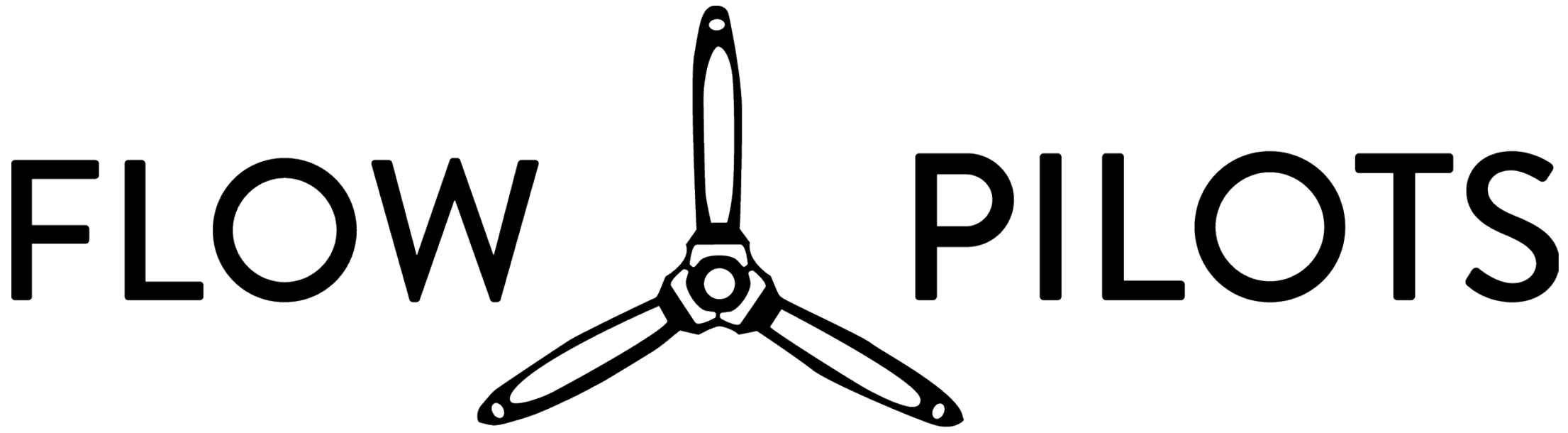


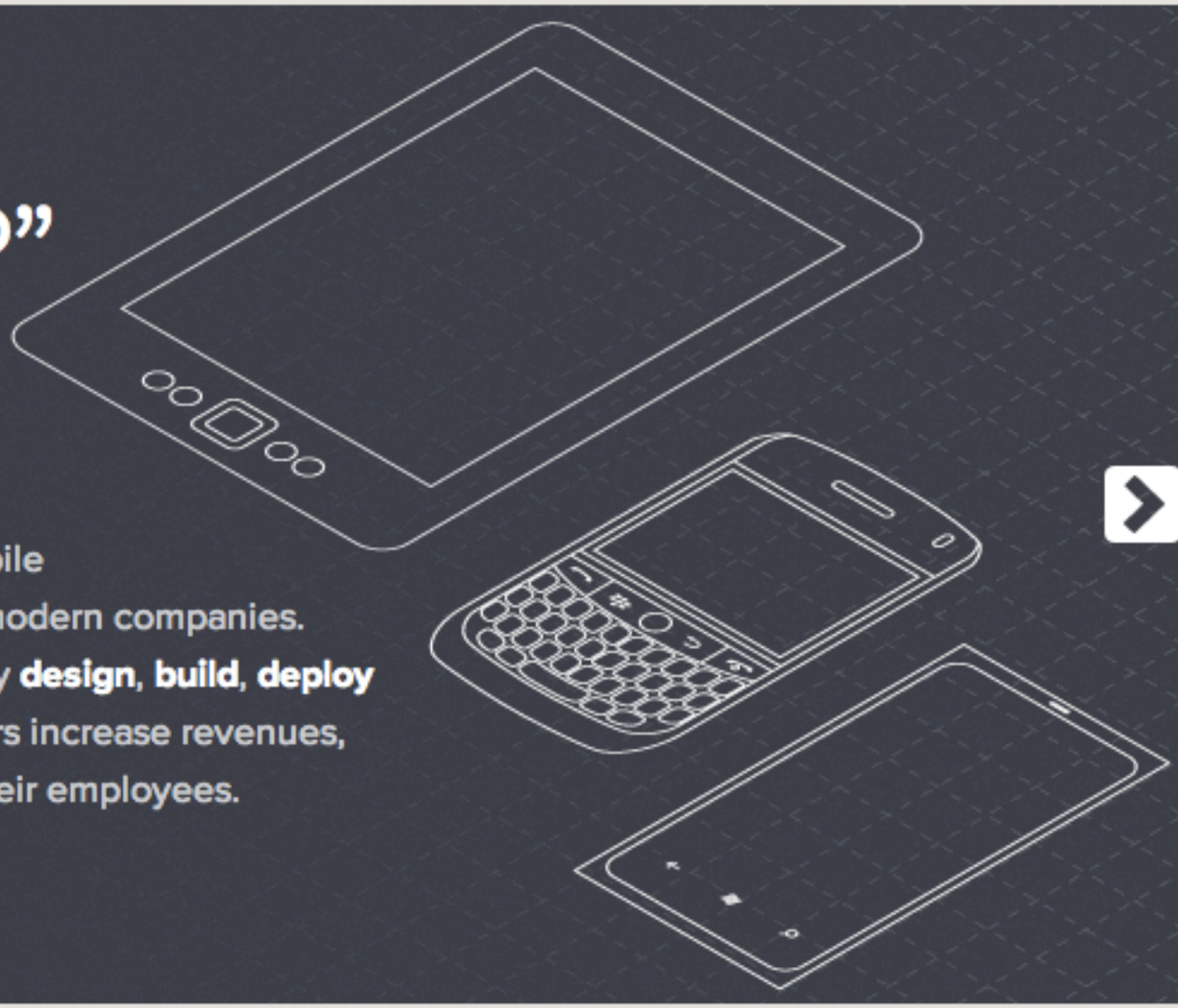
Mobile with Mono

Ruben Vermeersch
@rubenv

FLOW PILOTS

FINALLY. A PROFESSIONAL PARTNER FOR YOUR CORPORATE MOBILE NEEDS.

"WE NEED AN APP" IS NOT A MOBILE STRATEGY



At Flow Pilots, we believe that the smart use of mobile technologies will be a key driver in the success of modern companies. That is why we don't just develop apps. We carefully **design**, **build**, **deploy** and **manage** the digital tools that help our customers increase revenues, decrease costs or bring freedom and flexibility to their employees.

