

# Game Development in Unity3D for Windows Phone 8.1



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# Agenda

## 01 | Setup Development Environment

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02 | Create a Unity Game

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03 | Hardware Modifications

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04 | Understand API Changes

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# 01 | Setup Development Environment



# System Requirements

<b>Unity Engine</b>	<ul style="list-style-type: none"><li>• Unity 4.2+ supports Windows Store Apps &amp; Windows Phone 8.0</li><li>• Unity 4.5.3+ supports Universal Apps &amp; Windows Phone 8.1</li><li>• Tip: always use the most recent Unity builds</li></ul>
<b>Windows PC</b>	<ul style="list-style-type: none"><li>• Windows 8.x Professional+, 64 bit</li><li>• Microsoft Visual Studio Professional, Premium, Ultimate 2013<ul style="list-style-type: none"><li>• Update 2+ supports Universal Apps</li></ul></li><li>• Microsoft Visual Studio Express 2013</li><li>• Windows Phone devices</li></ul>
<b>Mac OS X</b>	<ul style="list-style-type: none"><li>• Boot Camp 5+</li><li>• Windows 8.x Professional &amp; up 64-bit ISO</li><li>• Windows 7 USB/DVD download tool</li><li>• Parallels 9+</li></ul>

# System Requirements Resources

## Windows PC

Unity:

- [unity3d.com/unity/download](http://unity3d.com/unity/download)

Windows OS:

- <http://windows.microsoft.com/en-us/windows/downloads>

Visual Studio IDE:

- <http://www.visualstudio.com/downloads/download-visual-studio-vs>

## Mac OS X

Boot Camp:

- [microsoftstore.com/store/msusa/html/pbPage.Help\\_Win7\\_usbdvd\\_dwnTool](http://microsoftstore.com/store/msusa/html/pbPage.Help_Win7_usbdvd_dwnTool)
- <http://windows.microsoft.com/en-us/windows-8/install-windows-on-mac>
- [help.apple.com/bootcamp/mac/5.0/help](http://help.apple.com/bootcamp/mac/5.0/help)
- [digitaltrends.com/computing/how-to-install-windows-8-on-a-mac/](http://digitrends.com/computing/how-to-install-windows-8-on-a-mac/)

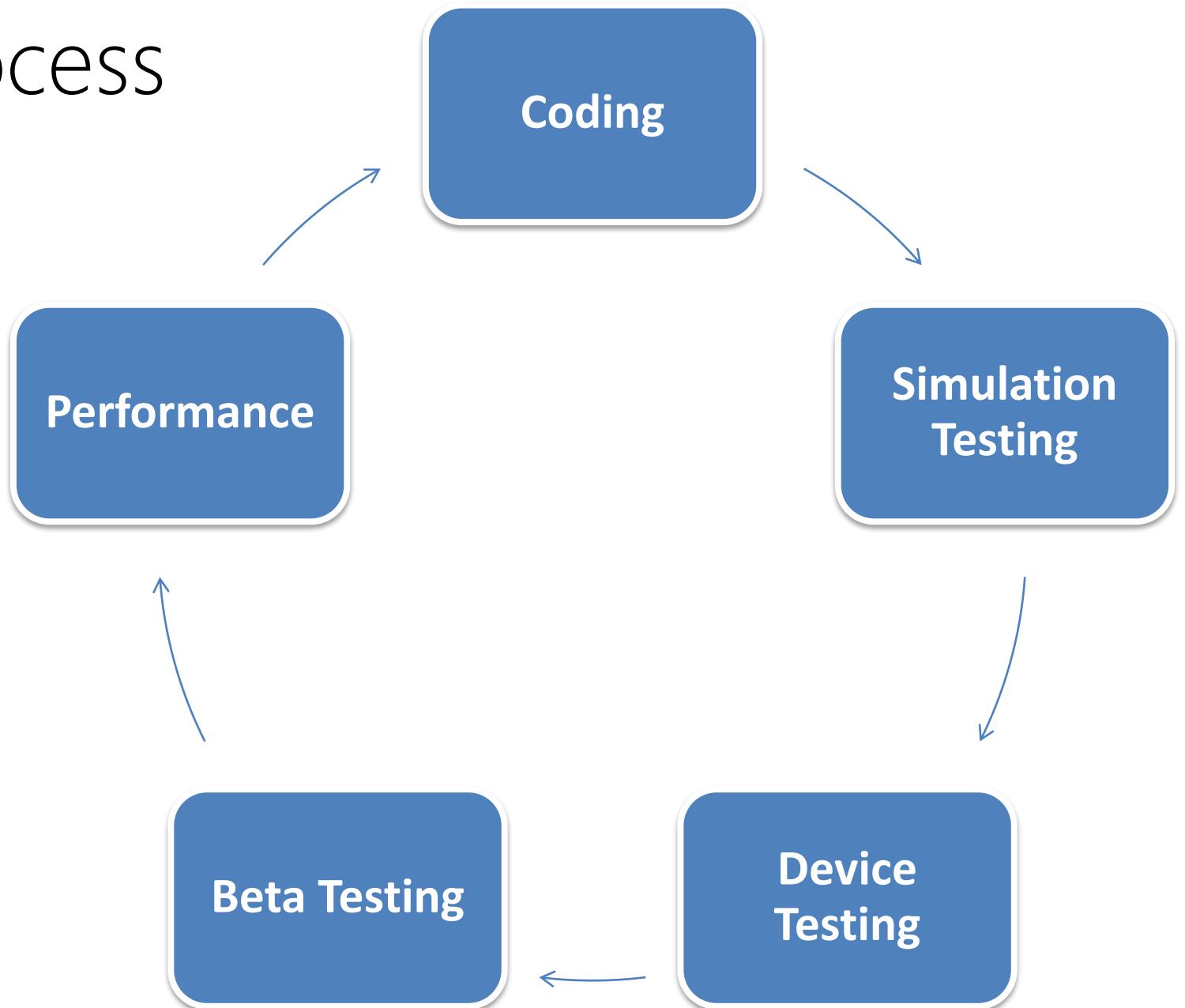
Parallels:

- [download.parallels.com/desktop/v9/ga/docs/en-US/Parallels%20Desktop%20User's%20Guide/](http://download.parallels.com/desktop/v9/ga/docs/en-US/Parallels%20Desktop%20User's%20Guide/)

# 01 | Development Tools



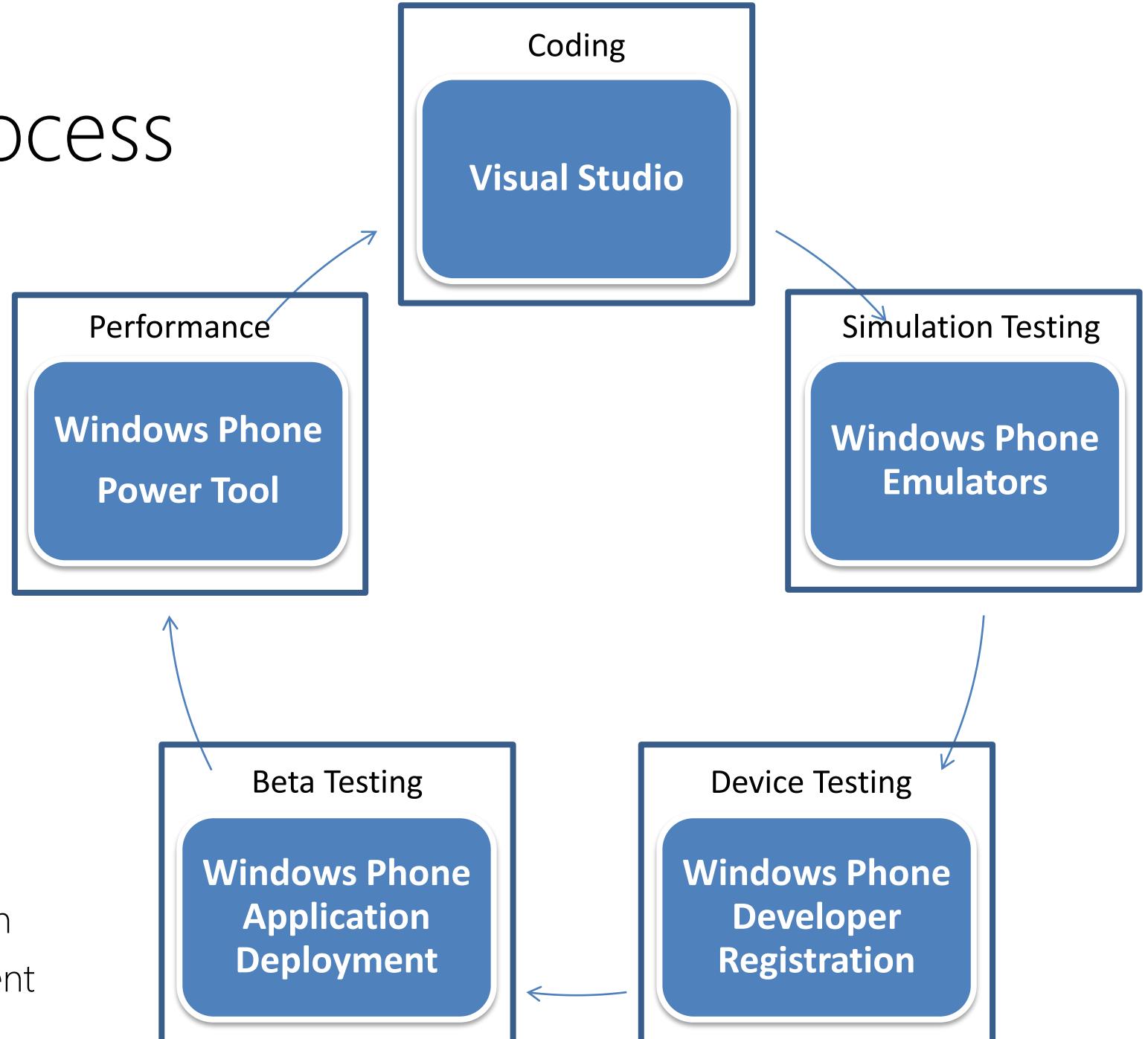
# Mobile Game Development Process



# Mobile Game Development Process

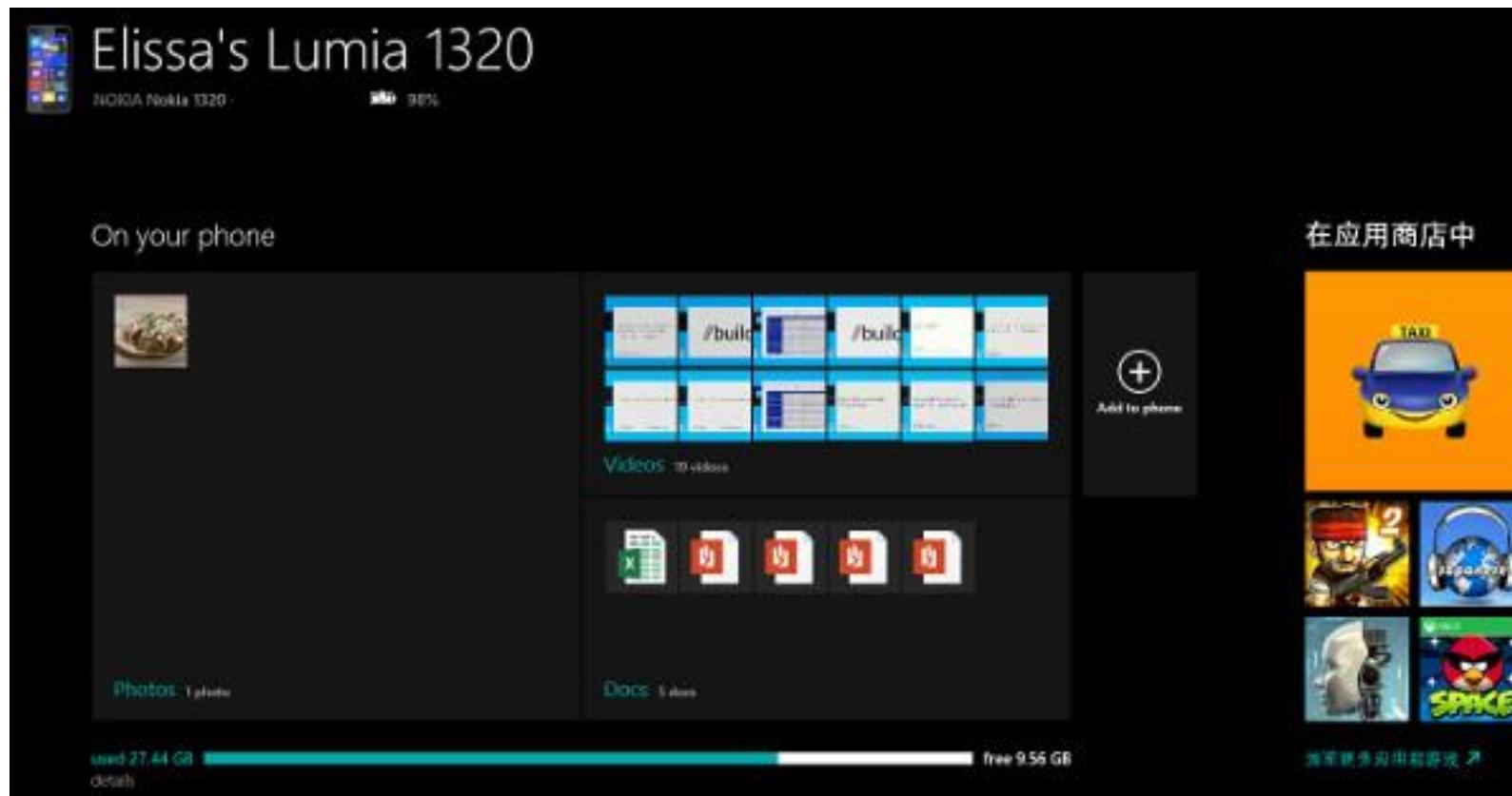
## Windows Phone Tools:

- Windows Phone
- Windows Phone Emulator
- Hyper-V Manager
- Dev Center App for WP8
- Windows Phone Power Tools
- Windows Phone Developer Registration
- Windows Phone Application Deployment

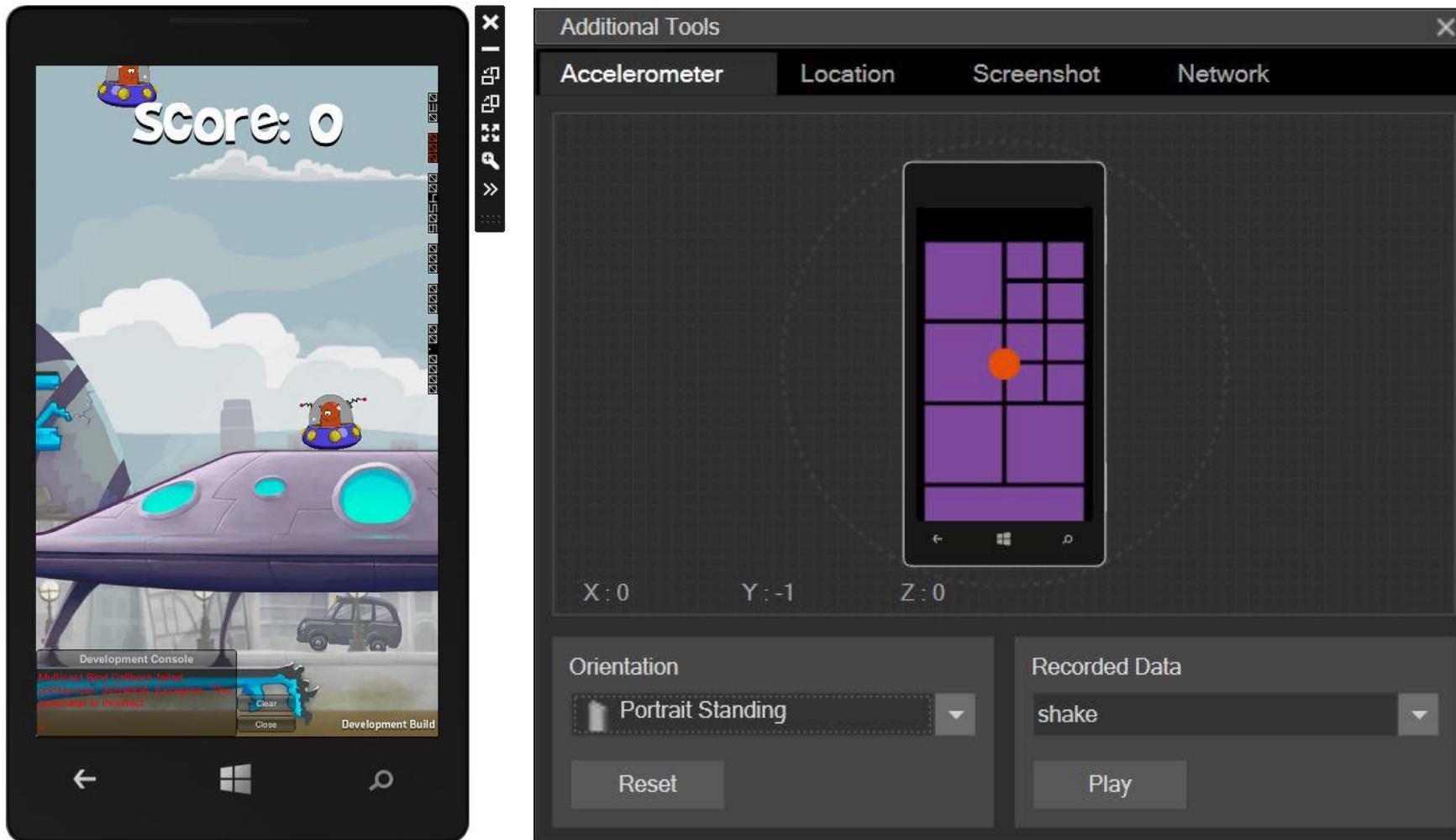


# Windows Phone Tool

- Connect your phone to computer's USB port
  - Upload/Download photos, videos, music, and documents



