Go X-Platform with Xamarin

Have your C# and mobile too

August 12, 2014
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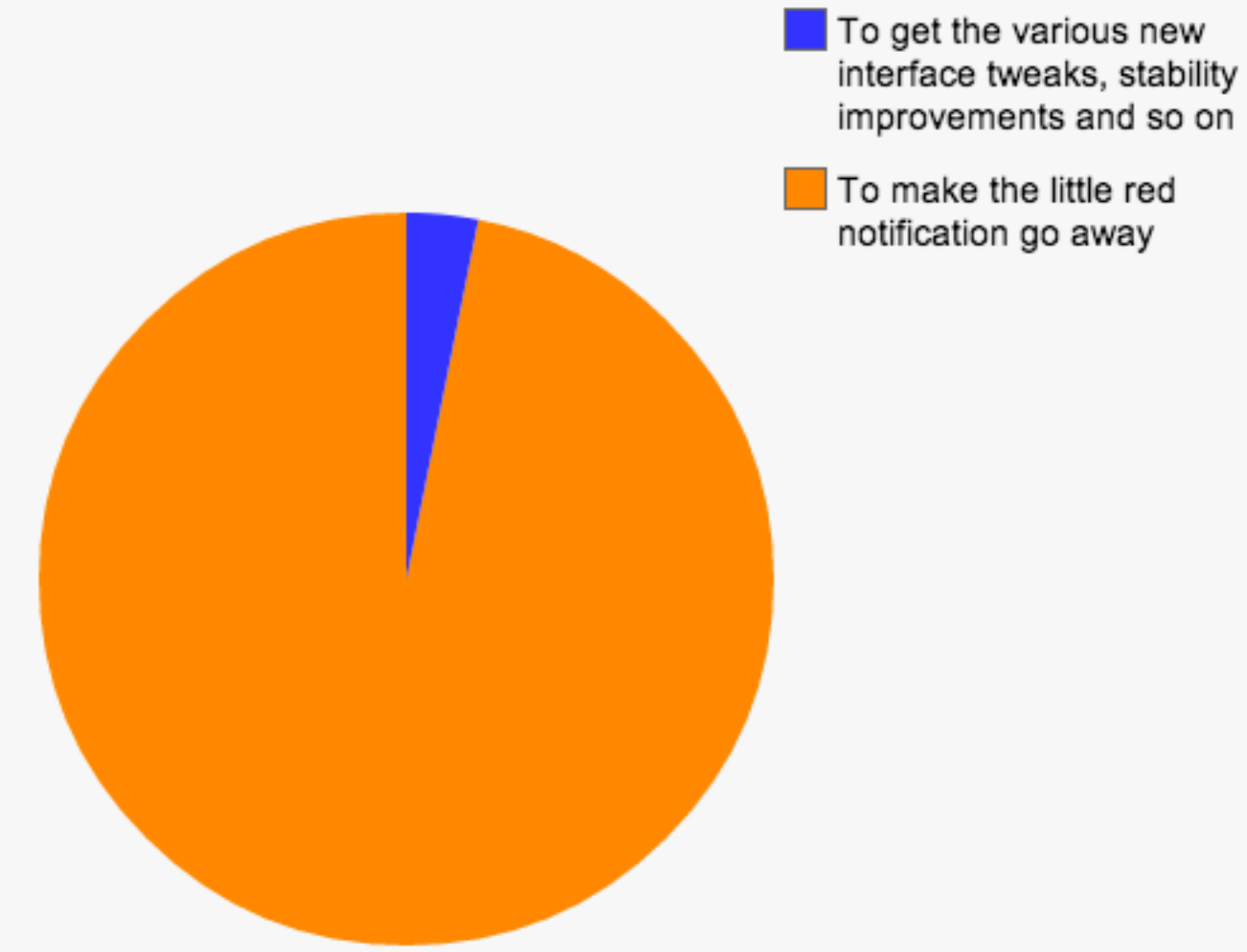
Reasons why I update my apps



Clarke
UNIVERSITY

EAGLE POINT

Dubuque .Net
Users Group

Motis

Cartegraph

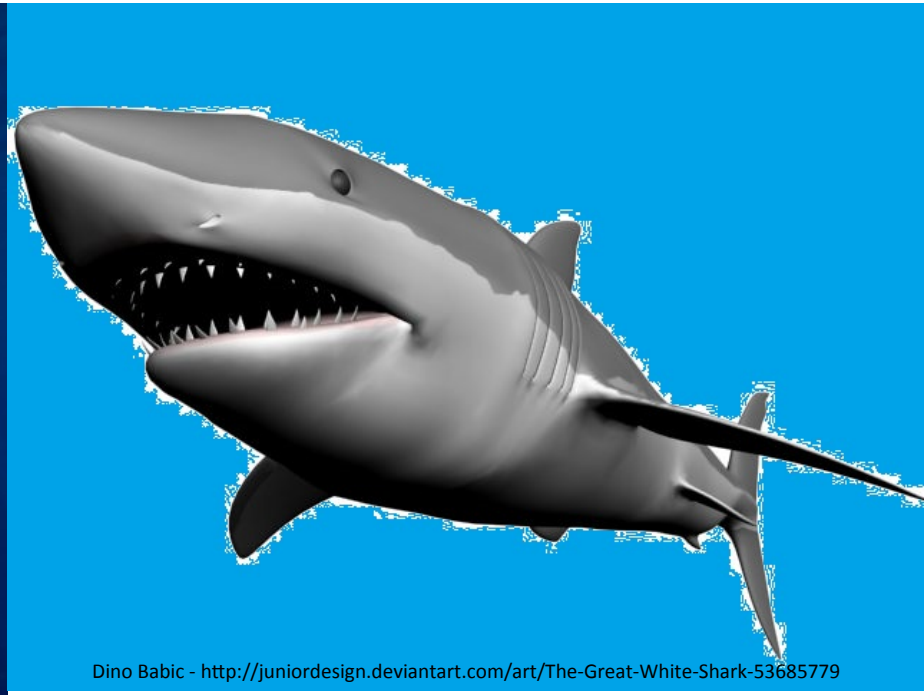
cynergy.

Mood board


Way Cool App

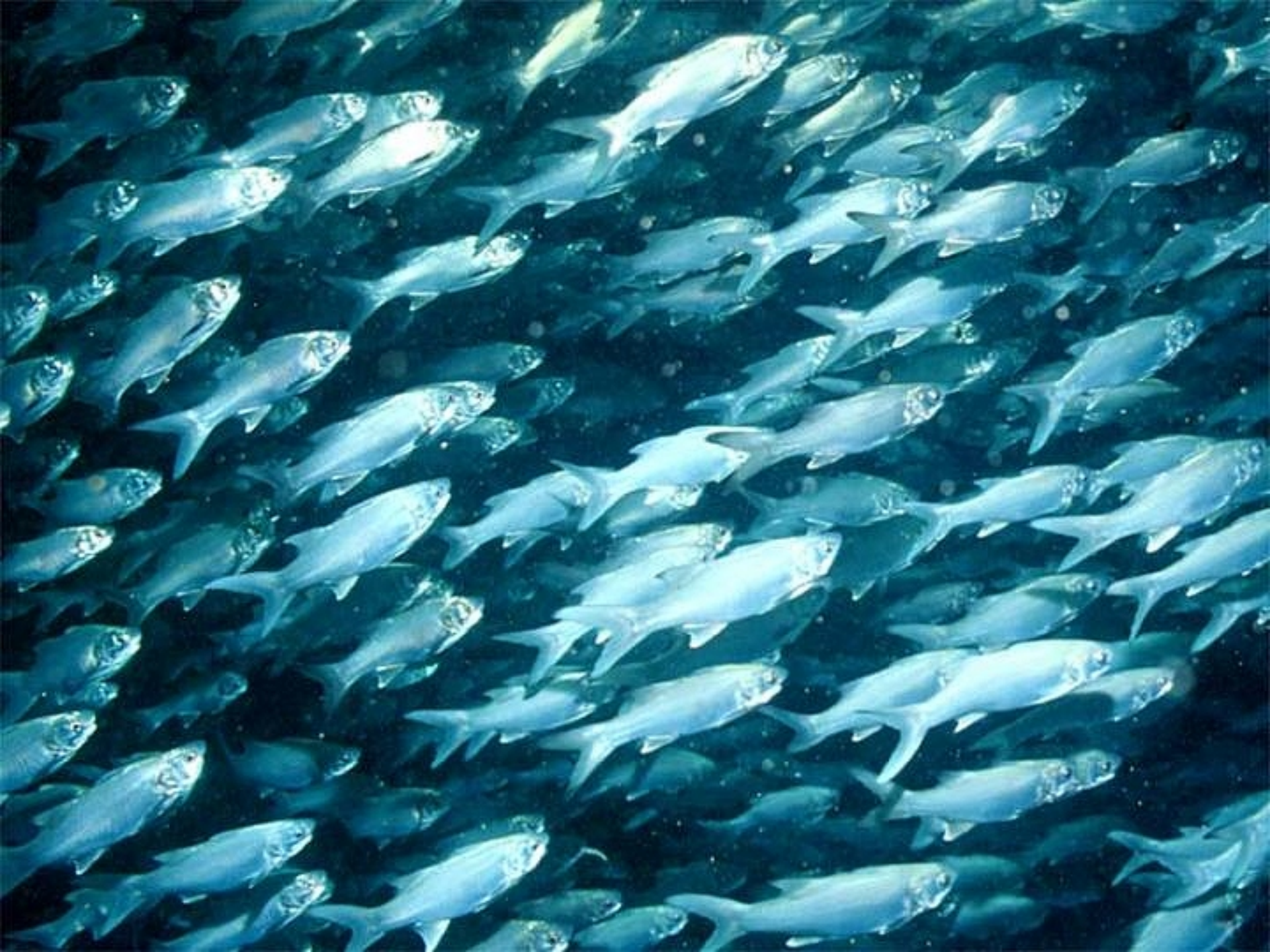

y Cool App


Ken Bondy - http://www.fotopedia.com/items/flickr-2145763683


Dino Babic - http://juniordesign.deviantart.com/art/The-Great-White-Shark-53685779

Real

Fake



//TODO:

- ❑ **Xamarin**
- ❑ HelloWorld++
- ❑ Architecture
- ❑ Build it bigger
- ❑ Gotchas
- ❑ Resources

on 2.5 Billion Devices

GLASS

amazon fireTV

kindle fire

C# Goodies

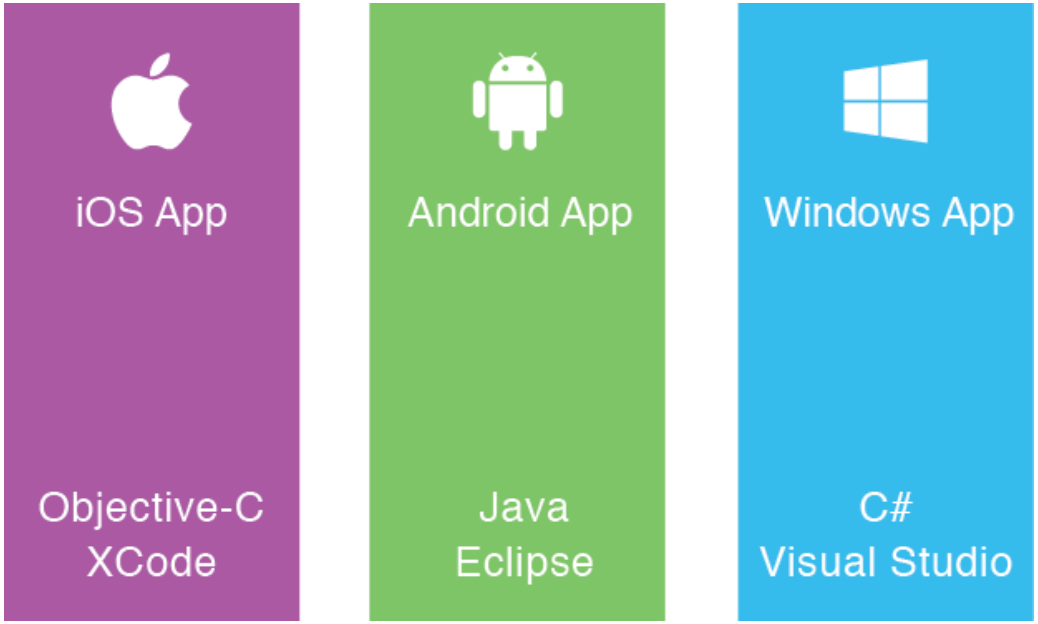
- Linq
- Lambdas
- Events
- Delegates
- Generics
- Async/await
- Etc. etc.

