

Xamarin.Forms: Native iOS, Android, & Windows apps from ONE C# Codebase

James Montemagno
@JamesMontemagno

Code + Slides
github.com/jamesmontemagno/MonkeyApp

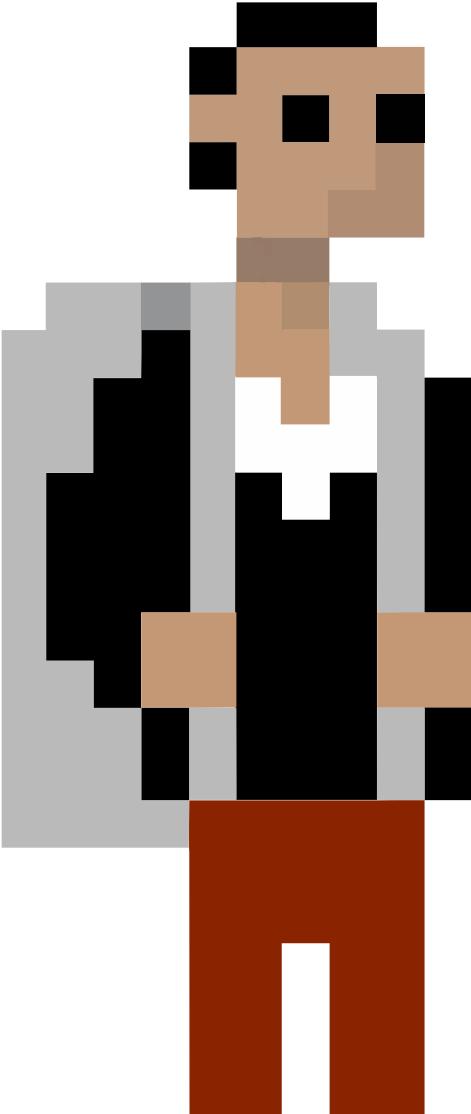
Agenda

- Introduction to Xamarin
 - **Xamarin, Xamarin.Forms, Test Cloud, Insights!**
- Building our First App
- Navigation
- Accessing Native Functionality
- Commands & Pull to Refresh
- Azure Mobile Services!

Code + Slides

github.com/jamesmontemagno/MonkeyApp

Who's this guy?



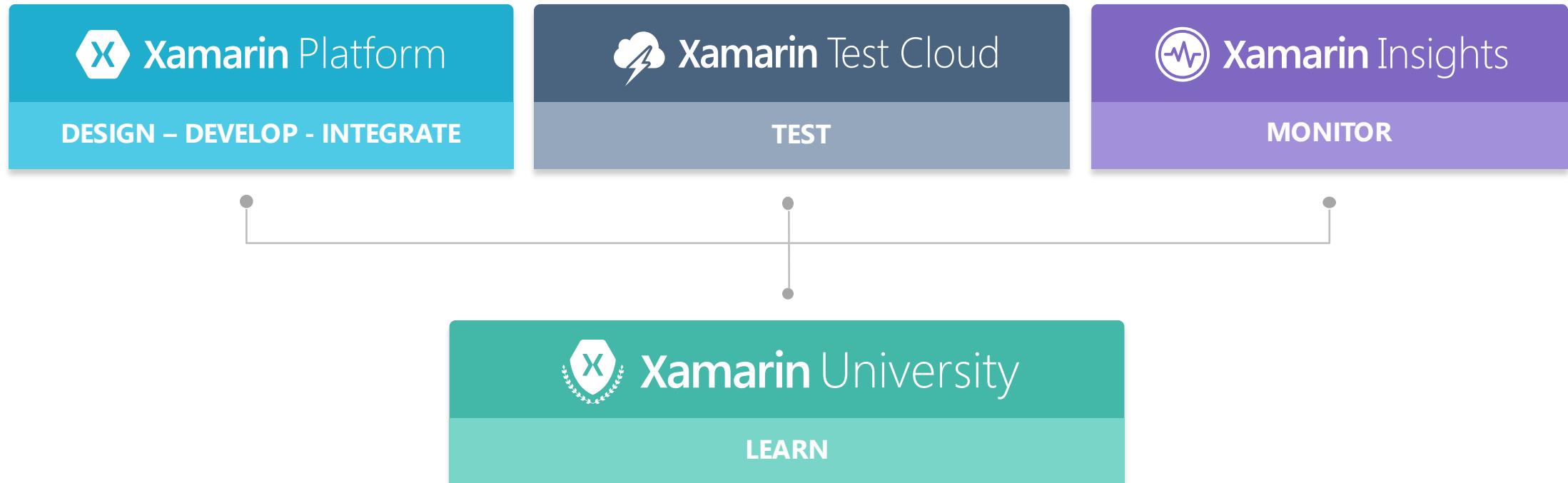
James
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Xamarin – Your Complete Mobile Solution



What is Native?





NATIONAL
GEOGRAPHIC

Quest for a Superbee

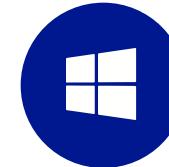
Can the world's most important pollinators be saved? How scientists and breeders are trying to create a

"Not only is native mobile code winning for app development, but with things like Instant Articles, native is making the browser-based web look like a relic even just for publishing *articles*."

-John Gruber

Architecting Mobile Apps

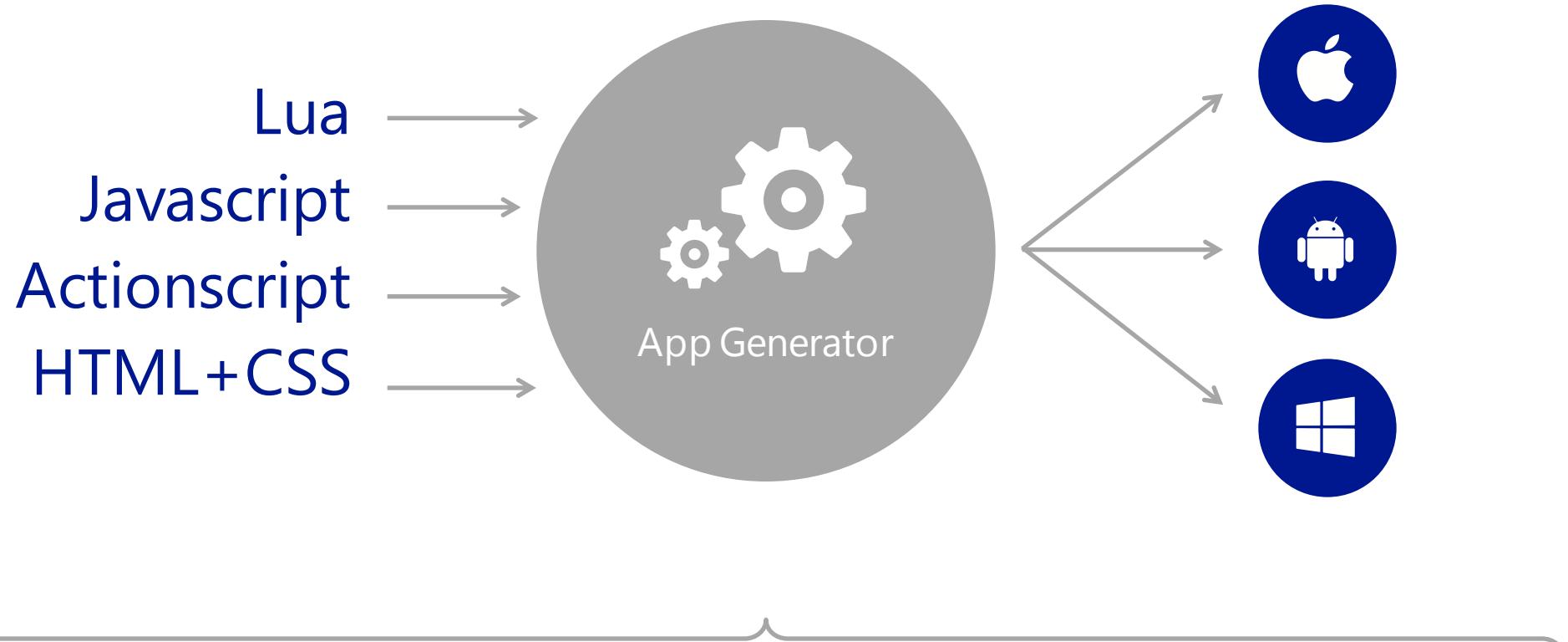
Silo Approach



| iOS | Android | Windows |
|----------------------|------------------------|---------------------|
| Objective-C Xcode | Java Android Studio | C# Visual Studio |

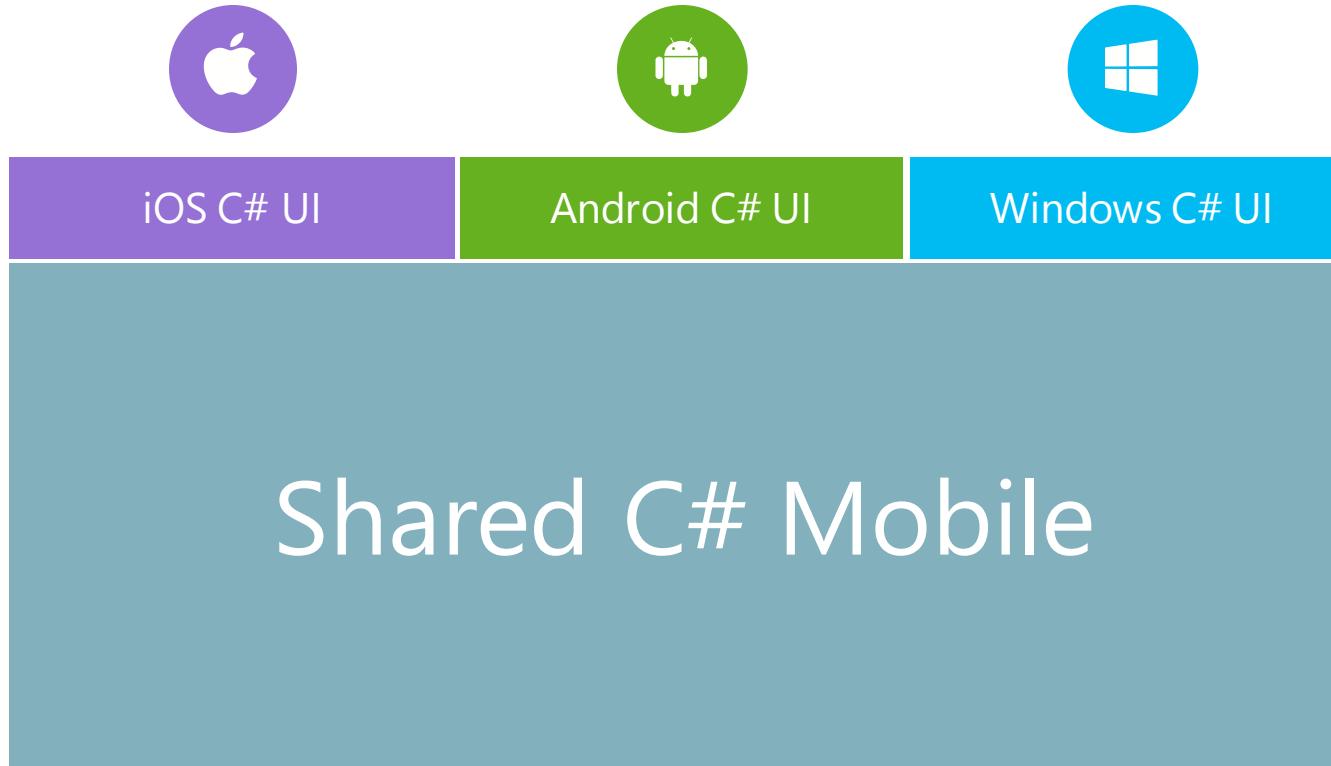
No shared code • Many languages & development environments • Multiple teams