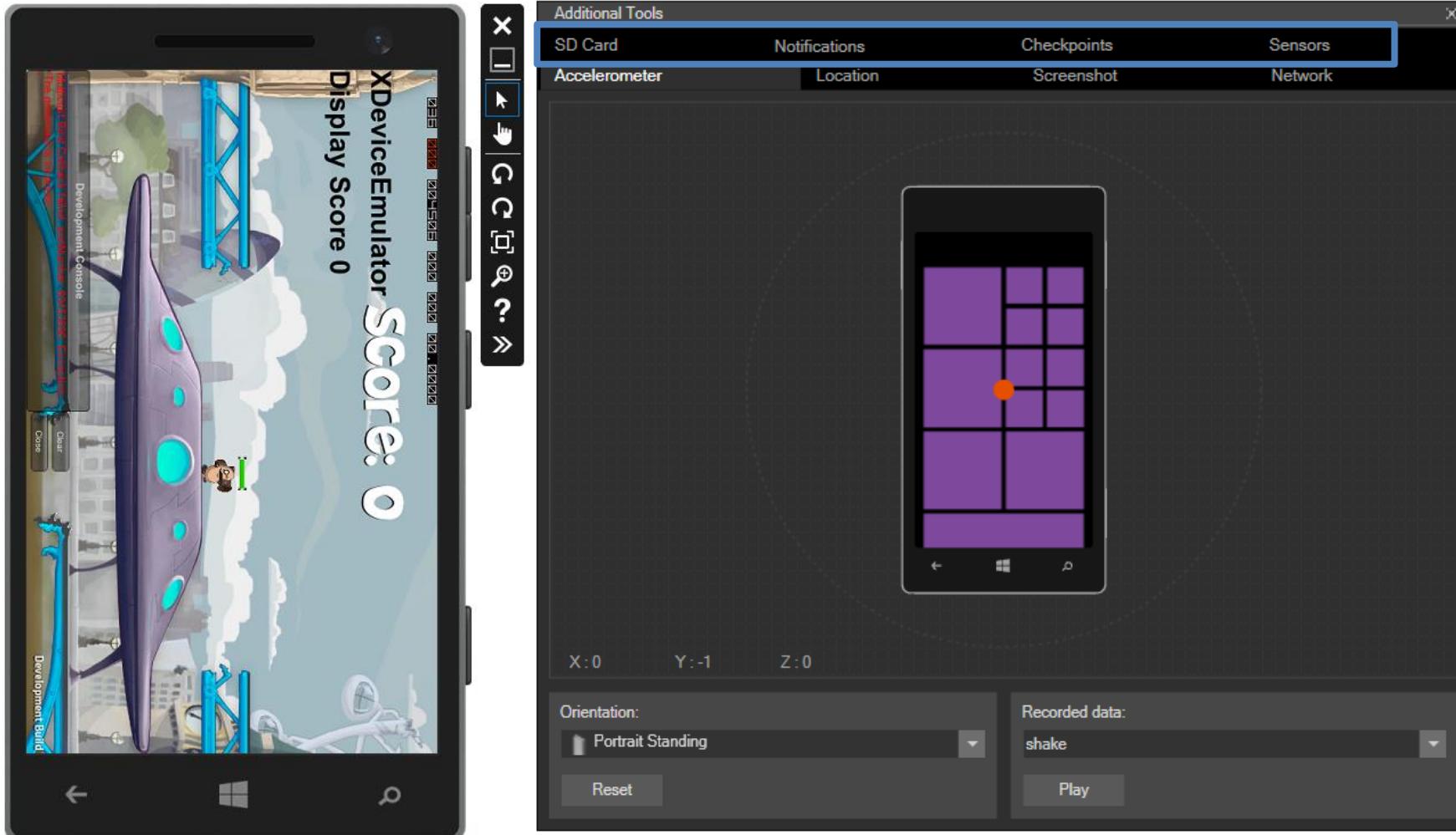
# Emulators ( 8.0 )



## Functionality:

- Accelerometer
- Location
- Screenshot
- Network

# Emulator ( 8.1 )



## Added Functionalities:

- SD Card
- Notifications
- Checkpoints
- Sensors

<http://msdn.microsoft.com/en-us/library/windows/apps/dn629629.aspx>

# Frame Rate Counters

## Sample Code

1

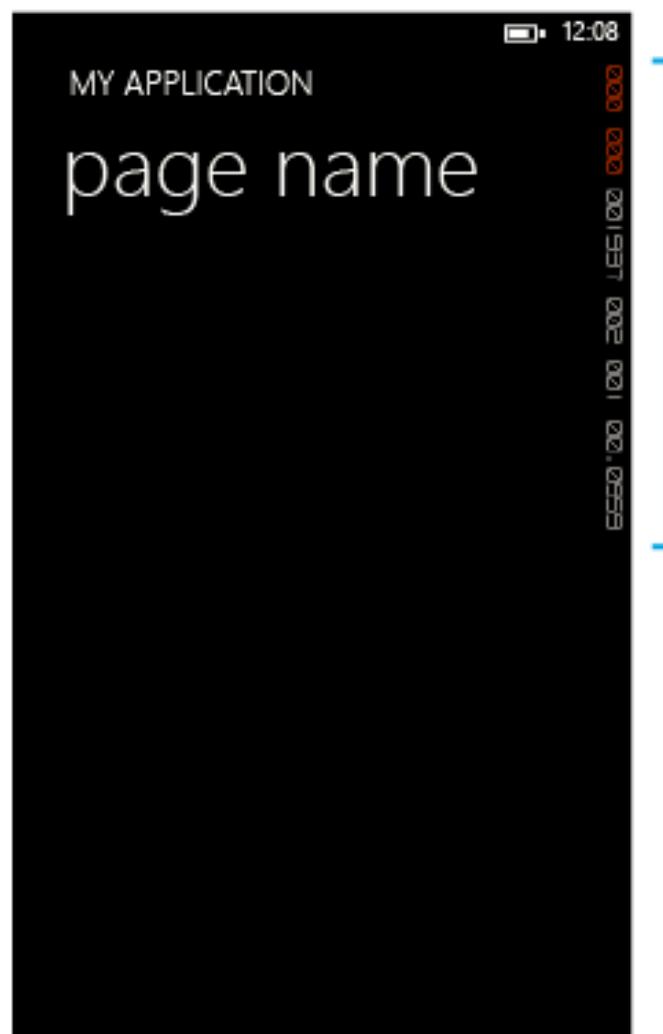
App.xaml.cs:

```
Application.Current.Host.Settings.EnableFrameRateCounter = true;
```

2

```
// ((1024 * 1024) = 1048576
string memUsage =
(Microsoft.Phone.Info.DeviceStatus.
ApplicationCurrentMemoryUsage / 104
8576.0f).ToString() + " MB";

string peakMemUsage = (Microsoft.Ph
one.Info.DeviceStatus.ApplicationPe
akMemoryUsage / 1048576.0f).ToStrin
g() + " MB";
```



- Composition thread frames per second
- User interface thread frames per second
- Texture memory usage
- Surface counter
- Intermediate surface counter
- Screen fill rate counter

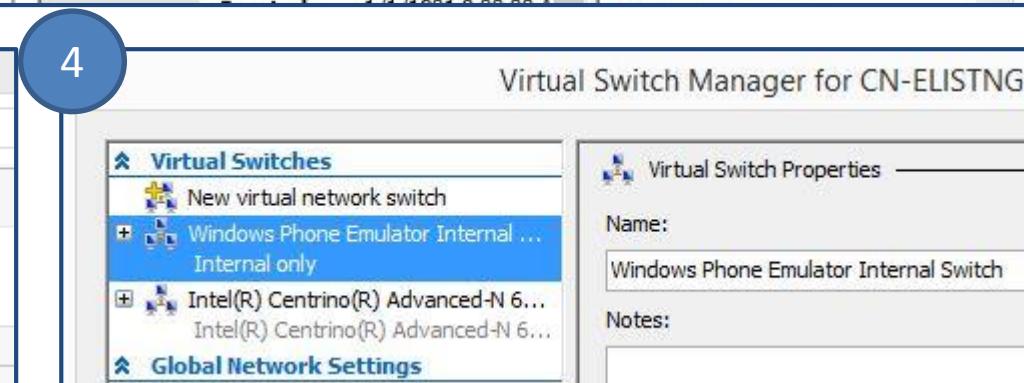
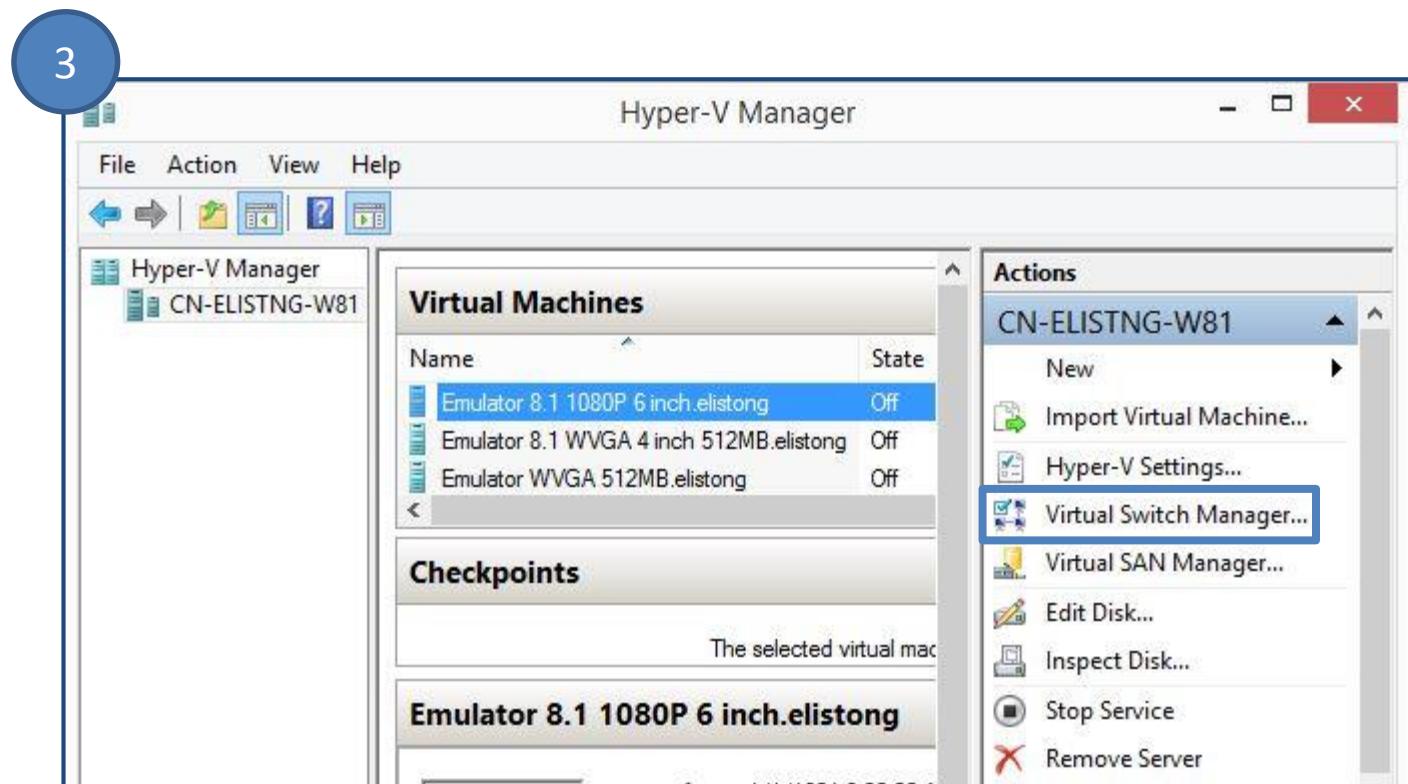
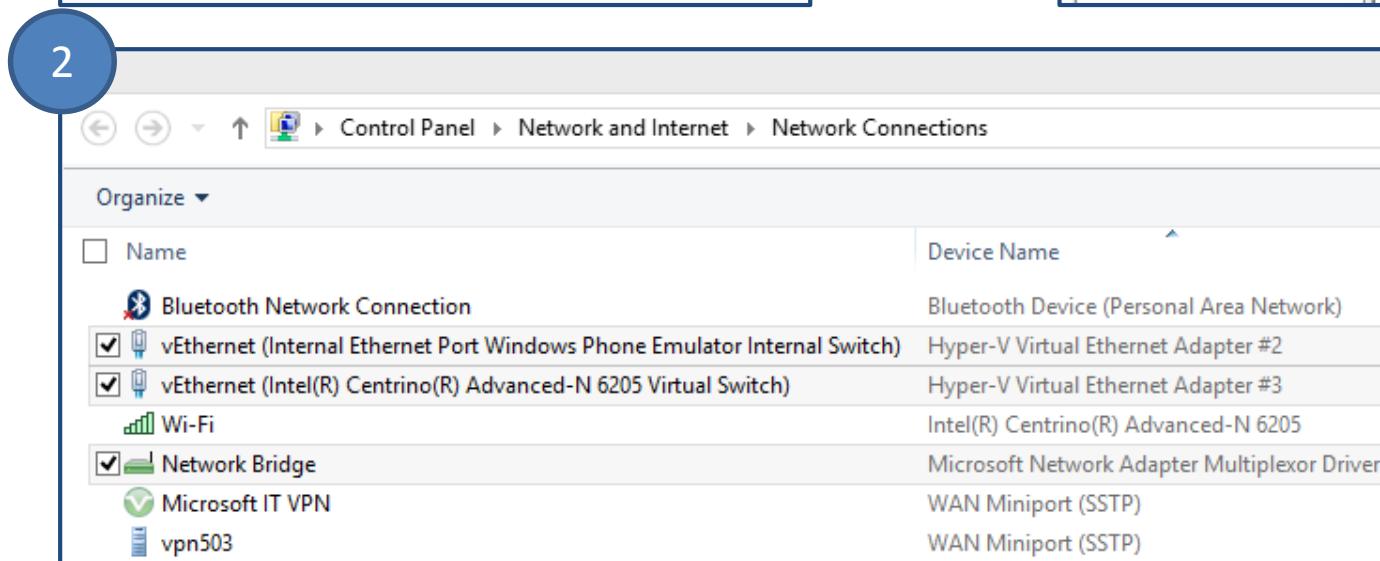
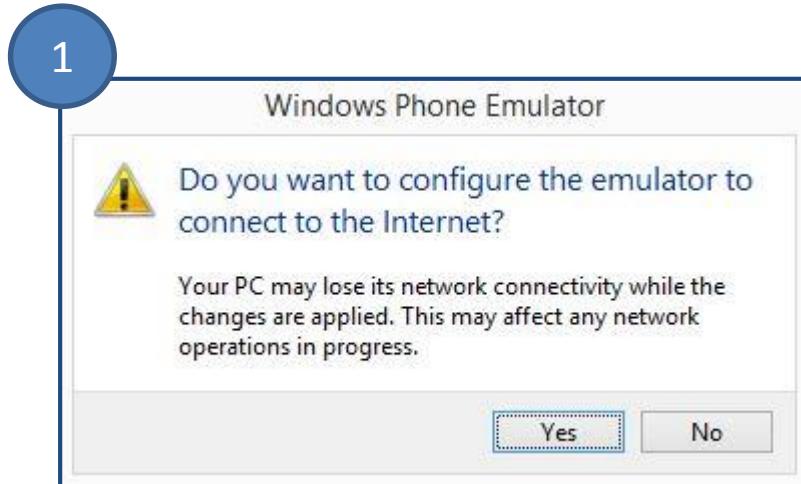
# Emulator: Memory Issues

- Solution: End any running process & software not in use
- <http://support.microsoft.com/kb/2911380/en-us>



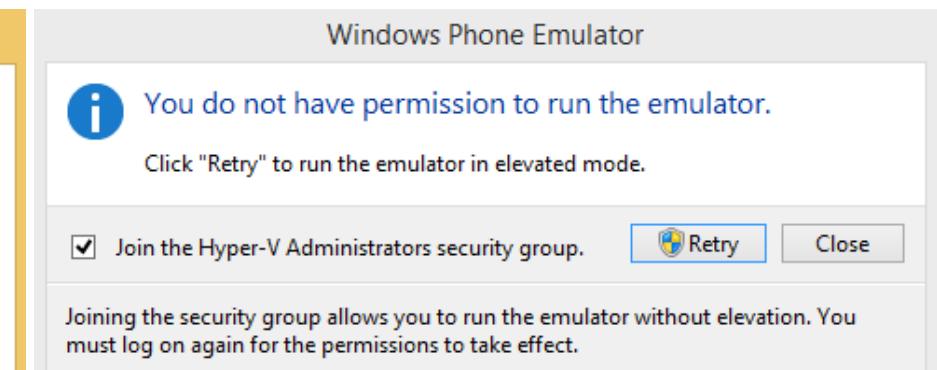
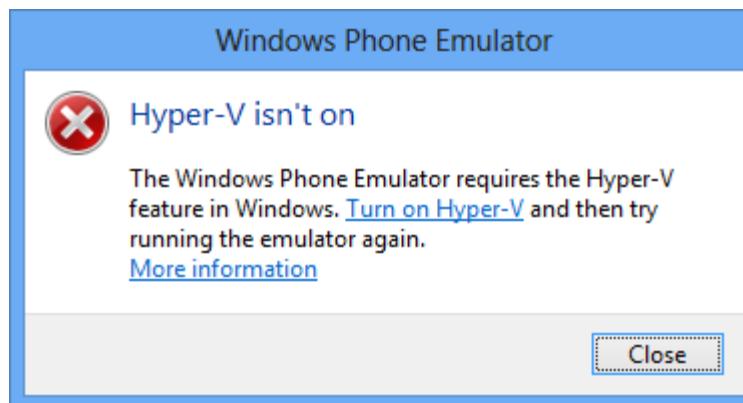
Task Manager					
Name	Status	7%	72%	1%	0%
		CPU	Memory	Disk	Network
Microsoft Visual Studio 2013 (32 bit)		0%	81.0 MB	0 MB/s	0 Mbps
Microsoft PowerPoint (32 bit)		0%	61.1 MB	0 MB/s	0 Mbps
Service Host: Local Service (No Network...)		0%	44.4 MB	0 MB/s	0 Mbps
Service Host: Local System (17)		0%	31.8 MB	0 MB/s	0 Mbps
Microsoft Word (32 bit)		0%	31.1 MB	0 MB/s	0 Mbps

# Emulator: Internet Issues



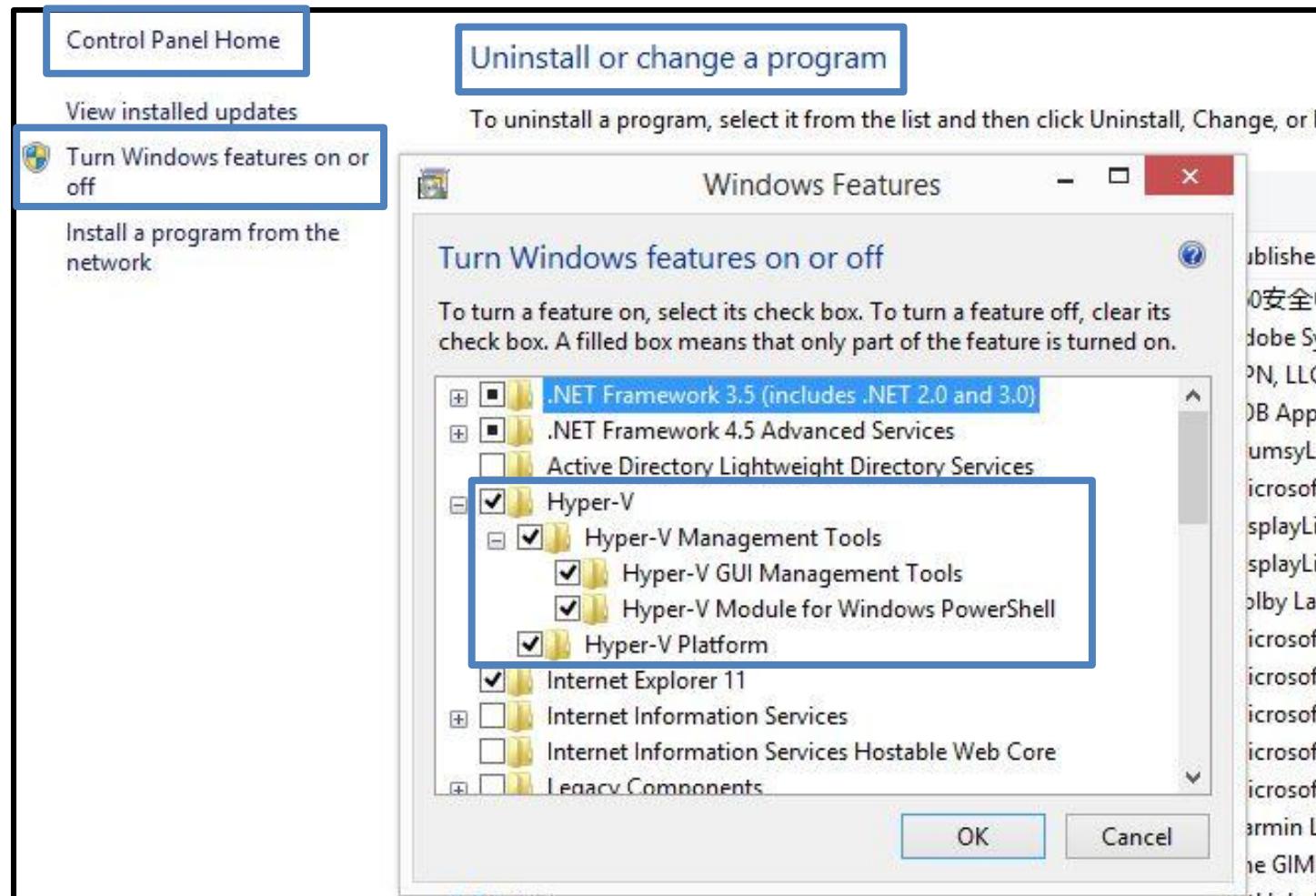
# Emulator: Virtualization Issues

- Related to hardware virtualization
- [http://msdn.microsoft.com/en-us/library/windows/apps/jj863509\(v=vs.105\).aspx](http://msdn.microsoft.com/en-us/library/windows/apps/jj863509(v=vs.105).aspx)



