](#), [Fl\\_Device\\_Plugin](#).

### 32.13.2 Typedef Documentation

#### 32.13.2.1 Fl\_Draw\_Image\_Cb

typedef void(\* [Fl\\_Draw\\_Image\\_Cb](#)) (void \*data, int x, int y, int w, **uchar** \*buf)  
signature of image generation callback function.

#### Parameters

|     |              |                                                                                                                                    |
|-----|--------------|------------------------------------------------------------------------------------------------------------------------------------|
| in  | <i>data</i>  | user data passed to function                                                                                                       |
| in  | <i>x,y,w</i> | position and width of scan line in image                                                                                           |
| out | <i>buf</i>   | buffer for generated image data. You must copy <i>w</i> pixels from scanline <i>y</i> , starting at pixel <i>x</i> to this buffer. |

## 32.14 FI\_Double\_Window.cxx File Reference

[Fl\\_Double\\_Window](#) implementation.

```
#include <config.h>
#include <FL/Fl.H>
#include <FL/Fl_Double_Window.H>
#include <FL/Fl_Overlay_Window.H>
#include <FL/Fl_Printer.H>
#include <FL/x.H>
#include <FL/fl_draw.H>
```

## Functions

- void [fl\\_begin\\_offscreen](#) (Fl\_Offscreen ctx)  
*Send all subsequent drawing commands to this offscreen buffer.*
- char [fl\\_can\\_do\\_alpha\\_blending](#) ()  
*Checks whether platform supports true alpha blending for RGBA images.*

- void [fl\\_copy\\_offscreen](#) (int x, int y, int w, int h, FL\_Offscreen pixmap, int srcx, int srcy)  
*Copy a rectangular area of the given offscreen buffer into the current drawing destination.*
- FL\_Offscreen [fl\\_create\\_offscreen](#) (int w, int h)  
*Creation of an offscreen graphics buffer.*
- void [fl\\_delete\\_offscreen](#) (FL\_Offscreen ctx)  
*Deletion of an offscreen graphics buffer.*
- void [fl\\_end\\_offscreen](#) ()  
*Quit sending drawing commands to the current offscreen buffer.*

## Variables

- const int **stack\_max** = 16

### 32.14.1 Detailed Description

[Fl\\_Double\\_Window](#) implementation.

## 32.15 fl\_draw.H File Reference

utility header to pull drawing functions together

```
#include <FL/x.H>
#include <FL/Enumerations.H>
#include <FL/Fl_Window.H>
#include <FL/Fl_Device.H>
```

## Macros

- #define [fl\\_clip fl\\_push\\_clip](#)  
*Intersects the current clip region with a rectangle and pushes this new region onto the stack (deprecated).*

## Enumerations

- enum {  
[FL\\_SOLID](#) = 0 , [FL\\_DASH](#) = 1 , [FL\\_DOT](#) = 2 , [FL\\_DASHDOT](#) = 3 ,  
[FL\\_DASHDOTDOT](#) = 4 , [FL\\_CAP\\_FLAT](#) = 0x100 , [FL\\_CAP\\_ROUND](#) = 0x200 , [FL\\_CAP\\_SQUARE](#) = 0x300 ,  
[FL\\_JOIN\\_MITER](#) = 0x1000 , [FL\\_JOIN\\_ROUND](#) = 0x2000 , [FL\\_JOIN\\_BEVEL](#) = 0x3000 }

## Functions

- FL\_EXPORT int [fl\\_add\\_symbol](#) (const char \*name, void(\*drawit)(FL\_Color), int scalable)  
*Adds a symbol to the system.*
- void [fl\\_arc](#) (double x, double y, double r, double start, double end)  
*Adds a series of points to the current path on the arc of a circle.*
- void [fl\\_arc](#) (int x, int y, int w, int h, double a1, double a2)  
*Draw ellipse sections using integer coordinates.*
- void [fl\\_begin\\_complex\\_polygon](#) ()  
*Starts drawing a complex filled polygon.*
- void [fl\\_begin\\_line](#) ()  
*Starts drawing a list of lines.*
- void [fl\\_begin\\_loop](#) ()  
*Starts drawing a closed sequence of lines.*
- void [fl\\_begin\\_points](#) ()  
*Starts drawing a list of points.*

- void `fl_begin_polygon` ()  
*Starts drawing a convex filled polygon.*
- FL\_EXPORT char `fl_can_do_alpha_blending` ()  
*Checks whether platform supports true alpha blending for RGBA images.*
- FL\_EXPORT void `fl_chord` (int x, int y, int w, int h, double a1, double a2)  
*fl\_chord declaration is a place holder - the function does not yet exist*
- void `fl_circle` (double x, double y, double r)  
*fl\_circle() is equivalent to fl\_arc(x,y,r,0,360), but may be faster.*
- int `fl_clip_box` (int x, int y, int w, int h, int &X, int &Y, int &W, int &H)  
*Intersects the rectangle with the current clip region and returns the bounding box of the result.*
- FL\_Region `fl_clip_region` ()  
*Returns the current clipping region.*
- void `fl_clip_region` (FL\_Region r)  
*Replaces the top of the clipping stack with a clipping region of any shape.*
- FL\_Color `fl_color` ()  
*Returns the last fl\_color() that was set.*
- void `fl_color` (FL\_Color c)  
*Sets the color for all subsequent drawing operations.*
- void `fl_color` (int c)  
*for back compatibility - use fl\_color(FL\_Color c) instead*
- void `fl_color` (uchar r, uchar g, uchar b)  
*Sets the color for all subsequent drawing operations.*
- FL\_EXPORT void `fl_cursor` (FL\_Cursor)  
*Sets the cursor for the current window to the specified shape and colors.*
- FL\_EXPORT void `fl_cursor` (FL\_Cursor, FL\_Color fg, FL\_Color bg=FL\_WHITE)
- void `fl_curve` (double X0, double Y0, double X1, double Y1, double X2, double Y2, double X3, double Y3)  
*Adds a series of points on a Bezier curve to the path.*
- int `fl_descent` ()  
*Returns the recommended distance above the bottom of a fl\_height() tall box to draw the text at so it looks centered vertically in that box.*
- void `fl_draw` (const char \*str, int n, int x, int y)  
*Draws starting at the given x, y location a UTF-8 string of length n bytes.*
- FL\_EXPORT void `fl_draw` (const char \*str, int x, int y)  
*Draws a nul-terminated UTF-8 string starting at the given x, y location.*
- FL\_EXPORT void `fl_draw` (const char \*str, int x, int y, int w, int h, FL\_Align align, FL\_Image \*img=0, int draw\_symbols=1)  
*Fancy string drawing function which is used to draw all the labels.*
- FL\_EXPORT void `fl_draw` (const char \*str, int x, int y, int w, int h, FL\_Align align, void(\*callthis)(const char \*, int, int, int), FL\_Image \*img=0, int draw\_symbols=1)  
*The same as fl\_draw(const char\*,int,int,int,int,FL\_Align,FL\_Image\*,int) with the addition of the callthis parameter, which is a pointer to a text drawing function such as fl\_draw(const char\*, int, int, int) to do the real work.*
- void `fl_draw` (int angle, const char \*str, int n, int x, int y)  
*Draws at the given x, y location a UTF-8 string of length n bytes rotating angle degrees counter-clockwise.*
- FL\_EXPORT void `fl_draw` (int angle, const char \*str, int x, int y)  
*Draws a nul-terminated UTF-8 string starting at the given x, y location and rotating angle degrees counter-clockwise.*
- FL\_EXPORT void `fl_draw_box` (FL\_Boxtype, int x, int y, int w, int h, FL\_Color)  
*Draws a box using given type, position, size and color.*
- void `fl_draw_image` (const uchar \*buf, int X, int Y, int W, int H, int D=3, int L=0)  
*Draws an 8-bit per color RGB or luminance image.*
- void `fl_draw_image` (FL\_Draw\_Image\_Cb cb, void \*data, int X, int Y, int W, int H, int D=3)

