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Windows Phone

Creating Windows Phone Projects

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Session 1.0

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Course Schedule

- Session 1 – Tuesday, August 23, 2011
  - **Building Windows Phone Apps with Visual Studio 2010**
  - Silverlight on Windows Phone—Introduction
  - Silverlight on Windows Phone—Advanced
  - Using Expression to Build Windows Phone Interfaces
  - Windows Phone Fast Application Switching
  - Windows Phone Multi-tasking & Background Tasks
  - Using Windows Phone Resources (Bing Maps, Camera, etc.)
- Session 2 – Wednesday, August 24, 2011
  - Application Data Storage on Windows Phone
  - Using Networks with Windows Phone
  - Tiles & Notifications on Windows Phone
  - XNA for Windows Phone
  - Selling a Windows Phone Application

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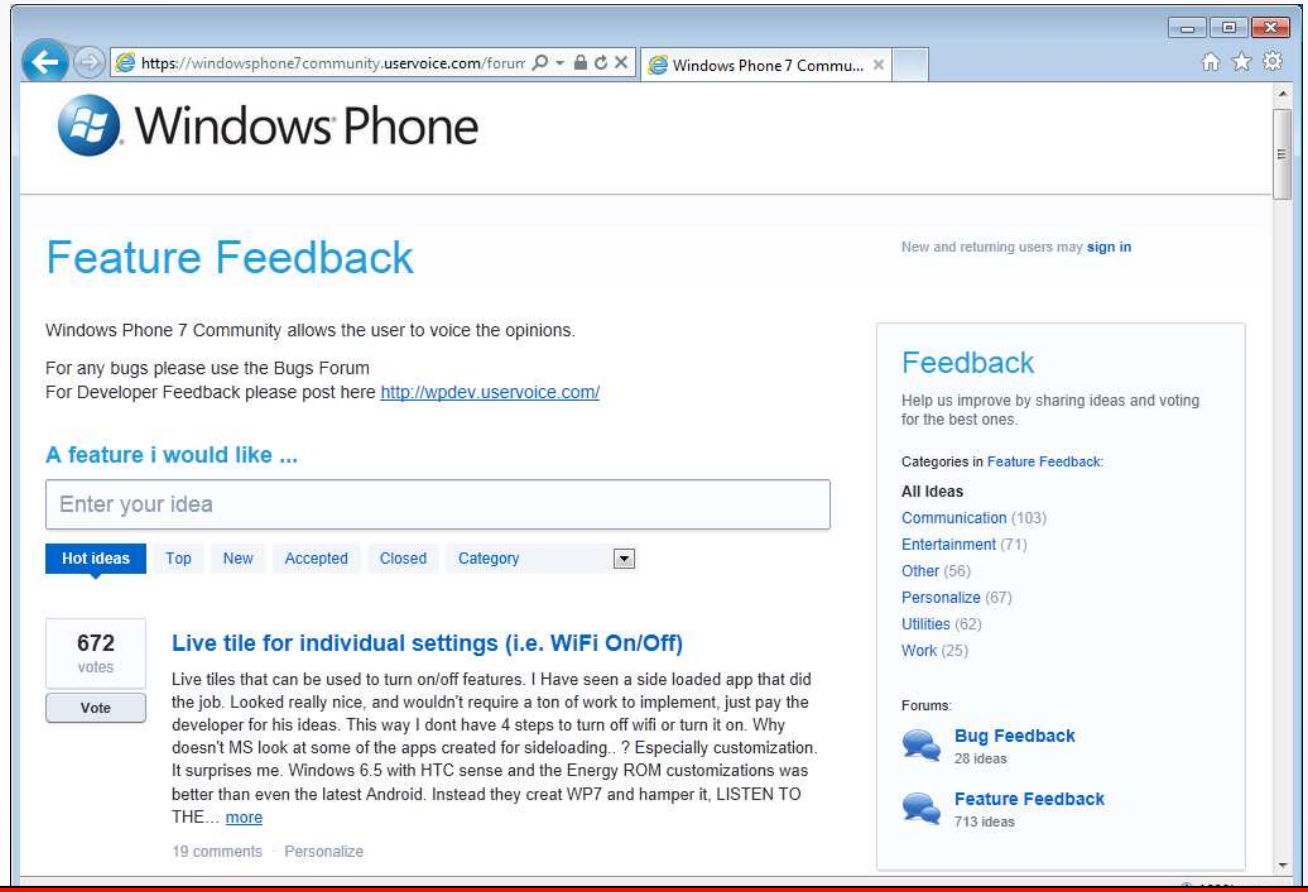

https://windowsphone7community.uservoice.com

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Visual Studio 2010

- Visual Studio is an "Integrated Development Environment" for creating programs
  - Edit program source
  - Add and manage program resources
  - Build, deploy and debug an application
- The tool is used in the same way for all platforms and languages
- It can be customised by plug-ins for the different target platforms

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Windows Phone on Visual Studio

- When creating Windows Phone applications you use Visual Studio to:
  - Create the Windows Phone Solution
  - Edit program source files
  - Add and manage program resources
  - Build and run the solution
  - Debug the solution on emulator or device
  - Mange the solution properties for deployment in the marketplace

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Visual Studio Projects and Solutions

- A .NET Program is made up of *assemblies*
  - An assembly is a library file (.dll) or an executable file (.exe) which contains compiled code and resources (e.g. images and sounds) along with a manifest
  - The .exe file also contains an entry point (Main)
- A single Visual Studio Project describes the content of a single assembly
- A Visual Studio solution is made up of a number of projects, at least one of which has an entry point where a program can start running

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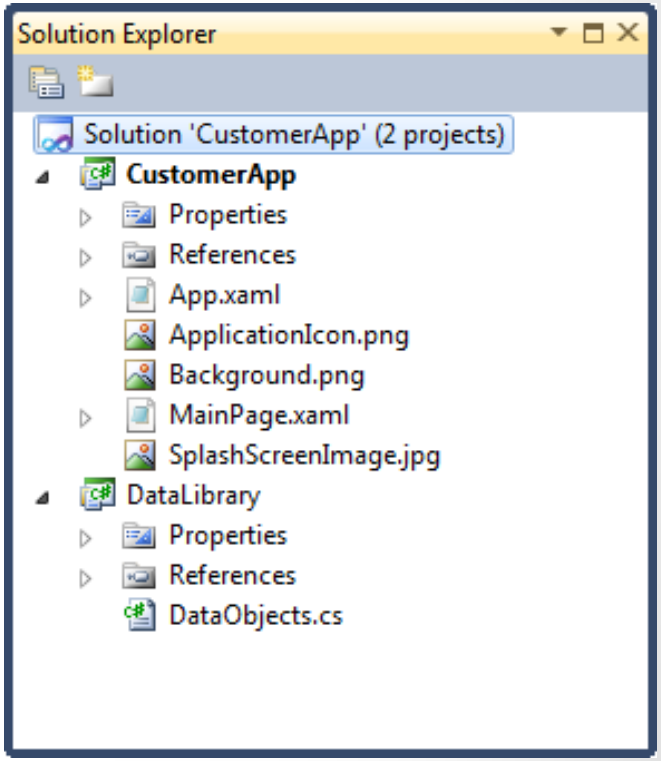
Solutions

- A Solution contains a number of projects
  - It is an XML file that contains references to the project files that make up the solution
- Each project contains resources and code
  - A single project can be shared amongst multiple solutions if you like
  - Alternatively you can just use a library assembly in your solution



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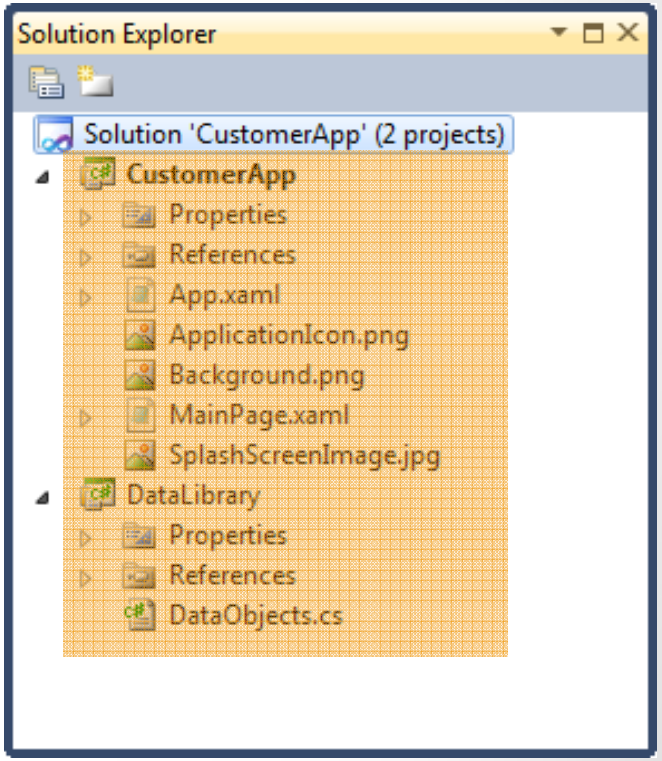
Projects in Solutions