# Hyper-V

- Step 1: Turn on Hyper-V in Windows features



Windows Phone  
Emulator  
uses Hyper-V  
Virtualization  
Technology

# Hyper-V

- Step 2: Does your computer support Virtualization ?
- <http://technet.microsoft.com/enus/sysinternals/cc835722.aspx>

Download  
Coreinfo.exe

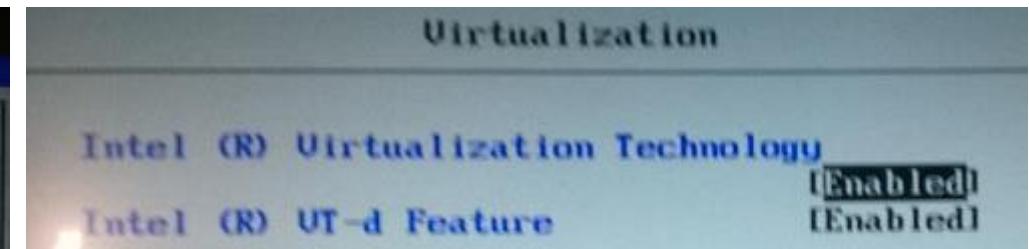
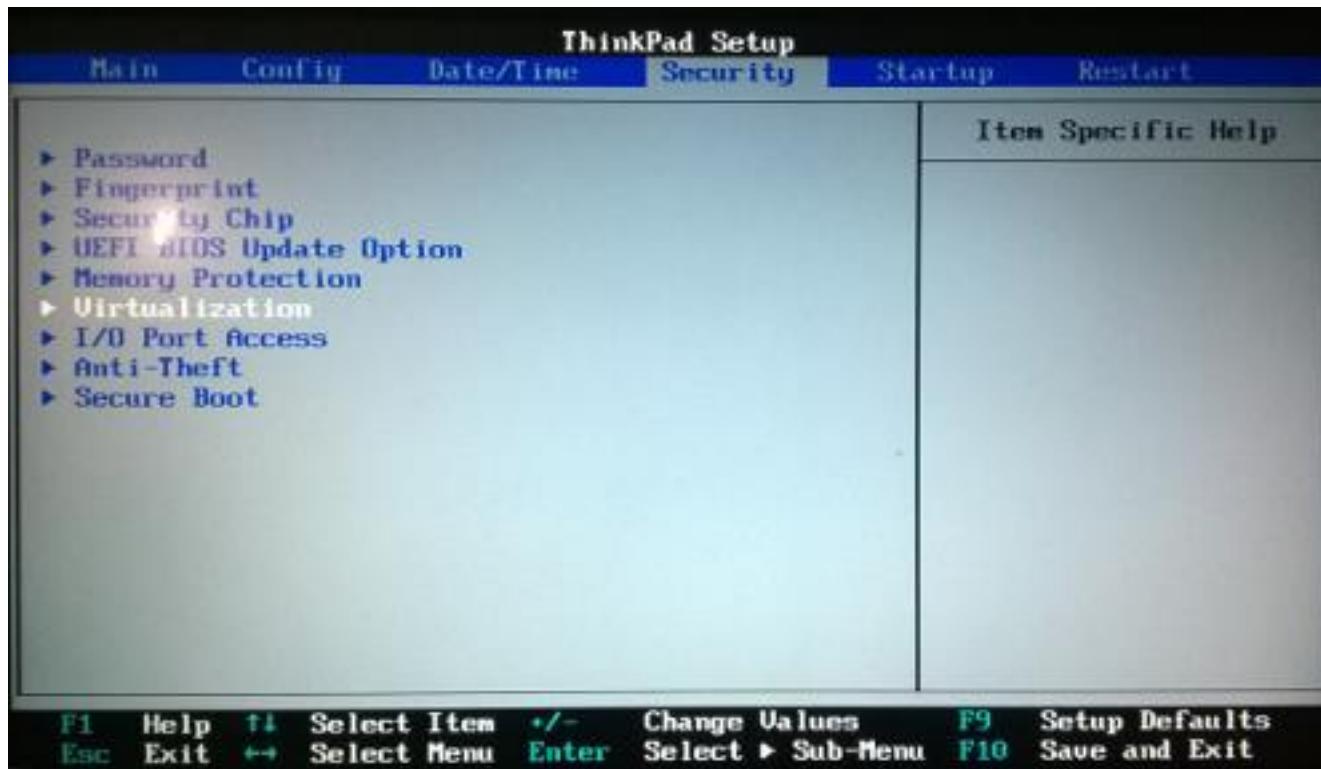
```
C:\Users\yimei\Downloads\Coreinfo>Coreinfo.exe

Coreinfo v3.21 - Dump information on system CPU and memory topology
Copyright (C) 2008-2013 Mark Russinovich
Sysinternals - www.sysinternals.com

Intel(R) Core(TM) i7-3520M CPU @ 2.90GHz
Intel64 Family 6 Model 58 Stepping 9, GenuineIntel
HTT          *      Hyperthreading enabled
HYPERVISOR   *      Hypervisor is present
VMX          -      Supports Intel hardware-assisted virtualization
SVM          -      Supports AMD hardware-assisted virtualization
EM64T        *      Supports 64-bit mode
```

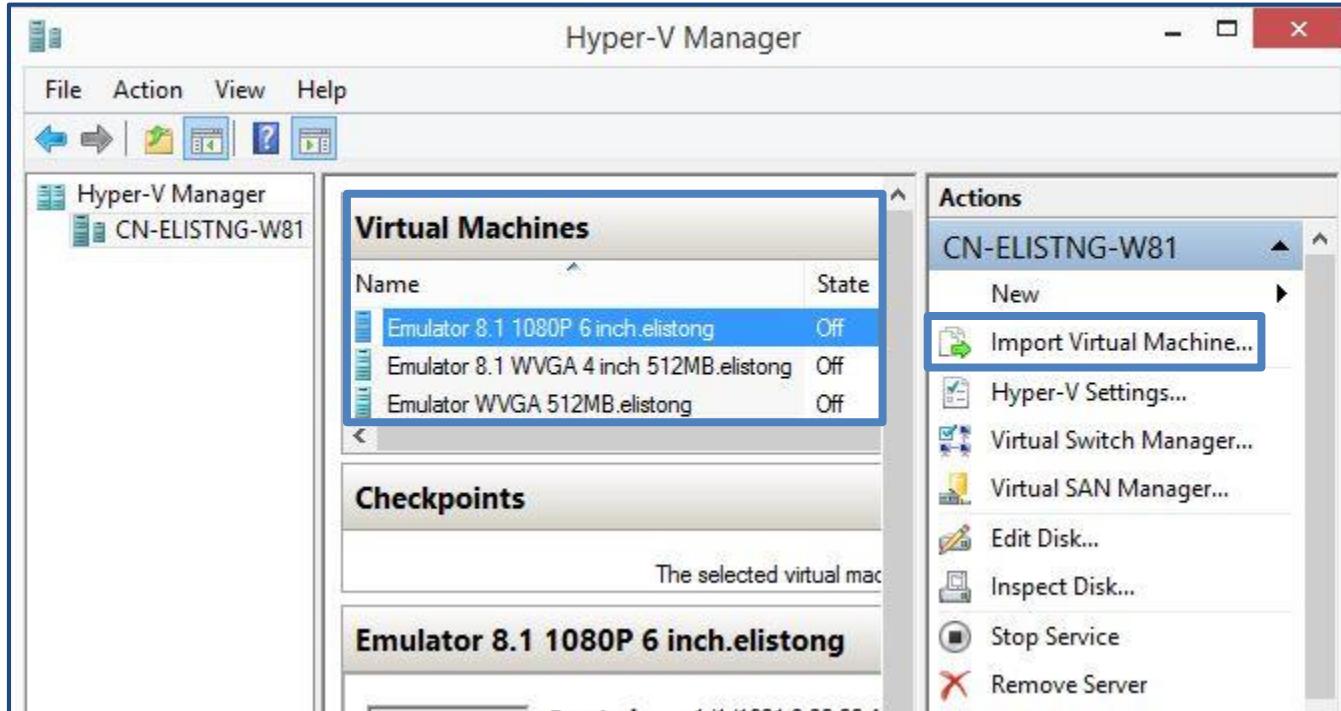
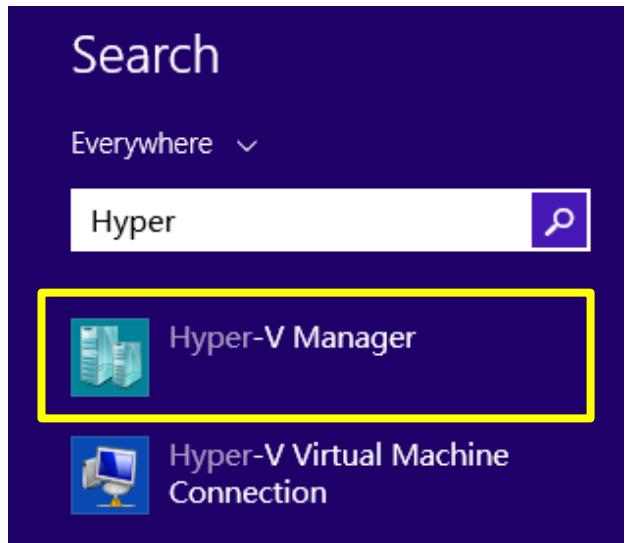
# Hyper-V

- Step 3: Check if Virtualization is enabled in your BIOS settings



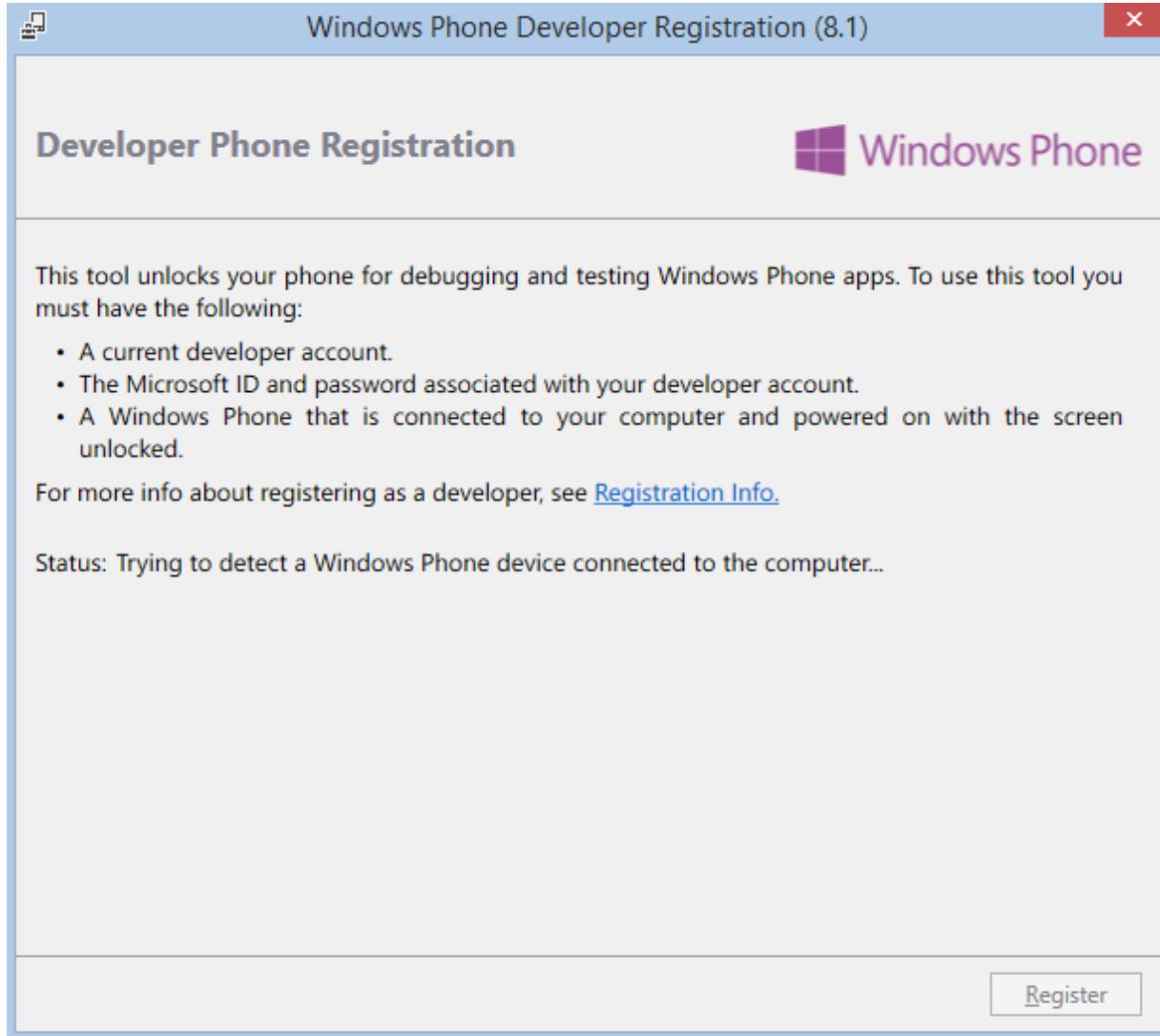
# Hyper-V

- Step 4: Hyper-V Manager



Name	Date modified	Type	Size
Flash.480x800	10/10/2012 3:58 AM	Hard Disk Image F...	39,278 KB
Flash.720x1280	10/10/2012 3:58 AM	Hard Disk Image F...	39,278 KB
Flash.768x1280	10/10/2012 3:58 AM	Hard Disk Image F...	39,278 KB

# Developer Phone Registration



- Test on a device!
- Firstly, register device for development
- Possible issues:  
<http://irisclasson.com/2013/10/28/problems-and-fixes-when-registering-a-windows-phone-8-device-to-deploydebug-applications>

# Developer Phone Registration

- <https://dev.windowsphone.com/en-us/Account/Devices>

The screenshot shows the Windows Phone Dev Center interface. At the top, there's a navigation bar with links for Dashboard, Get started, Design, Develop, Publish, and Community. On the right, it shows the user's email (elissatong@hotmail.com) and a Sign out link. A blue header bar at the top has a 'Submit App' button. Below the header, the main content area is titled 'Phones'. It includes a section for 'Apps' with a note about testing on real phones and a 'Learn how' link. For 'Reports', there's a link to register a phone. Under 'Account', it says 'Maximum number of phones you can register: 3'. A table lists two registered phones: 'Elissa's Lumia 1320' and 'Elissa's Nokia Lumia 820'. The first row is highlighted with a green border. The table columns are 'Phone name', 'Registered date', and 'Expiration date'. Each row has a 'Remove' link on the far right.

Phone name	Registered date	Expiration date	
Elissa's Lumia 1320	4/10/2014	4/10/2016	<a href="#">Remove</a>
Elissa's Nokia Lumia 820	2/18/2014	2/18/2016	<a href="#">Remove</a>

Apps

Reports

Account

Maximum number of phones you can register: 3

Phone name

Registered date

Expiration date

Elissa's Lumia 1320

4/10/2014

4/10/2016

[Remove](#)

Elissa's Nokia Lumia 820

2/18/2014

2/18/2016

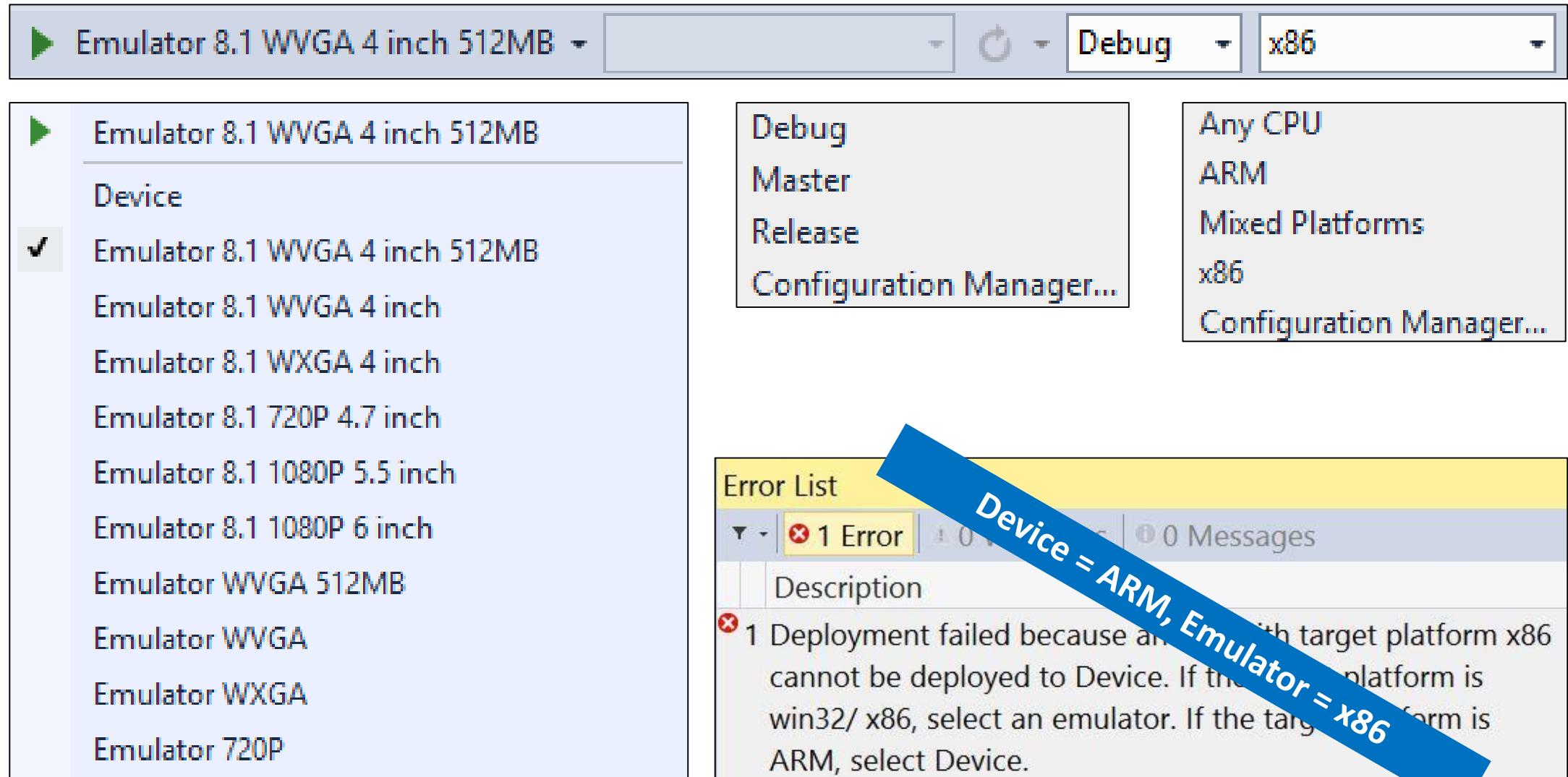
[Remove](#)