- Draws an image using a callback function to generate image data.*

  - void [fl\\_draw\\_image\\_mono](#) (const uchar \*buf, int X, int Y, int W, int H, int D=1, int L=0)

*Draws a gray-scale (1 channel) image.*

  - void [fl\\_draw\\_image\\_mono](#) (FI\_Draw\_Image\_Cb cb, void \*data, int X, int Y, int W, int H, int D=1)

*Draws a gray-scale image using a callback function to generate image data.*

  - FL\_EXPORT int [fl\\_draw\\_pixmap](#) (char \*const \*data, int x, int y, FI\_Color=FL\_GRAY)

*Draw XPM image data, with the top-left corner at the given position.*

  - FL\_EXPORT int [fl\\_draw\\_pixmap](#) (const char \*const \*cdata, int x, int y, FI\_Color=FL\_GRAY)

*Draw XPM image data, with the top-left corner at the given position.*

  - FL\_EXPORT int [fl\\_draw\\_symbol](#) (const char \*label, int x, int y, int w, int h, FI\_Color)

*Draw the named symbol in the given rectangle using the given color.*

  - void [fl\\_end\\_complex\\_polygon](#) ()

*Ends complex filled polygon, and draws.*

  - void [fl\\_end\\_line](#) ()

*Ends list of lines, and draws.*

  - void [fl\\_end\\_loop](#) ()

*Ends closed sequence of lines, and draws.*

  - void [fl\\_end\\_points](#) ()

*Ends list of points, and draws.*

  - void [fl\\_end\\_polygon](#) ()

*Ends convex filled polygon, and draws.*

  - FL\_EXPORT const char \* [fl\\_expand\\_text](#) (const char \*from, char \*buf, int maxbuf, double maxw, int &n, double &width, int wrap, int draw\_symbols=0)

*Copy from to buf, replacing control characters with ^X.*

  - [FI\\_Font fl\\_font](#) ()

*Returns the face set by the most recent call to [fl\\_font\(\)](#).*

  - void [fl\\_font](#) (FI\_Font face, FI\_Fontsize fsize)

*Sets the current font, which is then used in various drawing routines.*

  - FL\_EXPORT void [fl\\_frame](#) (const char \*s, int x, int y, int w, int h)

*Draws a series of line segments around the given box.*

  - FL\_EXPORT void [fl\\_frame2](#) (const char \*s, int x, int y, int w, int h)

*Draws a series of line segments around the given box.*

  - void [fl\\_gap](#) ()

*Call [fl\\_gap\(\)](#) to separate loops of the path.*

  - int [fl\\_height](#) ()

*Returns the recommended minimum line spacing for the current font.*

  - FL\_EXPORT int [fl\\_height](#) (int font, int size)

*This function returns the actual height of the specified font and size.*

  - FL\_EXPORT const char \* [fl\\_latin1\\_to\\_local](#) (const char \*t, int n=-1)

*Converts text from Windows/X11 latin1 character set to local encoding.*

  - void [fl\\_line](#) (int x, int y, int x1, int y1)

*Draws a line from (x,y) to (x1,y1)*

  - void [fl\\_line](#) (int x, int y, int x1, int y1, int x2, int y2)

*Draws a line from (x,y) to (x1,y1) and another from (x1,y1) to (x2,y2)*

  - void [fl\\_line\\_style](#) (int style, int width=0, char \*dashes=0)

*Sets how to draw lines (the "pen").*

  - FL\_EXPORT const char \* [fl\\_local\\_to\\_latin1](#) (const char \*t, int n=-1)

*Converts text from local encoding to Windows/X11 latin1 character set.*

  - FL\_EXPORT const char \* [fl\\_local\\_to\\_mac\\_roman](#) (const char \*t, int n=-1)

*Converts text from local encoding to Mac Roman character set.*

  - void [fl\\_loop](#) (int x, int y, int x1, int y1, int x2, int y2)

- Outlines a 3-sided polygon with lines.*

  - void `fl_loop` (int x, int y, int x1, int y1, int x2, int y2, int x3, int y3)
- Outlines a 4-sided polygon with lines.*

  - FL\_EXPORT const char \* `fl_mac_roman_to_local` (const char \*t, int n=-1)

*Converts text from Mac Roman character set to local encoding.*

  - FL\_EXPORT void `fl_measure` (const char \*str, int &x, int &y, int draw\_symbols=1)

*Measure how wide and tall the string will be when printed by the `fl_draw()` function with `align` parameter.*

  - FL\_EXPORT int `fl_measure_pixmap` (char \*const \*data, int &w, int &h)

*Get the dimensions of a pixmap.*

  - FL\_EXPORT int `fl_measure_pixmap` (const char \*const \*cdata, int &w, int &h)

*Get the dimensions of a pixmap.*

  - void `fl_mult_matrix` (double a, double b, double c, double d, double x, double y)

*Concatenates another transformation onto the current one.*

  - int `fl_not_clipped` (int x, int y, int w, int h)

*Does the rectangle intersect the current clip region?*

  - FL\_EXPORT unsigned int `fl_old_shortcut` (const char \*s)

*Emulation of XForms named shortcuts.*

  - FL\_EXPORT void `fl_overlay_clear` ()

*Erase a selection rectangle without drawing a new one.*

  - FL\_EXPORT void `fl_overlay_rect` (int x, int y, int w, int h)

*Draws a selection rectangle, erasing a previous one by XOR'ing it first.*

  - void `fl_pie` (int x, int y, int w, int h, double a1, double a2)

*Draw filled ellipse sections using integer coordinates.*

  - void `fl_point` (int x, int y)

*Draws a single pixel at the given coordinates.*

  - void `fl_polygon` (int x, int y, int x1, int y1, int x2, int y2)

*Fills a 3-sided polygon.*

  - void `fl_polygon` (int x, int y, int x1, int y1, int x2, int y2, int x3, int y3)

*Fills a 4-sided polygon.*

  - void `fl_pop_clip` ()

*Restores the previous clip region.*

  - void `fl_pop_matrix` ()

*Restores the current transformation matrix from the stack.*

  - void `fl_push_clip` (int x, int y, int w, int h)

*Intersects the current clip region with a rectangle and pushes this new region onto the stack.*

  - void `fl_push_matrix` ()

*Saves the current transformation matrix on the stack.*

  - void `fl_push_no_clip` ()

*Pushes an empty clip region onto the stack so nothing will be clipped.*

  - FL\_EXPORT uchar \* `fl_read_image` (uchar \*p, int X, int Y, int W, int H, int alpha=0)

*Reads an RGB(A) image from the current window or off-screen buffer.*

  - void `fl_rect` (int x, int y, int w, int h)

