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// Step by step

Microsoft Visual Basic 2013

Intermediate

Michael Halvorson

// Step by step

Your hands-on guide to Visual Basic fundamentals

Expand your expertise—and teach yourself the fundamentals of Microsoft Visual Basic 2013. If you have previous programming experience but are new to Visual Basic 2013, this tutorial delivers the step-by-step guidance and coding exercises you need to master core topics and techniques.

Discover how to:

- Master essential Visual Basic programming techniques
- Begin building apps for the Windows Store, Windows Phone 8, and ASP.NET
- Design apps using XAML markup, touch input, and live tiles
- Tackle advanced language concepts, such as polymorphism
- Manage data sources, including XML documents and web data
- Create a Windows Phone 8 app that manages key lifecycle events

Technologies Covered

- Windows 8.1
- Microsoft Visual Basic 2013
- Microsoft .NET Framework 4.5.1
- ASP.NET 4.5.1
- Windows Phone 8

About the Author

Michael Halvorson, a former Visual Basic localization manager at Microsoft, is the award-winning author of more than 35 books, including *Microsoft Visual Basic 2010 Step by Step* and *Start Here! Learn Microsoft Visual Basic 2012*.

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http://aka.ms/VB2013_SbS/files

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Companion eBook

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Michael Halvorson

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Introduction

Microsoft Visual Basic 2013 is an important upgrade and enhancement of the popular Visual Basic programming language and compiler, a technology that enjoys an installed base of millions of programmers worldwide. Visual Basic 2013 is not a standalone product but a key component of Microsoft Visual Studio 2013—a comprehensive development system that allows you to create powerful applications for Microsoft Windows 8.1, the Windows desktop, the web, Windows Phone 8, and a host of other environments.

Whether you purchase one of the commercial editions of Visual Studio 2013 or you download Visual Basic Express 2013 for a free test-drive of the software, you are in for an exciting experience. The latest features of Visual Basic will increase your productivity and programming prowess, especially if you enjoy using and integrating information from databases, entertainment media, webpages, and websites. In addition, an important benefit of learning Visual Basic and the Visual Studio Integrated Development Environment (IDE) is that you can use many of the same tools to write programs for Microsoft Visual C# 2013, Microsoft Visual C++ 2013, HTML5 and JavaScript, and other popular languages.

Microsoft Visual Basic 2013 Step by Step is a comprehensive introduction to Visual Basic programming using the Visual Basic 2013 software and Windows 8.1. I've designed this practical, hands-on tutorial with a variety of skill levels in mind. In my opinion, the best way to master a complex technology like Visual Basic is to follow the premise that programmers learn by doing. Therefore, by reading this book and working through the examples, you'll learn essential programming techniques through carefully prepared tutorials that you can complete on your own schedule and at your own pace.

Although I have significant experience with college teaching and corporate project management, this book is not a dry textbook or an "A to Z" programmer's reference; instead, it is a practical hands-on programming tutorial that puts *you* in charge of your learning, developmental milestones, and achievements. By using this book, programmers who are new to this topic will learn Visual Basic software development fundamentals in the context of useful, real-world applications; and intermediate Visual Basic programmers can quickly master the essential tools and techniques offered in the Visual Basic 2013 and Windows 8.1 upgrades.

I've taken a multiplatform approach in this book, so in addition to learning Visual Basic programming skills you'll learn to create a wide variety of applications, including Windows Store apps, Windows Forms (Windows desktop) apps, console apps, web apps

(ASP.NET), and Windows Phone 8 apps. Each of these application types has a place and a purpose in real-world development.

To complement this comprehensive approach, the book is structured into 5 topically organized parts, 21 chapters, and dozens of step-by-step exercises and sample programs. By using this book, you'll quickly learn how to create professional-quality Visual Basic 2013 applications for the Windows operating system, Windows Phone 8 platform, and a variety of web browsers. You'll also have fun!

Who should read this book

This is a step-by-step programming tutorial for readers who enjoy learning to do new things by doing them. My assumption is that you already have some experience with programming, possibly even an earlier version of Visual Basic, and that you are ready to learn about the Visual Studio 2013 product in the context of building applications that you can market in the Windows Store, Windows Forms (Windows desktop) for personal and enterprise purposes, web (ASP.NET) applications that run in browsers, and apps for the Windows Phone 8 platforms.

This book's content will supply you with concrete Visual Basic coding techniques as well as a broad overview of programming strategies suitable for Visual Basic development. The book's extensive collection of step-by-step exercises has a broad focus; they are written for technical people who understand programming and are not simply targeted toward hobbyists or absolute beginners. In addition, you will learn about the capabilities of the Windows 8.1 operating system and the specific design guidelines that Microsoft recommends for Windows 8.1 and Windows Phone 8 applications.

Assumptions

This book is designed to teach readers how to use the Visual Basic programming language. You will also learn how to use the Visual Studio 2013 IDE and development tools. This book assumes no previous experience with Visual Studio 2013, but it is written for readers who understand programming and are not absolute beginners. I assume that you are familiar with programming basics or have studied some version of BASIC or Visual Basic in the past and are now ready to move beyond elementary skills to platform-specific techniques.

If you have no prior knowledge of programming or Visual Basic, you might want to fill in some of the gaps with my introduction to Visual Basic 2012 and Windows Store development, *Start Here! Learn Visual Basic 2012* (Microsoft Press, 2012). From time

to time, I will refer to the exercises in that book to give you additional resources for your learning.

Microsoft Visual Basic 2013 Step by Step also assumes that you have acquired and are running the Windows 8.1 operating system and that you want to learn how to create applications for the Windows Store platform and other environments. To make the most of your programming practice, you will need to know a little about how to perform common tasks in Windows 8.1, how to customize the Start page and user interface, how to work with information on the web, and how to adjust basic system settings. If you also have Windows 8.1 installed on a tablet or touchpad device, all the better, because a fundamental design emphasis of Windows 8.1 is to make touch and gestures a natural way to manipulate content. You can build your applications on a laptop or desktop running Visual Studio 2013 and Windows 8.1 and then test out the applications on your tablet or touchpad.

In terms of the Visual Studio software, I assume that you are using one of the full, retail versions of Visual Studio 2013, such as Visual Studio Professional, Premium, or Ultimate. This will enable you to create the full range of application types that I describe in this book, including Windows Store apps, Windows Forms (Windows desktop) apps, console apps, Web Forms (ASP.NET) apps, and Windows Phone 8 apps.

If you don't have access to a full, retail version of Visual Studio 2013, you can experiment with the Visual Studio 2013 software by downloading free versions of the suite designed for specific platforms. These limited-feature or "Express" versions of Visual Studio 2013 are called Express for Windows, Express for Windows Desktop, Express for Windows Phone, and Express for Web. The Visual Studio website (*http://www.microsoft.com/visualstudio*) provides access to the retail and Express versions of Visual Studio, and it explains the differences among all of the available versions.

Who should not read this book

You might be disappointed with this book if you are already a knowledgeable Visual Basic programmer and are just looking to explore the new features of Visual Studio 2013. The *Step By Step* series is targeted toward readers who are professional developers but who have little to no previous experience with the topic at hand. If you are an advanced Visual Basic developer, you are likely to grow weary of the step by step exercises that introduce essential features such as decision structures, XAML markup, data access strategies, or using the .NET Framework.

Developers who have a lot of experience will feel that I'm exploring the obvious—but what is obvious to experienced programmers often isn't obvious at all to someone who is learning to use a new development platform. If Windows Store or Windows Phone programming with Visual Basic is a new concept for you, this is the place to start.

Organization of this book

This book is divided into five sections, each of which focuses on a different aspect or technology within the Visual Studio software and the Visual Basic programming language. Part I, "Introduction to Visual Studio development," provides an overview of the Visual Studio 2013 IDE and its fundamental role in .NET application creation and then moves into step-by-step development walkthroughs on the Windows Store and Windows Forms (Windows desktop) platforms.

Part II, "Designing the user interface," continues the focus on application creation in the Visual Studio IDE, emphasizing the construction of Windows Store apps, Windows Forms (Windows desktop) apps, and console apps. In particular, you'll learn how to work with XAML markup, XAML styles, important controls, and new Windows 8.1 design features, including command bar, flyout, tiles on the Windows Start page, and touch input.

Part III, "Visual Basic programming techniques," covers core Visual Basic programming skills, including managing data types, using the .NET Framework, structured error handling, working with collections and generics, data management with LINQ, and fundamental object-oriented programming skills.

Part IV, "Database and web programming," introduces data management techniques in Windows desktop and Windows Store applications, including binding data to controls and working with XML documents and Microsoft Access data sources. You'll also get an overview of ASP.NET web development strategies, along with a complete walkthrough of web development on the Web Forms (ASP.NET) platform.

Finally, Part V, "Microsoft Windows Phone programming," provides an overview of the features and capabilities presented by the Windows Phone 8 platform. You'll identify key hardware characteristics in the Windows Phone ecosystem, the marketing opportunities tendered by the Windows Phone Store, and you'll create a complete Windows Phone 8 app step by step.

Finding your best starting point in this book

This book is designed to help you build skills in a number of essential areas. You can use it if you're new to programming, switching from another programming language, or upgrading from Visual Studio 2010 or Visual Basic 2012. Use the following table to find your best starting point in this book.

If you are ...	Follow these steps
New to Visual Basic programming	**1.** Install the sample projects as described in the section "Installing the code samples," later in this Introduction. **2.** Learn essential skills for using Visual Studio and Visual Basic by working sequentially from Chapter 1 through Chapter 21. **3.** Use the companion book *Start Here! Learn Microsoft Visual Basic 2012* for additional instruction as your level of experience dictates.
Upgrading from Visual Basic 2010 or 2012	**1.** Install the sample projects as described in the section "Installing the code samples." **2.** Read Chapter 1, skim Chapters 2 through 4, and complete Chapters 5 through 21.
Interested primarily in creating Windows Store apps for Windows 8.1	**1.** Install the sample projects as described in the section "Installing the code samples." **2.** Complete Chapters 1 through 3, Chapter 5, Chapters 7 through 16, and Chapter 18.
Interested primarily in creating Windows Forms (Windows desktop) apps for Windows 8.1, Windows 8, or Windows 7	**1.** Install the sample projects as described in the section "Installing the code samples." **2.** Complete Chapters 1 through 2, Chapter 4, Chapter 6, Chapter 10, and Chapters 11 through 17.

Conventions and features in this book

This book presents information using the following conventions designed to make the information readable and easy to follow:

- Each exercise consists of a series of tasks, presented as numbered steps (1, 2, and so on) listing each action you must take to complete the exercise.
- The names of all program elements—controls, objects, methods, functions, properties, classes, variable names, and so on—appear in *italics*.
- As you work through steps, you'll occasionally see tables with lists of properties that you'll set in Visual Studio. Text properties appear within quotes, but you don't need to type the quotes.
- Boxed elements with labels such as "Note" provide additional information or alternative methods for completing a step successfully.
- Text that you type (including some code blocks) appears in **bold**.
- A plus sign (+) between two key names means that you must press those keys at the same time. For example, "Press Alt+Tab" means that you hold down the Alt key while you press the Tab key.
- A vertical bar between two or more menu items (for example, File | Close) means that you should select the first menu or menu item, then the next, and so on.

System requirements

You will need the following hardware and software to work through the examples in this book:

- The Windows 8.1 operating system. (Depending on your Windows configuration, you might also require Local Administrator rights to install or configure Visual Studio 2013.) Note that while the full versions of Visual Studio 2013 do support earlier versions of Windows, such as Windows 8 and Windows 7 SP1, the features described in this book require Windows 8.1, and the screen shots will all show this environment.