MPN certificates

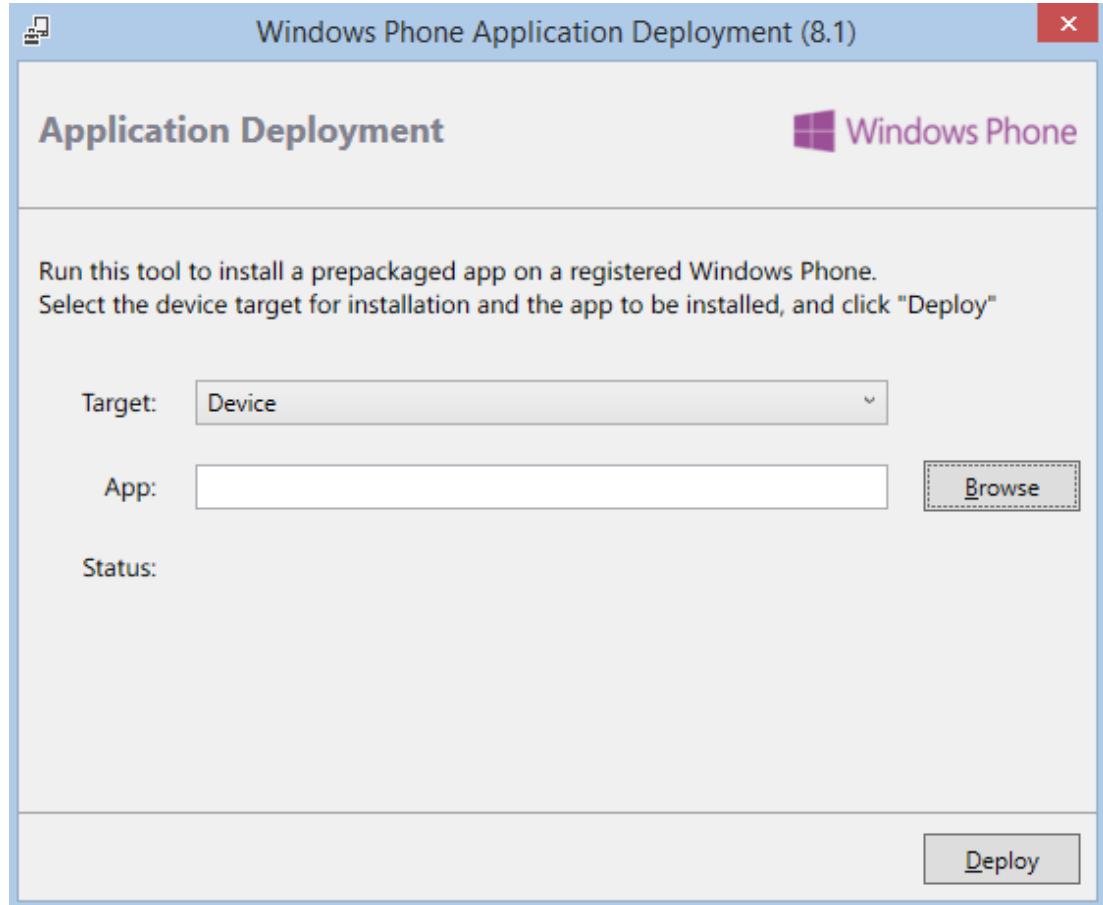
Phones

Windows dashboard

# Device Testing



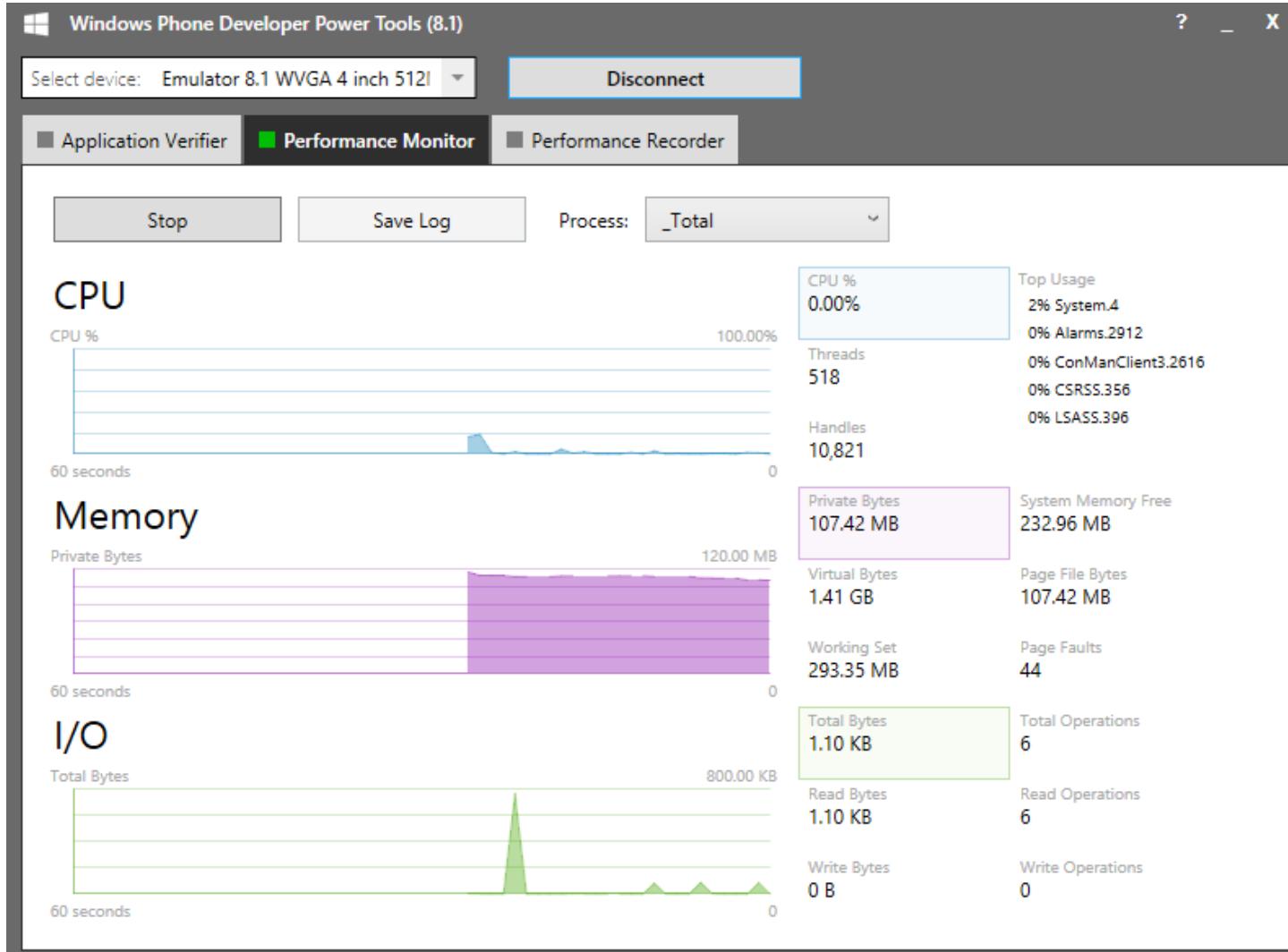
# Application Deployment



## Instructions

1. Select your Target
2. Browse to Windows Phone XAP
3. Click Deploy

# Windows Phone Power Tools



## Application Verifier

Detect subtle programming errors in native code: memory leaks, exceptions...

## Performance Monitor

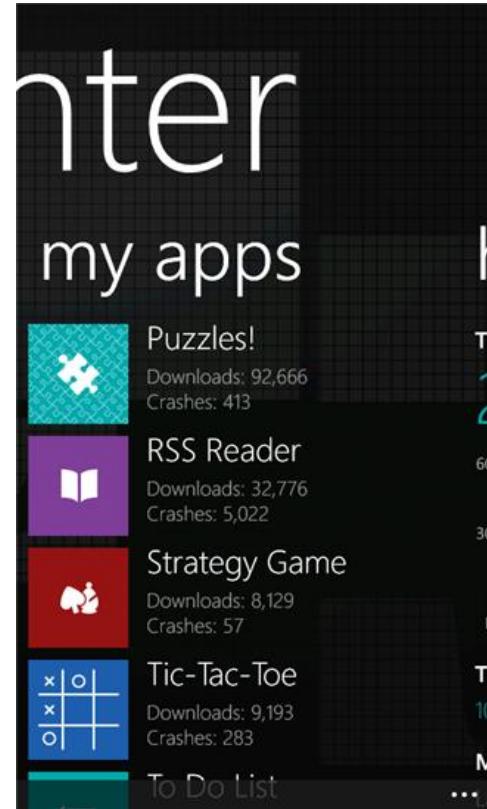
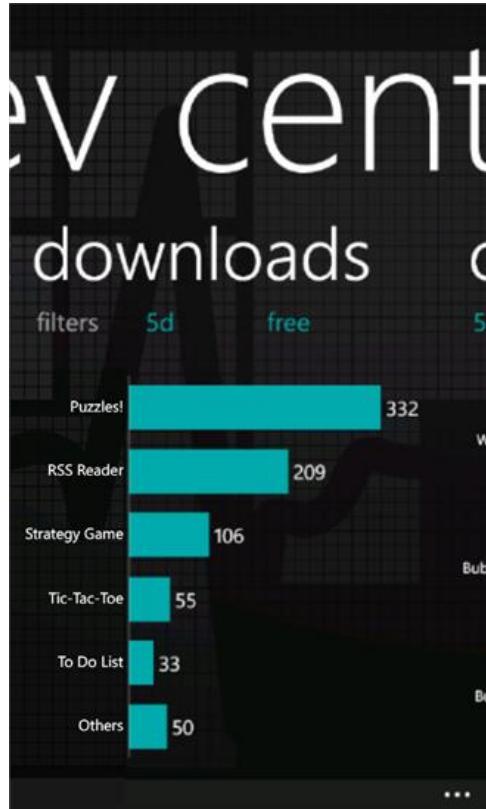
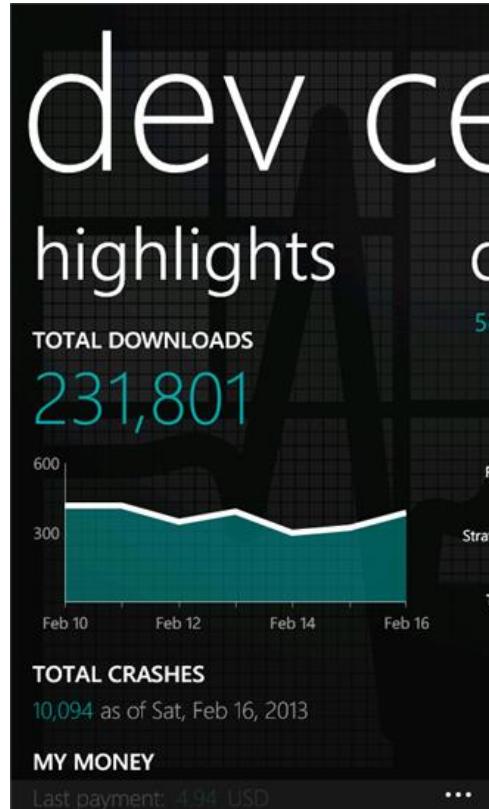
Capture real-time performance metrics and visualize them graphically.

## Performance Recorder

Collect system-wide logs and analyze them on your computer.

# Dev Center App

- Install Dev Center from the Windows Phone Store
- Functionalities: App info, downloads, crashes, user reviews, etc.



# prime[31] Unity Plugins

- For Windows Store & Windows Phone 8 plugins
  - IAP
  - Trial
  - Social
  - Ads
  - Live Tiles
  - Push Notifications
  - Flurry Analytics
  - & more!

# Additional Tools

## Visual Studio 2013 Tools for Unity

<http://visualstudiogallery.msdn.microsoft.com/20b80b8c-659b-45ef-96c1-437828fe7cf2>

## Visual Studio Productivity Power Tools 2013

<http://visualstudiogallery.msdn.microsoft.com/dbcb8670-889e-4a54-a226-a48a15e4cace>

## Prime31 Unity Plugins

<https://prime31.com/>

## Dev Center App

<http://www.windowsphone.com/zh-cn/store/app/dev-center/2d3063c2-4b29-4e69-9c03-50b67b0e6aec>

## Protobuf-net for WP8 .NET

<http://code.google.com/p/protobuf-net/>

# Setup Summary

Windows Store Apps	Windows Phone 8.0	Windows Phone 8.1	Universal Apps	Windows 8
Supports Mac OS X	Boot Camp or Parallels	Visual Studio	Windows Phone Emulators	Virtualization Hyper-V
Phone Registration Tool	Windows Phone Power Tools	Dev Center App	Prime31 Unity Plugins	Visual Studio Tools for Unity

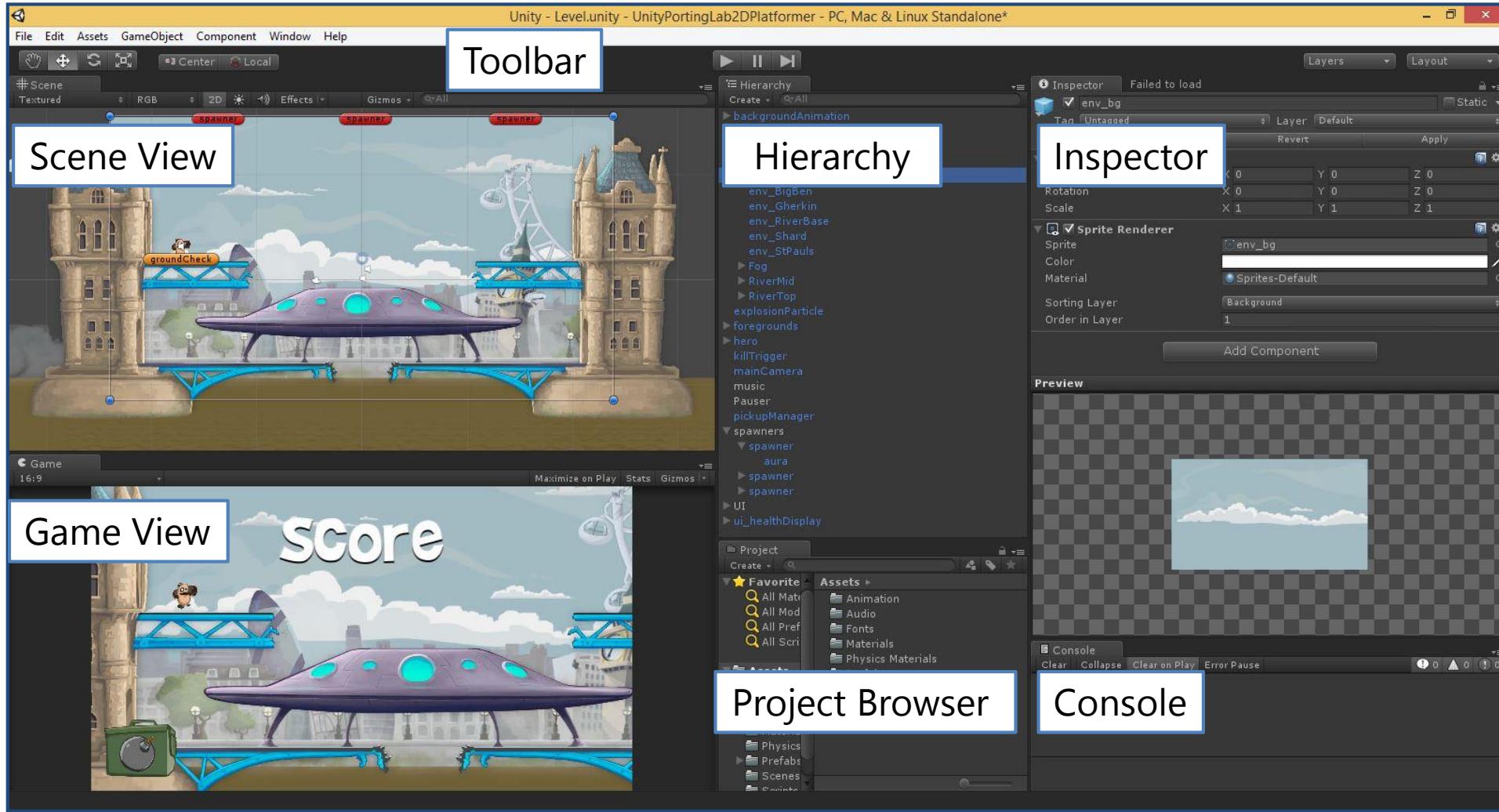
and more...

## 02 | Create a Unity Game



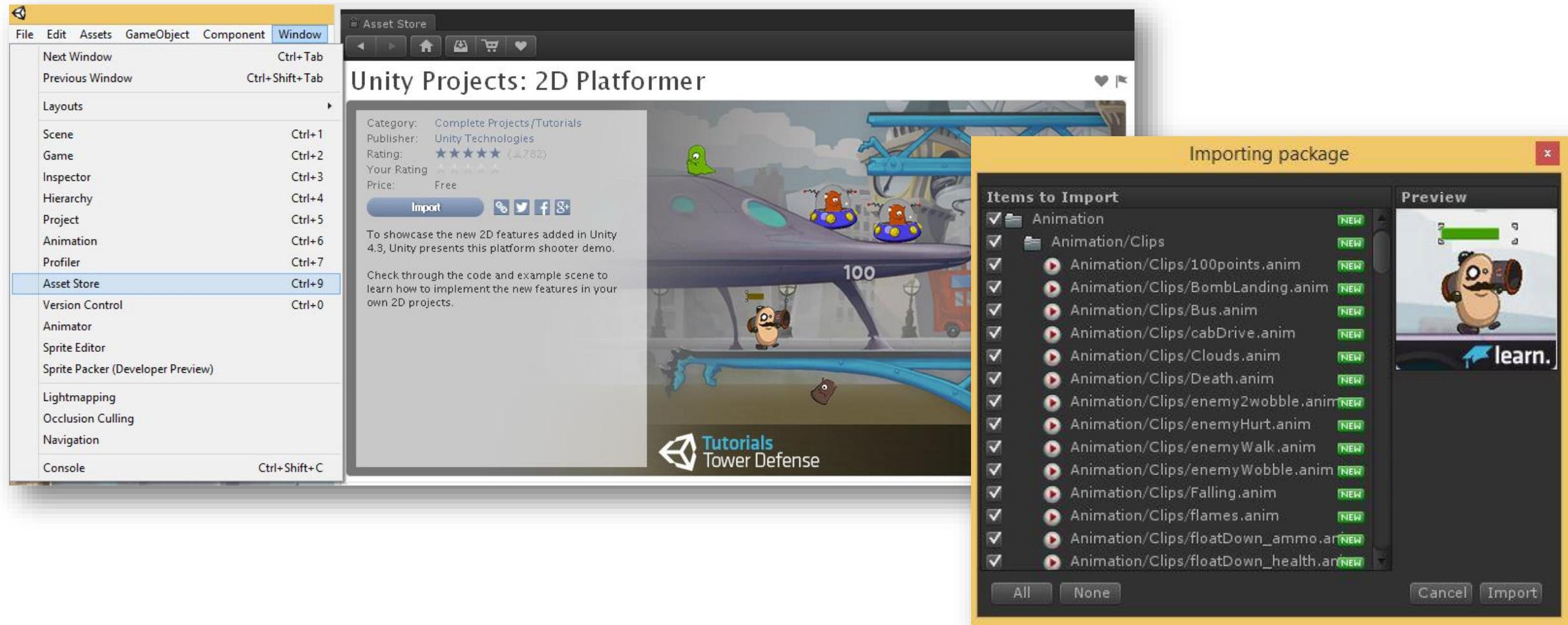
# Unity3D Editor

- <http://docs.unity3d.com/Manual/LearningtheInterface.html>



# Asset Store

Download models, environments, and useful tools!