Write Once, Run Anywhere



Limited native API access • Slow performance • Poor user experience

Xamarin's Unique Approach



Shared C# codebase • 100% native API access • High performance

Windows APIs

| | | | | |
|-----------------|----------------------|-----------------|--------------------|---------------------|
| Microsoft.Phone | Microsoft.Networking | Windows.Storage | Windows.Foundation | Microsoft.Devices |
| System.Net | System | System.IO | System.Linq | System.Xml |
| System.Data | System.Windows | System.Numerics | System.Core | System.ServiceModel |



C#

iOS – 100% API Coverage

| | | | | |
|-------------|----------------|-----------------|--------------|---------------------|
| MapKit | UIKit | iBeacon | CoreGraphics | CoreMotion |
| System.Net | System | System.IO | System.Linq | System.Xml |
| System.Data | System.Windows | System.Numerics | System.Core | System.ServiceModel |



C#

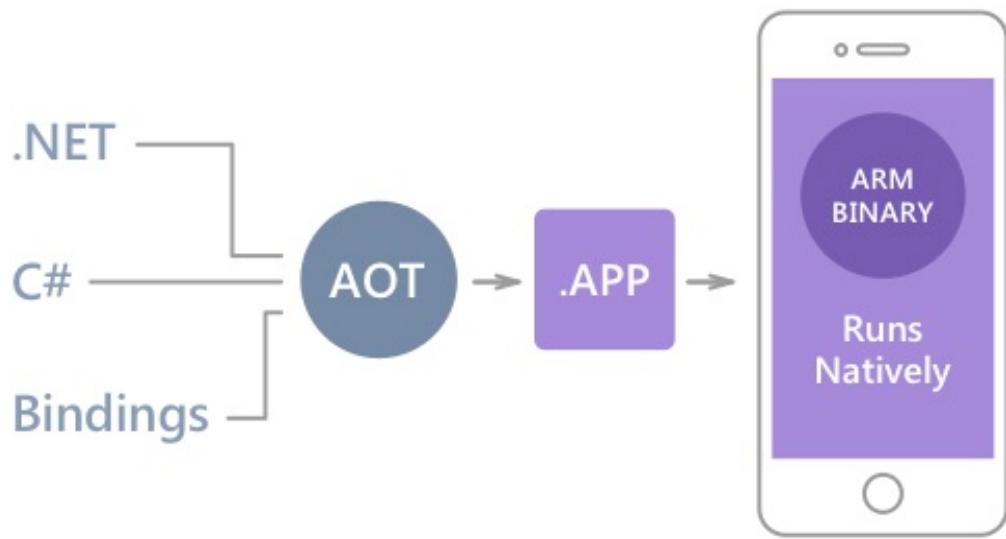
Android – 100% API Coverage

| | | | | |
|----------------|----------------|--------------------|--------------|---------------------|
| Text-to-speech | ActionBar | Printing Framework | Renderscript | NFC |
| System.Net | System | System.IO | System.Linq | System.Xml |
| System.Data | System.Windows | System.Numerics | System.Core | System.ServiceModel |

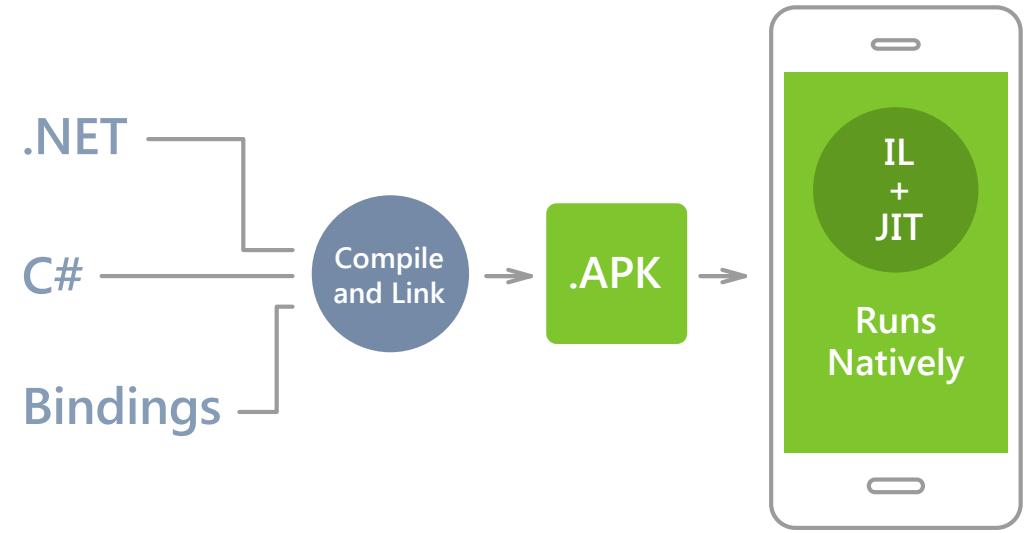


C#

Native Performance

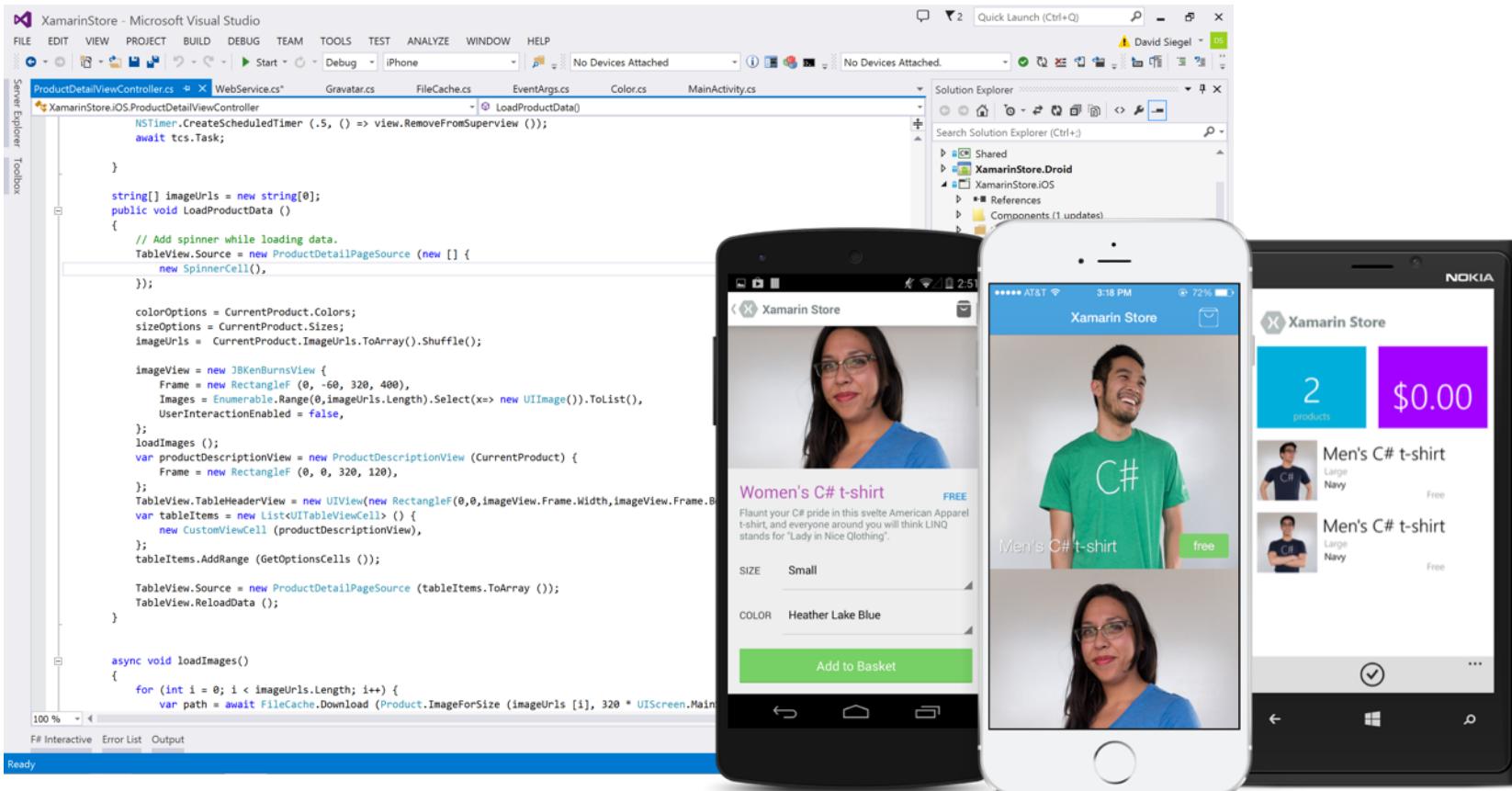


Xamarin.iOS does full Ahead Of Time (AOT) compilation to produce an ARM binary for Apple's App Store.



Xamarin.Android takes advantage of Just In Time (JIT) compilation on the Android device.

Anything you can do in Objective-C, Swift, or Java can be done in C# and Visual Studio with Xamarin.





