



**Silverlight
Show**

10 Laps around Silverlight 5

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Chapter 1: Introduction to Silverlight 5

Introduction

In this ebook we'll cover the new and exciting features in Silverlight 5. I am going to guide you step-by-step through the process of getting started with Silverlight 5 and then we will dive into the features that are the most important to you.

But first, we are going to:

- Explain why you should read this ebook over other Silverlight 5 resources.
- We will give a very brief introduction to Silverlight.
- Take a look at the Roadmap for this series.
- Review Silverlight's history.
- Download the bits required to develop a Silverlight 5 application.
- Become familiar with creating a new Silverlight 5 application.

Why read this ebook over other resources?

I'm sure you have seen a lot of Silverlight 5 information on the web and are wondering what makes this ebook different, so I will go ahead and tell you.

- Individual blog posts about Silverlight 5 are scattered all over the internet, it takes time to research and find relevant information. In this ebook, all information will be grouped together and easily referenced.
- Post-beta, Microsoft changed RichTextBox to RichTextBlock. Many samples on the web are still showing the old version and have never been updated.
- Breaking changes in Silverlight 5 that have happened recently will be included.
- I am a [Silverlight MVP](#) / Silverlight Insider and [XAML Advocate](#). I have spent the last few years of my life specializing in Silverlight and sharing the information to others.

A (very) Brief Introduction to Silverlight

Microsoft Silverlight is an application framework for writing Rich Internet Applications. The run-time environment is available as a plug-in for most web browsers and works on a variety of operating systems including Windows, Mac and Linux. While most people know Silverlight for the media capabilities, it has quickly turned into a solution for many Line-of-Business applications. Silverlight 5, which is expected at the end of this year, includes many new features that were not included in the previous version.

The Roadmap for this Ebook

I've included the Roadmap for the ebook below as you may want to visit other sections as you learn Silverlight 5. I picked the following features as I thought that you may find them useful in your day-to-day work.

- 1) [Introduction to SL5 – This chapter which provides a brief history of Silverlight and relevant links.](#)



- 2) [Binding- Ancestor Relative Source Binding and Implicit Data Templates.](#)
- 3) [Graphics –XNA 3D API and Improved Graphics Stack.](#)
- 4) [Media - Low-Latency Sound using XNA and Remote Control and Media Command \(Keys\) Support.](#)
- 5) [Text - Text Tracking and Leading, Linked and Multi-column Text, OpenType Support, Pixel Snapped Text and TextOptions.](#)
- 6) [Operating System Integration - Part 1 - P/Invoke, Multiple Windows and Unrestricted File System Access in Full Trust.](#)
- 7) [Operating System Integration - Part 2 - Default Filename for SaveFileDialog, 64-bit browser support and Power Awareness.](#)
- 8) [Productivity and Performance - XAML Binding Debugging, Parser Performance Improvements and Multi-core JIT for improved start-up time.](#)
- 9) [Controls - Double and Triple click support, PivotViewer and ComboBox Type-Ahead.](#)
- 10) [Other items - In-Browser HTML, PostScript and Tasks for TPL.](#)

Let's Begin with the History of Silverlight

Before diving into Silverlight 5, let's take a brief look at where Silverlight started and where it is now.

Silverlight 1 (released 2007)

- Developed under the codename WPF/E which stands for Windows Presentation Foundation / Everywhere.
- Started by invoking the Silverlight control from the HTML page, which then loads up a XAML File.
- Silverlight exposes a DOM (API), which is limited to JavaScript running in the browser.
- Data formats are limited to XML and JSON.

Silverlight 2 (released 2008)

- Included a version of the .NET Framework, implementing the CLR as 3.0.
- Can execute programs written in any .NET language.
- XAML Markup, as well as the code, is compiled into .NET assemblies which are then compressed using ZIP and stored in a .XAP File.
- Included classes for data access over web services, REST, WCF Services and ADO.NET Data Services.
- Several Media features included.

Silverlight 3 (released 2009)

- Silverlight has gained a lot of traction against competitors of RIA.

- UI Elements supports element-to-element binding.
- Can save files anywhere on the system via the SaveFileDialog.
- Supports Out-of-Browser Applications.
- Can check for updates on every launch and updates are automatically installed

Silverlight 4 (released 2010)

- Microsoft continues to add features to enhance Silverlight.
- Web cam and microphone support.
- Printing Support
- Clipboard and drag and drop support.
- WCF Rich internet application Services
- Component Object Model Support

Silverlight 5 (released 2011)

- Continues as a mature platform for developing LOB Applications. (Many new features added)
- Debug Data-Binding Expressions.
- XNA 3D API & Built-in 3D Graphics Support.
- Many Text Improvements.
- P/Invoke Support.
- In-Browser HTML.
- 64-bit browser Support.

[*Referenced Wikipedia Silverlight History](#)

As you can see, a new version of Silverlight has been released every year. Every year Silverlight is also becoming more feature rich and expanding upon the previous version. With Silverlight 5, we see that it continues as being a mature platform for developing LOB applications. Now that we have learned a little more about Silverlight, let's begin by downloading the bits necessary to build a Silverlight 5 application.

Downloading the Bits

Below you will find the download links necessary to build a Silverlight application.

Note: You can install the beta on top of the final release of Silverlight 4.

- Visual Studio 2010 SP1 or Visual Web Developer Express 2010 SP1 is required to develop Silverlight 5 Applications. [Visual Studio 2010 SP1](#) or [Visual Web Developer Express 2010 SP1](#).
- After you have installed VS2010 SP1 or Visual Web Developer Express 2010 SP1 then you will need to download and install the [Silverlight 5 Tools for Visual Studio 2010 SP1](#).
- This download will install all components necessary for Silverlight 5 development:
 - Silverlight 5 Developer Runtime
 - Silverlight 5 SDK (software development kit)
 - Update for Visual Studio 2010 Service Pack 1 and Visual Web Developer Express 2010 Service Pack 1 (KB2502836)
 - Microsoft WCF RIA Services V1.0 SP2 RC
- Download the [Silverlight 5 Toolkit](#) for additional templates.



- You should also install the [Expression Blend Preview for Silverlight 5](#). The current version of Expression Blend 4 will not allow you to make changes to your Silverlight 5 UI.
- I always like to have a local copy of the help documentation on my hard drive in case I need to read it while on a flight or if my internet is down. So, I would recommend downloading the [Silverlight 5 SDK CHM Help](#) documentation. It is around ~75MB, but well worth it in those tight situations.

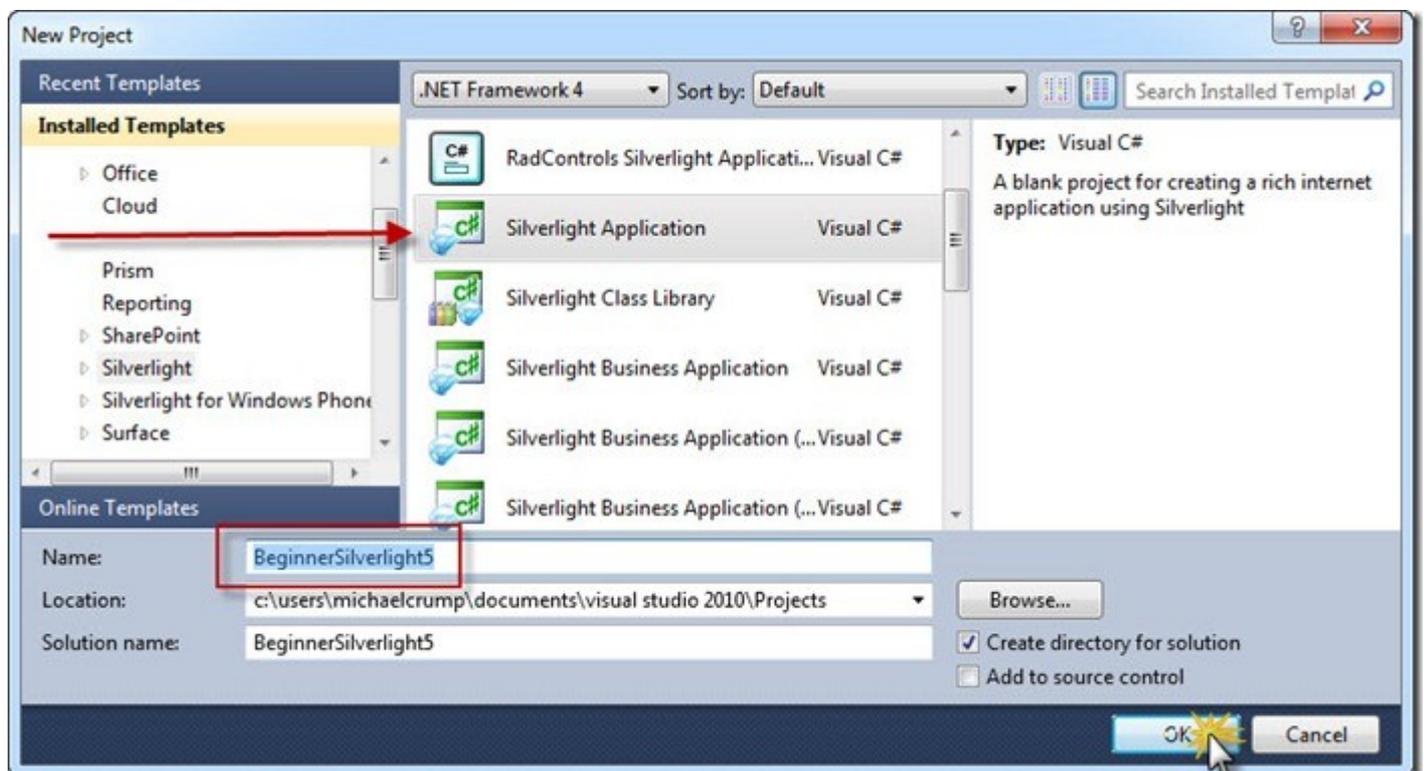
A couple of optional files are located below. Most of these tools are automatically installed when you installed the Silverlight 5 Tools.

- For reference purposes, the developer runtimes are available here for [Windows](#) and [Mac OS](#).
- The [WCF RIA Services v1 SP2 RC](#) can be found here but as mentioned earlier it is installed with the Silverlight 5 Tools.
- I found the [Silverlight 5 Features list](#) helpful for understanding what is and isn't included in the release.
- You can also download the [Silverlight 5 SDK](#) but it is also installed with the Silverlight 5 Tools.

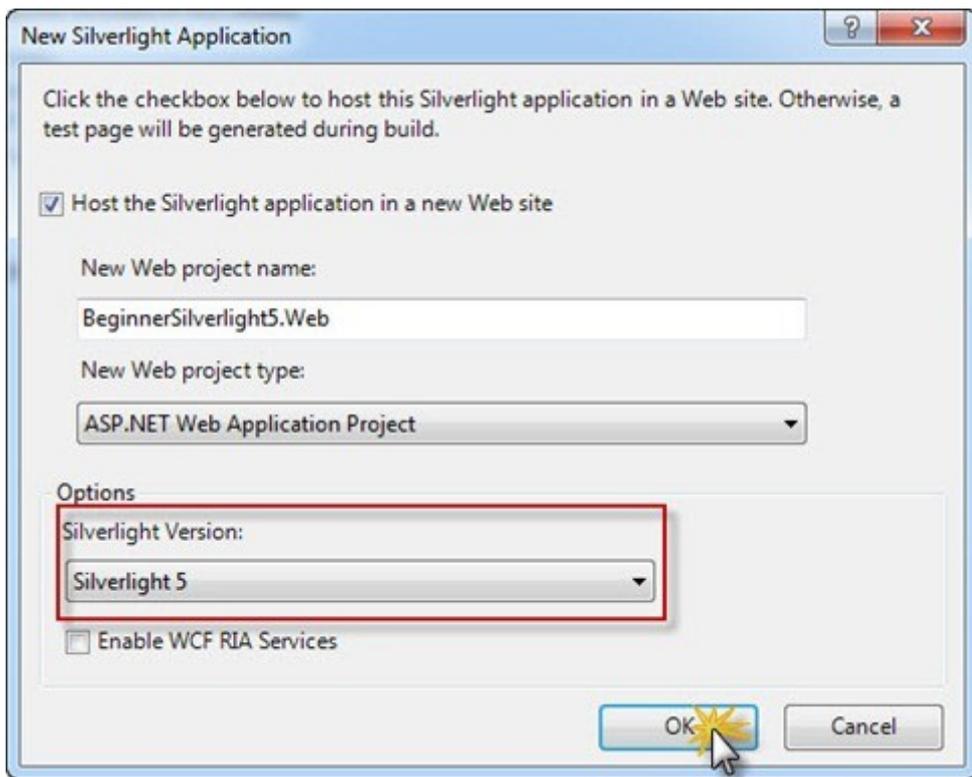
Note: If you are planning on developing Silverlight LOB Applications and want a jump start on developing then I would also recommend downloading and installing [Telerik's Silverlight Controls](#). They have a free trial available with absolutely no commitment.

After everything is installed...

Launch Visual Studio 2010 and select File → New Project. Then select Silverlight → Silverlight Application → Give it a name and hit OK.



On the New Silverlight Application Screen, you will see under “Options” that you may select which version of Silverlight that you want to use. Silverlight 5 is selected by default from this screen.

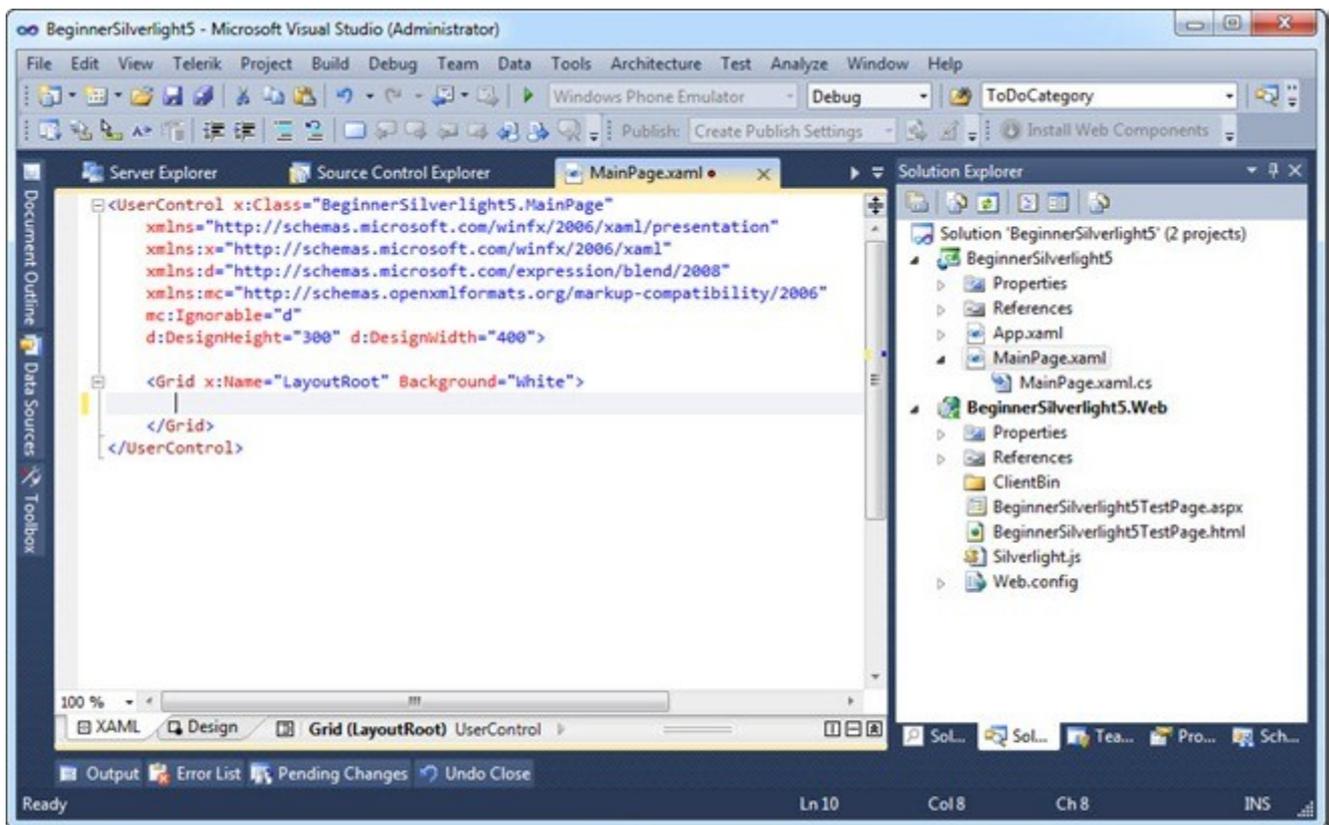


NOTE: You also have the ability to select Silverlight 3 or 4 from this drop-down.

Go ahead and hit “OK”.

Next Steps...

We now have a blank canvas to be working from. Next we'll begin to dive into the new binding features in Silverlight 5.



Conclusion

We have briefly discussed what Silverlight is, seen the roadmap for this ebook, looked at the history of Silverlight, downloaded the required bits and became familiar with a new Silverlight 5 project. In the next chapter of the ebook, we are going to take a look at several new binding features such as Ancestor Relative Source Binding and Implicit Data Templates.

Chapter 2: Binding

In this chapter, I am going to show you how to use Ancestor Relative Source Binding and Implicit Data Templates using Silverlight 5.

Let's Begin with Ancestor RelativeSource Binding

A new addition to the binding engine in Silverlight is called Ancestor RelativeSource Binding. This was previously available in WPF, but is new to Silverlight 5. With Ancestor RelativeSource Binding you can now bind a child object property to a parent object property. It comes with additional properties to determine the type of parent object and how many levels up it is from the child.

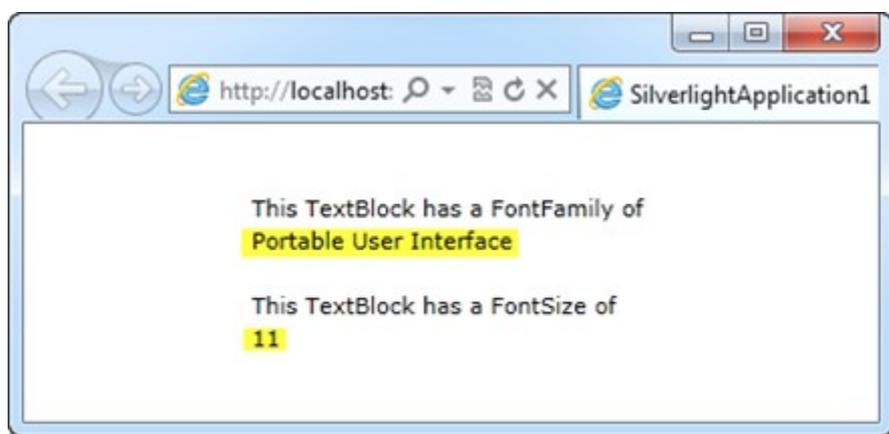
Let's begin today by looking at a sample ported over from WPF which shows how to retrieve the FontFamily and FontSize for a given TextBlock.

Adding onto our existing project.

