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Foreword by Brandon Watson
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Sams Teach Yourself Windows® Phone 7 Application Development in 24 Hours

SAMS

Scott Dorman
Kevin Wolf
Nikita Polyakov
Joe Healy

Sams **Teach Yourself**

Windows® Phone 7 Application Development in 24 Hours

SAMS 800 East 96th Street, Indianapolis, Indiana, 46240 USA

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About the Authors

Scott Dorman has been designated by Microsoft as a C# Most Valued Professional in recognition for his many contributions to the C# community. Scott has been involved with computers in one way or another for as long as he can remember. He has been working with computers professionally since 1993 and with .NET and C# since 2001. Currently, Scott's primary focus is developing commercial software applications using Microsoft .NET technologies. Scott runs a software architecture–focused user group, speaks extensively (including at Microsoft TechEd and community-sponsored code camps), and contributes regularly to online communities such as The Code Project and StackOverflow. Scott also maintains a .NET Framework and C#-focused technology blog at http://geekswithblogs.com/sdorman.

Kevin Wolf is a software engineer with 20 years of professional experience developing and deploying software. Kevin's background includes everything from developing hardware and software for real-time embedded systems, to CMS/Sales Force Automation systems, to large decision-support, line-of-business applications. For the past five years, Kevin's focus as an independent consultant has been on developing applications for mobile devices such as Windows Mobile, iPhone, and Android. In January of 2010, Kevin was recognized as a Microsoft MVP in the area of Device Application Development for his work promoting Windows Mobile.

Nikita Polyakov is a Microsoft Windows Phone Development MVP and has been a long-time community voice for most things mobile from Microsoft in the local community in Florida and online. Nikita helped and cochaired many local user groups and community initiatives. Nikita is a software professional with 10 years of experience building custom software using Microsoft platforms for many local and national customers. Nikita is passionate about the power of technology and enabling people to realize their full potential through quality software solutions.

Joe Healy is a Microsoft Developer Evangelist based in Florida. Joe's geographical responsibility is to provide "developer care" for the Gulf States District for the East Region Developer team. As such, he has responsibilities to bring .NET development to the masses in his area. Joe serves a multitude of clients, from corporate accounts to broad-reach events and user groups. He lectures on various development and architectural topics focused around the .NET Frameworks, Visual Studio .NET, and associated servers.

Dedications

Scott Dorman: *This book is first and foremost dedicated to Nathan, whom I hope follows in my footsteps and someday writes books of his own. Thank you for giving me a unique perspective and showing me the world through the eyes of a child.*

Kevin Wolf: *To my father who introduced me to computers at an early age by taking me to work with him on Saturday mornings and letting me play with a green screen terminal while he organized the punch cards. Thank you for providing me the building blocks necessary to get where I am today.*

Rest in Peace, Dad,
Donald Elwood Wolf 1944–2010

Nikita Polyakov: *Dedicated to my late grandfathers, my family, and my friends for your support and encouragement. Also everyone who mentored or took a chance on me.*

Joe Healy: *Dedicated to my geek girls, Ryan and Morgan, and my wife, Anne, for putting up with my "coding moods." Thanks to my mom and dad for my IIe in high school, and loaning me the $2,000 for the AT-Clone in college. I'm sure the accrued interest is pretty high, since I never paid you back. Thanks to my management at Microsoft for encouraging me and tolerating my many impulses and even more CLMs. And thanks to cutter, scumpy, and foghat: At some point in my computer career, you guys all taught me I still had a long way to go. Fla-wimo-dev, y'all rock. Nuff said.*

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Nikita Polyakov: Thanks to Joe, Kevin, and Scott for putting up with me over this entire process, and all the editors and staff who had to read my version of English. Also everyone in the Microsoft developer community for inspiring me much in the same way I hope I do today for others. Last but not least, thank you to everyone at Microsoft for a stellar product and the exceptional documentation of Windows Phone 7. A special thank you to my father, who gave me my very first English language book—*Visual Basic*.

We Want to Hear from You

As the reader of this book, *you* are our most important critic and commentator. We value your opinion and want to know what we're doing right, what we could do better, what areas you'd like to see us publish in, and any other words of wisdom you're willing to pass our way.

You can email or write me directly to let me know what you did or didn't like about this book—as well as what we can do to make our books stronger.