- A full retail edition of Visual Studio 2013, required for completing all of the exercises in this book (Visual Studio 2013 Professional, Premium, or Ultimate). The Visual Studio website (*http://www.microsoft.com/visualstudio*) explains the differences among these versions. Alternatively, you can experiment with the Visual Studio 2013 software by downloading free versions of the suite designed for specific platforms. The limited-feature versions of Visual Studio 2013 are called Express for Windows, Express for Windows Desktop, Express for Windows Phone, and Express for Web. You will need to download all four of these Express versions to get the necessary software to complete the book's exercises. (However, even with these Express editions, there will be a few gaps; for example, you will be unable to complete Chapter 10, "Creating console applications.")
- An Internet connection to view Visual Studio help files, try out the Windows Store and Windows Phone Store, and download this book's sample files.
- A computer with 1.6 GHz or faster processor.
- 1 GB RAM (32-bit) or 2 GB RAM (64-bit).
- 16 GB available hard disk space (32-bit) or 20 GB (64-bit) for Windows 8.1.
- DirectX 9 graphics device with WDDM 1.0 or higher driver.
- 1024 × 768 minimum screen resolution.

If you want to use touch for user input, you'll need a multitouch-capable laptop, tablet, or display. A multitouch-capable device is optional for the exercises in this book, although one is useful if you want to understand what such devices are capable of. Typically, a programmer will develop software on a desktop or laptop computer and then test multitouch functionality on a multitouch-capable device.

Although this book develops applications for Windows Phone 8, a Windows Phone is not required to complete the book's step-by-step exercises.

Code samples

Most of the chapters in this book include step-by-step exercises that let you interactively try out new material learned in the main text. All sample projects can be downloaded from the following page:

http://aka.ms/VB2013_SbS/files

Follow the instructions to download the Visual_Basic_2013_SBS_Sample_Code.zip file.

Installing the code samples

Follow these steps to install the code samples on your computer so that you can use them with the exercises in this book:

1. Unzip the Visual_Basic_2013_SBS_Sample_Code.zip file that you downloaded from the book's website. (Name a specific directory along with directions to create it, if necessary.) I recommend My Documents\Visual Basic 2013 SBS for the files.
2. If prompted, review the displayed end user license agreement. If you accept the terms, select the accept option, and then click Next.

Using the code samples

The code samples .zip file for this book creates a folder named Visual Basic 2013 SBS that contains 19 subfolders—one for each of the chapters in the book that have exercises. To find the examples associated with a particular chapter, open the appropriate chapter folder. You'll find the examples for that chapter in separate subfolders. The subfolder names have the same names as the examples in the book. For example, you'll find an example called Music Trivia in the My Documents\Visual Basic 2013 SBS\Chapter 02 folder on your hard drive. If your system is configured to display file extensions of the Visual Basic project files, look for .sln as the file extension. Depending on how your system is configured, you might see a Documents folder rather than a My Documents folder.

Acknowledgments

This book is a very substantial revision of an earlier Visual Basic Step by Step book published by Microsoft Press. In fact, in almost every way, it is an entirely new book, and it is the first programming title that I have written specifically to be a multiplatform guidebook, covering Visual Basic development on the Windows Store, Windows Forms, Web Forms, and Windows Phone platforms. I am very grateful to the many talented programmers and editors who offered their ideas and contributions to this volume.

At Microsoft Press, I would like to thank Devon Musgrave for his early enthusiasm for the project and for connecting me to team members in the Visual Studio product group. At O'Reilly Media, I would like to thank again Russell Jones, who discussed many of the topics in this book with me and offered technical and practical suggestions for completing the work on schedule. I am also grateful to Tim Patrick, a technical reviewer and experienced author and developer, who worked on both this Step by Step volume and the companion book, *Start Here! Learn Microsoft Visual Basic 2012*. (Perhaps we will work on a history book someday as well, Tim!)

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I am also most grateful to the Microsoft Visual Studio 2013 development team for providing me with the preview and release candidate software to work with. In addition, I would like to thank the Microsoft Windows 8.1 team for their support and offer my special thanks to the many MSDN forum contributors who asked and answered questions about Visual Basic and Windows programming.

Finally, I offer thanks and admiration to my immediate family for their continued support of my writing projects and various academic pursuits. Once again I was able to involve my son, Henry Halvorson, with the creation of electronic music and artwork, and his contributions appear in Chapters 3, 4, 5, and 9.

Errata & book support

We've made every effort to ensure the accuracy of this book and its companion content. Any errors that have been reported since this book was published are listed on our Microsoft Press site:

http://aka.ms/VB2013_SbS/errata

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CHAPTER 3

Creating your first Windows Store application

After completing this chapter, you will be able to

- Design the user interface for a Windows Store app.
- Use XAML controls in the Toolbox.
- Work with random numbers, digital photos, and sound effects.
- Write Visual Basic program code for an event handler.
- Create a splash screen for your Windows Store app.
- Save, test, and build a Windows Store app.

As you learned in Chapter 2, "The Visual Studio Integrated Development Environment," the Microsoft Visual Studio 2013 IDE is ready to help you build your Visual Basic applications. In this chapter, you'll dive right in and create a Visual Basic program for the Windows Store. As a complete walkthrough exercise, this chapter describes the essential steps that you will complete each time that you create a Visual Basic application in the Visual Studio 2013 IDE. In future chapters, you'll learn more about the diversity of application types that you can create with Visual Studio, including apps for the Windows Store, the Windows desktop, the console, the web, and Windows Phone. After you learn the core Visual Basic programming skills, you'll find that all of these application types have much in common.

In this chapter, you'll learn how to create a Las Vegas-style slot machine for the Windows Store. You'll design the user interface for the program with XAML controls in the Toolbox, and you'll adjust property settings and resize objects on the page with tools in the IDE. As part of the process, you'll use the *TextBlock* control to display random numbers, the *Image* control to insert a digital photograph, and the *MediaElement* control to play a sound effect when the user spins the number 7. To create the core functionality of the Windows Store app, you'll write Visual Basic program code for an event handler. Finally, you'll create a splash screen for the app, save and test the app in the IDE, and build an executable file that can be launched from the Windows Start page.

Lucky Seven: A Visual Basic app for the Windows Store

The Windows Store app that you're going to construct is Lucky Seven, a game program that simulates a lucky number slot machine. Lucky Seven has a simple user interface and can be created and compiled in just a few minutes by using Visual Studio 2013. Here's what your program will look like when it's finished:

Programming step by step

The Lucky Seven user interface contains one button, three text block objects to display lucky numbers, a digital photo depicting cash winnings, and a text block containing the title "Lucky Seven." I produced these elements by creating five visible objects on the Lucky Seven page and then changing several properties for each object. I also added a *MediaElement* control to the page, which is not visible at runtime, to play a special sound effect when the user wins the game.

After I designed the basic user interface, I added program code for the Spin button to process the user's button clicks and to display random numbers on the page. Finally, I created a splash screen for the app and prepared it for distribution by using tools in the Visual Studio IDE.

To re-create Lucky Seven, you'll follow five essential programming steps that will be the same for most of the projects that you create with Visual Studio. You'll design the user interface with Toolbox

controls, adjust important property settings, write Visual Basic code, prepare a splash screen and other required elements, test the program, and build an executable file.

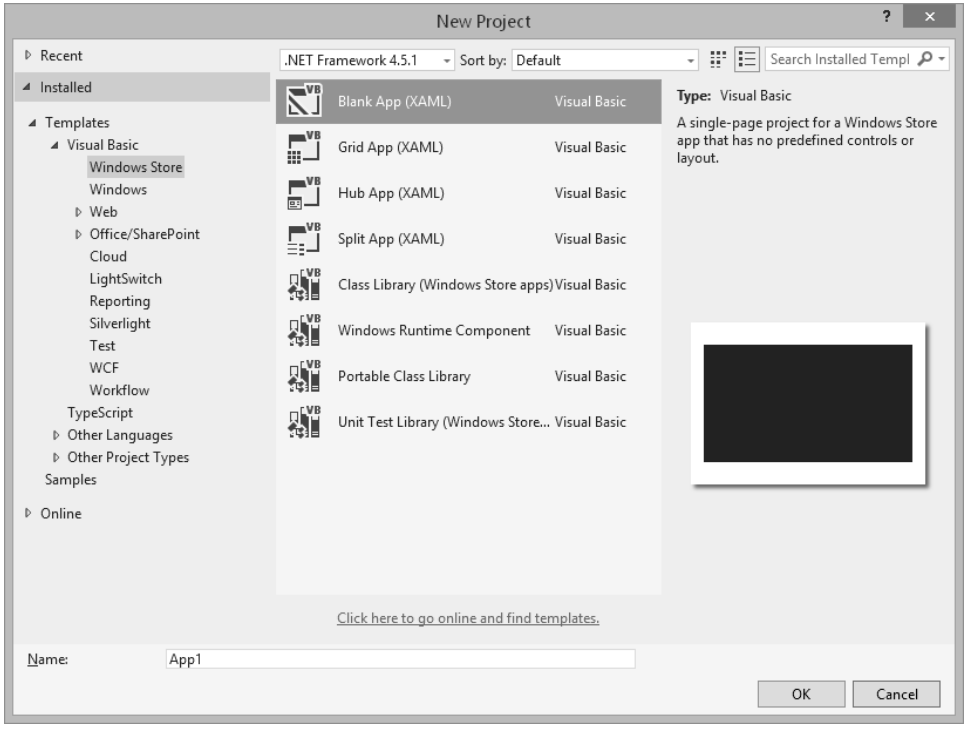
Designing the user interface

In this exercise, you'll start building Lucky Seven by first creating a new project and then using XAML controls for Windows Store apps to construct the user interface.

Create a new project

1. Start Visual Studio 2013.
2. On the Visual Studio File menu, click New Project.

   The New Project dialog box opens, as shown here:



The New Project dialog box provides access to the major template types available for creating applications with Visual Studio. On the left side of the dialog box is a list of the many template types available. Because the most recent language selection I made in this dialog box was Visual Basic, the Visual Basic templates are currently visible, but other programming templates and resources are also offered, including those for Visual C#, Visual C++, and JavaScript.

3. In the Visual Basic template group, click the Blank App (XAML) project if it is not already selected.

   When you use the Blank App template, Visual Studio will create a basic Windows Store app project with default tiles, splash screen, manifest, and startup code, but no predefined controls or layout. Note that other app types are available (which we'll get to later), including Windows (that is, Windows desktop), Web, and Windows Phone.

4. In the Name text box, type **My Lucky Seven**.

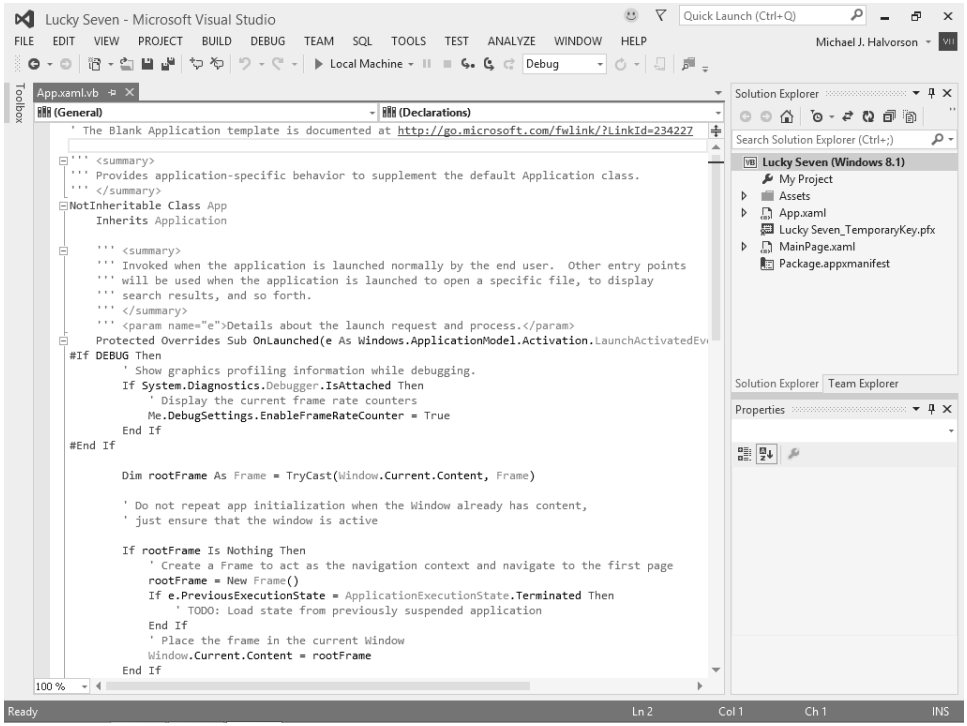
   Visual Studio assigns the name My Lucky Seven to your project. (You'll specify a folder location for the project later.)