Hopefully you have completed chapter 1 of the series. If not then create a new Silverlight 5 project and name it "BeginnerSilverlight5", and look under Solution Explorer. Double click the file named MainPage.xaml and replace the grid with the following code:

```
1: <Grid x:Name="LayoutRoot" Background="White" >
2:     <StackPanel VerticalAlignment="Center" HorizontalAlignment="Center" >
3:         <TextBlock Text="This TextBlock has a FontFamily of " />
4:         <TextBlock Text="{Binding RelativeSource={RelativeSource self}, Path=FontFamily}" />
5:         <TextBlock Text="&#x0a;This TextBlock has a FontSize of " />
6:         <TextBlock Text="{Binding RelativeSource={RelativeSource self}, Path=FontSize}" />
7:     </StackPanel>
8: </Grid>
```

If we go ahead and run this project then we will see that by setting the RelativeSource to self and the Path to FontFamily or FontSize then we were able to determine the FontFamily and FontSize of the TextBlock with no code-behind.

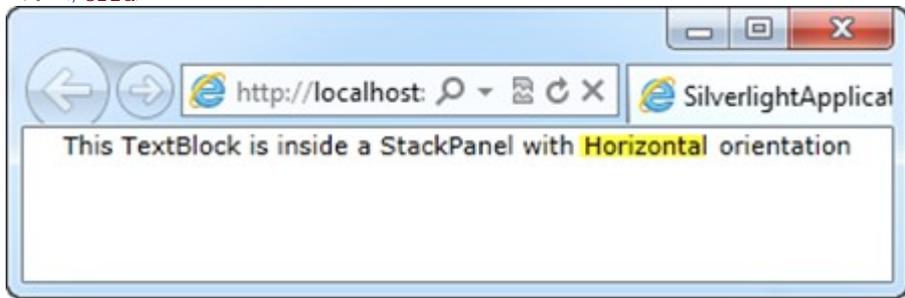


But that is not all that we can do. The Ancestor Relative Source contains a property called AncestorType where we can specify what to bind to. Let's go ahead and see a sample of the AncestorType being set. Go ahead and remove the code you added earlier with the following code snippet shown below:

```

1: <Grid x:Name="LayoutRoot" Background="White">
2:     <StackPanel Orientation="Horizontal" HorizontalAlignment="Center">
3:         <TextBlock Text="This TextBlock is inside a StackPanel with " />
4:         <TextBlock Text="{Binding RelativeSource={RelativeSource AncestorType=StackPanel},
Path=Orientation}"/>
5:     </StackPanel>
6: </Grid>

```



In this sample, we see the AncestorType being set to StackPanel and the Path to Orientation. When the application runs, it displays the word Horizontal. If we switch the StackPanel's Orientation to Vertical then it would have displayed Vertical.

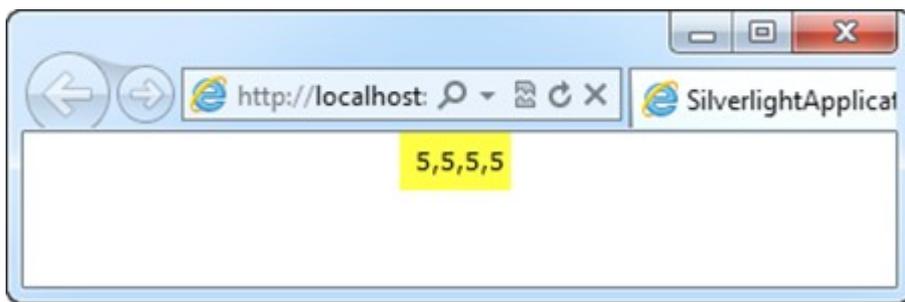
Finally, we will take a look at both AncestorType and AncestorLevel. Go ahead and remove the code you added earlier with the following code snippet shown below:

```

1: <Grid x:Name="LayoutRoot" Background="White" Margin="5,5,5,5" >
2:     <StackPanel Orientation="Horizontal" HorizontalAlignment="Center">
3:         <TextBlock Text="{Binding RelativeSource={RelativeSource AncestorType=Grid,
AncestorLevel=1}, Path=Margin}"/>
4:     </StackPanel>
5: </Grid>

```

As you can see from the following code, we set the AncestorType to the Grid (What Element to Bind) and AncestorLevel to 1. We also specified the Path to Margin. The Margin of the grid is then displayed when the application is executed.



Let's see what you have learned so far today.

Question: What would have happened if the AncestorLevel were set to 2 in the last example?

Answer: Nothing would have been displayed as it would not have found the Grid on Level 2.

Question: What would have happened if the Path was set to VerticalAlignment in the last example?

Answer: Then the word, "Stretch" would have been displayed in the window.

Let's take a look at Implicit Data Templates

Another new addition to the binding engine in Silverlight is called Implicit Data Templates. This was also previously available in WPF, but is new to Silverlight 5. Using Implicit Data Templates we have the ability to produce a DataTemplate that will be implicitly associated with a particular data type.

Let's dive straight into an example (Go ahead and create a new VS2010 Project and give it the name SLShowImplicitDataTemplateDemo):

I have two classes in my project.

1. Podcast.cs – Which contains the Description, ReleaseDate and a Link to the Podcast.
2. PodcastAuthor.cs – This class will inherit from Podcast and add the author of the Podcast.

They should look like this:

```
1: public class Podcast
2: {
3:     public string Description { get; set; }
4:     public DateTime ReleaseDate { get; set; }
5:     public Uri Link { get; set; }
6: }
1: public class PodcastAuthor : Podcast
2: {
3:     public string Author { get; set; }
4: }
```

Let's switch over to MainPage.xaml now.

The first thing we are going to need to do is setup a clr-namespace to our local project. In my sample below, I gave it the name of local and simply pointed it to my current project name.

```
1: xmlns:local="clr-namespace:SLShowImplicitDataTemplateDemo"
```

Now we will define our DataTemplates in a UserControl as shown below:

```
1: <UserControl.Resources>
2:     <DataTemplate DataType="local:Podcast">
3:         <StackPanel Orientation="Vertical">
4:             <TextBlock Text="{Binding Description}" />
5:             <TextBlock Name="txtReleaseDate" Text="{Binding ReleaseDate}" />
6:             <HyperlinkButton Content="Listen to this Episode" NavigateUri="{Binding Link}"
7:             TargetName="_blank" />
8:         </StackPanel>
9:     </DataTemplate>
10:
11:     <DataTemplate DataType="local:PodcastAuthor">
12:         <StackPanel Orientation="Vertical">
13:             <TextBlock Text="{Binding Author}" />
14:             <TextBlock Foreground="Red" Text="{Binding Description}" />
15:             <TextBlock Name="txtReleaseDate" Text="{Binding ReleaseDate}" />
16:             <HyperlinkButton Content="Listen to this Episode" NavigateUri="{Binding Link}"
17:             TargetName="_blank" />
18:         </StackPanel>
19:     </DataTemplate>
20: </UserControl.Resources>
```

The thing to notice here is that the DataTemplate is getting a DataType set to the particular class that we want to use. This will allow us to style our Templates differently depending on the data. If this is still not clear, then continue following along and you will see a screenshot of it in action.

Finally, let's add a ListBox to the grid and give it the name of listBox1.

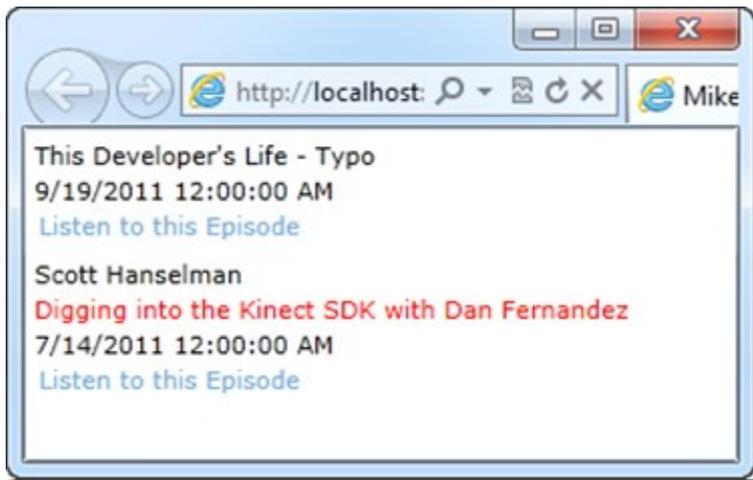
```
1: <Grid x:Name="LayoutRoot" Background="White">
2:     <ListBox Name="listBox1" />
3: </Grid>
```

Double click on MainPage.xaml.cs and add the following code snippet:

```
1: public MainPage ()
2: {
3:     InitializeComponent();
4:     Loaded += new RoutedEventHandler (MainPage_Loaded);
5: }
6:
7: void MainPage_Loaded(object sender, RoutedEventArgs e)
8: {
9:     var Podcast = new List<Podcast>();
10:
11:     Podcast.Add(new Podcast()
12:         {
13:             Description = "This Developer's Life - Typo",
14:             ReleaseDate = new DateTime(2011, 9, 19),
15:             Link = new Uri("http://www.thisdeveloperslife.com/post/2-0-5-typo",
UriKind.Absolute)
16:         });
17:
18:     Podcast.Add(new PodcastAuthor ()
19:         {
20:             Author = "Scott Hanselman",
21:             Description = "Digging into the Kinect SDK with Dan Fernandez",
22:             ReleaseDate = new DateTime(2011, 7, 14),
23:             Link = new Uri("http://hanselminutes.com/275/digging-into-the-kinect-sdk-with-dan-fernandez", UriKind.Absolute)
24:         });
25:
26:     listBox1.ItemsSource = Podcast;
27: }
```

In this code snippet, you will see that we created a Loaded event and added data to our application. We then set the ItemSource on our ListBox to the generic list called Podcast.

If you run the project you will see the following:



Notice how the Description of the second item is in red? That's because we used an Implicit Data Template on the PodcastAuthor class. Easy enough!

What else relating to binding should we know about?

Silverlight 5 has a lot of new features related to binding to cover. I decided to give a quick definition and and links to further information.

ICustomTypeProvider – This enables data binding to objects the structure of which cannot be known until runtime.

Links for further information:

[MSDN Documentation on ICustomTypeProvider](#)

[Using ICustomTypeProvider in Silverlight 5 by Damon Payne](#)

[Using ICustomTypeProvider in Silverlight 5 to Display JSON Data by Jeremy Likness](#)

Custom Markup Extensions – They allow custom code to be run at XAML parse time for both properties and event handlers. You are probably already familiar with Markup Extensions in Silverlight 4 (Binding, StaticResource, TemplateBinding, NullExtension and RelativeSource).

The Binding statement below is a MarkupExtension in Silverlight 4.

```
1: <TextBlock Name="txtReleaseDate" Text="{Binding ReleaseDate}" />
```

[MSDN Documentation on Markup Extensions](#)

[Silverlight 5 Rough Notes – Markup Extensions by Mike Taulty](#)

[Using Custom Markup Extensions in Silverlight 5 by Jeff Prosis](#)

Binding in Style Setters – You can use any type of markup extension inside of the style setter.

[MSDN Documentation on Style Setters](#)

[Binding on Style Setter in Silverlight 5 by Kunal Chowdhury](#)

[Silverlight 5 – Binding Style's Setter.Value by Muhammad Shujaat Siddiqi](#)

DataContextChanged Event – Occurs when the DataContext object for a control changes.

[MSDN Documentation for DataContextChanged Event.](#)

PropertyChanged now an UpdateSourceTrigger option – This updates the binding source immediately whenever the binding target property changes.

[MSDN Documentation for UpdateSourceTrigger Enumeration](#)

Conclusion

At this point, we have seen how you would use Ancestor Relative Source Binding and Implicit Data Templates in your Silverlight 5 Applications. We have also discussed a few other features included with the new binding engine in Silverlight 5. In the next chapter of the ebook, I am going to take a look at the new and improved Graphics stack in Silverlight 5 including the XNA 3D API and much more.

Chapter 3: Graphics

To recap what we learned in the previous chapter:

- We created a sample project for Ancestor Relative Source Binding and Implicit Data Templates.
- We took a look at other binding features that are included with Silverlight 5 and provided a definition and relevant links.

In this chapter, we are going to take a look at the new XNA 3D API and Improved Graphics Stack.

What exactly is XNA?

Before we get started diving into XNA, it's important to understand what it is first:

Microsoft XNA is a set of tools with a managed [runtime environment](#) provided by [Microsoft](#) that facilitates [video gamedevelopment](#) and management. XNA attempts to free game developers from writing "repetitive [boilerplate code](#)"^[1] and to bring different aspects of game production into a single system.^[2]

[Source: Wikipedia](#)

As you can see XNA got its roots for video game development. So you may be asking, "What is it doing in Silverlight 5?" Developers have realized for a long time that things like 3D Graphics inside of a web browser would be beneficial for many applications including: medical, transportation, government and of course gaming. They requested the feature using [Microsoft's UserVoice](#) and Microsoft added it as part of Silverlight 5. Silverlight 5 implementation of 3D is the most powerful yet running inside of a web browser.

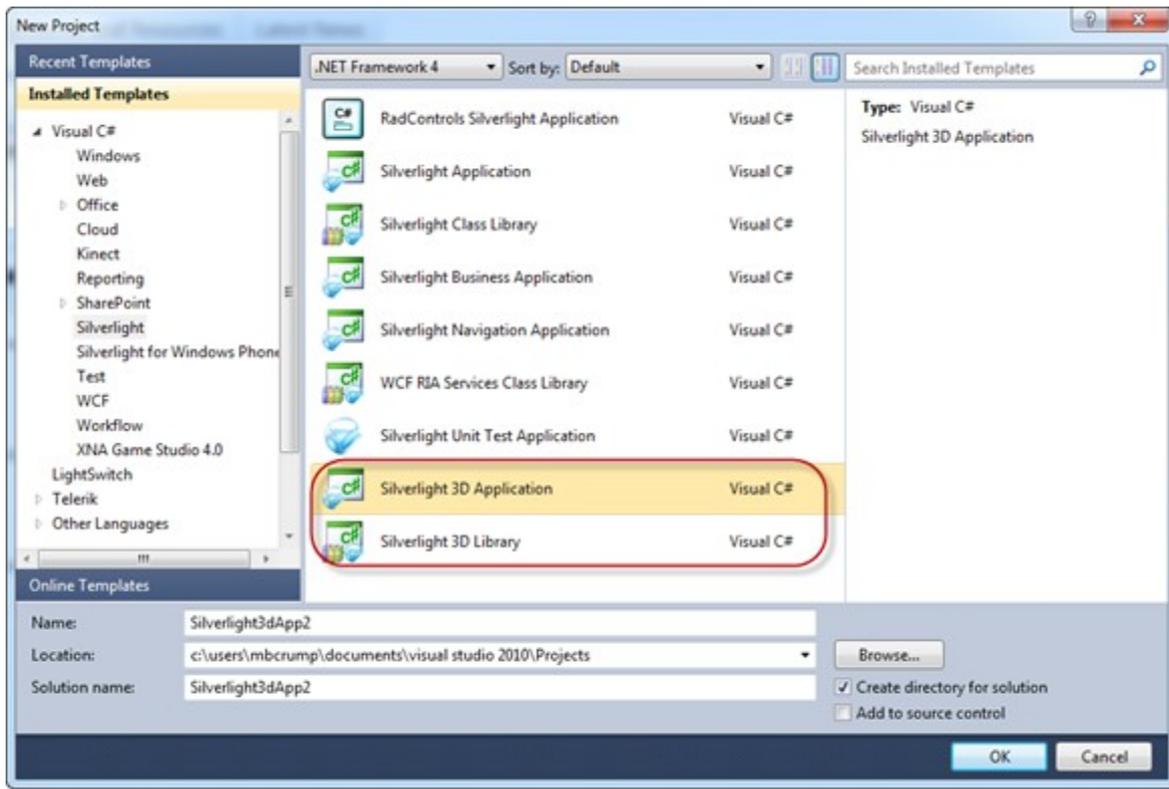
Now that we know a little more about XNA, let's get started...

Let's Begin with XNA Visual Studio Templates

Creating 3D application with Silverlight 5 requires some familiarity with concepts such as vertex shaders, sprites, DrawingSurface and others. If you are like me and have a majority of your experience developing Line of Business Applications then the road to XNA will be somewhat challenging. There is good news though as the latest [Silverlight 5 Toolkit](#) provides XNA Templates. Since I assume that most readers of this series are LOB developers, we will begin with a template. You may customize the template as needed later.

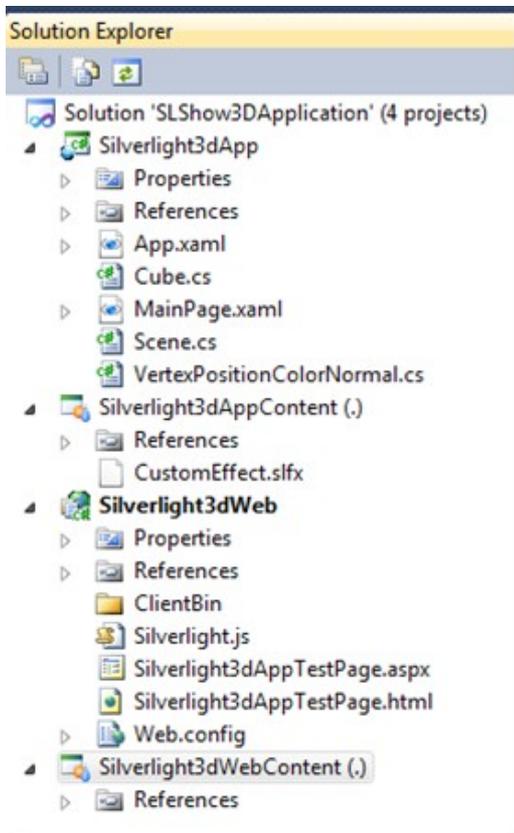
Let's get started...

Install the [Silverlight 5 Toolkit](#) and open Visual Studio 2010 and create a new Silverlight project. You should see the following new templates.



Select “**Silverlight 3D Application**” and give it any name that you want.

You will notice when the project loads up, we will have 4 projects inside our solution.

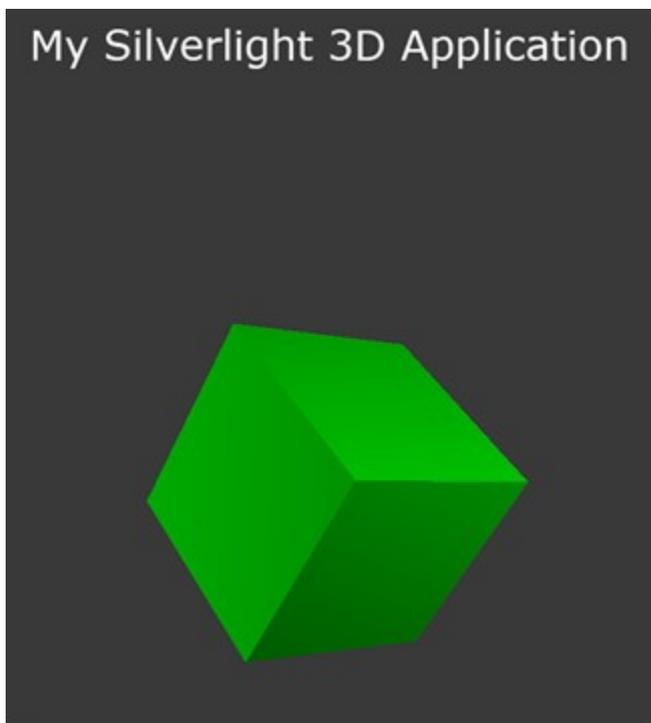


Here is a breakdown of the projects:

- **Silverlight3dApp** – Our main Silverlight project. (Did you notice that using this template that you did not have to select which version of Silverlight to target?)
- **Silverlight3dAppContent** – The content project attached with the main Silverlight Project. It contains Microsoft.Xna.Framework.Content.Pipeline references as well as CustomEffect.sfx. This extension stands for Silverlight Effect.
- **Silverlight3dWeb** – Our standard website that host the 3D Application.
- **Silverlight3dWebContent** – The content project attached with the web application. It also contains Microsoft.Xna.Framework.Content.Pipeline references.