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When you write, please be sure to include this book's title and author, as well as your name and contact information. I will carefully review your comments and share them with the author and editors who worked on the book.

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Introduction

When mobile phones were first introduced in the early 1970s, they were capable of doing nothing more than placing telephone calls. When the first 1G cellular network was introduced in 1979, mobile phones hadn't changed much in features but were beginning to decrease in size. In 1991, the first 2G network was introduced and began the transition from simple mobile phones to "smart" phones that could send and receive email, browse the web, and take pictures, in addition to being able to place phone calls. Nearly 30 years after their introduction, in 2001, the cellular networks began providing the necessary infrastructure to support more modern mobile phones with faster data connections and even greater capabilities.

Since then, mobile phones have become nearly ubiquitous in modern life. The features and capabilities have continued to improve, expand, and evolve. These advances have come with increasing network capabilities and speeds, such as 3G, HSDPA, and 4G. Despite all of these advances, the mobile phone landscape hadn't really changed much.

In 2007, Apple introduced the first iPhone with overwhelming response. The iPhone helped redefine the mobile phone landscape and introduced consumers to a much friendlier, easier-to-use touch-aware device. Quickly following Apple's success, Google introduced the first Android-based phones in late 2008. Once again, the mobile phone landscape changed dramatically. Both the iPhone and Android phones changed the mobile landscape and solidified the concept that these devices are more than just phones. The incredibly large assortment of applications available for both allows you to create a phone that fits your individual lifestyle…almost. The one thing that all of these devices have in common is that, although it has become easier to do more things with your phone, it still requires you to "stop and stare." For example, to see how many unread emails you have in your Inbox, you must still navigate to the email application, start it, and then you can see how many unread emails you have waiting.

During this time, Microsoft kept fairly quiet about its response to both the iPhone and Android phones, seemingly content to continue releasing Windows Mobile 6–based phones. However, with the release of Windows Phone 7, all of that has changed.

Windows Phone 7 introduced an entirely new mobile operating system, user interface, and development experience. Borrowing a page from the Apple playbook, Microsoft established minimum hardware requirements for all phones that run Windows Phone 7. The user interface, code-named Metro, is a typography-based design language that is modern, clean, and simple. The idea behind Metro is similar to that of the visual universal language you see in airports and large cities to clearly direct you to the content you want. If the current smartphones available could be categorized as "stop and stare," Windows Phone 7 phones could be categorized as "glance and go" through the use of hubs and tiles. For example, checking how many unread emails you have in your Inbox on a Windows Phone 7 device simply means unlocking the screen and glancing at the Outlook tile.

From an application-development perspective, Microsoft is leveraging the existing .NET developer base, potentially turning any C# or VB developer who understands Silverlight or the XNA Framework into a mobile application developer. This allows you to take your existing development skills with you when you build a mobile application.

Audience and Organization

This book is targeted toward the .NET programmer who is building his or her first mobile application or first Windows Phone 7 application. If you are first learning how to program, this book can help you on your way but it isn't intended to be a beginning programming book. The book is designed with the purpose of getting you familiar with how to develop a Windows Phone 7 application and allowing you to become productive as quickly as possible.

This book is divided into four parts, each one focusing on a different aspect of Windows Phone 7 application development. These parts progress from the simple fundamentals to more advanced topics, so I recommend reading them in order.

- Part I, "Fundamentals," provides the Windows Phone 7 essentials, including an overview of the development tools, the Metro user interface, considerations for desktop developers moving to a mobile device, and how to choose your application development model.
- Part II, "Developing Applications with Silverlight," teaches you the fundamentals of page-based navigation, developing finger-friendly applications, integrating with a hub, how to store data using isolated storage and how to consume OData and WCF services. You also learn how to use the notification model, Toast notifications, and Live Tiles.
- Part III, "Developing Games with the XNA Framework," starts with an introduction to the XNA Framework and goes on to build a simple XNA-based game.
- Part IV, "Diving Deeper," introduces the advanced concepts of localization and internationalization. Finally, we look at what it takes to create an application that is a good mobile citizen and how to distribute your application using the Windows Marketplace.

Throughout the book, we try to use examples that show real-world problems and how to solve them using a mobile application.

Conventions Used in This Book

This book uses several design elements and conventions to help you prioritize and reference the information it contains:

By the Way

By the Way boxes provide useful sidebar information that you can read immediately or circle back to without losing the flow of the topic at hand.