Flow Pilots CVBA
Oudenhof 9b
2880 Bornem

BTW BE 0842.238.033
IBAN BE72 7310 2122 7716
Call us: +32495592235

Mobile apps on different platforms

State of the union

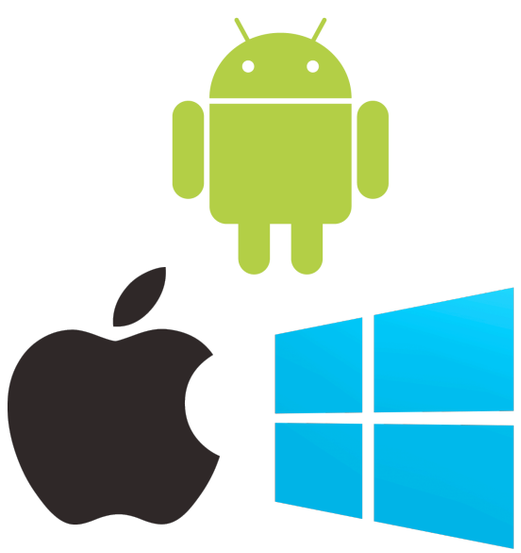
Three platforms, three technologies

Objective-C
Cocoa / UIKit

Java
Android SDK

C#
WinRT

Building on all platforms



Fully native

Loads of work

No reuse

Awesome

Hybrid

Web

No device APIs

Feels wrong

Code reuse

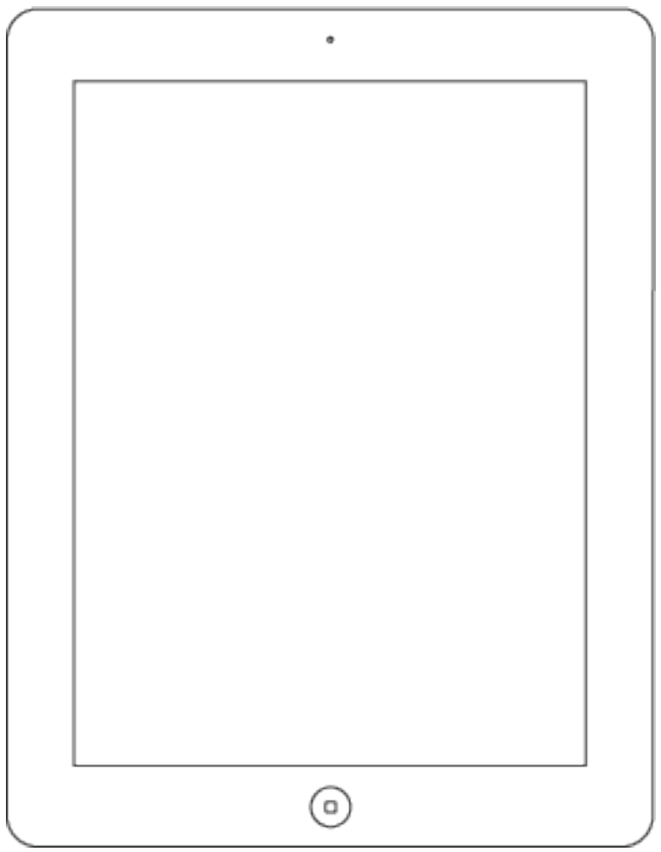
Today

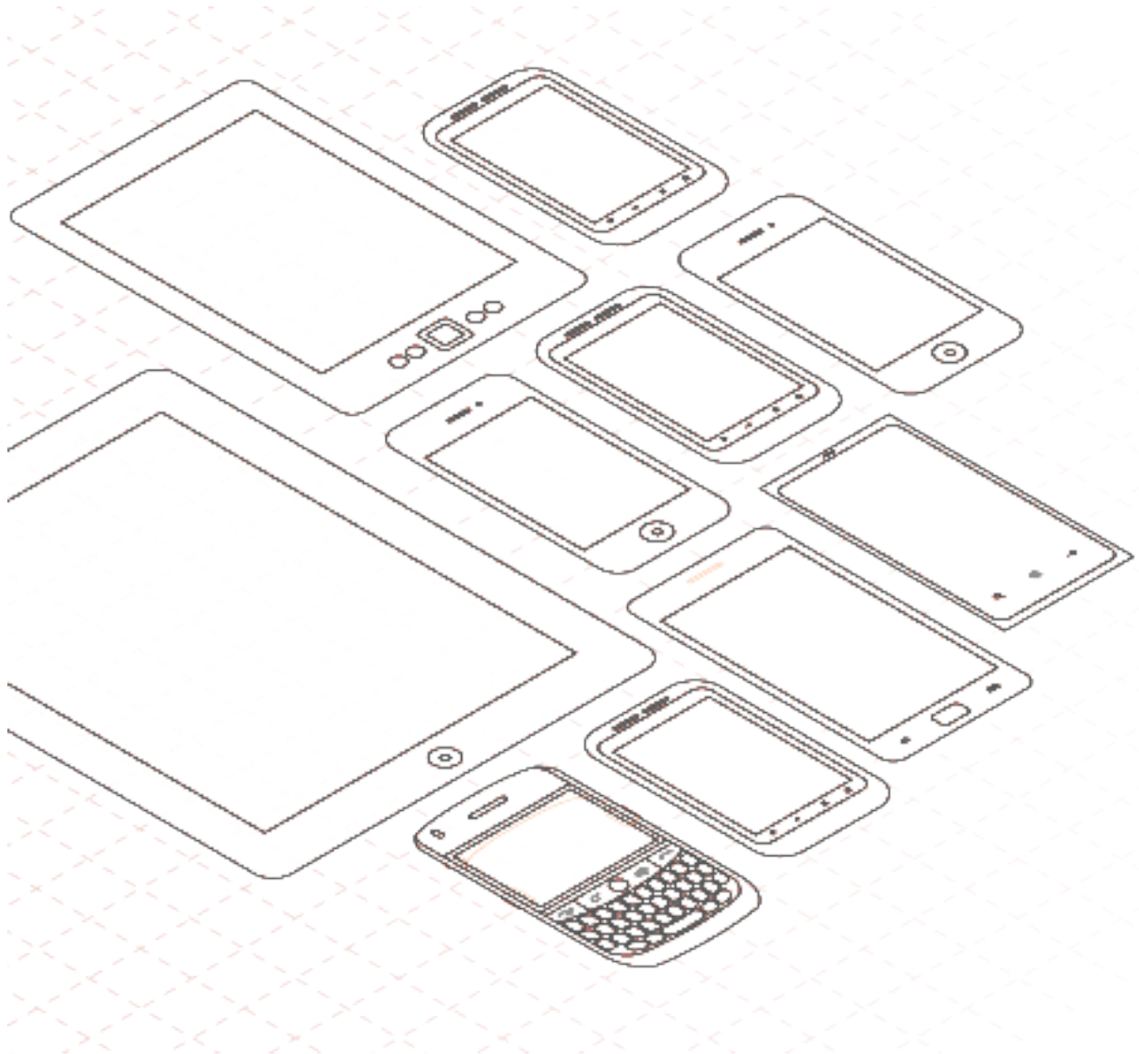
Life improvement for developers!

Xamarin.iOS & Xamarin.Android

Today

Life improvement for developers!

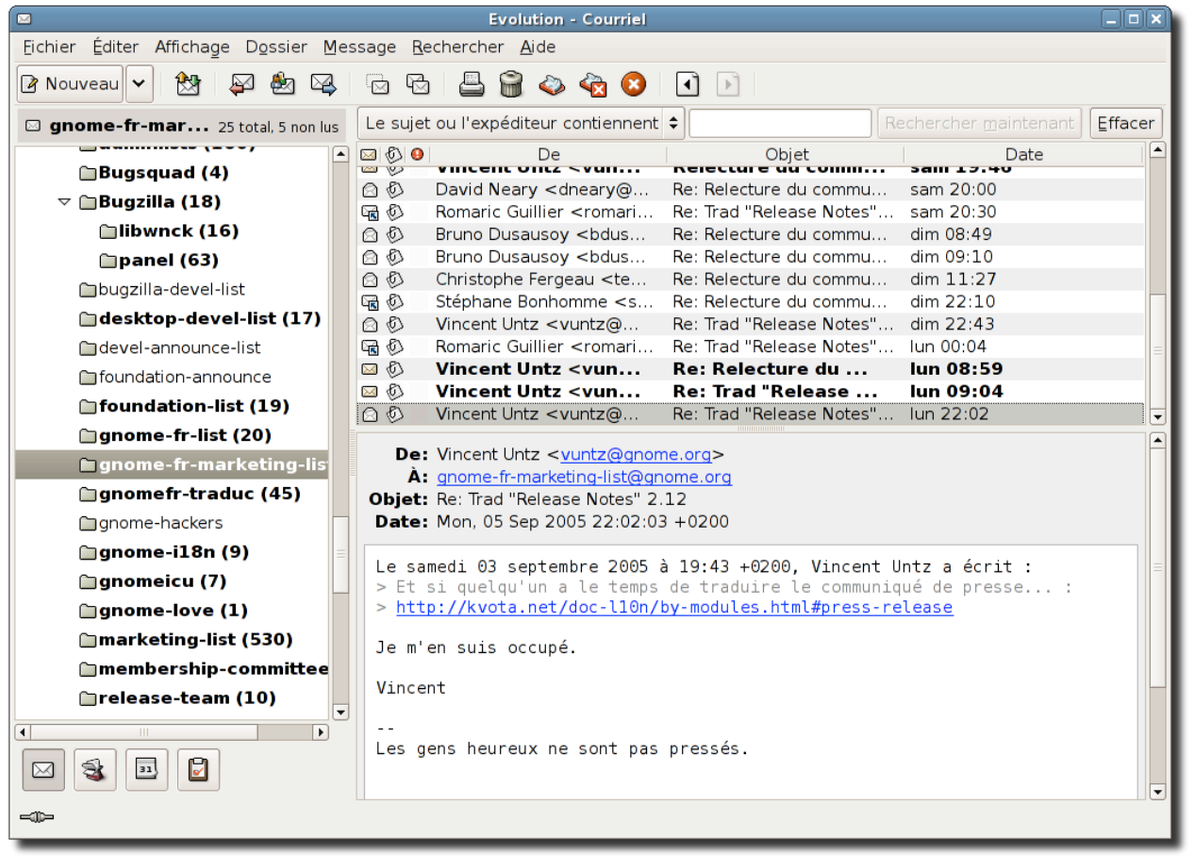




Brief history

Miguel De Icaza

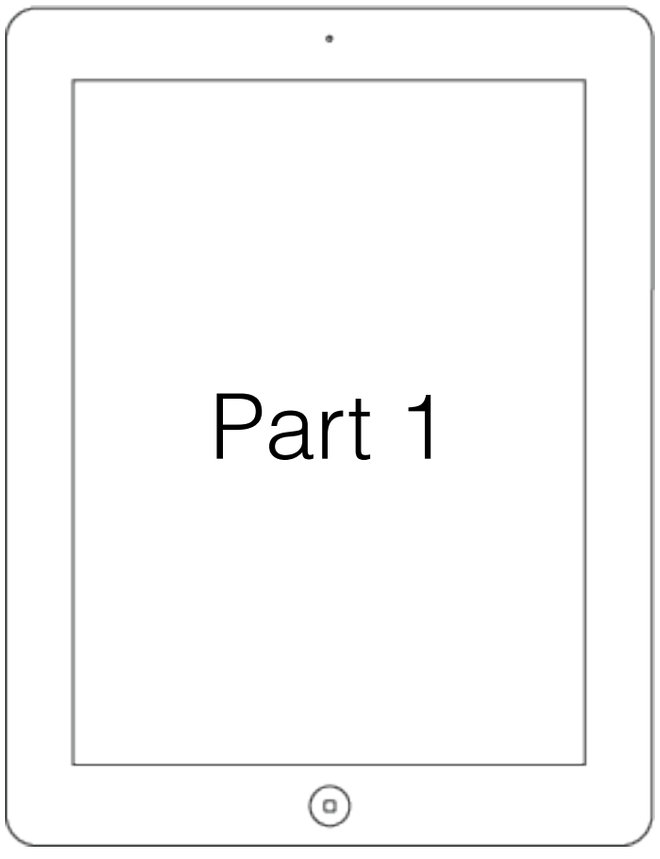
Miguel De Icaza



Evolution

- Reimplementation of .NET
- Tons of platforms
  - Linux, Mac, Windows, PS3, Xbox, Wii, iOS, Android, Z-Series
- 13 years in development

"Let us make developer tools that are objects of desire"


Part 1

Xamarin { iOS, Android, Mac

Trademart.xcodeproj — TrademartAppDelegate.m

Trademart › iPhone 6.1 Simulator

Build Trademart: **Succeeded** | 12/02/13 at 13:33

Project ⚠1

Run Stop Scheme Breakpoints Editor View Organizer

TradeMart › Classes › TrademartAppDelegate.m › No Selection

TradeMart
1 target, iOS SDK 6.1

- 3rd party
- Classes
  - TrademartAppDelegate.h
  - TrademartAppDelegate.m
  - Service
  - Models
  - ViewControllers
  - Views
- Other Sources
- Resources
- Frameworks
- Products

```
#pragma mark -
#pragma mark Application lifecycle

- (BOOL)application:(UIApplication *)application didFinishLaunchingWithOptions:(NSDictionary *)launchOptions {

    // Override point for customization after application launch.
    self.visitTabBarItem.title = NSLocalizedString(@"visitTabBarItem-title", nil);
    self.mapTabBarItem.title = NSLocalizedString(@"mapTabBarItem-title", nil);
    self.findTabBarItem.title = NSLocalizedString(@"findTabBarItem-title", nil);

    [self.window addSubview:self.tabBarController.view];

    // Download data.
    [[TMService sharedService] downloadAndParseAllData];

    [self.window makeKeyAndVisible];

    return YES;
}

- (void)applicationWillEnterForeground:(UIApplication *)application
{

    [[GANTracker sharedTracker] startTrackerWithAccountID:@"UA-15496516-3" dispatchPeriod:10 delegate:nil];

    if (![[NSUserDefaults standardUserDefaults] boolForKey:@"isFirstLaunch"])
    {
        [[GANTracker sharedTracker] trackPageview:@"/app/firstlaunch" withError:nil];
        [[NSUserDefaults standardUserDefaults] setBool:YES forKey:@"isFirstLaunch"];
    }

    [[GANTracker sharedTracker] trackPageview:@"/app/launch" withError:nil];
}

- (void)applicationDidEnterBackground:(UIApplication *)application
{
    [[GANTracker sharedTracker] stopTracker];
}

- (void)dealloc {
    [tabBarController release];
    [window release];
    [visitTabBarItem release];
    [mapTabBarItem release];
    [findTabBarItem release];
    [super dealloc];
}


@end
```

