



Start today with Red Hat's implementation of OpenJDK—a free and open source implementation of the Java Platform, Standard Edition (Java SE). The following downloads are for development only, please use the Customer Portal downloads for OpenJDK support. OpenJDK 11 Windows 64-bit OpenJDK 15 Windows bit Supplemental (no support) Supplemental (no support) Migration Toolkit for Applications helps analyze, impact, and facilitate applications of the Java programming language The Java language has undergone several changes since JDK 1.0 as well as numerous additions of classes and packages to the standard library. Since J2SE 1.4, the evolution of the Java language has been governed by the Java Community Process (JCP), which uses Java Specification Requests (JSRs) to propose and specify additions and changes to the Java platform. The language is specified by the Java Language Specification (JLS); changes to the JLS are managed under JSR 901. In addition to the language changes, other changes have been made to the Java Class Library over the years, which has grown from a few hundred classes in JDK 1.0 to over three thousand in J2SE 5. Entire new APIs, such as Swing and Java2D, have been introduced, and many of the original JDK 1.0 classes and methods have been deprecated. Some programs allow conversion of the Java SE Java backported to 1.4) (see Java backporting tools). Regarding Oracle Java SE Support Roadmap,[1] version 11 is the currently supported long-term support (LTS) version, together with Java 8 LTS, where Oracle Premier Support. Java 8 LTS last free software public update for commercial use was released by Oracle in January 2019, while Oracle continues to release no-cost public Java 8 updates for development[1] and personal use indefinitely.[2] Java 10 a previously support of Java 11 began. Java 7 is no longer publicly supported. For Java 11, long-term support will not be provided by Oracle for the public; instead, the broader OpenJDK community, as AdoptOpenJDK or others, is expected to perform the work.[3] Java 16 General Availability occurred on March 16, 2021, with Java 17 now also in development.[4] Version Releasedate End of FreePublic Updates[1][5][6][7] ExtendedSupport Until Old version, no longer maintained: JDK 1.1 February 1996 ?? Old version, no longer maintained: J2SE 1.2 December 1998 ?? Old version, no longer maintained: J2SE 1.3 May 2000 ?? Old version, no longer maintained: J2SE 1.4 February 2002 October 2008 February 2013 Old version, no longer maintained: J2SE 5.0 September 2009 April 2015 Old version, no longer maintained: Java SE 6 December 2006 April 2013 December 2018December 2023, paid support for Zulu[8] Old version, no longer maintained: Java SE 6 December 2006 April 2013 December 2008 February 2023, paid support for Zulu[8] Old version, no longer maintained: Java SE 6 December 2006 April 2013 December 2023, paid support for Zulu[8] Old version, no longer maintained: Java SE 6 December 2006 April 2013 December 2018December 2023, paid support for Zulu[8] Old version, no longer maintained: Java SE 6 December 2006 April 2013 December 2018 December 2023, paid support for Zulu[8] Old version, no longer maintained: Java SE 6 December 2006 April 2013 December 2018 December 2023, paid support for Zulu[8] Old version, no longer maintained: Java SE 6 December 2006 April 2013 December 2018 December 2023, paid support for Zulu[8] Old version, no longer maintained: Java SE 6 December 2006 April 2013 December 2018 December 2023, paid support for Zulu[8] Old version, no longer maintained: Java SE 6 December 2006 April 2013 December 2018 December 2023, paid support for Zulu[8] Old version, no longer maintained: Java SE 6 December 2006 April 2013 December 2018 maintained: Java SE 7 July 2011 April 2015 July 2022 Older version, yet still maintained: Java SE 8 (LTS) March 2014 January 2019 for Oracle (non-commercial)December 2030 for ZuluAt least May 2026 for Amazon Corretto December 2030 Old version, no longer maintained: Java SE 9 September 2017 March 2018 for OpenJDK N/A Old version, no longer maintained: Java SE 10 March 2018 for OpenJDK N/A Older version, yet still maintained: Java SE 11 (LTS) September 2018 September 2027 for ZuluAt least October 2024 for AdoptOpenJDKAt least September 2027 for Amazon Corretto September 2026, or September 2027 for e.g. Zulu[8] Old version, no longer maintained: Java SE 12 March 2019 for OpenJDK N/A Old version, no longer maintained: Java SE 13 September 2019 March 2020 for OpenJDK N/A Old version, no longer maintained: Java SE 12 March 2019 for OpenJDK N/A Old version, no longer maintained: Java SE 13 September 2019 for OpenJDK N/A Old version, no longer maintained: Java SE 12 March 2019 for OpenJDK N/A Old version, no longer maintained: Java SE 13 September 2027 for Amazon Corretto September 2027 for e.g. Zulu[8] Old version, no longer maintained: Java SE 12 March 2019 for OpenJDK N/A Old version, no longer maintained: Java SE 13 September 2019 for OpenJDK N/A Old version, no longer maintained: Java SE 14 March 2019 for OpenJDK N/A Old version, no longer maintained: Java SE 14 March 2019 for OpenJDK N/A Old version, no longer maintained: Java SE 14 March 2019 for OpenJDK N/A Old version, no longer maintained: Java SE 14 March 2019 for OpenJDK N/A Old version, no longer maintained: Java SE 14 March 2019 for OpenJDK N/A Old version, no longer maintained: Java SE 14 March 2019 for OpenJDK N/A Old version, no longer maintained: Java SE 14 March 2019 for OpenJDK N/A Old version, no longer maintained: Java SE 14 March 2019 for OpenJDK N/A Old version, no longer maintained: Java SE 14 March 2019 for OpenJDK N/A Old version, no longer maintained: Java SE 14 March 2019 for OpenJDK N/A Old version, no longer maintained: Java SE 14 March 2019 for OpenJDK N/A Old version, no longer maintained: Java SE 14 March 2019 for OpenJDK N/A Old version, no longer maintained: Java SE 14 March 2019 for OpenJDK N/A Old version, no longer maintained: Java SE 14 March 2019 for OpenJDK N/A Old version, no longer maintained longer maintained: Java SE 14 March 2020 September 2020 for OpenJDK N/A Old version, no longer maintained: Java SE 15 September 2020 for Zulu[8] N/A Current stable version: Java SE 16 March 2021 for OpenJDK N/A Future release: Java SE 17 (LTS) September 2021 September 2030 for Zulu TBA Legend:Old versionOlder version, still maintainedLatest versionLatest preview versionFuture release History In September 2017, Mark Reinhold, chief Architect of the Java Platform, proposed to change the release train to "one feature release every six months" rather than the current two-year schedule, [9][10] and later the proposal took effect. Versions 1.0 1.1 1.2 1.3 1.4 5.0 6 7 8 9 10 11 12 13 14 15 16 17 JDK 1.0 The first version was released on January 23, 1996. [11][12] The first stable version, JDK 1.0.2, is called Java 1. [12] JDK 1.1 Major additions in the release on February 19, 1997 included:[13] an extensive retooling of the AWT event model inner classes added to the language JavaBeans JDBC RMI reflection only, no modification at runtime was possible. (The ability to modify objects reflectively was added in J2SE 1.2, by introducing the AccessibleObject class and its subclasses such as the Field class.) JIT (Just In Time) compiler on Microsoft Windows platforms, produced for JavaSoft by Symantec Internationalization and Unicode support originating from Taligent[14] J2SE 1.2 Codename Playground The release on December 8, 1998 and subsequent releases through J2SE 5.0 were rebranded retrospectively Java 2 and the version name "J2SE" (Java 2 Platform, Enterprise Edition) and J2ME (Java 2 Platform, Enterprise Edition). This was a very significant release of Java as it tripled the size of the Java platform to 1520 classes in 59 packages. Major additions included: [15] strictfp keyword the Swing graphical API was integrated into the core classes Sun's JVM was equipped with a JIT compiler for the first time Java plug-in Java IDL, an IDL implementation for CORBA interoperability Collections framework J2SE 1.3 Codename Kestrel The most notable changes in the May 8, 2000 release were: [16][17] HotSpot JVM included (the HotSpot JVM) RMI was modified to support optional compatibility with CORBA Java Naming and Directory Interface (JNDI) included in core libraries (previously available as an extension) Java Platform Debugger Architecture (JPDA) JavaSound Synthetic proxy classes J2SE 1.4 Codename Merlin The February 6, 2002 release was the first release of the Java platform developed under the Java Community Process as JSR 59. Major changes included: [18][19] Language changes assert keyword (specified in JSR 41) Library improvements Regular expressions modeled after Perl regular expressions Exception to encapsulate original lower-level exception Internet Protocol version 6 (IPv6) support Non-blocking I/O (Java) (named NIO) (specified in JSR 51) Logging API (specified in JSR 47) Image I/O API for reading and writing images in formats like JPEG and PNG Integrated XML parser and XSLT processor (JAXP) (specified in JSR 5 and JSR 63) Integrated security and cryptography extensions (JCE, JSSE, JAAS) Java Web Start included (Java Web Start was first released in March 2001 for J2SE 1.3) (specified in JSR 56) Preferences API (java.util.prefs) Public support and security updates for Oracle customers ended in February 2013.