- The solution "CustomerApp" contains two projects
- `CustomerApp` is the application
- `DataLibrary` is the code library that is used in the solution
  - The DataLibrary project can be part of other solutions
  - Or we could use the assembly library that it produces



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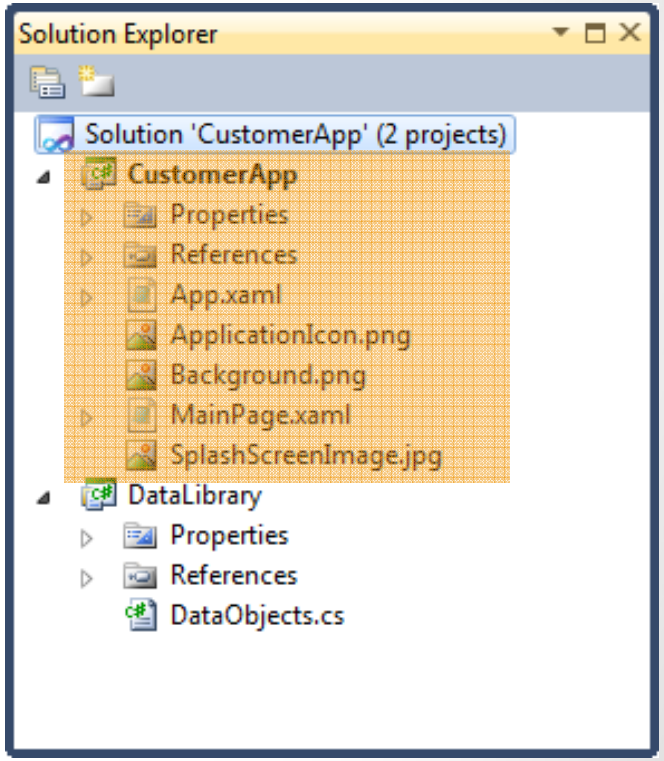
Executable Projects

- The project "CustomerApp" compiles to produce an executable assembly
  - One of the classes in the assembly contains a Main method which will be the starting point for the application
- A solution can contain multiple executable projects
  - You can choose which is started when the program runs



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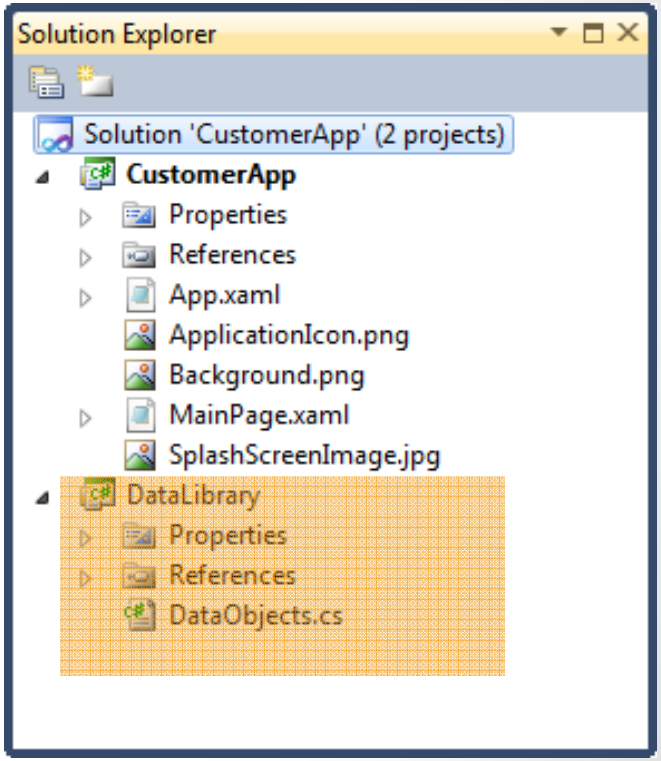
Library Projects

- The project "DataLibrary" compiles to produce a library assembly
  - None of the classes in the project contain a Main method
- This arrangement would allow us to work on the content of DataLibrary within Visual Studio
- We could instead add a reference to the DataLibrary dll if we just wanted to use the resources in a library



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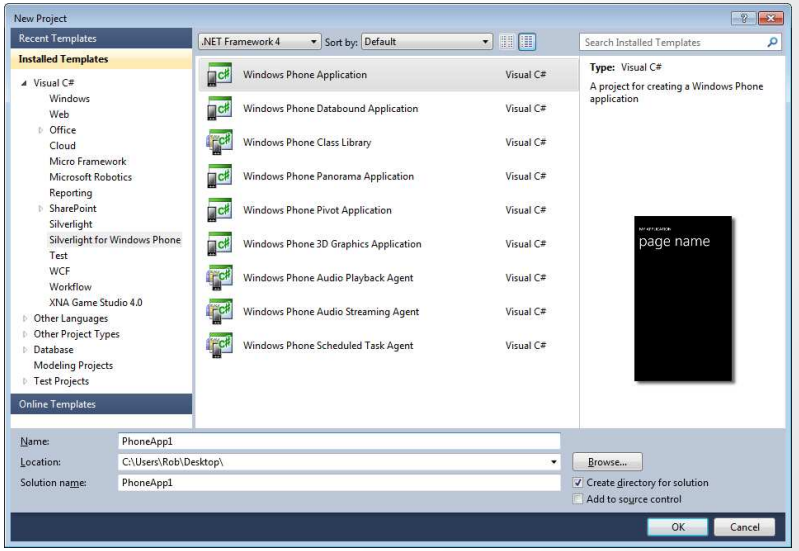
Templates

- New Projects and Solutions are created from templates installed into Visual Studio 2010
- Additional templates can be installed so that the tool can be used to target different platforms



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Making a Silverlight Application

- To create a Windows Phone Silverlight application we use the appropriate template
- This creates the initial page for our application and configures Visual Studio to target the Windows Phone platform
- If we want to create additional pages and add resources to the solution we can do this using Visual Studio

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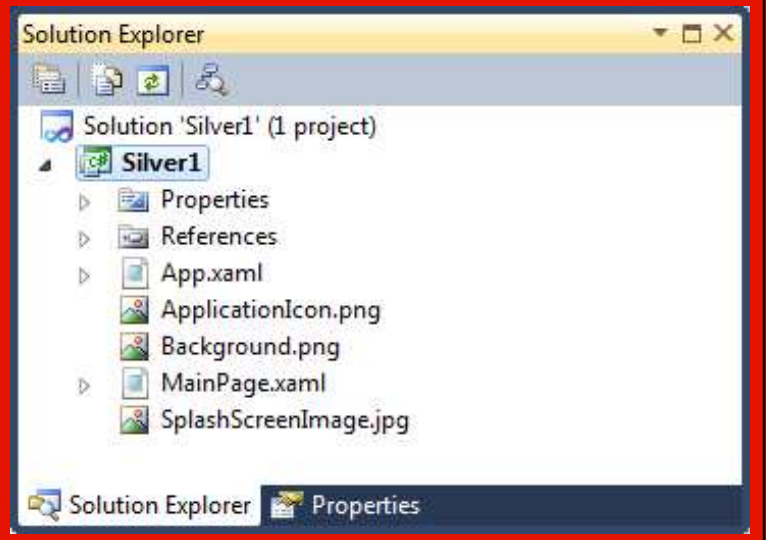
Windows Phone

Demo



Demo 1: Creating a Silverlight Application

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XNA Game Projects

- An XNA game project is created and managed with Visual Studio in just the same way as a Silverlight application
- The starting point is a different project template
- The structure of the solution is quite different