No Selection

Auto | All Output | Clear

Quick Help

Declaration `CODE_SIGN_IDENTITY`

Description The name ("common name") of a valid code-signing certificate in a keychain within your keychain path. A missing or invalid certificate will cause a build error. [CODE_SIGN_IDENTITY]

Object Library

DowloadRepository.Tests – PriorityTests.cs – Xamarin Studio

Debug | Default | Xamarin Studio | Press '⌘.' to search

Solution

- DownloadRepository (master)
  - DowloadRepository.Tests
    - References
    - Utils
      - BrokenStreamDownloader.cs
      - QueuedTestDownloader.cs
      - StringUtils.cs
      - TestDownloader.cs
    - CleanTests.cs
    - DownloadErrorTests.cs
    - DownloadManualTests.cs
    - DownloadTests.cs
    - FilestoreTests.cs
    - HttpDownloadTests.cs
    - IntervalHeapTests.cs
    - MemoizeTests.cs
    - PriorityTests.cs
    - RegistrationTests.cs
    - UrlUtilsTests.cs
  - DownloadRepository
    - References
    - Database
      - DataManager.cs
      - Registration.cs
    - Downloader
      - DownloadResult.cs
      - HttpDownloader.cs
      - IDownloader.cs
      - QueuedDownloader.cs
    - Filestore
      - FileManager.cs
    - Utils
      - IntervalHeap.cs
      - Memoize.cs
      - UrlUtils.cs
    - AssemblyInfo.cs
    - Download.cs

MemoizeTests.cs | PriorityTests.cs

No selection

```
1  using System;
2  using NUnit.Framework;
3  using FlowPilots.DownloadRepository;
4  using System.IO;
5  using System.Threading.Tasks;
6  using FlowPilots.DownloadRepository.Downloader;
7  using System.Collections.Generic;
8  using Hyena.Collections;
9  using System.Linq;
10
11 namespace DowloadRepository.Tests
12 {
13     [TestFixture]
14     public class PriorityDownloads
15     {
16         QueuedTestDownloader downloader;
17         DownloadRepository repo;
18
19         [SetUp]
20         public void CreateRepository ()
21         {
22             downloader = new QueuedTestDownloader (0);
23             repo = new DownloadRepository ("tests", downloader);
24         }
25
26         [TearDown]
27         public void DestroyRepository ()
28         {
29             repo.Destroy ();
30         }
31
32         int [] Queue {
33             get {
34                 return (from dl in downloader.ToArray() select Int32.Parse(dl)).ToArray ();
35             }
36         }
37
38         [Test]
39         public void TestDownloadOrder ()
40         {
41             for (var i = 1; i <= 5; i++) {
42                 repo.Get (i.ToString (), 10 - i);
43             }
44
45             Assert.AreEqual (new int [] { 1, 2, 3, 4, 5 }, Queue);
46         }
47
48         [Test]
49         public void TestDownloadReverseOrder ()
50         {
51             for (var i = 1; i <= 5; i++) {
52                 repo.Get (i.ToString (), i);
53             }
54
```

Source | Changes | Blame | Log | Merge

Toolbox | Properties | Document Outline

Test Results | Errors | Tasks

What is Xamarin.iOS?

.NET bindings to iOS APIs

- Plain C libraries and frameworks
- CoreFoundation based frameworks
- Objective-C based frameworks

What is it not?

- Not a UI toolkit!
- Not a platform abstraction!
- As a user, no way to tell the difference from 100% native

API bindings	Xamarin Studio	SDK
Bindings to the native APIs	IDE project support	Build tools
Mono Runtime Extensions to bridge .NET and Objective-C	Xcode designer integration	Packaging / Signing
iOS 4.0 and up	Project templates	Documentation

Some benefits

- One binding, multiple languages (most important: C#, soon: F#)
- Reuse C# across platforms
- Strongly typed APIs
    - Easy to explore
- Garbage collection everywhere
    - Both Foundation and CoreFoundation objects
    - Unlike ARC which is limited to NSObject
- Safe runtime, access to .NET class libraries and .NET ecosystem

Strongly typed APIs

- Foundation/CoreFoundation are weakly typed
  - Think C# 1.0 collections: ArrayList, Hashtable
- Mono exposes strong types:

```
UIView [] Views { get; set; }
```

vs.

```
(NSArray *) views;
```

Objective-C Sample

```
CIContext *context =
     [CIContext contextWithOptions:
        [NSDictionary dictionaryWithObject:[NSNumber numberWithBool:YES]
                    forKey:kCIContextUseSoftwareRenderer]];
CIImage *ciImage = [CIImage initWithCGImage:cgImage];

CIFilter *hueAdjustFilter = [CIFilter filterWithName:@"CIHueAdjust"];
CIFilter *colorControlsFilter = [CIFilter filterWithName:@"CIColorControls"];

[hueAdjustFilter setValue:[NSNumber numberWithDouble:3.0 * M_PI] forKey:@"inputAngle"];

[colorControlsFilter setDefaults];
[colorControlsFilter setValue:[NSNumber numberWithDouble:1.3] forKey:@"inputSaturation"];
[colorControlsFilter setValue:[NSNumber numberWithDouble:0.3] forKey:@"inputBrightness"];

[hueAdjustFilter setValue:ciImage forKey:@"inputImage"];
[colorControlsFilter setValue:[hueAdjustFilter valueForKey:@"outputImage"] forKey:@"inputImage"];
ciImage = [colorControlsFilter valueForKey:@"outputImage"];

[context [createCGImage: ciImage fromExtent:[ciImage extent]]];
```

C# Version

```
var context = CIContext.FromOptions (new CIContextOptions (){
    UseSoftwareRenderer = true
});
var ciImage = new CIImage (cgImage);
var hueAdjustFilter = new CIHueAdjust {
    InputAngle = 3.0f * Math.PI,
    Image = ciImage,
};

var colorControlsFilter = new CIColorControls {
    InputSaturation = 1.3f,
    InputBrightness = 0.3f,
    Image = hueAdjustFilter.OutputImage
};

ciImage = colorControlsFilter.OutputImage;
context.CreateImage (ciImage, ciImage.Extent);
```

C APIs

CoreFoundation APIs

```
CFStringRef keys[] = {
    kCTFontAttributeName,
    kCTForegroundColorAttributeName
};

CFTypeRef bval[] = {
    cfListLineCTFontRef,
    CGColorGetConstantColor(kCGColorBlack)
};

attr = CFDictionaryCreate (kCFAllocatorDefault,
    (const void **) &keys, (const void **) &bval,
    sizeof(keys) / sizeof(keys[0]), &kCFTypeDictionaryKeyCallBacks,
    &kCFTypeDictionaryValueCallBacks);

astr = CFAttributedStringCreate(kCFAllocatorDefault, CFSTR("Hello World"), attr);
```

C APIs

CoreFoundation APIs

```
CFStringRef keys[] = {
    kCTFontAttributeName,
    kCTForegroundColorAttributeName
};

CFTypeRef bval[] = {
    cfListLineCTFontRef,
    CGColorGetConstantColor(kCGColorBlack)
};

attr = CFDictionaryCreate (kCFAllocatorDefault,
    (const void **) &keys, (const void **) &bval,
    sizeof(keys) / sizeof(keys[0]), &kCFTypeDictionaryKeyCallBacks,
    &kCFTypeDictionaryValueCallBacks);

astr = CFAttributedStringCreate(kCFAllocatorDefault, CFSTR("Hello World"), attr);
```

```
var attrs = new CFStringAttributes {
    Font = listLineCTFont,
    ForegroundColor = UIColor.Black.CGColor
};

var astr = new NSAttributedString ("Hello World", attrs);
```

C APIs

AudioToolbox

```
UInt32 maxPacketSize;
UInt32 Propertysize = sizeof(maxPacketSize);
AudioFileGetProperty (
    audioFileID,
kAudioFilePropertyPacketSizeUpperBound,
&Propertysize,
&maxPacketSize
);
```

C APIs

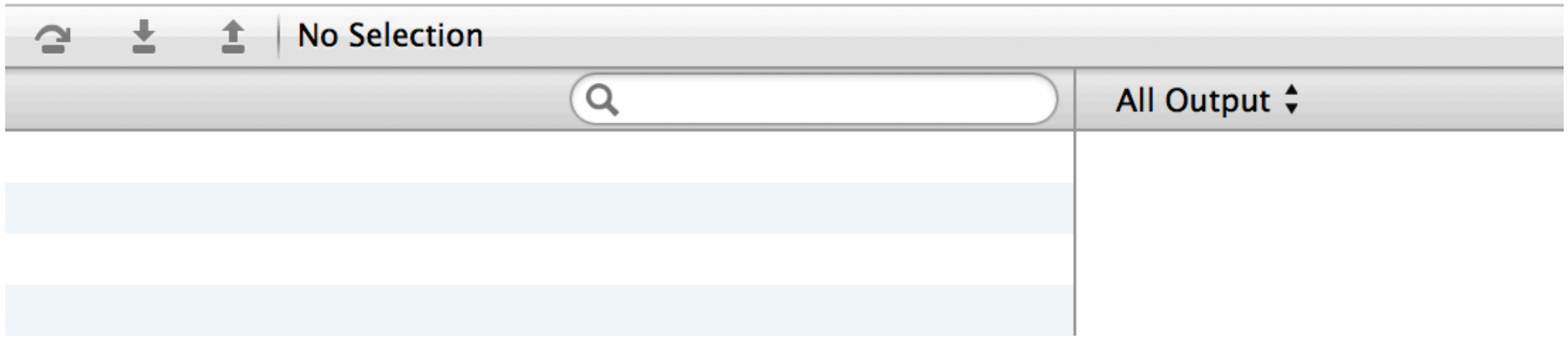
AudioToolbox

```
UInt32 maxPacketSize;
UInt32 Propertysize = sizeof(maxPacketSize);
AudioFileGetProperty (
    audioFileID,
    kAudioFilePropertyPacketSizeUpperBound,
    &Propertysize,
    &maxPacketSize
    );
```

```
var maxPacketSize = audioFile.PacketSizeUpperBound;
```