Ecosystem Goodies

- Visual Studio
- NuGet
- Productivity plugins…ReSharper, CodeRush, etc.

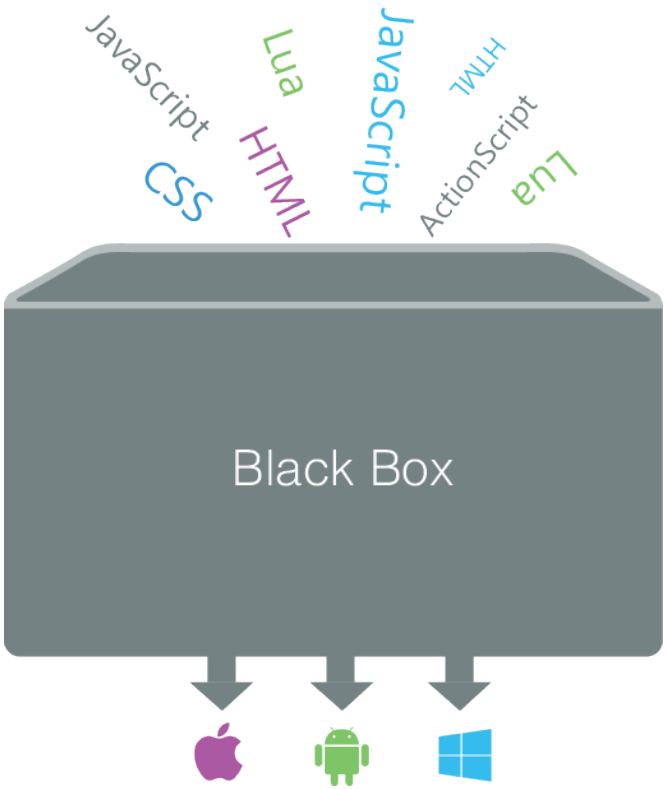
Cross-platform Approach

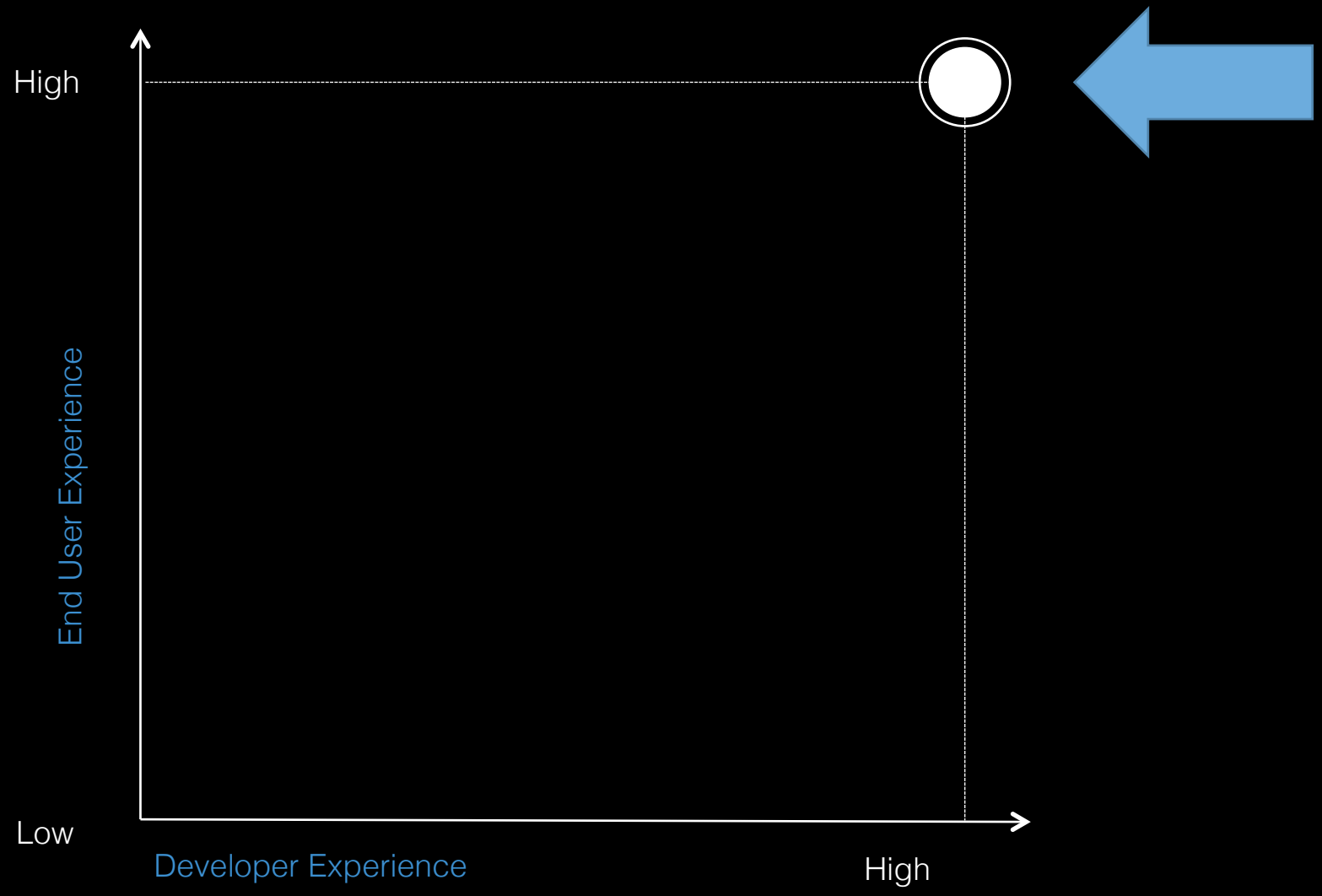
Native Tools Approach



Write-Once-Run-Anywhere Approach

- Ux?
- Device services?
- API coverage?