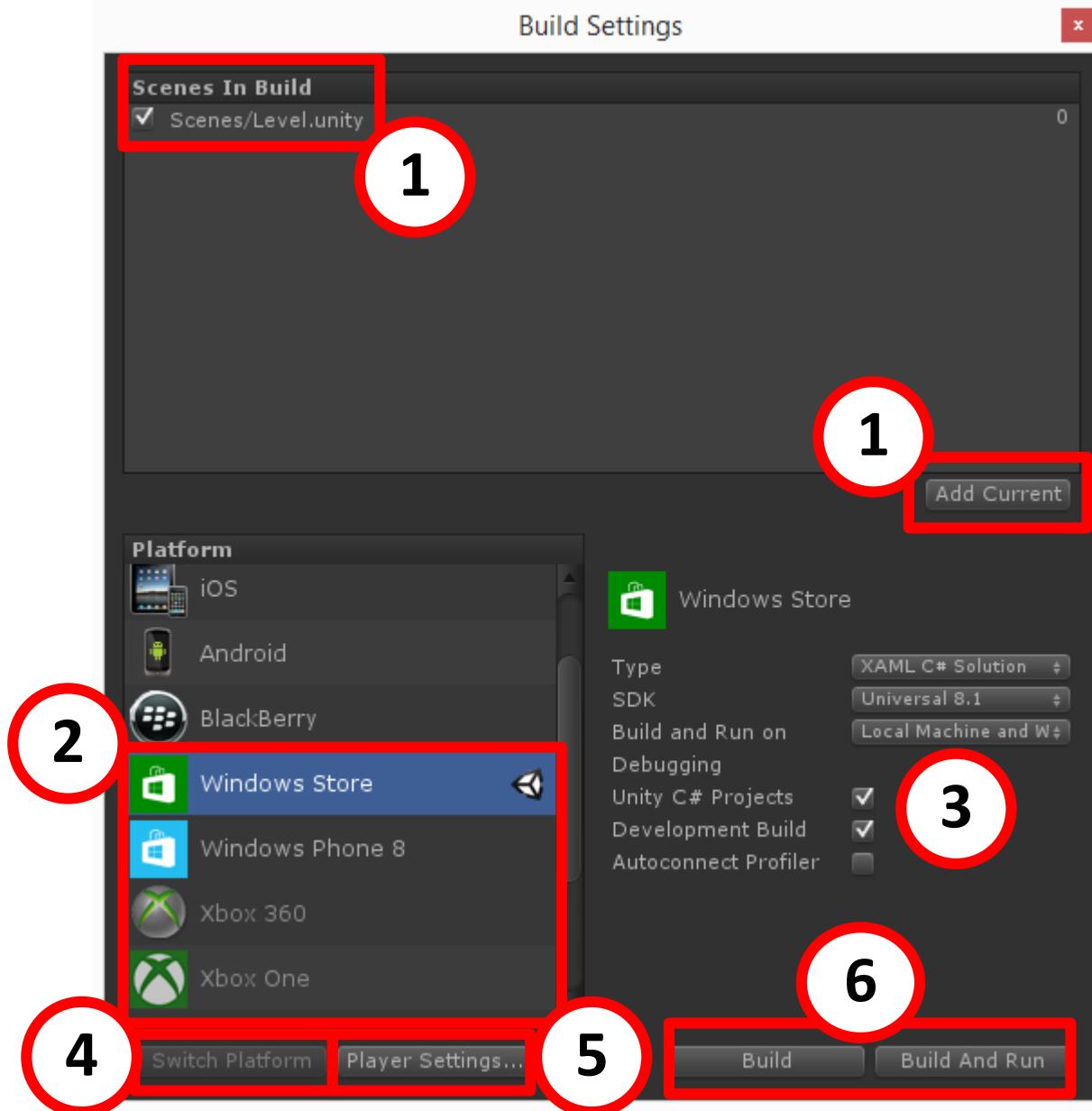


# DEMO

---

Create a Unity Game

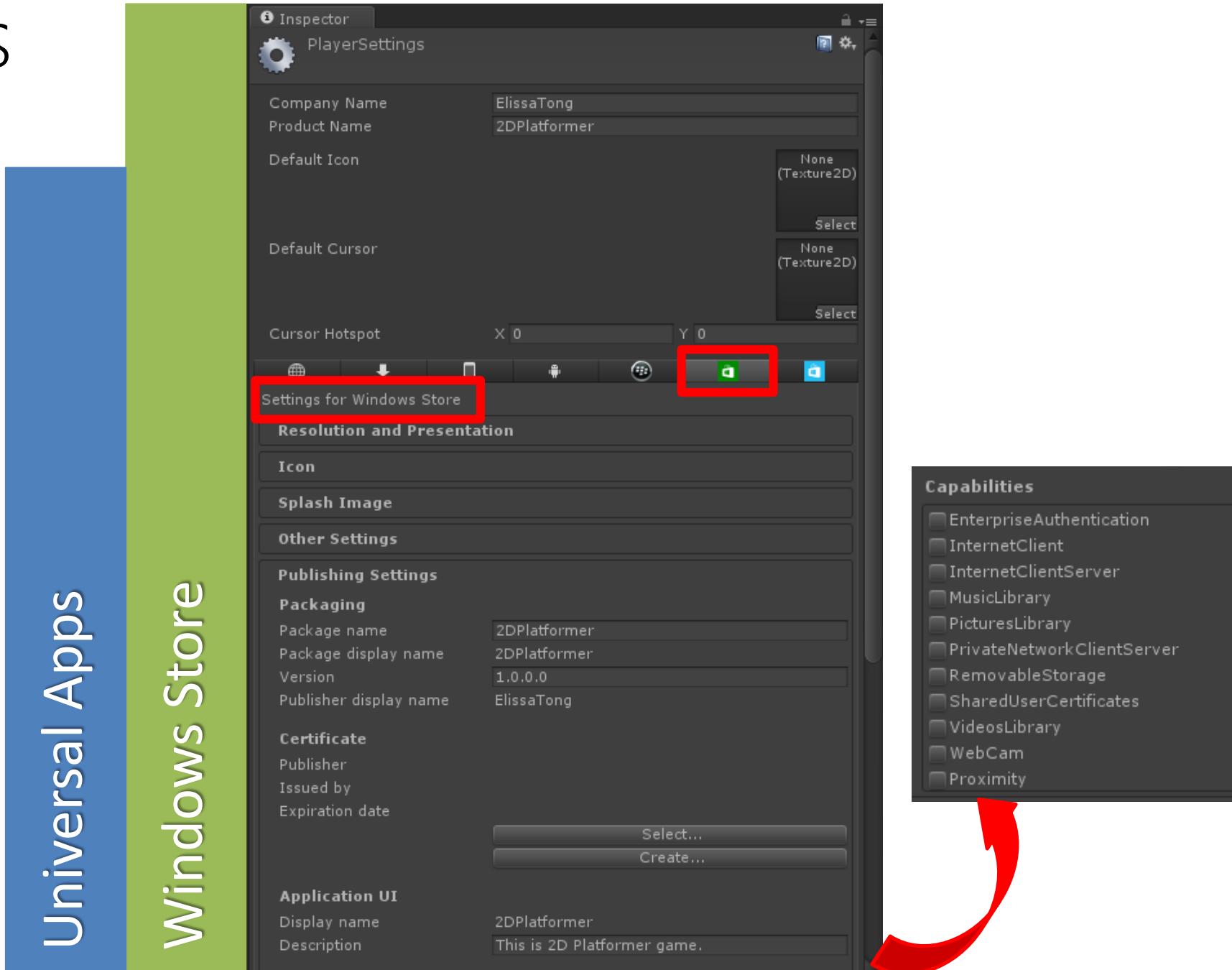
# Build Settings



1. Add needed game Scenes
2. Select a platform
3. Change platform settings
4. Click Switch Platform
5. (Optional) Modify Player Settings
6. Click Build or Build And Run

# Player Settings

Player Settings  
changes settings in  
Package.appxmanifest  
of your Visual Studio project



# Create a Unity Game

Unity 编辑

Asset Store

GameObject

Component

Prefabs

Build Settings

Player Settings

Visual Studio  
Builds &  
Deployment

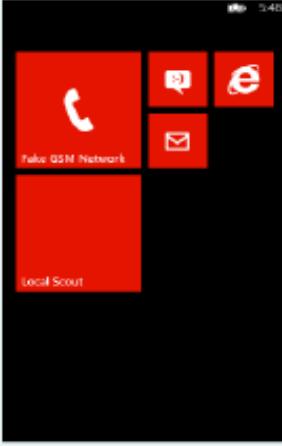
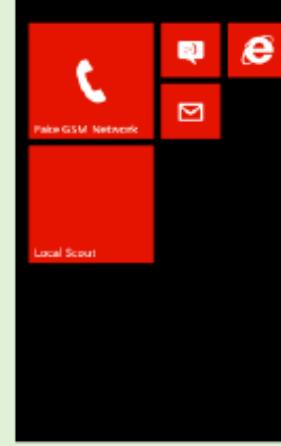
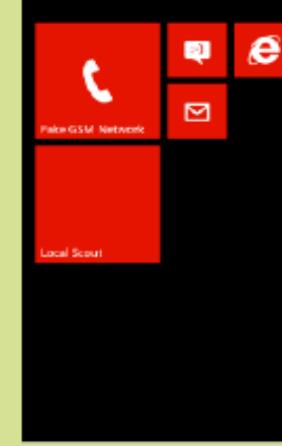
and more...

## 03 | Hardware Modifications



# Multiple Resolutions

- Windows Phone resolutions: WVGA, WXGA, 720p, 1080p
- Emulators available for each resolution
- <http://msdn.microsoft.com/en-us/library/windows/apps/xaml/hh465349.aspx>
- [http://msdn.microsoft.com/en-us/library/windows/apps/jj206974\(v=vs.105\).aspx](http://msdn.microsoft.com/en-us/library/windows/apps/jj206974(v=vs.105).aspx)

WVGA	WXGA	720p	1080p	Full Screen Size (Effective Pixel Resolution)	Device
				384x640	4.5" device 15:9 aspect ratio
480 x 800 15:9	768 x 1280 15:9	720 x 1280 16:9	1080 x 1920 16:9	400x711	4.7" device 16:9 aspect ratio
				450x800	5.5" device 16:9 aspect ratio
				491x873	6" device 16:9 aspect ratio

# Multiple Resolutions

What is your device screen width & height?

<http://blogs.windows.com/buildingapps/2013/11/22/taking-advantage-of-large-screen-windows-phones/>

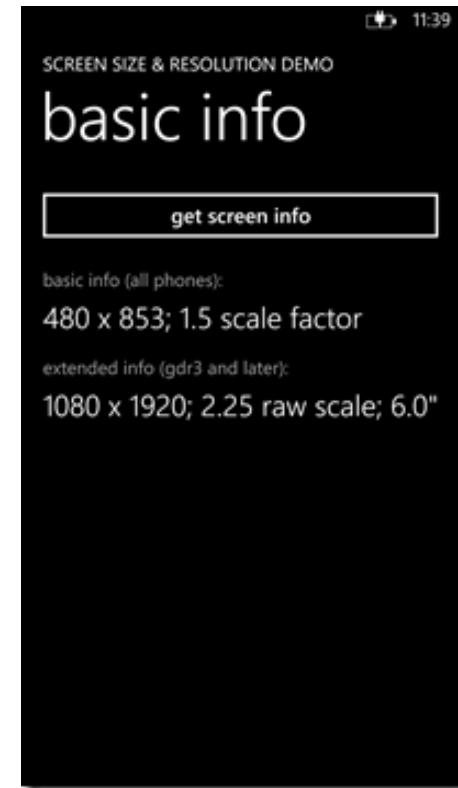
```
string GetBasicScreenInfo()
{
    var width = App.Current.Host.Content.ActualWidth;
    var height = App.Current.Host.Content.ActualHeight;
    var scaleFactor = (double)App.Current.Host.Content.ScaleFactor / 100d;
    return String.Format("{0} x {1}; {2:0.0} scale factor", width, height, scaleFactor);
}

string GetExtendedScreenInfo()
{
    object temp;
    if (!DeviceExtendedProperties.TryGetValue("PhysicalScreenResolution", out temp)) return "not available";

    var resolution = (Size)temp;
    if (!DeviceExtendedProperties.TryGetValue("RawDpiX", out temp) || (double)temp == 0d) return "not available";

    var dpi = (double)temp;
    var screenDiagonal = Math.Sqrt(Math.Pow(resolution.Width / dpi, 2) + Math.Pow(resolution.Height / dpi, 2));
    var width = App.Current.Host.Content.ActualWidth;

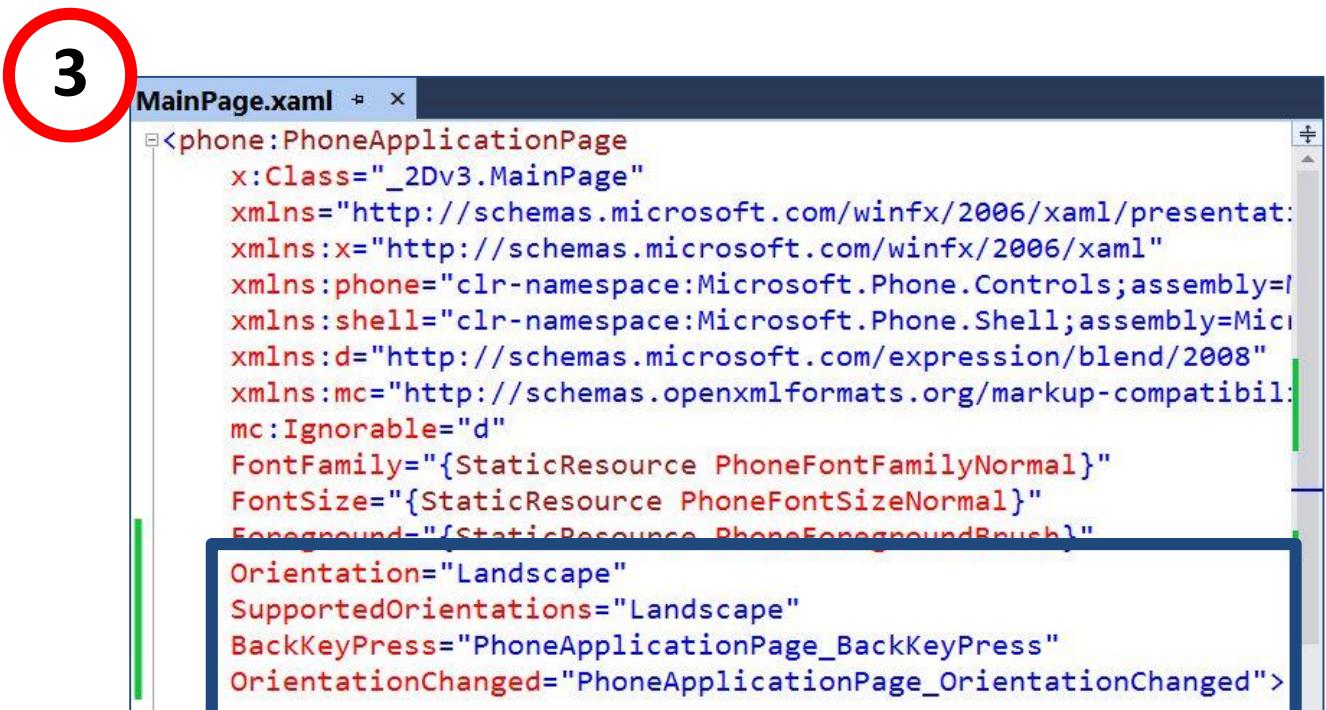
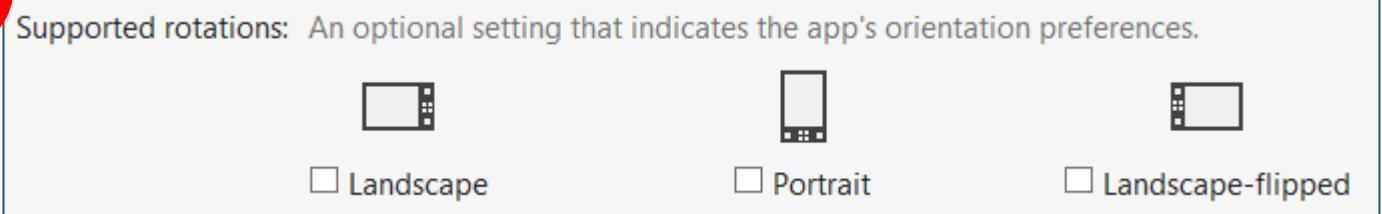
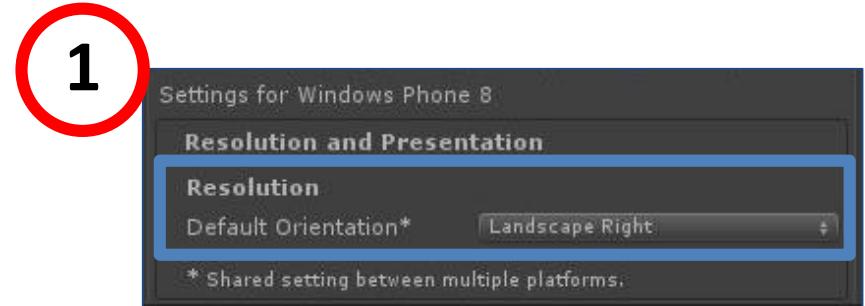
    return String.Format("{0} x {1}; {2:0.0#} raw scale; {3:0.0}",
        resolution.Width, resolution.Height, resolution.Width / width, screenDiagonal);
}
```



# Orientation

1. Windows Phone 8 Unity Player Settings
2. Package.appmanifest:
3. MainPage.xaml
4. Unity API

```
Screen.orientation =  
ScreenOrientation.AutoRotation;
```



# Memory Limits

Device	Memory	Windows Phone 8.0 * Native Min / Silverlight Min / Maximum	Windows Phone 8.1
Lower memory devices WVGA	512 MB	150 MB / 150 MB / 180 MB	185 MB
720p devices	1 GB	150 MB / 300 MB / 380 MB	390 MB
Newer devices: 4.5" WXGA	2 GB	150 MB / 450 MB / 570 MB	825 MB

## Memory-related manifest entries

Capabilities	ID_FUNC_EXTENDED_MEM	WP8.0: Use the maximum memory limit
Requirements	ID_REQ_MEMORY_300	WP8.0: Restriction app for only devices greater than 512 MB
Prerequisites	MinDeviceMemory	WP8.1: Define minimum device