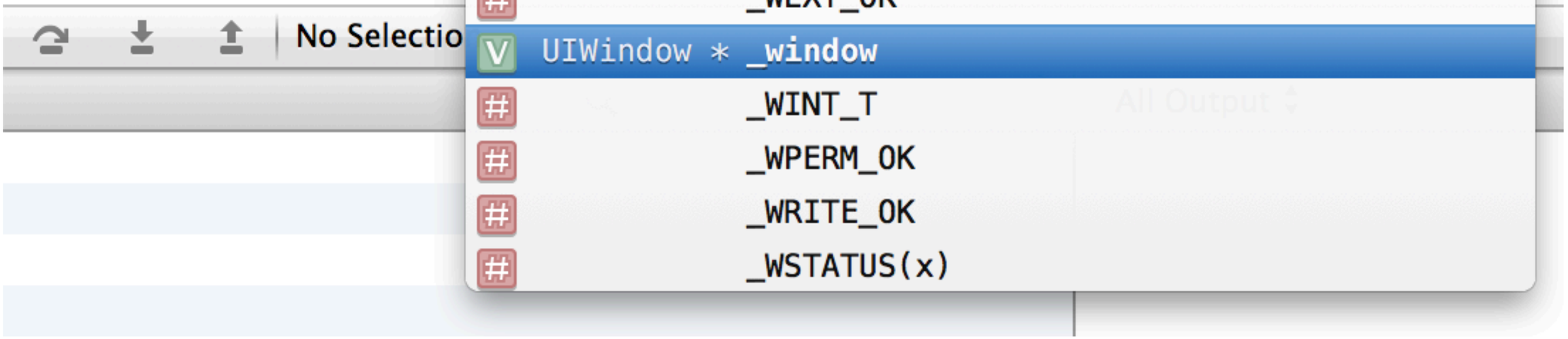
Code completion

```
CIContext *context = CIContext contextWithOptions:[
    [NSDictionary dictionaryWithObject:[NSNumber numberWithBool:YES]
                                forKey:(id<NSCopying>)]
];
```



Code completion

```
CIContext *context = CIContext contextWithOptions:[
    [NSDictionary dictionaryWithObject:[NSNumber numberWithBool:YES]
                                forKey:_window(id<NSCopying>)]
];
```



Code completion

```
CIContext *context = CIContext contextWithOptions:[
    [NSDictionary dictionaryWithObject:[NSNumber numberWithBool:YES]
                                forKey:_window (id<NSCopying>) ]
];
```

```
_WATTR_OK
_WCHAR_T
_WEXT_OK
UIWindow * _window
_WINT_T
_WPERM_OK
_WRITE_OK
_WSTATUS(x)
```

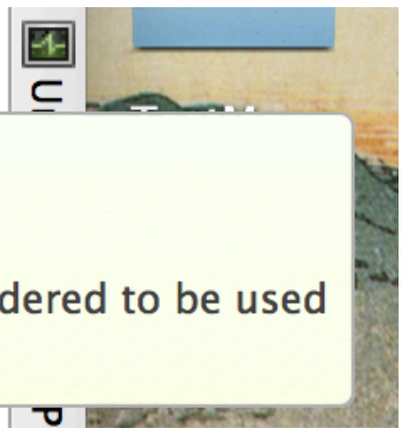
```
var context = CIContext.FromOptions (new CIContextOptions () {
    |
```

```
OutputColorSpace
UseSoftwareRenderer
WorkingColorSpace
```

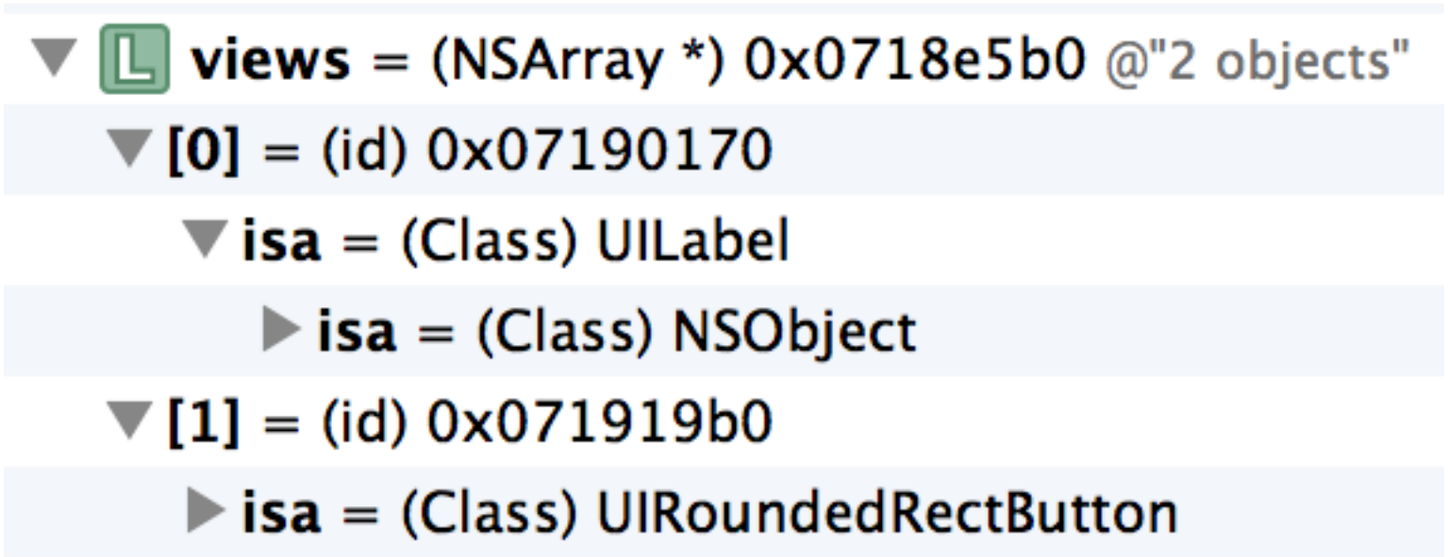
```
public bool UseSoftwareRenderer { get; set; }
```

Summary

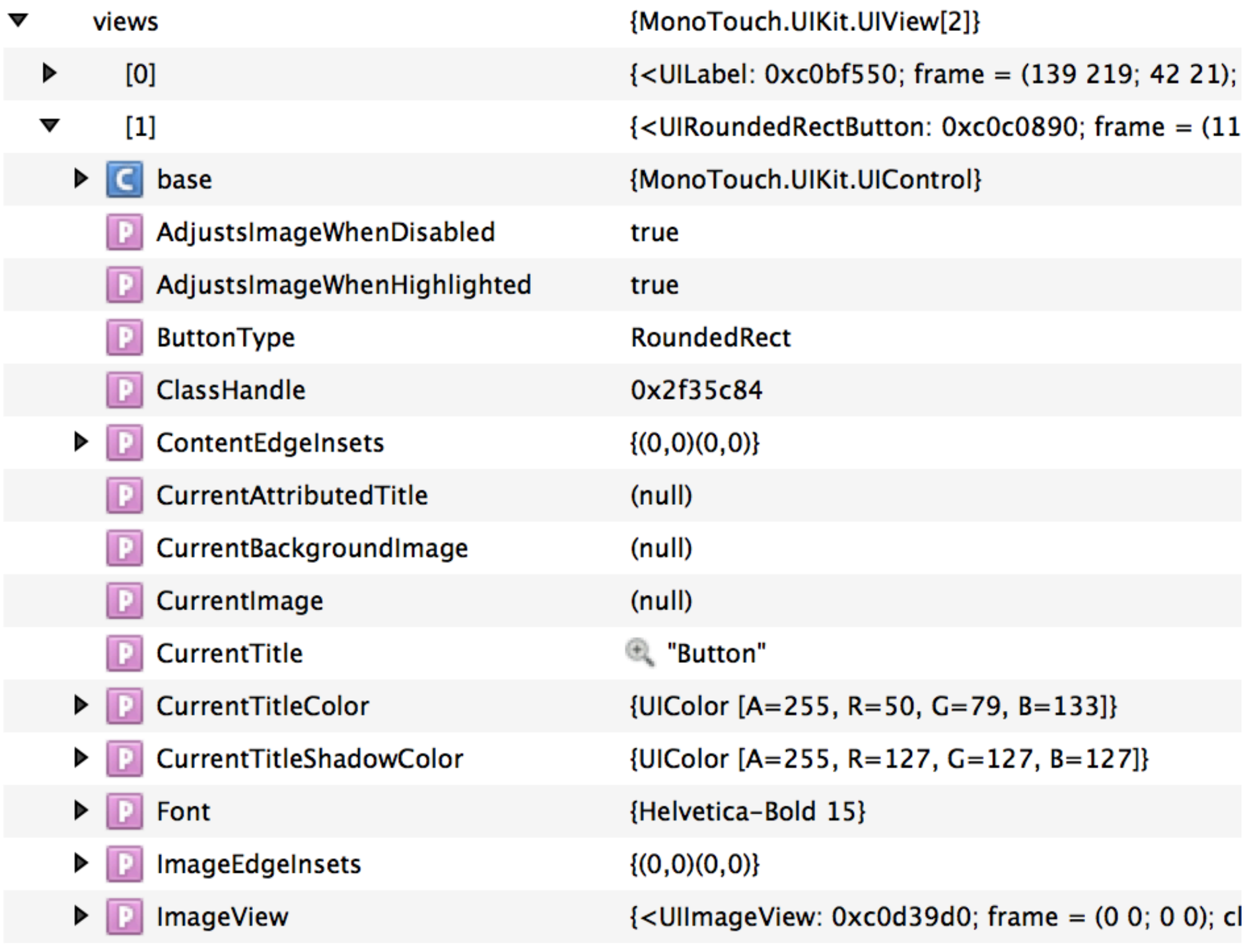
Setting this to true will force the CPU software rendered to be used and prevent the job to be offloaded to the GPU



Debugging


views = (NSArray *) 0x0718e5b0 @"2 objects"
[0] = (id) 0x07190170
isa = (Class) UILabel
isa = (Class) NSObject
[1] = (id) 0x071919b0
isa = (Class) UIRoundedRectButton

Debugging


views {MonoTouch.UIKit.UIView[2]}
[0] {<UILabel: 0xc0bf550; frame = (139 219; 42 21);
[1] {<UIRoundedRectButton: 0xc0c0890; frame = (11
base {MonoTouch.UIKit.UIControl}
AdjustsImageWhenDisabled true
AdjustsImageWhenHighlighted true
ButtonType RoundedRect
ClassHandle 0x2f35c84
ContentEdgeInsets {(0,0)(0,0)}
CurrentAttributedTitle (null)
CurrentBackgroundImage (null)
CurrentImage (null)
CurrentTitle "Button"
CurrentTitleColor {UIColor [A=255, R=50, G=79, B=133]}
CurrentTitleShadowColor {UIColor [A=255, R=127, G=127, B=127]}
Font {Helvetica-Bold 15}
ImageEdgeInsets {(0,0)(0,0)}
ImageView {<UIImageView: 0xc0d39d0; frame = (0 0; 0 0); cl