Let's run it.

Now that we have a brief understanding of what makes up the application, let's go ahead and run it by hitting F5. We should see the following cube rotating inside of our browser.

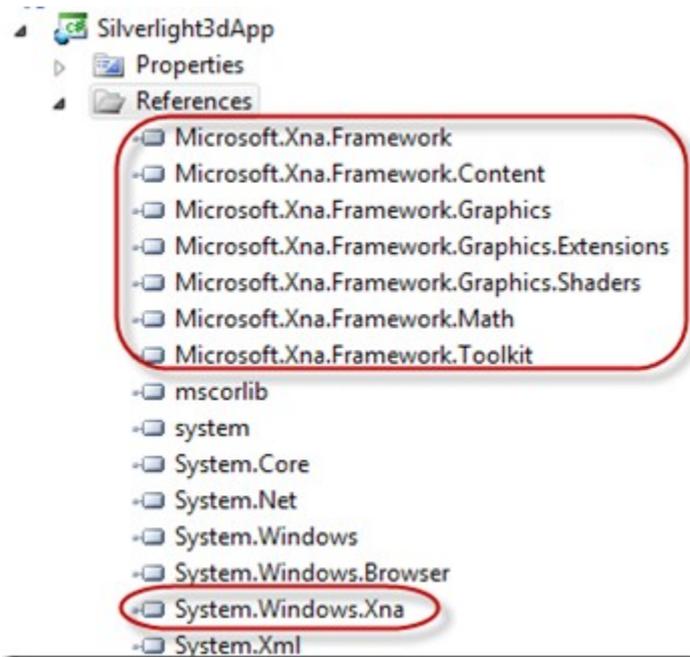


But how exactly does this work?

Part 1: The Silverlight Application

References

The first thing that you may notice is the new references to XNA as shown below:

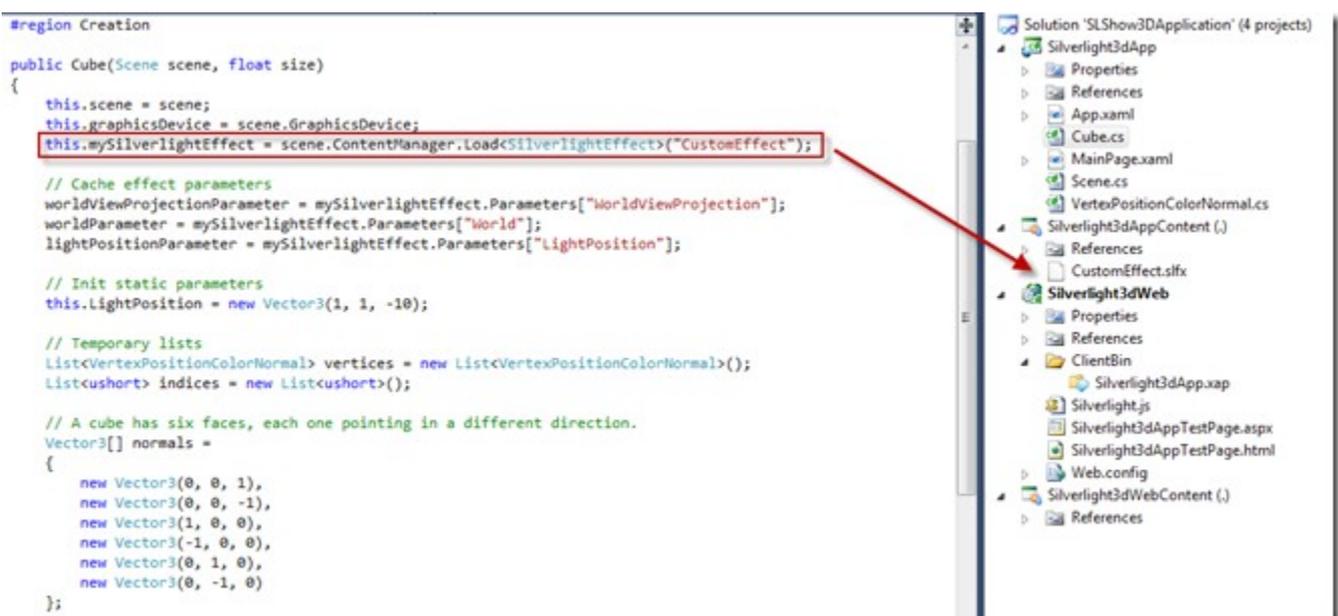


The files highlighted are not found in the standard Silverlight 5 application template. They are only added to a 3D Silverlight 5 application that uses XNA. They are necessary to perform complex calculations that things like 3D requires.

Cube.cs

If you open this class then you will see several regions such as Fields, Properties, Creation and Methods. The one that you want to pay special attention to is the “**Creation**” region.

Go ahead and double click on **Cube.cs** and expand it and you will see that it uses ContentManager to retrieve a slfx file from the content project. You can create your own silverlight effect files and add them to the ContentManager this way.



We won't dive deep into these classes as we are just looking for an overview. I encourage you to review the other regions inside the Cube/Scene/VertexPositionColorNormal classes.

Scene.cs

The scene actually creates the ContentManager and registers for a size changed event to update the aspect ratio.

MainPage.xaml

The MainPage.xaml contains a new control called DrawingSurface. You can see that they only added a name and gave it an event named myDrawingSurface_Draw which we will look at in a moment.

```
1: <Grid x:Name="LayoutRoot" Background="White">
2:     <!--3D drawing surface-->
3:     <DrawingSurface x:Name="myDrawingSurface" Draw="myDrawingSurface_Draw"/>
4:     <TextBlock Text="My Silverlight 3D Application" VerticalAlignment="Top"
5:         HorizontalAlignment="Center" Margin="0,30" Foreground="White"
6:         FontSize="40"/>
7: </Grid>
```

MainPage.xaml.cs

A fairly simple class as it checks to see if the GPU is on, then creates the scene which will render in the users web browser.

```
1: public partial class MainPage
2:     {
3:         Scene scene;
4:
5:         public MainPage()
6:         {
7:             InitializeComponent();
8:         }
9:
10:        private void myDrawingSurface_Draw(object sender, DrawEventArgs e)
11:        {
12:            // Render scene
13:            scene.Draw();
14:
15:            // Let's go for another turn!
16:            e.InvalidateSurface();
17:        }
18:
19:        private void UserControl_Loaded(object sender, RoutedEventArgs e)
20:        {
21:            // Check if GPU is on
22:            if (GraphicsDeviceManager.Current.RenderMode != RenderMode.Hardware)
23:            {
24:                MessageBox.Show("Please activate enableGPUAcceleration=true on your Silverlight
plugin page.", "Warning", MessageBoxButton.OK);
25:            }
26:
27:            // Create the scene
28:            scene = new Scene(myDrawingSurface);
```

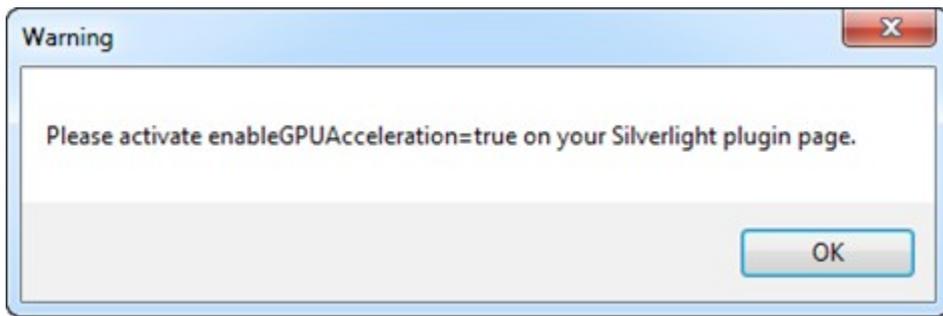
```
29:     }  
30: }
```

Part 2: The Web Application

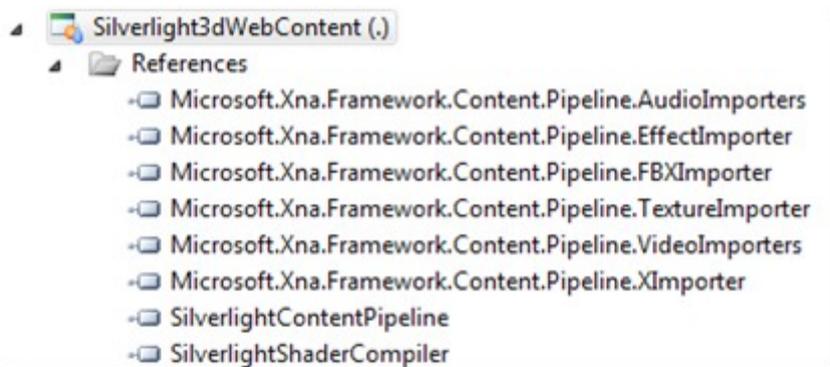
The main thing to notice here is that the following line has been added to both the .html and .aspx pages inside of the Silverlight object data.

```
1: <param name="enableGPUAcceleration" value="true" />
```

If this tag is missing, then Silverlight will display the following error message.



Also as stated earlier, we have a **Silverlight3dWebContent** project that includes the following references:



At this point, we have taken a quick look at XNA in Silverlight 5. But our journey doesn't have to end here. Microsoft included a ton of sample projects that will get you up to speed quickly.

Sample Source Code for XNA projects.

You can find sample source code for many XNA projects located in your C:\Program Files (x86)\Microsoft SDKs\Silverlight\v5.0\Toolkit\Sep11\Source directory. Simply extract the zip file and navigate to XNA.

Conclusion

At this point, we have seen how you would use the XNA 3D API in your Silverlight 5 Applications. We have also discussed a few other features included with the improved graphic stack engine in Silverlight 5. In the next chapter of the ebook, I am going to take a look at the new media features in Silverlight 5 including: Low-Latency Sound using XNA and Remote Control and Media Command (Keys) Support and much more.

Chapter 4: Media

To recap what we learned in the previous chapter:

- We briefly discussed what XNA is.
- We looked at the templates available for new XNA Silverlight 5 projects.
- We dissected the 3D XNA Template to learn more about its makeup.
- Pointed out where other sample projects for XNA were located on your hard disk.

In this chapter, I am going to discuss media features such as low-latency sound using features right out of XNA. We will also discuss Remote Control and Media Command (Keys) support using Silverlight 5.

Let's Begin with Low-Latency Sound using XNA SoundEffect

A new addition to Silverlight 5 is the ability to play low-latency sounds using the XNA SoundEffect class. This is very useful for kiosk or even games that need to play a certain sound over and over. In Silverlight 5, this is much easier than before (where people used various MediaElement hacks). You can now simply borrow the SoundEffect / SoundEffectInstance class from XNA.

Start with a new Silverlight 5 Project

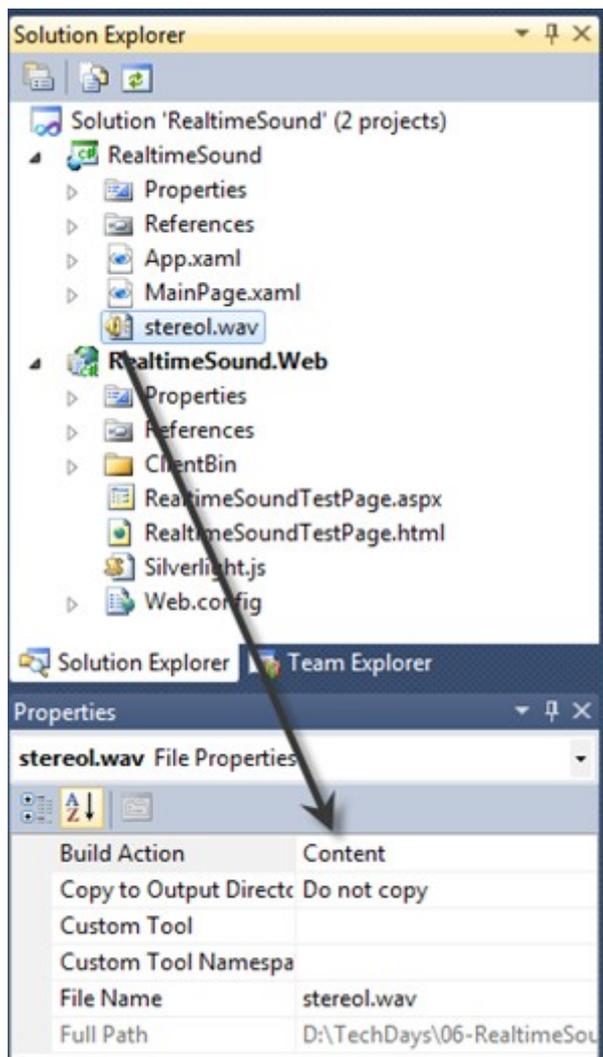
Launch Visual Studio 2010 and select File → New Project. Then select Silverlight → Silverlight Application → Give it a name and hit OK.

On the New Silverlight Application Screen, you will see under “Options” that you may select which version of Silverlight that you want to use. We will select Silverlight 5 for this option. If you don't see Silverlight 5 as an option then follow the guide [here](#).

The first thing you are going to want to do is to find a .wav file on the net that is PCM-encoded. They are very easy to find with a quick Google search. I am not going to include one for copyright reasons.

Now, right-click your Silverlight 5 project and select “Add”, then “Existing Item.” You can also easily access this screen by hitting “Shift-Alt-A” together. Navigate to wherever you downloaded the .wav file and select the file.

At this point, make sure the .wav file has a build action set to “Content”, as shown below.



Once this is complete, we will need to make a minor adjustment to our MainPage.xaml file to include a button to play the file for this demo.

```

1: <Grid x:Name="LayoutRoot" Background="White">
2:     <Button Content="Button" Height="23" HorizontalAlignment="Left" Margin="0,277,0,0"
Name="btnPlaySound" VerticalAlignment="Top" Width="75" Click="btnPlaySound_Click" />
3: </Grid>

```

The only thing that we added to our MainPage.xaml file was a button inside of the Grid that has an event handler when the user clicks the button.

We can navigate over to our MainPage.xaml.cs file and add the following code snippet:

```

1: private void btnPlaySound_Click(object sender, RoutedEventArgs e)
2: {
3:     var soundStream =
4:         Application.GetResourceStream(
5:             new Uri("stereol.wav", UriKind.RelativeOrAbsolute));
6:
7:     var effect = SoundEffect.FromStream(soundStream.Stream);
8:
9:     SoundEffectInstance engineInstance = effect.CreateInstance();
10:
11:     engineInstance.IsLooped = true;

```

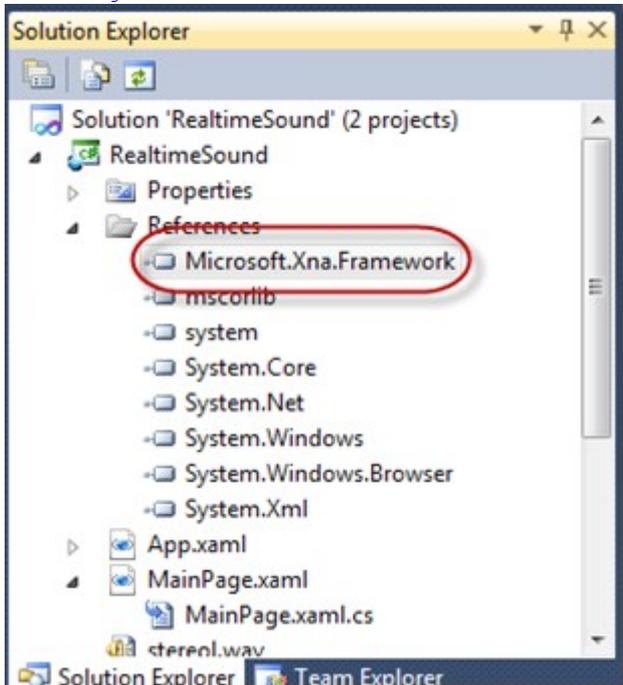
```
12:     engineInstance.Pitch = -1.0f;
13:     engineInstance.Volume = 0.75f;
14:
15:     engineInstance.Play();
16: }
```

In this code snippet, we are using several new features. Let's examine the code snippet line by line:

- Lines 3-5 creates our resource stream from the wav file that added earlier.
- Lines 7-9 is initializing the SoundEffectInstance class that is going to perform special effects for the .wav file.
- Lines 11-13 is creating a looped wav file that sets the pitch and the volume.
- Lines 15 simply plays the files.

Don't forget to add the proper namespace and reference to your project.

```
1: using Microsoft.Xna.Framework.Audio;
```



If you load the application now, you will hear your .wav file being played over and over again. The pitch and volume has also been adjusted. Easy enough!

Let's move onto Remote Control and media keys support.

Remote Control and Media Command (Keys) Support

One of the new improvements in Silverlight 5 is the ability to support Remote Control and Media Commands from various hardware manufactures. Below is a sample keyboard and remote control that has buttons for features such as (fast forward, stop, play, rewind, etc). Now we are able to make use of those buttons in Silverlight 5 with a few lines of code.



Let's get started.

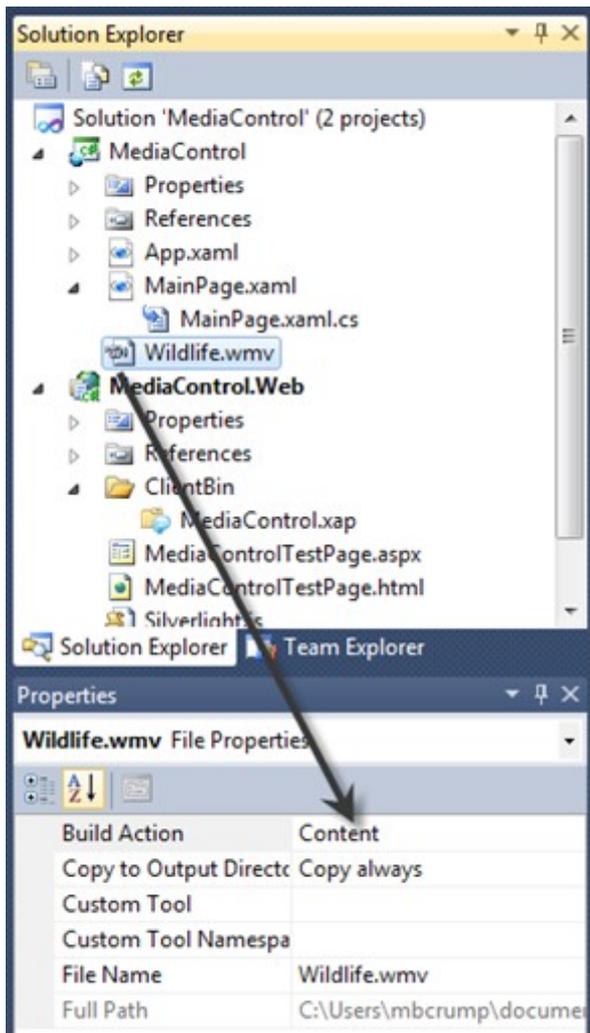
Launch Visual Studio 2010 and select File → New Project. Then select Silverlight → Silverlight Application → Give it a name and hit OK.