Important I'm recommending the "My" prefix here so that you don't confuse your new app with the Lucky Seven project I've created for you on disk. However, you'll see that I don't use the "My" prefix myself in the instructions, sample projects, or screen shots in the book—I am leaving that for your use.

   If the New Project dialog box contains Location and Solution Name text boxes, you need to specify a folder location and solution name for your new programming project now. Refer to Chapter 2, in the section "Configuring the IDE for step-by-step exercises," to learn how to adjust when these text boxes appear. As I noted in Chapter 2, I will be asking you to specify a location when you first save your project—a step that is typically near the end of each exercise.

5. Click OK to create the new project in Visual Studio.

   Visual Studio prepares the IDE for a new programming project and displays Visual Basic code associated with the blank application template. Your screen will look like this:



What you see here is standard startup code for a Windows Store app created in Visual Studio 2013, and the code is stored in the file App.xaml.vb within the project. Although each project contains an App.xaml file, your work in this chapter will begin with the app's user interface, which is stored in the MainPage.xaml file.

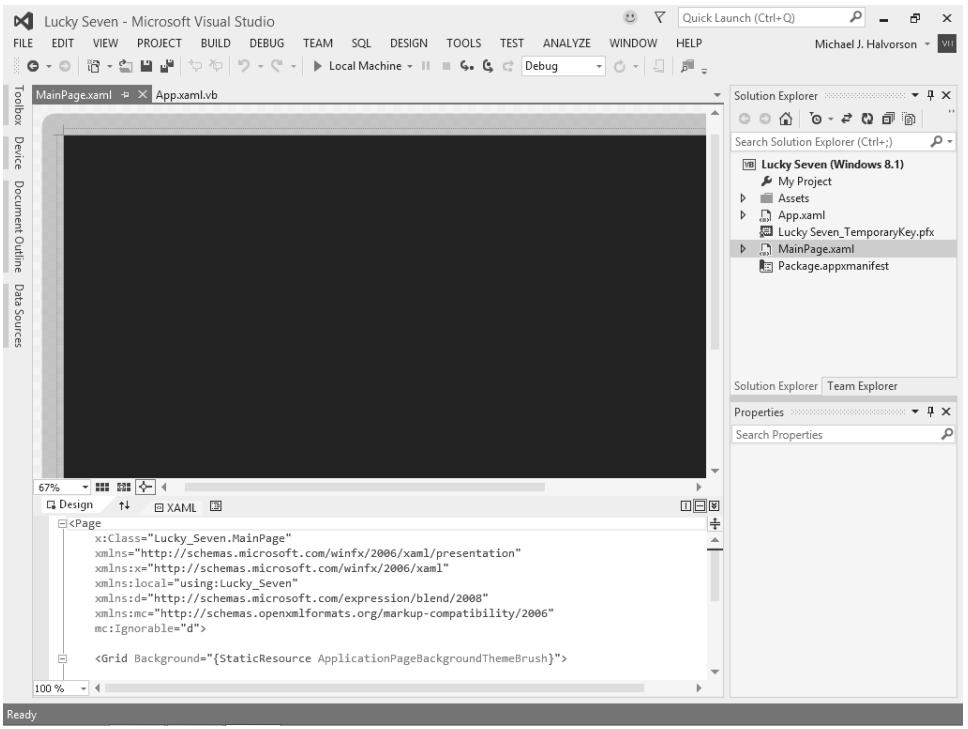
Note The section beginning *#If DEBUG Then* near the center of this illustration displays debugging information on the screen when the Windows Store app is executed in debugging mode, and it is designed for testing purposes. This code was present in the final Visual Studio 2013 software release and displays information about how long various tasks are taking during the execution of the Visual Studio app, including the frame rate for the user interface thread and how long it took (in milliseconds) to load the user interface. If you want to suppress the debugging information, remove the code between the *#If DEBUG* and *#End If* statements. For more information about the meaning of the debugging counters that appear at the top of the screen during testing, see *EnableFrameRateCounter* on *http://msdn.microsoft.com*.

You'll display that user interface now in the Designer and enhance it with Toolbox controls.

Navigate the Designer

1. Open Solution Explorer if it is not currently visible, and then double-click the file MainPage.xaml.

   Visual Studio opens MainPage.xaml in a Designer window and shows the upper-left corner of the app's main page. Below this page, you'll see the Code Editor with several lines of XAML markup associated with the user interface page in the Designer. As you add controls to the app page in the Designer, the Code Editor reflects the changes by displaying the XAML statements that will create the user interface. Your screen should look like this:



   Each time that you create a Windows Store app with Visual Basic and Visual Studio, you'll use Toolbox controls and XAML markup to design the user interface. This technique will be new to Visual Basic programmers who have primarily created Windows applications by using the technology known as Windows Forms. (You will have used the Toolbox but not XAML markup.) However, XAML will be somewhat familiar to programmers who have created Windows applications using Windows Presentation Foundation (WPF) or Windows Phone.

   Now let's review how the Designer works.

2. Click the scroll box in the Designer's vertical scroll bar, and drag it down.

   When you drag a scroll box in the Designer window, you can see more of the user interface you are working on.

3. Click the scroll box in the Designer's horizontal scroll bar, and drag it right. (Likewise, when you drag a horizontal scroll box, you can see hidden parts of the user interface.)

   Near the lower-left corner of the Designer, you'll see a Zoom tool, which allows you to zoom in on the current application page (to see more detail) or zoom out (to see more of the page). The current value of the Zoom tool is 67%. You can select a different value by clicking the Zoom tool's drop-down button.

4. Click the Zoom drop-down button, and then click Fit All.

   The entire application page now fits within the Designer. Depending on your screen resolution and the amount of screen space you have designated for the other IDE tools, you'll see a somewhat smaller version of the page.

Tip If your mouse has a mouse wheel, you can move quickly from one zoom setting to the next by holding down the Ctrl key and rotating the mouse wheel. This feature works whenever the Designer is active.

It is important to be able to quickly view different parts of the application page in different sizes while you build it. Sometimes you want to see the entire page to consider the layout of controls or other elements, and sometimes you need to view portions of the page up close. It's up to you to adjust the Designer window so that you can see the user interface clearly as you work with it.

Now set the Designer to its full-size setting.

5. Click the Zoom drop-down button, and then click 100%.

6. Adjust the Designer's vertical and horizontal scroll bars so that you can see the upper-left edge of the page.

   Seeing the edge of the page will help you orient yourself to the application window that the user sees.

   Now you'll add a Toolbox control to the page.

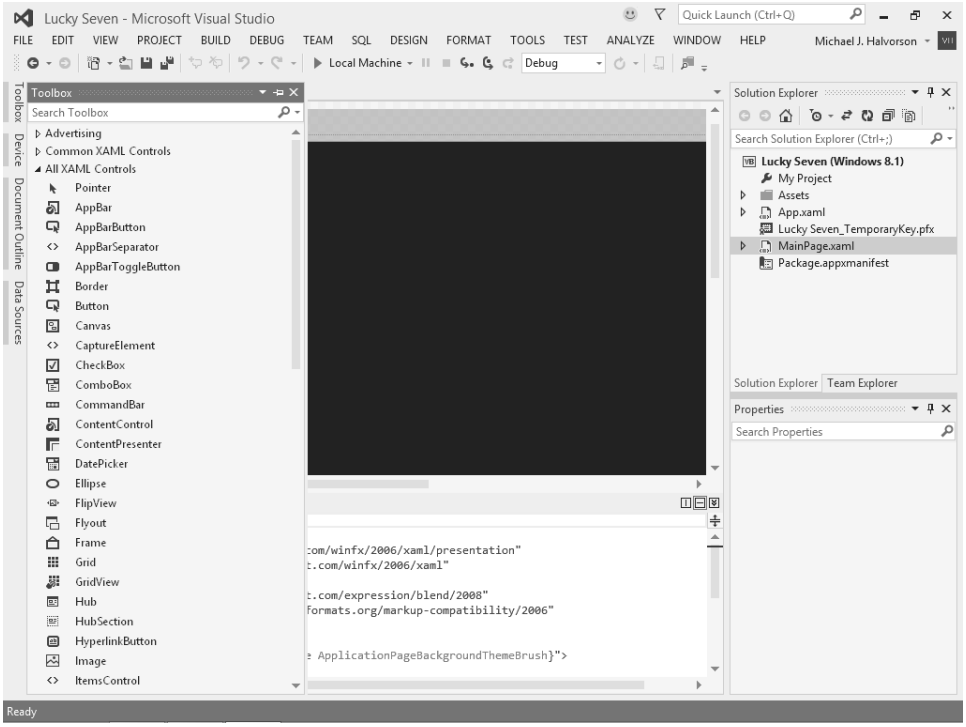
Open the Toolbox and use the *TextBlock* control

1. If the Toolbox is not currently visible, click the Toolbox tab or click the Toolbox command on the View menu.

   The Toolbox window contains a large collection of user interface controls that you can add to your application. Because you are building a Windows Store app for Windows 8.1, the types of controls that are displayed in the Toolbox are so-called XAML controls—that is, structured elements that control the look and feel of an application and can be successfully organized on a page by the XAML parser within Visual Studio.

There are also other collections of Toolbox controls for other types of applications (Windows Forms controls, HTML controls for web applications, Windows Phone controls, and so on), but you don't have to worry about that now—Visual Studio automatically loads the proper controls into the Toolbox when you open a new solution.

Your screen should look like this:



For convenience, the Toolbox controls have been organized into several groups: Advertising, Common XAML Controls (those controls that appear in many applications), and All XAML Controls (a list of all the XAML controls for Windows Store apps that are configured for use with Visual Studio).

Remember that the Toolbox window is like any other tool window in the Visual Studio IDE. You can move it, resize it, or pin it as needed. You can choose to keep the Toolbox open while you add controls to a new page (pinning it to the side of the IDE), or you can choose to use the Toolbox window's autohide feature so that the Toolbox collapses after each control has been selected.

2. Click the *TextBlock* control in the Toolbox, and move the mouse pointer to the Designer window.

   The mouse pointer changes to crosshairs. The crosshairs are designed to help you draw the rectangular shape of the *TextBlock* control on the page. You can also create a *TextBlock* with the default size by double-clicking the control in the Toolbox.

3. Click and drag to create a large rectangle-sized text block object that fills the top-left corner of the page.

   When you release the mouse button, Visual Studio creates a XAML text block object. *TextBlock* is designed to display text on your page and, in this case, can create a welcoming banner for your Windows Store app. You can update the text stored in the *TextBlock* object on your page by setting the *Text* property, either with the Properties window, XAML markup, or program code.

4. In the Properties window, change the *Text* property of the text block object to **Lucky Seven** and press Enter.

   Visual Studio displays "Lucky Seven" in the Properties window and in the Designer window. Now you'll increase the point size of the title and apply other formatting effects.