Design Philosophy

- Expose a direct binding to native APIs
  - Most of time 1:1 mapping
  - Expose strong types, hide weak types
  - Wrap "dictionary"-based APIs into strong types
  - Maps Objective-C Delegate pattern to C# events

More fun stuff

Beautiful async

Blocking the UI is the root of all ~~evil~~ user frustration

Beautiful async

Blocking the UI is the root of all ~~evil~~ user frustration

```
void DownloadTweets ()
  {
     FetchUrl (tweetUrl, result => {
          tweetDb.Populate (ParseJsonResult (result), () => {
               View.ReloadData ();
          });
     });
  }
```

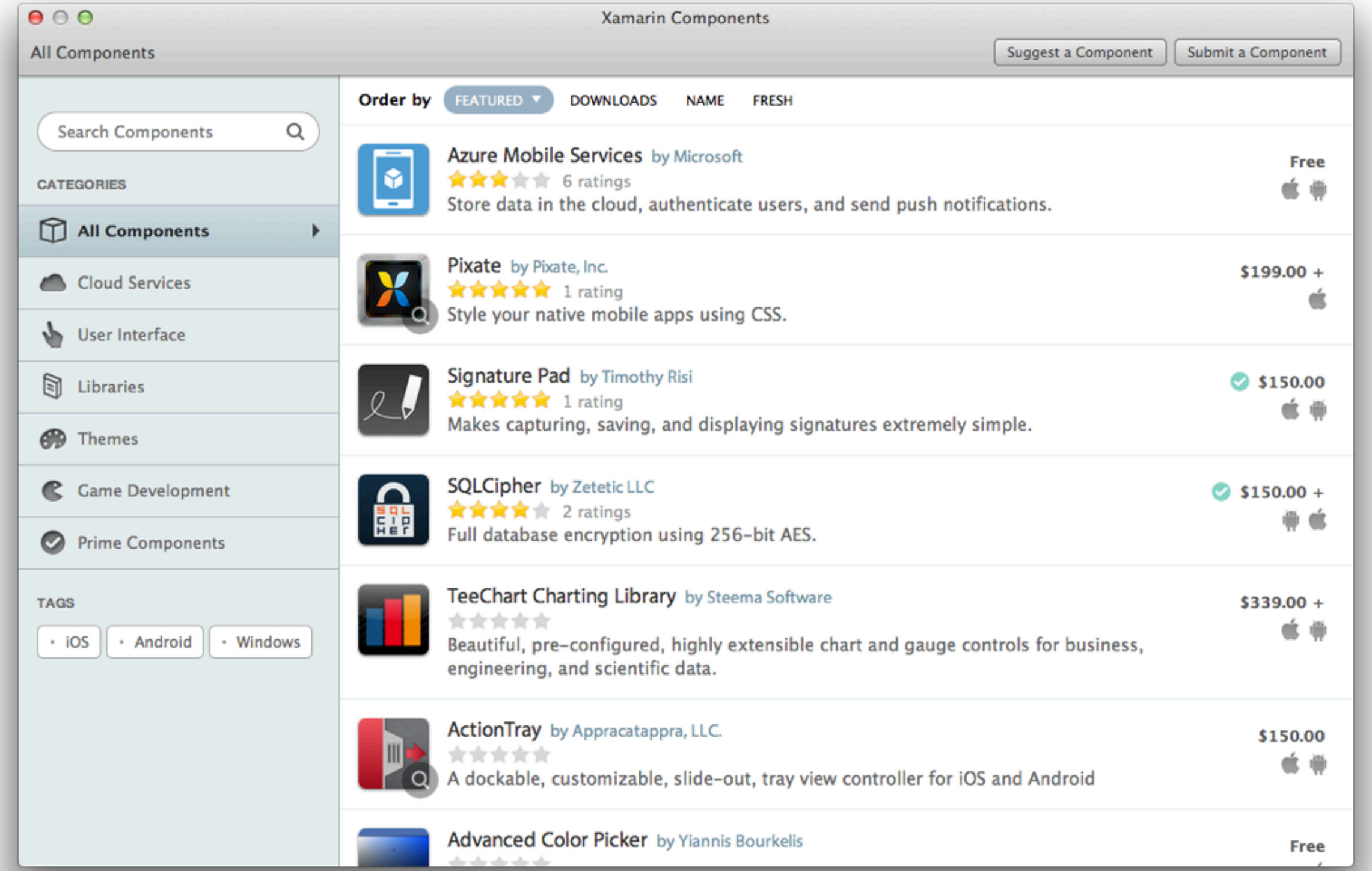
```
void DownloadTweets ()
{
    FetchUrl (tweetUrl, result => {
        if (result == null)
            View.InvokeOnMainThread (() => {
                ShowError ("Could not download tweets");
            });
        tweetDb.Populate (ParseJsonResult (result), (error) => {
            if (error) {
                Tweet.UpdateLastRead (lastValidCode, errorPost => {
                    if (errorPost != null)
                        View.InvokeOnMainThread (() => {
                            ShowError ("Twitter is down");
                        });
                });
            }  else {
                View.InvokeOnMainThread (() => {
                    View.ReloadData ();
                    lastValidCode = currentCode;
                });
            }
        });
    });
}
```

C# 5 Async

```
async void DownloadTweets ()
{
   var tweets = await FetchUrl (tweetUrl);
   if (tweets == null) {
      ShowError ("Could not download tweets");
      return;
   }

   if (!await tweetDb.Populate (ParseJsonResult (result)) {
       if (!await Tweet.UpdateLastRead (lastValidCode))
        ShowError ("Twitter is down");
   }  else {
      View.ReloadData ();
   }
}
```

Component Store



Component Store

Recipes

Recipes

All Platforms

Android

Controls
Autocomplete Text View
DatePicker
EditText
ImageButton
ImageView
MapView
WebView