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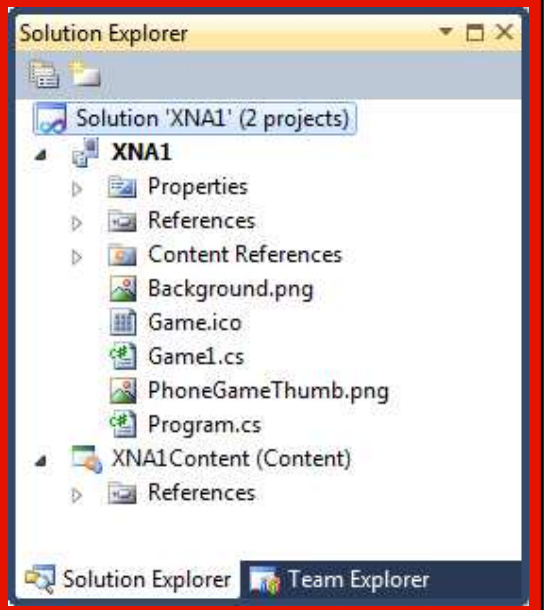
Windows Phone

Demo



Demo 2: Creating an XNA Game

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XNA Games

```
/// <summary>
/// This is called when the game should draw itself.
/// </summary>
/// <param name="gameTime">Provides a snapshot of timing values.</param>
protected override void Draw(GameTime gameTime)
{
    GraphicsDevice.Clear(Color.CornflowerBlue);

    // TODO: Add your drawing code here

    base.Draw(gameTime);
}
```

- XNA Games work in quite a different way to Silverlight applications
- They have an Update/Draw behaviour which is called repeatedly as the game runs

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Combining Silverlight and XNA

- Silverlight is great for applications
  - Very easy to create a rich user interface
  - Not so good for high performance games
- XNA is great for games
  - Makes good use of the graphics acceleration
  - Can be tedious to create UI behaviours
- The "Windows Phone and Silverlight Application" project type lets you use both systems in a single application

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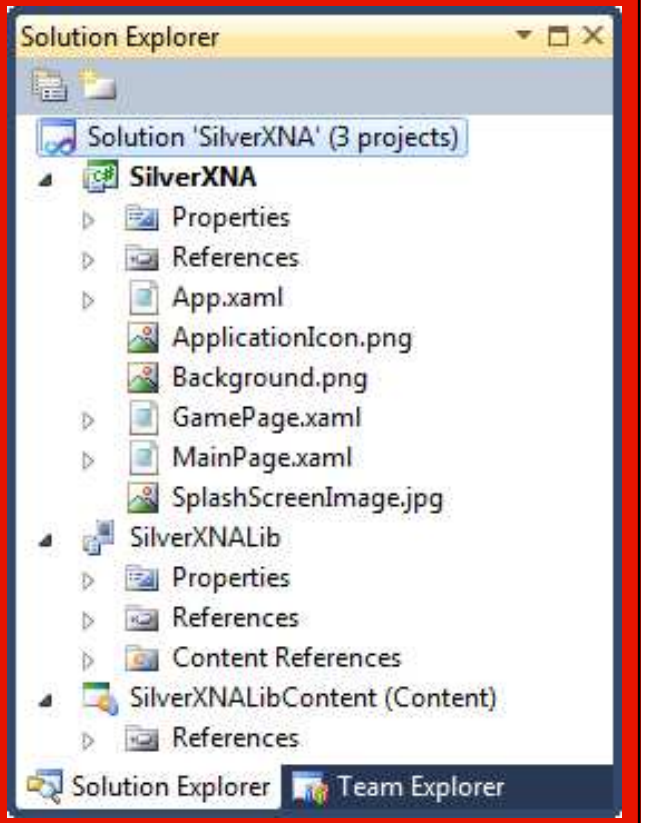
Windows Phone

Demo

Demo 3: Combining Silverlight and XNA



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Silverlight and XNA Programs

- The default Silverlight page in a combined project contains a single button that navigates to the game page
- This starts the XNA game engine running


```
// Simple button Click event handler to take us to the second page
private void Button_Click(object sender, RoutedEventArgs e)
{
    NavigationService.Navigate(new Uri("/GamePage.xaml", UriKind.Relative));
}
```

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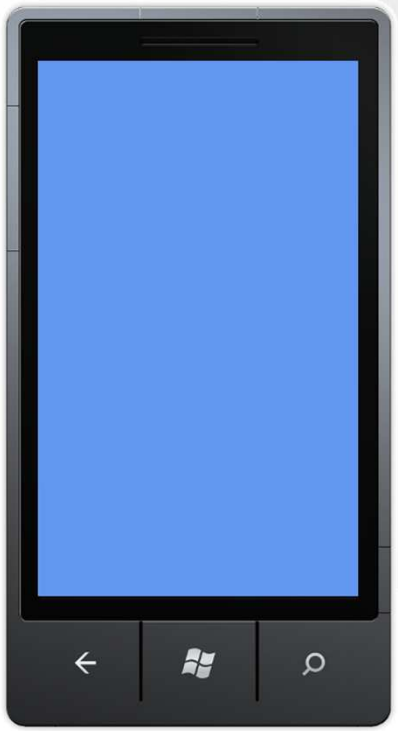
Silverlight and XNA Programs

- The XNA page contains versions of the `Draw` and `Update` methods that are called to run the game within the Silverlight environment



```
/// <summary>
/// Allows the page to draw itself.
/// </summary>
private void OnDraw(object sender, GameTimerEventArgs e)
{
    SharedGraphicsDeviceManager.Current.GraphicsDevice.Clear(Color.CornflowerBlue);

    // TODO: Add your drawing code here
}
```

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Combining Silverlight and XNA

- It is possible for the Silverlight form containing the XNA content to also hold Silverlight components
- This makes it possible to overlay Silverlight UI elements on top of an XNA display
- This makes building the user interface to an XNA game even easier

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Multiple Project Solutions

- It is perfectly possible to have multiple targets in a single Visual Studio 2010 solution
  - PC version of XNA game
  - Xbox version of XNA game
  - Windows Phone version of XNA game
- These can all share code libraries which are also part of the solution
- Many solutions can also share the output from a single project

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Review

- Visual Studio brings together code and assets into a project file that describes an *assembly*
- An assembly can be either an executable program or a dynamically loaded library
- Projects are brought together into solutions
- A solution can contain executables for a several different platforms, which can share code elements

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Windows Phone

Running Windows Phone Programs

Rob S. Miles | Microsoft MVP | University of Hull, UK
Andy Wigley | Microsoft MVP | Appa Mundi

Session 1.2

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Topics

- Deploying to the Phone
- Deploying to the Emulator
- Compiling and Running Programs
- Program Debugging
  - Adding Breakpoints
  - Single Stepping
  - Using the Immediate Window

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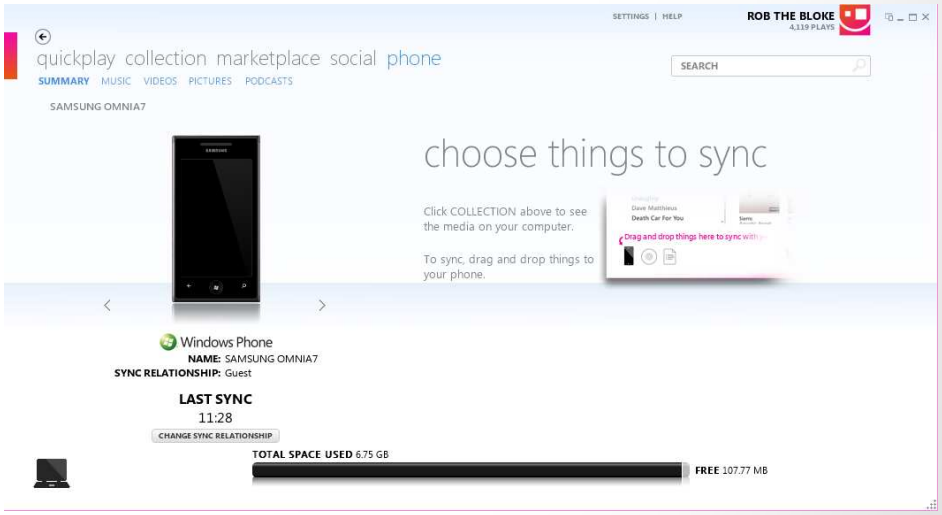
Connecting to the Windows Phone