Did you Know?

Did You Know? boxes highlight information that can make your programming more effective.

Watch Out!

Watch Out! boxes focus your attention on problems or side effects that can occur under certain situations.

In addition, this book uses various typefaces to help you distinguish code from regular English. Code is presented in a `monospace` font. Placeholders—words or characters that represent the real words or characters you would type in code—appear in *`italic monospace`*. When you are asked to type or enter text, that text appears in **bold**.

Some code statements presented in this book are too long to appear on a single line. In these cases, a line-continuation character (➥) is used to indicate that the following line is a continuation of the current statement.

Closing Thoughts

Windows Phone 7 represents a radical shift in the mobile landscape—for application developers, consumers, and Microsoft—bringing in an entirely new way to think about mobile applications and how people use them. You won't be an expert in Windows Phone 7 application development when you finish this book, but we hope you will feel comfortable about being able to create robust and highly effective mobile applications for Windows Phone 7.

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HOUR 3

Choosing an Application Framework

What You'll Learn in This Hour:

- Introducing the application frameworks
- Understanding Silverlight
- Understanding the XNA Framework

The application framework you choose impacts not only the amount of work you must do to complete the application but also the inherent features available to you. Different application frameworks are more suited to different types of applications and determine the default look and feel of your application, instrumentation, and available resources. There are two application frameworks, Microsoft Silverlight and Microsoft XNA Framework, available, each offering different strengths and weaknesses. By the end of this hour, you will be introduced to both the Silverlight and XNA frameworks.

Introducing the Application Frameworks

Silverlight is primarily for text-based applications, whereas the XNA Framework is primarily used for games. Both of these frameworks are flexible and can be adapted so that your imagination is the only limit to what can be created.

Regardless of which framework you decide to work with, you will still have the benefits of the Windows Phone Application Platform. The toolset is free, a rich application programming interface (API) set is available across the entire platform, all applications are sandboxed, and finished products can utilize Marketplace distribution routes.

By the Way

Choosing Your Framework

To choose an application framework, you need to have a very good understanding of your application idea itself. To help, consider writing a paragraph about what you want your application to do. You can also note other applications with a similar style to what you envision. Remember, a little preparation goes a long way.

By the Way

Directly Porting Applications

Although not necessarily a best practice, some developers have insisted on having the exact same user interface (UI) ported from an iPhone or Android application to Windows Phone. Typically, such directly ported applications do not fit the Metro style and trying to adapt a Metro template in Silverlight is not usually easy.

As a result, iPhone or Android developers may find using the XNA Framework more adapted to their particular user-interface styles and provides an excellent route for directly porting the user interface from other platforms.

Understanding Silverlight

Silverlight for Windows Phone is based on the Silverlight 3.0 out-of-browser model and is targeted at media-based applications and rich, interactive text applications. The Windows Phone Silverlight runtime has been optimized for the tight memory environment of Windows Phone.

From a programmer's perspective, Silverlight is an event-driven programming framework consisting of declarative markup, known as Extensible Application Markup Language (XAML), with supporting code. Silverlight projects can also have graphics, audio, and video resources. For controls, Silverlight uses a visual control tree, and when an item is added to that control tree, it is there until you remove it.

Silverlight offers a visual control framework for tasks such as input, user-interface (UI) rendering, media playback, controls, layouts, data binding, gestures, software input panels, and more. The Windows Phone developer tools also provide Microsoft Visual Studio project templates for basic applications, Panorama applications, and Pivot applications, which conform to the Metro design guidelines that can be used to jump-start your application development.

GO TO ▶ HOUR 1, "INTRODUCING WINDOWS PHONE 7," for more information on the Metro UI design guidelines.

Silverlight offers a number of unique advantages to application developers and are the most common applications in the Windows Phone Marketplace. These applications are easy to build and are easy to polish.

Visual controls make a developer's life easier and represent prebuilt templates for a number of common tasks. Silverlight for Windows Phone ships with a large number of stock controls, including `Button`, `CheckBox`, `TextBox`, `TextBlock`, `WebBrowser`, `MediaElement`, the Bing `Map` control, and more. The default control toolbox for Windows Phone Controls is shown in Figure 3.1.