5. In the Properties window, in the *Text* category, click the Font Size text box, type **98**, and press Enter.

   The Font Size text box offers a variety of font sizes up to 72, but in this case, you're typing a larger number to create a big impact on the screen.

Tip At any time, you can delete an object and start over again by selecting the object on the page and then pressing Delete. Feel free to create and delete objects to practice creating your user interface.

6. In the Properties window, in the *Brush* category, click the *Foreground* property, if it is not already selected.

   The *Foreground* property controls the color of the text in the text block.

7. Click the Solid Color Brush button.

   The Solid Color Brush button is the second tile from the left near the top of the dialog box. (This button might also be the default selection, but it will cause no harm if you click it again.)

   When the Solid Color Brush button is selected, you'll see the Color Resources editor.

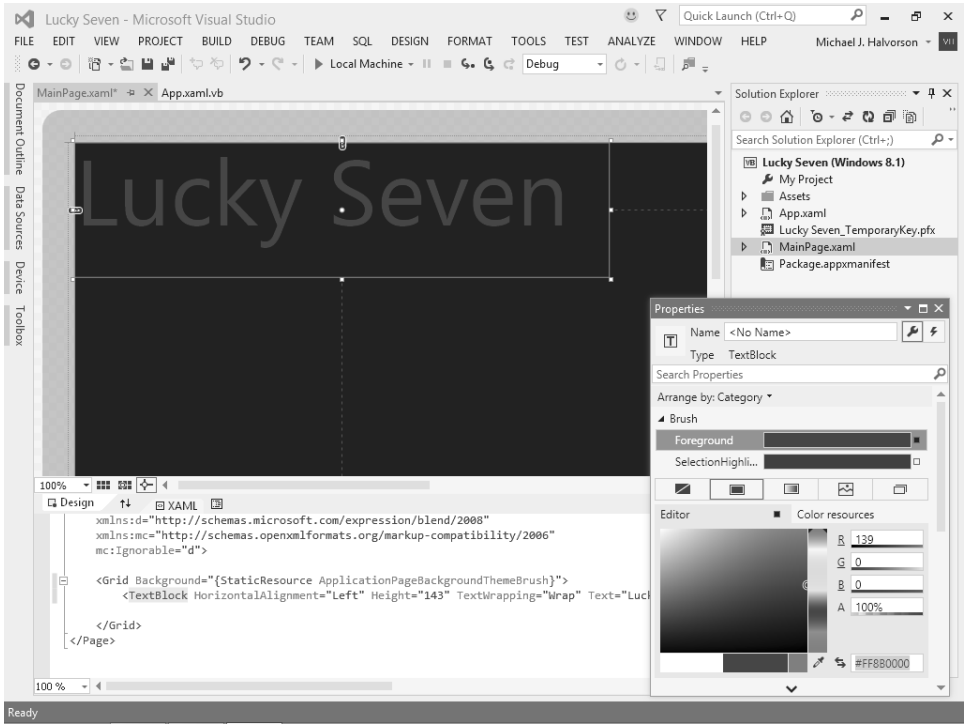
8. If you'd like more room to see the content of the Properties window, enlarge the window or configure the tool as a floating window so that you can see the Color Resources editor clearly.

9. Near the bottom of the editor, select the number containing the pound (#) sign.

   This eight-digit number is known as a hexadecimal color value—that is, a number expressed in base-16 arithmetic that specifies color by using RGBA values. When you specify a new color for text, you can specify individual values for red, green, and blue (R, G, and B), or you can use a standardized name, such as Red, DarkRed, White, Black, Purple, Lime, or Aquamarine.

10. Type **DarkRed** and press Enter.

    Note that after you press Enter in the Color Resources editor, Visual Studio converts "DarkRed" to the hexadecimal value #FF8B0000, as shown in the following screen:



11. Return the Properties window to its docked position if you moved or enlarged it.

Now you'll add three *TextBlock* controls below the Lucky Seven banner to display the randomly chosen numbers in the game. Each time that the user clicks Lucky Seven's Spin button, three new numbers will appear in these text blocks. If one of the numbers is a 7, the user wins and a sound is played.

Add text blocks for the random numbers

1. Double-click the *TextBlock* control in the Toolbox.

   Visual Studio creates a text block object on the page. In this case, the text block object is quite small, but you can resize it.

2. In the Properties window, click the *Text* category, click the *FontSize* box, type **72**, and then press Enter.

   Visual Studio expands the text block object to accommodate text in 72-point font.

3. In the Properties window, click the *Common* category, click the Text box, type **0**, and press Enter.

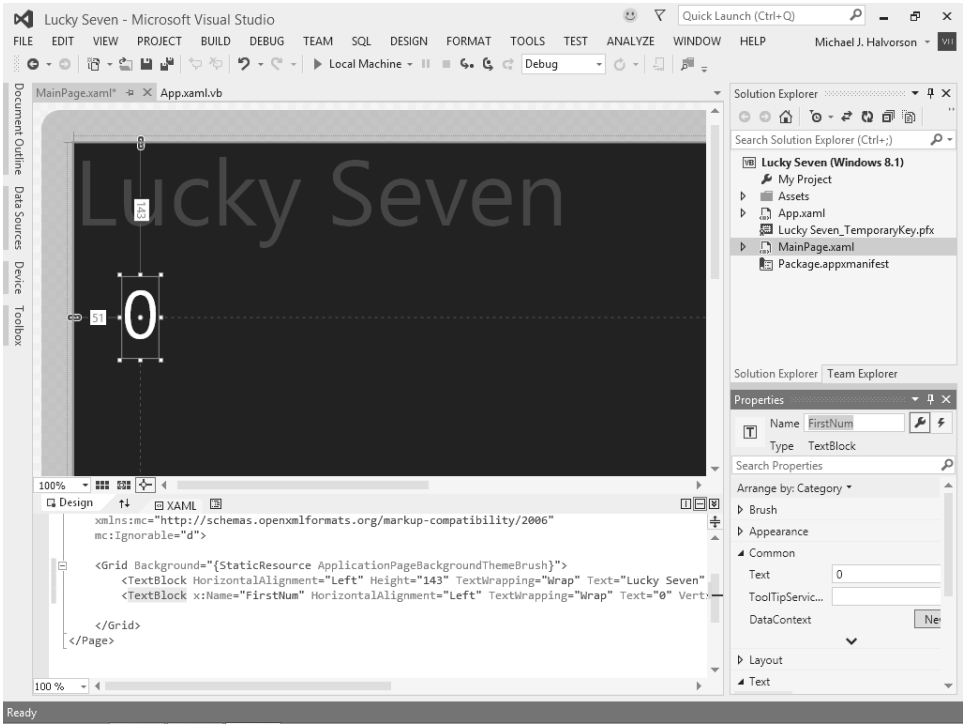
   0 will be an initial value for the first lucky number in the program.

4. At the top of the Properties window, change the *Name* property of the text block object to **FirstNum**.

   It is not required that all objects be named in your user interface, but it is important to name objects that will be referenced in program code. Because you'll be controlling the value of this lucky number in a Visual Basic event handler, you'll give it the name *FirstNum* here.

5. Drag the *FirstNum* text block object below the "u" in Lucky Seven.

   Your page should look something like this:



6. Double-click the *TextBlock* control in the Toolbox to create another text block object.

   This object will hold the second lucky number on the page.

7. Using the Properties window, set the *Name* property of the object to **SecondNum**, set the *FontSize* property to **72**, and set the *Text* property to **0**.

8. Move the new *SecondNum* object to the right of the *FirstNum* object, directly below the "y" in Lucky Seven.

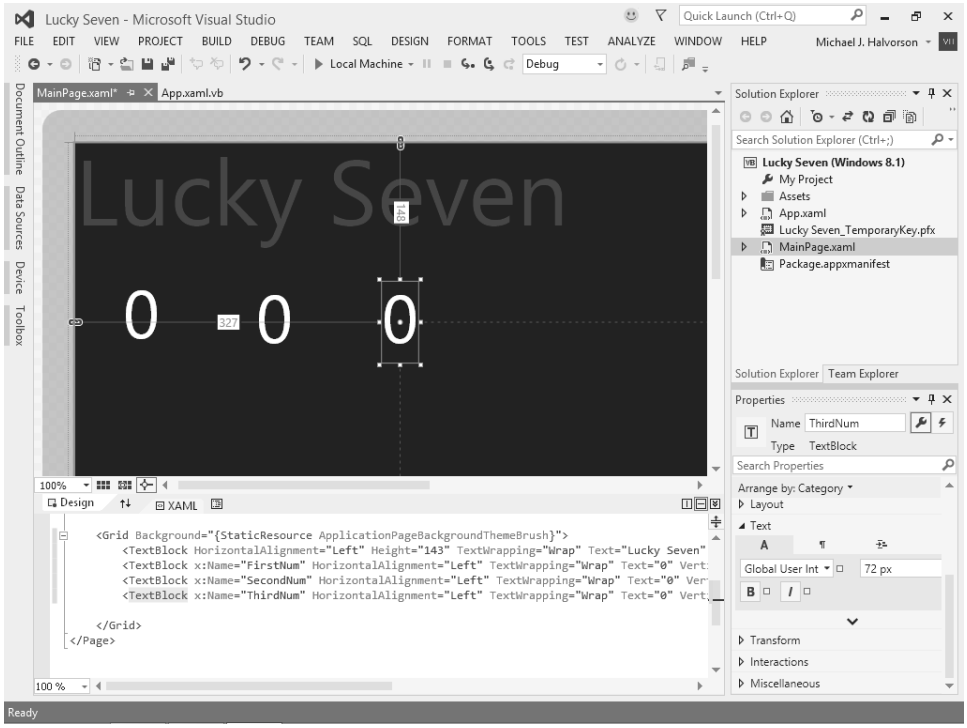
   Now you'll create the third lucky number for the page.

9. Double-click the *TextBlock* control in the Toolbox to create the last text block object.

10. Using the Properties window, set the *Name* property of the object to **ThirdNum**, set *FontSize* to **72**, and set *Text* to **0**.

11. Move the *ThirdNum* object to the right of the *SecondNum* object, directly below the first "e" in Lucky Seven.

    When you've finished, your four text block objects should look like those in this screen shot. (You can move your objects if they don't look quite right.)



Now you'll add a button control to the page.

Add a button control

1. Click the *Button* control in the Toolbox, and then move the mouse pointer over the application page.

2. Drag the pointer down and to the right. Release the mouse button to complete the button.

3. In the Properties window, in the *Common* category, change the *Content* property to **Spin** and press Enter.

   Note that a button object's contents are set via the *Content* property, rather than *Text* (like a text block object), because buttons can contain artwork and other data.

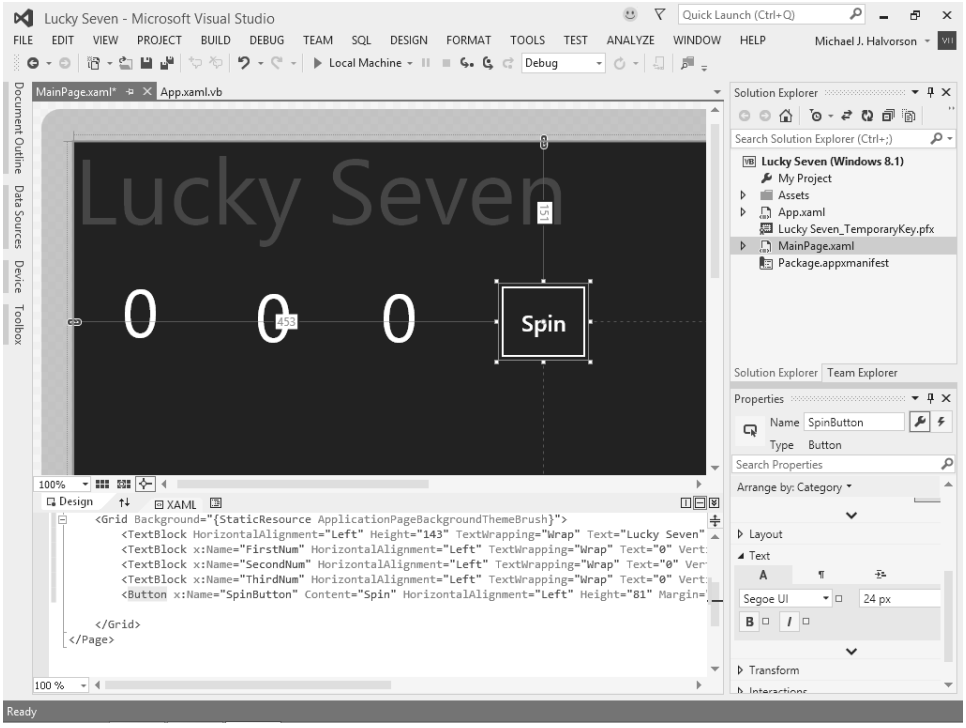
4. In the Properties window, change the button object's *Name* property to **SpinButton**.