Always Up-to-Date

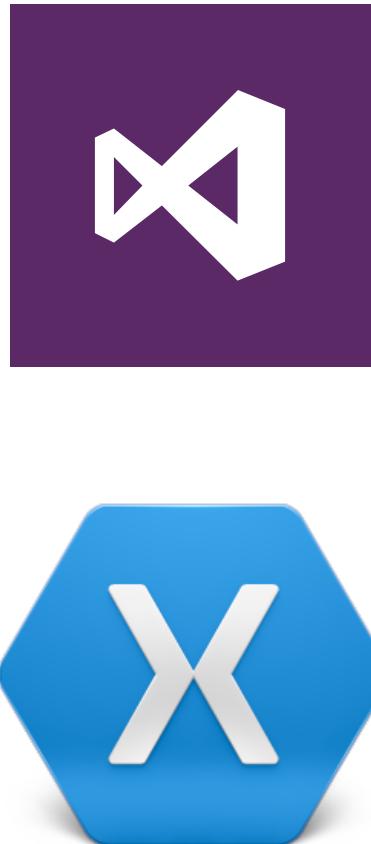
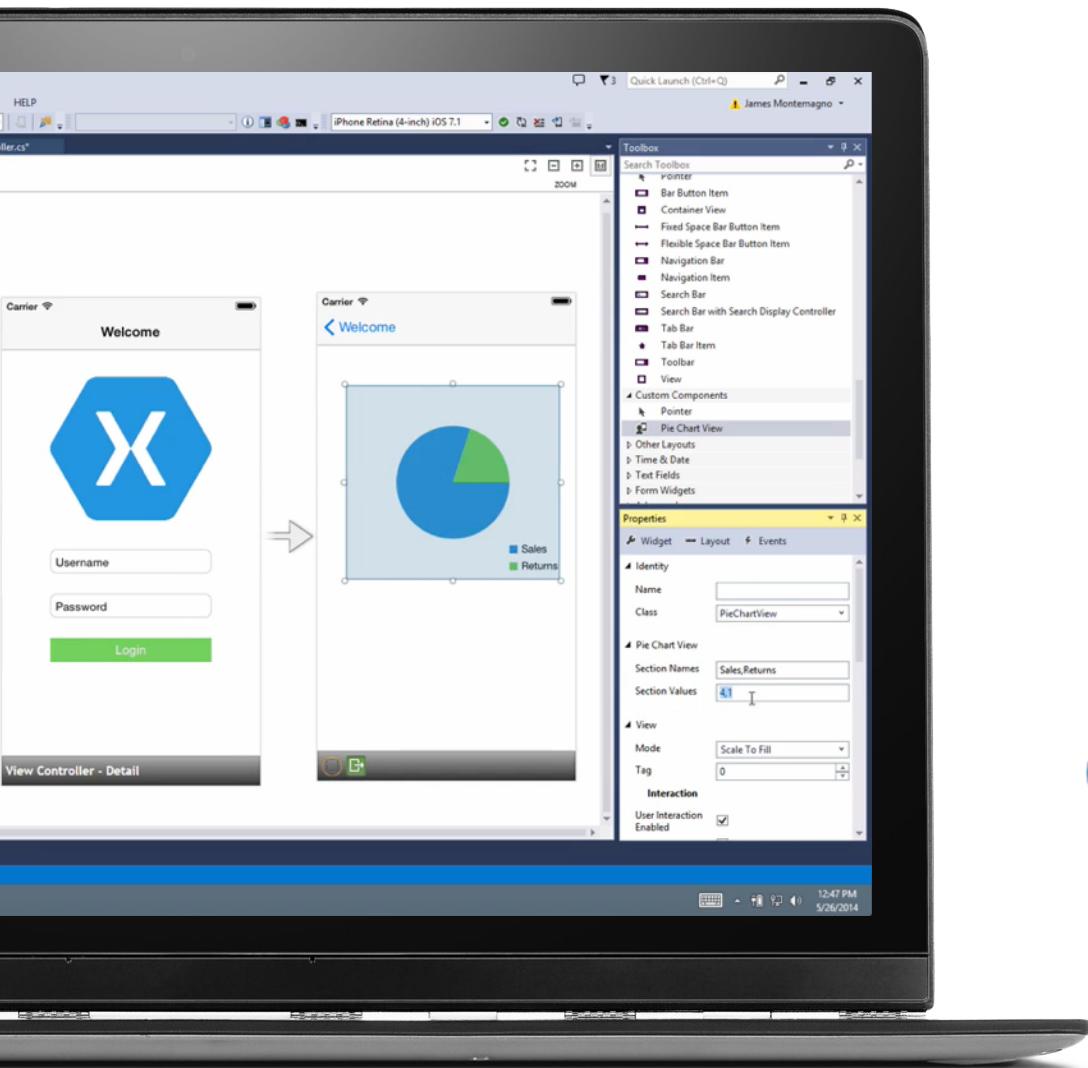
Same-day support:

- iOS 5
- iOS 6
- iOS 7
- iOS 7.1
- iOS 8
- iOS 9

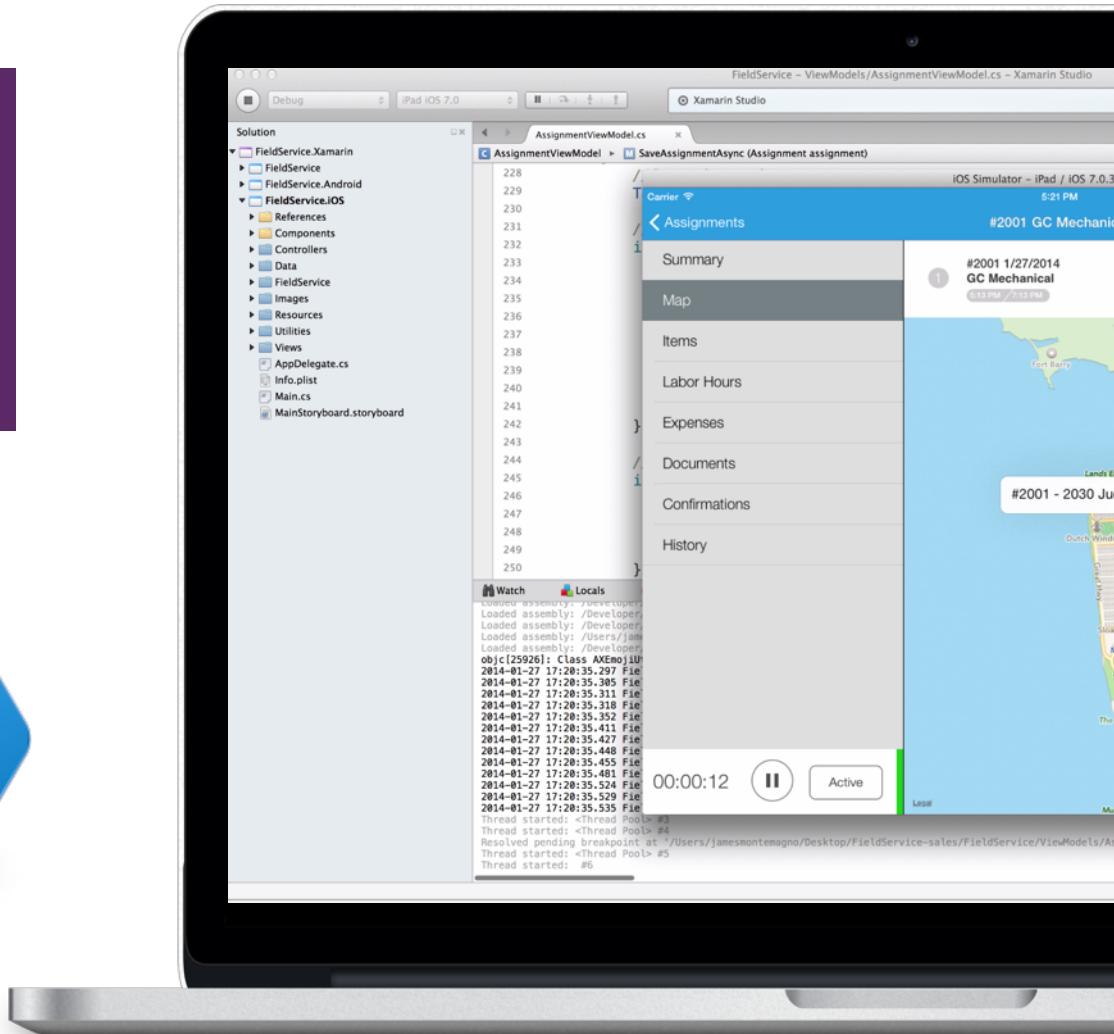
Full support for:

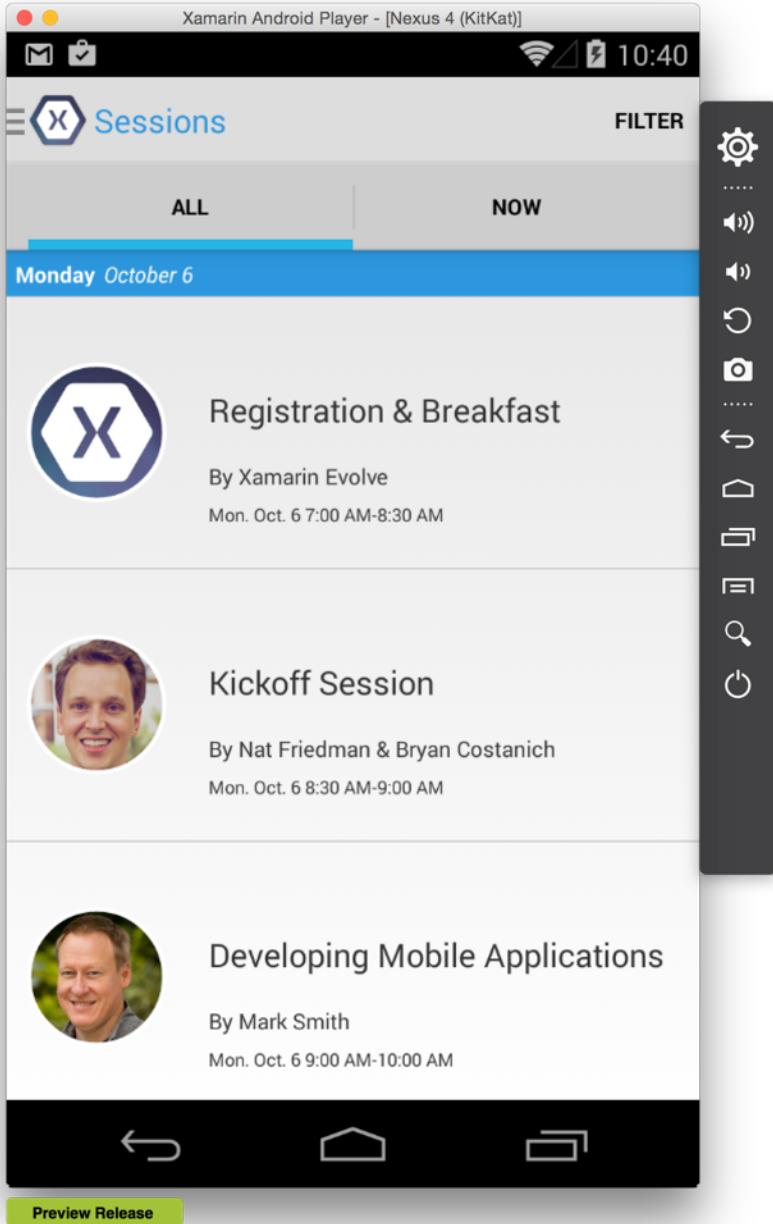
- Apple Watch
- Android Wear
- Amazon Fire TV
- Google Glass
- and much more