- The Windows Phone device uses the Zune software to connect to the Windows PC
  - Synchronise media
  - Perform phone updates



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Developer Phone Registration

- Before you can deploy your own programs to the device you need to register it as a developer device
- This is done once for a particular phone
- Registered developers can register up to 3 devices
  - Registered students can register one device

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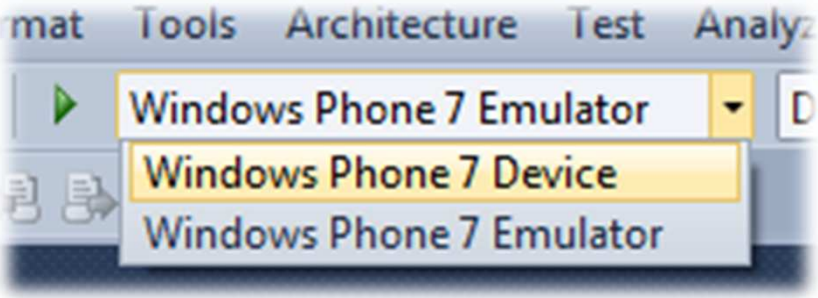
Deploying to the Phone



- Visual Studio lets you select the target device for your program when you run it
- The development environment is exactly the same for both platforms
- You can debug in exactly the same way for each too

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Deployment Problems

- If phone is displaying the Lock Screen, deployment will fail
  - You will get a deployment error from Visual Studio
- You can solve this by setting the phone lock timeout to never display the lock screen
- Applications that use media will not work correctly if they are deployed via the Zune software

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Zune Problems

- The Zune software must be running for the deployment from Visual Studio to work
- However, some programs do not work correctly when the Zune software is running
  - Programs that use media
- To solve this problem you can use the "Windows Phone Desktop Pass-Through" program, WPDPTConnect instead of the Zune
- It is supplied with the SDK

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Applications on the Phone

- Once you have deployed an application the phone device it is stored on the device for later use
- You are limited to 10 of your own applications on the phone at any one time
- You can also send compiled versions of your application to other registered developers for them to use on their developer devices

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The Windows Phone Emulator

- The Windows Phone emulator runs as a program on your Windows PC
- It contains the same software as a "real" phone, but built for the Windows PC platform
- The emulator is supplied with the Windows Phone SDK

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Emulator Features

- The emulator does not contain the complete Windows Phone experience
- It does have the browser and will provide the phone behaviours for things like placing calls and sending SMS messages
  - There are also some entries in the Address Book
- It also contains an emulation of the Windows Phone camera, GPS and motion sensors
- You can also use the emulator to capture screenshots of programs running on the phone

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Visual Studio Debugging

- Visual Studio provides an exceptional debugging experience
- This experience extends to Windows Phone
- You can do all the debugging actions in Windows Phone that you can do with a Windows PC application
  - Breakpoints
  - Single Stepping
  - Viewing and modifying variables

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Breakpoint

- You set a breakpoint at a statement where you want the program to pause
- When the program reaches the breakpoint you get control and can take a look at what the program is doing
- You can set breakpoints even when the program is running

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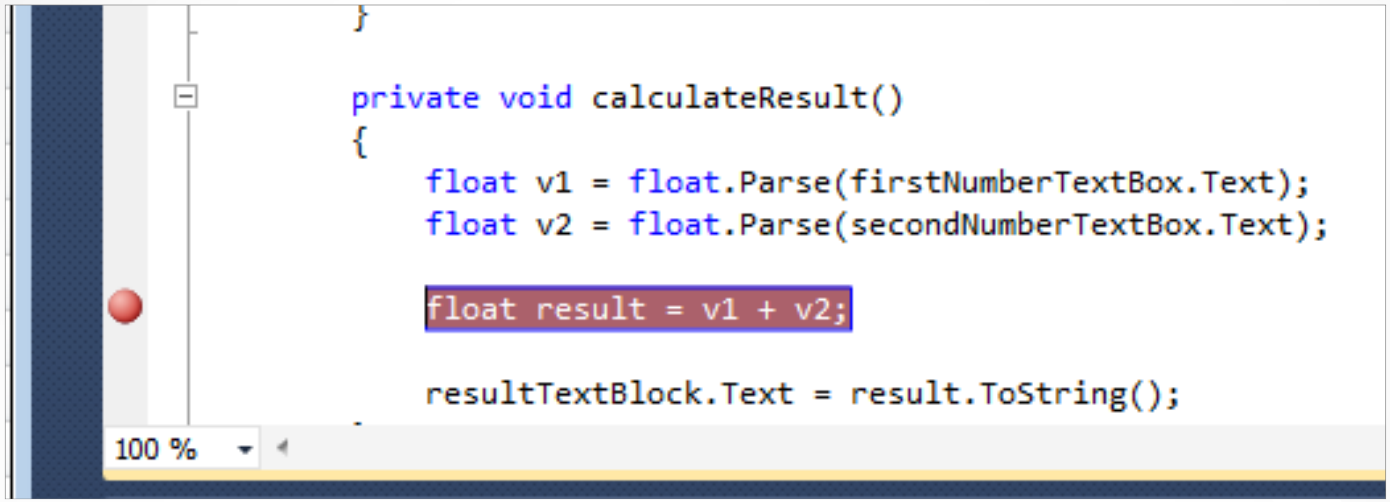
Setting a Breakpoint



- To set a breakpoint just double click in the left margin of the statement
- The statement is highlighted to indicate that a breakpoint has been set

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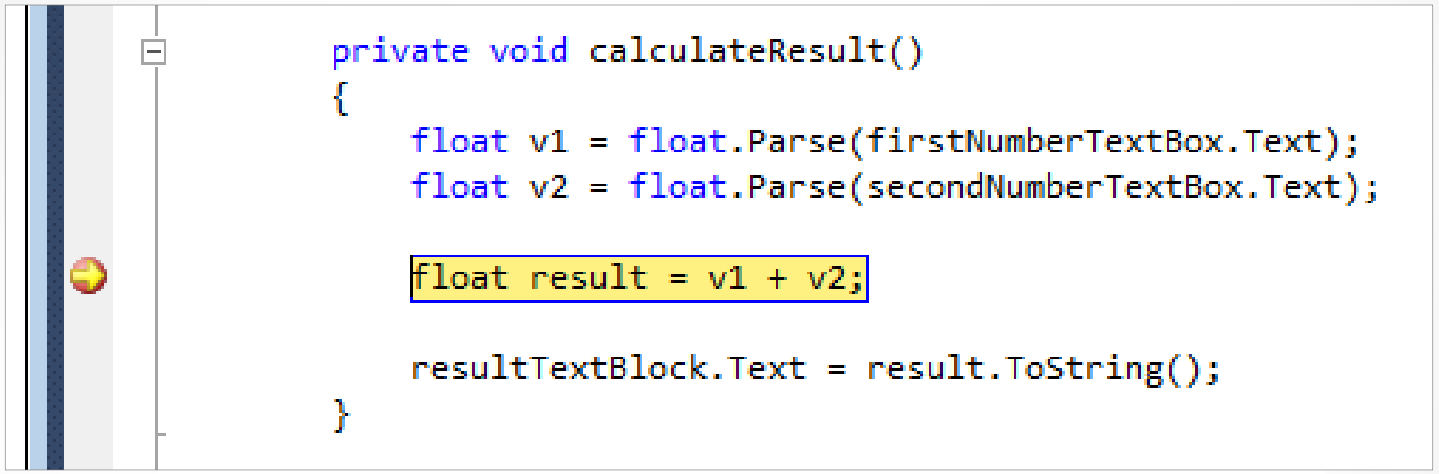
Hitting a Breakpoint



```
private void calculateResult()
{
    float v1 = float.Parse(firstNumberTextBox.Text);
    float v2 = float.Parse(secondNumberTextBox.Text);

    float result = v1 + v2;

    resultTextBlock.Text = result.ToString();
}
```

- The next time the statement is obeyed the program will break
- The statement at the breakpoint is highlighted