5. In the Properties window, in the *Text* category, change the *FontSize* property to **24**.

6. Resize the *SpinButton* object so that it is 81 pixels high and 95 pixels wide.

7. Move the button object so that it is to the right of the third lucky number on the page. Snap lines will appear again as you move the object, and the top edge of the button will snap to the top edge of the three numbers when aligned.

   Your screen should look like this:



Now you'll add an image to the page to graphically display the payout you'll receive when you draw a 7 and hit the jackpot. An *Image* control is designed to display bitmaps, icons, digital photos, and other artwork—a major design feature of most Windows Store apps. One of the most common uses for an *Image* control is to display a PNG or JPEG file.

Add an image

1. Click the *Image* control in the Toolbox.
2. Using the control's drawing pointer, create a large rectangular box below the lucky numbers and the Spin button on the page.
3. If necessary, adjust the Zoom setting in the Designer window so that you can see more of the page in the Designer. For example, a Zoom setting of 50% might be useful.

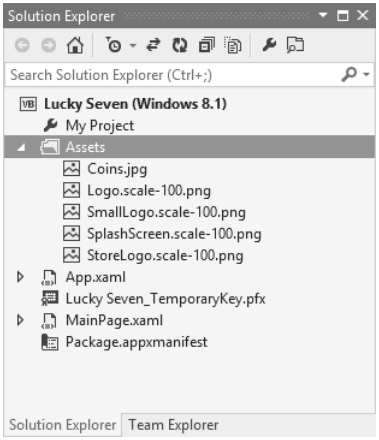
   It would be good if the image object covered most of the remaining area of the page below the numbers and the Spin button. Sometimes it is useful to reduce the size of a page in the Designer with the Zoom control to make these types of operations easier.

   Now you'll add a suitable photo to the project by using Solution Explorer and the Assets folder, a special container for resource files in your project.
4. If Solution Explorer is not visible now, open it by clicking Solution Explorer on the View menu.

   As you've already learned, Solution Explorer provides access to most of the files in your project, and prominently listed in Solution Explorer is the Assets folder, a container for your project's logo, splash screen, and other files. You'll add a digital photo to the Assets folder in the following step, which will make it available to your program.
5. Right-click the Assets folder in Solution Explorer to display a shortcut menu of useful Visual Studio commands.
6. Point to the Add command, and then click Existing Item.
7. In the Add Existing Item dialog box, browse to the My Documents\Visual Basic 2013 SBS\Chapter 03 folder and click Coins.jpg, a JPEG file containing coins from around the world—a visual representation of winnings in the Lucky Seven app.

8. Click Add to add the photo to your project in the Assets folder.

   Visual Studio inserts the file, and it appears now in Solution Explorer under Assets, as shown in the following illustration:



   When a file has been added to the Assets folder, it becomes part of the project you are working on, and it can be referenced via the Properties window. Most importantly, it becomes part of the project when the project is compiled for distribution—there is no need to remember where the file was originally located on your hard disk, because a copy will now travel with the project.

9. Select the image object (if it is not already selected) so that its properties are visible in the Properties windows.

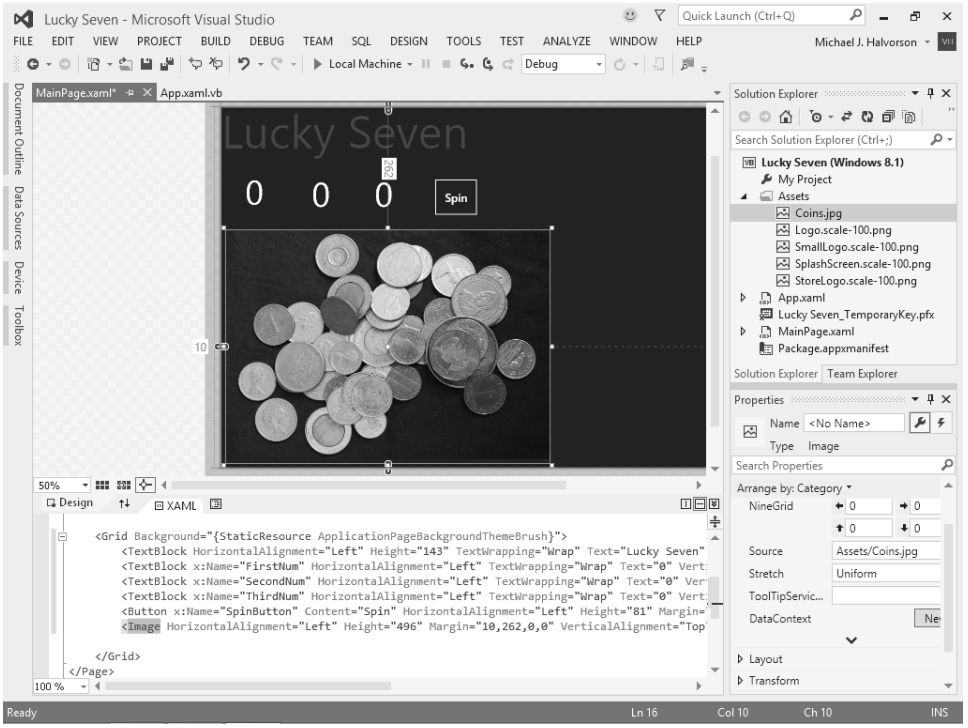
10. In the Properties window, in the Common category, click the *Source* text box, and then click Coins.jpg.

    You might need to expand the Properties window a little to see the drop-down list box arrow in the Source text box.

    After the file has been selected, a photo of coins from around the world fills the image object in the Designer.

11. Adjust the spacing of the image so that it takes up much of the left side of the page in the Designer.

    When you've finished, your page should look like this:



12. In the Properties window, change the *Name* property of the image object to **CoinImage**.

    Naming the image object is an important step, because you'll be referring to this object in Visual Basic code. Often you'll see me include the name of the control at the end of an object name so that its object type is clear.

Now you'll add a sound effect to the program so that the game plays a sound when the user spins a 7. You'll add this sound effect with the *MediaElement* control, which plays audio and video files in a Windows Store app. The sound you'll play is stored in a short WAV file named ArcadeRiff, created by Henry Halvorson.

Play audio media with the *MediaElement* control

1. In the Toolbox, expand the All XAML Controls category and double-click the *MediaElement* control.

   Visual Studio places a new media player object in the upper-left corner of the page. Like other new objects in the Designer, you can now move the object to a new location and customize it with property settings. However, the *MediaElement* control is essentially a behind-the-scenes tool; it is not visible to the user unless the control is displaying a video clip. For now, you can leave the media element object where it is.

   The *Source* property of the *MediaElement* control specifies the name of the media file that will be loaded into the control for playback. Before you can assign this property, you need to add a valid media file to the Assets folder, just as you did for the image control.

2. Right-click the Assets folder in Solution Explorer to display the shortcut menu.

3. Point to the Add command, and then click Existing Item.

4. In the Add Existing Item dialog box, browse to the My Documents\Visual Basic 2013 SBS\Chapter 03 folder and click ArcadeRiff.wav.

5. Click Add to add the music file to your project in the Assets folder.

   Visual Studio inserts the file, and it appears now in Solution Explorer under Assets.

   Now you're ready to name the media element object and assign it a music asset by using the *Source* property.

6. Click the media element object in the Designer window. (Zoom in on the Designer if necessary—remember that the object is invisible but it can be selected. You can always find it by clicking the *MediaElement* entry in the XAML tab of the Code Editor.)

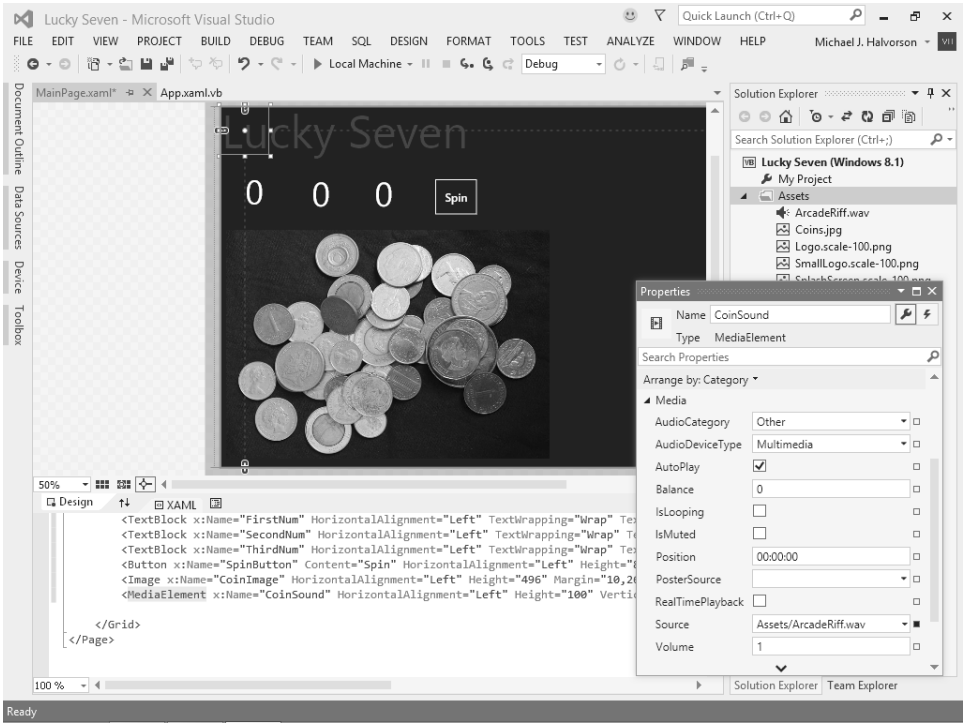
7. In the Properties window, change the *Name* property to **CoinSound**.

8. Expand the *Media* category, scroll down to the *Source* property, and click the Source list box.

   Your new media file (ArcadeRiff.wav) appears in the list.

   Click the ArcadeRiff.wav file to link it to the *CoinSound* object.

   Your screen will look like this (notice the entries in Solution Explorer and the Properties window):



The Properties window exposes a few other important media element properties that you can examine and adjust if desired.

For example, the AutoPlay check box is enabled by default, which directs the media control to automatically play the specified media file when the page loads. Because you don't want the sound to play until it is needed, disable that now.

9. Remove the check mark from the AutoPlay check box.

There are some other options you might notice now (but not adjust). The *Position* property specifies the location within the media file where playback will begin; this option is very useful if there is a specific place in the song or video where you want to start.

The *IsLooping* property is a Boolean value that allows you to run the media file over and over again if you like. Finally, *Volume* allows you to set an initial volume level for the media playback, which you can adjust with property settings in an event handler while the program is running.