Visual Studio



Xamarin Studio





Xamarin Android Player

- ✓ Mac or PC
- ✓ Runs side-by-side Windows Phone Emulator
- ✓ Free for Everyone!

xamarin.com/Android-Player

What else do I need???

iOS

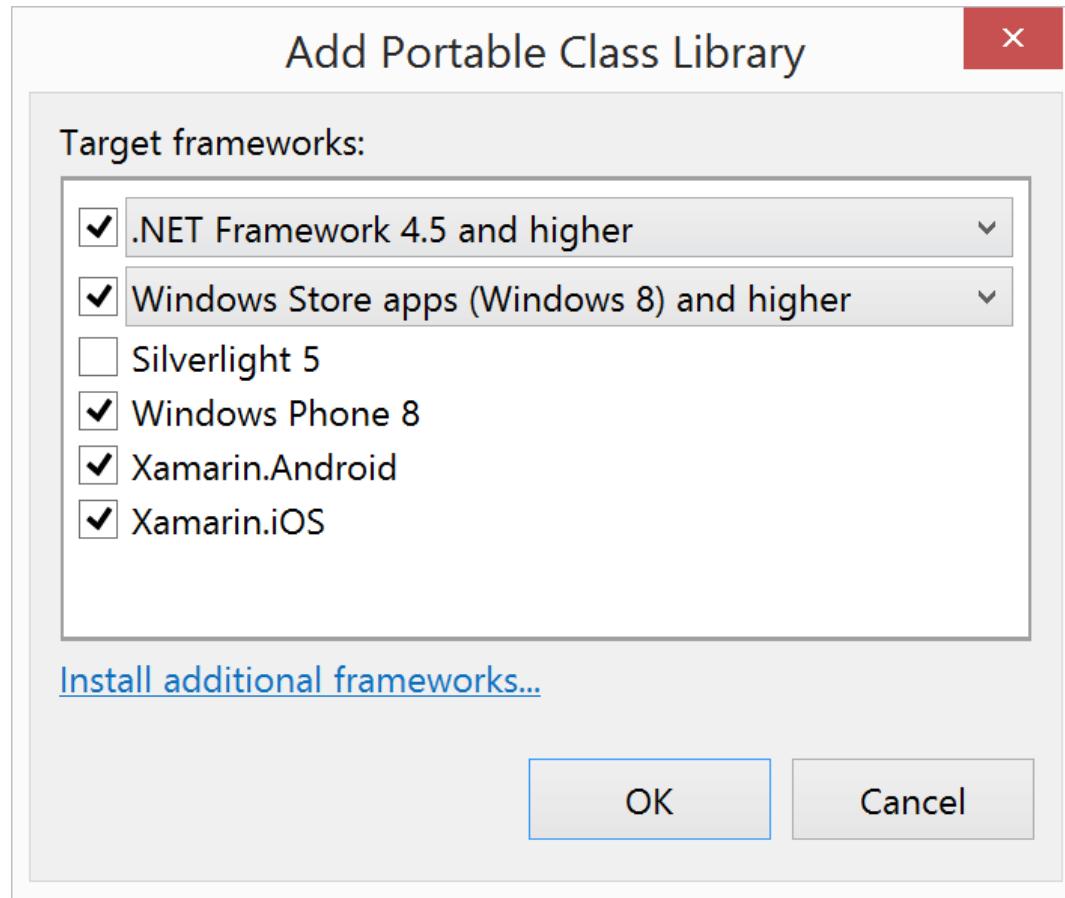
- ✓ Mac
- ✓ Mac & PC (with VS)
- ✓ Apple Developer Account (\$99 a year)
- ✓ Probably a device

Android

- ✓ Mac or PC
- ✓ Android Developer Account (\$20 Lifetime)
- ✓ Android Device (MotoE is good!)

Sharing Code

Portable Class Libraries



1 Assembly
Multiple Platforms

Including:
Xamarin.iOS and Xamarin.Android

NuGet

Add Packages

nuget.org

Xamarin.Social
Share statuses, links, and images on Facebook, Flickr, Twitter, and more.

Xamarin.Auth
A cross-platform API for authenticating users and storing their information.

Xamarin.Mobile
Xamarin.Mobile is a library that exposes a single set of APIs for common mobile device functionality across iOS, Android and Windows Phone.

Xamarin.InAppBilling
Component to assist in adding In-App Billing to a Xamarin application via Google Play Services.

Xamarin.FacebookBinding
Xamarin Android Binding library for Facebook Android SDK.

BugSense plugin for Xamarin Android application
BugSense is the leading crash reporting and quality metric tool for mobile applications.

Show pre-release packages

Each package is licensed to you by its owner. Microsoft is not responsible for, nor does it grant any licenses to, third-party packages.

xamarin

PlanetXamarin.WinStore - Manage NuGet Packages

Installed packages

Online

All

nuget.org

Motz NuGets

Microsoft and .NET

Updates

Stable Only

Sort by: Most Downloads

xamarin

EntityFramework
Entity Framework is Microsoft's recommended data access technology for new applications.

Json.NET
Json.NET is a popular high-performance JSON framework for .NET

jQuery
jQuery is a new kind of JavaScript Library. jQuery is a fast and concise JavaScript Library that simplifies HTML...

WebGrease
Web Grease is a suite of tools for optimizing javascript, css files and images.

Microsoft ASP.NET MVC
This package contains the runtime assemblies for ASP.NET MVC.

Microsoft HTTP Client Libraries
This package provides a programming interface for modern HTTP/REST based applications.

Microsoft ASP.NET Web API 2.2
This package contains everything you need to host ASP.NET Web API on IIS.

?

xamarin

Created by: James Newton-King

Id: Newtonsoft.Json

Version: 6.0.3

Last Published: 4/27/2014

Downloads: 6189092

License

[View License](#)

[Project Information](#)

[Report Abuse](#)

Description:

Json.NET is a popular high-performance JSON framework for .NET

Tags: json

Dependencies:

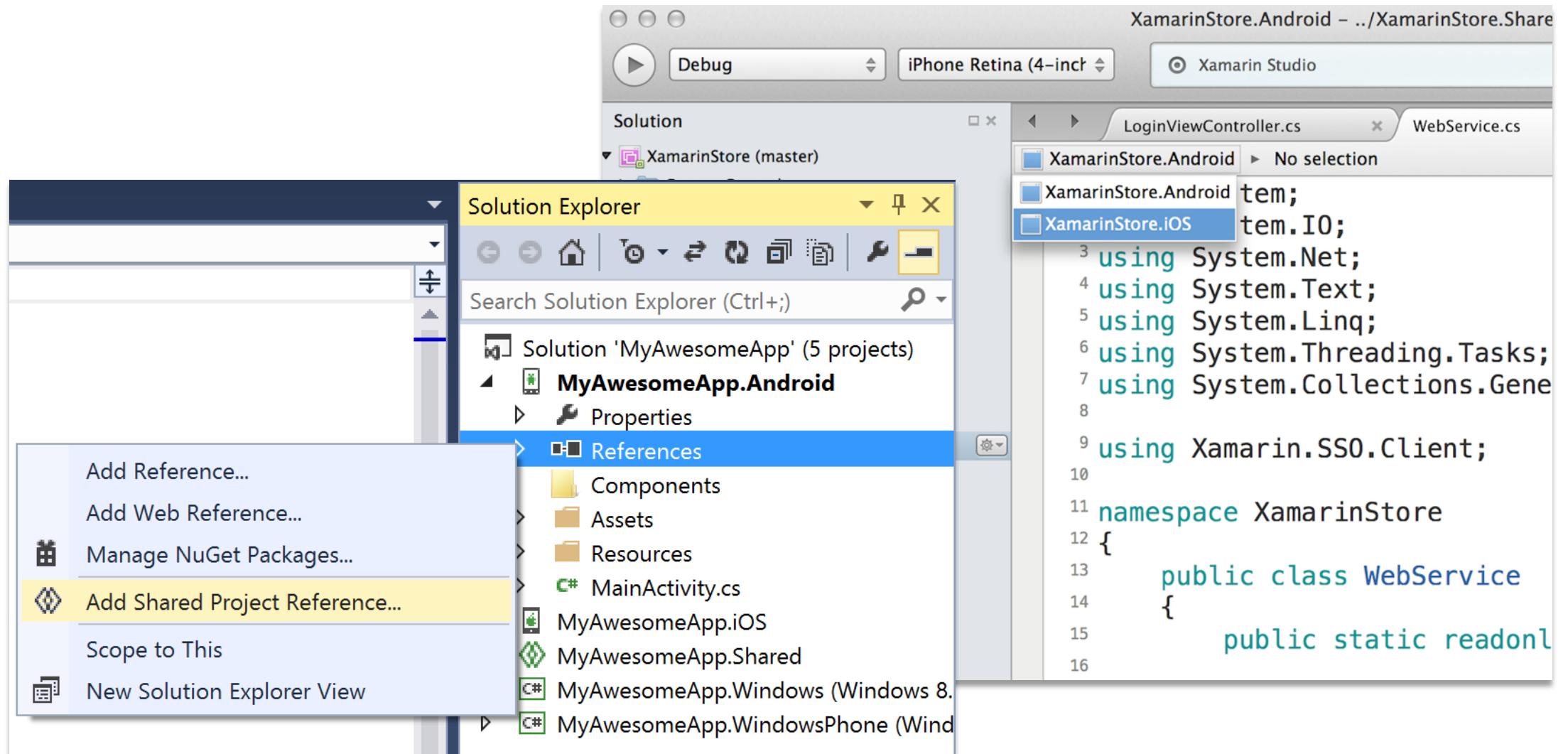
No Dependencies

1 2 3 4 5

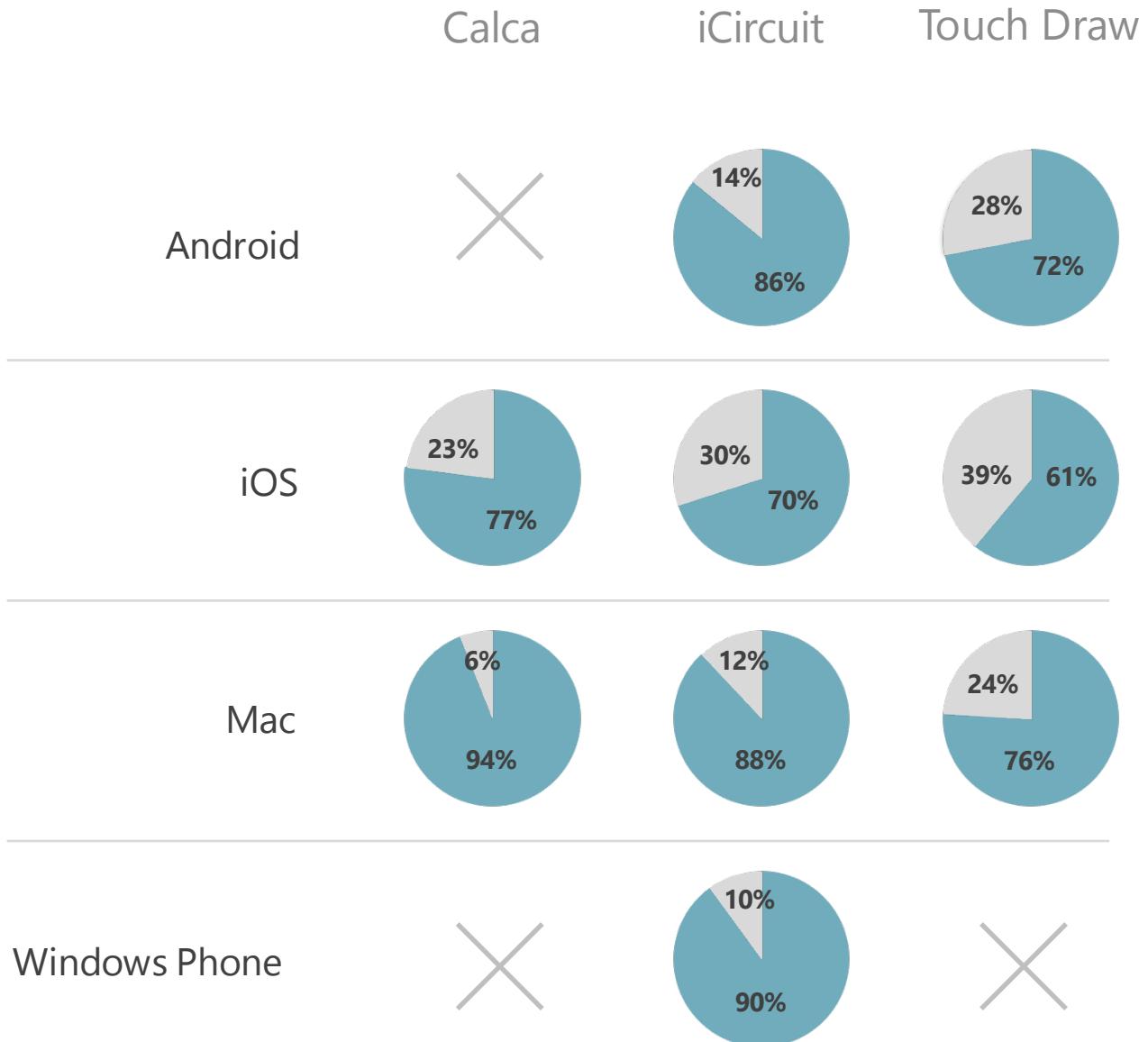
Settings

Close

Shared Projects



Code Sharing Stats



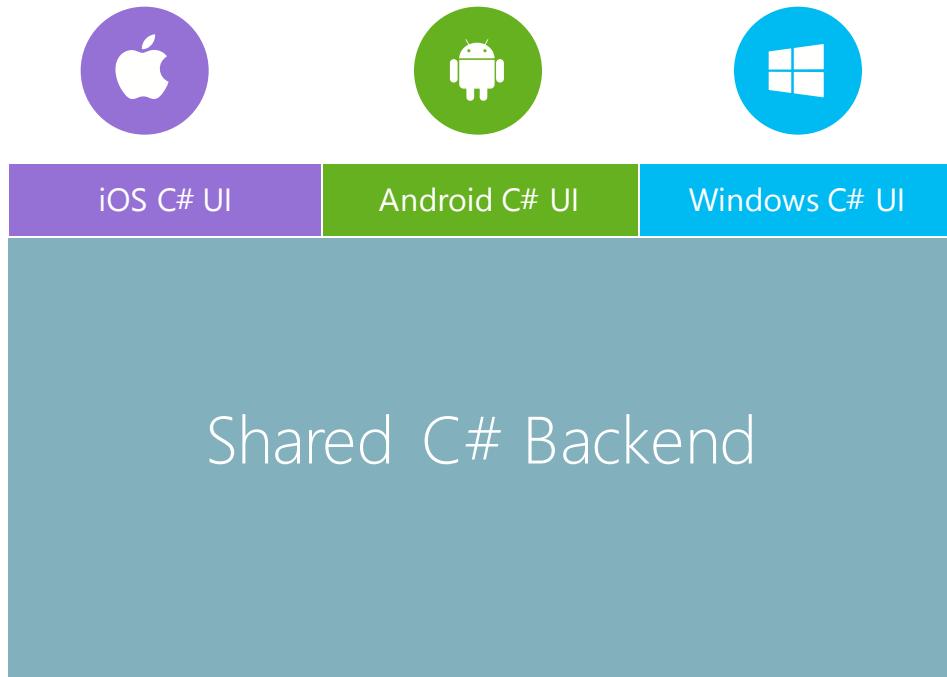
Let's Build an App

Meet Xamarin.Forms

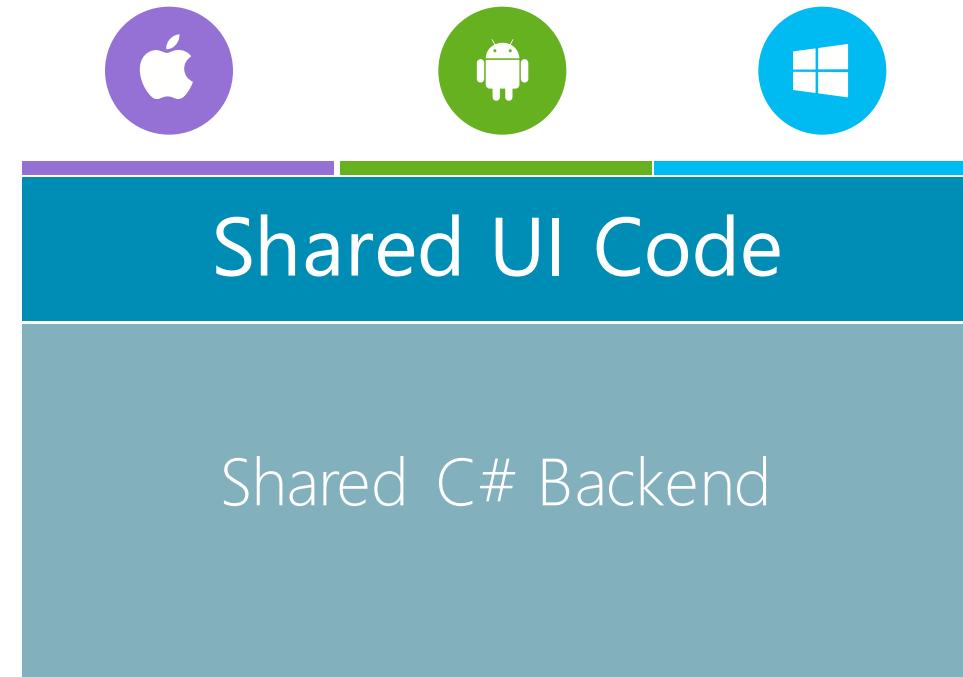


Build native UIs for iOS, Android, and Windows Phone
from a single, shared C# codebase.

Xamarin + Xamarin.Forms

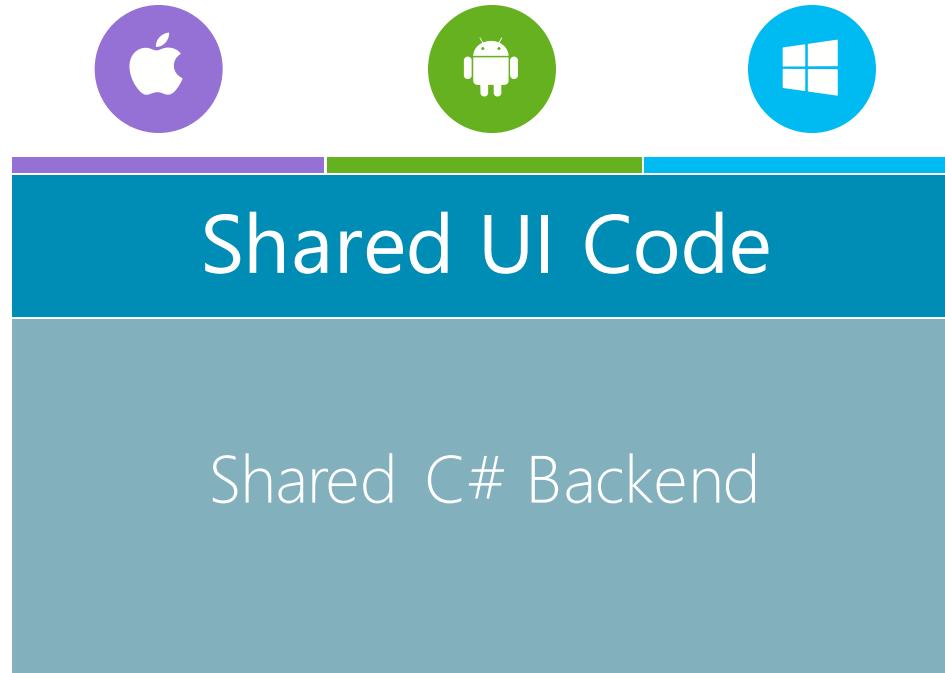


Traditional Xamarin
Approach



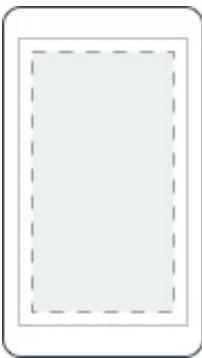
With Xamarin.Forms:
More code-sharing, all native

What's included



- ✓ 40+ Pages, layouts, and controls
(Build from code behind or XAML)
- ✓ Two-way data binding
- ✓ Navigation
- ✓ Animation API
- ✓ Dependency Service
- ✓ Messaging Center