By the Way

Silverlight for Windows Phone Versus Silverlight

We are not talking about web-deployed Silverlight applications (coming to the phone via a web browser) that you might be familiar with from other forms of Silverlight programming. On Windows Phone, all Silverlight applications are "out-of-browser" on the device programs and must be installed to the phone through the Windows Marketplace. These applications cannot be downloaded to the phone through the web.

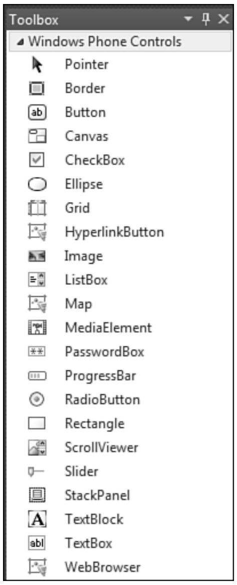
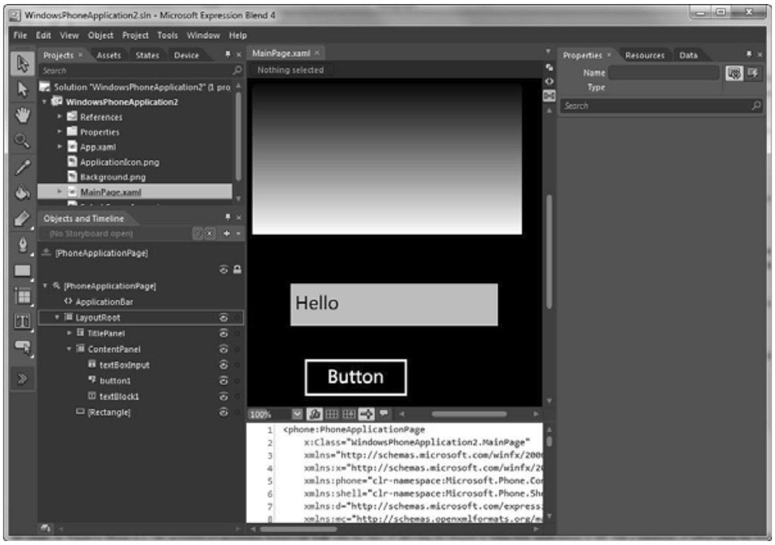


FIGURE 3.1
Default control palette in the Visual Studio Toolbox.

Silverlight also has great visual designers in both Visual Studio and Microsoft Expression Blend to assist with the layout and formatting of Phone pages. Expression Blend, shown in Figure 3.2, focuses on the application designer experience rather than the developer experience and can be used for advanced layout and styling of Silverlight applications. Without the designer, it would be necessary to run the program to visually check layouts and rendering.



```
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    x:Class="WindowsPhoneApplication2.MainPage"
    xmlns="http://schemas.microsoft.com/winfx/2006
    xmlns:x="http://schemas.microsoft.com/winfx/20
    xmlns:phone="clr-namespace:Microsoft.Phone.Co
    xmlns:shell="clr-namespace:Microsoft.Phone.Sh
    xmlns:d="http://schemas.microsoft.com/express
    xmlns:mc="http://schemas.openxmlformats.org/m
```

FIGURE 3.2
Expression Blend visual designer.

Being able to apply styles and resources for a common look and feel can save developers a large amount of effort and work. In web development, Cascading Style Sheets (CSS) are used to provide a common way to define a look and feel that may be applied across all assets in your project. Similarly, Silverlight offers Resource Dictionaries and Styles as a means to style common controls. Styles are commonly used to apply font items such as foreground, style, and family, as well as apply layouts to various flow templates.

Many applications make use of multiple pages and need a way to navigate between those pages. The Silverlight for Windows Phone application framework supports a navigation style similar to that used by web browsers, providing a history stack and backward and forward navigation methods. Applications may navigate from one page to another using document URIs and the NavigationService provided by the page framework. Navigation history is automatically maintained, keeping track of where you navigated from. Using the page navigation framework, Silverlight applications can easily integrate into the Windows Phone navigation model.