[20] J2SE 5.0 Codename Tiger The release on September 30, 2004 was originally numbered 1.5, which is still used as the internal version number. The number was changed to "better reflect the level of maturity, stability and security of the J2SE". [21] This version was developed under JSR 176. J2SE 5.0 entered its end-of-public-updates period on April 8, 2008; updates are no longer available to the public as of November 3, 2009. Updates were available to paid Oracle customers until May 2015.[1] Tiger added a number of significant new language features: [22][23] Generics: provides
compile-time (static) type safety for collections and eliminates the need for most type casts (type conversion) (specified by JSR 14) Metadata: also called annotations; allows language constructs such as classes and methods to be tagged with additional data, which can then be processed by metadata-aware utilities (specified by JSR 175) Autoboxing/unboxing: automatic conversions between primitive types (such as int) and primitive wrapper classes (such as Integer) (specified by JSR 201) Enumerations: the enum keyword creates a typesafe, ordered list of values (such as Day.MONDAY, Day.TUESDAY, etc.); previously this could only be achieved by non-typesafe constant integers or manually constructed classes (typesafe enum pattern) (specified by JSR 201) Varargs: the last parameter of a method can now be declared using a type name followed by three dots (e.g. void drawtext(String... lines)); in the calling code any number of parameters of that type can be used and they are then placed in an array to be passed to the method, or alternatively the calling code can pass an array of that type Enhanced for each loop: the for loop syntax is extended with special syntax for iterating over each member of either an array or any Iterable, such as the standard Collection classes (specified by JSR 201) Improved semantics of execution for multi-threaded Java programs; the new Java memory model addresses issues of complexity, effectiveness, and performance of previous specifications[24] Static imports There were also the following improvements to the standard libraries: Automatic stub generation for RMI objects Swing: New skinnable look and feel, called synth The concurrency utilities in package java.util.concurrent[25] Scanner class for parsing data from various input streams and buffers Java 5 is the last release of Java to officially support Microsoft Windows ME,[26] while Windows Vista was the newest version of Windows that J2SE 5 was supported on prior to Java 5 going end-oflife in October of 2009.[20] Java 5 Update 5 (1.5.0 05) is the last release of Java to work on Windows 95 (with Internet Explorer 5.5 installed) and Windows NT 4.0.[27] Java 5 was first available on Apple Mac OS X 10.4 (Tiger)[28] and was the default version of Java installed on Apple Mac OS X 10.5 (Leopard). Public support and security updates for Java 1.5 ended in November 2009. Paid security updates for Oracle customers ended in April 2015. Versioning system for the Java language, although the old versioning system continued to be used for developer libraries: Both version numbers "1.5.0" and "5.0" are used to identify this release of the Java 2 Platform Standard Edition. Version "5.0" is the developer version. The number "5.0" is used to better reflect the level of maturity, stability, scalability and security of the J2SE.— Version 1.5.0 or 5.0? [29] This correspondence continued through later releases (Java 6 = JDK 1.6, Java 7 = JDK 1.7, and so on). Java 5 updates Table of Java 5 updates Release date Highlights Java SE 5 2004-10-04 Metadata, generic types, autoboxing and auto-unboxing of primitive types, enhanced for loop, enumerated types, static import, formatted I/O, varargs, and concurrency utilities. Improved startup time and memory footprint. Sharing of read-only data between multiple running JVMs. Remote monitoring and management. A new JVM profiling API. Programmatic generation of stack traces. Support for XML 1.1 with Namespaces, XML Schema, SAX 2.0.2, DOM Level 3, and XSLT with a fast XSLTC compiler. Unicode 4.0 support. Java SE 5 Update 1 2004-12-25 50 bugs have been fixed. The program is now compiled with better optimization. Calendar bugfixes and other bugfixes were made. Java SE 5 Update 3 2005-05-03 This release fixes several bugs, including crashes of the Linux Mozilla plugin. Java SE 5 Update 4 2005-07-04 With the release, J2SE support for Windows 64-bit has progressed from release candidate to final release. This version runs on AMD64/EM64T 64-bit mode machines with Windows Server 2003 x64 Editions. Java SE 5 Update 5 2005-09-18 Several bugs were fixed and performance enhancements were made. Last release for Windows NT 4.0. Java SE 5 Update 6 2005-12-07 Prior to this update, an applet or application could specify the version of the JRE on which it would run. This has changed. All applets are executed with the latest JRE version. Java SE 5 Update 7 2006-05-29 Several bugs were fixed and performance enhancements were made. Java SE 5 Update 9 2006-11-12 This release fixes several minor regressions. Java SE 5 Update 10 2006-12-22 An implementation of the epoll I/O event notification facility, supported by Linux 2.6, was added. Many bugs were fixed. Java SE 5 Update 11 2007-03-08 Several bugs were fixed and performance enhancements were made. Java SE 5 Update 12 2007-06-11 Java SE 5 Update 13 2007-10-05 Multiple security vulnerabilities in Java Web Start relating to local file access were fixed. A security vulnerability in the JRE allowing network access restrictions to be circumvented was fixed. Update 15 2008-03-06 Several crashes due to heap buffer out-of-bounds were fixed, along with several other bugs. New root certificates from AOL, DigiCert, and TrustCenter are now included. Java SE 5 Update 16 2008-07-23 This release fixes several security flaws, such as DoS vulnerabilities, buffer overflows, and other bugs which could lead to crashes or which would give applets access to certain system resources. These vulnerabilities were located in Java Web Start, in the Java Management Extensions (JMX) Management Agent, and in the functions for handling XML data. Java SE 5 Update 17 2008-12-03 The UTF-8 charset implementation was updated to handle the non-shortest form of UTF-8 byte sequences, introducing an incompatibility from previous releases. New root certificates were fixed. Java SE 5 Update 18 2009-03-25 Several security issues were resolved. The behavior of the JNDI feature to store and retrieve Java objects in an LDAP directory was slightly modified. Five new root certificates were added. Many bugs were fixed. Java SE 5 Update 19 2009-05-29 Support was added for several system configurations. Service Tag support was added. Many bugs were fixed, including several crashes and memory leaks. Java SE 5 Update 20 2009-08-06 Several security vulnerabilities were resolved, such as potential system access by untrusted applets, and integer overflows in image processing and in Unpack200. Several new root certificates were added. Many other minor bugs were fixed. Java SE 5 Update 21 2009-09-09 Many minor bugs were fixed. Java SE 5 Update 22 2009-11-04 This release marks the End of Service Life (EOSL) for Java 5, and is its final public version. Several security vulnerabilities, reported as Sun Alerts 269868, 270474, 270475, and 270476, were fixed. Several other bugs were fixed. Furthermore, two new root certificates were added. Java SE 5 Update 23 2010-01-13 