Data
Adapters
ContentProviders
Files

Layout
Grid View
Table Layout

Other UX
Animation
Camera Intent
Drawing
Fragment
Gestures
TextureView

Networking
Email
NetworkInfo
SMS

General
Debugging
Projects

OS/Device Resources
Accelerometer
Geocoder
GPS

Fundamentals
Activity
Intent
Service

Resources
Device Specific
General

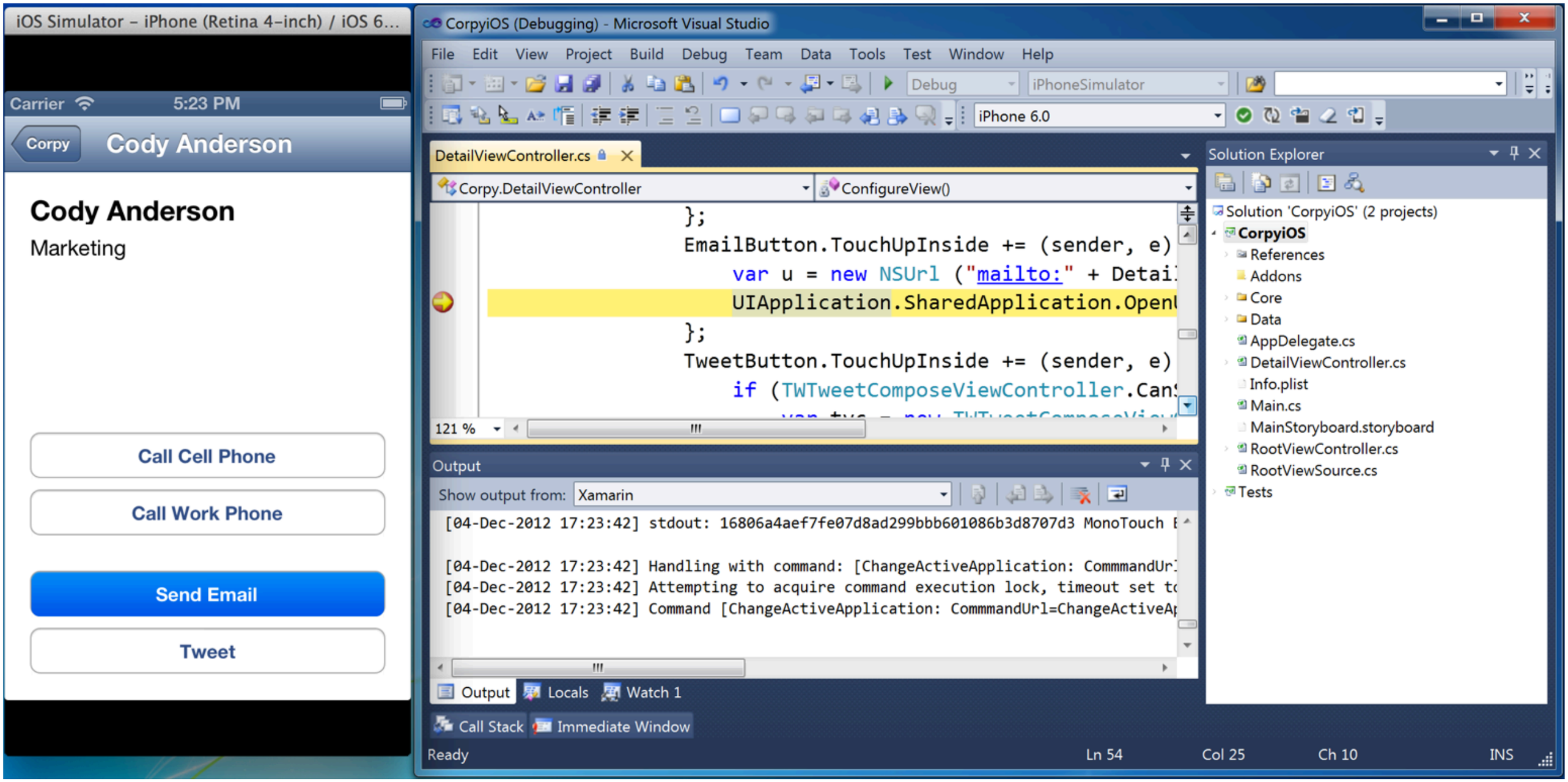
Media
Audio
Video

Web Services
Consuming Services

http://docs.xamarin.com/recipes

Visual Studio Support

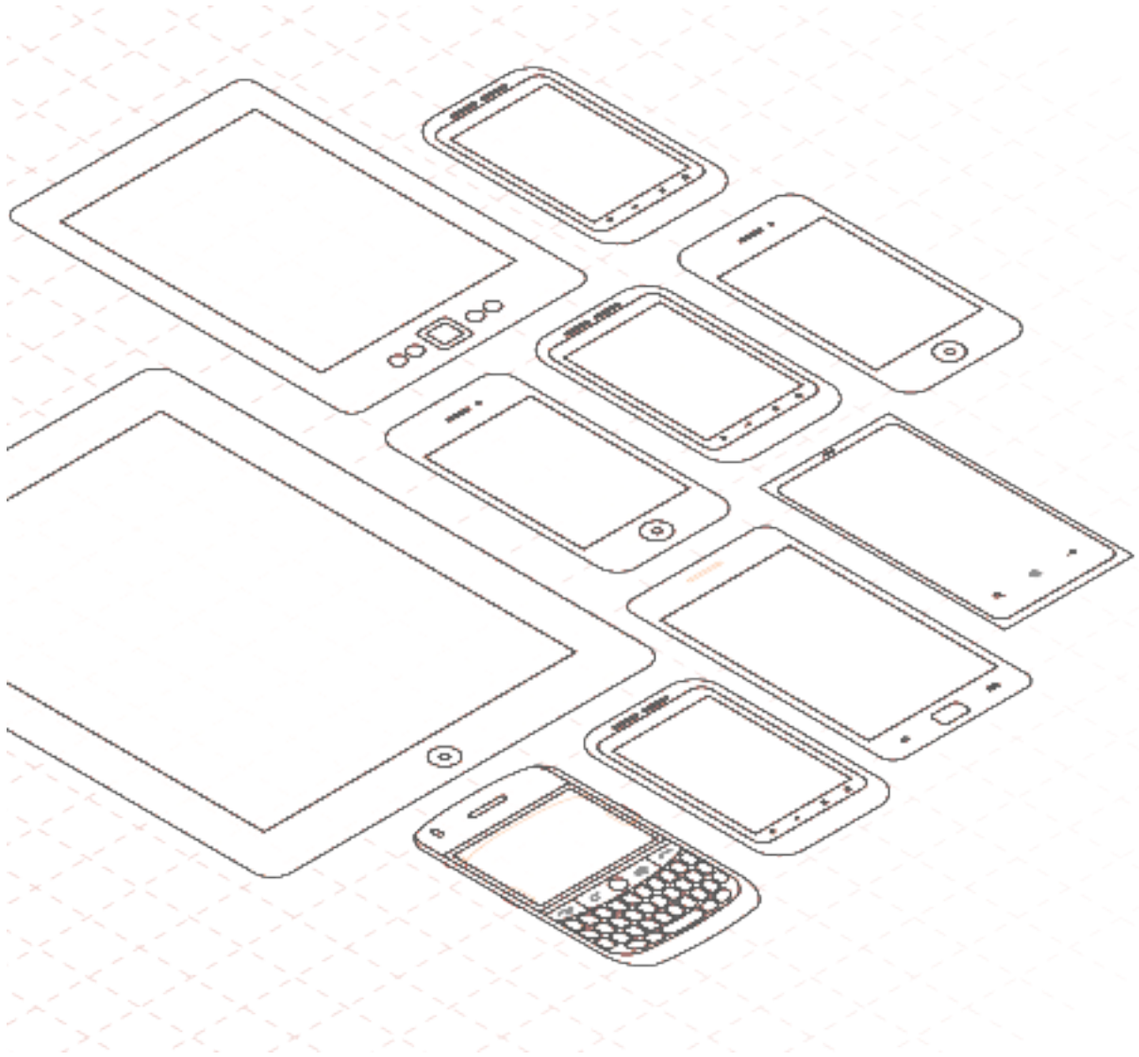
iOS and Android!



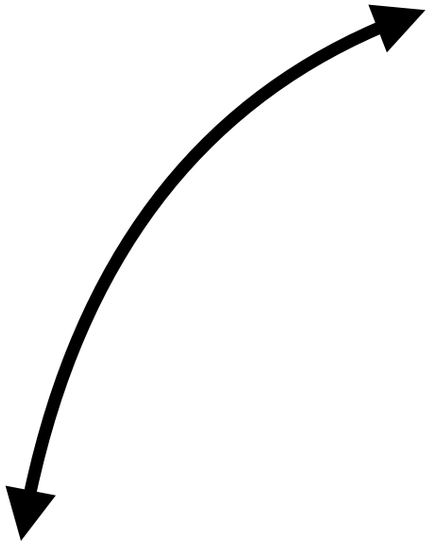
UI Designers

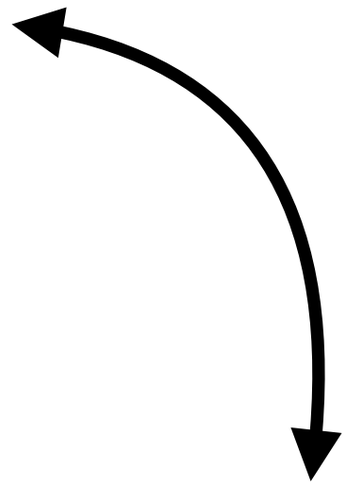
In short

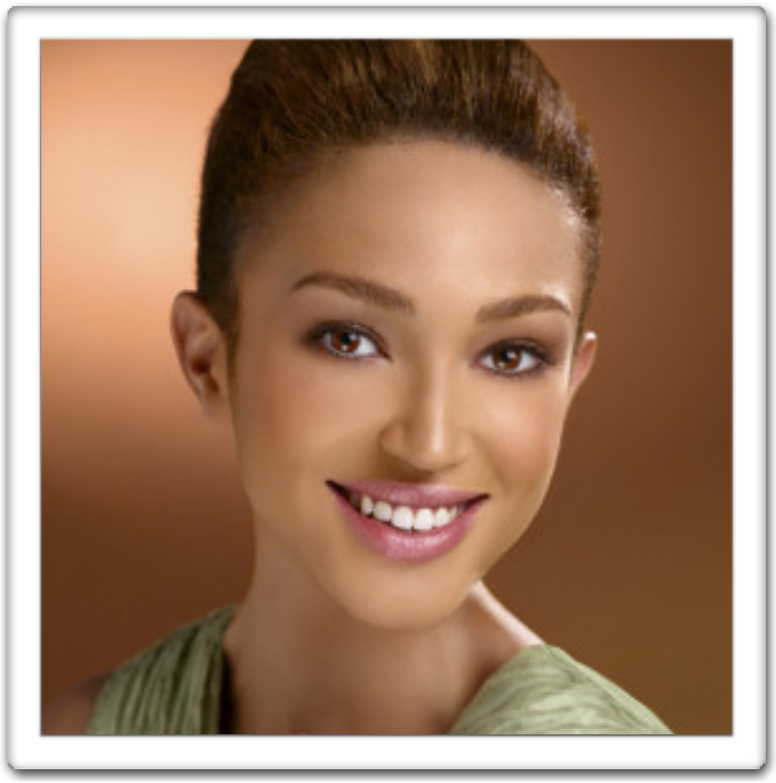
What the iOS developer story should have been