On the New Silverlight Application Screen, you will see under “Options” that you may select which version of Silverlight that you want to use. We will select Silverlight 5 for this option. If you don't see Silverlight 5 as an option then follow the guide [here](#).

The first thing you are going to want to do is to find a **.wmv** file that you can use for this application. I decided to use the **wildlife.wmv** file available on every Windows 7 PC. Just like before, I am not going to include it due to copyright reasons.

Now, right-click your Silverlight 5 project and select “Add”, then “**Existing Item.**” You can also easily access this screen by hitting “**Shift-Alt-A**” together. Navigate to wherever you downloaded the **.wmv** file and select the file.

At this point, make sure the **.wmv** file has a build action set to “**Content**”, as shown below.



Once this is complete, we will need to make a few minor adjustments to our MainPage.xaml file to play a video.

```

1: <Grid x:Name="LayoutRoot" Background="White">
2:     <MediaElement x:Name="videoPlayer"
3:         Source="/Wildlife.wmv" />
4:
5:     <TextBlock x:Name="txtMediaKey" Foreground="Red" HorizontalAlignment="Right"
VerticalAlignment="Bottom" Margin="5" FontSize="20" />
6:
7:     <Button x:Name="FullScreen"
8:         HorizontalAlignment="Left" VerticalAlignment="Bottom"
9:         Content="Go Full Screen" Margin="5" Click="FullScreen_Click" />
10: </Grid>

```

We added the following items to our MainPage.xaml file:

- MediaElement control – This will play the video and give us the ability to stop/start/pause the video using the Media Controls on our keyboard/remote control.
- TextBlock control – To display which MediaCommand code is being executed. (Excellent for debugging)
- Button control – To toggle between FullScreen mode.

We can navigate over to our MainPage.xaml.cs file and add the following code snippet:

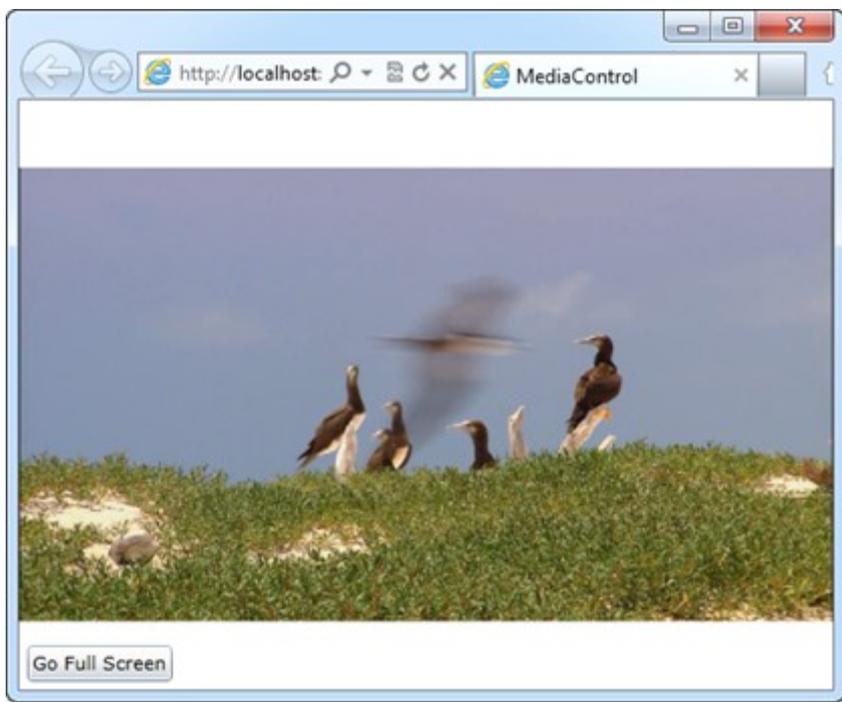
```
1: public MainPage ()
2: {
3:     InitializeComponent();
4:     this.MediaCommand += new MediaCommandEventHandler (MainPage_MediaCommand);
5: }
6:
7: private void MainPage_MediaCommand(object sender, MediaCommandEventArgs e)
8: {
9:
10:     txtMediaKey.Text = e.MediaCommand.ToString();
11:
12:     switch (e.MediaCommand)
13:     {
14:         case System.Windows.Media.MediaCommand.Play:
15:             videoPlayer.Play();
16:             return;
17:         case System.Windows.Media.MediaCommand.Pause:
18:             videoPlayer.Pause();
19:             return;
20:         case System.Windows.Media.MediaCommand.Stop:
21:             videoPlayer.Stop();
22:             return;
23:         case System.Windows.Media.MediaCommand.TogglePlayPause:
24:             if (videoPlayer.CurrentState == MediaElementState.Paused ||
25:                 videoPlayer.CurrentState == MediaElementState.Stopped)
26:                 videoPlayer.Play();
27:             else if (videoPlayer.CurrentState == MediaElementState.Playing)
28:                 if (videoPlayer.CanPause)
29:                     videoPlayer.Pause();
30:             return;
31:         case System.Windows.Media.MediaCommand.IncreaseVolume:
32:             videoPlayer.Volume += 5;
33:             return;
34:         case System.Windows.Media.MediaCommand.DecreaseVolume:
35:             videoPlayer.Volume -= 5;
36:             return;
37:         case System.Windows.Media.MediaCommand.ChannelUp:
38:             // Channel up
39:             return;
40:         case System.Windows.Media.MediaCommand.ChannelDown:
41:             // Channel down
42:             return;
43:         default:
44:             return;
45:     }
46: }
47:
48: private void FullScreen_Click(object sender, RoutedEventArgs e)
49: {
50:     Application.Current.Host.Content.IsFullScreen = !Application.Current.Host.Content.IsFullScreen;
51: }
```

Let's examine the code snippet line by line:

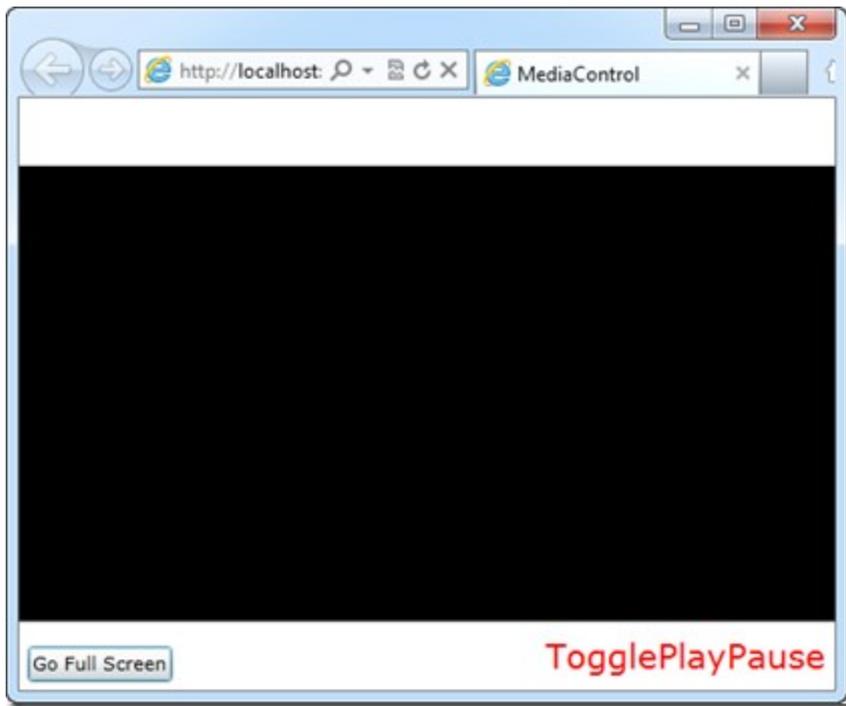
- Line 4 creates our MediaCommand event handler. This is going to hook up to our media commands case statement.
- Line 10 will simply display which MediaCommand the user has pressed into a TextBlock on the right hand side of the screen. This is useful for debugging applications that use the Media Features in Silverlight 5.
- Lines 12-44 is our switch statement that will trigger the respective action on the MediaElement control.
- Lines 48-51 will simply check to see if the screen is in FullScreen mode and toggle it accordingly.

Note: I didn't list all of the MediaCommand enums that are available. You can review a complete list [here](#).

If we run the application our video starts playing:



If we hit the “**Play/Pause**” media button on our keyboard (If your hardware supports it) then you will see the video is now paused and the word “**TogglePlayPause**” is located in the bottom right hand corner of our screen.



If you hit other media keys then the MediaElement will respond accordingly. You can even try out your WMC remote control if you have one available.

Please note: If you ever have an issue with the keys responding, then switch to FullScreen mode (by clicking the button) and try again. I've found several instances where the Silverlight application loses focus.

Notice how easy it was to add support for Media Keyboards and Remotes? Silverlight is already known for having an excellent media player and this just enhances it even more!

Conclusion

At this point, we have seen how you would use Low-Latency Sound using XNA and Remote Control and Media Command (Keys) Support in your Silverlight 5 Applications. We have also discussed a few other features in Silverlight 5. In the next chapter of the ebook, I am going to take a look at the new text improvements in Silverlight 5 including: Text Tracking and Leading, Linked and Multi-column Text, OpenType Support, Pixel Snapped Text and TextOptions.

Chapter 5: Text

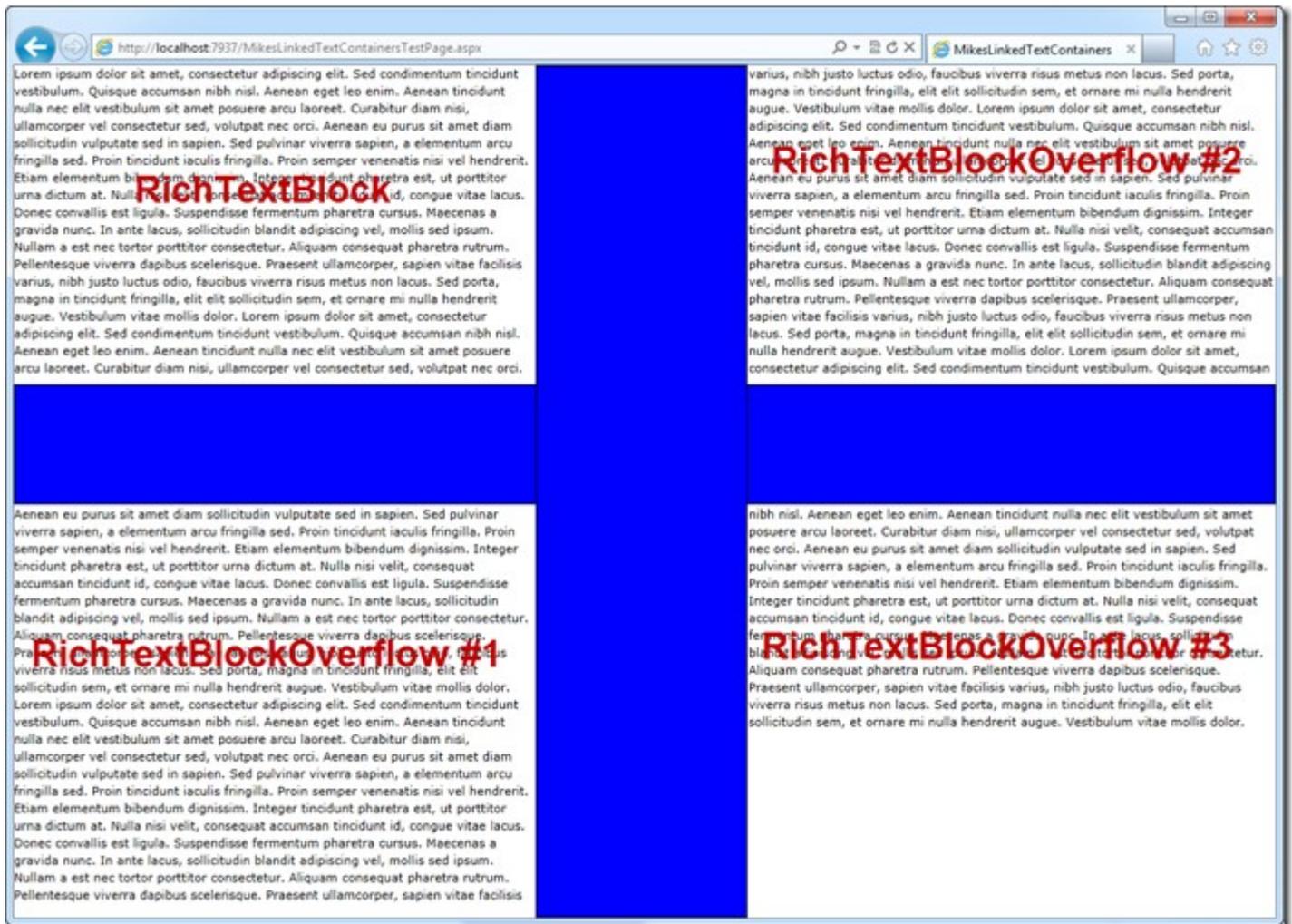
To recap what we learned in the previous chapter:

- We discussed the new media features included with Silverlight 5.
- We looked at using Low-Latency Sound with XNA SoundEffect and SoundEffectInstance classes.
- We also learned how to use remote control and media command (keys) support.

In this chapter, I am going to discuss the new text improvements in Silverlight 5 including: Text Tracking and Leading, Linked and Multi-column Text, OpenType Support, Pixel Snapped Text and TextOptions.

Linked and Multi-Column Text

We will use an example that I've demonstrated in the past that many have found helpful. The Linked and Multi-Column Text feature enables the text of a RichTextBlock control to overflow from one into the next. Multiple RichTextBlockOverflows can be chained together to spread text across a layout. Let's go ahead and take a look at a screenshot of a RichTextBlock with a RichTextBlockOverflow working together.



As you can see from this screenshot, we had a RichTextBlock in the upper left and its content overflowed onto the RichTextBlockOverflow #1, #2 and #3. You can think of this as something that is similar to a newspaper article. As the browser expands or contracts the content fills the available area.