Final property settings and adjustments

Your Lucky Seven page is almost complete. You just need to make a few final property settings, write the Visual Basic code, and design a splash screen that runs when your project starts.

Before you begin these tasks, let's think a little more specifically about how the program will operate when it runs. The game starts when the user opens the program and clicks the Spin button. When the Spin button is clicked, the app generates three random numbers and displays them in text block objects on the page. If and when the player hits the jackpot (that is, when at least one 7 appears in the text block objects), the object containing the photo of coins appears, and then the media element control plays a "celebration" sound.

Although the flow of events is pretty straightforward, the program needs to continue operating after the first "win." So, when the user clicks the Spin button, the coins image needs to disappear and remain hidden until another 7 appears, at which point the image is displayed again and the sound effect also run.

To get this behavior to work correctly, you need to find a mechanism to make the image object visible and invisible when you want. That can be accomplished by setting the image object's *Visibility* property, which is assigned *Visible* or *Collapsed* (invisible) values as needed. In fact, most objects in a Windows Store app can be made visible or invisible if you set this property—it is a built-in tool to control what appears on the screen. Give it a try here.

Set the *Visibility* property

1. Click the image object on the page.
2. In the Properties window, click the *Appearance* category, and then click the *Visibility* property.
3. In the drop-down list box that appears, click the *Collapsed* property.

   The image object on the page disappears. Don't worry—this is the desired effect. The object is not gone, it is just currently invisible. You'll make it reappear by using program code in an event handler.

Now you'll adjust the background color for the page. The default color value for Windows Store apps is Black, but a more colorful value can make the game more appealing. You can adjust this color by selecting the *Grid* object on the page and adjusting values in the *Brush* category by using the Properties window.

Set the page's background color

1. Select the *Grid* object by clicking the background page in the Designer (not one of the objects that you've just added).

   You can tell when you've selected the *Grid* object because its properties will fill the Properties window.

   As you'll learn in Chapter 7, "XAML markup step by step," each of the objects in a Windows Store app is defined by XAML markup codes and data that can be entered or adjusted in the Code Editor. The *Grid* object is the base layout element for a page, and all of the elements on a page are nested within this *Grid* object. In addition to serving as a useful container for objects, the *Grid* object also has settings that you can adjust, such as the background color that appears for your app. You'll set this now.

2. Click the *Brush* category, click the *Background* property, and then click the Solid Color Brush button.

3. Near the bottom of the Color Resources editor, select the number containing the pound (#) sign, replace the contents with **Green**, and press Enter.

   The alphanumeric value for green (#FF0080000) appears in the text box, and the background color of the *Grid* object changes to green. Feel free to experiment with other color values if you like.

   OK—that's it for the user interface design walkthrough. Save your work now, before you write the program code.

Save changes

1. Click the Save All command on the File menu to save all your additions to the Lucky Seven project.

   The Save All command saves everything in your project—the project file, the pages, the code-behind files, the assets, the package manifest, and other related components in your application. Because this is the first time that you have saved your project, the Save Project dialog box opens, prompting you for the name and location of the project. (If your copy of Visual Studio is configured to prompt you for a location when you first create your project, you won't see the Save Project dialog box now—Visual Studio just saves your changes.)

2. Browse and select a location for your files. I recommend that you use the My Documents\Visual Basic 2013 SBS\Chapter 03 folder (the location of the book's sample files), but the location is up to you. Because you used the "My" prefix when you originally opened your project, this version won't overwrite the practice file that I built for you on disk.

3. Clear the Create Directory For Solution check box.

   When this check box is selected, it creates a second folder for your program's solution files, which is not necessary for solutions that contain only one project (the situation for most programs in this book).

4. Click Save to save your files.

Tip If you want to save just the item you are currently working on (the page, the code module, or something else), you can use the Save command on the File menu. If you want to save the current item with a different name, you can use the Save As command.

Writing the code

Now you're ready to write the code for the Lucky Seven program. Because most of the objects you've created already "know" how to work when the program runs, they're ready to receive input from the user and process it. The inherent functionality of objects is one of the great strengths of Visual Studio and Visual Basic—after objects are placed on a page and their properties are set, they're ready to run without any additional programming.

However, the "meat" of the Lucky Seven game—the code that actually calculates random numbers, displays them in boxes, and detects a jackpot—is still missing from the program. This computing logic can be built into this Windows Store app only by using program statements—code that clearly spells out what the program should do at each step of the way. Because the Spin button drives the program, you'll associate the code for the game with an event handler designed for that button.

In the following steps, you'll enter the Visual Basic code for Lucky Seven in the Code Editor.

Use the Code Editor

1. In the Visual Studio Designer, click the *SpinButton* object.
2. Open the Properties window, and close the *Brush* category.
3. Near the top of the Properties window and to the right of the *Name* property and the Properties button, click the Event Handler button (a square button displaying a lightning bolt icon).

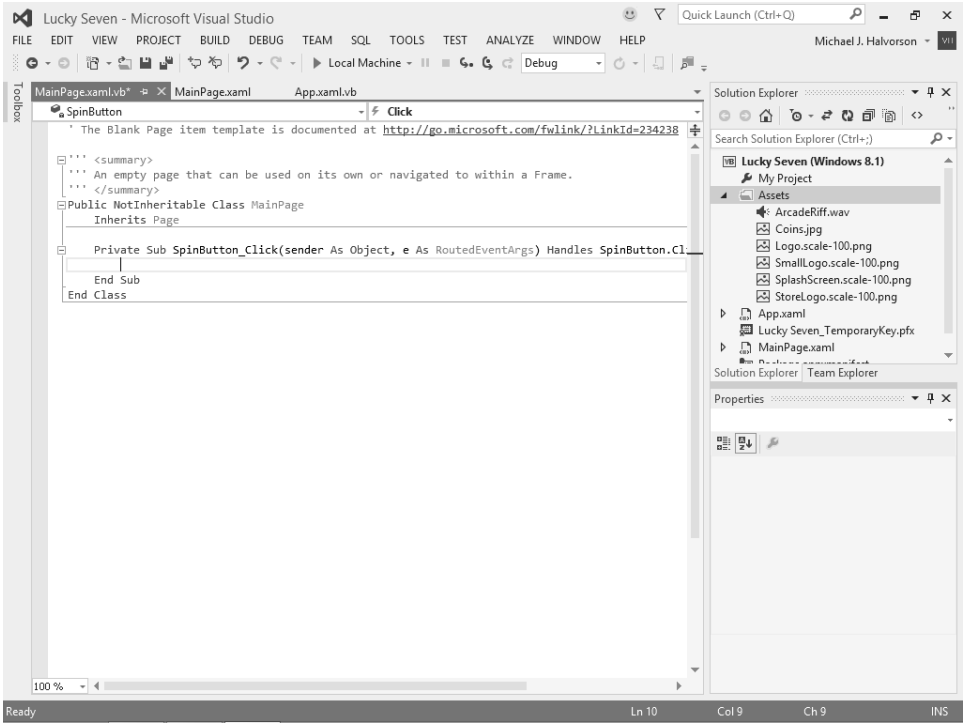
   A collection of actions or events that a button object can respond to fills the Properties window. Typical events that a button might recognize include *Click* (a mouse click), *DragOver* (an object being dragged over a button), Tapped (a button being touched by a finger), and *Drop* (an object being dragged over and dropped on a button).

Because Visual Basic is, at its core, an event-driven programming language, much of what you do as a software developer is create user interfaces that respond to various types of input from the user, and then you write event handlers that manage the input. Most of the time, you will need to write event handlers only for a few events associated with the objects in your programs. (However, the list of events is quite comprehensive to give you many options.)

To create an event handler for a particular event, you double-click the text box next to the event in the Properties window. Because you want to generate three random numbers each time that the user clicks the Spin button in your program, you'll write an event handler for the button's *Click* event.

4. Double-click the text box next to the *Click* event in the Properties window.

Visual Studio inserts an event handler named *SpinButton_Click* in the Click text box, and opens the MainPage.xaml.vb code-behind file in the Code Editor. Your screen should look like this:



Inside the Code Editor are program statements associated with the *MainPage* template that you opened when you started this project. This is Visual Basic program code, and you might notice right away that some of the code is organized into concise units, known as *procedures*. Near the bottom of the file is a new event handler procedure that you just created, called *SpinButton_Click*.

The *Sub* and *End Sub* keywords designate a procedure, and the keywords *Protected* and *Private* indicate how the procedure will be used. You'll learn more about these keywords later.

When you double-clicked the Click text box in the Properties window, Visual Studio automatically added the first and last lines of the *SpinButton_Click* event procedure, as the following code shows. (Your event procedure will not wrap as this one does. In print, I need to respect the book's margins.)

```
Private Sub SpinButton_Click(sender As Object, e As RoutedEventArgs) Handles SpinButton_
Click

End Sub
```

The body of a procedure fits between these lines and is executed whenever a user activates the interface element associated with the procedure. In this case, the event is a mouse click, but as you'll see later in the book, it could also be a different type of event. Programmers refer to this sequence as "triggering" or "firing" an event.

Tip You might also notice lines of text with green type in the Code Editor. In the default settings, green type indicates that the text is a *comment*, or an explanatory note written by the creator of the program, so that it might be better understood or used by others. The Visual Basic compiler does not execute, or *evaluate*, program comments.

5. Type the following program code, and press the Enter key after the last line:

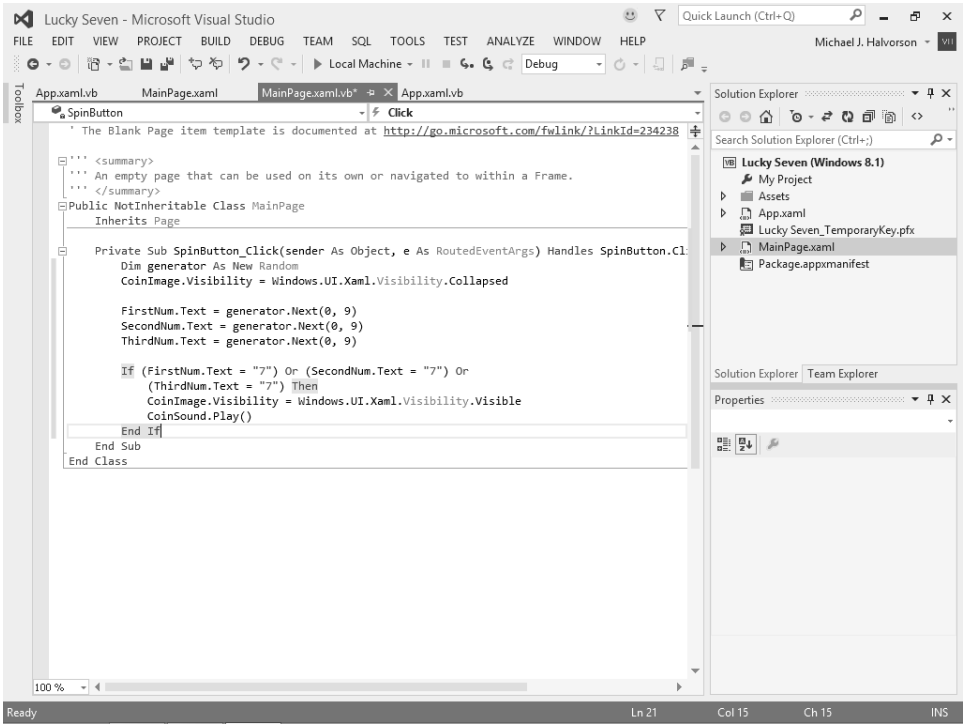
```
Dim generator As New Random
CoinImage.Visibility = Windows.UI.Xaml.Visibility.Collapsed

FirstNum.Text = generator.Next(0, 9)
SecondNum.Text = generator.Next(0, 9)
ThirdNum.Text = generator.Next(0, 9)

If (FirstNum.Text = "7") Or (SecondNum.Text = "7") Or
    (ThirdNum.Text = "7") Then
    CoinImage.Visibility = Windows.UI.Xaml.Visibility.Visible
    CoinSound.Play()
End If
```

As you enter the program code, Visual Studio formats the text and displays different parts of the code in color to help you identify the various elements. When you begin to type the name of an object property, Visual Basic also displays the available properties for the object that you're using in a list box, so you can click the property or keep typing to enter it yourself.