Part 2





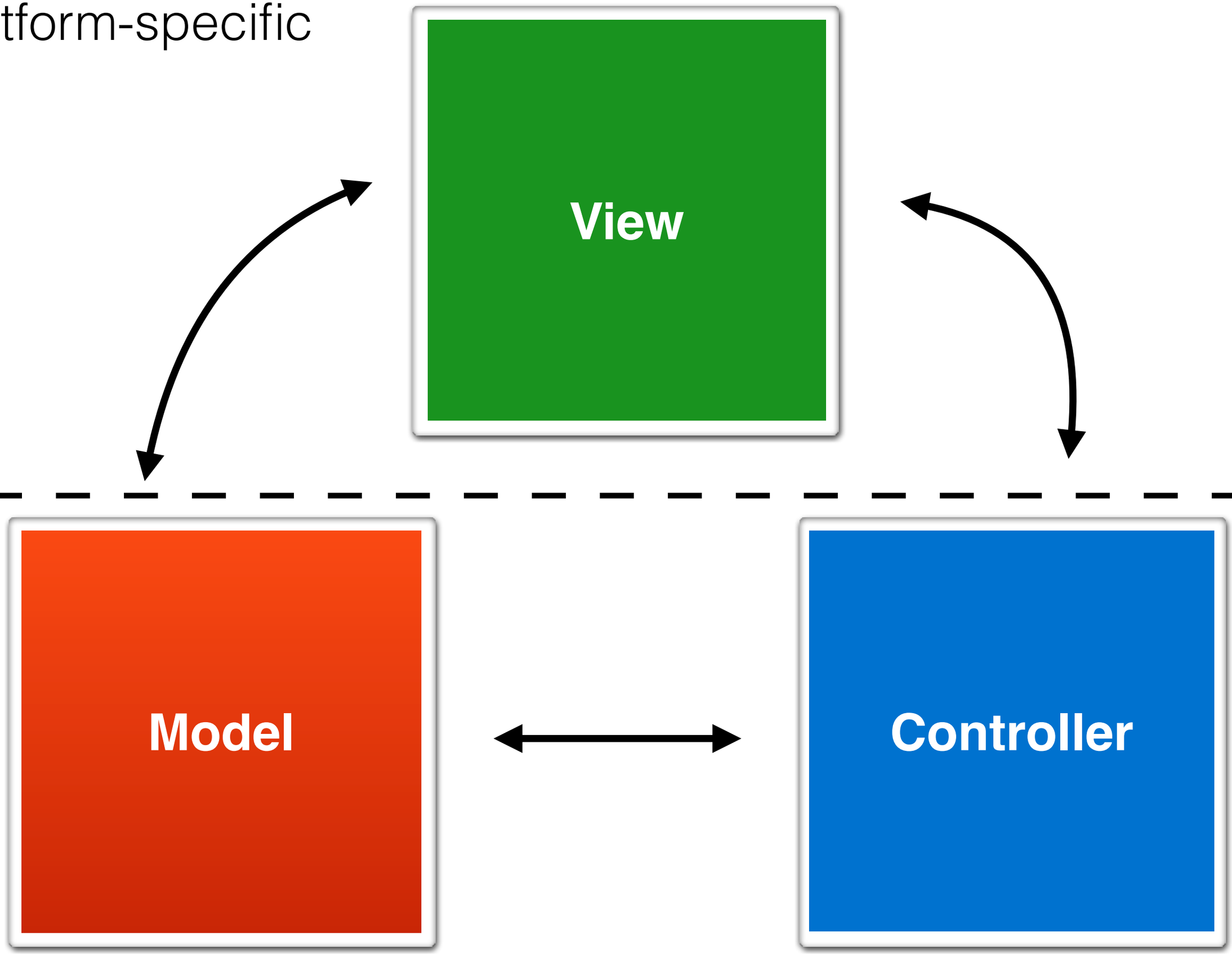


View

Model

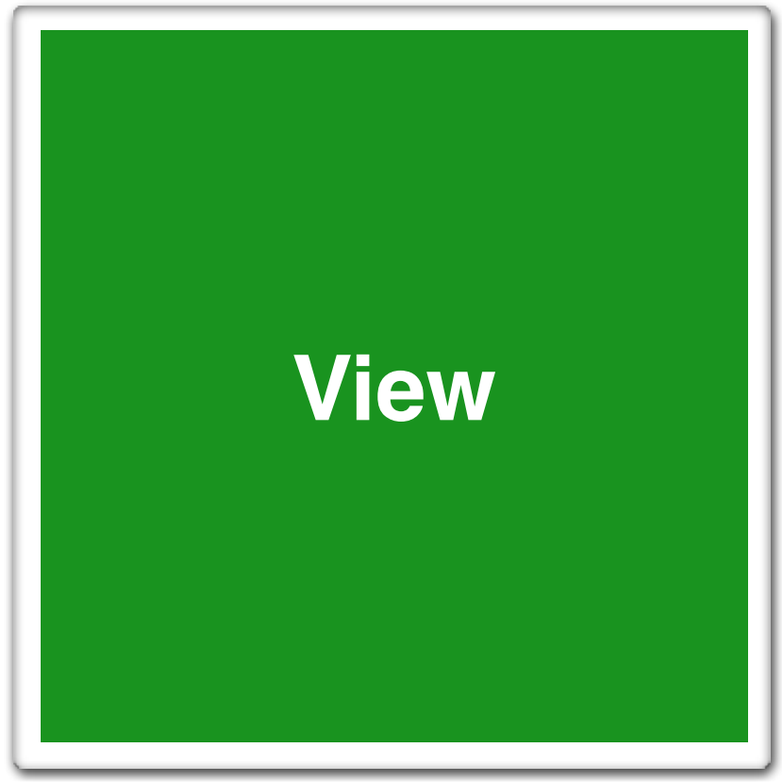
Controller

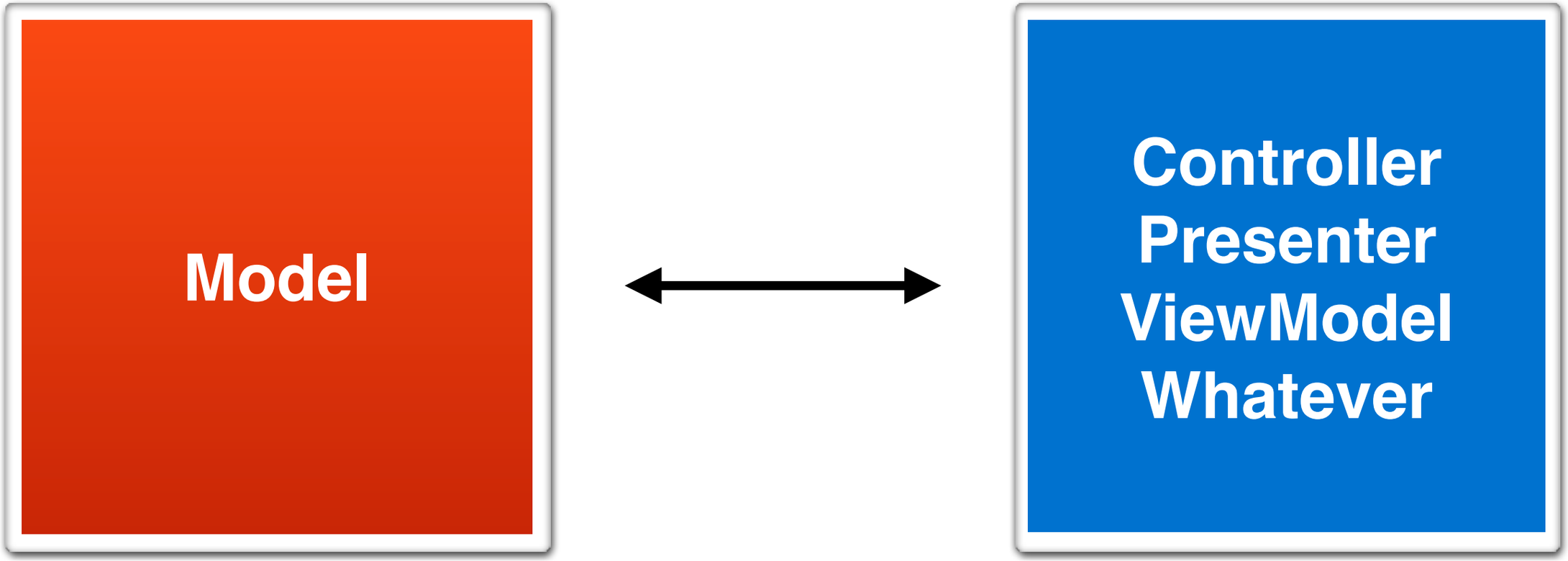
Platform-specific



Reusable (up to a certain extent)

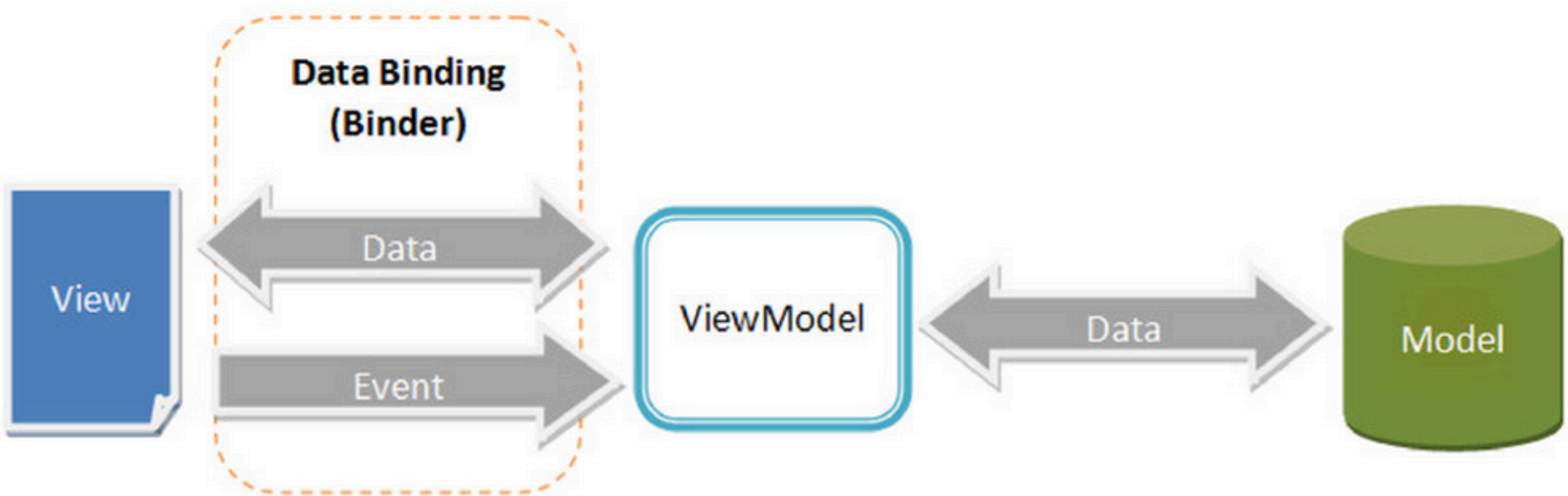
Platform-specific





Reusable (up to a certain extent)

MVVMCross



https://github.com/slodge/MvvmCross

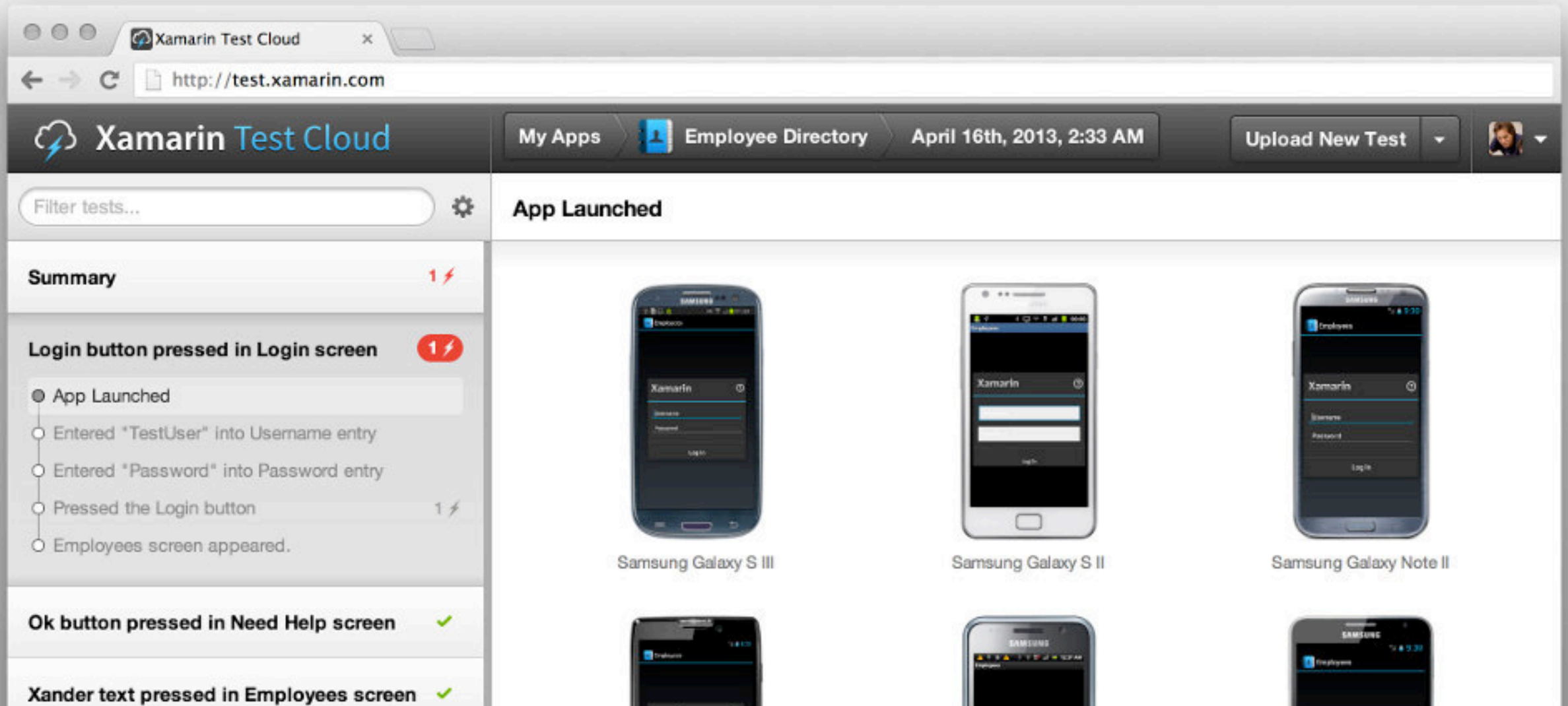
Native UI APIs	Xamarin.iOS	Xamarin.Android	WinRT
C#	Business Logic and Middleware (engine, core and 3rd party)		
Runtime	Mono		.NET
OS	iOS	Android	Win8

>2.6 billion devices!