Let's check out the code that made it happen:

```
1: <Grid x:Name="LayoutRoot"
2:     Background="White">
3:     <Grid.ColumnDefinitions>
4:         <ColumnDefinition Width="0.415*" />
5:         <ColumnDefinition Width="0.168*" />
6:         <ColumnDefinition Width="0.418*" />
7:     </Grid.ColumnDefinitions>
8:     <Grid.RowDefinitions>
9:         <RowDefinition Height="0.373*" />
10:        <RowDefinition Height="0.143*" />
11:        <RowDefinition Height="0.483*" />
12:    </Grid.RowDefinitions>
13:    <Rectangle Fill="Blue"
14:        Margin="0,1"
15:        Stroke="Black"
16:        Grid.Row="1"
17:        Grid.ColumnSpan="3" />
18:    <Rectangle Fill="Blue"
19:        Margin="-1,0,1,0"
20:        Stroke="Black"
21:        Grid.RowSpan="3"
22:        Grid.Column="1" />
23:    <RichTextBlock x:Name="rtb1"
24:        Margin="0,0,5,3"
25:        OverflowContentTarget="{Binding ElementName=rtb2}"
26:
27:        >
28:        <Paragraph>
29:            Lorem ipsum dolor sit amet, consectetur adipiscing elit. Sed condimentum tincidunt
30:            vestibulum. Quisque accumsan nibh nisl. Aenean eget leo enim. Aenean tincidunt nulla nec elit vestibulum
31:            sit amet posuere arcu laoreet. Curabitur diam nisi, ullamcorper vel consectetur sed, volutpat nec orci.
32:            Aenean eu purus sit amet diam sollicitudin vulputate sed in sapien. Sed pulvinar viverra sapien, a
33:            elementum arcu fringilla sed. Proin tincidunt iaculis fringilla. Proin semper venenatis nisi vel
34:            hendrerit. Etiam elementum bibendum dignissim. Integer tincidunt pharetra est, ut porttitor urna dictum
35:            at. Nulla nisi velit, consequat accumsan tincidunt id, congue vitae lacus. Donec convallis est ligula.
36:            Suspendisse fermentum pharetra cursus. Maecenas a gravida nunc. In ante lacus, sollicitudin blandit
37:            adipiscing vel, mollis sed ipsum. Nullam a est nec tortor porttitor consectetur. Aliquam consequat
38:            pharetra rutrum. Pellentesque viverra dapibus scelerisque. Praesent ullamcorper, sapien vitae facilisis
39:            varius, nibh justo luctus odio, faucibus viverra risus metus non lacus. Sed porta, magna in tincidunt
40:            fringilla, elit elit sollicitudin sem, et ornare mi nulla hendrerit augue. Vestibulum vitae mollis dolor.
41:            Lorem ipsum dolor sit amet, consectetur adipiscing elit. Sed condimentum tincidunt
42:            vestibulum. Quisque accumsan nibh nisl. Aenean eget leo enim. Aenean tincidunt nulla nec elit vestibulum
43:            sit amet posuere arcu laoreet. Curabitur diam nisi, ullamcorper vel consectetur sed, volutpat nec orci.
44:            Aenean eu purus sit amet diam sollicitudin vulputate sed in sapien. Sed pulvinar viverra sapien, a
45:            elementum arcu fringilla sed. Proin tincidunt iaculis fringilla. Proin semper venenatis nisi vel
46:            hendrerit. Etiam elementum bibendum dignissim. Integer tincidunt pharetra est, ut porttitor urna dictum
47:            at. Nulla nisi velit, consequat accumsan tincidunt id, congue vitae lacus. Donec convallis est ligula.
48:            Suspendisse fermentum pharetra cursus. Maecenas a gravida nunc. In ante lacus, sollicitudin blandit
49:            adipiscing vel, mollis sed ipsum. Nullam a est nec tortor porttitor consectetur. Aliquam consequat
50:            pharetra rutrum. Pellentesque viverra dapibus scelerisque. Praesent ullamcorper, sapien vitae facilisis
51:            varius, nibh justo luctus odio, faucibus viverra risus metus non lacus. Sed porta, magna in tincidunt
52:            fringilla, elit elit sollicitudin sem, et ornare mi nulla hendrerit augue. Vestibulum vitae mollis dolor.
```

```

31:         Lorem ipsum dolor sit amet, consectetur adipiscing elit. Sed condimentum tincidunt
vestibulum. Quisque accumsan nibh nisl. Aenean eget leo enim. Aenean tincidunt nulla nec elit vestibulum
sit amet posuere arcu laoreet. Curabitur diam nisi, ullamcorper vel consectetur sed, volutpat nec orci.
Aenean eu purus sit amet diam sollicitudin vulputate sed in sapien. Sed pulvinar viverra sapien, a
elementum arcu fringilla sed. Proin tincidunt iaculis fringilla. Proin semper venenatis nisi vel
hendrerit. Etiam elementum bibendum dignissim. Integer tincidunt pharetra est, ut porttitor urna dictum
at. Nulla nisi velit, consequat accumsan tincidunt id, congue vitae lacus. Donec convallis est ligula.
Suspendisse fermentum pharetra cursus. Maecenas a gravida nunc. In ante lacus, sollicitudin blandit
adipiscing vel, mollis sed ipsum. Nullam a est nec tortor porttitor consectetur. Aliquam consequat
pharetra rutrum. Pellentesque viverra dapibus scelerisque. Praesent ullamcorper, sapien vitae facilisis
varius, nibh justo luctus odio, faucibus viverra risus metus non lacus. Sed porta, magna in tincidunt
fringilla, elit elit sollicitudin sem, et ornare mi nulla hendrerit augue. Vestibulum vitae mollis dolor.
32:         Lorem ipsum dolor sit amet, consectetur adipiscing elit. Sed condimentum tincidunt
vestibulum. Quisque accumsan nibh nisl. Aenean eget leo enim. Aenean tincidunt nulla nec elit vestibulum
sit amet posuere arcu laoreet. Curabitur diam nisi, ullamcorper vel consectetur sed, volutpat nec orci.
Aenean eu purus sit amet diam sollicitudin vulputate sed in sapien. Sed pulvinar viverra sapien, a
elementum arcu fringilla sed. Proin tincidunt iaculis fringilla. Proin semper venenatis nisi vel
hendrerit. Etiam elementum bibendum dignissim. Integer tincidunt pharetra est, ut porttitor urna dictum
at. Nulla nisi velit, consequat accumsan tincidunt id, congue vitae lacus. Donec convallis est ligula.
Suspendisse fermentum pharetra cursus. Maecenas a gravida nunc. In ante lacus, sollicitudin blandit
adipiscing vel, mollis sed ipsum. Nullam a est nec tortor porttitor consectetur. Aliquam consequat
pharetra rutrum. Pellentesque viverra dapibus scelerisque. Praesent ullamcorper, sapien vitae facilisis
varius, nibh justo luctus odio, faucibus viverra risus metus non lacus. Sed porta, magna in tincidunt
fringilla, elit elit sollicitudin sem, et ornare mi nulla hendrerit augue. Vestibulum vitae mollis dolor.
33:         Lorem ipsum dolor sit amet, consectetur adipiscing elit. Sed condimentum tincidunt
vestibulum. Quisque accumsan nibh nisl. Aenean eget leo enim. Aenean tincidunt nulla nec elit vestibulum
sit amet posuere arcu laoreet. Curabitur diam nisi, ullamcorper vel consectetur sed, volutpat nec orci.
Aenean eu purus sit amet diam sollicitudin vulputate sed in sapien. Sed pulvinar viverra sapien, a
elementum arcu fringilla sed. Proin tincidunt iaculis fringilla. Proin semper venenatis nisi vel
hendrerit. Etiam elementum bibendum dignissim. Integer tincidunt pharetra est, ut porttitor urna dictum
at. Nulla nisi velit, consequat accumsan tincidunt id, congue vitae lacus. Donec convallis est ligula.
Suspendisse fermentum pharetra cursus. Maecenas a gravida nunc. In ante lacus, sollicitudin blandit
adipiscing vel, mollis sed ipsum. Nullam a est nec tortor porttitor consectetur. Aliquam consequat
pharetra rutrum. Pellentesque viverra dapibus scelerisque. Praesent ullamcorper, sapien vitae facilisis
varius, nibh justo luctus odio, faucibus viverra risus metus non lacus. Sed porta, magna in tincidunt
fringilla, elit elit sollicitudin sem, et ornare mi nulla hendrerit augue. Vestibulum vitae mollis dolor.
34:
35:         </Paragraph>
36:     </RichTextBlock>
37:     <RichTextBlockOverflow x:Name="rtb2"
38:         Grid.Row="2"
39:         OverflowContentTarget="{Binding ElementName=rtb3}"
40:
41:     />
42:     <RichTextBlockOverflow x:Name="rtb3"
43:         Grid.Column="2"
44:         OverflowContentTarget="{Binding ElementName=rtb4}"
45:     />
46:
47:     <RichTextBlockOverflow x:Name="rtb4"
48:         Grid.Column="2"
49:         Grid.Row="2"
50:     />
51:
52:
53: </Grid>

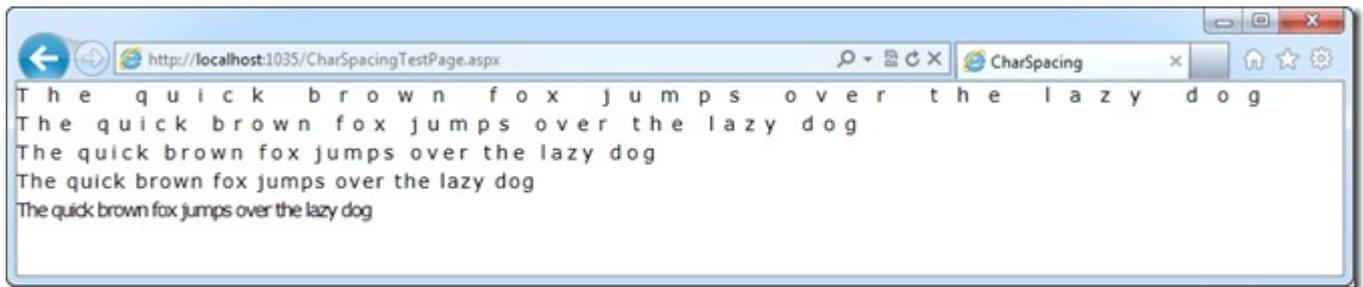
```

The key thing to remember here is that a `RichTextBlock` contains `OverflowContentTarget` which will allow you to bind to a special control called `RichTextBlockOverflow`.

NOTE: Post-beta, Microsoft changed this to use the non-editable RichTextBlock instead of RichTextBox. So a word of warning, many post-beta demos of this functionality on the web will no longer work. Good thing you are reading this guide, right? =>

Character Spacing

The TextBox and TextBlock controls provide a way to control the spacing of letters inside the text very easily. Let's go ahead and take a look at a screenshot of the various character spacing inside of a TextBlock.



Let's look at the code:

```
1: <Grid x:Name="LayoutRoot" >
2:     <StackPanel>
3:         <TextBlock CharacterSpacing="1000" FontSize="14"
4:             Text="The quick brown fox jumps over the lazy dog" />
5:         <TextBlock CharacterSpacing="500" FontSize="14"
6:             Text="The quick brown fox jumps over the lazy dog" />
7:         <TextBlock CharacterSpacing="250" FontSize="14"
8:             Text="The quick brown fox jumps over the lazy dog" />
9:         <TextBlock CharacterSpacing="100" FontSize="14"
10:            Text="The quick brown fox jumps over the lazy dog" />
11:        <TextBlock CharacterSpacing="-100" FontSize="14"
12:            Text="The quick brown fox jumps over the lazy dog" />
13:    </StackPanel>
14: </Grid>
```

As you can see, we just set the CharacterSpacing property of the TextBlock control. Please note that you may use a negative number to “squish” text together.

Open-Type Font

Silverlight 5 provides many new options for the [Typography](#) class inside of a TextBlock. They have so many improvements that the best way to see everything is to explore the class. Let's look at two new features:

1. ContextualAlternates - Gets or sets a value that determines whether custom glyph forms can be used based upon the context of the text being rendered.
2. StylisticSets - Gets or sets a value that indicates whether a stylistic set of a font form is enabled. (20 StylisticSets are available)

Let's look at a sample that uses ContextualAlternates and StylisticSets.

Michael Crump

The code looks like the following:

```
1: <TextBlock FontSize="80"  
2:     FontFamily="Gabriola"  
3:     Text="Michael Crump"  
4:     Typography.ContextualAlternates="True"  
5:     Typography.StylisticSet5="True" />
```

Pixel Snapped Text and TextOptions

Silverlight 5 provides many new options for the **TextOptions** property inside of a TextBlock.

1. TextFormattingMode – Gets the TextFormattingMode for the element
2. TextHintingMode – Gets or sets a value that indicates whether text rendering is optimized for readability or animation.
3. TextRenderingMode - Sets the TextRenderingMode for the element. 4 options are available: Aliased, Auto, ClearType and Grayscale.

Let's look at a sample that uses all of them together (Display, Fixed and Aliased). It may be hard to see in this demo, so try this one in your own application.

The quick brown fox jumps over the lazy dog

The code looks like the following:

```
1: <TextBlock FontSize="30" Text="The quick brown fox jumps over the lazy dog"  
2:     TextOptions.TextFormattingMode="Display"  
3:     TextOptions.TextHintingMode="Fixed"  
4:     TextOptions.TextRenderingMode="Aliased" />
```

Conclusion

At this point, we have seen how you would use Text Tracking and Leading, Linked and Multi-column Text, OpenType Support, Pixel Snapped Text and TextOptions in your Silverlight 5 Applications. We have also discussed a few other features in Silverlight 5. In the next chapter of the ebook, I am going to take a look at the new operating system integrations including: P/Invoke, Multiple Windows and Unrestricted File System Access in Full Trust.

Chapter 6: Operating System Integration Part 1

To recap what we learned in the previous chapter:

- We spend the entire “lap” discussing improvements in text in Silverlight 5.
- We discussed Linked and Multi-Column Text and where it might be useful in your next Silverlight application.
- We also looked at character spacing, open-type font, pixel snapped text and TextOptions.

In this chapter, I am going to discuss several new operating system integration features in Silverlight 5 including: P/Invoke, Multiple Windows and Unrestricted File System Access in Full Trust.

P/Invoke or Platform Invocation

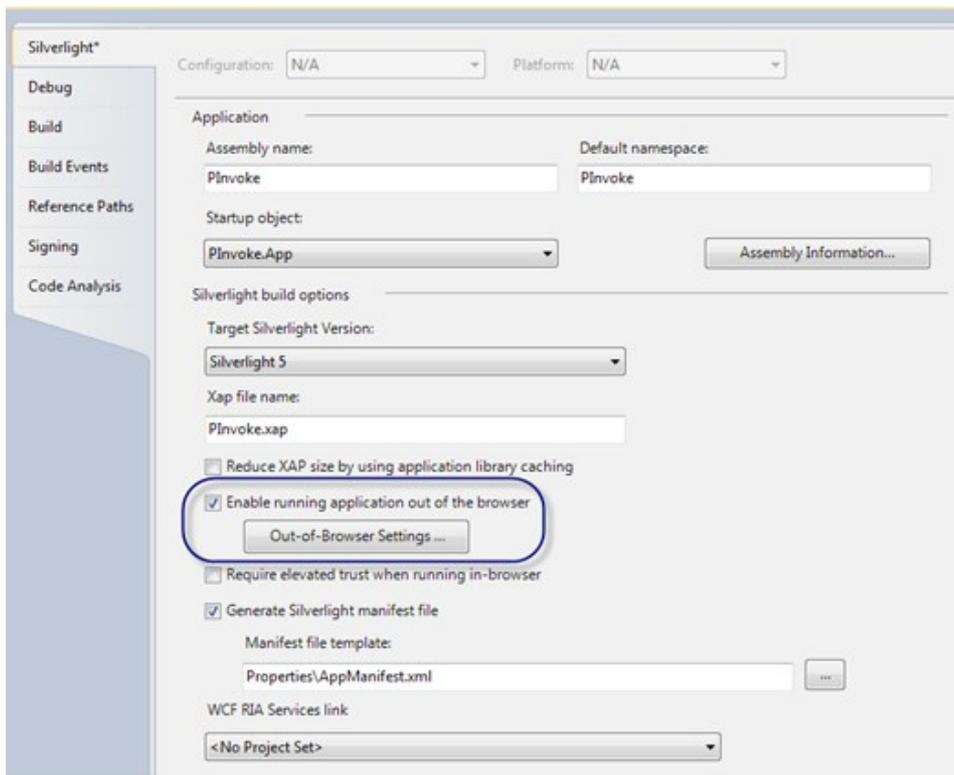
Before we dive into an example, let’s first answer the question: What is it? **Platform Invocation Services**, commonly referred to as **P/Invoke**, is a feature of [Common Language Infrastructure](#) implementations, like [Microsoft's Common Language Runtime](#), that enables [managed code](#) to call [native code](#).

*Reference to Wiki

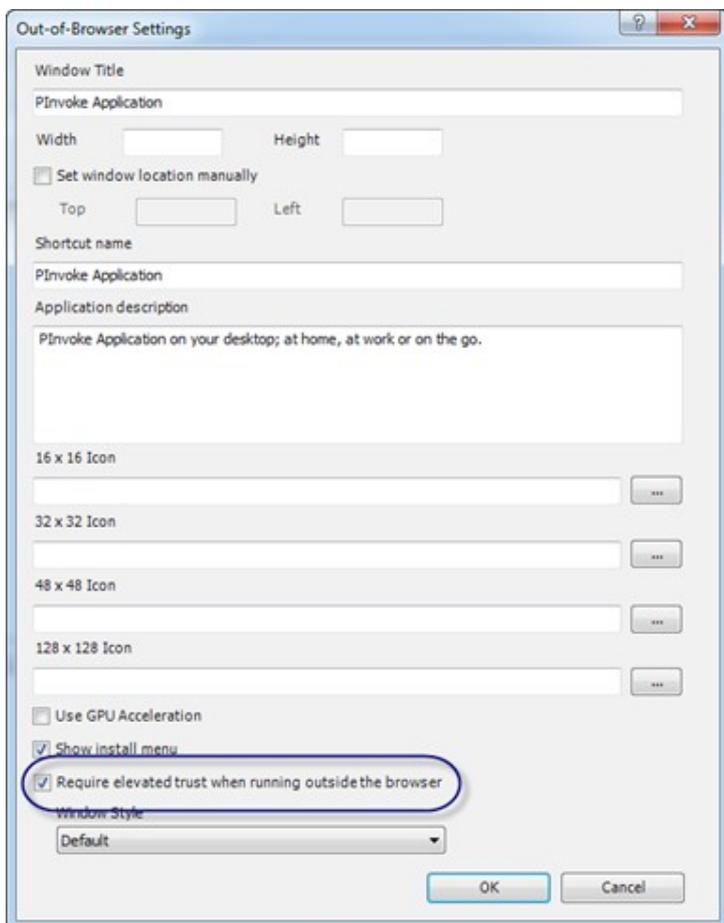
This feature is new to Silverlight 5 and we will take a look at how to use it in your own applications.

In order to create a new P/Invoke application in Silverlight 5, we will need to enable “**Require elevated trust**” in Silverlight 5. We can also use the functionality in-browser or out-of-browser. Let’s begin.

Fire up a new Silverlight 5 project and right click on our project and select Properties. Put a check in “**Enable running application out of the browser**” as shown below.



After you put a check in “Enable running application out of the browser”, go ahead and click the button. Now put a check in “**Require elevated trust when running outside the browser**”.



Switch back over to the MainPage.xaml and add in the following code:

```

1: <Grid x:Name="LayoutRoot" Background="White">
2:     <Button Height="23" HorizontalAlignment="Left" Margin="169,132,0,0" VerticalAlignment="Top"
Width="75" x:Name="btnclick" Content="click" Click="click_Click" />
3: </Grid>

```

This simply puts a button on our page that when the user clicks it the pc will make a beep sound.

Go ahead and add a new class to the project named **PlatformInvokeTest.cs** and add the following code.

```

1: using System;
2: using System.Runtime.InteropServices;
3:
4: namespace PInvoke
5: {
6:     public class PlatformInvokeTest
7:     {
8:         [DllImport("kernel32.dll")]
9:         public static extern bool Beep(int frequency, int duration);
10:
11:
12:         public static void PlaySound()
13:         {
14:             Random random = new Random();
15:             for (int i = 0; i < 50; i++)
16:             {
17:                 Beep(random.Next(10000), 100);
18:             }
19:         }
20:
21:     }
22: }

```

Let's switch back over to the MainPage.xaml.cs and add the following code to our button event handler:

```

1: private void click_Click(object sender, RoutedEventArgs e)
2: {
3:     PlatformInvokeTest.PlaySound();
4: }

```

If we run the application now, we will hear our PC beep many times. There are many other things you can do with P/Invoke such as Detecting if the user inserted a USB Key into their computer, opening the run dialog box and much much more! Very cool stuff!

Multiple Window Support

With Silverlight 5, we now have the ability to spawn multiple windows from an Out-of-Browser application with elevated trust with just a couple of lines of code.

A few things to note about Multiple Window Support though:

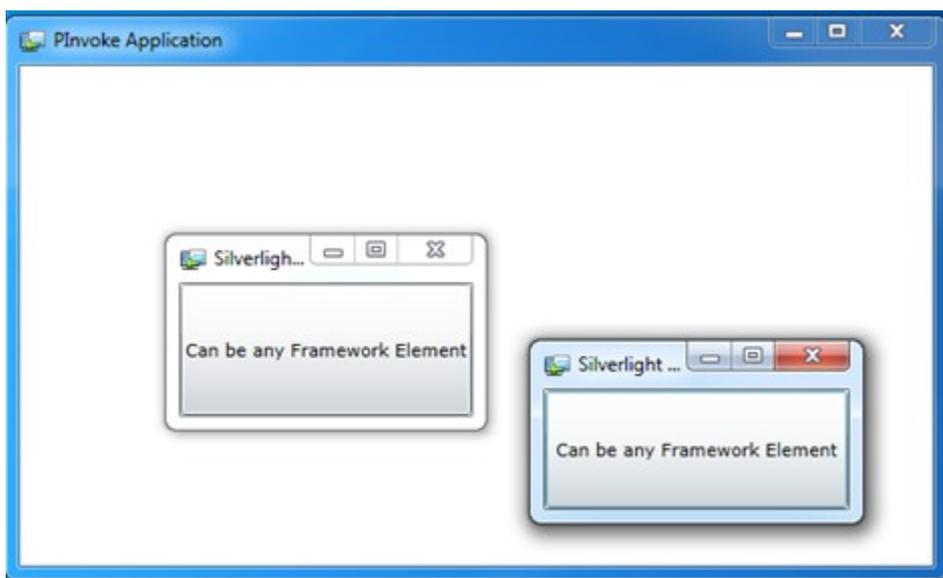
- If the main window closes, then all spawned windows close.
- You need to be running your application "Out-of-Browser" as well as in Elevated Trust mode.

If you followed the P/Invoke guide before then you will need to do the same thing for Multiple Window Support. That is, make this an out-of-browser application and add Elevated Trust.

After that is complete then go ahead and double click on your MainPage.xaml.cs file and add the following code:

```
1: public MainPage()  
2: {  
3:     InitializeComponent();  
4:     Loaded += new RoutedEventHandler(MainPage_Loaded);  
5: }  
6:  
7: void MainPage_Loaded(object sender, RoutedEventArgs e)  
8: {  
9:     for (int i = 0; i < 5; i++)  
10:    {  
11:        new Window()  
12:        {  
13:            Height = 400,  
14:            Width = 600,  
15:            Top = 24,  
16:            Left = 30,  
17:            Title = "Silverlight Show New Window",  
18:            Content = new Button() { Content = "Can be any Framework Element" },  
19:            Visibility = Visibility.Visible  
20:        };  
21:    }  
22:  
23: }
```

This application will spawn 5 windows when you run it. Below is a sample screenshot from the application with 2 additional windows showing. The other windows are closed for demonstration purposes.



Unrestricted File System Access in Full Trust

Have you ever wanted to write a file anywhere on a users computer in earlier versions of Silverlight but found out that you couldn't? Well in Silverlight 5 you can.