High
End User Experience
Low
Developer Experience
High

High Fidelity User Experience

Silo'd approach

Objective-C, Java, C#

Single Platform

Multiple Platforms

"Black Box" Approach

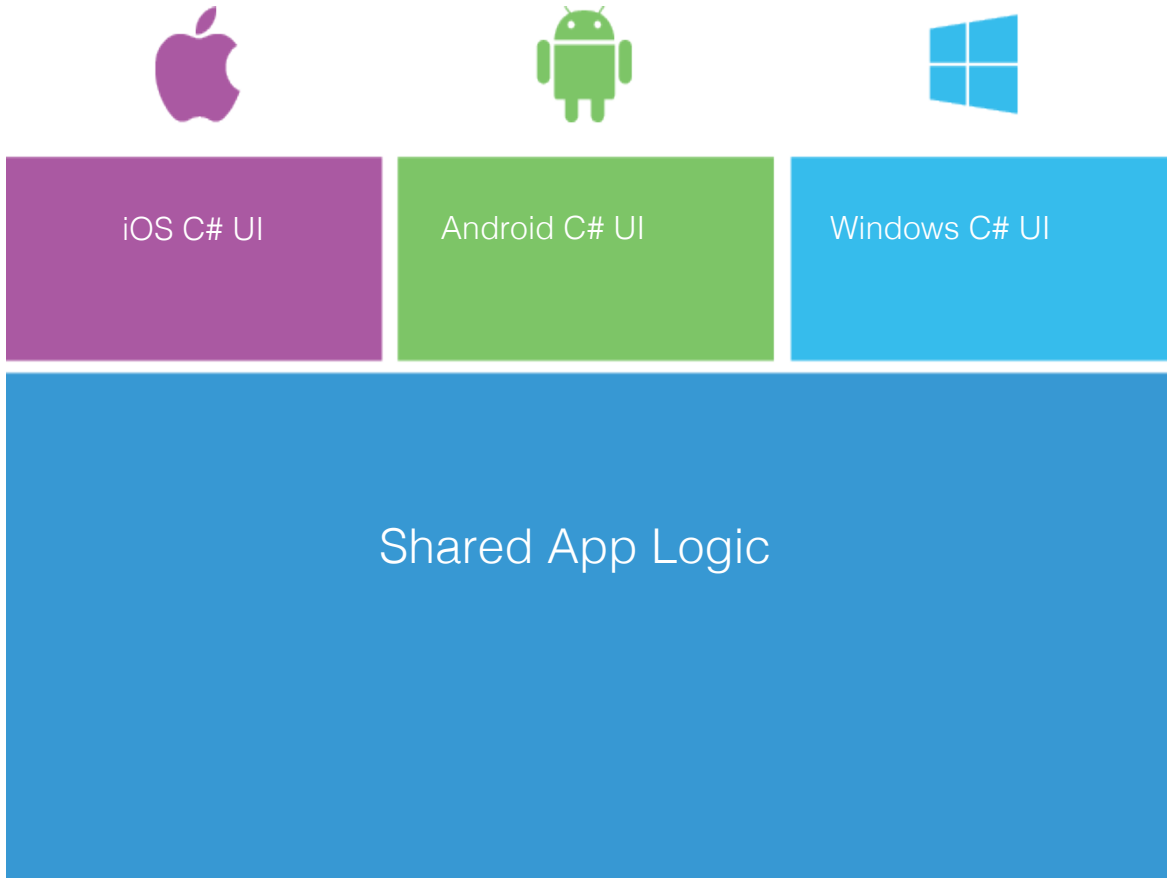
Abstraction frameworks

HTML 5

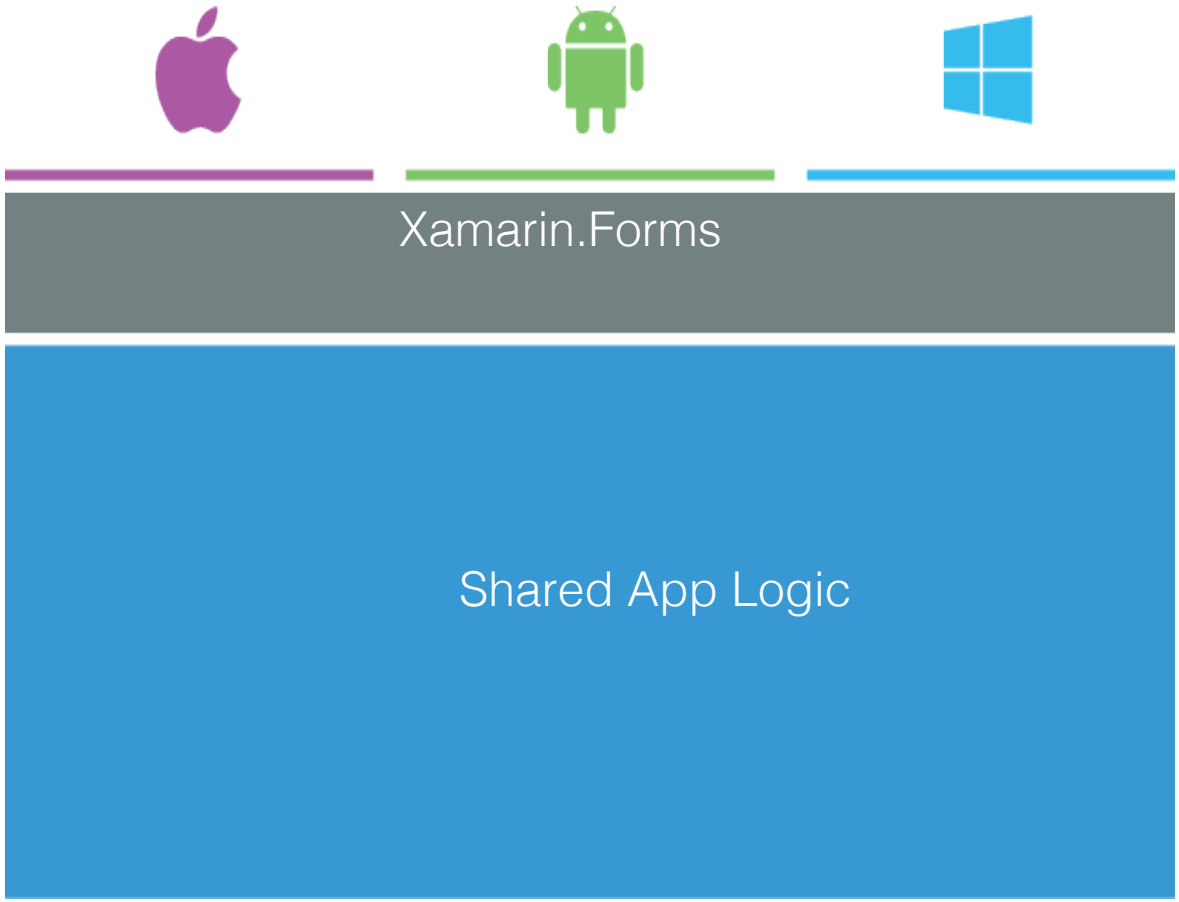
Write Once Run Anywhere

Code Sharing

“Traditional” Xamarin Architecture



“Newfangled” Alternative



Share Code

- Traditionally (Xamarin.iOS and Xamarin.Android)
  - …60-80+% code sharing
- Newfangled (Xamarin.Forms)
  - …90-100% code sharing
- Mix-n-match traditional w/ Xamarin.Forms
- iOS, Android, WP…yes, but also…
  - Xamarin.Mac
  - Amazon Fire, Glass, Mono, etc.
  - WPF, ASP.NET, Win8, etc.
  - Server-based services/apps…(e.g. CSLA)

High Fidelity Ux

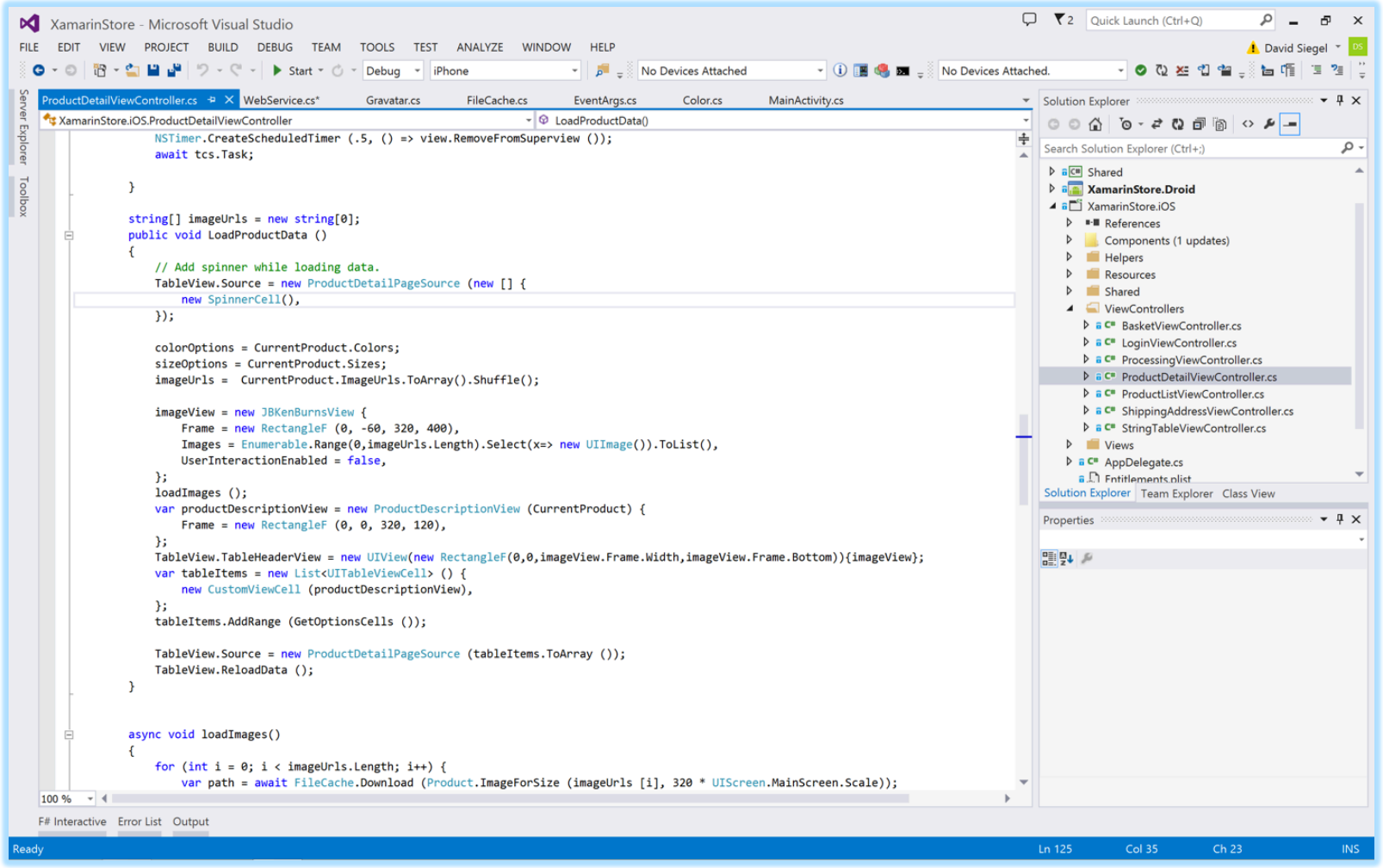
Xamarin Creates Native Apps

- Look and feel
- Performance
- “Hybrid” at design time…native at run time

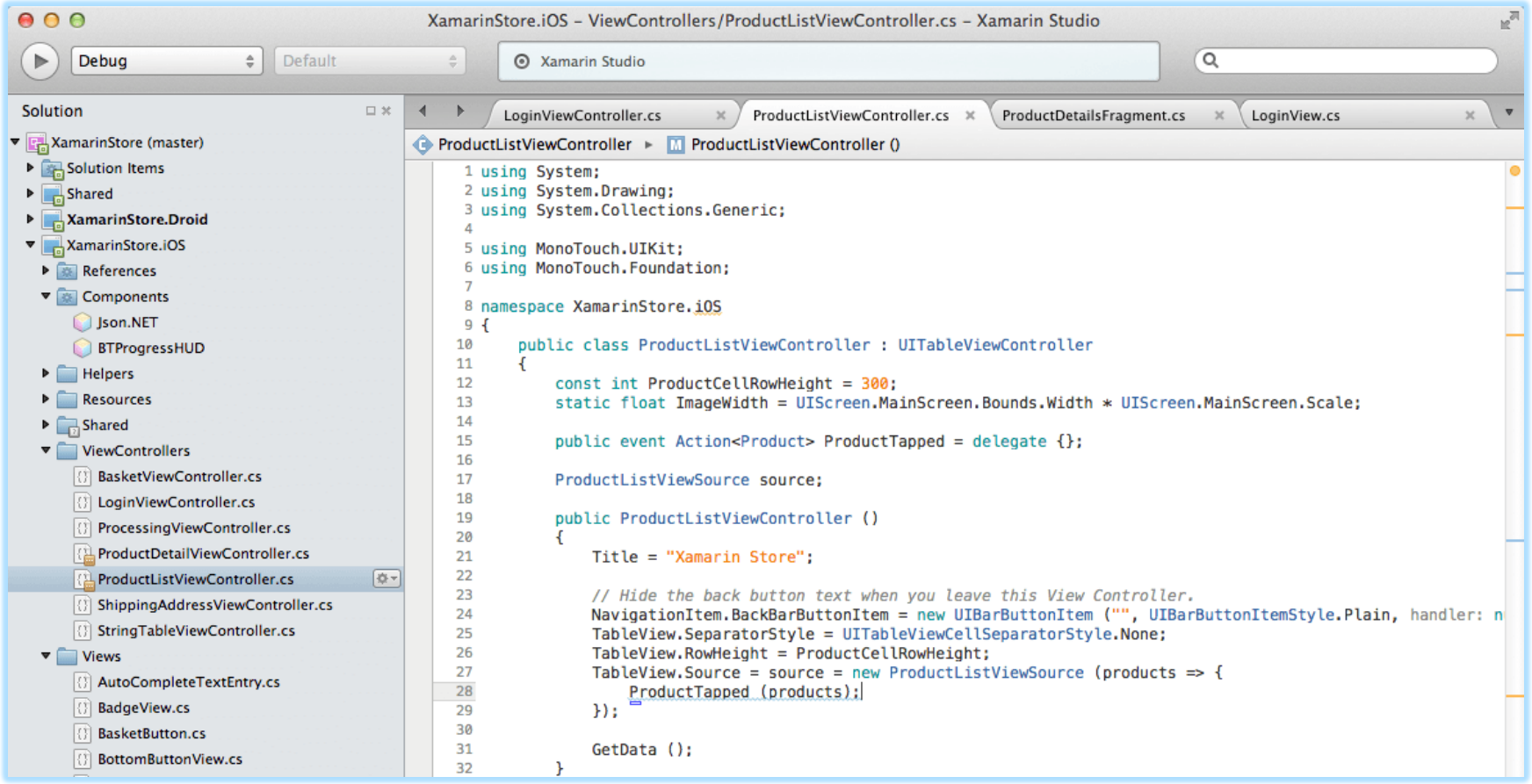
The Native API is Covered

- Anything in the native SDK is possible
- Access to device services
- Same day support