Your screen should now look like this:



Note If Visual Basic displays an additional error message, you might have misspelled a program statement. Check the offending line against the text in this book, make the necessary correction, and continue typing. (You can also delete a line and type it again from scratch.)

In Visual Studio, program statements can be composed of keywords, properties, object names, variables, numbers, special symbols, and other values. As you enter these items in the Code Editor, Visual Studio uses a feature known as IntelliSense to help you write the code. With IntelliSense, as Visual Studio recognizes language elements, it will automatically complete many expressions.

6. Click the Save All button to save your changes.

A look at the *SpinButton_Click* event handler

The *SpinButton_Click* event handler is executed when the user clicks the Spin button on the page. Essentially, the event handler performs four main tasks:

1. It declares a random number generator named *generator* in the program.
2. It hides the digital photo.
3. It creates three random numbers and displays them in text block objects.
4. It displays the Coins.jpg photo and plays a sound when the number *7* appears.

Let's look at each of these steps individually.

The random number generator is declared by this line of code:

```
Dim generator As New Random
```

You've probably declared and used variables before in programs. But notice the variable type here—the generator is declared using the type *Random*, which has been specifically designed to support the creation of so-called "pseudo-random" numbers—that is, numbers that don't follow a particular pattern and appear in a specific range. You'll use random numbers often in this book, and you'll learn much more about data types and conversion in Chapter 11, "Mastering data types, operators, and string processing."

Hiding the photo is accomplished by the following line:

```
CoinImage.Visibility = Windows.UI.Xaml.Visibility.Collapsed
```

As you learned earlier, the *Visibility* property determines whether or not an object on a page is visible. This specific syntax uses the objects in the .NET Framework to collapse (or hide) the photo of the coins. (This line is designed to restore the program to a neutral state if a previous spin had displayed the coins.)

The next three lines handle the random number computations. Does this concept sound strange? You can actually make Visual Basic generate unpredictable numbers within specific guidelines—that is, you can create random numbers for lottery contests, dice games, or other statistical patterns. The *generator* instance's *Next* method in each line creates a random number between 0 and 9—just what you need for this particular slot machine application.

```
FirstNum.Text = generator.Next(0, 10)
SecondNum.Text = generator.Next(0, 10)
ThirdNum.Text = generator.Next(0, 10)
```

The last group of statements in the program checks whether any of the random numbers is 7. If one or more of them is, the program displays the graphical depiction of a payout and plays the sound effect to announce the winnings.

```
If (FirstNum.Text = "7") Or (SecondNum.Text = "7") Or
    (ThirdNum.Text = "7") Then
    CoinImage.Visibility = Windows.UI.Xaml.Visibility.Visible
    CoinSound.Play()
End If
```

Each time the user clicks the Spin button, the *SpinButton_Click* event handler is executed, or called, and the program statements in the handler are run again. However, if you click the Spin button many times in rapid succession, you might miss one or more of the sound effects, because the media element object can play only one sound effect at a time.

Running Windows Store apps

Congratulations! You're ready to run your first Windows Store app. To run a Visual Basic program from the IDE, you can do any of the following:

- Click Start Debugging on the Debug menu.
- Click the Start Debugging button on the Standard toolbar. (You'll typically see "Local Machine" next to this button, because you debug on the local computer by default.)
- Press F5.

Try running your Lucky Seven program now. If Visual Basic displays an error message, you might have a typing mistake or two in your program code. Try to fix it by comparing the printed version in this book with the one you typed, or load Lucky Seven from your hard disk and run it.

Note I assume that you have named your project My Lucky Seven, but the instructions and screen shots below will show Lucky Seven because you might be running the sample project that I created.

Run the Lucky Seven program

1. Click the Start Debugging button on the Standard toolbar.

   The Lucky Seven program compiles and runs. After a few seconds, the user interface appears, just as you designed it.

2. Click the Spin button.

   The program picks three random numbers and displays them in the labels on the page. When a 7 appears, your screen will look like this:

The presence of a 7 also triggers the sound effect, which lasts a few seconds and sounds a bit like an electronic slot machine. You win!

3. Click the Spin button 15 or 16 more times, watching the results of the spins in the number text blocks.

   About half the time you spin, you hit the jackpot—pretty easy odds. (The actual odds are about 2.8 times out of 10; you're just lucky at first.) Later on, you might want to make the game tougher by displaying the photo only when two or three 7s appear, or by creating a running total of winnings.

4. When you've finished experimenting with your new creation, close the Windows Store app.

   The program stops, and the IDE reappears on your screen. Click the Stop Debugging button on the toolbar to end the program. Now you'll add a splash screen to the project.

Creating a splash screen for your app

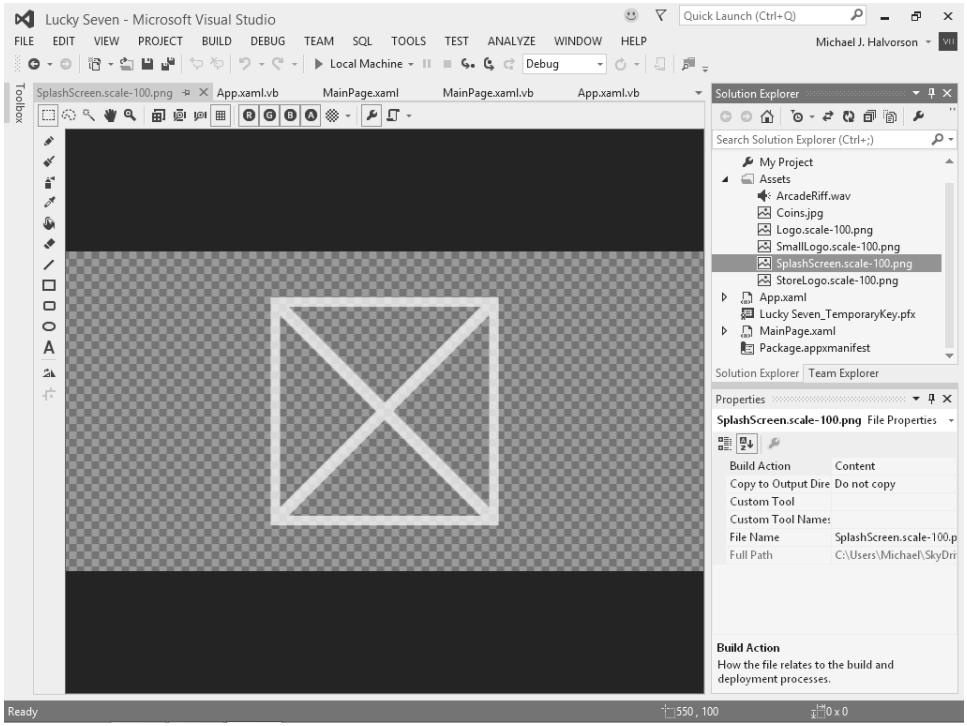
A *splash screen* is a transitional image that appears when your app first launches. Every Windows Store app must have a splash screen, which consists of an image (or text) and a surrounding background color. The splash screen is stored in the Assets folder within Solution Explorer, and every new Windows Store app has a basic splash screen that is created by default. You'll also see tile images in the Assets folder, which you'll learn to customize in Chapter 9, "Exploring Windows 8.1 design features: Command bar, flyout, tiles, and touch."

Although you can create a splash screen with Microsoft Paint or another third-party graphics program, you can also create a simple splash screen within Visual Studio. Just remember that a splash screen appears very briefly when you first launch your app. Accordingly, this is not the place to put elaborate program instructions or copyright information. You'll want to avoid placing advertisements or version information on a splash screen.

Instead, use the splash screen to offer a preview of the functionality of your app in some unique way. Consider an image or photo that will be easily adapted to other countries and cultures (that is, easily *localizable*) and that can be displayed effectively in different screen resolutions. Notice that Portable Network Graphics (.png) format is used because this file type is capable of displaying alpha transparency and 24-bit color images. When part of an image is formatted as transparent, the background color will be displayed behind it. (You'll see this in most splash screens and tiles in Windows Store and Windows Phone apps.)

Create a Lucky Seven splash screen

1. In Solution Explorer, open the Assets folder, and then double-click the file SplashScreen.scale-100.png.
2. This action opens the Image Editor Designer in Visual Studio, and loads the SplashScreen.scale-100.png file into the editor. Your screen looks like this:



The Solution Explorer and Properties windows are still visible. However, the Image Editor is active, and the design canvas is surrounded by graphics editing tools. The "X" shape in the center of the canvas is simply the default image for the SplashScreen.scale-100.png file. This is the image that you want to replace now.

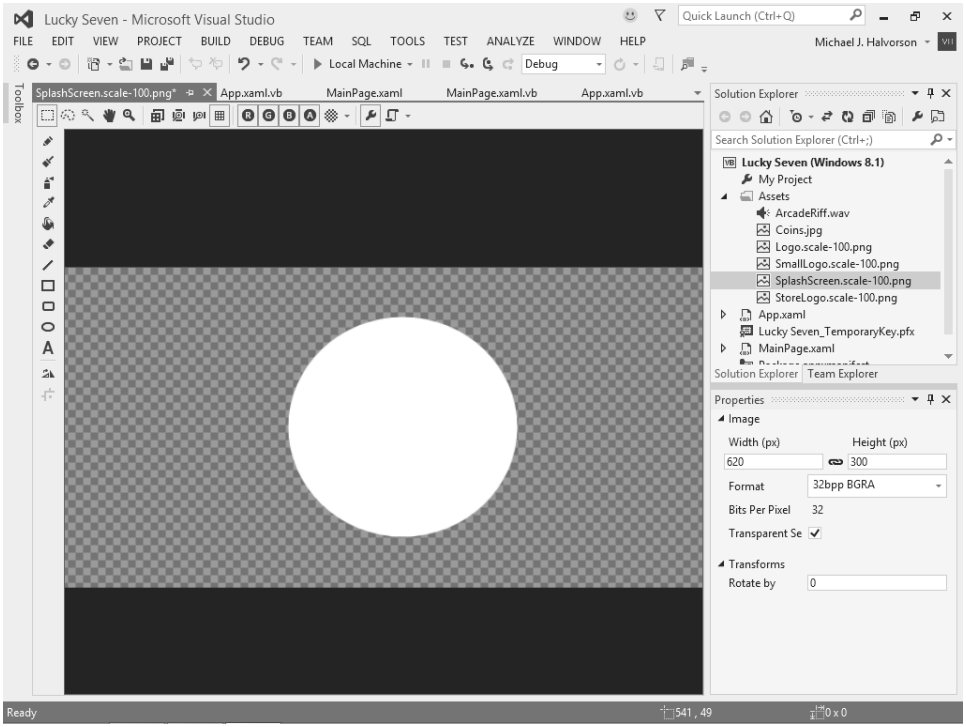
3. Click the Selection tool in the upper-left corner of the Image Editor, select the entire "X" shape, and press Delete.

   You now have a blank canvas on which to create your splash screen image. The alpha checkerboard pattern that you see is a color scheme that allows you to more easily see the transparent portions of your image—that is, what you see displayed as the checkerboard now will be replaced by the background when your splash screen is actually displayed on the screen.

4. Click the Ellipse tool on the left side of the Designer, and then create a circle shape in the middle of the splash screen.

   You can use the X- and Y-axis indicators in the lower-right corner of the screen to create your circle if you like. You can also use the Selection tool to move your shape to the center of the screen if you like.