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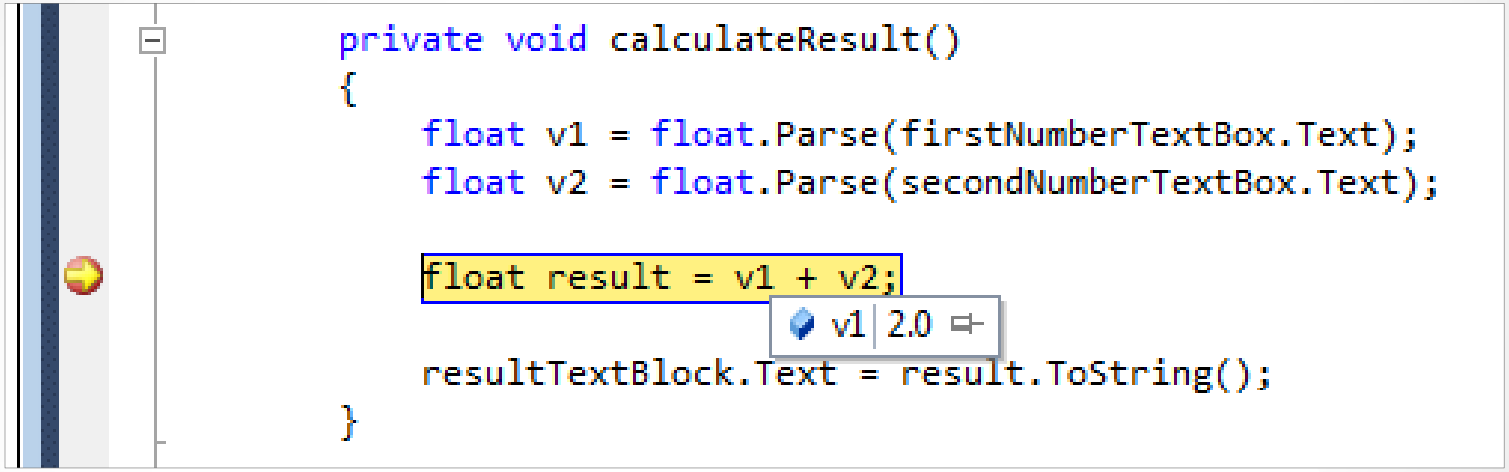
Viewing Variable Contents



- You can view the contents of a variable in the program by resting the cursor on the variable name in the code
- You can also select variables to watch

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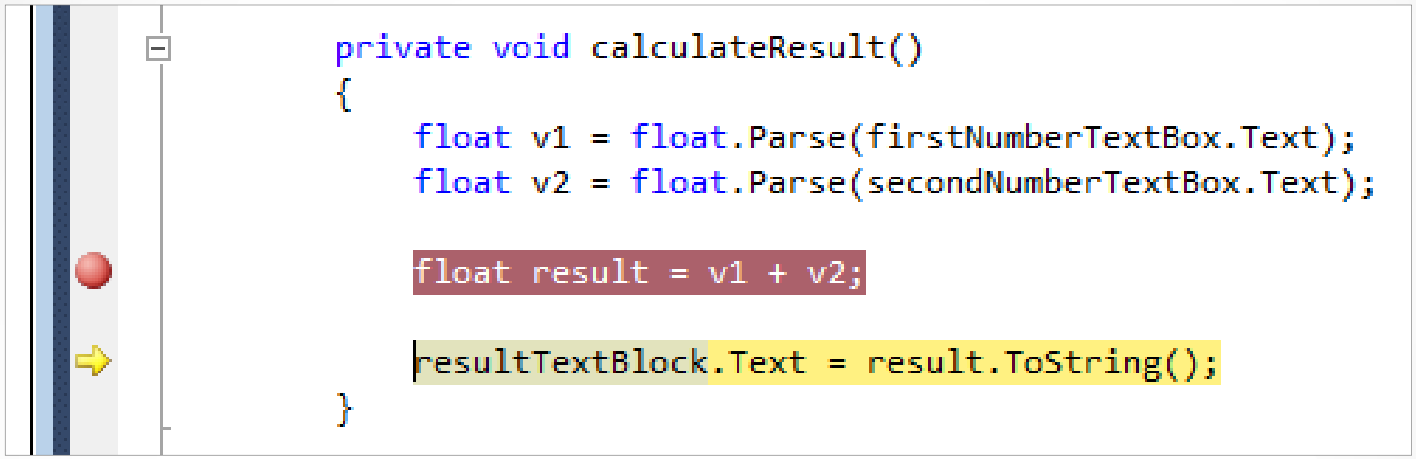
Single Stepping a Program



```
private void calculateResult()
{
    float v1 = float.Parse(firstNumberTextBox.Text);
    float v2 = float.Parse(secondNumberTextBox.Text);

    float result = v1 + v2;

    resultTextBlock.Text = result.ToString();
}
```

- You can step through code a line at a time
- The current position is highlighted in yellow
- Statement at current position has not been executed yet

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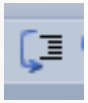
Program Control


Start or resume the program running


Execute a single statement and step into a method call


Execute a single statement and step over method calls


Exit a method which was stepped into


Pause the program


Stop the program

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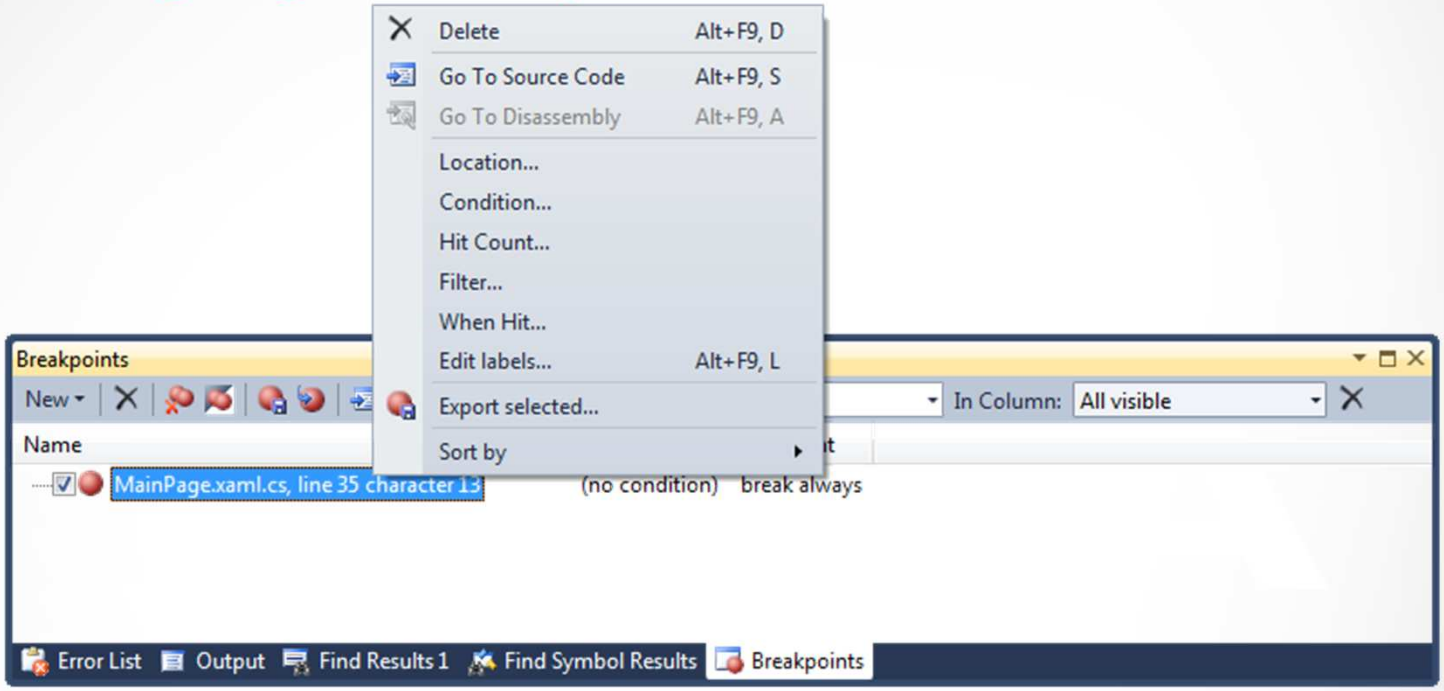
Managing Breakpoints



- Visual Studio provides a Breakpoint window you can use to manage all the breakpoints you set in a program
- You can also manipulate the properties of each breakpoint