*Draws a 1-pixel border inside the given bounding box.*

  - void `fl_rect` (int x, int y, int w, int h, FL\_Color c)

*Draws with passed color a 1-pixel border inside the given bounding box.*

  - void `fl_rectf` (int x, int y, int w, int h)

*Colors with current color a rectangle that exactly fills the given bounding box.*

  - void `fl_rectf` (int x, int y, int w, int h, FL\_Color c)

*Colors with passed color a rectangle that exactly fills the given bounding box.*

  - FL\_EXPORT void `fl_rectf` (int x, int y, int w, int h, uchar r, uchar g, uchar b)

*Colors a rectangle with "exactly" the passed `r`, `g`, `b` color.*

- FL\_EXPORT void [fl\\_reset\\_spot](#) (void)
- void [fl\\_restore\\_clip](#) ()
  - Undoes any clobbering of clip done by your program.*
- void [fl\\_rotate](#) (double d)
  - Concatenates rotation transformation onto the current one.*
- void [fl\\_rtl\\_draw](#) (const char \*str, int n, int x, int y)
  - Draws a UTF-8 string of length n bytes right to left starting at the given x, y location.*
- void [fl\\_scale](#) (double x)
  - Concatenates scaling transformation onto the current one.*
- void [fl\\_scale](#) (double x, double y)
  - Concatenates scaling transformation onto the current one.*
- FL\_EXPORT void [fl\\_scroll](#) (int X, int Y, int W, int H, int dx, int dy, void(\*draw\_area)(void \*, int, int, int, int), void \*data)
  - Scroll a rectangle and draw the newly exposed portions.*
- FL\_EXPORT void [fl\\_set\\_spot](#) (int font, int size, int X, int Y, int W, int H, [FL\\_Window](#) \*win=0)
- FL\_EXPORT void [fl\\_set\\_status](#) (int X, int Y, int W, int H)
- FL\_EXPORT const char \* [fl\\_shortcut\\_label](#) (unsigned int shortcut)
  - Get a human-readable string from a shortcut value.*
- FL\_EXPORT const char \* [fl\\_shortcut\\_label](#) (unsigned int shortcut, const char \*\*eom)
  - Get a human-readable string from a shortcut value.*
- [Fl\\_Fontsize](#) [fl\\_size](#) ()
  - Returns the size set by the most recent call to [fl\\_font\(\)](#).*
- FL\_EXPORT void [fl\\_text\\_extents](#) (const char \*, int &dx, int &dy, int &w, int &h)
  - Determines the minimum pixel dimensions of a nul-terminated string.*
- void [fl\\_text\\_extents](#) (const char \*t, int n, int &dx, int &dy, int &w, int &h)
  - Determines the minimum pixel dimensions of a sequence of n characters.*
- double [fl\\_transform\\_dx](#) (double x, double y)
  - Transforms distance using current transformation matrix.*
- double [fl\\_transform\\_dy](#) (double x, double y)
  - Transforms distance using current transformation matrix.*
- double [fl\\_transform\\_x](#) (double x, double y)
  - Transforms coordinate using the current transformation matrix.*
- double [fl\\_transform\\_y](#) (double x, double y)
  - Transforms coordinate using the current transformation matrix.*
- void [fl\\_transformed\\_vertex](#) (double xf, double yf)
  - Adds coordinate pair to the vertex list without further transformations.*
- void [fl\\_translate](#) (double x, double y)
  - Concatenates translation transformation onto the current one.*
- void [fl\\_vertex](#) (double x, double y)
  - Adds a single vertex to the current path.*
- FL\_EXPORT double [fl\\_width](#) (const char \*txt)
  - Returns the typographical width of a nul-terminated string using the current font face and size.*
- double [fl\\_width](#) (const char \*txt, int n)
  - Returns the typographical width of a sequence of n characters using the current font face and size.*
- double [fl\\_width](#) (unsigned int c)
  - Returns the typographical width of a single character using the current font face and size.*
- void [fl\\_xyline](#) (int x, int y, int x1)
  - Draws a horizontal line from (x,y) to (x1,y)*
- void [fl\\_xyline](#) (int x, int y, int x1, int y2)
  - Draws a horizontal line from (x,y) to (x1,y), then vertical from (x1,y) to (x1,y2)*
- void [fl\\_xyline](#) (int x, int y, int x1, int y2, int x3)
  - Draws a horizontal line from (x,y) to (x1,y), then vertical from (x1,y) to (x1,y2)*

*Draws a horizontal line from (x,y) to (x1,y), then a vertical from (x1,y) to (x1,y2) and then another horizontal from (x1,y2) to (x3,y2)*

- void [fl\\_yxline](#) (int x, int y, int y1)

*Draws a vertical line from (x,y) to (x,y1)*

- void [fl\\_yxline](#) (int x, int y, int y1, int x2)

*Draws a vertical line from (x,y) to (x,y1), then a horizontal from (x,y1) to (x2,y1)*

- void [fl\\_yxline](#) (int x, int y, int y1, int x2, int y3)

*Draws a vertical line from (x,y) to (x,y1) then a horizontal from (x,y1) to (x2,y1), then another vertical from (x2,y1) to (x2,y3)*

## Variables

- FL\_EXPORT char [fl\\_draw\\_shortcut](#)

### 32.15.1 Detailed Description

utility header to pull drawing functions together

## 32.16 Fl\_Image.H File Reference

[Fl\\_Image](#), [Fl\\_RGB\\_Image](#) classes.

```
#include "Enumerations.H"
#include <stdlib.h>
```

## Classes

- class [Fl\\_Image](#)

*Base class for image caching and drawing.*

- class [Fl\\_RGB\\_Image](#)

*The [Fl\\_RGB\\_Image](#) class supports caching and drawing of full-color images with 1 to 4 channels of color information.*

## Enumerations

- enum [Fl\\_RGB\\_Scaling](#) { [FL\\_RGB\\_SCALING\\_NEAREST](#) = 0 , [FL\\_RGB\\_SCALING\\_BILINEAR](#) }

*The scaling algorithm to use for RGB images.*

### 32.16.1 Detailed Description

[Fl\\_Image](#), [Fl\\_RGB\\_Image](#) classes.

### 32.16.2 Enumeration Type Documentation

#### 32.16.2.1 Fl\_RGB\_Scaling

enum [Fl\\_RGB\\_Scaling](#)

The scaling algorithm to use for RGB images.

#### Enumerator

|                                         |                                                       |
|-----------------------------------------|-------------------------------------------------------|
| <a href="#">FL_RGB_SCALING_NEAREST</a>  | default RGB image scaling algorithm                   |
| <a href="#">FL_RGB_SCALING_BILINEAR</a> | more accurate, but slower RGB image scaling algorithm |

## 32.17 fl\_line\_style.cxx File Reference

Line style drawing utility hiding different platforms.

```
#include <FL/Fl.H>
#include <FL/fl_draw.H>
#include <FL/x.H>
#include <FL/Fl_Printer.H>
#include "flstring.h"
#include <stdio.h>
```

### Variables

- int `fl_line_width_` = 0

### 32.17.1 Detailed Description

Line style drawing utility hiding different platforms.