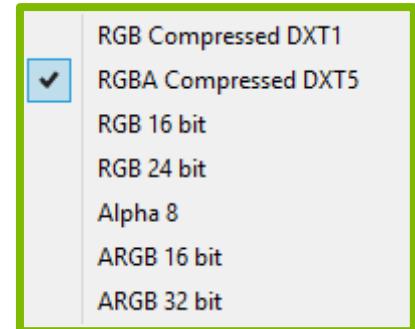
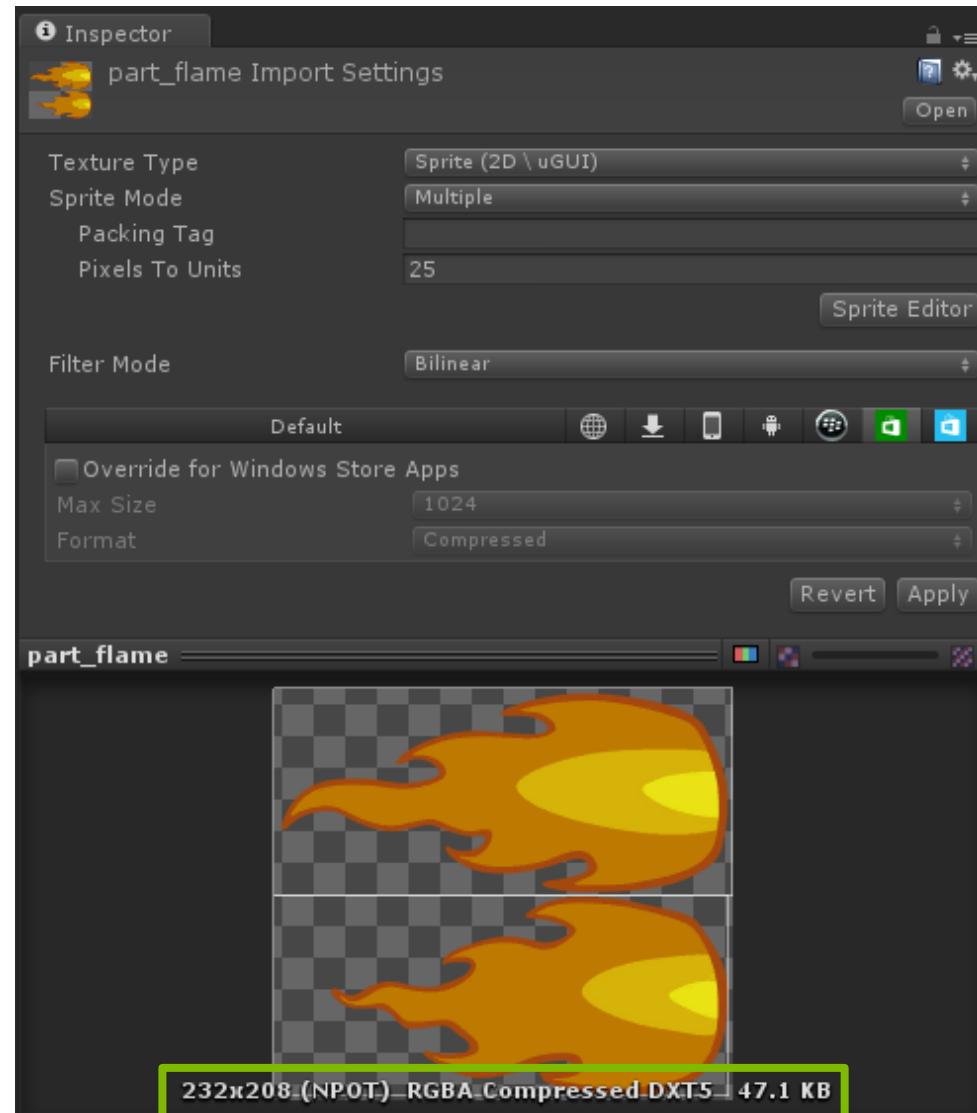
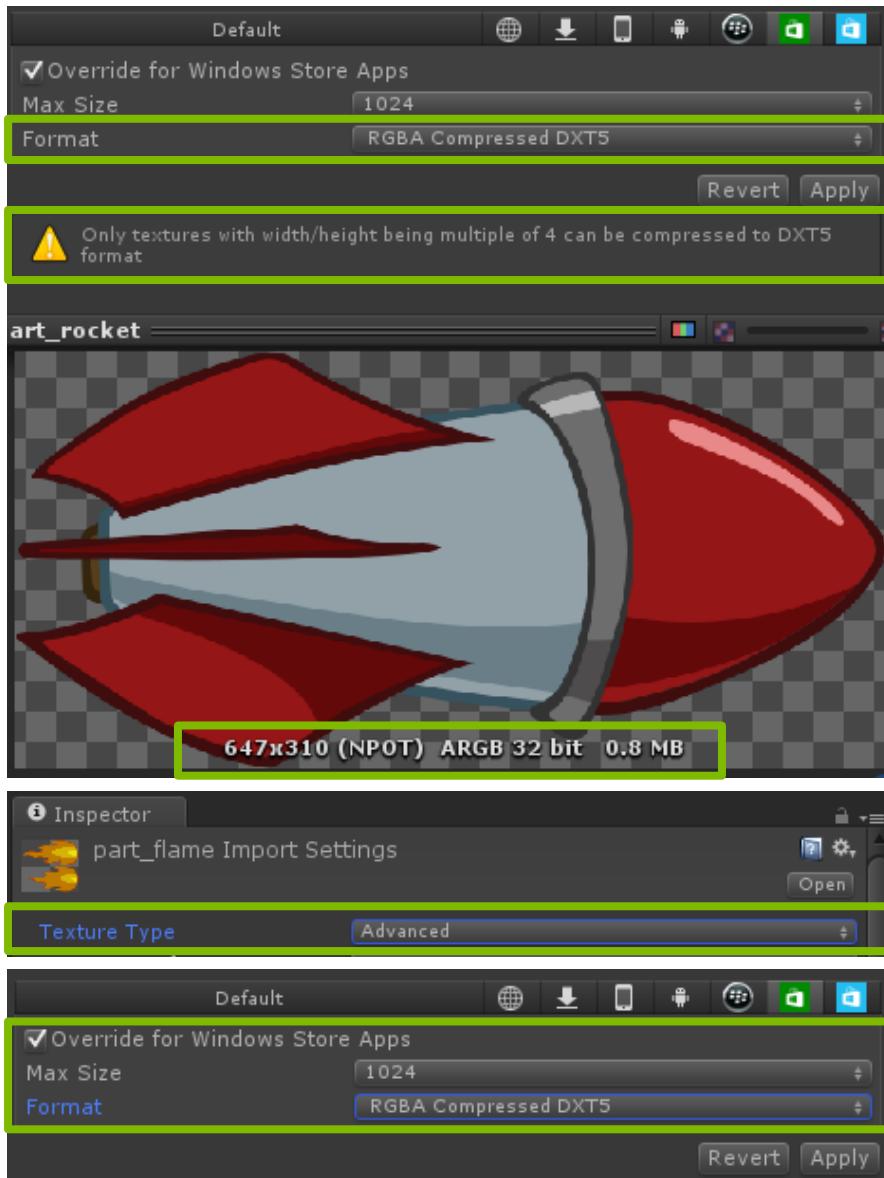
App memory limits for Windows Phone 8

[http://msdn.microsoft.com/en-us/library/windowsphone/develop/jj681682\(v=vs.105\).aspx/html](http://msdn.microsoft.com/en-us/library/windowsphone/develop/jj681682(v=vs.105).aspx/html)

# Memory Limits

```
// WP8.0.  
ulong committedLimit = Windows.Phone.System.Memory.MemoryManager.ProcessCommittedLimit;  
ulong committedBytes = Windows.Phone.System.Memory.MemoryManager.ProcessCommittedBytes;  
// WP8.1.  
ulong usageLimit = Windows.System.MemoryManager.AppMemoryUsageLimit;  
ulong currentUsage = Windows.System.MemoryManager.AppMemoryUsage;  
MemoryManager.AppMemoryUsageIncreased += OnAppMemoryUsageIncreased;  
MemoryManager.AppMemoryUsageDecreased += OnAppMemoryUsageDecreased;  
  
private void OnAppMemoryUsageIncreased(object sender, object e)  
{    switch (MemoryManager.AppMemoryUsageLevel)  
    {  
        case AppMemoryUsageLevel.High:  
            break;  
        case AppMemoryUsageLevel.Medium:  
            break;  
        case AppMemoryUsageLevel.Low:  
            break;  
    }  
}
```

# Memory: Texture Compression



<http://docs.unity3d.com/Manual/class-TextureImporter.html>

# Memory Resources

How to disable features in apps for lower-memory phones for WP8

[http://msdn.microsoft.com/en-US/library/windows/apps/hh855083\(v=vs.105\).aspx/html](http://msdn.microsoft.com/en-US/library/windows/apps/hh855083(v=vs.105).aspx/html)

Managing Resource Constraints on Windows Phone

<http://channel9.msdn.com/Events/Build/2014/3-542>

Developing apps for lower-memory phones for Windows Phone 8

[http://msdn.microsoft.com/en-us/library/windows/apps/hh855081\(v=vs.105\).aspx](http://msdn.microsoft.com/en-us/library/windows/apps/hh855081(v=vs.105).aspx)

Make sure to profile your phone app's memory usage

<http://forum.unity3d.com/threads/202952-tips-and-tricks-make-sure-to-profile-your-phone-app-s-memory-usage!>

# Back Button

## Windows Phone Technical Certification Requirements

[http://msdn.microsoft.com/en-us/library/windows/apps/hh184840\(v=vs.105\).aspx](http://msdn.microsoft.com/en-us/library/windows/apps/hh184840(v=vs.105).aspx)

### MainPage.xaml.cs

```
private void PhoneApplicationPage_BackKeyPress(object s, CancelEventArgs e)
{
    e.Cancel = UnityApp.BackButtonPressed();
    // TO DO. . .
}
```

### Unity Scripts

```
if (Input.GetKeyDown(KeyCode.Escape)) {
{
    Debug.Log("ESCAPE Input key down");
    Application.Quit();
}
```

# Player Control

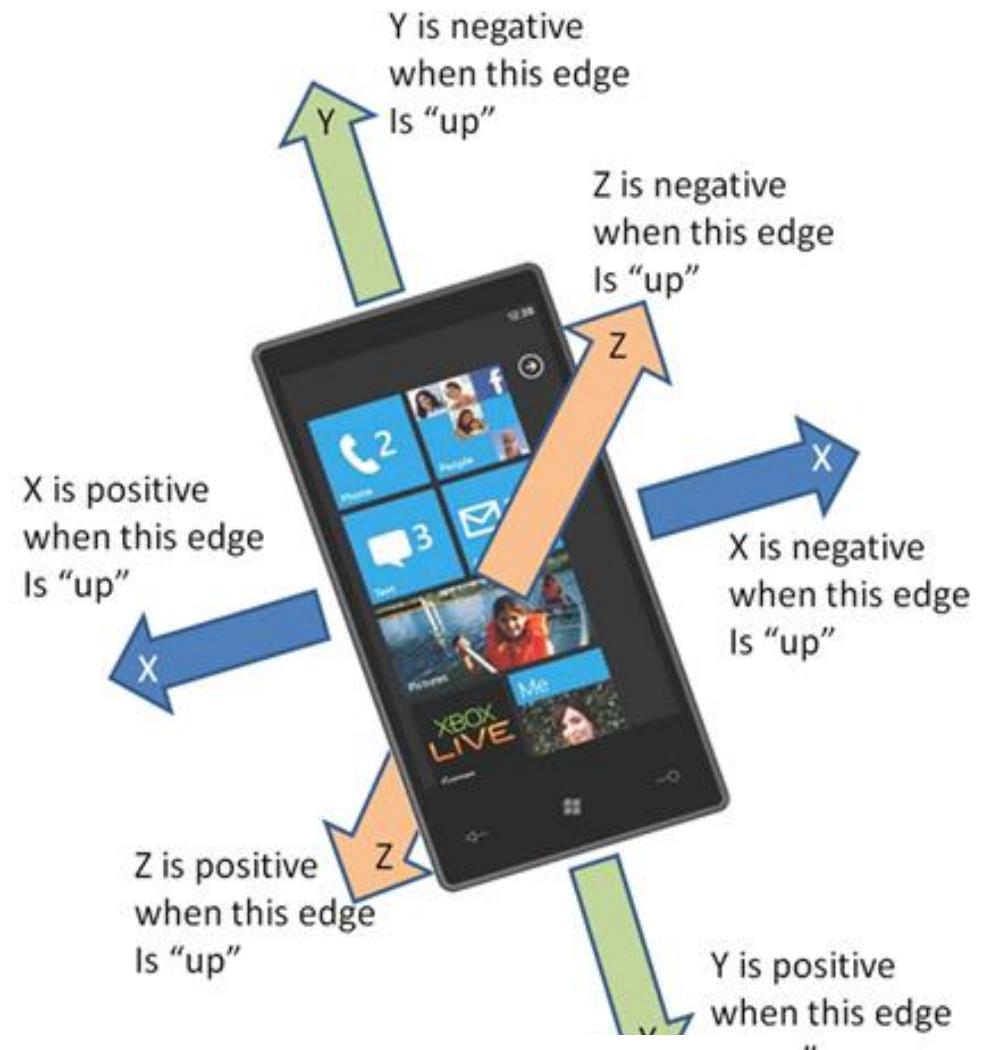
## Unity Scripts

### Accelerometer

```
if(Application.platform == RuntimePlatform.WP8Player)
{
    MoveAmount = (PlayerSpeed * Input.acceleration.x )
        * Time.deltaTime;
    transform.Translate(Vector3.right * MoveAmount);
    MoveAmount = (PlayerSpeed * ((-Input.acceleration.z
        + 0.5f)*2)) * Time.deltaTime;
    transform.Translate(Vector3.forward * MoveAmount);
}
```

### Touch

```
if (Application.platform == RuntimePlatform.WP8Player)
{
    if (grounded && Input.touchCount == 1 && Input.GetTouch(0).phase == TouchPhase.Ended)
        jump = true;
}
```



# DEMO

---

Hardware Modifications

# Hardware Modifications

Multiple  
Resolutions

Orientation

Memory

Texture  
Compression

Back Button

Accelerometer

Touch

and more...

## 04 | Understand API Changes



# .NET Framework

## Mono .NET (Unity 3.5 .NET)

<https://github.com/mono/mono/tree/master/mcs/class/System/System.Net>

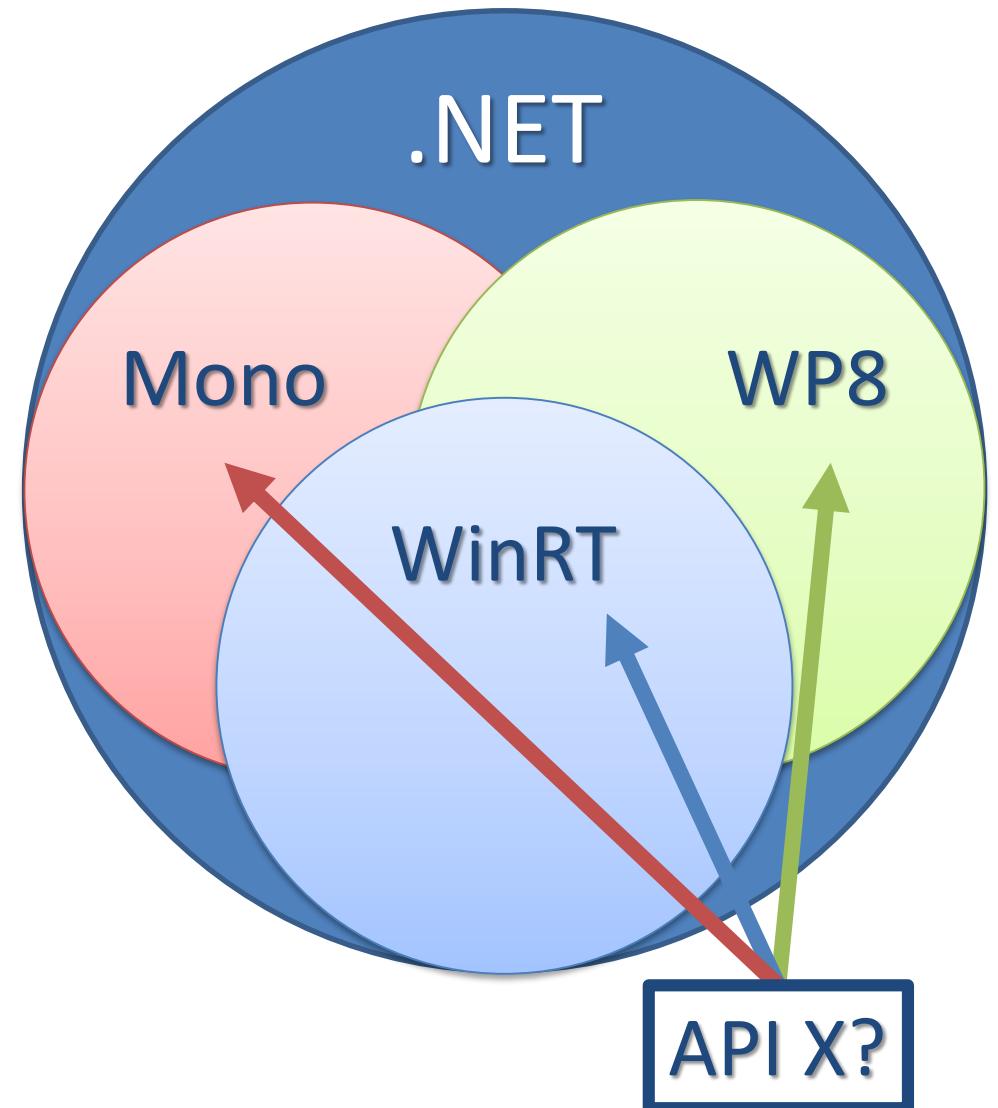
## .NET API for Windows Phone 8.0

[http://msdn.microsoft.com/en-us/library/windowsphone/develop/jj207211\(v=vs.105\).aspx](http://msdn.microsoft.com/en-us/library/windowsphone/develop/jj207211(v=vs.105).aspx)

## .NET API for Windows Runtime

(Windows 8.1 & Windows Phone 8.1)