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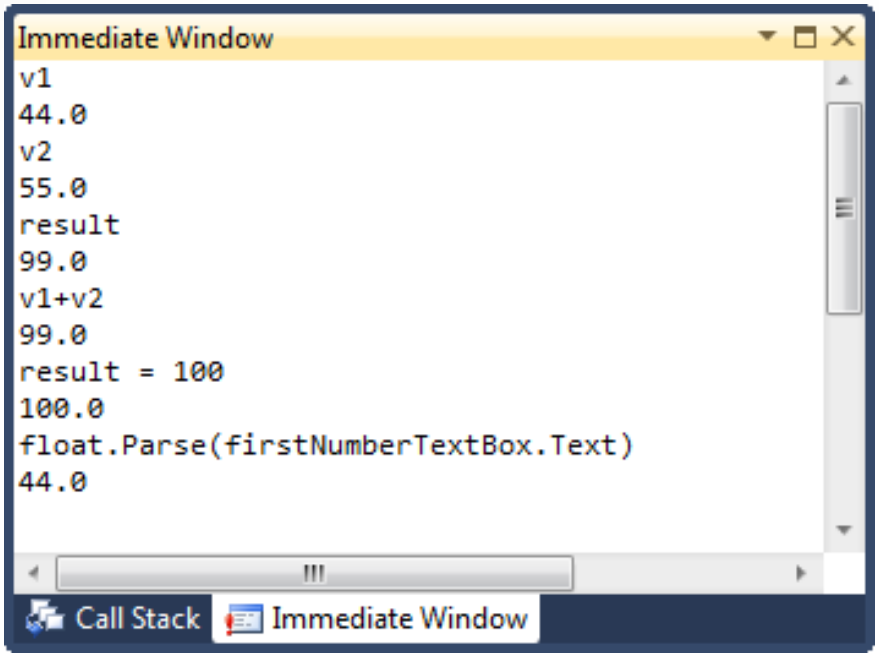
The Immediate Window



- Lets you view and change the values of variables
- You can even call methods inside your program

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Windows Phone

Demo

Demo 1: Debugging AddingMachine

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Design for Debug

```
private void calculateResult()
{
    resultTextBlock.Text =
       (float.Parse(firstNumberTextBox.Text) +
        float.Parse(secondNumberTextBox.Text)).ToString();
}
```

- We could create our entire program behaviour in a single statement
- However, this makes it much harder to take a look at the intermediate values and find out why our program is failing
- Intermediate values make it easier to understand and debug, and don't have any affect on execution speed

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Review

- The Windows Phone emulator shows the behaviour of the phone but not performance
- You can set breakpoints in your Windows Phone programs to stop code at particular statements
- You can view the contents of variables in the program
- You can also view and modify program variables using the Immediate Window

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Windows Phone

The Windows Phone Emulator

Rob S. Miles | Microsoft MVP | University of Hull, UK
Andy Wigley | Microsoft MVP | Appa Mundi

Session 1.3

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Topics

- An Overview of the Emulator
- Using the Windows Phone Keyboard
- Emulator Orientation
- Camera Emulation
- Location Emulation
- Position Sensor Emulation
- Capturing Screenshots

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Emulator Features

- The emulator does not contain the complete Windows Phone experience
  - No Zune media playback
  - Only the browser application built in
- It does have the browser and will provide the phone behaviours for things like placing calls and sending SMS messages
  - There are also some entries in the Address Book and pictures in the media library

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Emulator Performance

- The emulator is not a reliable way of predicting how a program will perform on a real device
  - The processor in a Windows PC may be more powerful than the one in the phone
- The emulator is for functional testing only
- If you have any concerns about performance you should ensure you run your program on a real device

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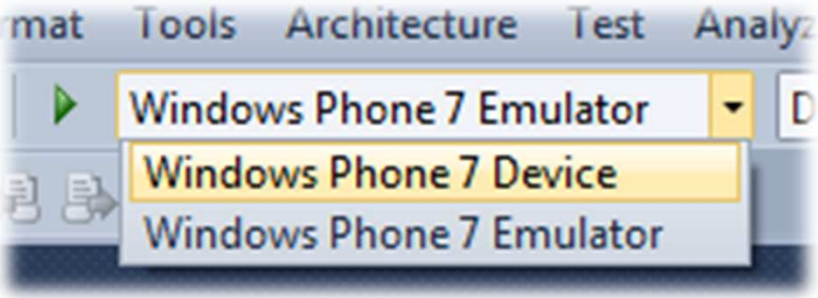
Deploying to the Emulator



- Visual Studio lets you select the target device for a program when it runs
- The emulator is started the first time you deploy to it
  - It will then remain running until you stop it, and maintain its own local storage during that time

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The Windows Phone Emulator

- The Windows Phone emulator runs as a program on your Windows PC
- It contains the same software as a "real" phone, but built for the Windows PC platform
- The emulator is supplied with the Windows Phone SDK

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The Emulator Program

- The emulator is a complete phone, running inside your PC
  - All actions performed on it will be persisted until you stop the emulator process
- You can change the settings of the phone, run programs that have been downloaded into it or download them again from Visual Studio
- You can also use the browser on the phone

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Emulator Features

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  - There are also some entries in the Address Book
- It also contains an emulation of the Windows Phone camera, GPS and motion sensors

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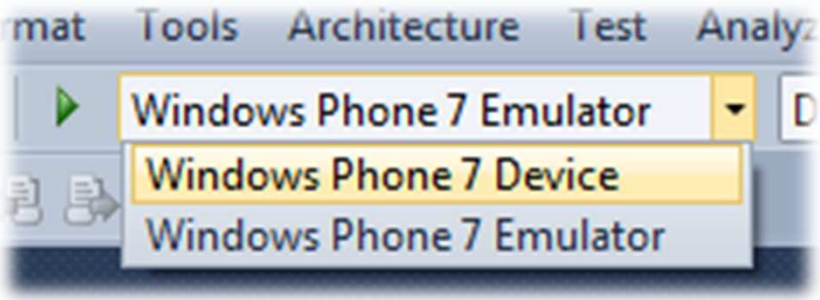
Deploying to the Phone



- Visual Studio lets you select the target device for your program when you run it
- The development environment is exactly the same for both platforms
- You can debug in exactly the same way for each too

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Emulator Interface

- You can use the PC mouse to control the emulator
- If you have a multi-touch display you can use multiple touchpoints to pinch and zoom on the display
- The emulator will emulate the touch keyboard so you can type by clicking on the keys

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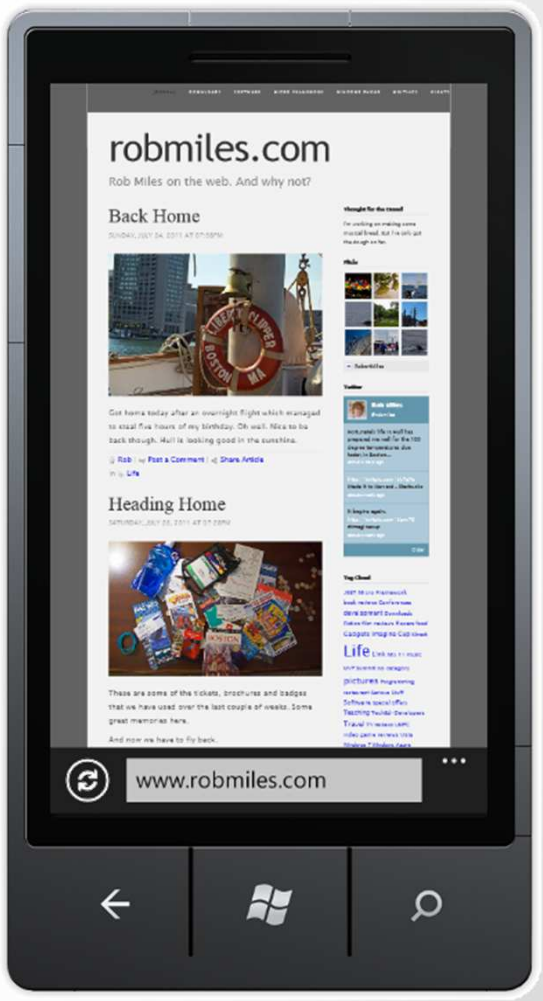
Using the PC Keyboard

- If you want to type using the PC keyboard you use the Pause/Break key to toggle the emulator software keyboard
- When the software keyboard is not present the emulator receives input from the PC keys