## 32.18 Fl\_Menu\_Item.H File Reference

```
#include "Fl_Widget.H"
#include "Fl_Image.H"
```

### Classes

- struct [Fl\\_Menu\\_Item](#)

*The [Fl\\_Menu\\_Item](#) structure defines a single menu item that is used by the [Fl\\_Menu\\_](#) class.*

### Typedefs

- typedef [Fl\\_Menu\\_Item](#) **Fl\_Menu**

### Enumerations

- enum {  
[FL\\_MENU\\_INACTIVE](#) = 1 , [FL\\_MENU\\_TOGGLE](#) = 2 , [FL\\_MENU\\_VALUE](#) = 4 , [FL\\_MENU\\_RADIO](#) = 8 ,  
[FL\\_MENU\\_INVISIBLE](#) = 0x10 , [FL\\_SUBMENU\\_POINTER](#) = 0x20 , [FL\\_SUBMENU](#) = 0x40 , [FL\\_MENU\\_DIVIDER](#)  
= 0x80 ,  
[FL\\_MENU\\_HORIZONTAL](#) = 0x100 }
- enum {  
**FL\_PUP\_NONE** = 0 , **FL\_PUP\_GREY** = [FL\\_MENU\\_INACTIVE](#) , **FL\_PUP\_GRAY** = [FL\\_MENU\\_INACTIVE](#) ,  
**FL\_MENU\_BOX** = [FL\\_MENU\\_TOGGLE](#) ,  
**FL\_PUP\_BOX** = [FL\\_MENU\\_TOGGLE](#) , **FL\_MENU\_CHECK** = [FL\\_MENU\\_VALUE](#) , **FL\_PUP\_CHECK** = [FL\\_MENU\\_VALUE](#) ,  
**FL\_PUP\_RADIO** = [FL\\_MENU\\_RADIO](#) ,  
**FL\_PUP\_INVISIBLE** = [FL\\_MENU\\_INVISIBLE](#) , **FL\_PUP\_SUBMENU** = [FL\\_SUBMENU\\_POINTER](#) }

### Functions

- FL\_EXPORT [Fl\\_Shortcut](#) `fl_old_shortcut` (const char \*)  
*Emulation of XForms named shortcuts.*

### 32.18.1 Enumeration Type Documentation



### 32.18.1.1 anonymous enum

anonymous enum

#### Enumerator

|                    |                                                                           |
|--------------------|---------------------------------------------------------------------------|
| FL_MENU_INACTIVE   | Deactivate menu item (gray out)                                           |
| FL_MENU_TOGGLE     | Item is a checkbox toggle (shows checkbox for on/off state)               |
| FL_MENU_VALUE      | The on/off state for checkbox/radio buttons (if set, state is 'on')       |
| FL_MENU_RADIO      | Item is a radio button (one checkbox of many can be on)                   |
| FL_MENU_INVISIBLE  | Item will not show up (shortcut will work)                                |
| FL_SUBMENU_POINTER | Indicates user_data() is a pointer to another menu array.                 |
| FL_SUBMENU         | This item is a submenu to other items.                                    |
| FL_MENU_DIVIDER    | Creates divider line below this item. Also ends a group of radio buttons. |
| FL_MENU_HORIZONTAL | ??? – reserved                                                            |

## 32.19 FI\_Native\_File\_Chooser.H File Reference

[FI\\_Native\\_File\\_Chooser](#) widget.

```
#include <FL/Fl_File_Chooser.H>
```

### Classes

- class [FI\\_FLTK\\_File\\_Chooser](#)
- class [FI\\_GTK\\_File\\_Chooser](#)
- class [FI\\_Native\\_File\\_Chooser](#)

*This class lets an FLTK application easily and consistently access the operating system's native file chooser.*

### 32.19.1 Detailed Description

[FI\\_Native\\_File\\_Chooser](#) widget.

## 32.20 FI\_Paged\_Device.cxx File Reference

implementation of class [FI\\_Paged\\_Device](#).

```
#include <FL/Fl_Paged_Device.H>
```

```
#include <FL/Fl.H>
```

```
#include <FL/fl_draw.H>
```

### 32.20.1 Detailed Description

implementation of class [FI\\_Paged\\_Device](#).

## 32.21 FI\_Paged\_Device.H File Reference

declaration of class [FI\\_Paged\\_Device](#).

```
#include <FL/Fl_Device.H>
```

```
#include <FL/Fl_Window.H>
```

## Classes

- class [FI\\_Paged\\_Device](#)  
*Represents page-structured drawing surfaces.*
- struct [FI\\_Paged\\_Device::page\\_format](#)  
*width, height and name of a page format*

## Macros

- #define [NO\\_PAGE\\_FORMATS](#) 30 /\* MSVC6 compilation fix \*/  
*Number of elements in enum Page\_Format.*

### 32.21.1 Detailed Description

declaration of class [FI\\_Paged\\_Device](#).

## 32.22 FI\_PostScript.H File Reference

declaration of classes [FI\\_PostScript\\_Graphics\\_Driver](#), [FI\\_PostScript\\_File\\_Device](#).

```
#include <FL/Fl_Paged_Device.H>
#include <FL/fl_draw.H>
#include <stdarg.h>
```

## Classes

- class [FI\\_PostScript\\_File\\_Device](#)  
*To send graphical output to a PostScript file.*
- class [FI\\_PostScript\\_Graphics\\_Driver](#)  
*PostScript graphical backend.*

## Typedefs

- typedef int() [FI\\_PostScript\\_Close\\_Command](#)(FILE \*)

### 32.22.1 Detailed Description

declaration of classes [FI\\_PostScript\\_Graphics\\_Driver](#), [FI\\_PostScript\\_File\\_Device](#).

## 32.23 FI\_Printer.H File Reference

declaration of classes [FI\\_Printer](#), [FI\\_System\\_Printer](#) and [FI\\_PostScript\\_Printer](#).

```
#include <FL/x.H>
#include <FL/Fl_Paged_Device.H>
#include <FL/fl_draw.H>
#include <FL/Fl_Pixmap.H>
#include <FL/Fl_RGB_Image.H>
#include <FL/Fl_Bitmap.H>
#include <stdio.h>
#include <FL/Fl_PostScript.H>
```

## Classes

- class [Fl\\_PostScript\\_Printer](#)  
*Print support under Unix/Linux.*
- class [Fl\\_Printer](#)  
*OS-independent print support.*
- class [Fl\\_System\\_Printer](#)  
*Print support under MSWindows and Mac OS.*

### 32.23.1 Detailed Description

declaration of classes [Fl\\_Printer](#), [Fl\\_System\\_Printer](#) and [Fl\\_PostScript\\_Printer](#).

## 32.24 fl\_rect.cxx File Reference

Drawing and clipping routines for rectangles.

```
#include <config.h>
#include <FL/Fl.H>
#include <FL/Fl_Widget.H>
#include <FL/Fl_Printer.H>
#include <FL/fl_draw.H>
#include <FL/x.H>
```

## Functions

- [Fl\\_Region](#) **XRectangleRegion** (int x, int y, int w, int h)

## Variables

- int [fl\\_line\\_width\\_](#)

### 32.24.1 Detailed Description

Drawing and clipping routines for rectangles.

## 32.25 Fl\_Shared\_Image.H File Reference

[Fl\\_Shared\\_Image](#) class.

```
#include "Fl_Image.H"
```

## Classes

- class [Fl\\_Shared\\_Image](#)  
*This class supports caching, loading, scaling, and drawing of image files.*

## Typedefs

- typedef [Fl\\_Image](#) **\*(Fl\_Shared\_Handler)** (const char \*name, [uchar](#) \*header, int headerlen)

## Functions

- `FL_EXPORT void fl\_register\_images ()`  
*Register the image formats.*

### 32.25.1 Detailed Description

[Fl\\_Shared\\_Image](#) class.