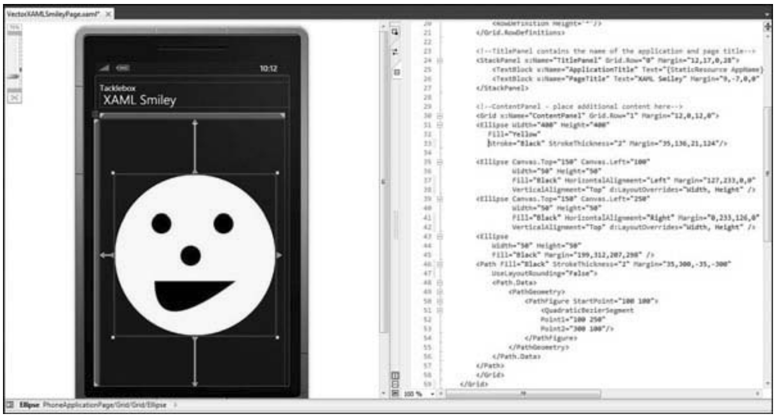
Most programmers have experience in event-driven programming metaphors. Traditionally, line-of-business applications built using VB, C#, or even Java use an event-driven metaphor. Events are raised and methods (either procedures or functions), which subscribe to those events, call the appropriate code in response. For certain types of applications, such as informational or forms-based applications, this is the preferred model and Silverlight fully embraces it.

In keeping with its Windows Presentation Foundation (WPF) base, Silverlight supports vector-based image formats and has a high-performance, vector-based rendering engine built in. Unlike raster, or bitmap, images, which can lose picture quality (called pixelation) when they are scaled to larger sizes, vector images use geometric paths for drawing so they dynamically scale without pixelation. Figure 3.3 shows the XAML for a vector-based smiley face image inside the Visual Studio design surface.

Performance of Vector Graphics

Vector graphics may be slower to render than prerendered, static raster images. Watch out for performance hiccups rendering a complex vector graphic where you might have been able to use a static bitmap instead.

Watch Out!


VectorXAMLSmileyPage.xaml*
10:12
Tacklebox
XAML Smiley
100 %
Ellipse PhoneApplicationPage/Grid/Grid/Ellipse

```
        <RowDefinition Height="*"/>
    </Grid.RowDefinitions>

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    <StackPanel x:Name="TitlePanel" Grid.Row="0" Margin="12,17,0,28">
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        <TextBlock x:Name="PageTitle" Text="XAML Smiley" Margin="9,-7,0,0"
    </StackPanel>

    <!--ContentPanel - place additional content here-->
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       Fill="Yellow"
       Stroke="Black" StrokeThickness="2" Margin="35,136,21,124"/>

    <Ellipse Canvas.Top="150" Canvas.Left="100"
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             VerticalAlignment="Top" d:LayoutOverrides="Width, Height" />
    <Ellipse Canvas.Top="150" Canvas.Left="250"
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             Fill="Black" HorizontalAlignment="Right" Margin="0,233,126,0"
             VerticalAlignment="Top" d:LayoutOverrides="Width, Height" />
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                    <QuadraticBezierSegment
                    Point1="100 250"
                    Point2="300 100"/>
                </PathFigure>
            </PathGeometry>
        </Path.Data>
    </Path>
    </Grid>
</Grid>
```

FIGURE 3.3
Vector-rendered smiley face inside Visual Studio.

Silverlight for Windows Phone is a very powerful event-driven programming framework allowing developers to bring their applications to life with a minimum of effort. Although the use of XAML in Silverlight is usually considered a benefit, it can also be a potential drawback, requiring study in the areas of layout, control binding, and other areas to become proficient.

Great Silverlight Examples

Many thousands of applications are available through the Windows Phone Marketplace. The following sections contain a couple of examples of what can be accomplished using Silverlight for Windows Phone.

Facebook

The Facebook application, shown in Figure 3.4, by Microsoft offers a great look at an application styled for Windows Phone. The various levels of information are presented in a flowing manner, and the text fits in well with the Metro style across the phone. Explore how the various screens interact in this application before you begin designing your own.