Native UI APIs	Xamarin .iOS	Xamarin .Android	Gtk#	Xamarin .Mac	ASP .NET	WinRT	Winforms, WPF
C#	Business Logic and Middleware (engine, core and 3rd party)						
Runtime	Mono				.NET		
OS	iOS	Android	Linux (Mac / Windows)	OS X	Server	Win8	Windows (Old)

Xamarin Test cloud

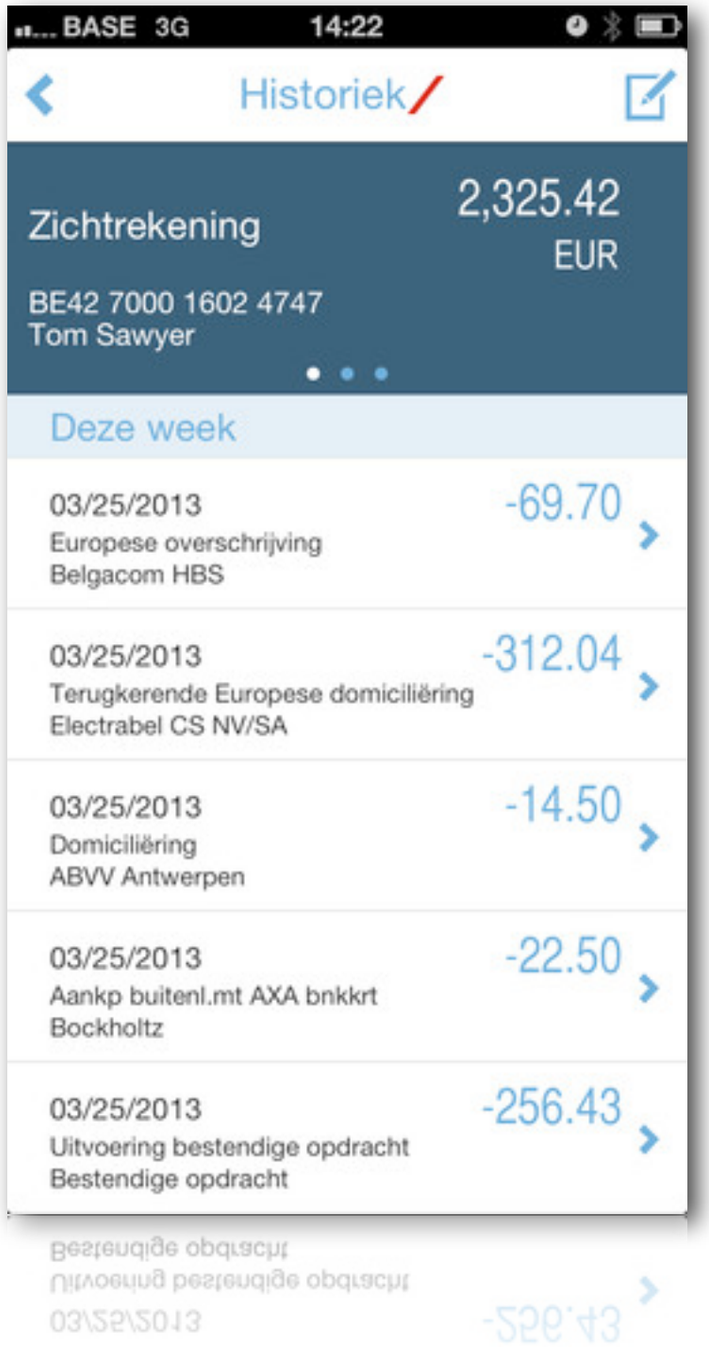
iOS and Android
Real devices!
Discovery mode



Some examples

WestVlinderen

Axa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Historiek
Zichtrekening
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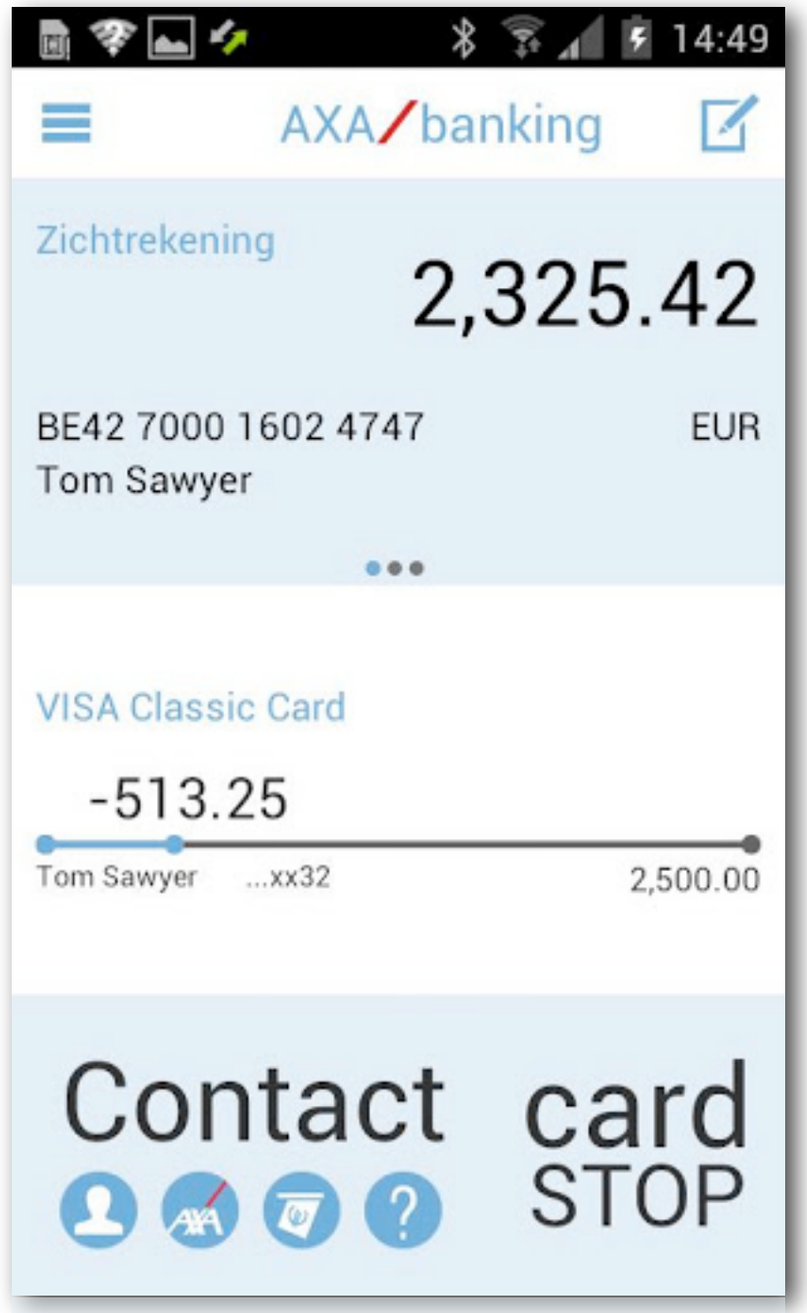
EUR
BE42 7000 1602 4747
Tom Sawyer
Deze week
03/25/2013
Europese overschrijving
Belgacom HBS
-69.70
03/25/2013
Terugkerende Europese domiciliëring
Electrabel CS NV/SA
-312.04
03/25/2013
Domiciliëring
ABVV Antwerpen
-14.50
03/25/2013
Aankp buitenl.mt AXA bnkkrt
Bockholtz
-22.50
03/25/2013
Uitvoering bestendige opdracht
Bestendige opdracht
-256.43


14:49
AXA/banking
Zichtrekening
2,325.42
BE42 7000 1602 4747
EUR
Tom Sawyer
VISA Classic Card
-513.25
Tom Sawyer
...xx32
2,500.00
Contact
card
STOP

- iOS
- Android
- WP7

No free lunch

	STARTER FREE	INDIE $299 Per platform, per developer	MOST POPULAR BUSINESS $999 Per platform, per developer	ENTERPRISE $1899 Per platform, per developer
Permitted Use	Individual	Individual	Organization	Organization
Deploy to Device	✓	✓	✓	✓
Xamarin Studio	✓	✓	✓	✓
Unlimited App Size		✓	✓	✓
Visual Studio Support			✓	✓
Business Features			✓	✓
Prime Components				✓
Email Support			✓	✓
One Business Day SLA				✓
Hotfixes				✓
Technical Kick-off Session				✓
Code Troubleshooting			At Extra Cost	At Extra Cost
	Download	Select	Select	Select

Take away

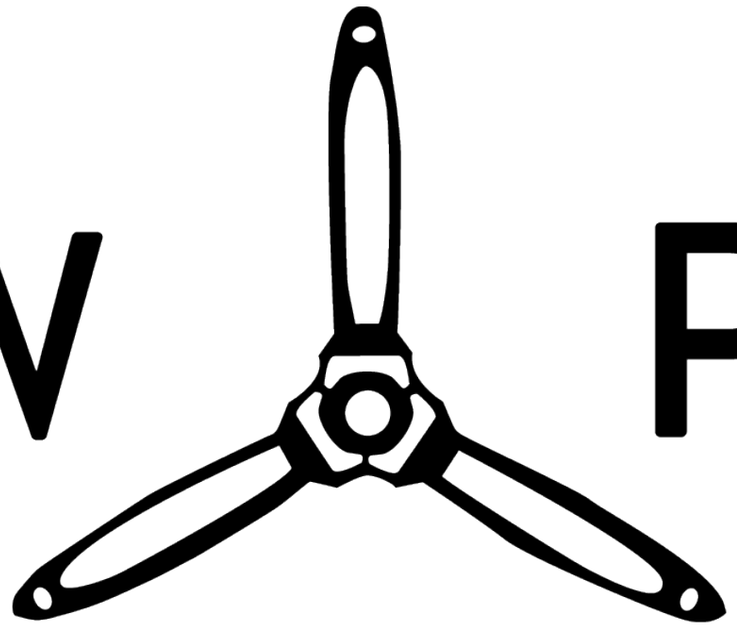
- Xamarin.iOS on its own will make your life as an iOS developer more enjoyable
- The mono/.Net ecosystem allows code reuse and more reusability in development without sucking
- Give it a try!

http://xamarin.com/

Discuss!

Questions? Demo?

Ruben Vermeersch
ruben@flowpilots.com
@rubenv

FLOW  PILOTS

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