Just like the earlier samples make this an out-of-browser application and add Elevated Trust. (See the P/Invoke demo at the beginning of this article for a quick-how to.)

Switch over to the MainPage.xaml and add in the following code:

```
1: <Grid x:Name="LayoutRoot" Background="White">
2:     <Button Height="23" HorizontalAlignment="Left" Margin="169,132,0,0" VerticalAlignment="Top"
Width="75" x:Name="btnclick" Content="click" Click="click_Click" />
3: </Grid>
```

Let's switch back over to the MainPage.xaml.cs and add the following code to our button event handler:

```
1: private void click_Click(object sender, RoutedEventArgs e)
2: {
3:     // Create a Directory on the Root of C
4:     var tempDirectory = @"c:\michaelcrump";
5:     if (!Directory.Exists(tempDirectory))
6:     {
7:         Directory.CreateDirectory(tempDirectory);
8:     }
9:
10:    // Give it a FileName
11:    var filename = string.Format("slshowrocks.txt");
12:    var fullPath = System.IO.Path.Combine(tempDirectory, filename);
13:
14:    // Write Something in the File!
15:    using (FileStream fs = File.Create(fullPath))
16:    using (StreamWriter sr = new StreamWriter(fs, Encoding.UTF8))
17:    {
18:        sr.WriteLine("Hello World");
19:    }
20: }
```

This will create a directory on our C:\ called michaelcrump. Then it will create a file named "slshowrocks.txt" and give it some content. If you run the application and click on the button then you should have the new folder/file created on your root hard disk.

If Visual Studio 2010 is complaining of any missing namespaces then just make sure you add the following:

```
1: using System.IO;
2: using System.Text;
```

Very easy to accomplish and it is not limited to writing files. You can also read files from anywhere on the hard disk! In the next part of this series, we will look at letting the user specify the location of the saved file.

Conclusion

At this point, we have seen how you would use P/Invoke, Multiple Windows and Unrestricted File System Access in Full Trust in your Silverlight 5 Applications. We have also discussed a few other features in Silverlight 5. In the next chapter of the ebook, I am going to take a look at more new operating system features including: Default Filename for SaveFileDialog, 64-bit browser support and Power Awareness.

Chapter 7: Operating System Integration Part 2

To recap what we learned in the previous chapter:

- We spent some time building an application that uses P/Invoke or Platform Invocation to get familiar with Elevated Trust and Out of Browser applications. We also reviewed that P/Invoke allows managed code to call native code.
- We then took a look at how to create a Silverlight 5 application that uses multiple windows that are separate from the main Silverlight window. We discussed how that if you close one of the newly spawned windows then it only closes that instance.
- We wrapped up with creating an application that uses unrestricted file access to demonstrate creating a folder and placing a file inside of it with some content.

In this chapter, I am going to discuss a few more operating system integration features in Silverlight 5 including: Default Filename for SaveFileDialog, 64-bit browser support and Power Awareness for Media Applications.

Default Filename for SaveFileDialog

In previous version of Silverlight, you could not specify the default filename for the SaveFileDialog message. In Silverlight 5 you can very easily.

Fire up a new Silverlight 5 project and give it any name that you want. We are going to create a simple application that contains one button and when the user clicks it the SaveFileDialog will appear with a default filename.

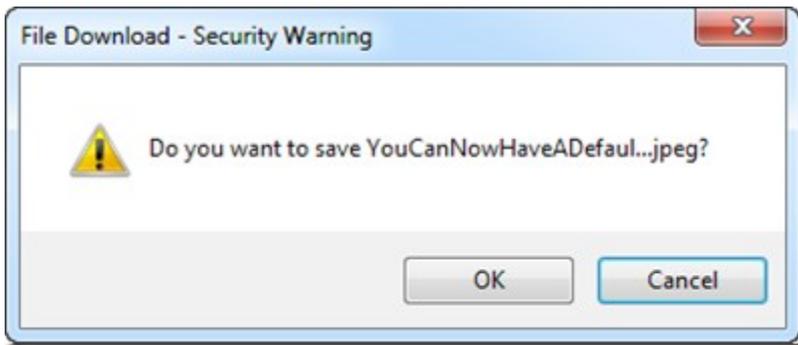
Switch over to the MainPage.xaml and add in the following code:

```
1: <StackPanel HorizontalAlignment="Center" VerticalAlignment="Center">
2:     <Button x:Name="btnSaveFile" Content="Save File Dialog" Click="btnSaveFile_Click"/>
3: </StackPanel>
```

Let's switch back over to the MainPage.xaml.cs and add the following code to our button event handler:

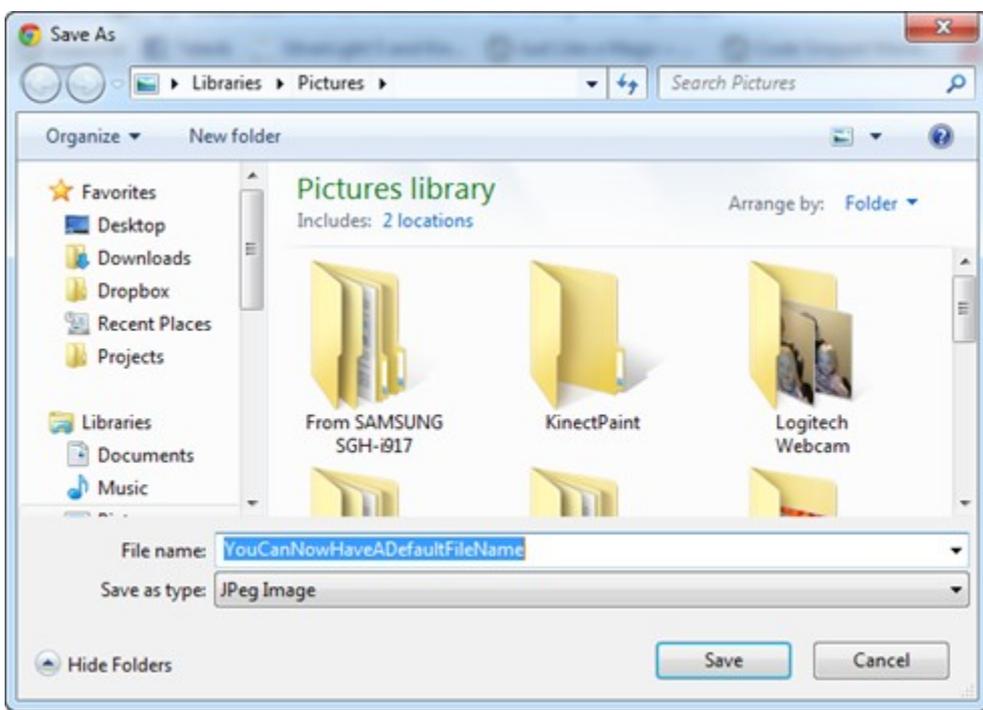
```
1: private void btnSaveFile_Click(object sender, RoutedEventArgs e)
2:     {
3:         var saveFileDialog1 = new SaveFileDialog
4:         {
5:             Filter = "Jpeg Image|*.jpg|Bitmap Image|*.bmp|Gif Image|
*.gif",
6:             DefaultFileName = "YouCanNowHaveADefaultFileName.jpeg"
7:         };
8:         saveFileDialog1.ShowDialog();
9:     }
```

If we run the application now, we will see the following prompt.



(Note: You could run this application in elevated trust to remove the security warning, see this [post](#) for details)

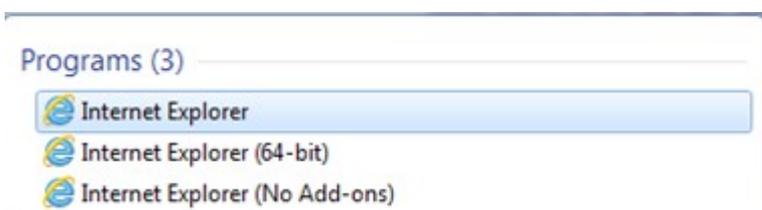
Go ahead and select OK and you will see the following screen:



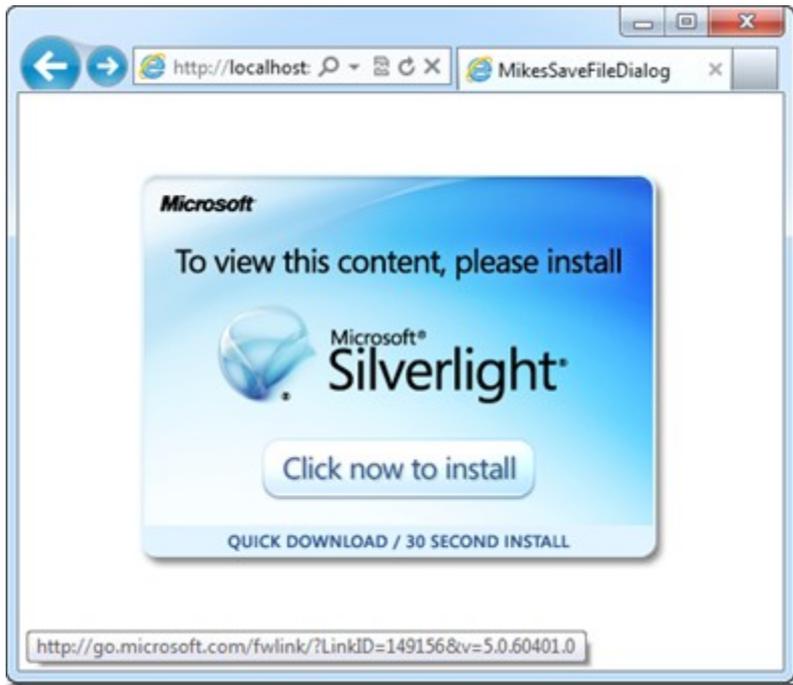
You should notice that the File name field is filled in for us with a default save as type as Jpeg. Of course, if you didn't want the user to see the security warning then you could run this application in elevated trust as mentioned under the image.

64-bit browser support

64-bit browser support is also new to Silverlight 5. If you have installed Windows 7 x64 then you already have a 64-bit version of Internet Explorer. You can find it by going to the “**search program and files**” prompt and typing **Internet Explorer** as shown below.



If you launch Internet Explorer x64 and visit a site built with Silverlight 5 then you will see the following message:

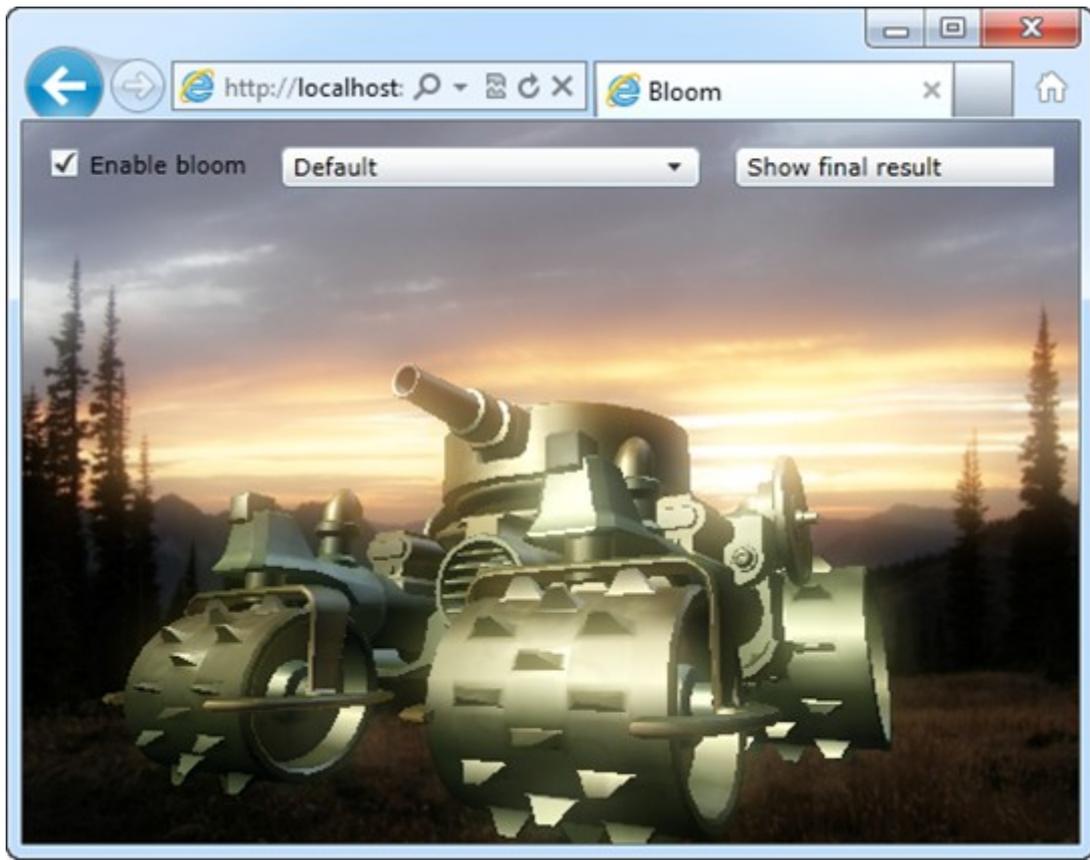


After you click on the hyperlink then it will take you to a page that says the following:

A screenshot of a Microsoft Silverlight message page. It features the Silverlight logo at the top left. The main text reads: 'The version you have requested was an early (beta) version of Silverlight - not the current one. If you arrived at this page by following a link from another Web site, please contact the site owner to let them know that they must upgrade to the latest release of Silverlight.' Below this is a section titled 'Let us know' with the text: 'if the site is not updated shortly so we can try to assist in upgrading the site to the latest Silverlight technology.' Underneath is a section titled 'Direct Download Links' with two links: 'Install for Windows' and 'Install for Macintosh', each preceded by a right-pointing arrow icon.

(Please note this message will change after the final version of Silverlight 5 is released.)

Don't worry about this prompt, just go ahead and click "**Install for Windows**" and you will now be able to run Silverlight 5 applications inside of a browser running in 64-bit mode. Pretty sweet stuff!



Power Awareness for Media Apps

Silverlight 5 comes with an improved power awareness feature. When you are watching a video in Silverlight 5, the screensaver will be disabled (for example, it will not kick in and distract you from your movie). It also allows the computer to sleep when the video is not playing. This is all accomplished with no additional code! You just have to be using Silverlight 5.

Conclusion

At this point, we have seen how you would use specify a default filename for SaveFileDialog, we looked at 64-bit browser support and power awareness for media applications. We have also discussed a few other features in Silverlight 5. In the next chapter of the ebook, I am going to take a look at a few productivity and performance features including: XAML Binding Debugging, Parser Performance Improvements and Multi-core JIT for improved start-up time.

Chapter 8: Productivity and Performance

To recap what we learned in the previous chapter:

- We learned how you could specify a default filename when using the SaveFileDialog prompt. We also discussed how you could run the application in elevated trust to prevent the security warning from being displayed.
- We then took a look at 64-bit browser support that is included with Silverlight 5 and learned that if your user is using a 64-bit browser then they will be redirected to a location to download the Silverlight 5 x64 runtime.
- We wrapped up a short section on new and improved power awareness for media applications.

In this chapter, I am going to discuss productivity and performance enhancements in Silverlight 5 including: XAML Binding Debugging, Parser Performance Improvements and Multi-core JIT for improved start-up time.

XAML Binding Debugging

XAML Binding Debugging is one of the most important features in the Silverlight 5. We have all been stuck with Binding expressions at one point or another and wanted an easier way to debug them. Now anywhere that you see a **{Binding}** expression you can put a break point on it just like your typical C# code. Let's take a look at a sample:

Fire up a new Silverlight 5 project and give it any name that you want.

Go ahead and add a new class to the project named **Podcast.cs** and add the following code.

```
1: public class Podcast
2:     {
3:         public string Description { get; set; }
4:         public DateTime ReleaseDate { get; set; }
5:         public Uri Link { get; set; }
6:
7:         public Podcast(string description, DateTime releasedate, Uri link)
8:         {
9:             Description = description;
10:            ReleaseDate = releasedate;
11:            Link = link;
12:        }
13:    }
```

Let's switch back over to the MainPage.xaml.cs and add the following code:

```
1: public MainPage()
2: {
3:     InitializeComponent();
4:     Loaded += new RoutedEventHandler(MainPage_Loaded);
```

```

5: }
6:
7: void MainPage_Loaded(object sender, RoutedEventArgs e)
8: {
9:     this.DataContext =
10:         new Podcast("This Developer's Life - Criticism",
11:             new DateTime(2011, 4, 21),
12:             new Uri("http://thisdeveloperslife.com/post/2-0-1-criticism", UriKind.Absolute)
13:         );
14:
15: }

```

Switch back over to the MainPage.xaml and add in the following code replacing the current Grid:

```

1: <Grid x:Name="LayoutRoot" Background="White">
2:     <StackPanel Orientation="Vertical">
3:         <TextBlock Text="{Binding Description}" />
4:         <TextBlock Name="txtReleaseDate" Text="{Binding ReleaseDate}" />
5:         <HyperlinkButton Content="Listen to this Episode" NavigateUri="{Binding Lik}"
TargetName="_blank" />
6:     </StackPanel>
7: </Grid>

```

While here, go ahead and put a break point on the “Hyperlink” button line, which you can do by clicking outside its margin as shown below:



Notice the Red Circle and the highlighted “**Binding**” word? The Visual Studio 2010 debugger will stop once the XAML parser hits that line.

Please note that if you try to put a breakpoint on any line outside of the “Binding” keyword, then you will get a message saying, “This is not a valid location for a breakpoint” at the bottom of your screen:

We are now ready to begin debugging, so, press “F5” on your keyboard to begin. You will notice that the Binding breakpoint was hit. If you examine your **Locals window** then you will see the following:

| Name | Value | Type |
|--|---|--|
| BindingState | {Error: System.Exception: System.Windows.Data Error: BindingExpression path error: 'Lik' property not found on object of type 'MikesDebuggingXaml.Podcast'. | object |
| Action | UpdatingTarget | System.Windows.Data.BindingAction |
| Binding | {System.Windows.Data.Binding} | System.Windows.Data.Binding |
| BindingExpression | {System.Windows.Data.BindingExpression} | System.Windows.Data.BindingExpression |
| Error | {Error: System.Exception: System.Windows.Data Error: BindingExpression path error: 'Lik' property not found on object of type 'MikesDebuggingXaml.Podcast'. | object |
| FinalSource | {MikesDebuggingXaml.Podcast} | object |
| LastCompletedStage | PathResolution | System.Windows.Data.BindingStage |
| [System.Windows.Data.Debugging.UpdateTargetPipeline] | {System.Windows.Data.Debugging.UpdateTargetPipeline} | System.Windows.Data.Debugging.UpdateTargetPipeline |

It looks like we have an error in our Binding statement that is telling us the property ‘**Lik**’ does not exist on the class called Podcast. If you continue running the application then you will quickly notice that the webpage launches but the “Listen to this Episode” hyperlink does not work.

If we take a quick look at our **Podcast** class then we will notice that the property is actually called **Link**. If we go back to our MainPage.xaml and change

```
1: <HyperlinkButton Content="Listen to this Episode" NavigateUri="{Binding Lik}" TargetName="_blank" />
```

to

```
1: <HyperlinkButton Content="Listen to this Episode" NavigateUri="{Binding Link}" TargetName="_blank" />
```

and run our application again it will work properly.