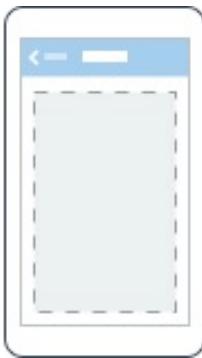
Pages



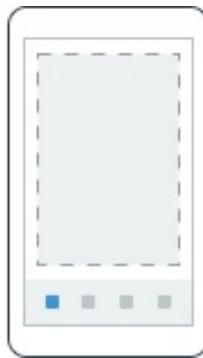
Content



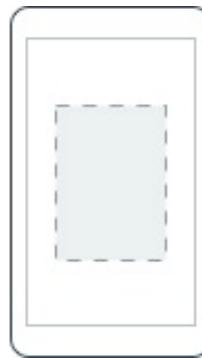
MasterDetail



Navigation

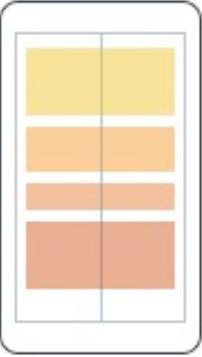


Tabbed

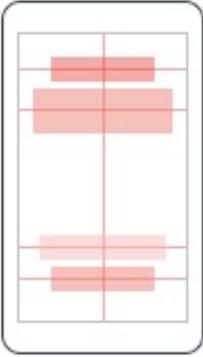


Carousel

Layouts



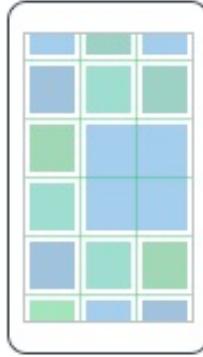
Stack



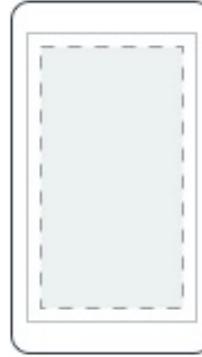
Absolute



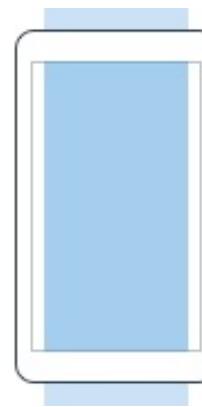
Relative



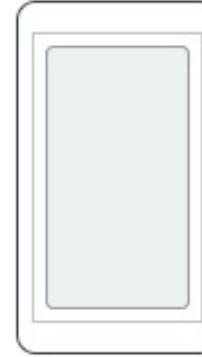
Grid



ContentView



ScrollView



Frame

Controls

| | | | | |
|-------------------|------------|-------------|------------|-----------|
| ActivityIndicator | BoxView | Button | DatePicker | Editor |
| Entry | Image | Label | ListView | Map |
| OpenGLView | Picker | ProgressBar | SearchBar | Slider |
| Stepper | TableView | TimePicker | WebView | EntryCell |
| ImageCell | SwitchCell | TextCell | ViewCell | |

Xamarin.Forms Ecosystem



Control Comparison

| Windows | Xamarin.Forms |
|-----------------|-------------------|
| StackPanel | StackLayout |
| TextBox | Entry |
| ListBox | ListView |
| CheckBox | Switch |
| ProgressBar | ActivityIndicator |
| Grid | Grid |
| Label | Label |
| Button | Button |
| Image | Image |
| Date/TimePicker | Date/TimePicker |

| Windows | Xamarin.Forms |
|--------------------|--------------------|
| DataContext | BindingContext |
| {Binding Property} | {Binding Property} |
| ItemsSource | ItemsSource |
| ItemTemplate | ItemTemplate |
| DataTemplate | DataTemplate |

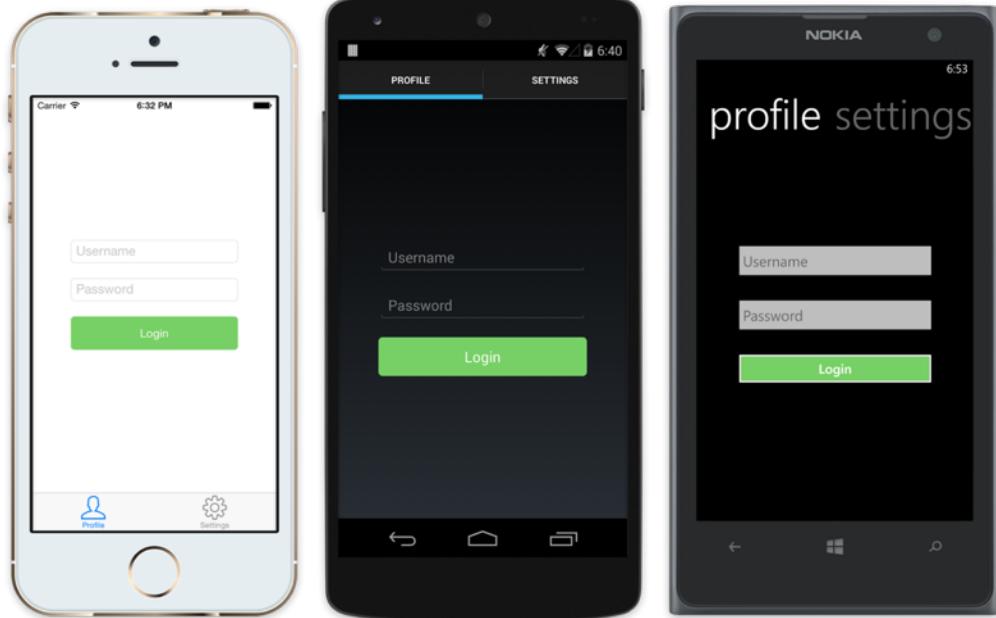
```
<Label Text="{Binding Color.R,  
        Converter={StaticResource intConverter},  
        ConverterParameter=255,  
        StringFormat='R={0:X2}' }" />
```

Binding Comparison

```
<ContentPage.Padding>
    <OnPlatform x:TypeArguments="Thickness">
        <OnPlatform.iOS>
            0, 20, 0, 0
        </OnPlatform.iOS>
        <OnPlatform.Android>
            0, 0, 0, 0
        </OnPlatform.Android>
        <OnPlatform.WinPhone>
            0, 0, 0, 0
        </OnPlatform.WinPhone>
    </OnPlatform>
</ContentPage.Padding>
```

Platform Customization

Native UI from shared code



```
<?xml version="1.0" encoding="UTF-8"?>
<TabbedPage xmlns="http://xamarin.com/schemas/2014/forms"
             xmlns:x="http://schemas.microsoft.com/winfx/2009/xaml"
             x:Class="MyApp.MainPage">
<TabbedPage.Children>
<ContentPage Title="Profile" Icon="Profile.png">
    <StackLayout Spacing="20" Padding="20"
                 VerticalOptions="Center">
        <Entry Placeholder="Username"
              Text="{Binding Username}"/>
        <Entry Placeholder="Password"
              Text="{Binding Password}"
              IsPassword="true"/>
        <Button Text="Login" TextColor="White"
               BackgroundColor="#77D065"
               Command="{Binding LoginCommand}"/>
    </StackLayout>
</ContentPage>
<ContentPage Title="Settings" Icon="Settings.png">
    <!-- Settings -->
</ContentPage>
</TabbedPage.Children>
```

Xamarin.Forms
3 Apps
1 C# Codebase
Demo

Mobile Quality Challenges

Challenges

- Device Fragmentation
- App Complexity
- Fast Release Cycles
- Short Sessions
- High Mobile User Expectations