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 32 security fixes. Java SE 5 Update 24 2010-04-15 Not available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 2 security fixes. Java SE 5 Update 25 2010-07-07 Not available publicly, only available through the Java SE 5 Update 26 2010-10-12 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 2 security fixes. Java SE 5 Update 27 2010-12-08 Not available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 22 security fixes. Java SE 5 Update 28 2011-02-15 Not available publicly, only available through the Java SE 5 Update 29 2011-03-21 Not available through the Java SE 5 Update 29 2011-03-21 Not available publicly, only available through the Java SE 5 Update 29 2011-03-21 Not available through the Java SE 5 Update 29 2011-03-21 Not available through the Java SE 5 Update 29 2011-03-21 Not available publicly, only available through the Java SE 5 Update 29 2011-03-21 Not available through the Java SE 5 Update 29 2011-03-21 Not available through the Java SE 5 Update 29 2011-03-21 Not available publicly, only available through the Java SE 5 Update 29 2011-03-21 Not availabl fixes. Java SE 5 Update 30 2011-06-07 Not available publicly. only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster: 1 security fix. Java SE 5 Update 31 2011-08-16 Not available publicly. only available through the Java
SE Support program and in Solaris 10's Recommended Patchset Cluster; 10 security fixes. Java SE 5 Update 32 2011-10-18 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 20 security fixes[31] Java SE 5 Update 33 2011-12-12 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 20 security fixes[31] Java SE 5 Update 33 2011-12-12 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 21 security fixes. Java SE 5 Update 34 2012-02-14 Not available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 14 security fixes[32] Java SE 5 Update 35 2012-04-26 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 5 security fixes. Java SE 5 Update 36 2012-06-12 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 14 security fixes[33] Java SE 5 Update 38 2012-08-14 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 30 security fixes[34] Java SE 5 Update 39 2013-02-19 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 50 security fixes[35] Java SE 5 Update 40 2013-02-19 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 5 security fixes[36] Java SE 5 Update 41 2013-03-04 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster: 2 security fixes[37] Java SE 5 Update 51 2013-06-18 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 40 security fixes [39] Java SE 5 Update 55 2013-10-15 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 51 security fixes[40] Java SE 5 Update 61 2014-01-14 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 36 security fixes[41] Java SE 5 Update 65 2014-04-15 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster: 37 security fixes[42] Java SE 5 Update 71 2014-07-15 Not available publicly, only available through the Java SE 5 Update 75 2014-10-16 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster: 25 security fixes[44] Java SE 5 Update 81 2015-01-21 Not available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster: 19 security fixes[45] Java SE 5 Update 85 2015-04-14 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 14 security fixes[46] Java SE 6 Codename Mustang As of the version released on December 11, 2006, Sun replaced the name "J2SE" with Java SE and dropped the ".0" from the version number.[47] Internal numbering for developers remains 1.6.0.[48] This version was developed under JSR 270. During the development phase, new builds including enhancements and bug fixes were released approximately weekly. Beta versions were released in February and June 2006, leading up to a final release that occurred on December 11, 2006. Major changes included in this version: [49][50] Support for older Win9x versions dropped; unofficially, Java 6 Update 7 was the last release of Java shown to work on these versions of Windows. [citation needed] This is believed [by whom?] to be due to the major changes in Update 10. Scripting Language Support (JSR 223): Generic API for tight integration with scripting languages, and built-in Mozilla JavaScript Rhino integration. Dramatic performance improvements for the core platform, [51][52] and Swing. Improved Web Service support through JAX-WS (JSR 224). JDBC 4.0 support (JSR 221). Java Compiler API (JSR 199): an API allowing a Java program to select and invoke a Java Compiler programmatically. Upgrade of JAXB to version 2.0: Including integration of a StAX parser. Support for pluggable annotations (JSR 269).[53] Many GUI improvements, such as integration of SwingWorker in the API, table sorting and filtering, and true Swing double-buffering (eliminating the gray-area effect). JVM improvements include: synchronizations, new algorithms and upgrades to existing garbage collection algorithms, and application start-up performance. Java 6 can be installed to Mac OS X 10.5 (Leopard) running on 64-bit (Core 2 Duo and higher) processor machines. [54] Java 6 is also supported by both 32-bit and 64-bit machines running Mac OS X 10.6 (Snow Leopard). Java 6 reached the end of its supported life in February 2013, at which time all public updates, including security updates, were scheduled to be stopped.[55][56] Oracle released two more updates to Java 6 in March and April 2013, which patched some security vulnerabilities.[57][58] Java 6 release, Sun, and later Oracle, released several updates which, while not changing any public API, enhanced end-user usability or fixed bugs.[59] Table of Java 6 updates Release date Highlights Java SE 6 2006-12-23 This release adds many enhancements in the fields of Web services, scripting, databases, pluggable annotations, and security, as well as guality, compatibility, and stability. JConsole is now officially supported. Java DB support has been added. Java SE 6 Update 1 2007-05-07 Java SE 6 Update 2 2007-07-03 Java SE 6 Update 3 2007-10-03 Java SE 6 Update 4 2008-01-14 HotSpot VM 10 Java SE 6 Update 5 2008-03-05 Several security flaws were eliminated. New root certificates from AOL, DigiCert, and TrustCenter are now included. Java SE 6 Update 6 2008-04-16 A workaround for the infamous Xlib/XCB locking assertion issue was introduced. A memory leak when using Kerberos authentication with LoginContext was fixed. Several other bugs were fixed. Java SE 6 Update 7 (1.6.0.7) is the last version of Java that was shown to be working on the Win9x family of operating systems[citation needed] Java SE 6 Update 10[61] 2008-10-15 HotSpot VM 11. Major changes for this update include: Java Deployment Toolkit, a set of JavaScript functions to ease the deployment of applets and Java Web Start applications.[61] Java Kernel, a small installer including only the most commonly used JRE classes. Other packages are downloaded when needed. Enhanced updater. Enhanced updater. Enhanced updater. Enhanced versioning and pack200 support is no longer required.[61] Java Quick Starter, to improve cold start-up time. Improved performance of Java2D graphics primitives on Windows, using Direct3D and hardware acceleration. A new Swing look and feel called Nimbus and based on synth.[62] Next-Generation Java Plug-In: applets now run in a separate process and support many features of Web Start applications.[61] Java SE 6 Update 11[63] 2008-12-03 13 security fixes[64] Java SE 6 Update 12[65] 2008-12-12 No security fixes; 64-bit Java plug-in (for 64-bit web browsers only); Windows Server 2008 support; performance improvements of graphics and JavaFX applications Java SE 6 Update 13[66] 2009-03-24 7 security fixes, JNDI store and retrieve Java objects in LDAP slightly modified JMX Change (createMBeanunregisterMBean), 4 new root certificates added Java SE 6 Update 14[67] 2009-05-28 HotSpot VM 14. This release includes extensive performance updates to the JIT compiler, compressed pointers for 64-bit machines, as well as support for the G1 (Garbage First) low-pause garbage collector.[68][69] The -XX:+DoEscapeAnalysis option directs the HotSpot JIT compiler to use escape analysis to determine whether local objects can be allocated on the stack instead of the heap.[70] Some developers have noticed an issue introduced in this release which causes debuggers to miss breakpoints seemingly randomly.