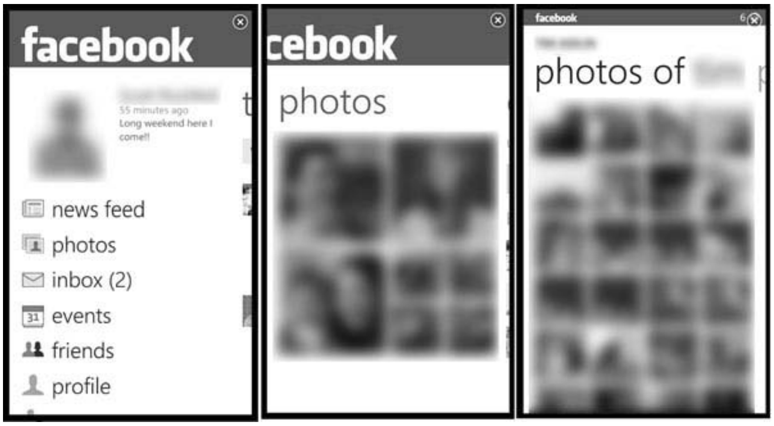

FIGURE 3.4 The Facebook application interface.

Popper 2

Not all Silverlight applications need to adhere to the Metro style. Bill Reiss, of Blue Rose Games (http://www.bluerosegames.com/brg), has published a fantastic bubble breaker game called *Popper 2*, shown in Figure 3.5. Games don't necessarily work very well in the standard Metro styling for Windows Phone, so *Popper 2* uses an alternative user interface to render a Silverlight game on Windows Phone. These innovations include custom menus, screen flow, and much more. This is a great application to explore if you're interested in an alternative Silverlight user-interface style.

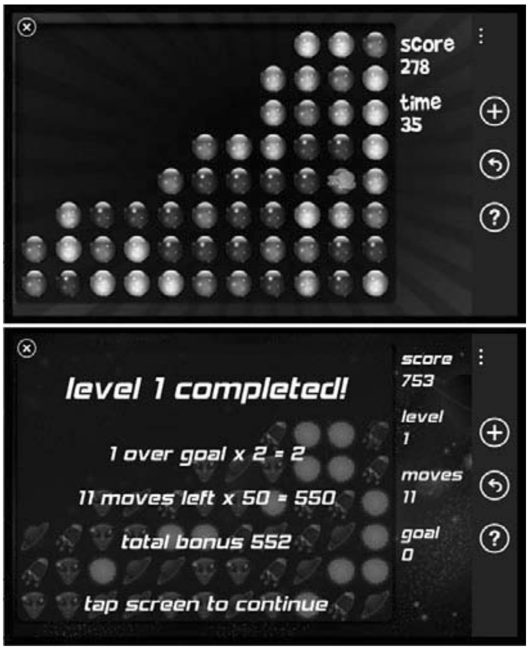

FIGURE 3.5 *Popper 2* menu and screen.

Understanding the XNA Framework

The XNA Framework is primarily targeted at game development. Applications built using the XNA Framework run on a game-optimized managed runtime on top of the Windows Phone operating system. As a general rule, if you're going to write a game, it will be easier to write one on XNA than on Silverlight. XNA offers a unique set of advantages targeted for those wanting very graphically intense applications.

The framework itself is fairly minimalist in regard to user-interface trimmings, such as controls and designers, but provides a lightning-fast runtime execution environment. Programs execute in a loop-based environment, with screen and logic update blocks typically firing 30 times per second. All items on the screen are updated every time the screen is updated, which means it does not show up if you don't draw it. Unlike Silverlight, by default there is no event-driven programming mechanism in XNA.

To build an XNA game, you use Visual Studio and XNA Game Studio Express. In Part III, "Developing Games with the XNA Framework," you will dive deeper into using the XNA Framework.

The XNA Framework, built on top of the .NET Framework, uses a specialized common language runtime optimized for games. This runtime is available not only for Windows Phone, but also for Xbox, Windows 7, Vista, Zune, and Windows XP. A program written for one XNA platform may be retargeted with minimal effort to another platform, so a game written for Windows Phone can potentially be extended to target Windows 7 or any of the other XNA runtime environments fairly easily. This cross-targeting capability makes XNA attractive if you want the potential to port your applications to other platforms.

Because the XNA Framework is targeted for game development, it offers a lower memory footprint than Silverlight and provides a high-performance memory framework designed for the demands of near-real-time games. The math and floating-point computational engines are optimized for the phone. Performance is specifically geared toward graphics with high-performance 2D sprite rendering for rotations, transforms, filtering, and others. For 3D scenarios, the phone also offers hardware-accelerated 3D APIs. As a result, XNA provides the optimal platform for graphics rendering.

Game developers often seek unique and innovative game experiences that will make their products stand out. There are no predefined application templates for XNA as there are for Silverlight, which means each application must design and code its own user interface from scratch. This also means there are no design guidelines related to user interfaces for XNA games.