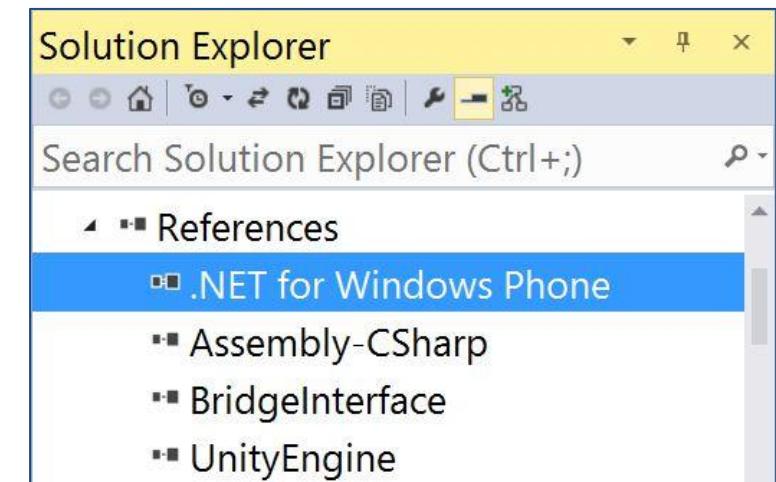
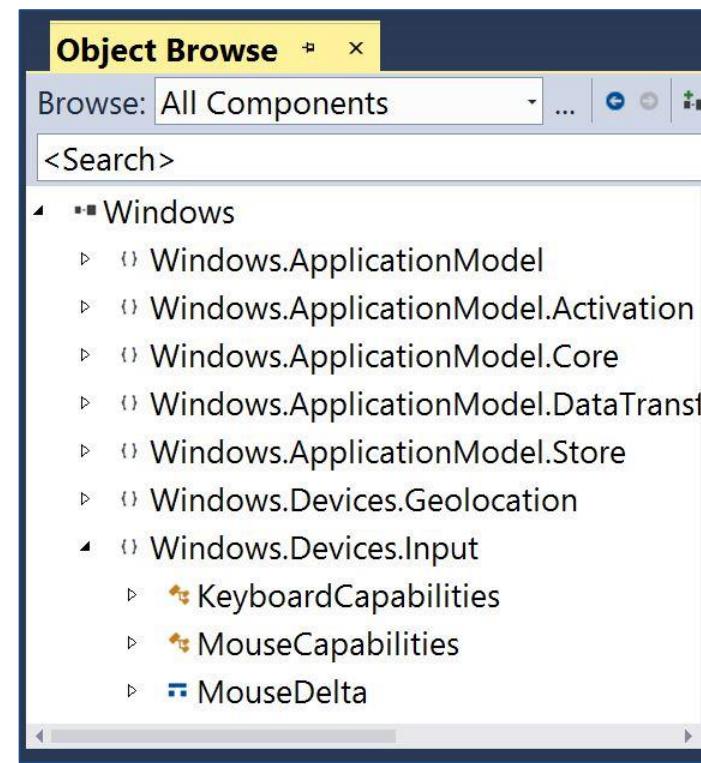
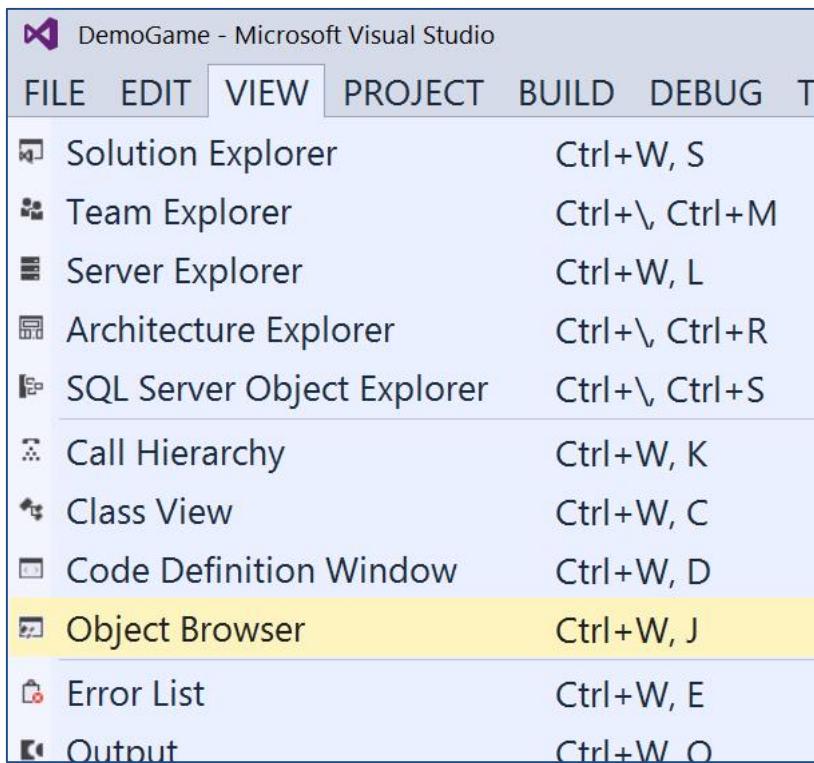
<http://msdn.microsoft.com/en-us/library/windows/apps/bb211369.aspx>



# .NET Framework

How do you know if an API is supported?

- Visual Studio IDE → View → Object Browser
- Or open Solution Explorer, and double click on any References



# Platform #defines

#defines	Supported Platforms
UNITY_WP8	Windows Phone 8.0 apps
UNITY_WP_8_1	Windows Phone 8.1 and Universal 8.1 apps on Windows Phone devices
UNITY_METRO	Windows Phone 8.1, Windows Store 8.0, Windows Store 8.1 and Universal 8.1 apps
UNITY_METRO_8_0	Windows Store 8.0 apps
UNITY_METRO_8_1	Windows Store 8.1 and Universal 8.1 apps running on Windows devices
UNITY_WINRT	Both Windows Phone and Windows Store apps, regardless of version
UNITY_WINRT_8_0	Windows Phone 8.0 and Windows Store 8.0 apps;
UNITY_WINRT_8_1	Windows Phone 8.1, Windows Store 8.1 and Universal apps for Windows and Windows Phone devices
NETFX_CORE	Windows Store 8.0, Windows Store 8.1, Windows Phone 8.1 and Universal 8.1 scripts that are compiled using Microsoft C# compiler.

# Resolve API Needs

- Case 1: Unity Plugins

Example: Elissa's GitHub Unity Plugins:

<https://github.com/elissatong/UnityPortingLabs>

Example: 3rd Party GitHub Platformer Plugins:

<https://github.com/windowsgamessamples/UnityPorting>

- Case 2: Direct Communication: Action (void delegate)

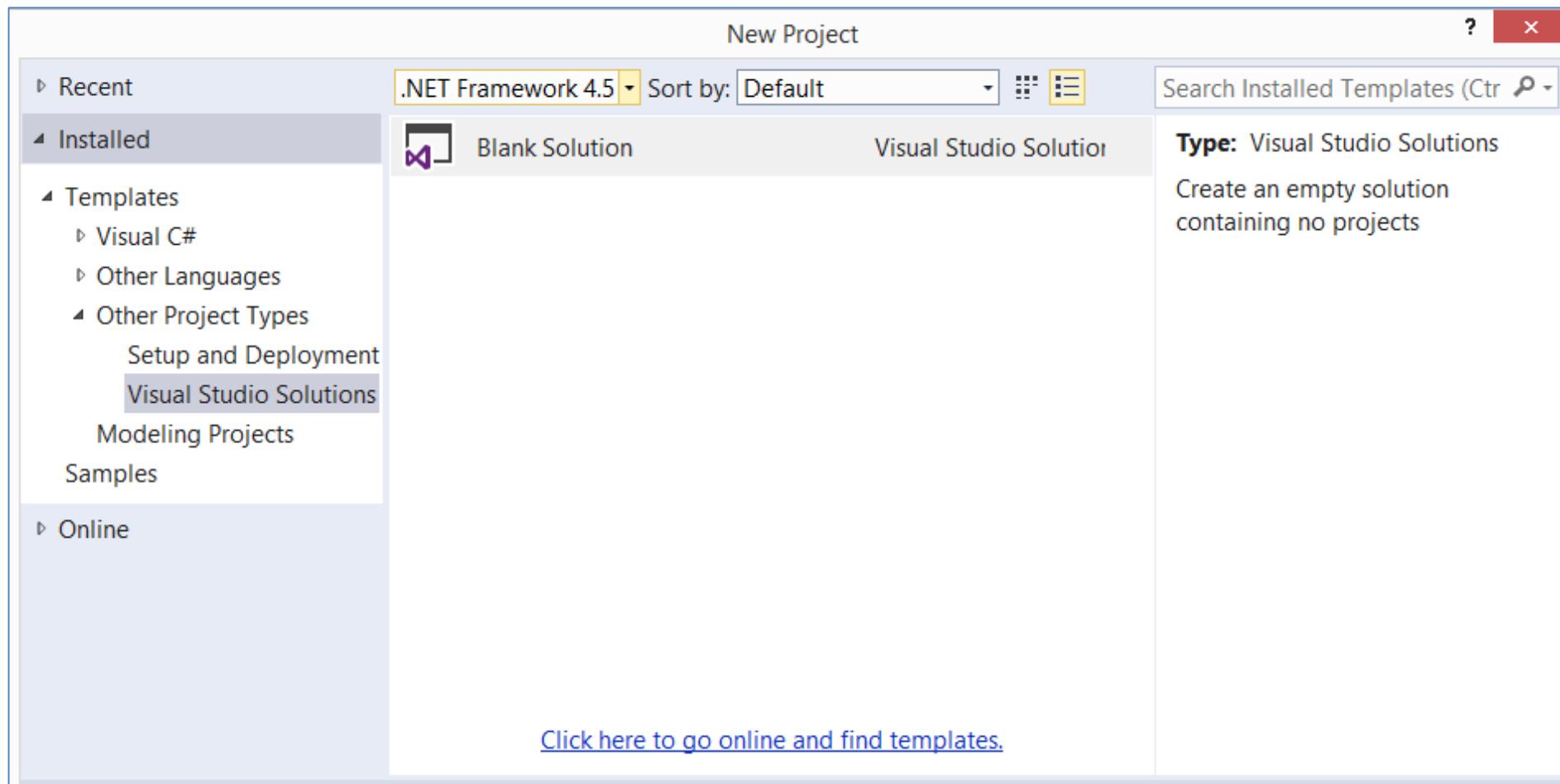
Example: WindowsGateway.cs

- Case 3: Global instances

Example: GameManager.cs

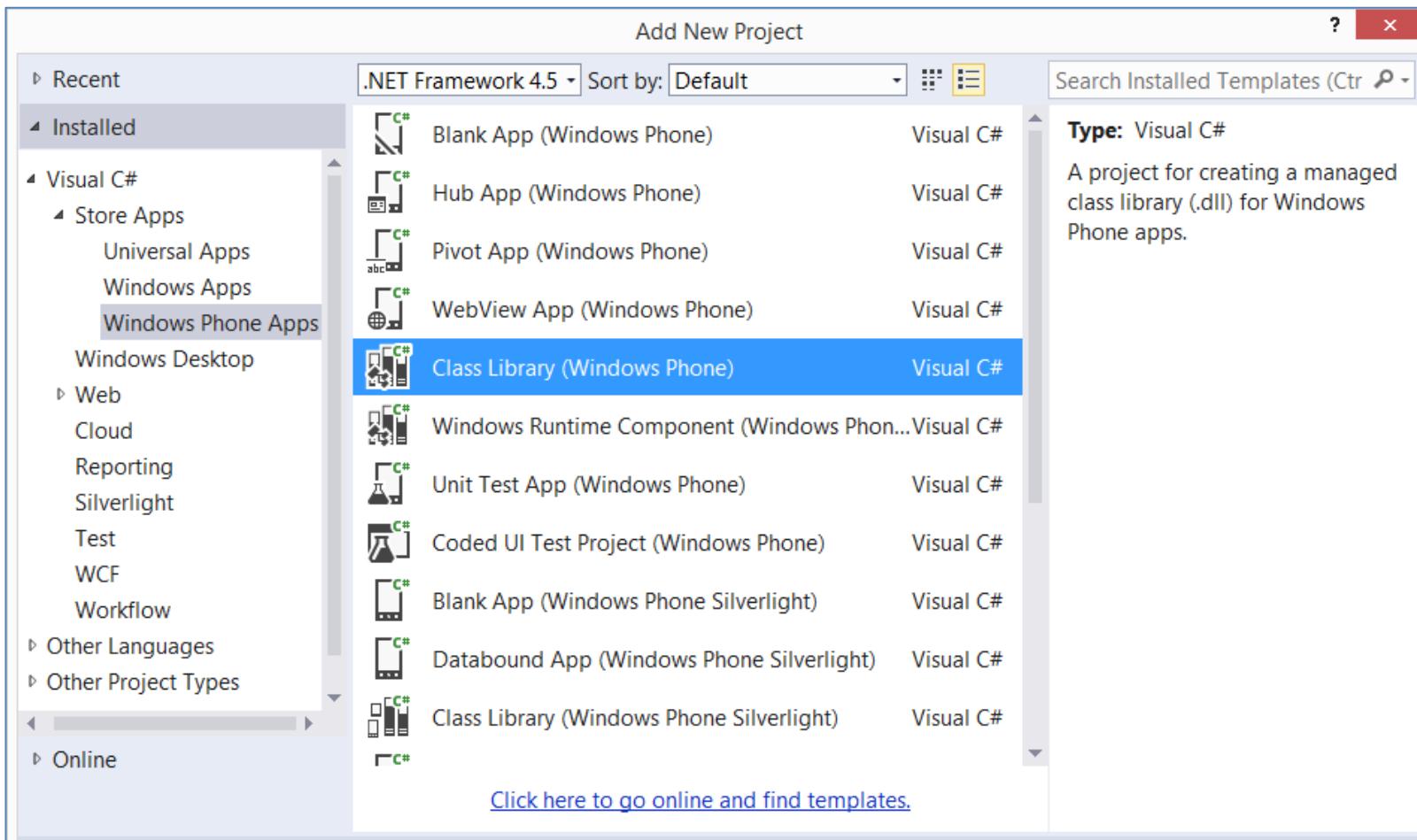
# Case 1: Unity Plugins

## Step 1: Create a Visual Studio Blank Solution



# Unity Plugins

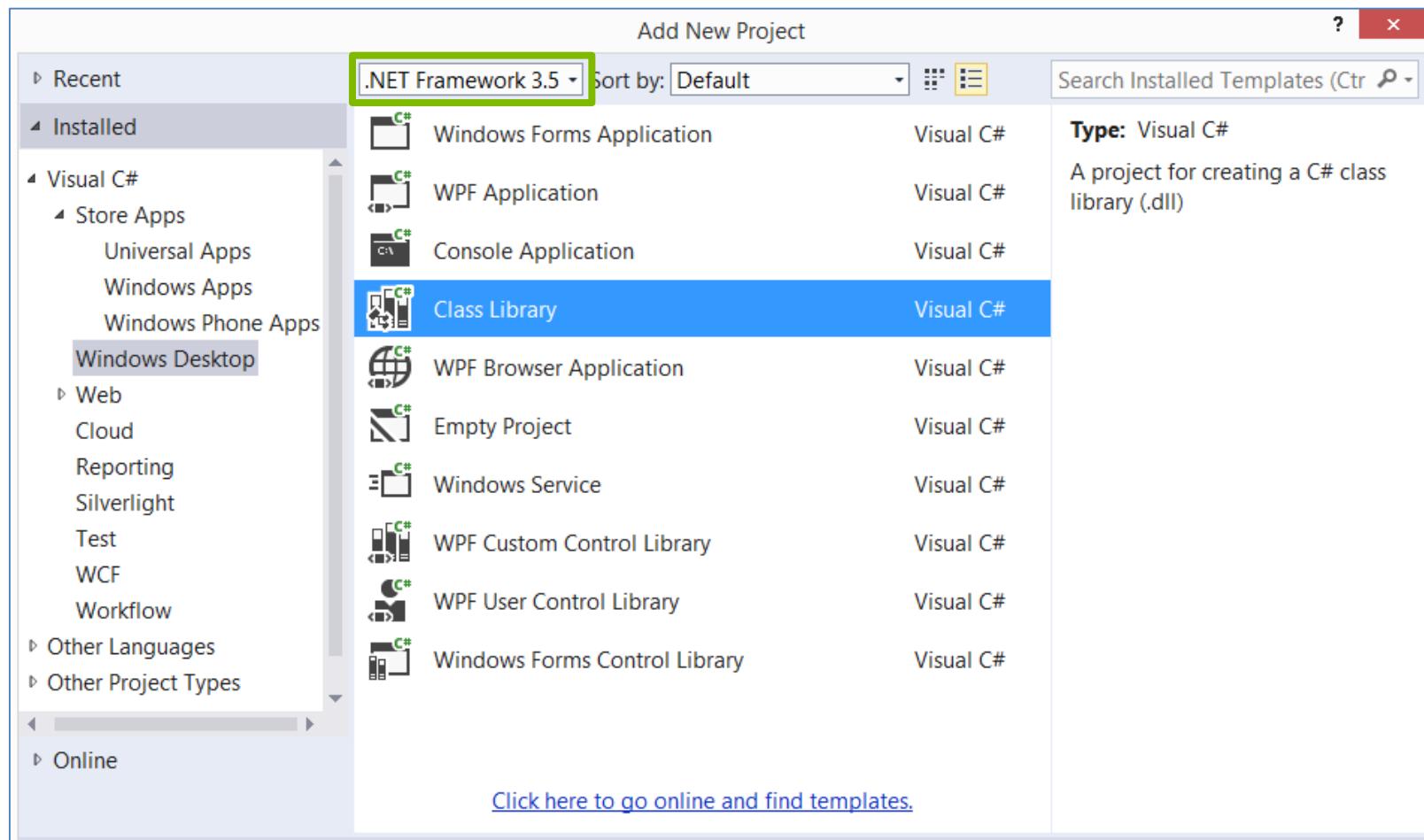
Step 2: Add New Project to Solution, select Class Library (Windows Phone)



# Unity Plugins

## Step 3: Add New Project to Solution, select Windows Desktop: Class Library

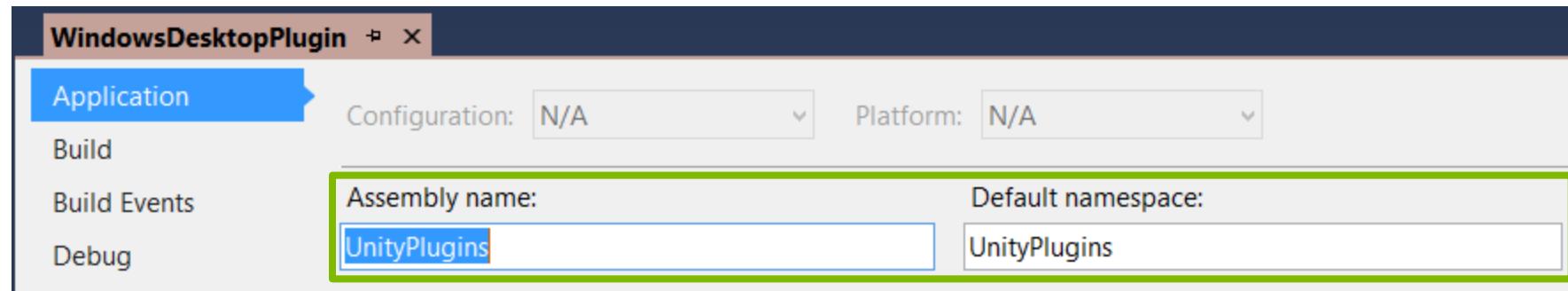
Unity uses .NET 3.5  
Hence, need to select  
.NET Framework 3.5



# Unity Plugins

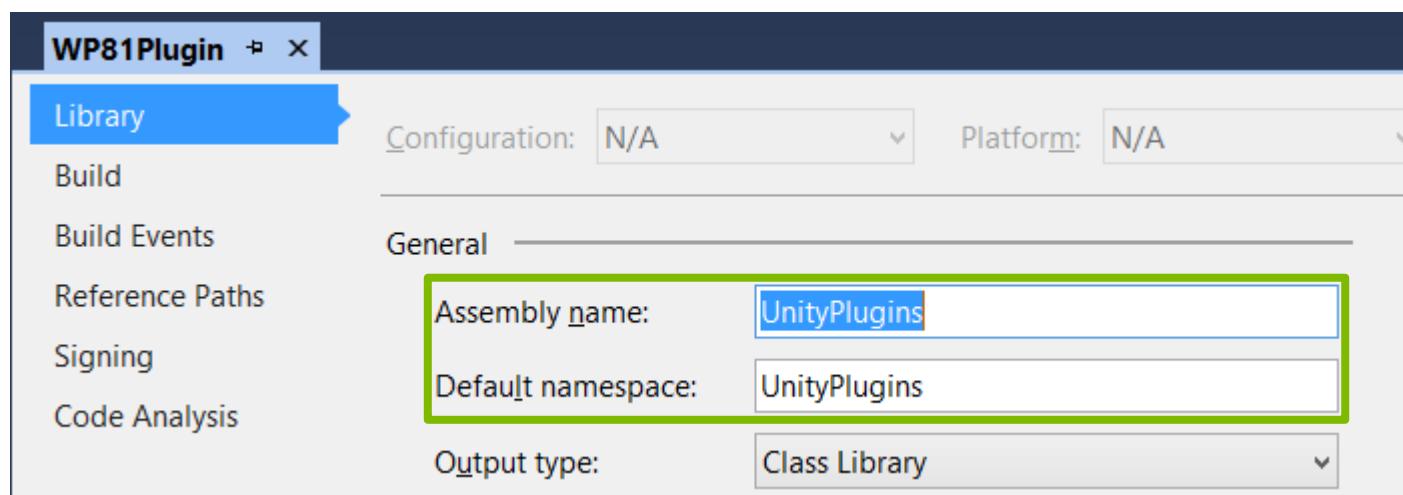
Step 4: In each Class Library project, open Properties.