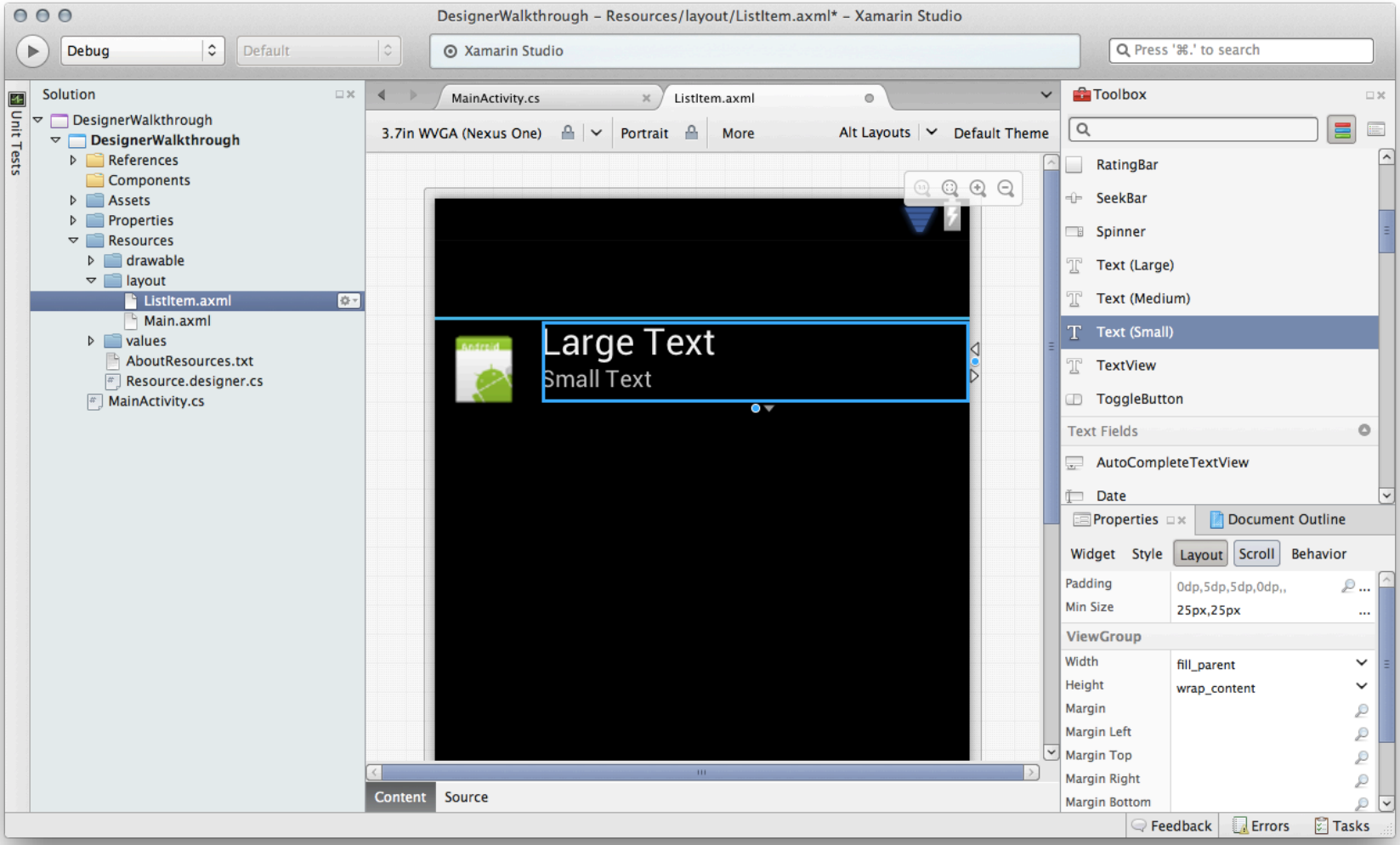
Native SDK++...Visual Studio



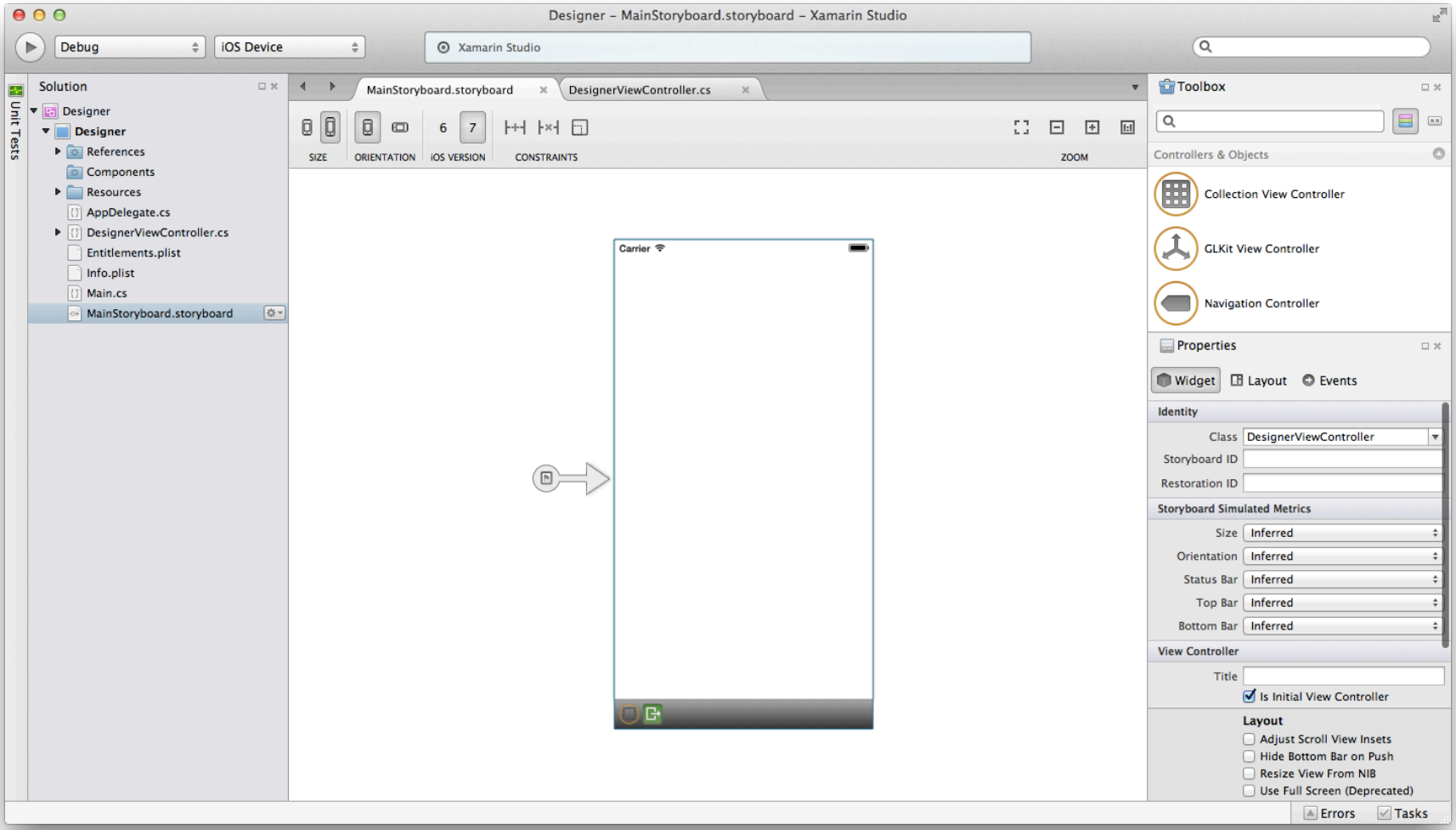
Native SDK++…Xamarin Studio

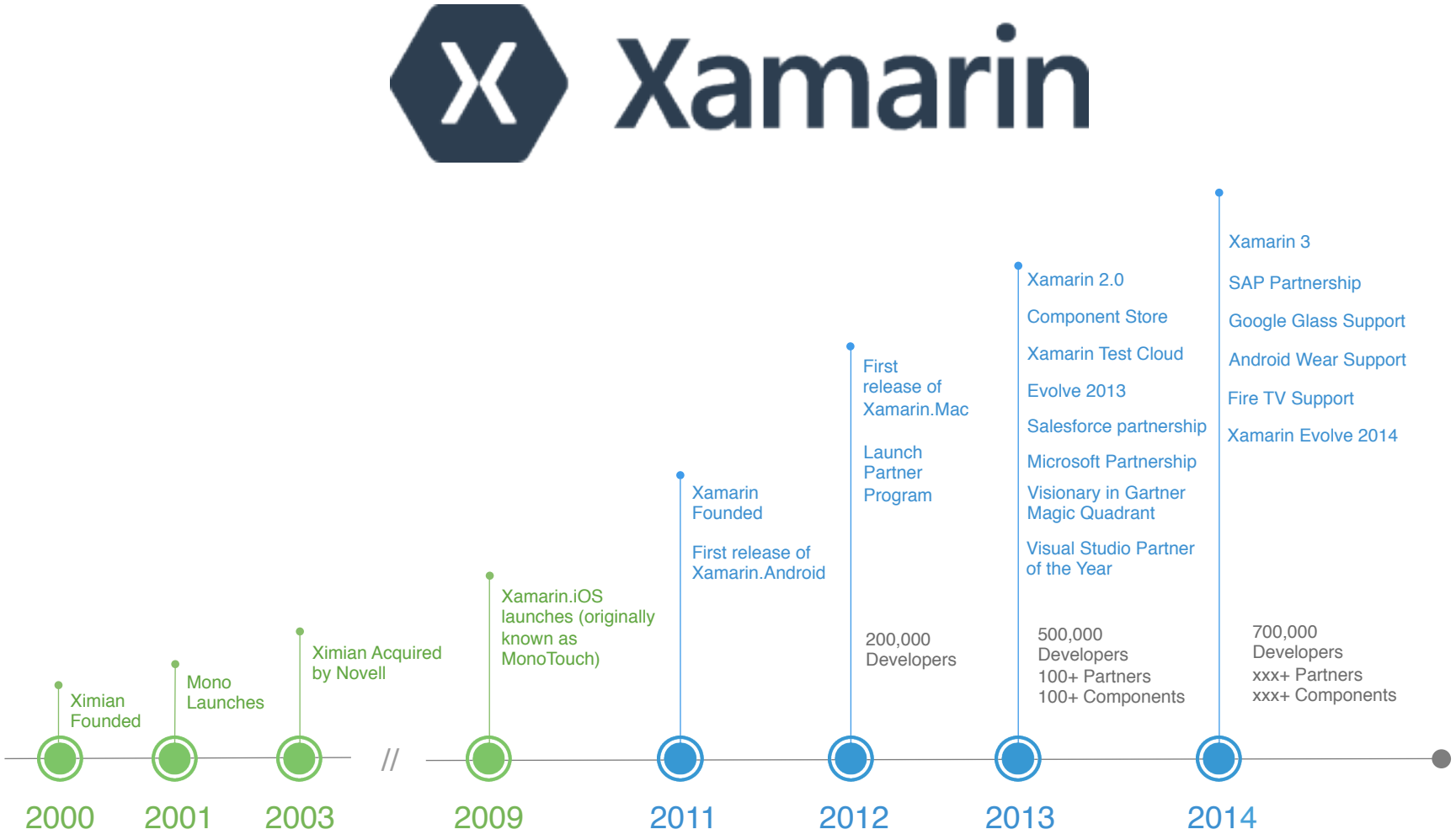


Native SDK++…Android Designer



Native SDK++…iOS Designer





> 700,000 registered developers

//TODO:

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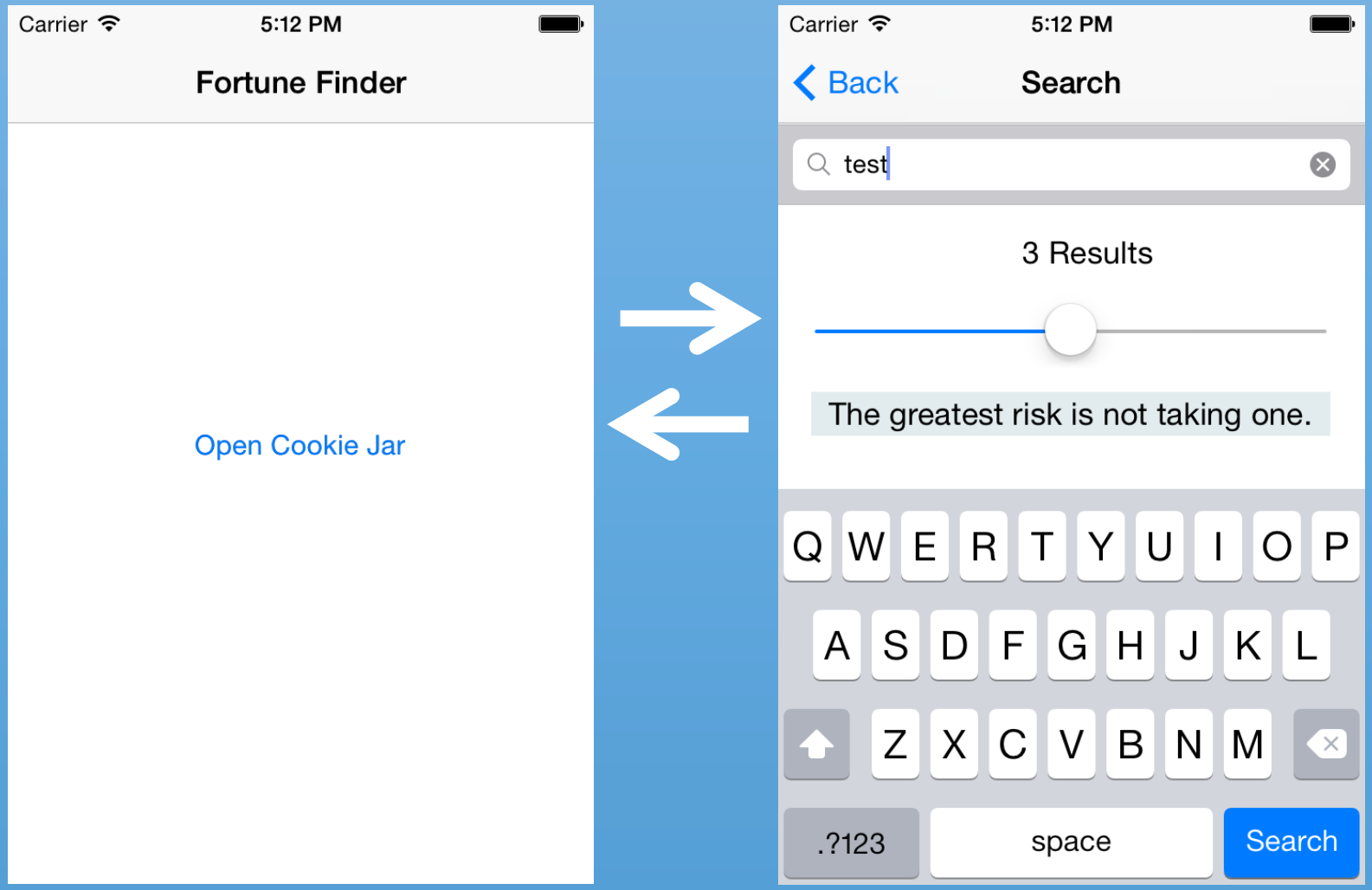
- ❑ Resources

Let's Build This



That's the Plan

"Everybody has a plan till they get punched in the mouth."

- Mike Tyson

//TODO:

- ❑ Xamarin
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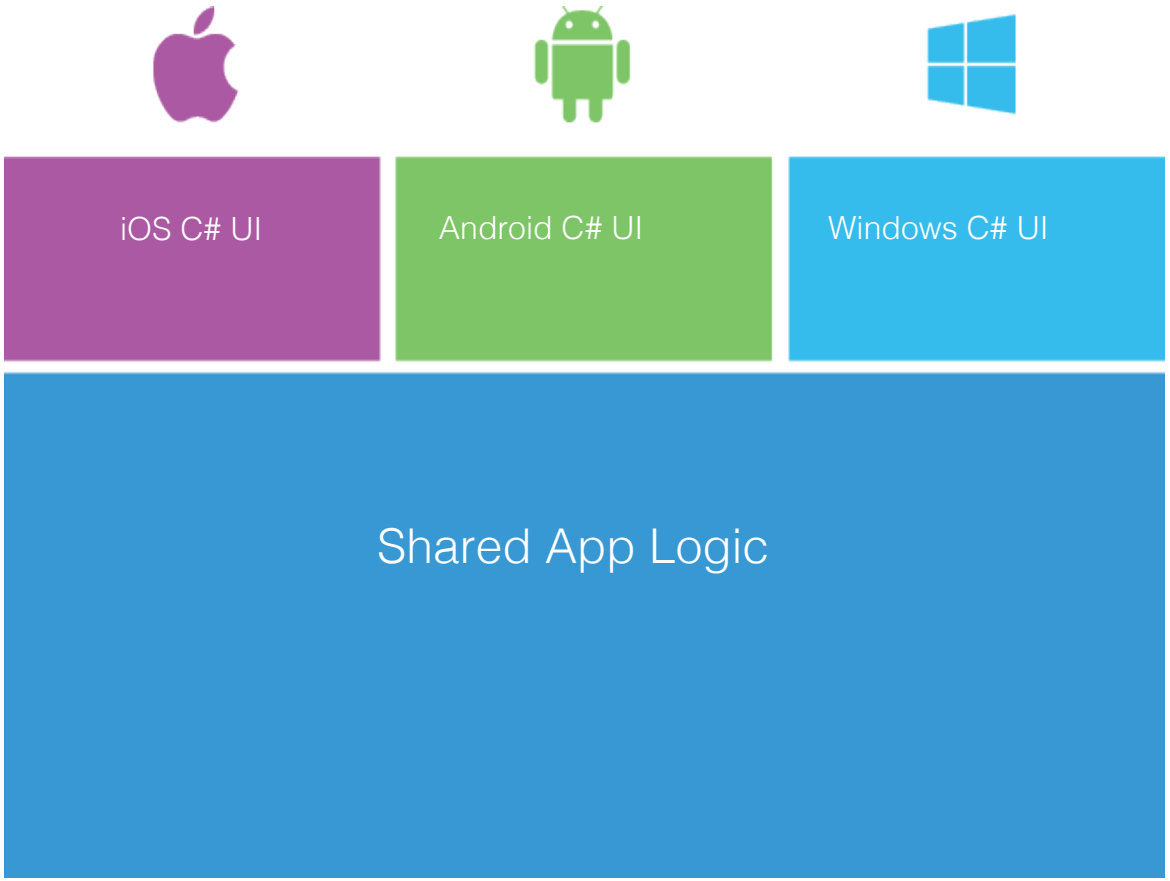
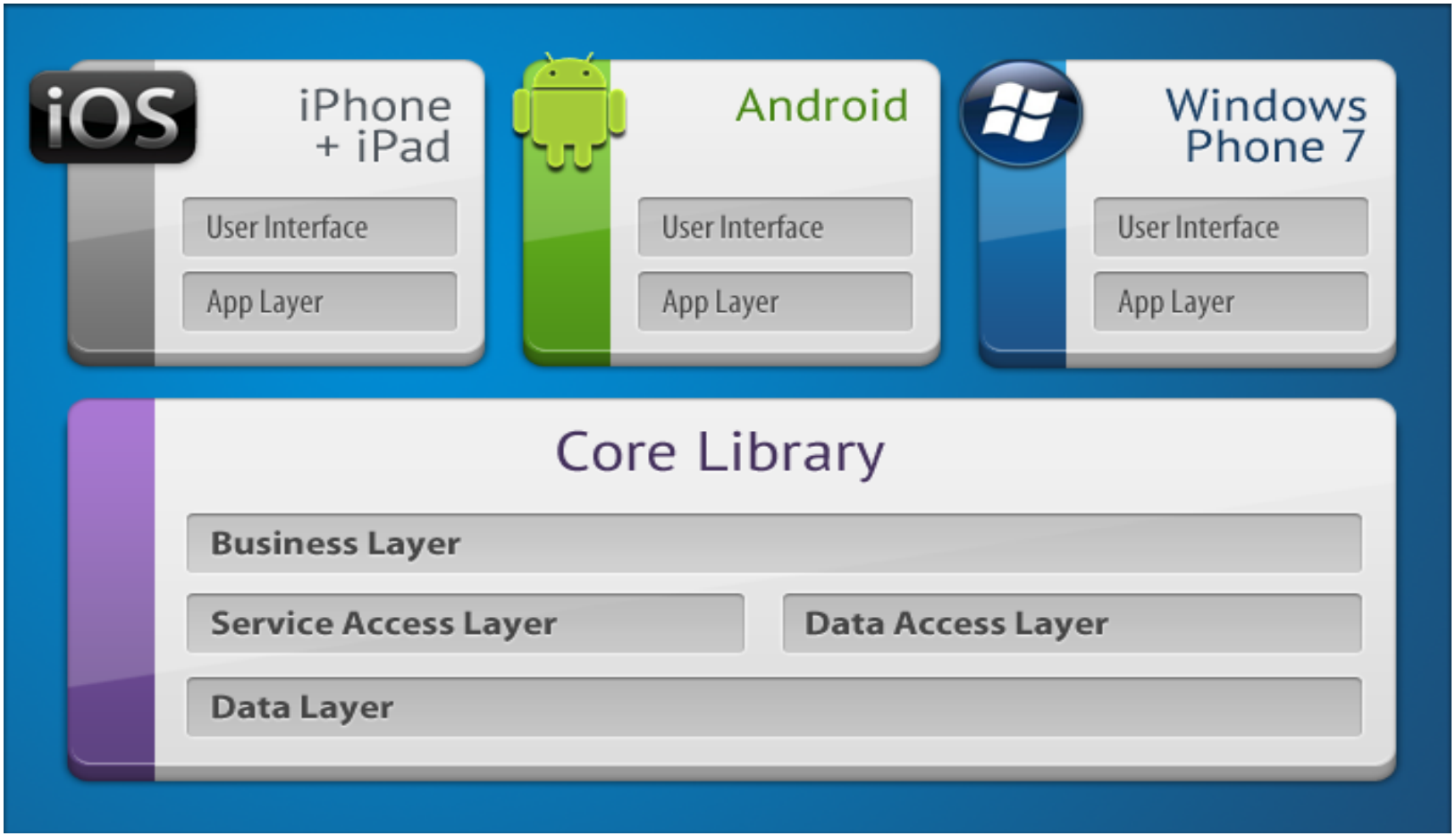
Let’s zoom in a bit further…