[71] Sun has a corresponding bug, which is tracking the issue. The workaround applies to the Client and Server VMs.[72] Using the -XX:+UseParallelGC option will prevent the failure. Another workaround is to roll back to update 13, or to upgrade to update 16. Java SE 6 Update 15 2009-08-04 Introduced patch-in-place functionality[73] Java SE 6 Update 16 2009-08-11 Fixed the issue introduced in update 17[75] 2009-11-04 Security fixes; two new root certificates Java SE 6 Update 18[76] 2010-01-13 No security fixes; Hotspot VM 16; support for Ubuntu 8.04 LTS Desktop Edition, SLES 11, Windows 7, Red Hat Enterprise Linux 5.3, Firefox 3.6, VisualVM 1.2; updated Java DB; many performance improvements Java SE 6 Update 19[77] 2010-03-30 Security fixes; root certificate changes: seven new, three removed, five replaced with stronger signature algorithms; interim fix for TLS renegotiation attack Java SE 6 Update 20[78] 2010-04-15 2 security fixes; Hotspot VM 17; support for Red Hat Enterprise Linux 5.4 and 5.5, Oracle Enterprise Linux 4.8, 5.4, 5.5; Google Chrome 4 support; support for Customized Loading Progress Indicators; VisualVM 1.2.2 Java SE 6 Update 22[80] 2010-10-12 29 security fixes; RFC 5746 support Java SE 6 Update 23[81] 2010-12-08 No security fixes; Hotspot VM 19; better support for right-to-left languages Java SE 6 Update 24[82] 2011-02-15 21 security fixes; updated Java DB Java SE 6 Update 25 2011-03-21 No security fixes; Hotspot VM 20; support for Internet Explorer 9, Firefox 4 and Chrome 10; improved BigDecimal; includes "tiered" compilation in the Server VM that enables it to start quickly as does the Client VM, while achieving better peak performance (this feature is enabled by specifying server and -XX:+TieredCompilation command options)[83] Java SE 6 Update 26[84]
2011-06-07 17 new security fixes; [85] last version compatible with Windows Vista SP1 Java SE 6 Update 27[86] 2011-08-16 No security fixes; certification for Firefox 5 Java SE 6 Update 29[87] 2011-10-18 20 security fixes, various bug fixes[88] Java SE 6 Update 30[89] 2011-12-12 No security fixes; fix for SSL regression in Update 29; support for Red Hat Enterprise Linux 6 Java SE 6 Update 31[90] 2012-02-14 14 security fixes and one bug fix; last version work reliably for Windows 2000[91] Java SE 6 Update 32[92] 2012-04-26 No security fixes, various bug fixes Java SE 6 Update 33[93] 2012-06-12 14 security fixes, improved VM configuration file loading Java SE 6 Update 35[95] 2012-08-30 Contains a security-in-depth fix[96] Java SE 6 Update 37[97] 2012-10-16 30 security fixes Java SE 6 Update 38[98] 2012-12-11 Various bug fixes[99] Java SE 6 Update 39[100] 2013-02-01 50 security fixes Java SE 6 Update 43[102] 2013-03-04 2 security fixes Java SE 6 Update 45[103] 2013-04-16 42 security fixes;[104] other changes;[103] final public update.[105] Java SE 6 Update 51[106] 2013-06-18 Not available publicly, only available through the Java SE Support program and in Apple Update for OS X Snow Leopard, Lion & Mountain Lion; up to 40 security fixes[107] Java SE 6 Update 65[108] 2013-10-15 Not available publicly, only available through the Java SE Support program and in Apple Update for OS X Snow Leopard, Lion & Mountain Lion; at least 11 critical security fixes[109] Java SE 6 Update 75[112] 2014-04-15 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster no. #54; 25 security fixes[113] Java SE 6 Update 81[114] 2014-07-15 Not available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 11 security fixes[115] Java SE 6 Update 85[116] 2014-10-16 Not available publicly, only available through the Java SE 6 Update 31[113] 2015-01-21 Linux x64 and Windows i586 versions are available as the Java SE 6 Reference Implementation. [119] Other versions are only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 15 security fixes [120] Java SE 6 Update 95 2015-04-14 Not available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 14 security fixes [121] Java SE 6 Update 101 2015-07-15 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 18 security fixes [122] Certification for IE 10 and 11 was introduced in 1.6.0 101 Java SE 6 Update 105 2015-10-20 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 17 security fixes[123] Java SE 6 Update 111 2016-01-20 Not available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 13 security fixes[124] Java SE 6 Update 113 2016-02-05 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 1 security fix[125] Java SE 6 Update 115 2016-04-21 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 8 security fixes[126] Java SE 6 Update 121 2016-07-19 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 15 security fixes[127] Java SE 6 Update 131 2016-10-18 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 15 security fixes[127] Java SE 6 Update 131 2016-10-18 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 13 security fixes[128] Java SE 6 Update 141 2017-01-17 Not available publicly, only available program and in Solaris 10's Recommended Patchset Cluster; 17 security fixes[129] Java SE 6 Update 151 2017-04-18 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 10 security fixes [130] Java SE 6 Update 161 2017-07-18 Not available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 5 security fixes [131] Java SE 6 Update 171 2017-10-20 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 7 security fixes[132] Java SE 6 Update 181 2018-01-16 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 7 security fixes[132] Java SE 6 Update 181 2018-01-16 Not available publicly, only available through the Java SE 6 Update 181 2018-01-16 Not available publicly. Patchset Cluster; 12 security fixes[133] Java SE 6 Update 191 2018-04-17 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 7 security fixes[134] Java SE 6 Update 201 2018-07-17 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 3 security fixes[135] Java SE 6 Update 211 2018-10-18 Not available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 8 security fixes[136] Java SE 7 Java 7 (codename Dolphin[137]) is a major update that was launched on July 7, 2011[138] and was made available for developers on July 28, 2011.[139] The development period was organized into thirteen milestones; on June 6, 2011, the last of the thirteen milestones was finished.[139][140] On average, 8 builds (which generally included enhancements and bug fixes) were released per milestone. The feature list at the OpenJDK 7 project lists many of the changes, with the new invokedynamic bytecode under JSR-292,[142] following the prototyping work currently done on the Multi Language Virtual Machine Compressed 64-bit pointers[143] (available in Java 6 with -XX:+UseCompressedOops)[144] These small language changes (grouped under a project named Coin):[145] Strings in switch[146] Automatic resource management in try-statement[147] Improved type inference for generic instance creation, aka the diamond operator [148] Simplified varargs method declaration[149] Binary integer literals[150] Allowing underscores in numeric literals[151] Catching multiple exception types and rethrowing exceptions with improved type checking[152] Concurrency utilities under JSR 166[153] New file I/O library (defined by JSR 203) adding support for multiple file systems, file metadata and symbolic links. The new packages are java.nio.file.spi[154][155] Timsort is used to sort collections and arrays of objects instead of merge sort Library-level support for elliptic curve cryptography algorithms An XRender pipeline for Java 2D, which improves handling of features specific to modern GPUs New platform APIs for the graphics features originally implemented in version 6u10 as unsupported APIs[156] Enhanced library-level support for new network protocols, including SCTP and Sockets Direct Protocol Upstream updates to XML and Unicode Java deployment rule sets[157] Lambda (Java's implementation of lambda functions), Jigsaw (Java's implementation of modules), and part of Coin were dropped from Java 7, and released as part of Java 8 (except for Jigsaw, which was released in Java 9).[158][159] Java 7 was the default version to download on java.com from April 2012 until Java 8 was released. [160] Java 7 updates Oracle issued public updates to the Java 7 family on a guarterly basis [161] until April 2015 when the product reached the end of its public availability. [162] Further updates for JDK 7, which are scheduled to continue until Jul 2022, are only made available to customers with a support contract.