### 32.25.2 Function Documentation

#### 32.25.2.1 fl\_register\_images()

```
FL_EXPORT void fl_register_images ()
```

Register the image formats.

This function is provided in the fltk\_images library and registers all of the "extra" image file formats that are not part of the core FLTK library.

## 32.26 fl\_show\_colormap.H File Reference

The [fl\\_show\\_colormap\(\)](#) function hides the implementation classes used to provide the popup window and color selection mechanism.

### Functions

- FL\_EXPORT [Fl\\_Color fl\\_show\\_colormap \(Fl\\_Color oldcol\)](#)  
*Pops up a window to let the user pick a colormap entry.*

### 32.26.1 Detailed Description

The [fl\\_show\\_colormap\(\)](#) function hides the implementation classes used to provide the popup window and color selection mechanism.

## 32.27 Fl\_Tree.H File Reference

This file contains the definitions of the [Fl\\_Tree](#) class.

```
#include <FL/Fl.H>
#include <FL/Fl_Group.H>
#include <FL/Fl_Scrollbar.H>
#include <FL/fl_draw.H>
#include <FL/Fl_Tree_Item.H>
#include <FL/Fl_Tree_Prefs.H>
```

### Classes

- class [Fl\\_Tree](#)  
*Tree widget.*

### Enumerations

- enum [Fl\\_Tree\\_Reason](#) {  
[FL\\_TREE\\_REASON\\_NONE](#) =0 , [FL\\_TREE\\_REASON\\_SELECTED](#) , [FL\\_TREE\\_REASON\\_DESELECTED](#) ,  
[FL\\_TREE\\_REASON\\_RESELECTED](#) ,  
[FL\\_TREE\\_REASON\\_OPENED](#) , [FL\\_TREE\\_REASON\\_CLOSED](#) , [FL\\_TREE\\_REASON\\_DRAGGED](#) }

*The reason the callback was invoked.*

### 32.27.1 Detailed Description

This file contains the definitions of the [Fl\\_Tree](#) class.

## 32.27.2 Enumeration Type Documentation

### 32.27.2.1 Fl\_Tree\_Reason

enum [Fl\\_Tree\\_Reason](#)

The reason the callback was invoked.

Enumerator

|                           |                                               |
|---------------------------|-----------------------------------------------|
| FL_TREE_REASON_NONE       | unknown reason                                |
| FL_TREE_REASON_SELECTED   | an item was selected                          |
| FL_TREE_REASON_DESELECTED | an item was de-selected                       |
| FL_TREE_REASON_RESELECTED | an item was re-selected (e.g. double-clicked) |
| FL_TREE_REASON_OPENED     | an item was opened                            |
| FL_TREE_REASON_CLOSED     | an item was closed                            |
| FL_TREE_REASON_DRAGGED    | an item was dragged into a new place          |

## 32.28 Fl\_Tree\_Item.H File Reference

This file contains the definitions for [Fl\\_Tree\\_Item](#).

```
#include <FL/Fl.H>
#include <FL/Fl_Widget.H>
#include <FL/Fl_Image.H>
#include <FL/fl_draw.H>
#include <FL/Fl_Tree_Item_Array.H>
#include <FL/Fl_Tree_Prefs.H>
```

### Classes

- class [Fl\\_Tree\\_Item](#)

*Tree widget item.*

### 32.28.1 Detailed Description

This file contains the definitions for [Fl\\_Tree\\_Item](#).

## 32.29 Fl\_Tree\_Item\_Array.H File Reference

This file defines a class that manages an array of [Fl\\_Tree\\_Item](#) pointers.

```
#include <FL/Fl.H>
#include "Fl_Export.H"
```

### Classes

- class [Fl\\_Tree\\_Item\\_Array](#)

*Manages an array of [Fl\\_Tree\\_Item](#) pointers.*

### 32.29.1 Detailed Description

This file defines a class that manages an array of [Fl\\_Tree\\_Item](#) pointers.

## 32.30 FI\_Tree\_Prefs.H File Reference

This file contains the definitions for [FI\\_Tree](#)'s preferences.

```
#include <FL/Fl.H>
```

### Classes

- class [FI\\_Tree\\_Prefs](#)  
*Tree widget's preferences.*

### Typedefs

- typedef void() [FI\\_Tree\\_Item\\_Draw\\_Callback](#)([FI\\_Tree\\_Item](#) \*, void \*)

### Enumerations

- enum [FI\\_Tree\\_Connector](#) { [FL\\_TREE\\_CONNECTOR\\_NONE](#) =0 , [FL\\_TREE\\_CONNECTOR\\_DOTTED](#) =1 , [FL\\_TREE\\_CONNECTOR\\_SOLID](#) =2 }
- Defines the style of connection lines between items.*
- enum [FI\\_Tree\\_Item\\_Draw\\_Mode](#) { [FL\\_TREE\\_ITEM\\_DRAW\\_DEFAULT](#) =0 , [FL\\_TREE\\_ITEM\\_DRAW\\_LABEL\\_AND\\_WIDGET](#) =1 , [FL\\_TREE\\_ITEM\\_HEIGHT\\_FROM\\_WIDGET](#) =2 }
- Bit flags that control how item's labels and widget(s) are drawn in the tree via `item_draw_mode()`.*
- enum [FI\\_Tree\\_Item\\_Reselect\\_Mode](#) { [FL\\_TREE\\_SELECTABLE\\_ONCE](#) =0 , [FL\\_TREE\\_SELECTABLE\\_ALWAYS](#) }
- Defines the ways an item can be (re) selected via `item_reselect_mode()`.*
- enum [FI\\_Tree\\_Select](#) { [FL\\_TREE\\_SELECT\\_NONE](#) =0 , [FL\\_TREE\\_SELECT\\_SINGLE](#) =1 , [FL\\_TREE\\_SELECT\\_MULTI](#) =2 , [FL\\_TREE\\_SELECT\\_SINGLE\\_DRAGGABLE](#) =3 }
- Tree selection style.*
- enum [FI\\_Tree\\_Sort](#) { [FL\\_TREE\\_SORT\\_NONE](#) =0 , [FL\\_TREE\\_SORT\\_ASCENDING](#) =1 , [FL\\_TREE\\_SORT\\_DESCENDING](#) =2 }
- Sort order options for items added to the tree.*

### 32.30.1 Detailed Description

This file contains the definitions for [FI\\_Tree](#)'s preferences.

```
Fl_Tree_Prefs
:
:
:
Fl_Tree :
|_____ Fl_Tree_Item
```

### 32.30.2 Enumeration Type Documentation

#### 32.30.2.1 FI\_Tree\_Connector

enum [Fl\\_Tree\\_Connector](#)

Defines the style of connection lines between items.