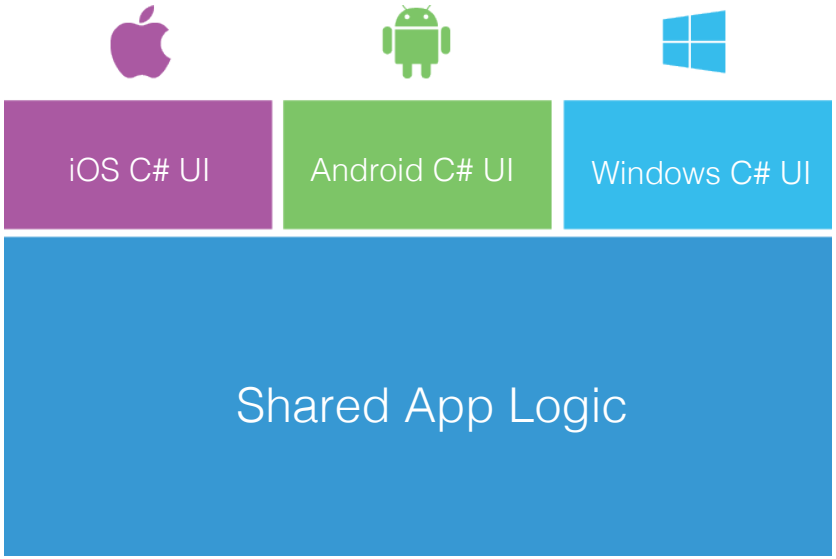
Architecture

Xamarin

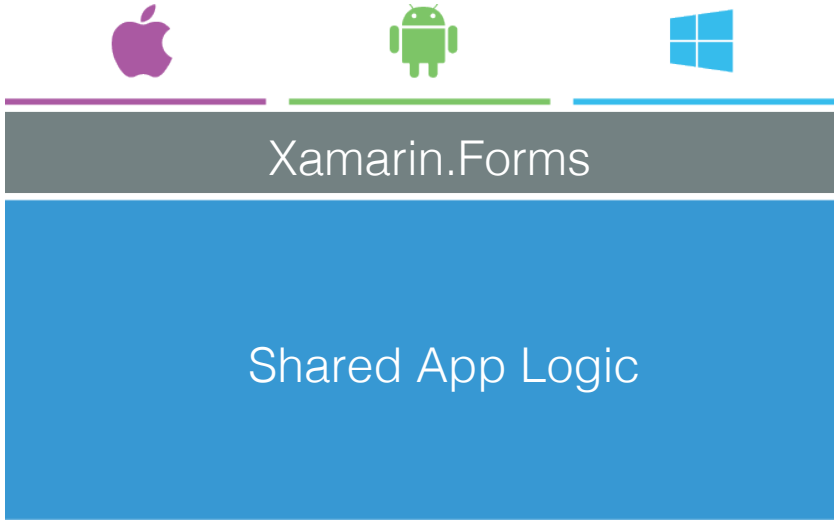
“Traditional” Approach



Default v. Xamarin.Forms



Default



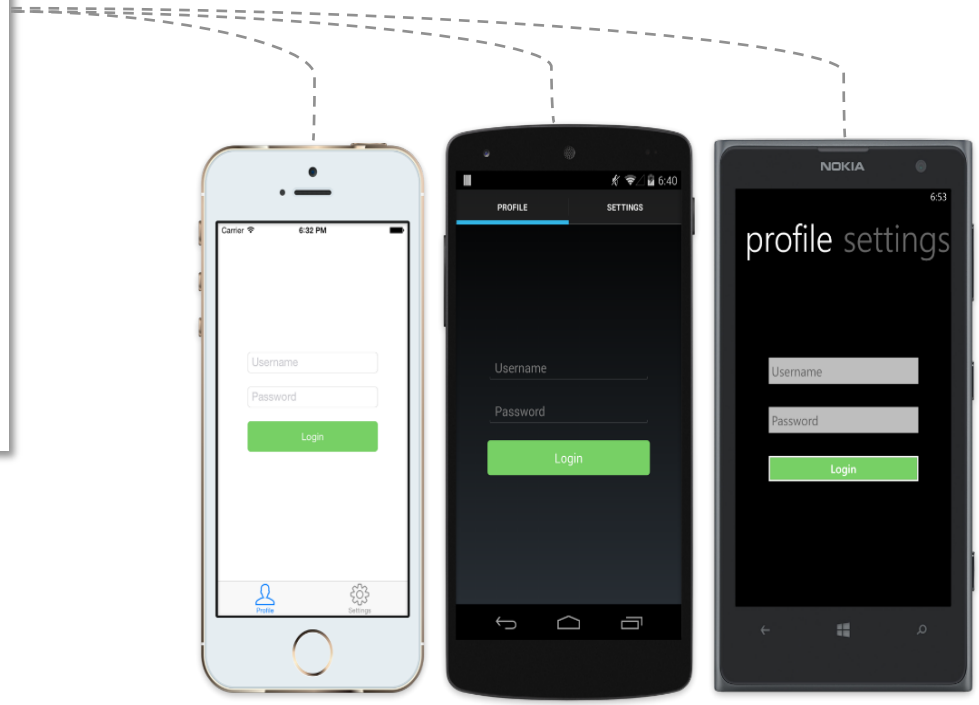
Xamarin.Forms

Xamarin.Forms

```
using Xamarin.Forms;

var profilePage = new ContentPage {
    Title = "Profile",
    Icon = "Profile.png",
    Content = new StackLayout {
        Spacing = 20, Padding = 50,
        VerticalOptions = LayoutOptions.Center,
        Children = {
            new Entry { Placeholder = "Username" },
            new Entry { Placeholder = "Password", IsPassword = true },
            new Button {
                Text = "Login",
                TextColor = Color.White,
                BackgroundColor = Color.FromHex("77D065") }}}
};

var settingsPage = new ContentPage {
    Title = "Settings",
    Icon = "Settings.png",
    (...)
};

var mainPage = new TabbedPage { Children = { profilePage, settingsPage } };
```

A single UI API

At runtime, each Xamarin.Forms page and its controls are mapped to platform-specific native user interface elements



How To Share

How do you share?

- Object-oriented abstraction
  - Interfaces, base classes, etc.
- Design patterns
  - IoC, subject/observer; pub/sub
- Language features
  - Partial classes, partial methods, extension methods
- Compiler and build features
  - Conditional compilation
  - Custom build scripts
- Solution structuring
  - File linking, shared projects, PCL's

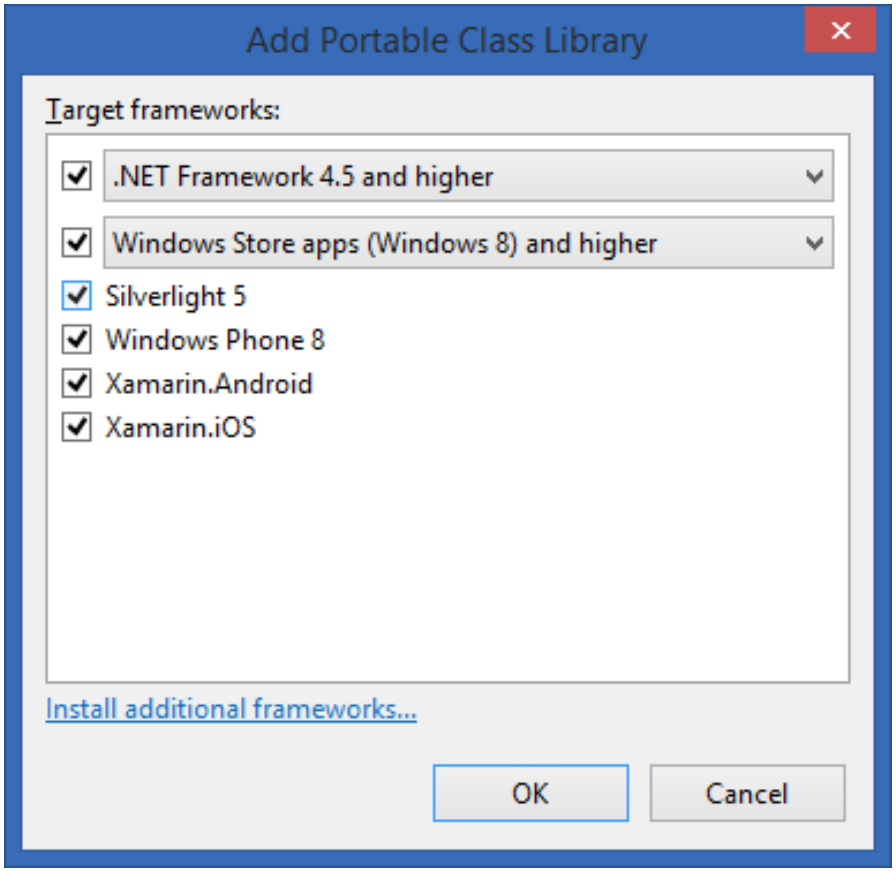
Solution Structuring for Core Code

- OK: File linking approach
  - Multiple “Core” project definitions
  - Use the “Project Linker” component to sync
- GOOD: Project sharing approach
  - One “Core” project
  - Build settings controlled by referencing projects
- EVEN GOODER: Multi-targeting via PCL
  - One “Core” project
  - Built to work x-platform as per PCL profile chosen

Portable Class Libraries

October 2013 – key support for PCL's announced by the .Net team

…including HttpClient, SignalR, and others



Portable Class Libraries

- Portable Class Libraries are specific to a “feature set”
- The supported features are described by its “Profile”

Feature	.NET Framework	Windows Store	Silverlight	Windows Phone	Xamarin
Core	Y	Y	Y	Y	Y
LINQ	Y	Y	Y	Y	Y
IQueryable	Y	Y	Y	7.5+	Y
Serialization	Y	Y	Y	Y	Y
Data Annotations	4.0.3+	Y	Y	-	Y
System.IO.File	-	-	-	-	-

Find Similar UI Patterns

iOS – UIViewController	Android – Activity / Fragment
ViewDidLoad	OnCreate
ViewWillAppear	OnStart
ViewDidAppear	OnResume
ViewWillDisappear	OnPause
ViewDidDisappear	OnStop
UITableView	ListView
UITableViewDataSource	ListAdapter