[163] Table of Java 7 updates Release date Highlights Java SE 7 [164] 2011-07-28 Initial release; HotSpot VM 21 Java SE 7 Update 1[165] 2011-10-18 20 security fixes, other bug fixes Java SE 7 Update 2[166] 2011-12-12 No security fixes; HotSpot VM 22; reliability and performance improvements; support for Solaris 11 and Firefox 5 and later; JavaFX included with Java SE JDK, improvements for web-deployed applications Java SE 7 Update 3[167] 2012-02-14 14 security fixes[168] Java SE 7 Update 4[169] 2012-04-26 No security updates HotSpot VM 23: JDK Support for Mac OS X Java SE 7 Update 5[170] 2012-06-12 14 security fixes[171] Java SE 7 Update 6[172] 2012-08-14 JavaFX and Java Access Bridge included in Java SE JDK and JRE installation, JavaFX support for touch-enabled monitors and touch pads, JavaFX support for Linux, JDK and JRE Support for Mac OS X, JDK for Linux on ARM[173] Java SE 7 Update 7[174] 2012-08-30 4 security fixes[96] Java SE 7 Update 9[175] 2012-10-16 30 security vulnerabilities fixes[176] Java SE 7 Update 10[177] 2012-12-11 New security features, such as the ability to disable any Java application from running in the browser and new dialogs to warn you when the JRE is insecure, and bug fixes Java SE 7 Update 11[178] 2013-01-13 Olson Data 2012i; bugfix for problems with Stand-alone version of JavaFX Installed, security fixes for CVE-2013-0422;[179] the default security level for Java applets and web start applications has been increased from "Medium" to "High" Java SE 7 Update 13[180] 2013-02-01 50 security fixes Java SE 7 Update 17[182] 2013-03-04 2 security fixes Java SE 7 Update 21[183] 2013-04-16 Multiple changes including 42 security fixes, a new Server JRE that doesn't include the plug-in, and the JDK for Linux on ARM Java SE 7 Update 25[184] 2013-06-18 Multiple changes including 40 security fixes[107][185] Java SE 7 Update 40[186] 2013-09-10 621 bug fixes, [187] New security features, hardfloat ARM, Java Mission Control 5.2 and Retina Display support[188] Java SE 7 Update 45[189] 2013-10-15 51 security fixes; [109] protections against unauthorized redistribution of Java
applications; restore security fixes; block JAVA applets without manifest (like Remote console – Java Applet – IBM IMM card, HP iLO card) even if warning dialog is with sentence "will be blocked in next version", [191][192] 17 bug fixes Java SE 7 Update 55[193] 2014-04-15 37 security fixes, [113] 19 bug fixes [194] Java SE 7 Update 60[195] 2014-05-28 Java Mission Control 5.3, [196] 130 bug fixes[197] Java SE 7 Update 65[198] 2014-07-15 18 bug fixes[202] Java SE 7 Update 71[201] 2014-10-14 16 bug fixes[202] Java SE 7 Update 71[201] 2014-10-14 Same release date with Update 71 as a corresponding Patch Set Update (PSU) for Java SE 7 [204] 36 bug fixes[205] Java SE 7 Update 75[206] 2015-01-20 12 bug fixes,[207] SSLv3 disabled by default Java SE 7 Update 76[208] 2015-01-20 Same release date with Update 75 as a corresponding Patch Set Update (PSU) for Java SE 7,[204] 97 bug fixes[209] Java SE 7 Update 79[210] 2015-04-14 21 security fixes, 6 bug fixes,[211] Java SE 7 Update 80[212] 2015-04-14 Last public release of Java 7; same release date with Update 79 as a corresponding Patch Set Update (PSU) for Java SE 7, 104 bug fixes[213] Java SE 7 Update 85 2015-07-15 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster: 25 security fixes[214] Java SE 7 Update 91 2015-10-20 Not available publicly, only available through the Java SE 7 Update 91 2015-10-20 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 8 security fixes[216] Java SE 7 Update 97 2016-02-05 Not available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 1 security fix[125] Java SE 7 Update 99 2016-03-23 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 22 security fixes[218] Java SE 7 Update 111 2016-07-19 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 36 security fixes[127] Java SE 7 Update 121 2016-10-18 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 32 security fixes[128] Java SE 7 Update 131 2017-01-17 Not available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 34 security fixes[129] Java SE 7 Update 141 2017-04-18 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 8 security fixes [219] Java SE 7 Update 151 2017-07-18 Not available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 8 security fixes [131] Java SE 7 Update 161 2017-10-20 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 4 security fixes [132] Java SE 7 Update 171 2018-01-16 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster: 51 security fixes[133] Java SE 7 Update 181 2018-07-17 Not available publicly, only available through the Java SE 7 Update 191 2018-07-17 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 9 security fixes[135] Java SE 7 Update 201 2018-10-18 Not available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 13 security fixes[136] Java SE 7 Update 211 2019-01-15 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 5 security fixes [220] Java SE 7 Update 221 2019-04-16 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 5 security fixes[221] Java SE 7 Update 231 2019-07-16 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 6 security fixes[222] Java SE 7 Update 241 2019-10-15 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 15 security fixes[223] Java SE 7 Update 251 2020-01-14 Not available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 12 security fixes[224] Java SE 7 Update 261 2020-04-14 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 15 security fixes [225] Java SE 7 Update 271 2020-07-14 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 11 security fixes[226] Java SE 7 Update 281 2020-10-20 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 8 security fixes[227] Java SE 7 Update 291 2021-01-19 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 8 security fixes[227] Java SE 7 Update 291 2021-01-19 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 1 security fixes[228] Java SE 7 Update 301 2021-04-12 Not available publicly, only available through the Java SE Support program and in Solaris 10's Recommended Patchset Cluster; 11 security fixes[229] Java SE 8 Java 8 was released on March 18, 2014, [230] [231] and included some features that were planned for Java 7 but later deferred. [232] Work on features was organized in terms of JDK Enhancement Proposals (JEPs). [233] JSR 335, JEP 126: Language-level support for lambda expressions (officially, lambda expressions; unofficially, closures) under Project Lambda [234] and default methods (virtual extension methods)[235][236][237] which allow the addition of methods to interfaces without breaking existing implementations. There was an ongoing debate in the Java community on whether to add support for lambda expressions.[238][239] Sun later declared that lambda expressions would be included in Java and asked for community input to refine the feature. [240] Supporting lambda expressions also enables functional-style operations on collections. Default methods allow an author of an API to add new methods to an interface without breaking the old code using it. Although it was not their primary intent, [235] default methods also allow multiple inheritance of behavior (but not state). JSR 223, JEP 174: Project Nashorn, a JavaScript runtime which allows developers to embed JavaScript code within applications JSR 308, JEP 104: Annotation on Java types[241] Unsigned integer arithmetic[242] JSR 337, JEP 120: Repeating annotations[243] JSR 310, JEP 150: Date and time API[244] JEP 178: Statically-linked JNI libraries[245] JEP 153: Launch JavaFX applications (direct launching of JavaFX application JARs)[246] JEP 122: Remove the permanent generation[247] Java 8 is not supported on Windows XP[248] but as of JDK 8 update 25, it can still be installed and run under XP by downloading archived zip format file and unzipping it for the executable. The last version of Java 8 could run on XP is update 251. But the its components compatibility starts to break on unsupported OS in very early during Java 8 updates development. From October 2014, Java 8 was the default version to download (and then again the download replacing Java 9) from the official website. [250] "Oracle will continue to provide Public Updates and auto updates of Java SE 8, Indefinitely for Personal Users". [2] Java 8 updates Table of Java 8 updates Release Release Release Release Bava SE 8 Update 