Change Assembly name and Default namespace to use same name.



The screenshot shows the properties window for the "WindowsDesktopPlugin" project. The "Application" tab is selected. The "Assembly name:" field contains "UnityPlugins" and the "Default namespace:" field also contains "UnityPlugins". Both fields are highlighted with a green border.

Configuration:	N/A	Platform:	N/A
Assembly name:	UnityPlugins	Default namespace:	UnityPlugins

The screenshot shows the properties window for the "WP81Plugin" project. The "Library" tab is selected. The "General" section displays the "Assembly name:" field containing "UnityPlugins" and the "Default namespace:" field also containing "UnityPlugins". Both fields are highlighted with a green border.

Configuration:	N/A	Platform:	N/A
Assembly name:	UnityPlugins	Default namespace:	UnityPlugins
Output type:	Class Library		

# Unity Plugins

Step 5: Open up Class1.cs, change Namespace name to match.  
Make sure all classes, functions, and property names match.

```
namespace UnityPlugins
{
    public class Class1
    {
        public static string GetMemoryUsageLimit
        {
            get
            {
                return "Not supported";
            }
        }

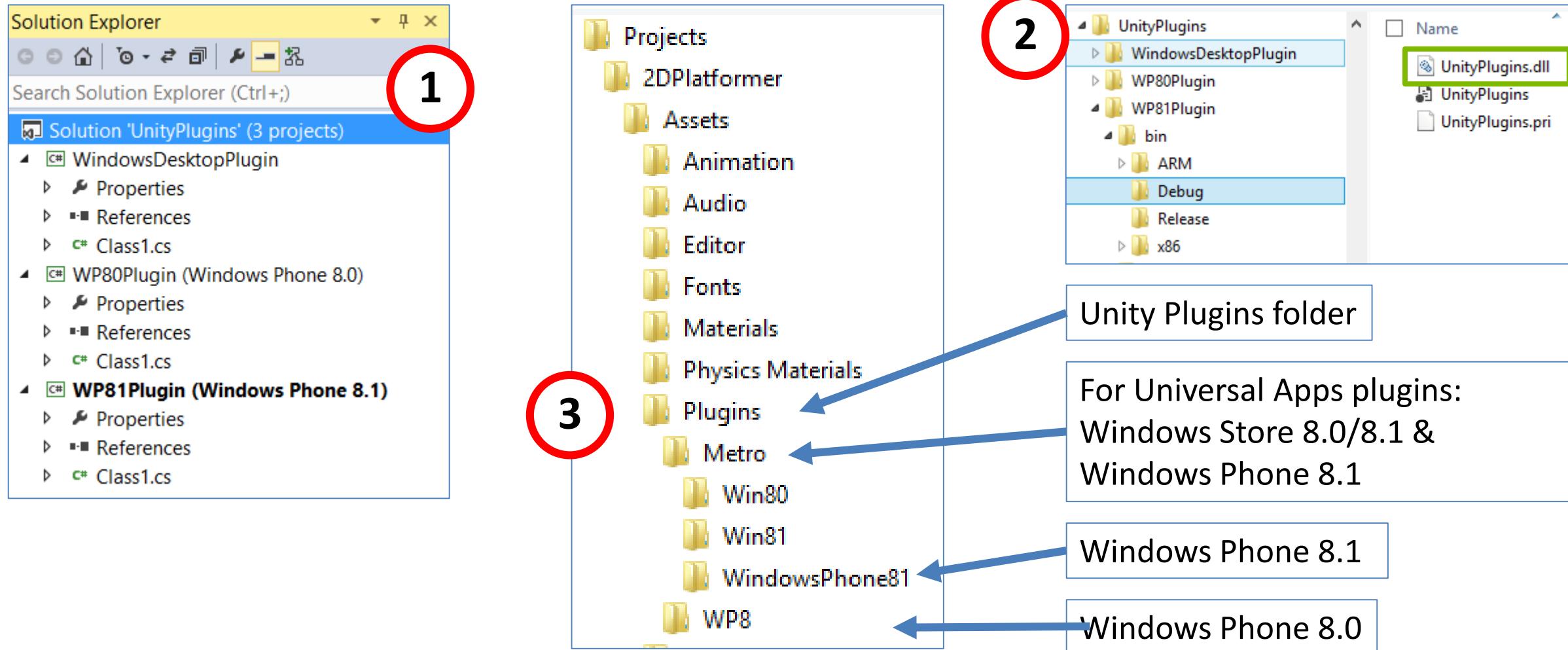
        public static string GetMemoryCurrentUsage
        {
            get
            {
                return "Not supported";
            }
        }
    }
}
```

```
namespace UnityPlugins
{
    public class Class1
    {
        public static string GetMemoryUsageLimit
        {
            get
            {
                // WP8.1.
                ulong usageLimit = Windows.System.MemoryManager.AppMemoryUsageLimit;
                ulong bytesToMB = usageLimit / (1024 * 1024);
                return bytesToMB.ToString() + " MB";
            }
        }

        public static string GetMemoryCurrentUsage
        {
            get
            {
                // WP8.1.
                ulong currentUsage = Windows.System.MemoryManager.AppMemoryUsage;
                ulong bytesToMB = currentUsage / (1024 * 1024);
                return bytesToMB.ToString() + " MB";
            }
        }
    }
}
```

# Unity Plugins

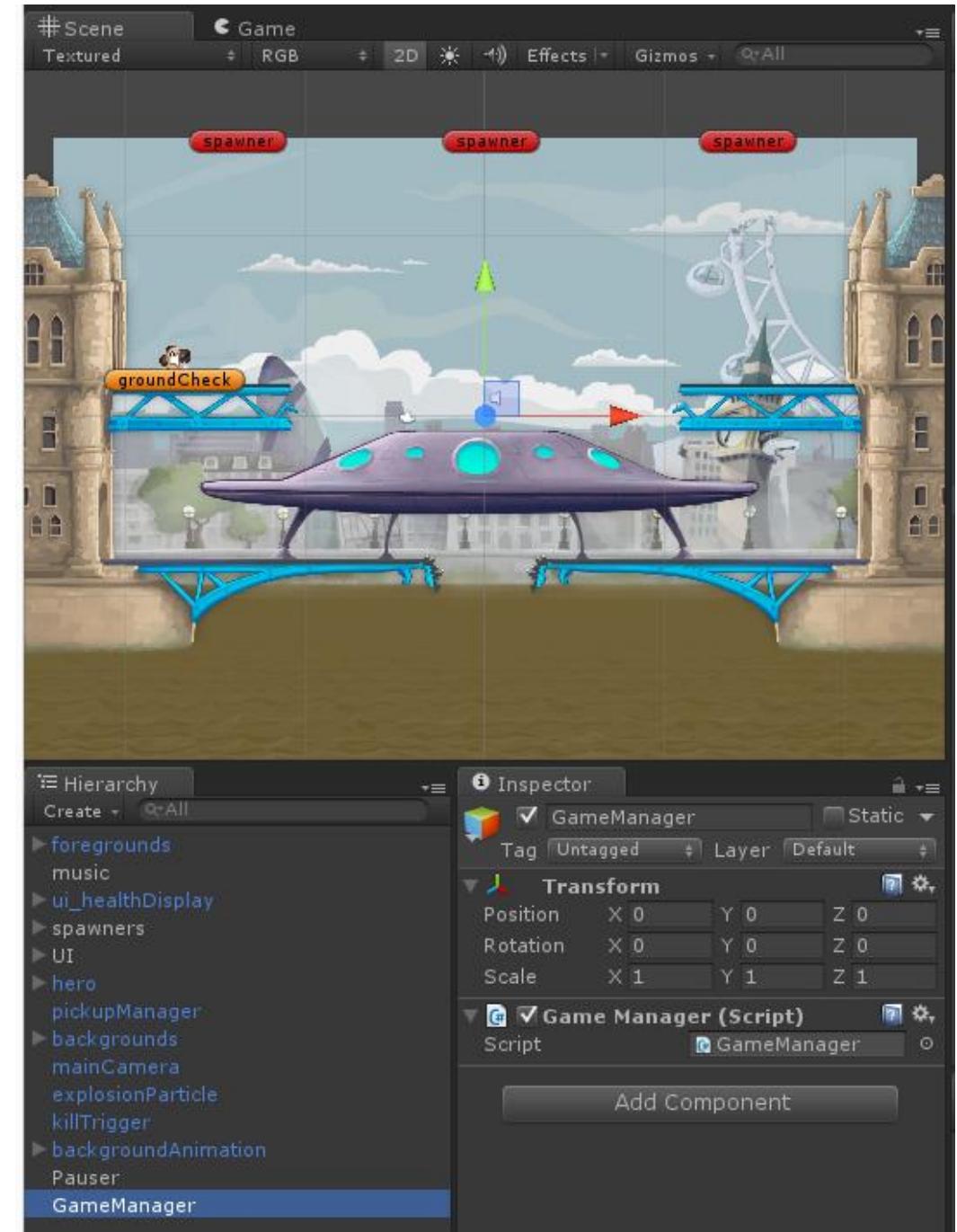
Step 6: Build Solution, copy UnityPlugins.dll to Unity's Plugins folder.



# Unity Plugins

Step 7: To test out the new plugin:

- Add a new GameObject to a Scene
- Add a new script to GameObject
- Build for Universal Apps



# Unity Plugins

Step 7: Open Visual Studio project, open up the Unity script, add code from UnityPlugins.

```
public class GameManager : MonoBehaviour
{
    private GUIStyle mGUILayoutLabel;
    private void SetGuiLabelStyles()
    {
        mGUILayoutLabel = new GUIStyle();
        mGUILayoutLabel.fontSize = 24;
        mGUILayoutLabel.fontStyle = FontStyle.Bold;
        mGUILayoutLabel.alignment = TextAnchor.MiddleLeft;
    }
    void OnGUI()
    {
        GUI.Label(new Rect(40, 20, 250, 50),
            UnityPlugins.Class1.GetMemoryCurrentUsage(mGUILayoutLabel));
        GUI.Label(new Rect(40, 50, 250, 50),
            UnityPlugins.Class1.GetMemoryUsageLimit(mGUILayoutLabel));
    }
    void Start()
    {
        SetGuiLabelStyles();
    }
}
```

Unity Editor using Windows Desktop plugin



Windows Phone 8.1 Emulator

# When to use Unity Plugins

- Missing API errors
  - XmlDocument
  - Reflection
  - File IO
  - Networking
- Windows Phone features
  - IAP
  - Trial Mode
  - Maps
  - Speech
  - Live Tiles

The screenshot shows a web browser window displaying the Microsoft MSDN website at <http://msdn.microsoft.com/en-us/library/windows/apps/xaml/dn655839.aspx>. The page is titled "Tiles for Windows Phone 8" and "What's New in Windows Ph...". The navigation bar includes links for Dashboard, Get started, Design, Develop, Publish, and Community. On the left, there's a sidebar with "Unity References" and a "Windows Feature Guide" section. The main content area is titled "Windows Phone 8.1 features" and lists several new features:

- Geolocation**: Describes the Windows Runtime geolocation APIs available in Windows Phone 8, mentioning better interoperability with other features like geofencing.
- Detecting Geolocation**: A link for more information.
- Geofencing**: Describes Windows Phone 8.1's introduction of geofencing APIs for receiving notifications when a device enters or leaves a geographic region.
- Quickstart: Setting up a geofence**: A link for more information.
- Maps**: Describes the improvements in Windows Phone 8.1 maps, including support for offline tiles, better gestures, and improved routing.
- Maps and directions**: A link for more information.
- Background transfers**: Describes the support for the **Windows.Networking.BackgroundTransfer** namespace, allowing for background uploads and downloads even when the app is not running.
- Windows Phone 8.1 supports the Windows.Networking.BackgroundTransfer namespace**: A note explaining that these APIs replace the background transfer service APIs in Windows Phone 8.

# Plugins/API References

Windows Phone Plugins step by step guide (using C#)

<http://docs.unity3d.com/Manual/wp8-plugins-guide-csharp.html>

Windows Phone Plugins step by step guide (using C++)

<http://docs.unity3d.com/Manual/wp8-plugins-guide-cplusplus.html>

Unity Script Reference: Windows File API

<http://docs.unity3d.com/ScriptReference/Windows.File.html>

# Case 2: Direct Communication

For direct communication between Unity & Windows Phone

Step 1: Create Unity script, WindowsGateway.cs

```
/// Windows specific and interop between Unity and Windows Store or Windows Phone 8
using UnityEngine; using System.Collections; using System;
public static class WindowsGateway
{
    static WindowsGateway()
    {
        UnityLoaded = delegate { };
        OnClickPlay = delegate { };
        OnScoreUpdate = delegate { };
        OnClickBuy = delegate { };
    }
    public static Action UnityLoaded;
    public static Action OnClickPlay;
    public static Action OnScoreUpdate;
    public static Action OnClickBuy;
}
```

# Direct Communication

Step 2: In Unity scripts, make the calls to the functions as needed.

MainManager.cs:

```
void OnGUI()
{
    if (GUI.Button(new Rect(x, yP, BUTTON_SIZE, BUTTON_SIZE), "", mGUIStyle))
    {
        WindowsGateway.OnClickPlay();
        Application.LoadLevel("Level");
    }
}
```

# Direct Communication

Step 3: In Windows Phone solution, create events & register events to the Action delegate.

MainPage.xaml.cs:

```
public MainPage(SplashScreen splashScreen)
{    InitializeComponent();
    splash = splashScreen;
    GetSplashBackgroundColor();
    OnResize();
    onResizeHandler = new WindowSizeChangedEventHandler((o, e) => OnResize());
    Window.Current.SizeChanged += onResizeHandler;
    WindowsGateway.OnClickPlay = OnClickPlay;
}

private void OnClickPlay()
{
    FlurryAnalytics.LogEvent(Constants.EVENT_PLAY_GAME);
}
```

# Case 3: Global Instance

To access Unity variables & states

Step 1: In a Unity script, add a static instance.

```
private static readonly GameManager instance = new GameManager();  
  
private GameManager() { }  
  
public static GameManager Instance  
{  
    get  
    {  
        return instance;  
    }  
}  
  
public bool IsMainMenu = true;  
public static bool IsPaused = false;
```

# Case 3: Global Instance

Step 2: In Windows Phone solution, just reference the Unity static instance!

```
public MainPage(SplashScreen splashScreen)
{
    this.InitializeComponent();
    splash = splashScreen;
    GetSplashBackgroundColor();
    OnResize();
    onResizeHandler = new WindowSizeChangedEventHandler((o, e) => OnResize());
    Window.Current.SizeChanged += onResizeHandler;

    bool isMainMenu = GameManager.Instance.IsMainMenu;
    bool isGamePaused = GameManager.IsPaused;
    if (isGamePaused)
    {
        // Do something
    }
    elseif (isMainMenu) { // Do something}
}
```

# DEMO

---

Understand API Changes

# Understanding API Changes



and more...

# Additional Resources

<http://unity3d.com/pages/windows/porting>

## REACH MILLIONS OF PLAYERS. JUST LIKE THAT.

It's so easy to bring your existing Unity titles to Windows Store and Windows Phone. Use the resources on this page to port your content quickly and efficiently to a whole new global audience.

### START WITH THE BASICS

Our Getting Started guides cover everything you need to know: configurations, SDKs, general considerations and first steps



[Getting started on Windows Phone \(663 KB\)](#)



[Getting started on Windows Store \(720 KB\)](#)

### THEN GET THE PORTING TIPS

Once you get the basics, read our porting tips that pinpoint what to consider when adjusting your code to target Windows Store and Windows Phone



## Tools

### Developer Tools

<http://developer.windowsphone.com/en-us/getstarted/downloads>

### Windows Phone Toolkit

<http://phone.codeplex.com/>

### Coding4Fun Toolkit

<http://coding4fun.codeplex.com/>

### Windows Phone Power Tools

<http://wptools.codeplex.com/>

## Resources

### Multi-resolution apps for Windows Phone 8

[http://msdn.microsoft.com/en-us/library/windowsphone/develop/jj206974\(v=vs.105\).aspx](http://msdn.microsoft.com/en-us/library/windowsphone/develop/jj206974(v=vs.105).aspx)

### Introduction to multiple resolution support

[http://developer.nokia.com/community/wiki/Introduction\\_to\\_multiple-resolution\\_support\\_on\\_Windows\\_Phone\\_8\\_apps](http://developer.nokia.com/community/wiki/Introduction_to_multiple-resolution_support_on_Windows_Phone_8_apps)

### Command Line Prompts

<https://docs.unity3d.com/Documentation/Manual/CommandLineArguments.html>

## Sharing

<http://msdn.microsoft.com/zh-cn/jj923044>

<http://weibowp8sdk.codeplex.com>

## Learning Resources

### Unite 2014: Seattle

<http://unity3d.com/unite/unite2014/keynote>

### 2014 Building Your First Windows Game with Unity

<http://channel9.msdn.com/Events/Build/2014/2-503>

### Unity3D WP8 Examples:

<https://docs.unity3d.com/Documentation/Manual/wp8-examples.html>

### Nokia Community

[http://developer.nokia.com/community/wiki/Getting\\_Started\\_with\\_Unity\\_3D\\_on\\_Windows\\_Phone](http://developer.nokia.com/community/wiki/Getting_Started_with_Unity_3D_on_Windows_Phone)

### Microsoft Virtual Academy: Porting Unity Games to Windows 8.1 & Windows Phone 8

<http://www.microsoftvirtualacademy.com/training-courses/porting-unity-games-to-windows-8-1-windows-phone>

### Porting Unity Games

<http://unity3d.com/pages/windows/porting>

### Code Kwondo: Closer Look at Unity

<http://channel9.msdn.com/Events/Developer-Movement/UnityAndGaming/Part1>

### Building Windows Games with Unity

<http://channel9.msdn.com/Events/Windows-Camp/Building-Windows-Games-with-Unity>

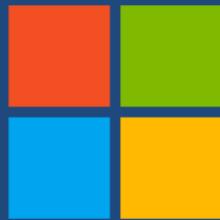
# Thank you



Elissa Tong

[elistong@microsoft.com](mailto:elistong@microsoft.com)

<https://github.com/elissatong/UnityPortingLabs>



# Microsoft

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