By the Way

XNA Starter Kits

Although there are no predefined application templates for XNA games, there are many free XNA Starter Kits that can help jump-start your game development. These are available at the following websites:

- http://create.msdn.com/en-US/education/catalog/sample/ui_controls
- http://create.msdn.com/en-US/education/catalog/?contenttype=0&devarea=16&platform=0&sort=1

Working with graphics can be very mathematically intense. To help simplify this, XNA embraces the graphical concept of the sprite, which is a flat, 2D texture drawn on the screen to represent a graphical game object. Programmatically, a sprite is an image resource combined with a position telling XNA where to draw it.

When working with images, instructions can be passed that tell how the graphics should be shaded and is a key advantage for the XNA Framework. The four configurable shading effects provided are the following:

- SkinnedEffect
- EnvironmentMapEffect
- DualTextureEffect
- AlphaTestEffect

By the Way

Image Manipulation in XNA

XNA provides support for drawing, rotating, stretching, scaling, and filtering 2D images in a high-performing manner. By default, the Silverlight framework has no 3D graphics support, whereas the XNA Framework fully supports 3D graphics and offers hardware acceleration for 3D graphical objects for the best performance possible.

In addition to shading effects, the XNA Framework also provides different blend modes to determine how colors interact with each other when they are overlaid and combined. This type of blending is necessary in advanced graphical rendering. Whereas Silverlight for Windows Phone has only Alpha blending, the XNA Framework supports a large number of blend modes, including the following:

- Inversion
- Alpha
- Zero
- One

If you install the Reach graphics demo from the MSDN Creators site, you can see a number of different rich renderings provided by the XNA Framework. This demo runs in both Windows and Windows Phone. Figure 3.6 shows some screenshots from the Reach graphics demo.

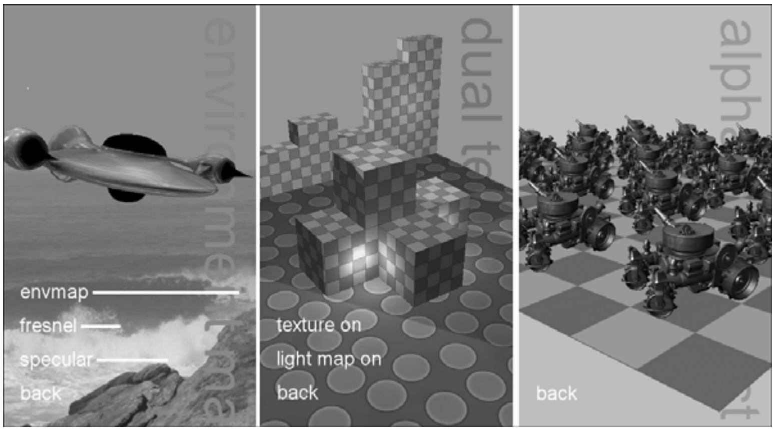

FIGURE 3.6
Reach graphics demo application.

Although there are no predefined application templates for the XNA Framework, there is a Content Pipeline project template, which translates various media sources into XNA consumable formats. This pipeline is extensible for custom formats, but a large number of formats are supported by default. Standard graphics and audio formats are supported as well as AutoDesk, DirectX, Textures, Microsoft Cross-Platform Audio Creation Tool (XACT), and more. If you have media assets in a large variety of formats you need to utilize, XNA is an excellent choice.

As you have seen, the XNA Framework is designed to be a high-performance game programming framework. As a result, there is not really any visual designer support for user-interface work in XNA. There are also no built-in controls, such as text boxes. In fact, rendering text in XNA can be one of the most difficult tasks because of the lack of support for wrapping text controls, flowable control panels, and other text-rendering elements.

Great XNA Examples

You will find a number of great examples of XNA-based games, such as *Glyder: Adventure World*, or *Flowerz*, in the Windows Phone Marketplace. Two sample games, *Catapult Wars* and *Marble Maze*, with complete source code are also available from http://create.msdn.com as part of the Microsoft Educational Resource training materials.

Catapult Wars, shown in Figure 3.7, makes use of moving backgrounds, sounds, graphics, fonts, and other content assets inside the XNA Framework. Reproducing this example on Silverlight would be difficult, although not impossible. (With enough time and custom code, anything is possible!)