5[251] 2014-04-15 Using "*" in Caller-Allowable-Codebase attribute; 11 bug fixes Java SE 8 Update 11[252] 2014-07-15 Java Dependency Analysis Tool (jdeps); Java Control Panel option to disable sponsors; JAR file attribute – Entry-Point; JAXP processing limit property – maxElementDepth; 18 security bug fixes, [253] 15 bug fixes Java SE 8 Update 20[254] 2014-08-19 669 bug fixes, [255] JMC 5.4, String deduplication (disabled by default) Java SE 8 Update 25[256] 2014-10-14 10 bug fixes Java SE 8 Update 31[257] 2015-01-19 26 bug fixes; SSLv3 (disabled by default) Java SE 8 Update 40[258] 2015-03-03 645 bug fixes, [259] Added the notion of "memory pressure" to help indicate how much of system's memory is still available (low pressure = high memory, high pressure = low memory) Java SE 8 Update 45[260] 2015-04-14 13 bug fixes Java SE 8 Update 51[261] 2015-07-14 Added support for native sandbox on Windows platforms (disabled by default); also, 25 security fixes, 14 bug fixes Java SE 8 Update 60[262] 2015-08-18 480 bug fixes [263] Java SE 8 Update 65[264] 2015-10-20 25 security fixes, 3 bug fixes Java SE 8 Update 66[265] 2015-11-16 15 bug fixes Java SE 8 Update 71[266] 2016-01-19 8 security fixes, 5 bug fixes, 5 bug fixes, 5 bug fixes Java SE 8 Update 72 2016-01-19 8 security fixes, 5 bug fixes Java SE 8 Update 73[268] 2016-02-03 1 security fixes, 5 bug fixes Java SE 8 Update 72 2016-01-19 8 security fixes, 5 bug fixes Java SE 8 Update 73[268] 2016-02-03 1 security fixes Java SE 8 Update 73[268] 2016-02-03 1 security fixes Java SE 8 Update 72 2016-01-19 8 security fixes, 5 bug fixes Java SE 8 Update 73[268] 2016-02-03 1 security fixes Java SE 8 Update 73[268] 2016-02-03 1 security fixes Java SE 8 Update 73[268] 2016-02-03 1 security fixes Java SE 8 Update 73[268] 2016-02-03 1 security fixes Java SE 8 Update 73[268] 2016-02-03 1 security fixes Java SE 8 Update 73[268] 2016-02-03 1 security fixes Java SE 8 Update 73[268] 2016-02-03 1 security fixes Java SE 8 Update 73[268] 2016-02-03 1 security fixes Java SE 8 Update 73[268] 2016-02-03 1 security fixes Java SE 8 Update 73[268] 2016-02-03 1 security fixes Java SE 8 Update 73[268] 2016-02-03 1 security fixes Java SE 8 Update 73[268] 2016-02-03 1 security
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111[275] 2016-10-18 7 Security fixes and 9 bug fixes Java SE 8 Update 112[276] 2016-10-18 Additional features and 139 bug fixes over 8u111 Java SE 8 Update 121[277] 2017-01-17 3 additional features, 5 changes, and 11 bug fixes over 8u112. Java SE 8 Update 131[278] 2017-04-18 4 changes and 42 bug fixes (2) notable). Java SE 8 Update 141[279] 2017-07-18 Additional feature, 3 changes and 12 bug fixes. Java SE 8 Update 151[281] 2017-10-17 22 Security fixes, 2 notes, 1 certificate revocation, 1 new feature, 6 changes and 24 bug fixes. from 8u144, Java SE 8 Update 152[282] 2017-10-17 Security fixes, 1 new feature, 1 change and 238 bug fixes, 63 bug fixes, Java SE 8 Update 161[283] 2018-01-16 21 Security fixes, 3 new features, 9 changes and 1 bug fix from 8u152, Java SE 8 Update 162[284] 2018-01-16 Security fixes, 63 bug fixes, Java SE 8 Update 171[285] 2018-04-17 Security fixes, bug fixes. Java SE 8 Update 172[286] 2018-04-17 Security fixes, bug fixes. Java SE 8 Update 191[288] 2018-10-16 New features, changes, bug fixes. Java SE 8 Update 192[289] 2018-10-16 16 New features, changes, bug fixes. Java SE 8 Update 201[290] 2019-01-15 New features, changes, bug fixes. Java SE 8 Update 202[291] 2019-01-15 New features, changes, bug fixes. Java SE 8 Update 202[291] 2019-04-16 New features, changes, bug fixes. Java SE 8 Update 202[291] 2019-01-15 New features, changes, bug fixes. Java SE 8 Update 202[291] 2019-04-16 New features, changes, bug fixes. Java SE 8 Update 202[291] 2019-01-15 New features, changes, bug fixes. Java SE 8 Update 202[291] 2019-04-16 New features, changes, bug fixes. Java SE 8 Update 202[291] 2019-04-16 New features, changes, bug fixes. Java SE 8 Update 202[291] 2019-04-16 New features, changes, bug fixes. Java SE 8 Update 202[291] 2019-04-16 New features, changes, bug fixes. Java SE 8 Update 202[291] 2019-04-16 New features, changes, bug fixes. Java SE 8 Update 202[291] 2019-04-16 New features, changes, bug fixes. 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Java SE 8 Update 202[291] 2019-04-16 New features, changes, bug fixes. Java SE 8 Update 202[291] 2019-04-16 New features, changes, bug fixes. Java SE 8 Update 202[New features (e.g. 5 currency symbols, including for Bitcoin and "New Japanese Era Name Reiwa" [293]), changes, bug fixes. License Update 221 [294] 2019-07-16 New features, changes, bug fixes. Java SE 8 Update 231 [295] 2019-10-15 New features, changes, bug fixes and 18 security fixes. Java SE 8 Update 241[296] 2020-01-14 New features, changes, bug fixes. Java SE 8 Update 251[297] 2020-04-14 New features, changes, bug fixes. Java SE 8 Update 251[297] 2020-04-14 New features, changes, bug fixes. Java SE 8 Update 251[297] 2020-04-14 New features, changes, bug fixes. Java SE 8 Update 251[297] 2020-04-14 New features, changes, bug fixes. Java SE 8 Update 251[297] 2020-04-14 New features, changes, bug fixes. Java SE 8 Update 251[297] 2020-04-14 New features, changes, bug fixes. 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Java SE 8 Update 251[297] 2020-04-14 New features, changes, bug fixes. Java SE 8 Update 251[297] 2020-04-14 New features, changes, bug fixes. Java SE 8 Update 251[297] 2020-04-14 New features, changes, bug fixes. Java SE 8 Update 251[298] 2020-04-14 New features, changes, bug fixes. Java SE 8 Update 251[298] 2020-04-14 New 271[299] 2020-10-20 New features, changes, bug fixes. Java SE 8 Update 281[300] 2021-04-20 New features, changes, bug fixes. Java SE 9 Java SE 8 Update 281[300] 2021-04-20 New features, changes, bug fixes. Java SE 9 Java SE 9 Java SE 9 Java SE 9 Java SE 8 Update 291[301] 2021-04-20 New features, changes, bug fixes. Java SE 9 current implementation of Project Jigsaw by Java Executive Committee,[303] which led Oracle to fix some open issues and concerns, and to refine some critical technical questions. In the last days of June 2017, Java Community Process expressed nearly unanimous consensus on the proposed Module System scheme. [304] JSR 376: Modularization of the JDK under Project Jigsaw (Java Platform Module System)[159] JavaDB was removed from JDK[305] JEP 193: Variable handles : define a standard means to invoke the equivalents of various java.util.concurrent.atomic and sun.misc.Unsafe operationsJEP 213: Milling Project Coin : Allow @SafeVarargs on private instance methods; Allow effectively-final variables to be used as resources in the try-with-resources statement; Allow diamond with anonymous classes if the argument type of the inferred type is denotable; Complete the removal, begun in Java SE 8, of underscore from the set of legal identifier names; Support for private methods in interfacesJEP 222: jshell: The Java Shell (Read-Eval-Print Loop) : JShell is a REPL command-line interface for the Java language. [306] JEP 254: Compact StringsJEP 263: HiDPI graphics: automatic scaling and sizingJEP 266: More concurrency updates : It includes a Java implementation of Reactive Streams.[307] including a new Flow class[308] that included the interfaces previously provided by Reactive Streams.[309] JEP 268: XML catalogs JEP 26 image. It effectively allows to produce a fully usable executable including the JVM to run it JEP 295: Ahead-of-Time Compilation provided by GraalVM. The first Java 9 release candidate was released on August 9, 2017.[310] The first stable release of Java 9 was on September 21, 2017.[311] History At JavaOne 2011, Oracle discussed features they hoped to release for Java 9 in 2016.[312] Java 9 should include better support for multi-gigabyte heaps, better native code integration, a different default garbage collector (G1, for "shorter response times")[313] and a self-tuning JVM.[314] In early 2016, the release of Java 9 was rescheduled for March 2017[315] and later again postponed four more months to July 2017.