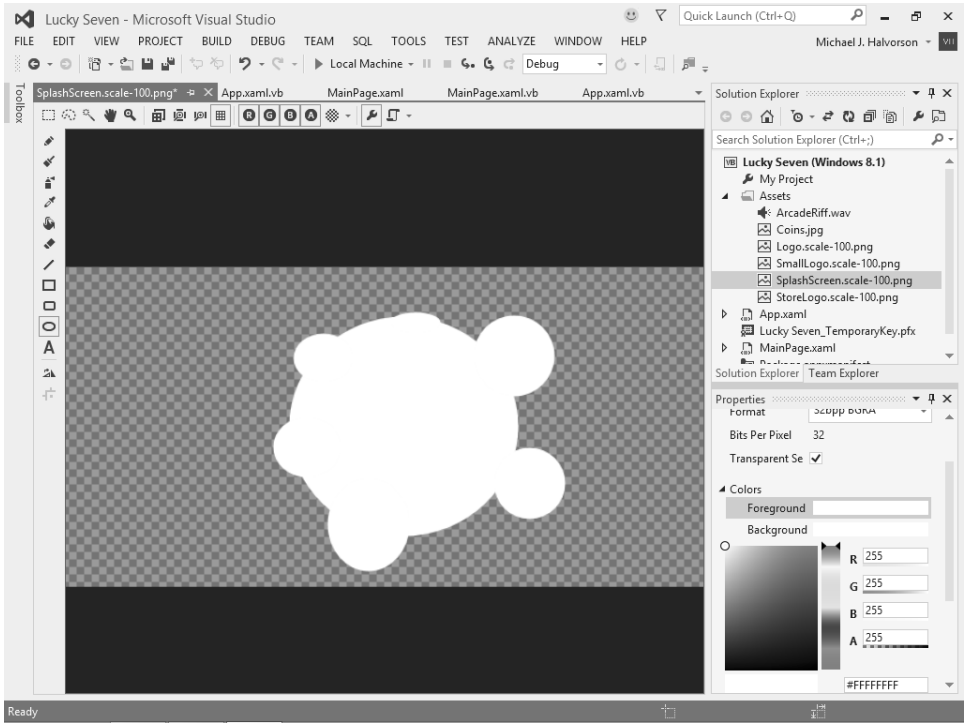
Your Image Editor will look like this:



5. Use the Ellipse tool to add four or five smaller circles around the edge of the circle that you have created.

   Typical splash screens show simple geometric shapes like this. Consider using a simplified version of your company logo.

   Your simple splash screen now looks like this:



You could add additional effects to this splash screen, embellishing it with colors, images, text, or animation. However, for this first walkthrough, you have something that will work just fine.

6. Click the Save All command on the File menu to save your changes.

7. Press F5 to run the project, and examine your splash screen.

   Notice that the splash screen comes and goes in just a few moments. Did you notice the ellipse shapes and the black background color?

8. Close the program, and then close the Image Editor Designer.

Now your project is complete—it is time to test and deploy the app by adding it to the Windows Start page on your local computer. However, note that if this were a commercial Windows Store app being prepared for distribution to other users via the Windows Store, you would now add additional items to your app as described in Table 1-1. For more information, see Chapter 1, "Visual Basic 2013 development opportunities and the Windows Store."

Sample projects on disk

If you didn't build the My Lucky Seven project from scratch (or if you did build the project and want to compare what you created to what I built for you as I wrote the chapter), take a moment to open and run the completed Lucky Seven project, which is located in the Visual Basic 2013 SBS\Chapter 03 folder on your hard disk (the default location for the practice files for this chapter). If you need a refresher course on opening projects, see the detailed instructions in Chapter 2.

This book is a step-by-step tutorial, so you will benefit most from building the projects on your own and experimenting with them. But after you have completed the projects, it is often a good idea to compare what you have with the practice file "solution" that I provide, especially if you have unexpected results. To make this easy, I will give you the name of the solution files on disk before you run the completed program in most of the step-by-step exercises.

After you have compared the My Lucky Seven project to the Lucky Seven solution files on disk, reopen My Lucky Seven and prepare to compile it as an executable file. If you didn't create My Lucky Seven, use my solution file to complete the exercise.

Building an executable file

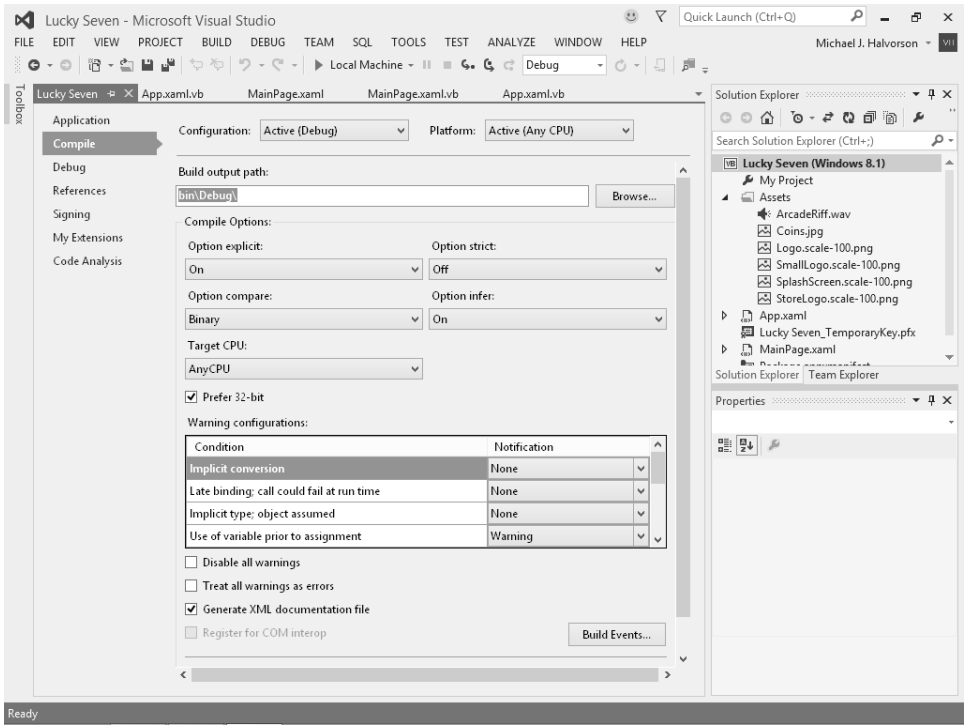
Your last task in this chapter is to complete the development process and create an application for Windows, or an *executable file*. Windows applications created with Visual Studio have the file name extension .exe and can be run on any system that contains Windows and the necessary support files. If you end up distributing your application via the Windows Store, the complete deployment package will be posted securely in the Store and made available to customers who would like to download it. However, you can also deploy your application to individual computers running Windows directly from within Visual Studio.

Because you just created a Windows Store app that targets the Windows 8.1 operating system, you need to be running Windows 8.1 to run this particular program. You won't post the sample app to the Windows Store yet, because it has not been registered or thoroughly tested. But you can deploy the app on your own computer, which does not have as many registration requirements as the Windows Store interface.

To assist in the testing and compilation process, Visual Studio allows you to create two types of executable files for your Windows application project: a *debug build* and a *release build*.

Debug builds are created automatically by Visual Studio when you create and test your program. They are stored in a folder called bin\Debug within your project folder. The debug executable file contains debugging information that makes the program run slightly slower.

Release builds are optimized executable files stored in the bin\Release folder within your project. To customize the settings for your release build, you click the *ProjectName* Properties command on the Project menu, and then click the Compile tab, where you'll see a list of compilation options that looks like the following screen. The Solution Configurations drop-down list box on the Standard Visual Studio toolbar indicates whether the executable is a debug build or a release build.



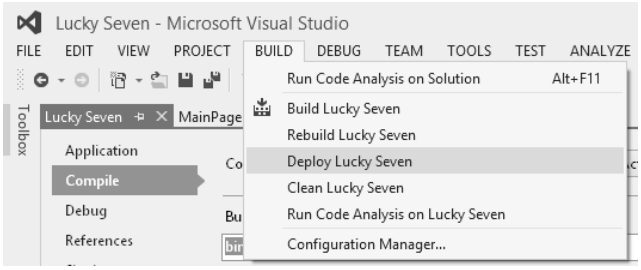
The process of preparing an executable file for a specific computer is called *deploying the application*. As noted, when you deploy an application with Visual Studio, the IDE handles the process of copying all the executable and support files that you will need to register the program with the operating system and run it. Visual Studio allows you to deploy applications *locally* (on the computer you are using) or *remotely* (on a computer attached to the network or Internet).

In the following steps, you'll deploy a release build for the My Lucky Seven application locally and create an application icon for the program on the Windows Start page.

Deploy a release build for the Lucky Seven app

1. Click the Solution Configurations drop-down list box on the Standard toolbar, and then click the Release option. Visual Studio will prepare your project for a release build, with the debugging information removed. The build output path is set to bin\Release\.

2. On the Build menu, click the Deploy Lucky Seven command.



   The Build command creates a bin\Release folder in which to store your project (if the folder doesn't already exist) and compiles the source code in your project. The Output window appears to show you milestones in the assembly and deployment process. The result is an executable file named Lucky Seven.exe, which Visual Studio registers with the operating system on your computer.

   Visual Studio deploys the application locally because Local Machine is currently selected on the toolbar next to the Start button. This is the desired behavior here, but you can also deploy applications on a remote machine (that is, a computer attached to yours via a network or the Internet) by selecting the Remote Machine option. If you select this option, you'll be presented with a dialog box asking for more information about the remote connection. Remember that remote deploying is mostly designed for testing purposes. The best way to install completed applications via the Internet is through the Windows Store.

   When you deploy an application built for the Windows 8.1 user interface, Windows automatically creates a new program icon for the application on the Start page. You can use this icon to launch the program whenever you want to run it. Try running My Lucky Seven now from the Start page on your computer.

3. Open the Windows Start page, and browse to the list of applications that are currently installed.

4. There are two possible locations for your new app: the main Start page, or the secondary Start page containing a longer list of app tiles. (This is where my Windows 8.1 system put the new Lucky Seven program.)

Because you didn't create a colorful Start page tile for your app, the default (gray) tile is shown. Your screen will look similar to this (note the Lucky Seven app in the second column):

5. Click the Lucky Seven application icon, and the Lucky Seven program will load and run in Windows.

6. Test the application again, clicking Spin several times and building up a few wins. When you are finished, close the app.

7. Return to Visual Studio, and close the Output window and the Lucky Seven properties page. Note that you can view and change compilation options whenever you want—the properties page is always available.

8. On the File menu, click Exit to close Visual Studio and the My Lucky Seven project.

9. Click Save if you are prompted to, and the Visual Studio IDE will close.

Congratulations on completing your first Windows Store app!

Summary

This chapter described how to create a Windows Store app named Lucky Seven by using Visual Studio 2013. The development process has much in common with earlier versions of Visual Basic and Visual Studio. You add Toolbox controls to a page, set properties, write program code, test the application, and prepare it for deployment. However, the XAML Toolbox for Windows Store apps is significantly different than the Toolbox used to create Windows Forms apps for the Windows desktop. In this chapter, we reviewed how to use XAML controls step by step. In the next chapter, you'll review how to use the Windows Forms Toolbox to create a desktop application for Windows 8.1, Windows 8, or Windows 7.

While creating the Lucky Seven slot machine game, you practiced using the *TextBlock* control, the *Button* control, the *Image* control, the *MediaElement* control, and setting the *Grid* control's background color. You also learned how to create a splash screen with the Visual Studio Image Editor. Finally, you tested and deployed your application to the Windows Start page. With a little more work, you'll also be able to deploy applications like Lucky Seven to the Windows Store.

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