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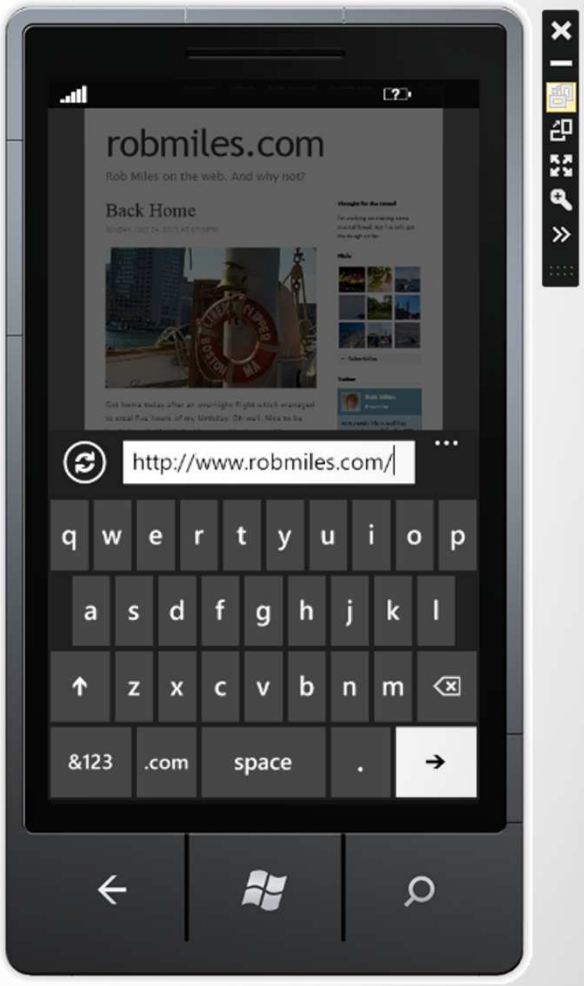
Emulator Orientation

- If you hover the Windows PC mouse over the emulator an extra set of tools appears
- These allow you to rotate the emulator into different orientations
- The software is informed of these orientation changes



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Landscape Orientation

- This is the emulator in landscape orientation
- Note that there are two landscape orientations – controls left and controls right – but only one portrait orientation

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Camera Emulation

- The camera emulator just "takes" a simple photograph and returns it
- You can use this to show your applications are invoking the camera task and receiving the result correctly

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Windows Phone

Demo

Demo 1: Photo Snap

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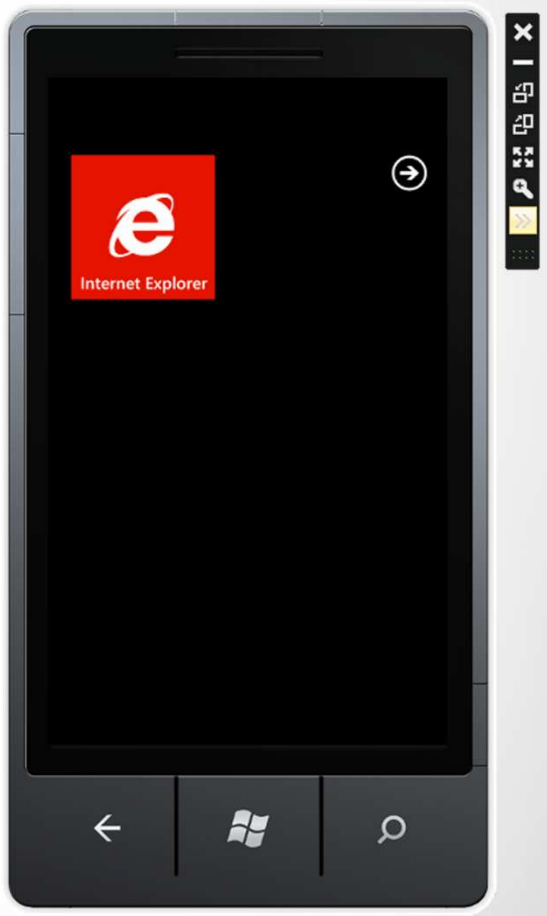
Location Emulation

- Windows Phone applications can use the emulator to generate location data for them
- To do this we open the Additional Tools pane on the emulator



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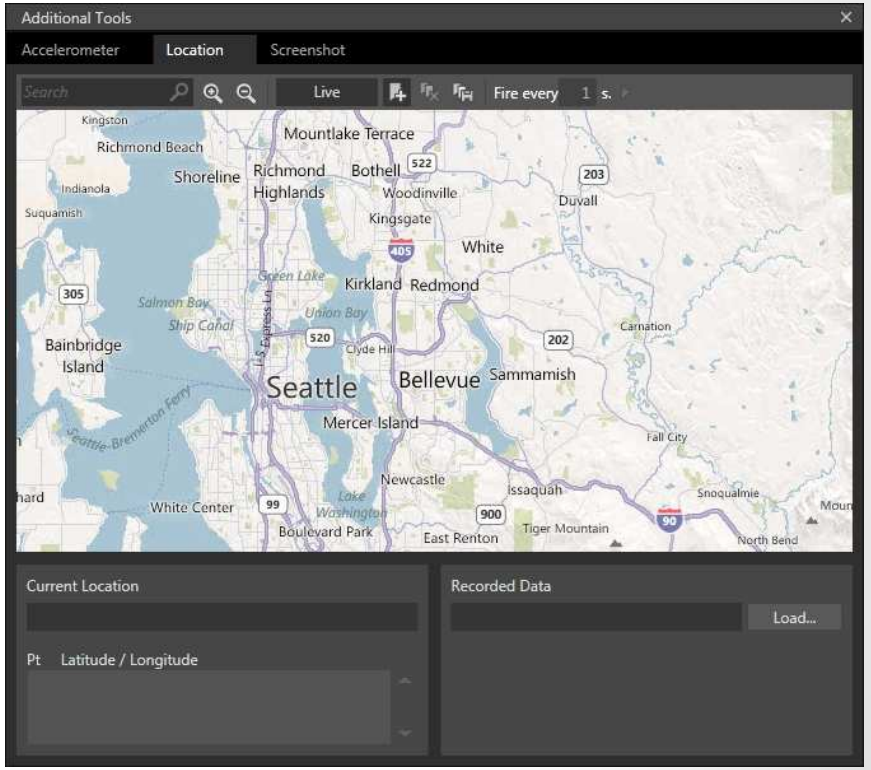
Additional Tools

- This is the Location tab in the Additional Tools
- You can click on any location to "move" the emulator to that position
- You can also place pushpins to describe a route, and then "replay" that route



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Code and API

```
// Initialize the GeoCoordinateWatcher.
watcher = new
GeoCoordinateWatcher(GeoPositionAccuracy.High);

watcher.MovementThreshold = 0.5; // Reduce 'noise'

watcher.PositionChanged +=
    new EventHandler<GeoPositionChangedEventArgs
                                        <GeoCoordinate>>(
                                    watcher_PositionChanged);
watcher.StatusChanged += new
  EventHandler<GeoPositionStatusChangedEventArgs>(
     watcher_StatusChanged);
```


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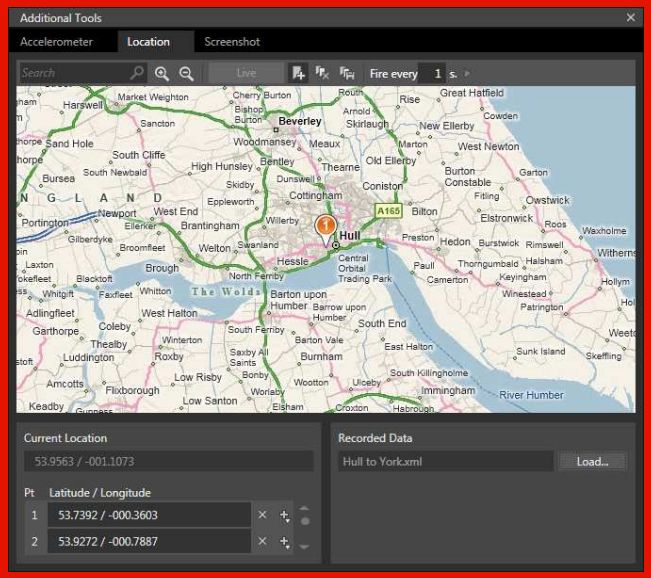
Windows Phone