[316] Java 9 updates Release date Highlights Java SE 9[317] 2017-09-21 Initial release Java SE 9.0.1[318] 2017-10-17 October 2017 security fixes and critical bug fixes Java SE 9.0.4[319] 2018-01-16 Final release for JDK 9; January 2018 security fixes and critical bug fixes Java SE 10 OpenJDK 10 was released on March 20, 2018, with twelve new features were: JEP 286: Local-Variable Type InferenceJEP 296: Consolidate the JDK Forest into a Single RepositoryJEP 304: Garbage-Collector InterfaceJEP 307: Parallel Full GC for G1JEP 310: Application Class-Data SharingJEP 312: Thread-Local HandshakesJEP 313: Remove the Native-Header Generation Tool (iavah)JEP 314: Additional Unicode Language-Tag ExtensionsJEP 316: Heap Allocation on Alternative Memory DevicesJEP 317: Experimental Java-Based JIT CompilerJEP 319: Root CertificatesJEP 322: Time-Based Release Versioning The first of these JEP 286 Local-Variable Type Inference, allows the var keyword to be used for local variables with the actual type calculated by the compiler. So we can do var list = new ArrayList(); // infers ArrayList var stream = list.stream(); // infers Stream Java 10 updates Release date Highlights Java SE 10.0.1[322] 2018-04-17 Security fixes, 5 bug fixes[323] Java SE 10.0.2[324] 2018-07-17 Final release for JDK 10. Security fixes, 7 bug fixes[325] Java SE 11 JDK 11 was released on September 25, 2018 and the version is currently open for bug fixes. It offers LTS, or Long Term Support. Among others, Java 11 includes a number of new features, such as:[326] JEP 181: Nest-Based Access ControlJEP 309: Dynamic Class-File ConstantsJEP 315: Improve Aarch64 IntrinsicsJEP 318: Epsilon: A No-Op Garbage CollectorJEP 320: Remove the Java EE and CORBA ModulesJEP 321: HTTP Client (Standard)JEP 323: Local-Variable Syntax for Lambda ParametersJEP 324: Key Agreement with Curve25519 and Curve448JEP 327: Unicode 10JEP 328: Flight RecorderJEP 329: ChaCha20 and Poly1305 Cryptographic AlgorithmsJEP 330: Launch Single-File Source-Code ProgramsJEP 331: Low-Overhead Heap ProfilingJEP 333: ZGC: A Scalable Low-Latency Garbage Collector (Experimental)JEP 332: Transport Layer Security (TLS) 1.3JEP 333: ZGC: A Scalable Low-Latency Garbage Collector (Experimental)JEP 332: Transport Layer Security (TLS) 1.3JEP 333: ZGC: A Scalable Low-Latency
Garbage Collector (Experimental)JEP 332: Transport Layer Security (TLS) 1.3JEP 333: ZGC: A Scalable Low-Latency Garbage Collector (Experimental)JEP 332: Transport Layer Security (TLS) 1.3JEP 333: ZGC: A Scalable Low-Latency Garbage Collector (Experimental)JEP 332: Transport Layer Security (TLS) 1.3JEP 333: ZGC: A Scalable Low-Latency Garbage Collector (Experimental)JEP 332: Transport Layer Security (TLS) 1.3JEP 333: ZGC: A Scalable Low-Latency Garbage Collector (Experimental)JEP 332: Transport Layer Security (TLS) 1.3JEP 333: ZGC: A Scalable Low-Latency Garbage Collector (Experimental)JEP 335: Deprecate the Nashorn JavaScript Engine JEP 333: ZGC: A Scalable Low-Latency Garbage Collector (Experimental)JEP 335: Deprecate the Nashorn JavaScript Engine JEP 333: ZGC: A Scalable Low-Latency Garbage Collector (Experimental)JEP 335: Deprecate the Nashorn JavaScript Engine JEP 336: Deprecate the Pack200 Tools and API A number of features from previous releases were dropped; in particular, Java SE 11[328] Java EE and CORBA modules have been removed from JDK[327] Java 11 updates Release date Highlights Java SE 11[328] 2018-09-25 Initial release Java SE 11.0.1[329] 2018-10-16 Security & bug fixes Java SE 11.0.2[330] 2019-01-15 Security & bug fixes Java SE 11.0.3[331] 2019-04-16 New features, Security & bug fixes Java SE 11.0.3[331] 2019-04-16 New features, Security & bug fixes Java SE 11.0.4[332] 2019-07-16 New features, Security & bug fixes Java SE 11.0.3[331] 2019-04-16 New features, Security & bug fixes Java SE 11.0.4[332] 2019-07-16 New features, Security & bug fixes Java SE 11.0.4[332] 2019-07-16 New features, Security & bug fixes Java SE 11.0.4[332] 2019-04-16 New features, Security & bug fixes Java SE 11.0.4[332] 2019-04-16 New features, Security & bug fixes Java SE 11.0.4[332] 2019-07-16 New features, Security & bug fixes Java SE 11.0.4[332] 2019-07-16 New features, Security & bug fixes Java SE 11.0.4[332] 2019-07-16 New features, Security & bug fixes Java SE 11.0.4[332] 2019-07-16 New features, Security & bug fixes Java SE 11.0.4[332] 2019-07-16 New features, Security & bug fixes Java SE 11.0.4[332] 2019-07-16 New features, Security & bug fixes Java SE 11.0.4[332] 2019-07-16 New features, Security & bug fixes Java SE 11.0.4[332] 2019-07-16 New features, Security & bug fixes Java SE 11.0.4[332] 2019-07-16 New features, Security & bug fixes Java SE 11.0.4[332] 2019-07-16 New features, Security & bug fixes Java SE 11.0.4[332] 2019-07-16 New features, Security & bug fixes Java SE 11.0.4[332] 2019-07-16 New features, Security & bug fixes Java SE 11.0.4[332] 2019-07-16 New features, Security & bug fixes Java SE 11.0.4[332] 2019-07-16 New features, Security & bug fixes Java SE 11.0.4[332] 2019-07-16 New features, Security & bug fixes Java SE 11.0.4[332] 2019-07-16 New features, Security & bug fixes Java SE 11.0.4[332] 2019-07-16 New features, Security & bug fixes Java SE 11.0.4[332] 2019-07-16 New features, Security & bug fixes Java SE 11.0.4[332] 2019-07-16 New features, Security & bug fixes Java SE 11.0.4[332] 2019-07-16 New features, Security & bug fixes Java SE 11.0.4[332] 2019-07-16 New features, Security & bug fixes J Identifies Windows Server 2019 Java SE 11.0.5[333] 2019-10-15 New features, Security & bug fixes Java SE 11.0.7[335] 2020-04-14 New features, Security & bug fixes Java SE 11.0.8[336] 2020-07-14 New features, Security & bug fixes Java SE 11.0.7[335] 2020-04-14 New features, Security & bug fixes Java SE 11.0.7[335] 2020-04-14 New features, Security & bug fixes Java SE 11.0.7[335] 2020-04-14 New features, Security & bug fixes Java SE 11.0.7[335] 2020-04-14 New features, Security & bug fixes Java SE 11.0.7[335] 2020-04-14 New features, Security & bug fixes Java SE 11.0.7[335] 2020-04-14 New features, Security & bug fixes Java SE 11.0.7[335] 2020-04-14 New features, Security & bug fixes Java SE 11.0.7[335] 2020-04-14 New features, Security & bug fixes Java SE 11.0.7[335] 2020-04-14 New features, Security & bug fixes Java SE 11.0.7[335] 2020-04-14 New features, Security & bug fixes Java SE 11.0.7[335] 2020-04-14 New features, Security & bug fixes Java SE 11.0.7[335] 2020-04-14 New features, Security & bug fixes Java SE 11.0.7[335] 2020-04-14 New features, Security & bug fixes Java SE 11.0.7[335] 2020-04-14 New features, Security & bug fixes Java SE 11.0.7[335] 2020-04-14 New features, Security & bug fixes Java SE 11.0.7[335] 2020-04-14 New features, Security & bug fixes Java SE 11.0.7[335] 2020-04-14 New features, Security & bug fixes Java SE 11.0.7[335] 2020-04-14 New features, Security & bug fixes Java SE 11.0.7[335] 2020-04-14 New features, Security & bug fixes Java SE 11.0.7[335] 2020-04-14 New features, Security & bug fixes Java SE 11.0.7[335] 2020-04-14 New features, Security & bug fixes Java SE 11.0.7[335] 2020-04-14 New features, Security & bug fixes Java SE 11.0.7[335] 2020-04-14 New features, Security & bug fixes Java SE 11.0.7[335] 2020-04-14 New features, Security & 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Among others, Java 12 includes a number of new features, such as: [340] JEP 189: Shenandoah: A Low-Pause-Time Garbage Collector (Experimental)JEP 334: JVM Constants APIJEP 340: One AArch64 Port, Not TwoJEP 341: Default CDS ArchivesJEP 344: Abortable Mixed Collections for G1JEP 346: Promptly Return Unused Committed Memory from G1 The preview feature Jep 325 extends the switch statement so it can be also be used as expression, and add a new form of case label where the right hand side is a expression. No break statement is needed. For complex expressions a yield statement can be used. This becomes standard in Java SE 14. int ndays = switch(month) { case JAN, MAR, MAY, JUL, AUG, OCT, DEC -> 31; case APR, JUN, SEP, NOV -> 30; case FEB -> { if(year % 400 == 0) yield 29; else if(year % 400 == 0) yield 29; else if(year % 4 == 0) yield 29; else if(year % 400 == 0) yield 29; else if(yea Highlights Java SE 12[341] 2019-03-19 Initial release Java SE 12.0.1[342] 2019-04-16 New Japanese Era Name & Security fixes Java SE 12.0.2[343] 2019-07-16 Removed some root CA certificates Java SE 13 JDK 13 was released on September 17, 2019. Java 13 includes the following new features, as well as "hundreds of smaller enhancements and thousands of bug fixes". [344] JEP 350: Dynamic CDS ArchivesJEP 351: ZGC: Uncommit Unused MemoryJEP 353: Reimplement the Legacy Socket APIJEP 354: Switch Expressions (Preview)JEP 355: Text Blocks (Preview) JEP 355: Text Blocks allows multiline string literals: String html = """ Hello, world """; Java 13 