#### Enumerator

|                                          |                                             |
|------------------------------------------|---------------------------------------------|
| <a href="#">FL_TREE_CONNECTOR_NONE</a>   | Use no lines connecting items.              |
| <a href="#">FL_TREE_CONNECTOR_DOTTED</a> | Use dotted lines connecting items (default) |
| <a href="#">FL_TREE_CONNECTOR_SOLID</a>  | Use solid lines connecting items.           |

**32.30.2.2 Fl\_Tree\_Item\_Draw\_Mode**enum `Fl_Tree_Item_Draw_Mode`Bit flags that control how item's labels and widget()s are drawn in the tree via `item_draw_mode()`.**Enumerator**

|                                                 |                                                                                                                  |
|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| <code>FL_TREE_ITEM_DRAW_DEFAULT</code>          | If <code>widget()</code> defined, draw in place of label, and <code>widget()</code> tracks item height (default) |
| <code>FL_TREE_ITEM_DRAW_LABEL_AND_WIDGET</code> | If <code>widget()</code> defined, include label to the left of the widget.                                       |
| <code>FL_TREE_ITEM_HEIGHT_FROM_WIDGET</code>    | If <code>widget()</code> defined, <code>widget()</code> 's height controls item's height.                        |

**32.30.2.3 Fl\_Tree\_Item\_Reselect\_Mode**enum `Fl_Tree_Item_Reselect_Mode`Defines the ways an item can be (re) selected via `item_reselect_mode()`.**Enumerator**

|                                        |                                                                      |
|----------------------------------------|----------------------------------------------------------------------|
| <code>FL_TREE_SELECTABLE_ONCE</code>   | Item can only be selected once (default)                             |
| <code>FL_TREE_SELECTABLE_ALWAYS</code> | Enables <code>FL_TREE_REASON_RESELECTED</code> events for callbacks. |

**32.30.2.4 Fl\_Tree\_Select**enum `Fl_Tree_Select`

Tree selection style.

**Enumerator**

|                                              |                                                                             |
|----------------------------------------------|-----------------------------------------------------------------------------|
| <code>FL_TREE_SELECT_NONE</code>             | Nothing selected when items are clicked.                                    |
| <code>FL_TREE_SELECT_SINGLE</code>           | Single item selected when item is clicked (default)                         |
| <code>FL_TREE_SELECT_MULTI</code>            | Multiple items can be selected by clicking with SHIFT, CTRL or mouse drags. |
| <code>FL_TREE_SELECT_SINGLE_DRAGGABLE</code> | Single items may be selected, and they may be. reordered by mouse drag.     |

**32.30.2.5 Fl\_Tree\_Sort**enum `Fl_Tree_Sort`

Sort order options for items added to the tree.

**Enumerator**

|                                      |                                                             |
|--------------------------------------|-------------------------------------------------------------|
| <code>FL_TREE_SORT_NONE</code>       | No sorting; items are added in the order defined (default). |
| <code>FL_TREE_SORT_ASCENDING</code>  | Add items in ascending sort order.                          |
| <code>FL_TREE_SORT_DESCENDING</code> | Add items in descending sort order.                         |

## 32.31 fl\_types.h File Reference

This file contains simple "C"-style type definitions.

### Typedefs

#### Miscellaneous

- typedef unsigned int [Fl\\_Char](#)  
*24-bit Unicode character - upper 8 bits are unused*
- typedef const char \* [Fl\\_CString](#)  
*Flexible length UTF-8 Unicode read-only string.*
- typedef unsigned int [Fl\\_Shortcut](#)  
*24-bit Unicode character + 8-bit indicator for keyboard flags*
- typedef char \* [Fl\\_String](#)  
*Flexible length UTF-8 Unicode text.*
- typedef unsigned char [uchar](#)  
*unsigned char*
- typedef unsigned long [ulong](#)  
*unsigned long*

### 32.31.1 Detailed Description

This file contains simple "C"-style type definitions.

### 32.31.2 Typedef Documentation

#### 32.31.2.1 Fl\_CString

```
typedef const char* Fl_CString
```

Flexible length UTF-8 Unicode read-only string.

See also

[Fl\\_String](#)

#### 32.31.2.2 Fl\_String

```
typedef char* Fl_String
```

Flexible length UTF-8 Unicode text.

**Todo** FIXME: temporary (?) typedef to mark UTF-8 and Unicode conversions

## 32.32 fl\_utf8.h File Reference

header for Unicode and UTF-8 character handling

```
#include "Fl_Export.H"
#include "fl_types.h"
#include <stdio.h>
#include <string.h>
#include <stdlib.h>
#include <sys/types.h>
#include <sys/stat.h>
#include <locale.h>
```



## Macros

- #define **xchar** unsigned short

## Functions

- FL\_EXPORT int [fl\\_access](#) (const char \*f, int mode)  
*Cross-platform function to test a files access() with a UTF-8 encoded name or value.*
- FL\_EXPORT int [fl\\_chmod](#) (const char \*f, int mode)  
*Cross-platform function to set a files mode() with a UTF-8 encoded name or value.*
- FL\_EXPORT int [fl\\_execvp](#) (const char \*file, char \*const \*argv)
- FL\_EXPORT FILE \* [fl\\_fopen](#) (const char \*f, const char \*mode)  
*Cross-platform function to open files with a UTF-8 encoded name.*
- FL\_EXPORT char \* [fl\\_getcwd](#) (char \*b, int l)  
*Cross-platform function to get the current working directory as a UTF-8 encoded value.*
- FL\_EXPORT char \* [fl\\_getenv](#) (const char \*v)  
*Cross-platform function to get environment variables with a UTF-8 encoded name or value.*
- FL\_EXPORT char [fl\\_make\\_path](#) (const char \*path)  
*Cross-platform function to recursively create a path in the file system.*
- FL\_EXPORT void [fl\\_make\\_path\\_for\\_file](#) (const char \*path)  
*Cross-platform function to create a path for the file in the file system.*
- FL\_EXPORT int [fl\\_mkdir](#) (const char \*f, int mode)  
*Cross-platform function to create a directory with a UTF-8 encoded name.*
- FL\_EXPORT unsigned int [fl\\_nonspacing](#) (unsigned int ucs)  
*Returns true if the Unicode character ucs is non-spacing.*
- FL\_EXPORT int [fl\\_open](#) (const char \*f, int oflags,...)  
*Cross-platform function to open files with a UTF-8 encoded name.*
- FL\_EXPORT int [fl\\_rename](#) (const char \*f, const char \*n)  
*Cross-platform function to rename a filesystem object using UTF-8 encoded names.*
- FL\_EXPORT int [fl\\_rmdir](#) (const char \*f)  
*Cross-platform function to remove a directory with a UTF-8 encoded name.*
- FL\_EXPORT int [fl\\_stat](#) (const char \*f, struct stat \*b)  
*Cross-platform function to stat() a file using a UTF-8 encoded name or value.*
- FL\_EXPORT int [fl\\_system](#) (const char \*cmd)  
*Cross-platform function to run a system command with a UTF-8 encoded string.*
- FL\_EXPORT int [fl\\_tolower](#) (unsigned int ucs)  
*Returns the Unicode lower case value of ucs.*
- FL\_EXPORT int [fl\\_toupper](#) (unsigned int ucs)  
*Returns the Unicode upper case value of ucs.*
- FL\_EXPORT unsigned [fl\\_ucs\\_to\\_Utf16](#) (const unsigned ucs, unsigned short \*dst, const unsigned dstlen)
- FL\_EXPORT int [fl\\_unlink](#) (const char \*f)  
*Cross-platform function to unlink() (that is, delete) a file using a UTF-8 encoded filename.*
- FL\_EXPORT char \* [fl\\_utf2mbcs](#) (const char \*s)  
*Converts UTF-8 string s to a local multi-byte character string.*
- FL\_EXPORT const char \* [fl\\_utf8back](#) (const char \*p, const char \*start, const char \*end)
- FL\_EXPORT int [fl\\_utf8bytes](#) (unsigned ucs)  
*Return the number of bytes needed to encode the given UCS4 character in UTF-8.*
- FL\_EXPORT unsigned [fl\\_utf8decode](#) (const char \*p, const char \*end, int \*len)
- FL\_EXPORT int [fl\\_utf8encode](#) (unsigned ucs, char \*buf)
- FL\_EXPORT unsigned [fl\\_utf8from\\_mb](#) (char \*dst, unsigned dstlen, const char \*src, unsigned srclen)
- FL\_EXPORT unsigned [fl\\_utf8froma](#) (char \*dst, unsigned dstlen, const char \*src, unsigned srclen)
- FL\_EXPORT unsigned [fl\\_utf8fromwvc](#) (char \*dst, unsigned dstlen, const wchar\_t \*src, unsigned srclen)