//TODO:

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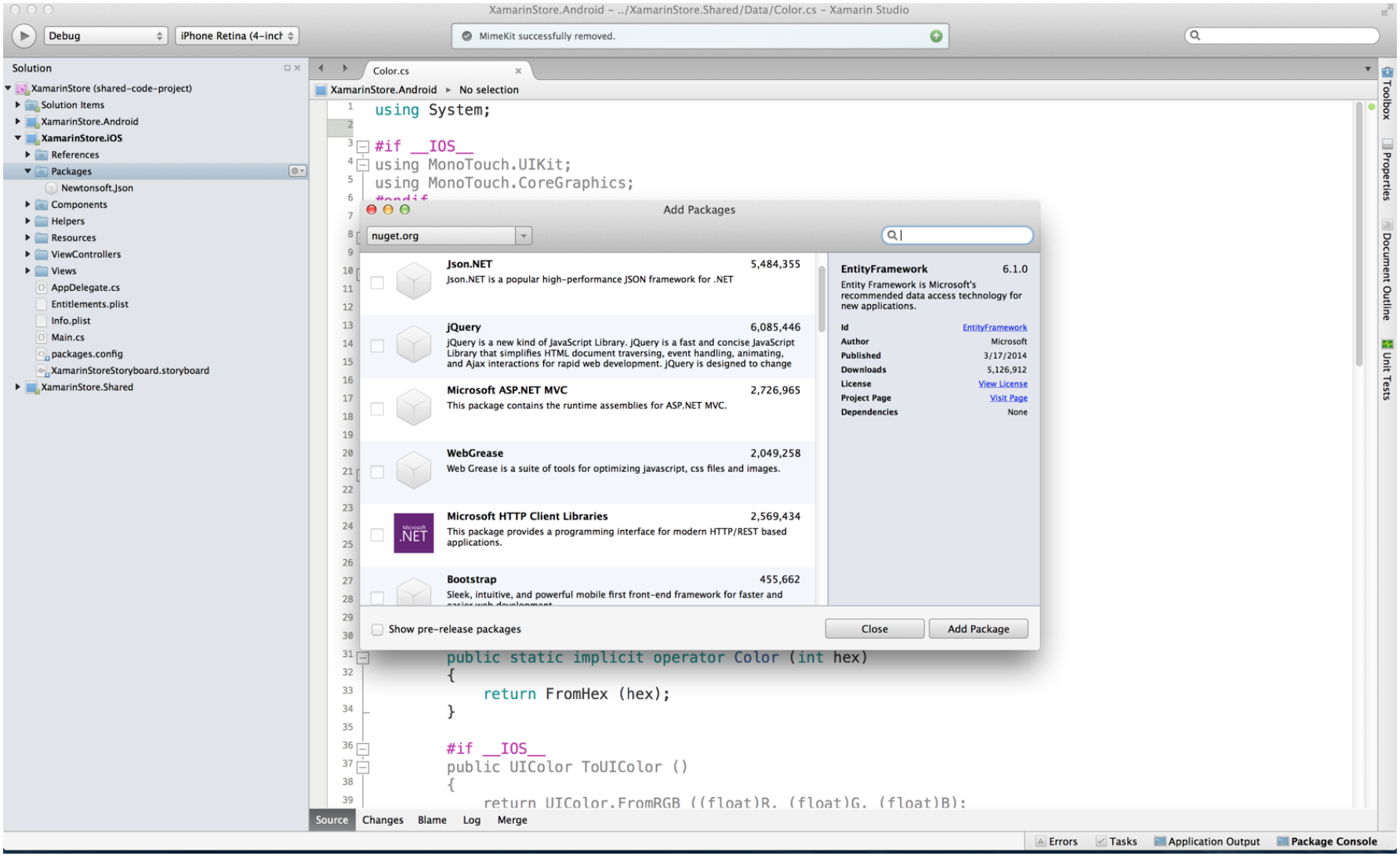
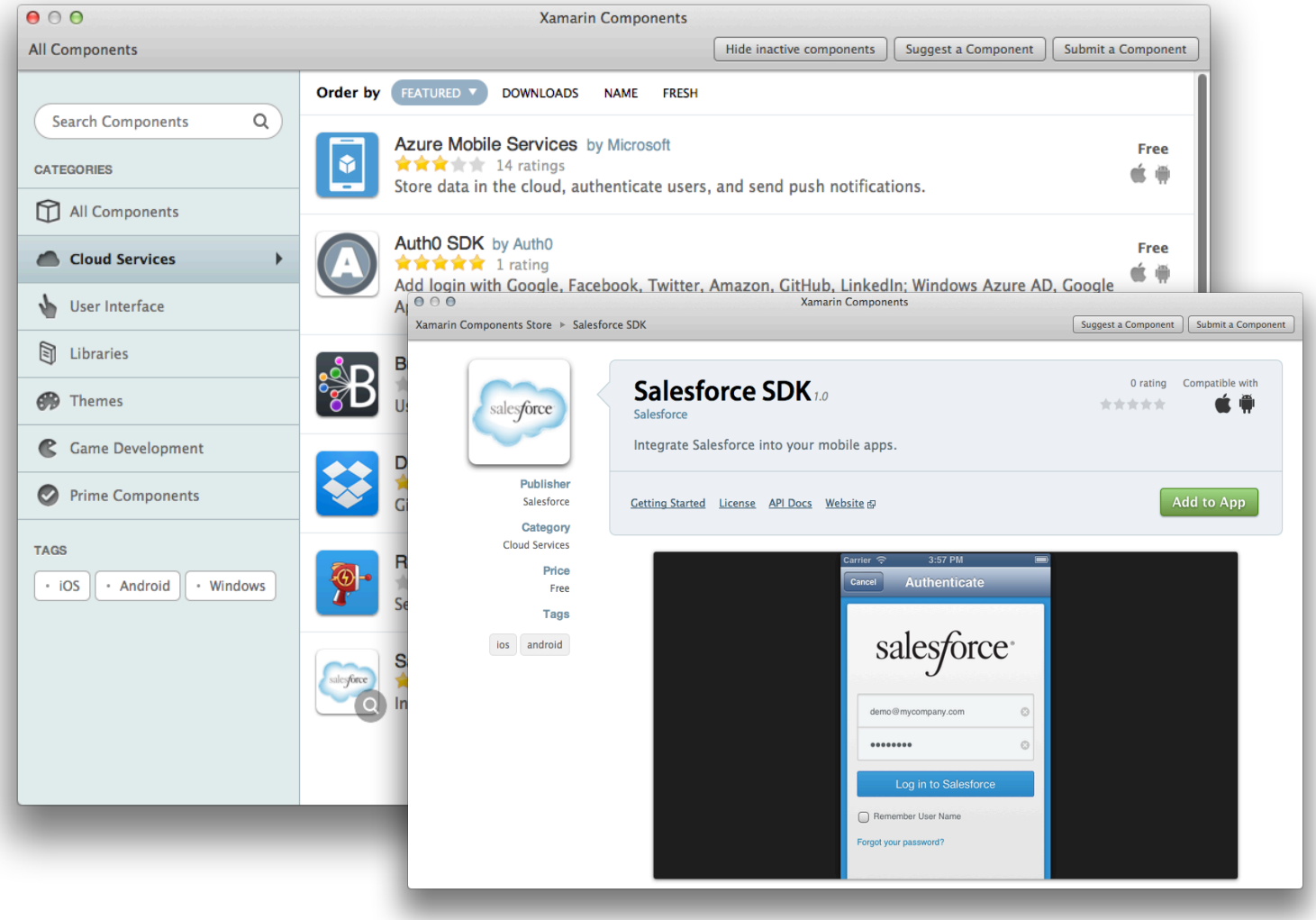
NuGet Package Manager



Xamarin Component Store



What Building Blocks Should I Use?

Popular X-Platform Components

From http://components.xamarin.com/

- Json.NET
- Xamarin.Mobile
- Facebook SDK
- Xamarin.Auth
- Xamarin.Social
- Azure Mobile Services
- Various UI Widgets…Bar Chart, Radial Progress, Login Screen, etc.

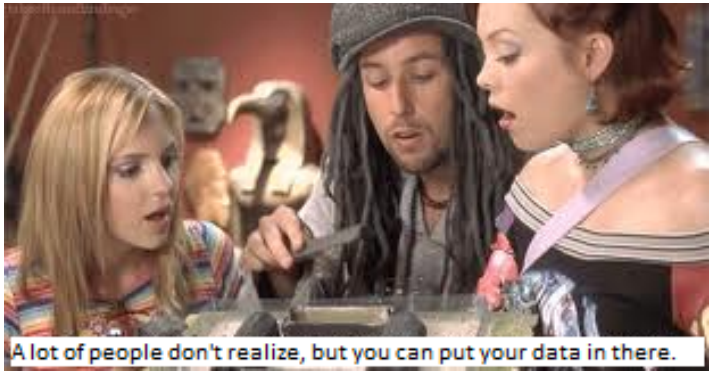
Xamarin.Mobile

Remote Requests

- BasicHttpBinding: Consume a WCF web service
- RestSharp: Simple REST web client
- HttpClient: Now PCL friendly
- The Paul Betts collection…
  - Fusillade: An opinionated HTTP library
  - Refit: Automatic type-safe REST library
  - ModernHttpClient: HttpClient implementations that use platform-native HTTP clients

Where do I park my data?

- SQLite is “typical” for local structured data
  - Could also use flat files, XML, etc.
- Best easy options for Sqlite
  1. ADO provider using System.Data and Mono.Data.Sqlite
  2. C#-SQLite – File-based C# port of SQLite
  3. Sqlite-net – “Simple, powerful, cross-platform SQLite client and ORM”
     - Strongly-typed queries
     - Single file (1,964 LOC)
- Component store
  - SQLLite.net component
  - SQLCipher component ($500)
    - 256-bit AES encryption



Graphics, Drawing, & Gaming

- OpenTK
  - OpenGL-based for Android, iOS
- MonoGame
  - XNA-API across platforms
- Cocos2D-XNA
  - 2D/3D game framework, XNA API compatible with MonoGame

Some Other Personal Favorites

- TinyIoC and TinyMessenger
  - DI and Pub/Sub
  - drop-in code, one PCL issue
- Rx (Reactive Extensions)
- NetTopologySuite
  - in NuGet as “NTS – Topology Suite”

Full Frameworks

- MonoCross
  - http://monocross.net/
- MvvmCross
  - https://github.com/MvvmCross/MvvmCross
- ReactiveUI
  - https://github.com/reactiveui/ReactiveUI

Native Libraries

- P/Invoke

```
[DllImport (Constants.UIKitLibrary,EntryPoint="UIRectFrameUsingBlendMode")]
public extern static void RectFrameUsingBlendMode (RectangleF rect, CGBlendMode bl
```

- iOS: Objective-C, C++ libraries
  - https://github.com/mono/monotouch-bindings
- Android: Java, C, C++ libraries
- Binding Project Template
- Documented guides

//TODO:

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- ❑ Resources

MEGAFACEPALM

When a single facepalm is not enough.