On Mobile, Quality is Hard

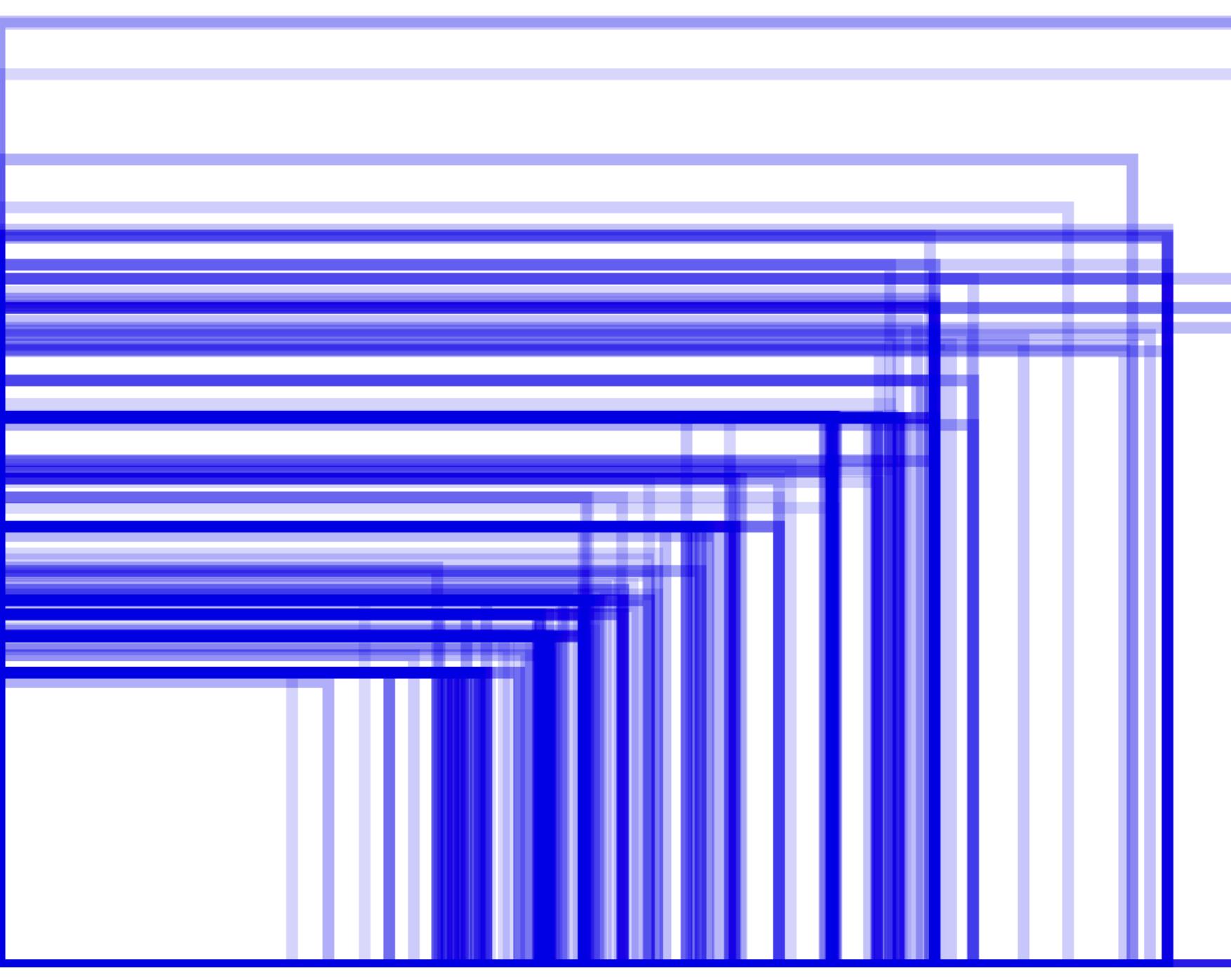


{ 5 OS versions
20 Devices
20 Languages
35 Locales
6 Screen sizes



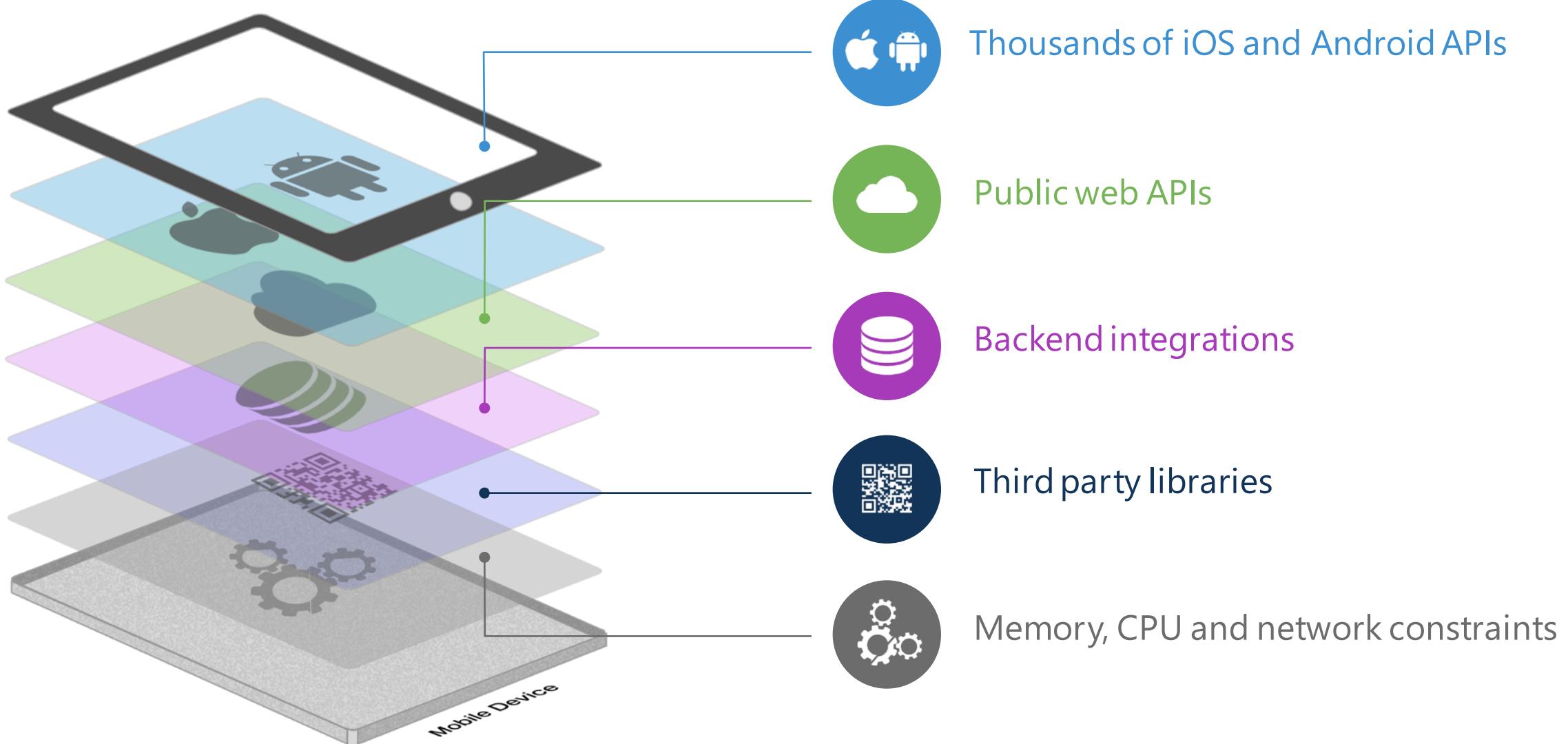
{ 9 OS versions
24K+ Distinct devices
39 Languages
57 Locales
27 Screen sizes
1,294 Brands
6 Screen configurations





OpenSignal

App Complexity





Tap



Scroll



Swipe



Pinch



Multi Finger



Text Entry

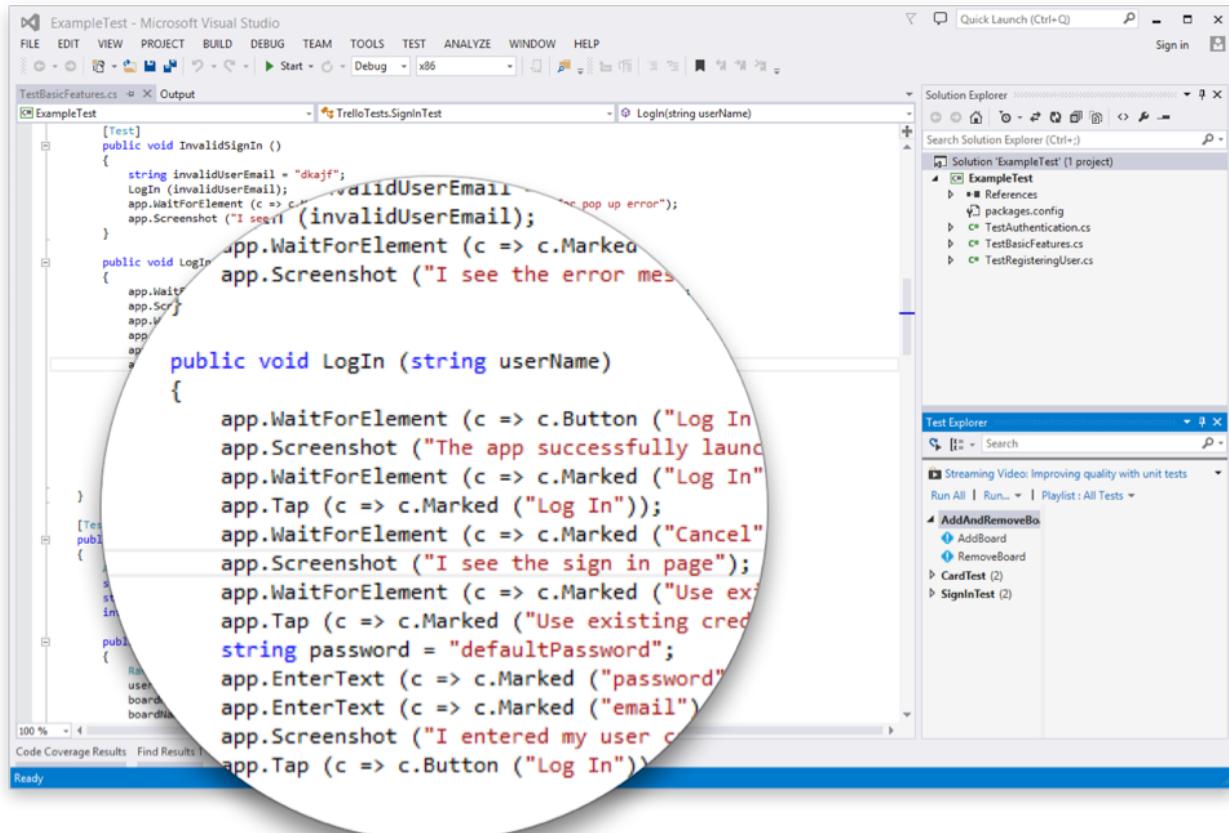


Rotation



GPS

Introducing Xamarin.UITest



Create Automated User Interface tests all in C#

Upload to the Test Cloud or run against a Device or Simulator

Run directly from Visual Studio or Xamarin Studio

FREE to use a Simulator*

Works on ANY app: Native, Hybrid, or Xamarin



Xamarin Test Cloud

xamarin.com/testcloud

Screenshot of the Xamarin Test Cloud interface showing a test run for the "Xamarin CRM" app on the "master" branch at "Aug 23, 2015 10:03:59 PM".

The left sidebar shows the "Overview" section with a list of test results:

- Customers tests**
 - Check Customer Details (✓)
 - Check Customer Navigation (✓)
 - Check Customer Phone (✓)
 - Investigate Customer Page (✓)
- Sales tests**
 - Add an item (⚡)

A detailed test plan for "Add an item" is shown:

- First I launch the app
- Then I tap 'Sales' (highlighted in blue)
- Then I tap 'Add'
- Then I choose the first result
- Then I set the title and description
- Then I tap 'Save'
- Then I go back

The main area displays a grid of 24 iPhone devices running iOS versions 8.2, 8.3, 8.3.1, 8.3.2, 8.3.3, 8.3.4, 8.3.5, 8.3.6, 8.3.7, 8.3.8, 8.3.9, 8.3.10, 8.3.11, 8.3.12, 8.3.13, 8.3.14, 8.3.15, 8.3.16, 8.3.17, 8.3.18, 8.3.19, 8.3.20, 8.3.21, 8.3.22, and 8.3.23. Each device shows a screenshot of the "Xamarin CRM" app interface.

Devices on Demand

Which devices do you want to run?

Top 20 Top 10 Tablets Top 10 Phones Select None X

Sort By

Market share •

Name

OS version

Form Factor

Phone

Tablet

Manufacturer

Acer

Amazon

Asus

HP

90% worldwide market share

Samsung Galaxy S III
Android 4.3
Market share: 2.492%

Samsung Galaxy S4
Android 4.4.2
Market share: 2.310%

Samsung Galaxy Y
Android 2.3.6
Market share: 1.409%

Samsung Galaxy S III Mini
Android 4.1.2
Market share: 1.324%

Samsung Galaxy S4
Android 4.3
Market share: 1.132%

Samsung Galaxy Note II
Android 4.3
Market share: 1.005%

LG Nexus 5
Android 4.4.2
Market share: 0.980%

Samsung Galaxy S II
Android 4.1.2
Market share: 0.954%

Samsung Galaxy S III
Android 4.1.2
Market share: 0.924%

Samsung Galaxy S Duos
Android 4.0.4
Market share: 0.834%

Samsung Galaxy Core
Android 4.1.2
Market share: 0.827%

Samsung Galaxy Grand Duos
Android 4.2.2
Market share: 0.824%

< Back

Select 20 devices >

○ ● ○ ○

Let's build a Xamarin.UITest Test!