updates Release date Highlights Java SE 13.0.1[346] 2019-09-17 General Availability Release Java SE 13.0.2[347] 2020-01-14 Security & bug fixes Java SE 14 JDK 14 was released on March 17, 2020. Java 14 includes the following new features, as well as "hundreds of smaller enhancements and thousands of bug fixes". [348] JEP 305: Pattern Matching for instanceof (Preview)JEP 343: Packaging Tool (Incubator)JEP 345: NUMA-Aware Memory Allocation for G1JEP 349: JFR Event StreamingJEP 352: Non-Volatile Mapped Byte BuffersJEP 358: Helpful NullPointerExceptionsJEP 361: Switch Expressions (Standard)JEP 361: Switch Expressions (Standard)JEP 362: Deprecate the Solaris and SPARC PortsJEP 363: Remove the Concurrent Mark Sweep (CMS) Garbage CollectorJEP 364: ZGC on WindowsJEP 365: ZGC on WindowsJEP 366: Deprecate the ParallelScavenge + SerialOld GC CombinationJEP 367: Remove the Pack200 Tools and APIJEP 368: Text Blocks (Second Preview)JEP 370: Foreign-Memory Access API (Incubator) JEP 305, Pattern Matching for instance of simplifies the common case of an instance of test being immediately followed by cast, replacing if (obj instance of String) { String s = (String) obj; System.out.println(s.length()); } with if (obj instance of String s) { System.out.println(s.length()); } Use 359 Records allows easy creation of simple immutible Tuple like classes. record Point(int x, int y) { } Point p = new Point(3,4); System.out.println(p.x()); Java 14 updates Release Release date Highlights Java SE 14/349 2020-03-17 General Availability Release Java SE 14.0.1 [350] 2020-04-14 Security & bug fixes Java SE 15 JDK 15 was released on September 15, 2020. Java 15 adds e.g. support for multi-line string literals (aka Text Blocks). The Shenandoah and Z garbage collectors (latter sometimes abbreviated ZGC) are now ready for use in production (i.e. no longer marked experimental). Support for Oracle's Solaris operating system (and SPARC CPUs) is dropped (while still available in e.g. Java 11). The Nashorn JavaScript Engine is removed. Also removed some root CA certificates. JEP 339: Edwards-Curve Digital Signature Algorithm (EdDSA)JEP 372: Remove the Nashorn JavaScript EngineJEP 373: Reimplement the Legacy DatagramSocket APIJEP 374: Disable and Deprecate Biased LockingJEP 375: Pattern Matching for instanceof (Second Preview)JEP 377: ZGC: A Scalable Low-Latency Garbage CollectorJEP 379: Shenandoah: A Low-Pause-Time Garbage CollectorJEP 381: Remove the Solaris and SPARC PortsJEP 383: Foreign-Memory Access API (Second Incubator) JEP 384: Records (Second Preview) JEP 385: Deprecate RMI Activation for Removal JEP 360 Sealed Classes and interfaces that restrict which other classes or interfaces that restrict which other classes and interfaces that restrict which other classes or interfaces that restrict which other classes and interfaces that restrict which other classes or interfaces may extend or implement them. package com.example.geometry; public abstract sealed class Shape permits Circle, Rectangle, Square {...} Together with records, sealed classes are
product types and sealed classes are sum types. They work well with other recent features like records, switch expressions, and pattern matching for instance-of. They all form part of a system for "Pattern matching in Java" first discussed by Gavin Bierman and Brian Goetz, in September 2018.[352] Java 15 updates Release date Highlights Java SE 15[353] 2020-09-15 General Availability Release Java SE 15.0.1[354] 2020-10-20 Security & bug fixes Java SE 15.0.2[355] 2021-01-19 Security & bug fixes Java SE 16 JDK 16 was released on March 16, 2021. Java 16 removes Ahead-of-Time compilation itself was and is still written in C++, while as of Java 16, more recent C++14 (but still not e.g. C++17 or C++20) is allowed. The code was also moved to GitHub (dropping the Mercurial source control system). JEP 338: Vector API (Incubator)JEP 347: Enable C++14 Language FeaturesJEP 357: Migrate from Mercurial to GitJEP 369: Migrate to GitHubJEP 376: ZGC: Concurrent Thread-Stack ProcessingJEP 380: Unix-Domain Socket ChannelsJEP 386: Alpine Linux Port – not yet stableJEP 387: Elastic MetaspaceJEP 388: Windows/AArch64 PortJEP 389: Foreign Linker API (Incubator)JEP 390: Warnings for Value-Based ClassesJEP 392: Packaging ToolJEP 393: Foreign-Memory Access API (Third Incubator)JEP 394: Pattern Matching for instanceofJEP 395: RecordsJEP 396: Strongly Encapsulate JDK Internals by DefaultJEP 397: Sealed Classes (Second Preview) Java 16 updates Release date Highlights Java SE 16[357] 2021-03-16 General Availability Release Java SE 16.0.1[358] 2021-04-20 Timezone database update, bug fixes, and security updates Java SE 17 JDK 17 is the next long-term support (LTS) release now under active development, [359] due out in September 2021 if the current 6-month release cycles continue. Java 17 is expected to be the 2nd long-term support (LTS) release since switching to the new 6-month release cadence (the first being Java 11). JEP 356: Enhanced Pseudo-Random Number GeneratorsJEP 382: New macOS Rendering PipelineJEP 398: Deprecate the Applet API for RemovalJEP 410: Remove the Experimental AOT and JIT Compiler Java 17 updates Release Release date Highlights Latest Build[360] 2021-09-xx TBC Early-Access Builds: Build 15 (2021-03-24) Future features Project Valhalla: Value types, objects without identity but with an efficient memory layout. Project Panama: Improved interoperability with native code, to enable Java source code to call functions and use data types from other languages, in a way that is easier and has better performance than today. Project Loom: Virtual threads, a lightweight user-mode scheduled alternative to standard OS managed threads. Virtual threads are mapped to OS threads in a many-to-many relationship, in contrast to the many-to-one relationship from the original green threads implementation in early versions of Java. Implementations The officially supported Java SE. Releases are based on the OpenJDK project, which is a free and open source project with an open development model. Other Java implementations exist, however-in part due to Java's early history as proprietary software, while some implementation, often the result of some area of academic or corporate-sponsored research. Many Linux distributions include builds of OpenJDK through the IcedTea project started by Red Hat, which provides an easier build and integration environment. Visual J++ and the Microsoft Java Virtual Machine were created as incompatible implementations. After the Sun v. Microsoft lawsuit, Microsoft abandoned it and began work on the .NET platform. Other proprietary Java implementations are available, such as Azul's Zing; additionally, Azul offers certified open source OpenJDK builds under the Zulu moniker. Prior to the release of OpenJDK, while Sun's implementation was still proprietary, the GNU Classpath project was created to provide a free and open source implementation of the Java platform. Since the release of JDK 7, when OpenJDK became the official reference implementation, the original motivation for the GNU Classpath project almost completely disappeared and its last release was in 2012. The Apache Harmony project was started shortly before the release of OpenJDK. After Sun's initial source code release, the Harmony project continued, working to provide an implementation under a lax license, in contrast to the protective license chosen for OpenJDK. Google later developed Android and released it under a lax license. Android incorporated parts of the Harmony project, supplemented with Google's own Dalvik virtual machine and ART. Apache Harmony has since been retired, and Google has switched its use of Harmony components with equivalent ones from OpenJDK. Both Jikes and Jikes RVM are open source research projects that were developed by IBM. Several other implementations exist that started as proprietary software but are now open source. IBM initially developed OpenJ9 as the project and donated it to the Eclipse Foundation. JRockit is a proprietary implementation that was acquired by Oracle and incorporated into subsequent OpenJDK versions. References ^ a b c d "Oracle Java SE Support Roadmap". www.oracle.com. ^ a b "Oracle Java SE Support Roadmap". Retrieved 2021-02-17. ^ Reinhold, Mark (2018-08-17). "What does LTS mean for OpenJDK?". Retrieved 2018-08-28. ^ "JDK 17 Early-Access Builds". jdk.java.net. 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