- FL\_EXPORT const char \* [fl\\_utf8fwd](#) (const char \*p, const char \*start, const char \*end)
- FL\_EXPORT int [fl\\_utf8len](#) (char c)  
*Returns the byte length of the UTF-8 sequence with first byte c, or -1 if c is not valid.*
- FL\_EXPORT int [fl\\_utf8len1](#) (char c)  
*Returns the byte length of the UTF-8 sequence with first byte c, or 1 if c is not valid.*
- FL\_EXPORT int [fl\\_utf8locale](#) (void)
- FL\_EXPORT int [fl\\_utf8test](#) (const char \*src, unsigned len)
- FL\_EXPORT unsigned [fl\\_utf8to\\_mb](#) (const char \*src, unsigned srclen, char \*dst, unsigned dstlen)
- FL\_EXPORT unsigned [fl\\_utf8toa](#) (const char \*src, unsigned srclen, char \*dst, unsigned dstlen)
- FL\_EXPORT unsigned [fl\\_utf8toUtf16](#) (const char \*src, unsigned srclen, unsigned short \*dst, unsigned dstlen)
- FL\_EXPORT unsigned [fl\\_utf8towc](#) (const char \*src, unsigned srclen, wchar\_t \*dst, unsigned dstlen)  
*Converts a UTF-8 string into a wide character string.*
- FL\_EXPORT int [fl\\_utf\\_nb\\_char](#) (const unsigned char \*buf, int len)  
*Returns the number of Unicode chars in the UTF-8 string.*
- FL\_EXPORT int [fl\\_utf\\_strcasecmp](#) (const char \*s1, const char \*s2)  
*UTF-8 aware strcasecmp - converts to Unicode and tests.*
- FL\_EXPORT int [fl\\_utf\\_strncasecmp](#) (const char \*s1, const char \*s2, int n)  
*UTF-8 aware strncasecmp - converts to lower case Unicode and tests.*
- FL\_EXPORT int [fl\\_utf\\_tolower](#) (const unsigned char \*str, int len, char \*buf)  
*Converts the string str to its lower case equivalent into buf.*
- FL\_EXPORT int [fl\\_utf\\_toupper](#) (const unsigned char \*str, int len, char \*buf)  
*Converts the string str to its upper case equivalent into buf.*
- FL\_EXPORT int [fl\\_wcwidth](#) (const char \*src)  
*extended wrapper around fl\_wcwidth\_(unsigned int ucs) function.*
- FL\_EXPORT int [fl\\_wcwidth\\_](#) (unsigned int ucs)  
*wrapper to adapt Markus Kuhn's implementation of wcwidth() for FLTK*

### 32.32.1 Detailed Description

header for Unicode and UTF-8 character handling

## 32.33 fl\_vertex.cxx File Reference

Portable drawing code for drawing arbitrary shapes with simple 2D transformations.

```
#include <config.h>
#include <FL/fl_draw.H>
#include <FL/x.H>
#include <FL/Fl.H>
#include <FL/math.h>
#include <stdlib.h>
```

### 32.33.1 Detailed Description

Portable drawing code for drawing arbitrary shapes with simple 2D transformations.

## 32.34 FI\_Widget.H File Reference

[Fl\\_Widget](#), [Fl\\_Label](#) classes .

```
#include "Enumerations.H"
```

## Classes

- struct [Fl\\_Label](#)  
*This struct stores all information for a text or mixed graphics label.*
- class [Fl\\_Widget](#)  
*Fl\_Widget is the base class for all widgets in FLTK.*

## Macros

- `#define FL_RESERVED_TYPE 100`  
*Reserved type numbers (necessary for my cheapo RTTI) start here.*

## Typedefs

- typedef void() [Fl\\_Callback](#)([Fl\\_Widget](#) \*, void \*)  
*Default callback type definition for all fltk widgets (by far the most used)*
- typedef void() [Fl\\_Callback0](#)([Fl\\_Widget](#) \*)  
*One parameter callback type definition passing only the widget.*
- typedef void() [Fl\\_Callback1](#)([Fl\\_Widget](#) \*, long)  
*Callback type definition passing the widget and a long data value.*
- typedef [Fl\\_Callback](#) \* [Fl\\_Callback\\_p](#)  
*Default callback type pointer definition for all fltk widgets.*
- typedef long [fl\\_intptr\\_t](#)
- typedef unsigned long [fl\\_uintptr\\_t](#)

### 32.34.1 Detailed Description

[Fl\\_Widget](#), [Fl\\_Label](#) classes .

### 32.34.2 Macro Definition Documentation

#### 32.34.2.1 FL\_RESERVED\_TYPE

```
#define FL_RESERVED_TYPE 100
```

Reserved type numbers (necessary for my cheapo RTTI) start here.

Grep the header files for "RESERVED\_TYPE" to find the next available number.

### 32.34.3 Typedef Documentation

#### 32.34.3.1 fl\_intptr\_t

```
typedef long fl_intptr_t
```

**Todo** typedef's `fl_intptr_t` and `fl_uintptr_t` should be documented.

## 32.35 Fl\_Window.H File Reference

[Fl\\_Window](#) widget .

```
#include "Fl_Group.H"
#include "Fl_Bitmap.H"
#include <stdlib.h>
```

## Classes

- class [FL\\_Window](#)  
*This widget produces an actual window.*
- struct [FL\\_Window::shape\\_data\\_type](#)  
*Data supporting a non-rectangular window shape.*

## Macros

- #define [FL\\_DOUBLE\\_WINDOW](#) 0xF1  
*double window type id*
- #define [FL\\_WINDOW](#) 0xF0  
*window type id all subclasses have type() >= this*

### 32.35.1 Detailed Description

[FL\\_Window](#) widget .