Xamarin Insights

xamarin.com/insights

Reports per day ▾

| Date | Reports |
|--------|---------|
| Mar 23 | 160 |
| Mar 24 | 85 |
| Mar 25 | 60 |
| Mar 26 | 155 |
| Mar 27 | 90 |
| Mar 28 | 10 |
| Mar 29 | 10 |
| Apr 01 | 60 |
| Apr 02 | 25 |
| Apr 03 | 20 |
| Apr 04 | 15 |
| Apr 05 | 55 |
| Apr 06 | 45 |
| Apr 07 | 130 |
| Apr 08 | 65 |
| Apr 09 | 55 |
| Apr 10 | 50 |
| Apr 11 | 35 |
| Apr 12 | 10 |
| Apr 13 | 80 |
| Apr 14 | 85 |
| Apr 15 | 55 |
| Apr 16 | 85 |
| Apr 17 | 10 |
| Apr 18 | 10 |
| Apr 19 | 75 |

Unresolved Issues: 223

Affected Users: 155 (28%)

Affected Versions: 10

Last Crash: 52 minutes ago

Last Warning: 8 minutes ago

Xamarin Insights – Real-time monitoring



Supports

- ✓ Xamarin.iOS
- ✓ Xamarin.Android
- ✓ Xamarin.Mac
- ✓ Windows Phone
- ✓ Windows Store
- ✓ Windows Desktop

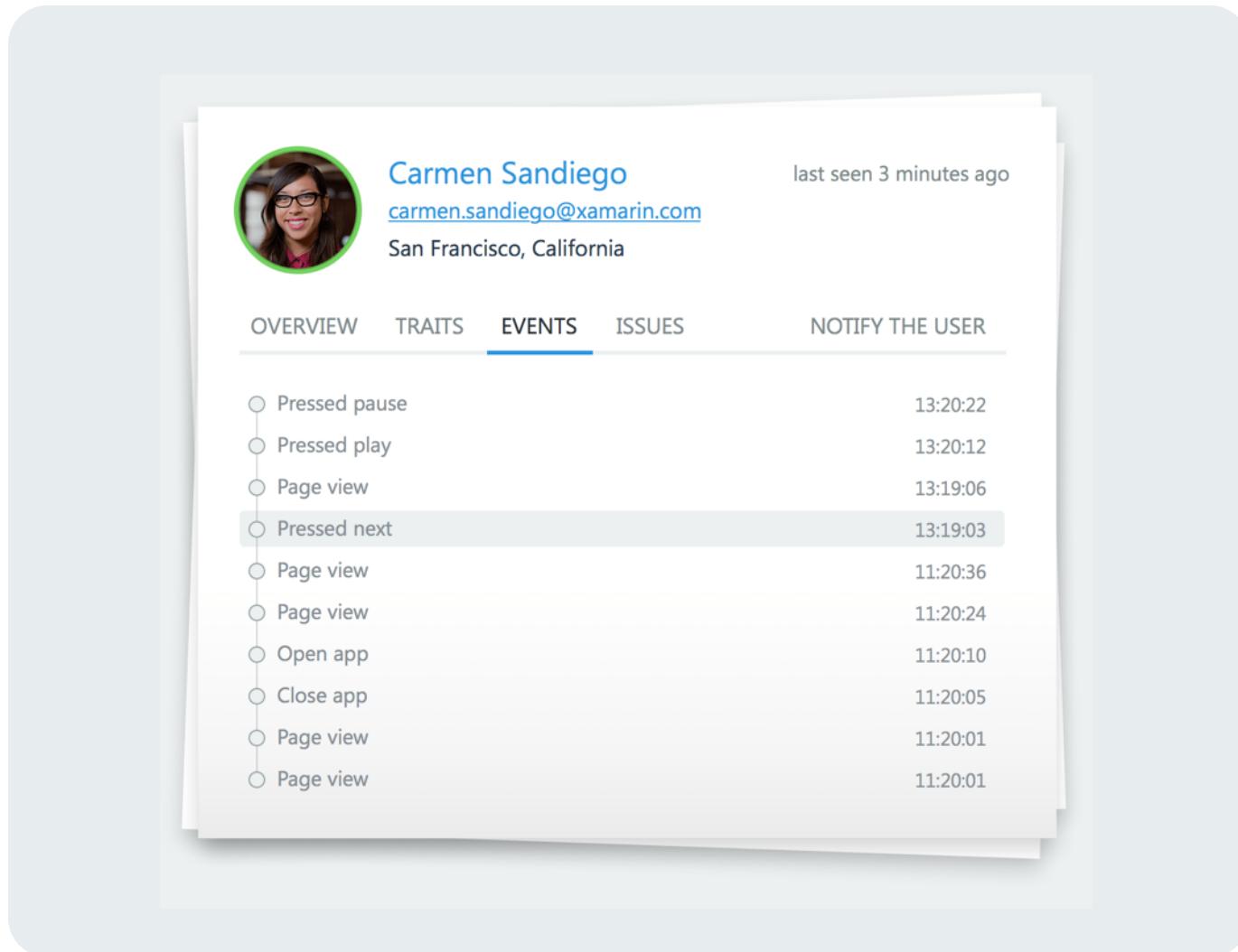
Xamarin Insights – Report

The screenshot shows a web browser displaying the Xamarin Insights report for a NullReferenceException. The report details the exception type as 'NullReferenceException' with the message 'Object reference not set to an instance of an object'. It shows the last occurrence was 10 hours ago, with a count of 1 and 1 user affected (1.0%). The report includes sections for 'Occurrences per Day' (1 over the past 24 hours, 1 over 7 days, 1 over 30 days), 'Top Affected Version' (1.4.0 (1.4.4)), 'Affected OS' (iOS 9.0.2), and 'Affected Devices' (iPhone 6 Plus (7.1)). Below this, a 'Guest 175' section lists the device as 'iPhone 6 Plus iOS 9.0.2' and the version as '14.0 (1.4.4)'. A stack trace for the exception is provided, showing the error occurred at Verona.iOS.HomeScreen.ViewWillAppear (Boolean animated) [0x00000] in <filename unknown>:0, with the full stack trace including UIKit.UIApplicationMain and Verona.iOS.Application.Main. At the bottom, there is a 'Feedback' button.

Automatically report any uncaught managed or native exception.

Report your own caught exceptions with simple cross-platform API.

Xamarin Insights – Track



The screenshot shows a user profile for Carmen Sandiego. At the top, there's a circular profile picture of a woman with glasses, followed by her name "Carmen Sandiego" and email "carmen.sandiego@xamarin.com". Below that is her location "San Francisco, California" and a status message "last seen 3 minutes ago". Below the profile information is a navigation bar with tabs: OVERVIEW, TRAITS, EVENTS (which is underlined in blue), and ISSUES. To the right of the tabs is a button labeled "NOTIFY THE USER". The main content area is titled "EVENTS" and lists ten events with their timestamps:

| Event | Timestamp |
|---------------|-----------|
| Pressed pause | 13:20:22 |
| Pressed play | 13:20:12 |
| Page view | 13:19:06 |
| Pressed next | 13:19:03 |
| Page view | 11:20:36 |
| Page view | 11:20:24 |
| Open app | 11:20:10 |
| Close app | 11:20:05 |
| Page view | 11:20:01 |
| Page view | 11:20:01 |

Track any event that occurs in your application.

Even track performance of how long an operation takes.

Xamarin Insights – Identify

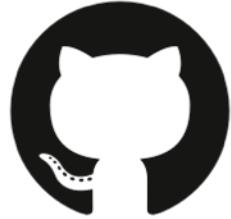
The screenshot shows the Xamarin Insights web application. The top navigation bar includes links for Issues, Users (which is selected), Events, Audience, and Settings, along with a Docs section and a user profile for Andrew.

The main area displays a list of users under the "Xamarin App" category. Each user entry includes a checkbox for selection, the user's name, email, location, and their last seen status. The "SESSIONS" column indicates the number of sessions, and the "LAST SEEN" column shows the time since the user was last active.

A modal window is open for the user "Martine Emmerich". It shows her profile picture, name, email, location, and last seen status. Below this, there are tabs for OVERVIEW, TRAITS, and SESSIONS. The SESSIONS tab is selected, displaying a timeline of her sessions. The first session on April 5, 2015, is expanded, showing detailed events like "Play Song" (Ed Sheeran, Pop, Thinking Out Loud) and "Page View". Another session on March 28, 2015, is also listed.

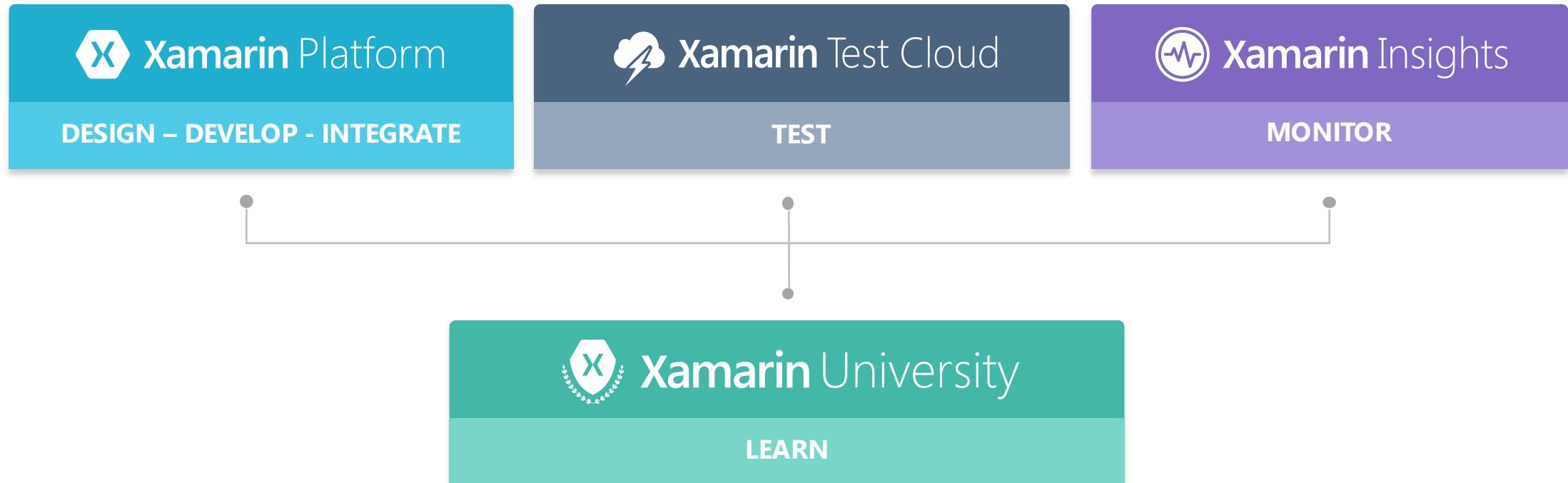
Combine event tracking with user identification to resolve issues faster.

Xamarin Insights – Integrate

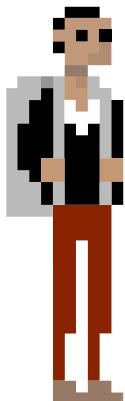


Simple integrations into popular services
for mission critical notifications.

Xamarin – Your Complete Mobile Solution



20 Minute Break



James
Montemagno
Developer Evangelist, Xamarin

james@xamarin.com

motzcod.es

@JamesMontemagno