Demo



Demo 2: Location Demo

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Orientation Emulation

- A Silverlight application is usually controlled from the touch screen, which is emulated using the mouse
- However, games may be controlled by the player tipping or moving the phone
- A Windows Phone contains an accelerometer and compass that can be used to determine the orientation and movement of the phone
- The emulator can emulate these

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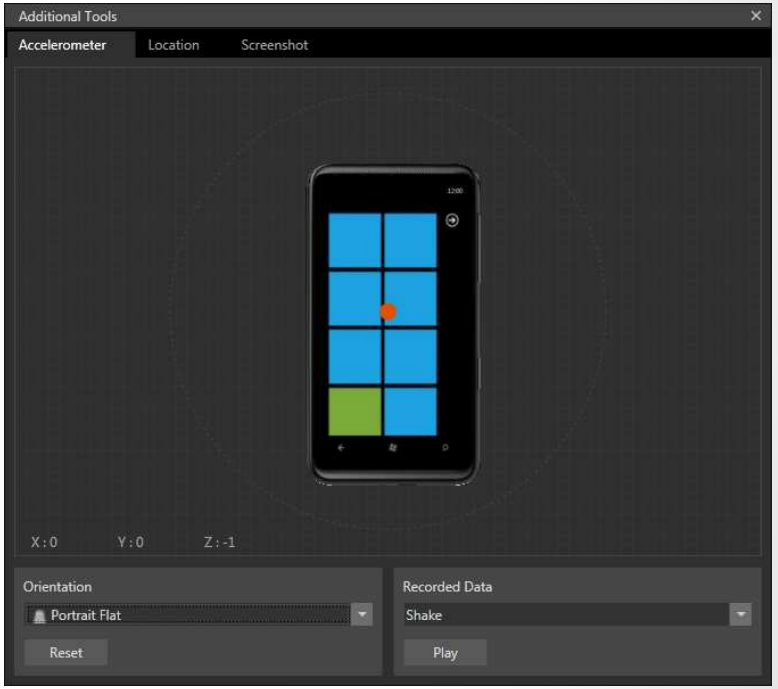
Orientation Tab

- The Orientation Tab lets you manipulate a "virtual phone"
- The sensor readings will be produced that reflect the manipulation of the emulator



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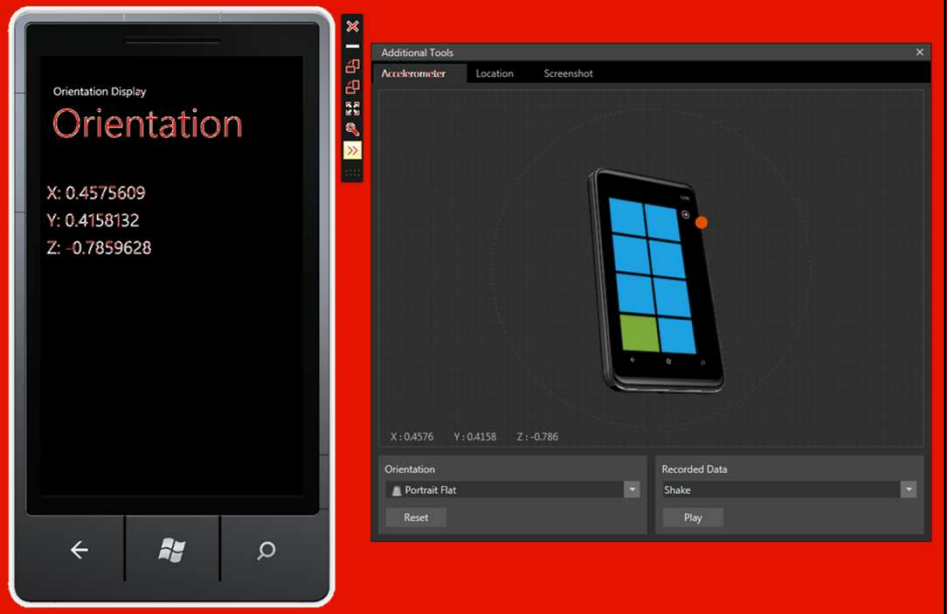
Windows Phone

Demo



Demo 3: Orientation Demo

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Capturing Screenshots

- It is very useful to be able to take screenshots of the emulator
  - These can be used in documentation and also to promote the application in the Marketplace
- The emulator Additional Tools pane provides a Screenshot tab
- This captures the screenshot at the present level of zoom of the emulator display

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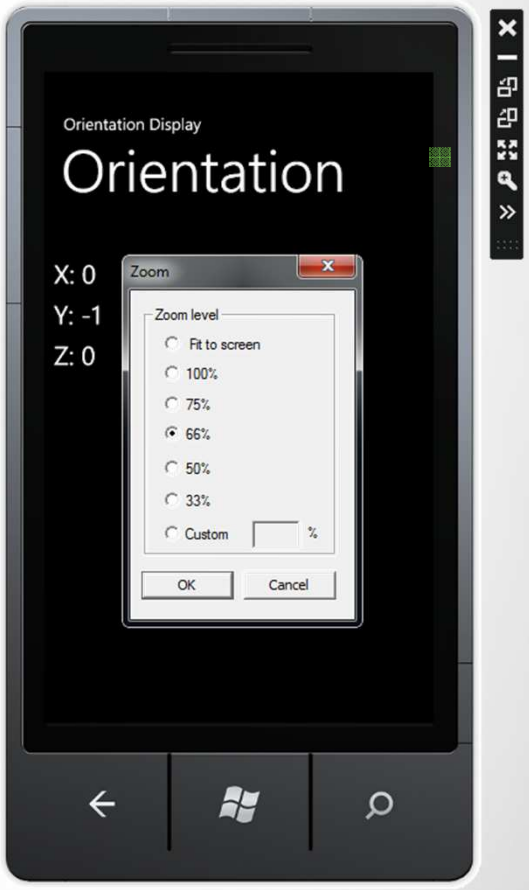
Emulator Zoom Level

- For accurate screenshots you must set the Zoom Level to 100%
- You can select this from the tools that appear when you hover the mouse pointer over the emulator



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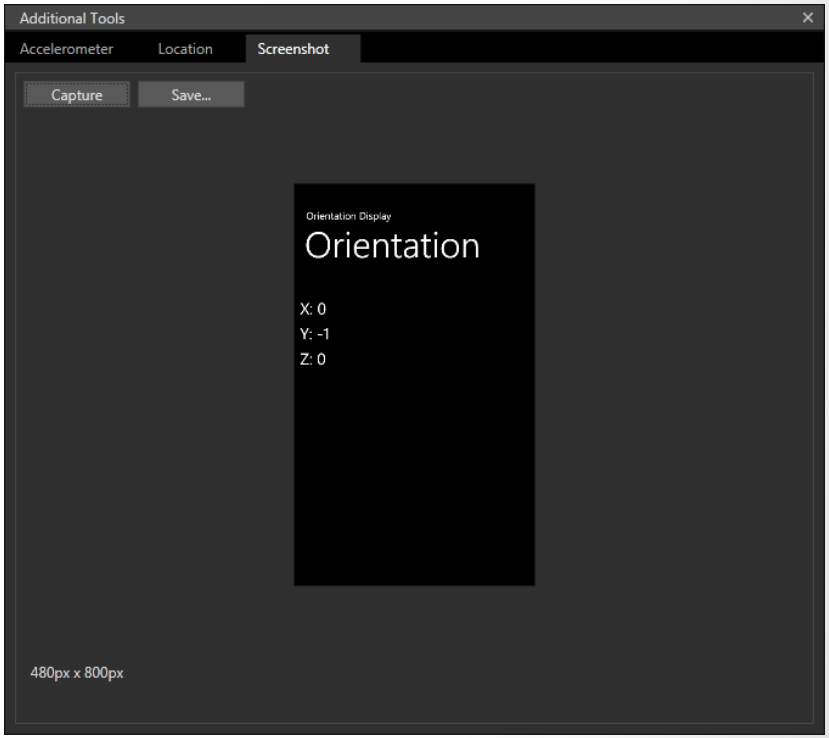
Capturing a Screenshot

- The Screenshot tab in the Additional Tools pane lets you capture and save screenshots
- They are saved as PNG files, so they can be directly used in Marketplace uploads



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Review

- The emulator provides all the behaviours of a Windows Phone device, but it does not emulate the actual hardware speed
- It can emulate the camera, GPS and accelerometer sensors
- You can also use the emulator to capture screenshots of active applications and games

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