UBC ASIC200 class of 2011

//GOTCHA: Reference Cycles

Garbage collection quietly coexists with native reference counting. Watch for cycles.

```
public class MyViewController : UIViewController
{
    public override void ViewDidLoad()
    {
        base.ViewDidLoad();

        Add(new MyView());
    }
}


public class MyView : UIView
{
    UIViewController parent;

    public MyView(MyViewController parentViewController)
    {
        parent = parentViewController;
    }
}
```

//GOTCHA: Reference Cycles

Workarounds

1. Design around it
2. Use WeakReference →
3. Set “parent” to null
4. Call Dispose

```
public class MyView: UIView
{
    WeakReference _parent;

    public MyView(MyViewController parentViewController)
    {
        _parent = new WeakReference(parentViewController);
    }

    void DoSomething()
    {
        var parent = _parent.Target as MyViewController;
        if (parent != null)
        {
            // now safe to use parent
        }
    }
}
```

//GOTCHA: Surprise References

- Event handlers are notorious for this

```
myTextField.EditingChanged +=
    (sender, e) => ViewModel.HelloText = myTextField.Text;
```

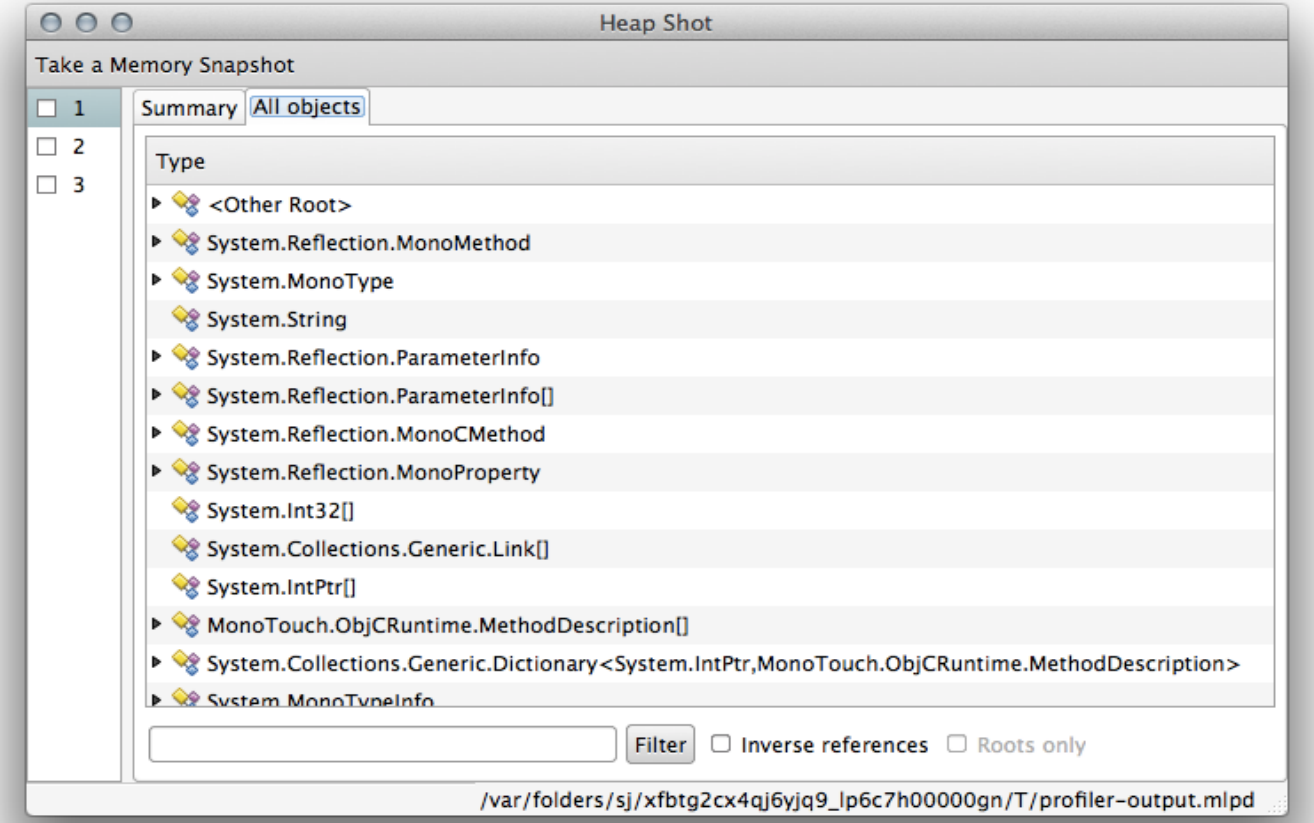
- Manual alternative

```
myTextField.EditingChanged += HandleValueChanged;
myTextField.EditingChanged -= HandleValueChanged;
```

- Something that's easier…an event wrapper

```
myTextField.EditingChanged += new WeakEventHandler(
    (sender, e) => ViewModel.HelloText = myTextField.Text
).Handler;
```

Use The Profiler…



Android: [Consult the guide for directions]

//TODO:

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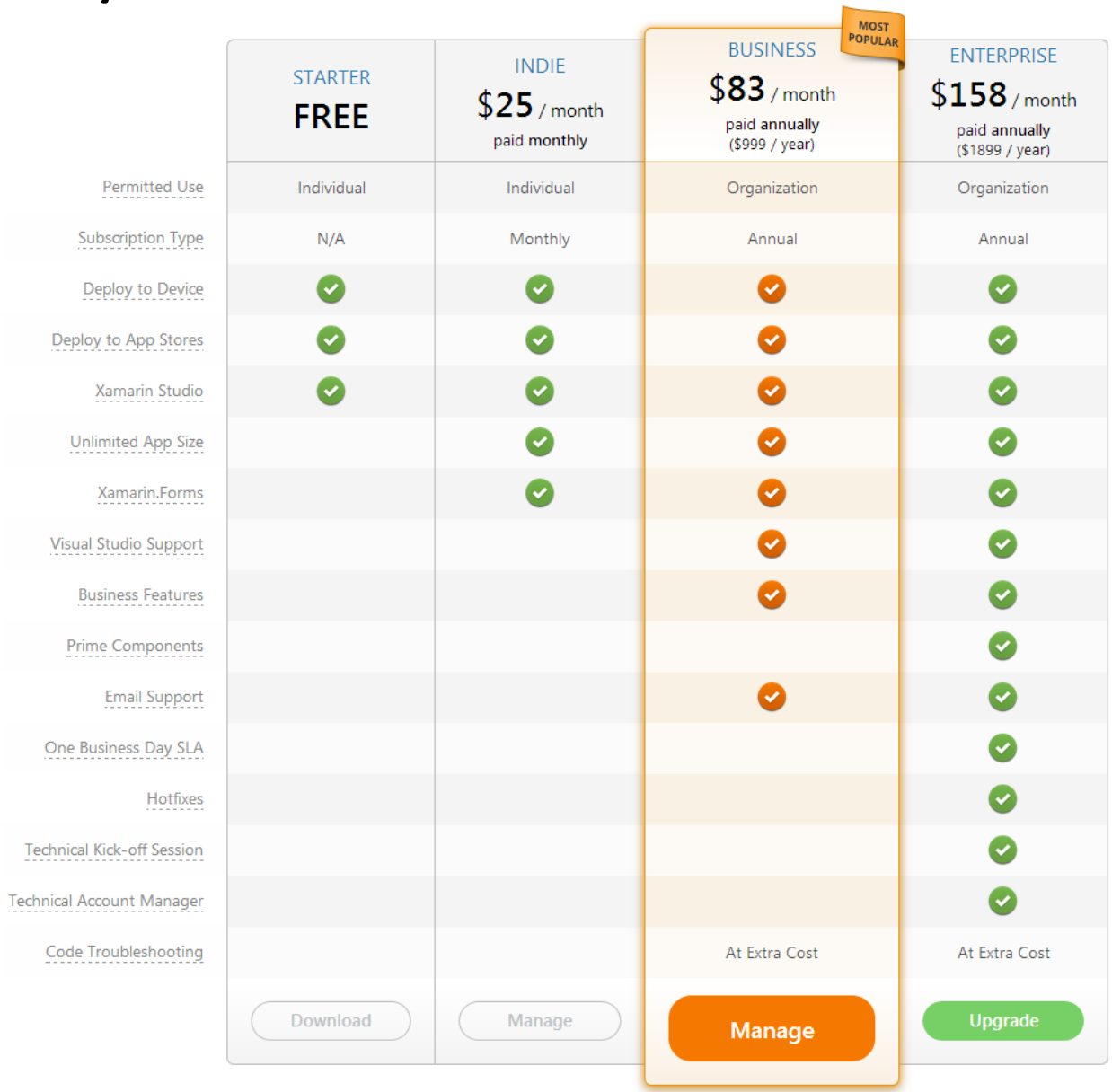
- ❑ Gotchas
- ❑ **Resources**

What you'll need



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Permitted Use	Individual	Individual	Organization	Organization
Subscription Type	N/A	Monthly	Annual	Annual
Deploy to Device	✓	✓	✓	✓
Deploy to App Stores	✓	✓	✓	✓
Xamarin Studio	✓	✓	✓	✓
Unlimited App Size		✓	✓	✓
Xamarin.Forms		✓	✓	✓
Visual Studio Support			✓	✓
Business Features			✓	✓
Prime Components				✓
Email Support			✓	✓
One Business Day SLA				✓
Hotfixes				✓
Technical Kick-off Session				✓
Technical Account Manager				✓
Code Troubleshooting			At Extra Cost	At Extra Cost
	Download	Manage	Manage	Upgrade

What you'll need

Development OS	Mac OS X	Windows	
IDE	Xamarin Studio	Xamarin Studio	Visual Studio
iOS	Y	-	Y
Android	Y	Y	Y
Windows Phone	-	-	Y

For iOS you need a Mac to build on

even if you use Windows to develop on

(a $600 Mac mini works just fine!)

Check out this link

Pretty much everything starts here

http://developer.xamarin.com/

- Getting started, videos, tutorials, samples, recipes, API, advanced topics, etc.
- Special section covering cross-platform topics

Helpful Tips

- Pick one platform to do first
- Don’t just Google for “Xamarin”
  - The entire native knowledge base is usable
- Understand MonoTouch and MonoDroid monikers
  - Historical evolution of naming
  - MonoTouch == Xamarin.iOS
  - MonoDroid == Mono for Android == Xamarin.Android

Tools for the Mac Tool Belt

(for first time Mac'ers)

- Charles (like Fiddler): http://www.charlesproxy.com/
- Graphics work
  - Screen captures/clips
    - Grab (built-in utility)
    - Entire desktop: **Command-Shift-3**
    - Portion of desktop: **Command-Shift-4**
    - Specific application window: **Command-Shift-4**, then **Spacebar**
    - Add **Control** to send to clipboard instead of file on desktop
  - DigitalColor Meter (built-in utility)
  - PaintCode: http://www.paintcodeapp.com/
- SourceTree: http://www.sourcetreeapp.com/
- SizeUp: https://www.irradiatedsoftware.com/sizeup/

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Related links listed on the ThatConference session page
https://www.thatconference.com/sessions/session/2240

Sample code and slides on GitHub
https://github.com/DennisWelu/presentations
https://github.com/DennisWelu/csharp-utils

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