It is very easy to debug Binding expressions now with that feature. Another undocumented feature is that if you have Silverlight 5 installed then you can also debug your Silverlight 4 binding statements! Sweet!

Productivity and Performance Improvements

Silverlight 5 contains many additional performance improvements that you may not be aware of. I have decided to create a short list here:

- Reduced network latency by using a background thread for networking.
- Hardware acceleration is enabled in windowless mode with Internet Explorer 9.
- XAML parser improvements that speed up startup and runtime performance.
- Support for 64-bit operating systems as discussed in part 7 of this series.
- Multi-core JIT for improved startup time.
- Increased performance of hardware decoding and presentation of H.264 media for lower-power devices.
- Text layout performance improvements

As you can see the Silverlight Team has been hard at work not only adding additional features to Silverlight 5 but improving performance all around.

Conclusion

At this point, we have seen how you would debug binding statements using Silverlight 5’s built-in XAML debugger. We also looked at several productivity and performance improvements in Silverlight 5. In the next chapter of the ebook, I am going to take a look at several new controls/features shipping with Silverlight 5 including: Double and Triple click support, PivotViewer and ComboBox Type-Ahead.

Chapter 9: Controls

To recap what we learned in the previous chapter:

- We learned how you could specify a break point inside of a Binding Expressions in Silverlight 5. We also learned how you could use this same functionality inside of Silverlight 4 with the Silverlight 5 SDK installed.
- We then created a sample application that contained a binding error and took a look at the output window to investigate it further. We were then able to determine the source of our error and correct it quickly.
- We finished up with listing several productivity and performance improvements in Silverlight 5 that you may not be aware of.

In this chapter, I am going to discuss several new features/controls such as Double and Triple click support, PivotViewer and ComboBox Type-Ahead.

Double and Triple Click Support

One of the new features in Silverlight 5 is the ability to use Double and Triple Click Support. This functionality will tell you how many times the user has clicked the mouse button. The property is called **ClickCount** and resides in the **MouseButtonEventArgs** class. Let's take a look at how to use this new feature.

Fire up a new Silverlight 5 project and give it any name that you want.

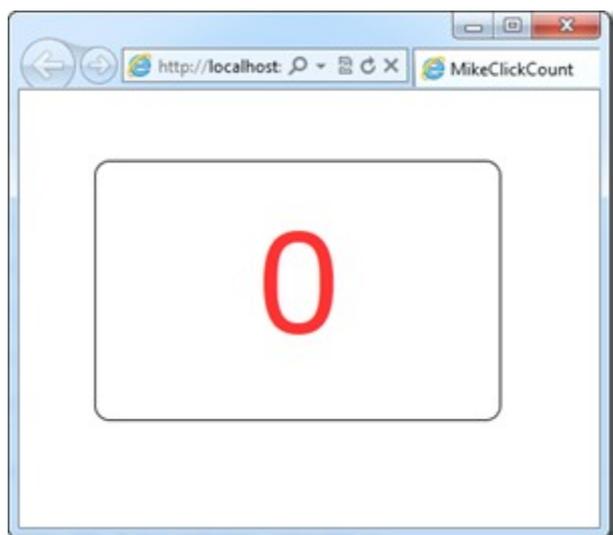
Switch over to the MainPage.xaml.cs and add the following code: *(Note: You may not need the MainPage() Method section)*

```
1: public MainPage()
2: {
3:     InitializeComponent();
4: }
5:
6: private void textBlock1_MouseLeftButtonDown(object sender, MouseButtonEventArgs e)
7: {
8:     textBlock1.Text = e.ClickCount.ToString();
9: }
```

Switch back over to the MainPage.xaml and add in the following code replacing the current Grid:

```
1: <Grid x:Name="LayoutRoot" Background="White">
2:     <Border BorderBrush="Black" BorderThickness="1" Margin="52,49,68,74" CornerRadius="10">
3:         <TextBlock Height="152" HorizontalAlignment="Center" x:Name="textBlock1" Text="0"
VerticalAlignment="Center" Width="244" MouseLeftButtonDown="textBlock1_MouseLeftButtonDown"
Foreground="#FFFF2E2E" FontSize="96" TextAlignment="Center" />
4:     </Border>
5: </Grid>
```

If we go ahead and run the application then we will see the following application.



Go ahead and begin clicking inside of the border and you will see the number increase. If you wait a few seconds and click again then you will notice that it reset itself. You could easily add `If..Then...` statements to determine what click count number they are on. This may be helpful for a 35 click Easter egg. :)

PivotViewer

Microsoft's Silverlight Team defines it as the following: The Silverlight PivotViewer makes it easier to interact with massive amounts of data on the web in ways that are powerful, informative and valuable. I couldn't agree more. Let's begin today by creating a SL5 application that uses the PivotViewer control and displays a collection of movies. (*Classic example, eh?*)

Please note that this sample barely scratches the surface of what you can do with the PivotViewer. I've included an official link by Microsoft at the bottom of this post for your reference.

Fire up a new Silverlight 5 project and give it the name **PivotViewer**.

Switch over to the `MainPage.xaml.cs` and add the following code:

```
1: using System;
2: using System.Linq;
3: using System.Windows;
4: using System.Windows.Controls;
5: using System.Collections.ObjectModel;
6:
7: namespace PivotViewer
8: {
9:     public partial class MainPage : UserControl
10:    {
11:        private ObservableCollection<Movie> Movies;
12:
13:        public MainPage ()
14:        {
15:            InitializeComponent();
16:            Movies = new ObservableCollection<Movie>();
17:            for (Int64 i = 0; i < 500; i++)
18:            {
```

```

19:             Movies.Add(new Movie() { Title = "Ice Age" + i.ToString(), CountryOfOrigin = "USA",
Description = "Set during the Ice Age.", Director = "Chris Wedge" + i.ToString(), Duration = 90,
ReleaseDate = new DateTime(2002, 09, 03) });
20:
21:         }
22:     }
23:
24:     private void UserControl_Loaded(object sender, RoutedEventArgs e)
25:     {
26:         MoviePivot.ItemsSource = Movies;
27:     }
28: }
29: }

```

We need to create a new class now named **Movie**. Inside of that class should look like the following:

```

1: using System;
2:
3: namespace PivotViewer
4: {
5:     public class Movie
6:     {
7:         public string Title { get; set; }
8:         public int Duration { get; set; }
9:         public DateTime ReleaseDate { get; set; }
10:        public string CountryOfOrigin { get; set; }
11:        public string Description { get; set; }
12:        public string Director { get; set; }
13:    }
14: }

```

Switch back over to the MainPage.xaml and add in the following code replacing everything:

```

1: <UserControl x:Class="PivotViewer.MainPage"
2:     xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation"
3:     xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml"
4:     xmlns:d="http://schemas.microsoft.com/expression/blend/2008"
5:     xmlns:mc="http://schemas.openxmlformats.org/markup-compatibility/2006"
6:     xmlns:pivot="clr-namespace:System.Windows.Controls.Pivot;assembly=System.Windows.Controls.Pivot"
7:     Loaded="UserControl_Loaded"
8:     mc:Ignorable="d"
9:     d:DesignHeight="300" d:DesignWidth="400">
10:
11:     <Grid x:Name="LayoutRoot" Background="White">
12:         <pivot:PivotViewer x:Name="MoviePivot"
13:             AccentColor="LightGreen"
14:             Background="LightGray"
15:             ControlBackground="LightYellow"
16:             SecondaryBackground="AntiqueWhite"
17:             SecondaryForeground="Bisque"
18:             SecondaryItemValueBackgroundColor="Chocolate" >
19:
20:             <!--Setting PivotProperties-->
21:             <pivot:PivotViewer.PivotProperties>
22:                 <pivot:PivotViewerStringProperty Id="FTitle" Options="CanFilter" DisplayName="Title"
Binding="{Binding Title}" />
23:                 <pivot:PivotViewerStringProperty Id="FDuration" Options="CanFilter"
DisplayName="Duration" Binding="{Binding Duration}" />

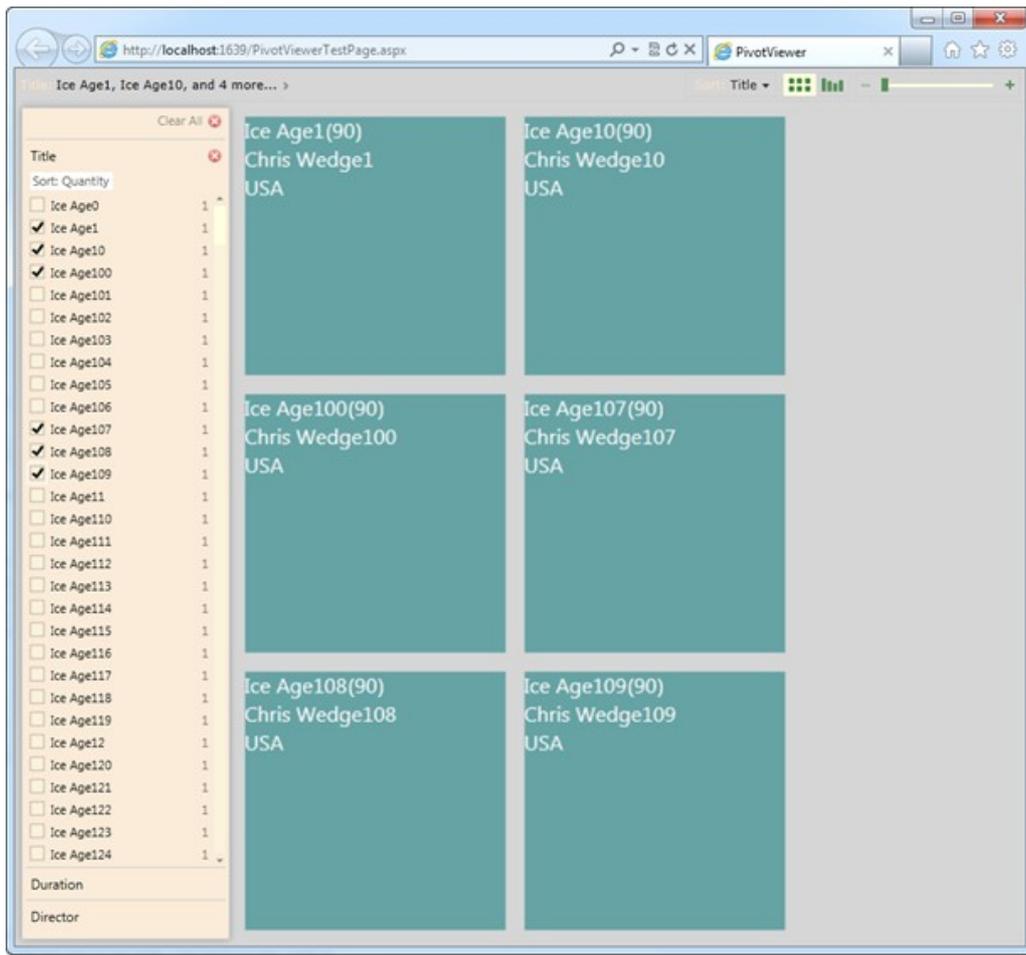
```

```

24:         <pivot:PivotViewerStringProperty Id="FDirector" Options="CanFilter"
DisplayName="Director" Binding="{Binding Director}" />
25:
26:     </pivot:PivotViewer.PivotProperties>
27:
28:     <!--Setting data-->
29:     <pivot:PivotViewer.ItemTemplates>
30:         <pivot:PivotViewerItemTemplate>
31:             <Border Width="200" Height="200" Background="CadetBlue">
32:                 <StackPanel Orientation="Vertical">
33:
34:                     <StackPanel Orientation="Horizontal">
35:                         <TextBlock Text="{Binding Title}" FontSize="16" Foreground="White" /
>
36:                         <TextBlock Text="(" FontSize="16" Foreground="White" />
37:                         <TextBlock Text="{Binding Duration}" FontSize="16"
Foreground="White" />
38:                         <TextBlock Text=")" FontSize="16" Foreground="White" />
39:                     </StackPanel>
40:                     <TextBlock Text="{Binding Director}" FontSize="16" Foreground="White" />
41:                     <TextBlock Text="{Binding CountryOfOrigin}" FontSize="16"
Foreground="White" />
42:                 </StackPanel>
43:             </Border>
44:         </pivot:PivotViewerItemTemplate>
45:     </pivot:PivotViewer.ItemTemplates>
46: </pivot:PivotViewer>
47: </Grid>
48: </UserControl>

```

If we run our application and select a few items then we will see the following screen. As you can tell when the application loaded that it contained 500 items – Wow!



I've barely touched on the amount of things that you can do with PivotViewer. If you want to learn more than please visit the Silverlight site located [here](#).

Combo-Box Type Ahead

Another new feature in Silverlight 5 is Combo-Box Type Ahead. This makes choosing items from a long list very simple. Let's go ahead and build a sample application.

Fire up a new Silverlight 5 project and give it any name that you want.

Switch over to the MainPage.xaml.cs and add the following code:

```

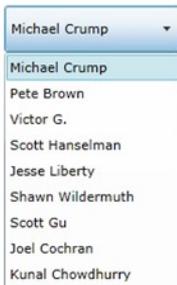
1: public MainPage()
2: {
3:     InitializeComponent();
4:     var lstDevelopers = new List<string>
5:     { "Michael Crump",
6:       "Pete Brown",
7:       "Victor G.",
8:       "Scott Hanselman",
9:       "Jesse Liberty",
10:      "Shawn Wildermuth",
11:      "Scott Gu",
12:      "Joel Cochran",
13:      "Kunal Chowdhury" };
14:     cbDevelopers.ItemsSource = lstDevelopers;
15: }

```

Switch back over to the MainPage.xaml and add in the following code replacing the existing Grid:

```
1: <Grid x:Name="LayoutRoot" Background="White">
2:     <ComboBox x:Name="cbDevelopers" Height="40" Width="150" Margin="20" />
3: </Grid>
```

If we run our application and begin typing then we will see the ComboBox automatically highlights the row that matches our selection.



Conclusion

At this point, we have seen how you would use Double and Triple click support, PivotViewer and ComboBox Type-Ahead. In the next and final chapter of the ebook, I am going to take a look at several new features shipping with Silverlight 5 including: In-Browser HTML, PostScript and Tasks for TPL.

Chapter 10: Other items

To recap what we learned in the previous chapter:

- We took a look at several new controls in Silverlight 5 including: Double and Triple click support and ComboBox Type-Ahead.
- We then took a deeper dive into the PivotViewer control as it is more complex than the others and provided additional links.

In this chapter, I am going to discuss several new features that did not fit in any of the above categories. We will discuss In-Browser HTML, PostScript and Tasks for TPL.

In-Browser HTML

In Silverlight 4, we could use the WebBrowser control only in an “Out-of-Browser” application. This has changed in Silverlight 5 as we can now use the WebBrowser control in the browser (IE). It will however require that you make a few changes to your system. Let’s get started:

1) **Update the registry** – Locate the following keys:

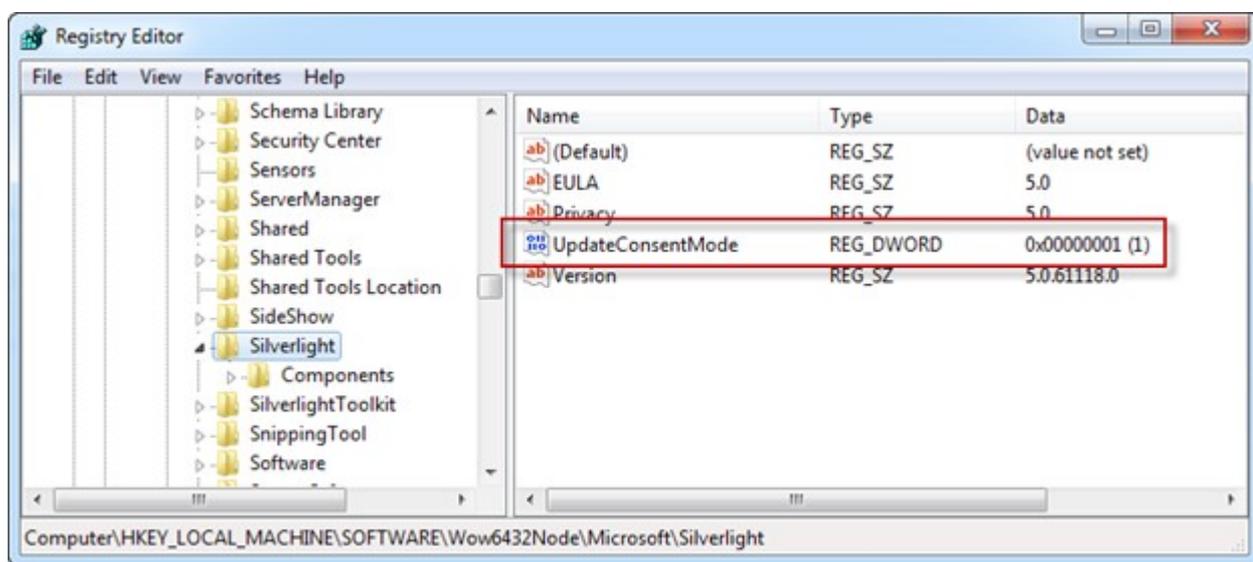
If you running on a 32 bit machine,

HKEY_LOCAL_MACHINE\Software\Microsoft\Silverlight

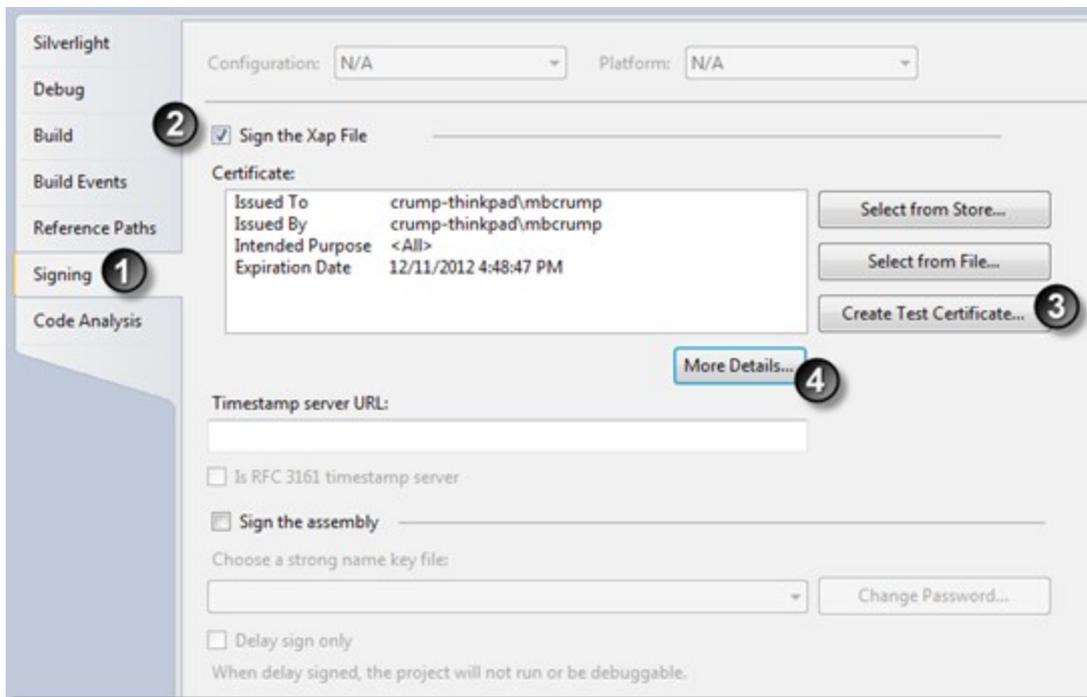
and if you are running on a 64-bit machine,