## 32.36 gl.h File Reference

This file defines wrapper functions for OpenGL in FLTK.

```
#include "Enumerations.H"
#include <GL/gl.h>
```

## Functions

- FL\_EXPORT void [gl\\_color](#) ([FL\\_Color](#) i)  
*Sets the current OpenGL color to an FLTK color.*
- void [gl\\_color](#) (int c)  
*back compatibility*
- FL\_EXPORT int [gl\\_descent](#) ()  
*Returns the current font's descent.*
- FL\_EXPORT void [gl\\_draw](#) (const char \*)  
*Draws a nul-terminated string in the current font at the current position.*
- FL\_EXPORT void [gl\\_draw](#) (const char \*, float x, float y)  
*Draws a nul-terminated string in the current font at the given position.*
- FL\_EXPORT void [gl\\_draw](#) (const char \*, int n)  
*Draws an array of n characters of the string in the current font at the current position.*
- FL\_EXPORT void [gl\\_draw](#) (const char \*, int n, float x, float y)  
*Draws n characters of the string in the current font at the given position.*
- FL\_EXPORT void [gl\\_draw](#) (const char \*, int n, int x, int y)  
*Draws n characters of the string in the current font at the given position.*
- FL\_EXPORT void [gl\\_draw](#) (const char \*, int x, int y)  
*Draws a nul-terminated string in the current font at the given position.*
- FL\_EXPORT void [gl\\_draw](#) (const char \*, int x, int y, int w, int h, [FL\\_Align](#))  
*Draws a string formatted into a box, with newlines and tabs expanded, other control characters changed to ^X.*
- FL\_EXPORT void [gl\\_draw\\_image](#) (const [uchar](#) \*, int x, int y, int w, int h, int d=3, int ld=0)
- FL\_EXPORT void [gl\\_finish](#) ()  
*Releases an OpenGL context.*
- FL\_EXPORT void [gl\\_font](#) (int fontid, int size)  
*Sets the current OpenGL font to the same font as calling [fl\\_font\(\)](#)*
- FL\_EXPORT int [gl\\_height](#) ()

- Returns the current font's height.*
- FL\_EXPORT void [gl\\_measure](#) (const char \*, int &x, int &y)  
*Measure how wide and tall the string will be when drawn by the [gl\\_draw\(\)](#) function.*
- FL\_EXPORT void [gl\\_rect](#) (int x, int y, int w, int h)  
*Outlines the given rectangle with the current color.*
- void [gl\\_rectf](#) (int x, int y, int w, int h)  
*Fills the given rectangle with the current color.*
- FL\_EXPORT void [gl\\_start](#) ()  
*Creates an OpenGL context.*
- FL\_EXPORT double [gl\\_width](#) (const char \*)  
*Returns the width of the string in the current font.*
- FL\_EXPORT double [gl\\_width](#) (const char \*, int n)  
*Returns the width of n characters of the string in the current font.*
- FL\_EXPORT double [gl\\_width](#) (uchar)  
*Returns the width of the character in the current font.*

### 32.36.1 Detailed Description

This file defines wrapper functions for OpenGL in FLTK.

To use OpenGL from within an FLTK application you MUST use [gl\\_visual\(\)](#) to select the default visual before doing [show\(\)](#) on any windows. Mesa will crash if you try to use a visual not returned by [glxChooseVisual](#).

This does not work with [Fl\\_Double\\_Window](#)'s! It will try to draw into the front buffer. Depending on the system this will either crash or do nothing (when pixmaps are being used as back buffer and GL is being done by hardware), work correctly (when GL is done with software, such as Mesa), or draw into the front buffer and be erased when the buffers are swapped (when double buffer hardware is being used)

### 32.36.2 Function Documentation

#### 32.36.2.1 [gl\\_color\(\)](#)

```
FL_EXPORT void gl_color (
 Fl_Color i)
```

Sets the current OpenGL color to an FLTK color.

For color-index modes it will use [fl\\_xpixel\(c\)](#), which is only right if the window uses the default colormap!

#### 32.36.2.2 [gl\\_draw\(\)](#) [1/7]

```
FL_EXPORT void gl_draw (
 const char * str)
```

Draws a nul-terminated string in the current font at the current position.

See also

On the Mac OS X platform, see [gl\\_texture\\_pile\\_height\(int\)](#)

#### 32.36.2.3 [gl\\_draw\(\)](#) [2/7]

```
FL_EXPORT void gl_draw (
 const char * str,
 float x,
 float y)
```

Draws a nul-terminated string in the current font at the given position.

See also

On the Mac OS X platform, see [gl\\_texture\\_pile\\_height\(int\)](#)

**32.36.2.4 gl\_draw() [3/7]**

```
FL_EXPORT void gl_draw (
 const char * str,
 int n)
```

Draws an array of n characters of the string in the current font at the current position.

**See also**

On the Mac OS X platform, see [gl\\_texture\\_pile\\_height\(int\)](#)

**32.36.2.5 gl\_draw() [4/7]**

```
FL_EXPORT void gl_draw (
 const char * str,
 int n,
 float x,
 float y)
```

Draws n characters of the string in the current font at the given position.

**See also**

On the Mac OS X platform, see [gl\\_texture\\_pile\\_height\(int\)](#)

**32.36.2.6 gl\_draw() [5/7]**

```
FL_EXPORT void gl_draw (
 const char * str,
 int n,
 int x,
 int y)
```

Draws n characters of the string in the current font at the given position.

**See also**

On the Mac OS X platform, see [gl\\_texture\\_pile\\_height\(int\)](#)

**32.36.2.7 gl\_draw() [6/7]**

```
FL_EXPORT void gl_draw (
 const char * str,
 int x,
 int y)
```

Draws a nul-terminated string in the current font at the given position.

**See also**

On the Mac OS X platform, see [gl\\_texture\\_pile\\_height\(int\)](#)

**32.36.2.8 gl\_draw() [7/7]**

```
FL_EXPORT void gl_draw (
 const char * str,
 int x,
 int y,
 int w,
```

```

 int h,
 Fl_Align align)

```

Draws a string formatted into a box, with newlines and tabs expanded, other control characters changed to ^X. and aligned with the edges or center. Exactly the same output as [fl\\_draw\(\)](#).

### 32.36.2.9 gl\_rect()

```

FL_EXPORT void gl_rect (
 int x,
 int y,
 int w,
 int h)

```

Outlines the given rectangle with the current color.

If [Fl\\_Gl\\_Window::ortho\(\)](#) has been called, then the rectangle will exactly fill the given pixel rectangle.

### 32.36.2.10 gl\_rectf()

```

void gl_rectf (
 int x,
 int y,
 int w,
 int h) [inline]

```

Fills the given rectangle with the current color.

See also

[gl\\_rect\(int x, int y, int w, int h\)](#)

## 32.37 mac.H File Reference

Mac OS X-specific symbols.

### Classes

- class [Fl\\_Mac\\_App\\_Menu](#)  
*Mac OS-specific class allowing to customize and localize the application menu.*

### Functions

- void [fl\\_mac\\_set\\_about](#) ([Fl\\_Callback](#) \*cb, void \*user\_data, int shortcut=0)  
*Attaches a callback to the "About myprog" item of the system application menu.*
- void [fl\\_open\\_callback](#) (void(\*cb)(const char \*))  
*Register a function called for each file dropped onto an application icon.*

### Variables

- int [fl\\_mac\\_os\\_version](#)  
*The version number of the running Mac OS X (e.g., 100604 for 10.6.4)*
- int [fl\\_mac\\_quit\\_early](#)  
*Determines whether cmd-Q or the "Quit xxx" item of application menu terminates the app or only the event loop.*
- class [Fl\\_Sys\\_Menu\\_Bar](#) \* [fl\\_sys\\_menu\\_bar](#)  
*The system menu bar.*

### 32.37.1 Detailed Description

Mac OS X-specific symbols.





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