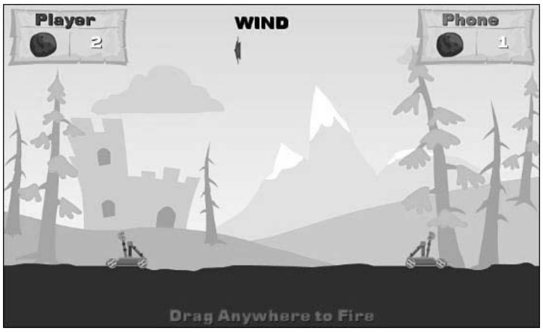

FIGURE 3.7
Catapult Wars.

Presented in tutorial format, *Marble Maze*, shown in Figure 3.8, is another open source sample from Microsoft. The end result shows off the 3D capabilities of Windows Phone 7 and XNA on a very simple level. Even with 3D modeling and code, the game is still smooth and performs well. Developers seeking to learn XNA can use *Marble Maze* as a starting base for exploring 3D programming on Windows Phone.

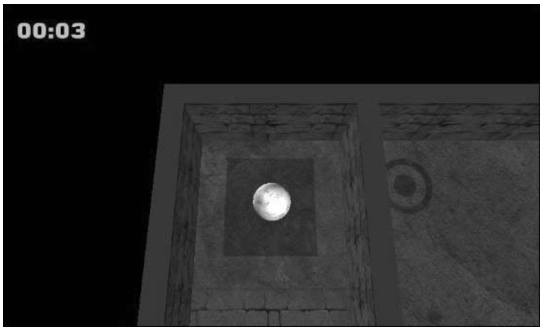

FIGURE 3.8
Marble Maze.

Summary

Silverlight and XNA both have distinct advantages for various application types through built-in constructs, which support the particular types of applications they target. Silverlight is targeted toward textual applications with embedded graphics and video. The Metro styling offers an attractive launching point for building applications. Although Silverlight also provides animation storyboards and timelines, which can be used to develop many simple 2D games, the XNA Framework is targeted at game development and provides a high-performance runtime capable of complex graphical rendering.

Think about the application you are writing, explore some of the applications on the market today to get an idea of what's possible, and begin prototyping with the framework of your choice. Table 3.1 shows a feature comparison between Silverlight and the XNA Framework.

TABLE 3.1 Decision Matrix—Silverlight Versus XNA

Criteria	Silverlight	XNA Framework
2D graphics	✓	✓✓✓
3D graphics		✓✓✓
Controls	✓✓✓	
Cross-targeting	✓	✓✓✓
Event based	✓✓✓	
Game	✓	✓✓✓
Loop based		✓✓✓
Metro UI	✓✓✓	
Text based	✓✓✓	

Q&A

Q. ***What is XNA?***

A. XNA is a high-speed framework designed specifically for game programming; XNA offers a built-in game loop that redraws the screen every 30 seconds. Content Pipelines offer a route for XNA games to consume a variety of audio and graphic content formats.

Q. ***What is Silverlight for Windows Phone?***

A. Silverlight for Windows Phone is a version of Silverlight specifically targeted toward building applications on Windows Phone. Preconstructed templates for Phone, Panorama, and Pivot are available that harness the Metro UI styling built in. Silverlight is a great choice for building text-driven phone applications and applications integrating in media or audio.

Workshop

Quiz

1. What are some of the advantages of the XNA application framework?
2. What are some of the advantages of the Silverlight application framework?

Answers

1. Raw speed is a key advantage of the XNA Framework, as well as the free-form user interface, the built-in game loop, and the extensive graphics and audio support.
2. Some advantages of the Silverlight application framework include the text-based templates for the Metro user interface and the familiar programming metaphor.

Exercise

1. Explore a completed 2D XNA game by downloading and running *Catapult Wars* in the Windows Phone Emulator.
2. Explore a completed 3D XNA game by downloading and running *Marble Maze*.
3. Download the free Facebook application to your Windows Phone and navigate through the various menu styles and information contexts to familiarize yourself with the application.
4. Download the trial of *Popper 2* from the Zune marketplace and explore the game, noting how Silverlight applications are not constrained to Metro UI applications.
5. Think about the application you are envisioning. Write a paragraph about it, and sketch a few screens to help determine which application model fits your desired outcome.

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