HKEY_LOCAL_MACHINE\Software\Wow6432Node\Microsoft\Silverlight

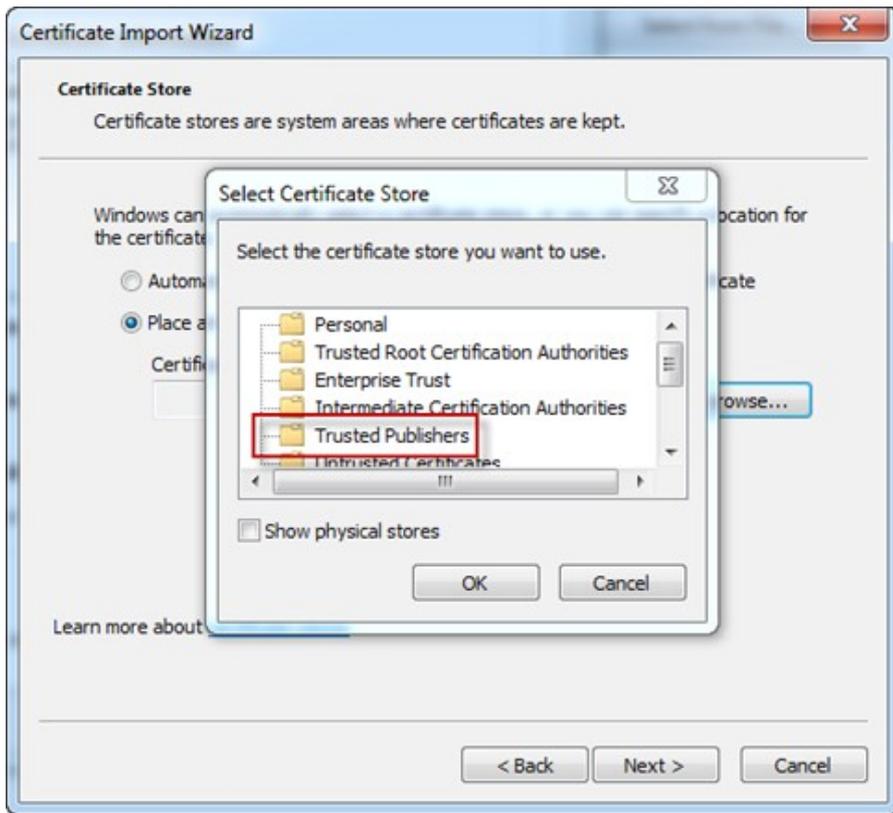
change the **UpdateConsentMode** from a 0 to 1.



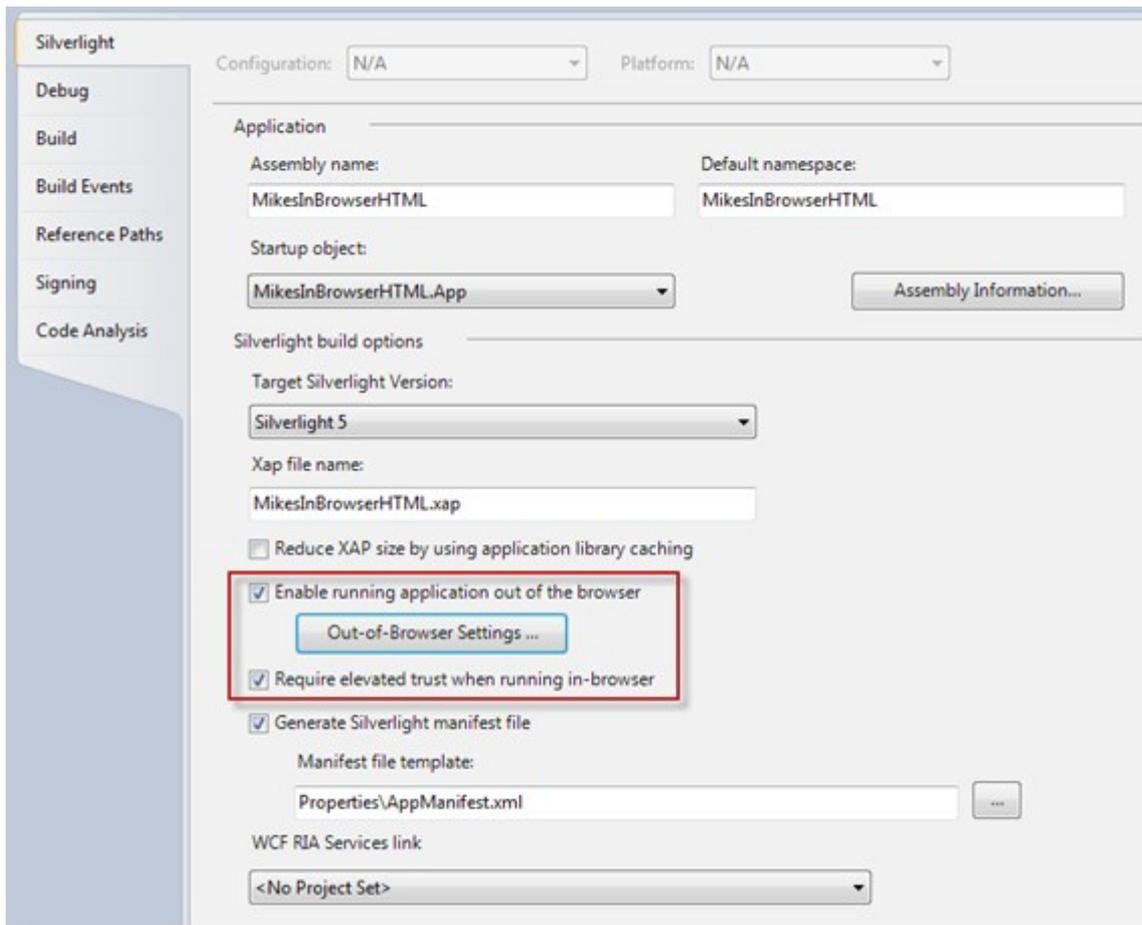
2) **Sign the XAP File** - Right click on the Silverlight application and go to properties. Choose **Signing** and check the checkbox **Sign the .XAP file**. Now click on the button **Create Test Certificate**. Enter any password that you want and hit the OK button. Now click on the **More Details** button.



Click on the **Install Certificate** button. Clicking on the button brings up the **Certificate Import wizard**. Click on the **Next** button and choose Place all certificates in the following store. Click on the **Browse** button. This will show you a Certificate Store. Choose **Trusted Publisher** and finish the wizard. Now repeat the same step to install this certificate in **Trusted Root Certification Authorities**.



3) **Enable Out-of-Browser and Require elevated trust when running in-browser.** Right click on the Silverlight application and go to properties. Place a checkmark in **Enable Out-of-Browser** and **Require elevated trust when running in-browser.**

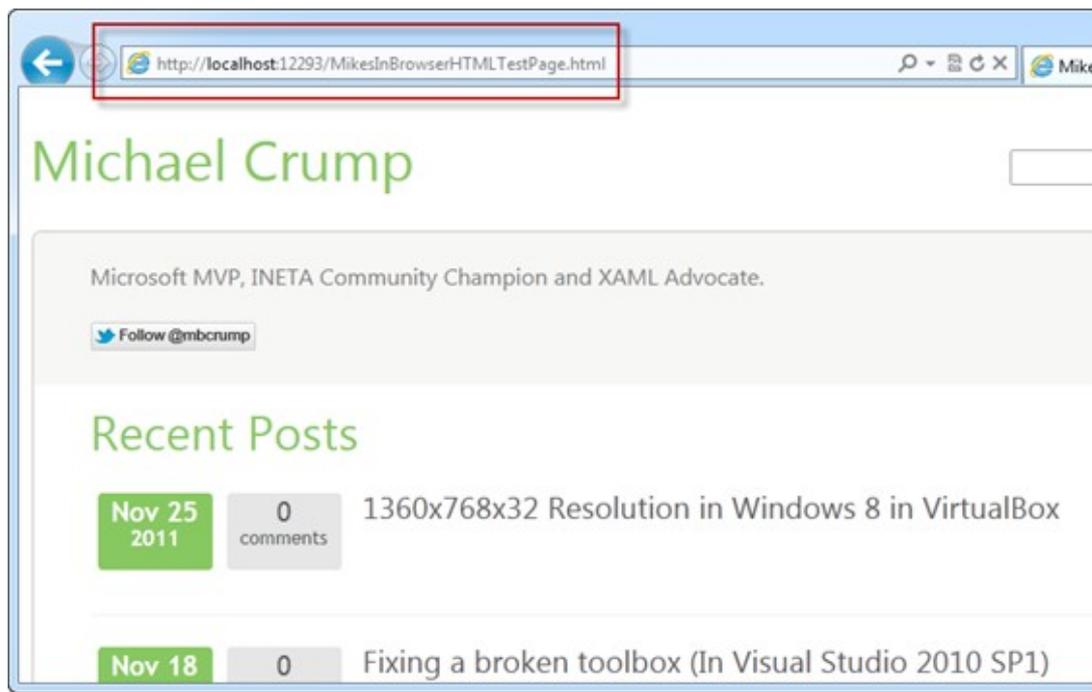


Now let's switch over to the MainPage.xaml and replace the Grid with the following code:

```
1: <Grid x:Name="LayoutRoot" Background="White">
2:     <WebBrowser x:Name="webBrowser" Source="http://michaelcrump.net/" />
3: </Grid>
```

If we run our application now (using Internet Explorer), then we will see the WebBrowser control working inside of the browser.

Note: This will not work in Chrome, Safari, others (Only Internet Explorer).



You can also add html pages to your project and point the source to that file as well.

PostScript Vector Printing

In Silverlight 4, we had bitmap-based printing. This meant that every time a page was going to print that Silverlight 4 sent the bitmap representing the entire page to the printer. We quickly found out that this resulted in horrible performance for larger print jobs. Now in Silverlight 5 we have PostScript Vector printing. This provides us with a much faster solution. Let's get started building a sample application that uses this features.

Let's switch over to the MainPage.xaml and replace the Grid with the following code:

```
1: <StackPanel x:Name="LayoutRoot" Background="White" HorizontalAlignment="Center"
VerticalAlignment="Center">
2:     <Button x:Name="basicVector" Click="basicVector_Click" />
3:     <Button x:Name="forceVector" Click="forceVector_Click" />
4: </StackPanel>
```

We can navigate over to our MainPage.xaml.cs file and add in the following code snippet for our button event handlers:

```
1: private void basicVector_Click(object sender, RoutedEventArgs e)
2: {
3:     PrintDocument document = new PrintDocument();
4:
5:     document.PrintPage += (s, ea) =>
6:     {
7:         StackPanel stPanel = new StackPanel();
8:
9:         for (int i = 0; i < 10; i++)
10:        {
11:            TextBlock tb = new TextBlock();
12:            tb.Text = "Basic Vector mode.";
```

```

13:
14:         stPanel.Children.Add(tb);
15:     }
16:
17:     ea.PageVisual = stPanel;
18:     ea.HasMorePages = true;
19: };
20:
21: document.Print("Basic Vector Demo");
22:
23: }
24:
25: private void forceVector_Click(object sender, RoutedEventArgs e)
26: {
27:     PrintDocument document = new PrintDocument();
28:
29:     document.PrintPage += (s, ea) =>
30:     {
31:         StackPanel stPanel = new StackPanel();
32:
33:         for (int i = 0; i < 10; i++)
34:         {
35:             TextBlock tb = new TextBlock();
36:             tb.Text = "Forced Vector mode.";
37:
38:             stPanel.Children.Add(tb);
39:         }
40:
41:         ea.PageVisual = stPanel;
42:         ea.HasMorePages = true;
43:     };
44:
45:     PrinterFallbackSettings settings = new PrinterFallbackSettings();
46:     settings.ForceVector = true;
47:     settings.OpacityThreshold = 0.7;
48:
49:     document.Print("Forced Vector Print", settings);
50: }

```

In our first button, we have a basic PostScript Vector Printing job. We create a **PrintDocument** (which was also in SL4), then add a **PrintPage** with some basic text to it. We finally print the document using Vector printing with **document.Print**.

In our second button, we do the same thing but we call **PrinterFallbackSettings** and force the print job to print in Vector mode. We can also set the Opacity value by calling **OpacityThreshold**.

Tasks Parallel Library (TPL)

In short, TPL is to simply asynchronous methods. Silverlight 5 does not include the full TPL but it does provide Tasks and its related factories. Which is exactly what you want! Let's get started.

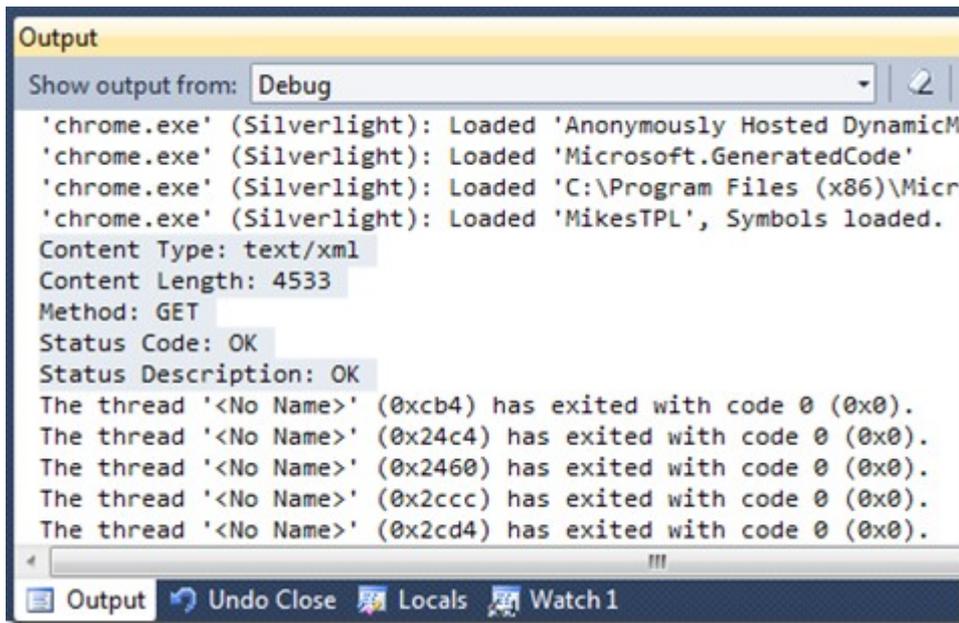
We are going to use a sample XML file provided by Microsoft found [here](#). Go ahead and download it and add it to your Web Project with the name of books.xml.

Next, let's go ahead and navigate over to our MainPage.xaml.cs file and add in the proper namespaces to use TPL. Next, we will add in the second code snippet:

```
1: using System;
2: using System.Linq;
3: using System.Net;
4: using System.Threading.Tasks;
5: using System.Windows;
6: using System.Windows.Controls;
7: using System.Diagnostics;
1: public MainPage()
2: {
3:     InitializeComponent();
4:     Loaded += new RoutedEventHandler(MainPage_Loaded);
5: }
6:
7: void MainPage_Loaded(object sender, RoutedEventArgs e)
8: {
9:     string uri = "http://localhost:15863/books.xml";
10:
11:     var request = HttpWebRequest.Create(uri);
12:
13:     Task.Factory.FromAsync<WebResponse>(
14:         request.BeginGetResponse, request.EndGetResponse, null)
15:         .ContinueWith(
16:             task =>
17:             {
18:                 var response = (HttpWebResponse)task.Result;
19:                 Debug.WriteLine("Content Type: " + response.ContentType);
20:                 Debug.WriteLine("Content Length: " + response.ContentLength);
21:                 Debug.WriteLine("Method: " + response.Method);
22:                 Debug.WriteLine("Status Code: " + response.StatusCode);
23:                 Debug.WriteLine("Status Description: " + response.StatusDescription);
24:             });
25: }
```

Note: You will need to change the localhost port in the above code sample before proceeding.

Go ahead and run the application and then look at your Output window in VS2010. You should see the following information.



```
Output
Show output from: Debug
'chrome.exe' (Silverlight): Loaded 'Anonymously Hosted DynamicM
'chrome.exe' (Silverlight): Loaded 'Microsoft.GeneratedCode'
'chrome.exe' (Silverlight): Loaded 'C:\Program Files (x86)\Micr
'chrome.exe' (Silverlight): Loaded 'MikesTPL', Symbols loaded.
Content Type: text/xml
Content Length: 4533
Method: GET
Status Code: OK
Status Description: OK
The thread '<No Name>' (0xcb4) has exited with code 0 (0x0).
The thread '<No Name>' (0x24c4) has exited with code 0 (0x0).
The thread '<No Name>' (0x2460) has exited with code 0 (0x0).
The thread '<No Name>' (0x2ccc) has exited with code 0 (0x0).
The thread '<No Name>' (0x2cd4) has exited with code 0 (0x0).
```

The thing to note here is `Task.Factory.FromAsync`. This creates a `Task` that represents a pair of begin and end methods that conform to the Asynchronous Programming Model Pattern.

Conclusion

At this point, we have taken a dive into all of the new features of Silverlight 5. Now that you are equipped with a solid understanding of what Silverlight 5 has to offer, you can begin to use this in your own applications. I want to thank you for reading this ebook and if you ever have any questions feel free to contact me on the various sources listed below. I also wanted to thank

SilverlightShow.Net and Telerik for giving me the opportunity to share this information with everyone.

About the Author

Michael Crump is a Microsoft MVP, INETA Community Champion, and an author of several .NET books. He has been seen speaking at a variety of conferences including: CodeStock, DevLink, and TechDays. Michael has also written dozens of articles on .NET development including CodeProject, SilverlightShow, DZone, Developer Fusion and CodeZone. He currently works at [Telerik](http://www.telerik.com) (www.telerik.com) as a XAML Evangelist spreading all the wonderful news of XAML. You can follow Michael on [Twitter](#) at mbc Crump or keep up with his blog by visiting michaelcrump.net.



Publications

[Producing and Consuming OData in a Silverlight and WP7 App](#)

July 1, 2011

Authors: [Michael Crump](#), [Silverlight MVP](#), [MCPD](#)

Product Description

The Open Data Protocol (OData) is an open web protocol for querying and updating data. It allows for the consumer to query the datasource (usually over HTTP) and retrieve the results in Atom, JSON or plain XML format, including pagination, ordering or filtering of the data.

In this ebook, Silverlight MVP Michael Crump is going to show you how to produce an OData Data Source and consume it using Silverlight 4 and Windows Phone 7. Read the ebook to have a deep understanding of OData and how you may use it in your own applications. Downloadable source code available for each chapter.

This ebook is based on SilverlightShow.net 4-part article series 'Producing and Consuming OData in a Silverlight and Windows Phone 7 application' (<http://www.silverlightshow.net/items/Producing-and-Consuming-OData-in-a-Silverlight-and-Windows-Phone-7-application.aspx>).