

# Cross-platform development

# Silo'd Approach

- Build Apps Multiple Times
  - Multiple Teams
  - Multiple Code Bases
  - Different toolsets



iOS

Swift  
Xcode



Android

Java  
Android Studio



Windows

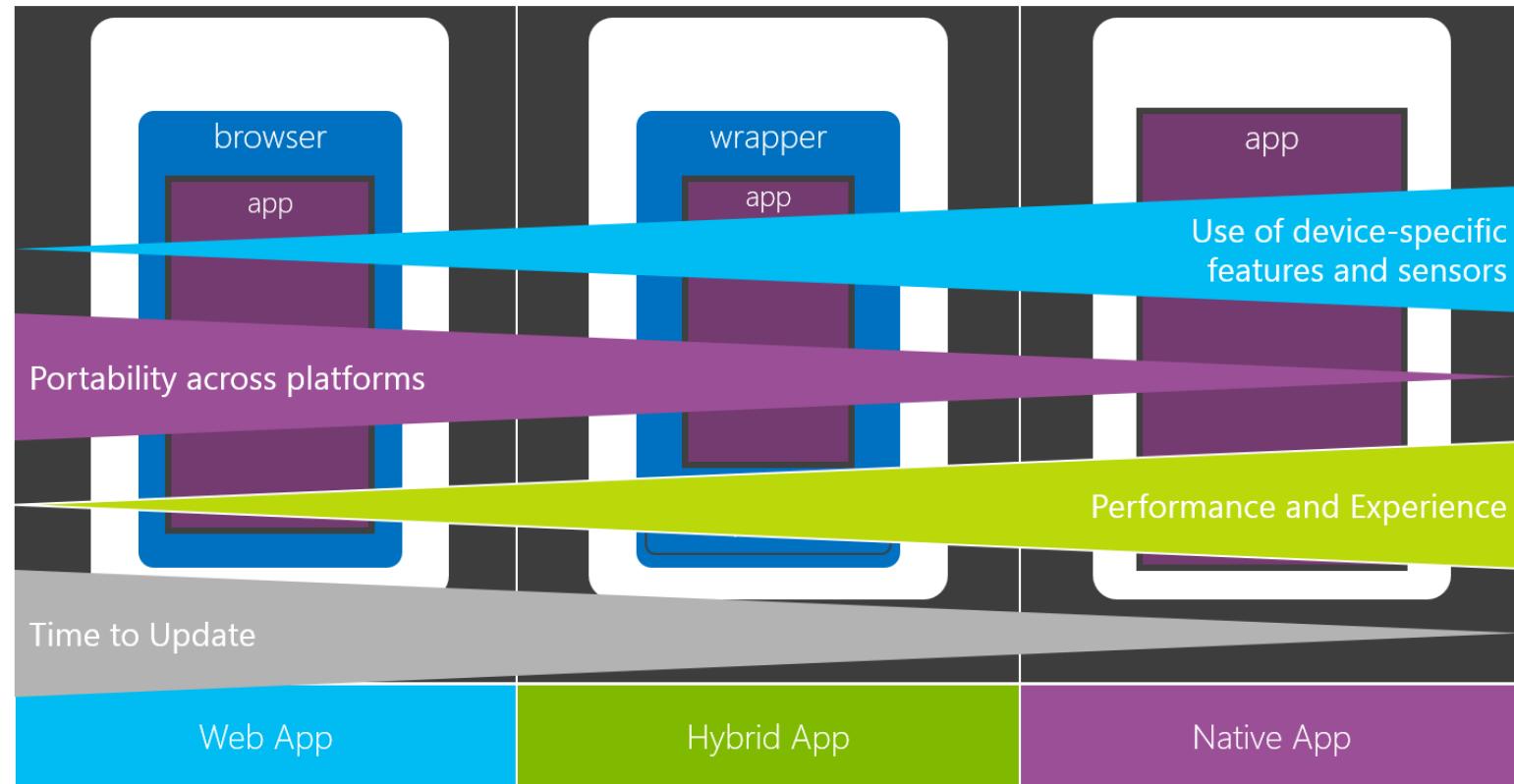
C#  
Visual Studio

**“We could probably save 70% of our development budget by switching to a single, cross-platform client, but we would probably lose 80% of our users.”**



-- Phil Libin, Evernote CEO

# Client technology choices



# Write Once, Run Anywhere Approach



- Least common denominator
- Browser fragmentation
- Developing & designing for 1 platform, happen to get other platforms

# Three options

- Hybrid app
- Interpreted app
- Cross-compiled

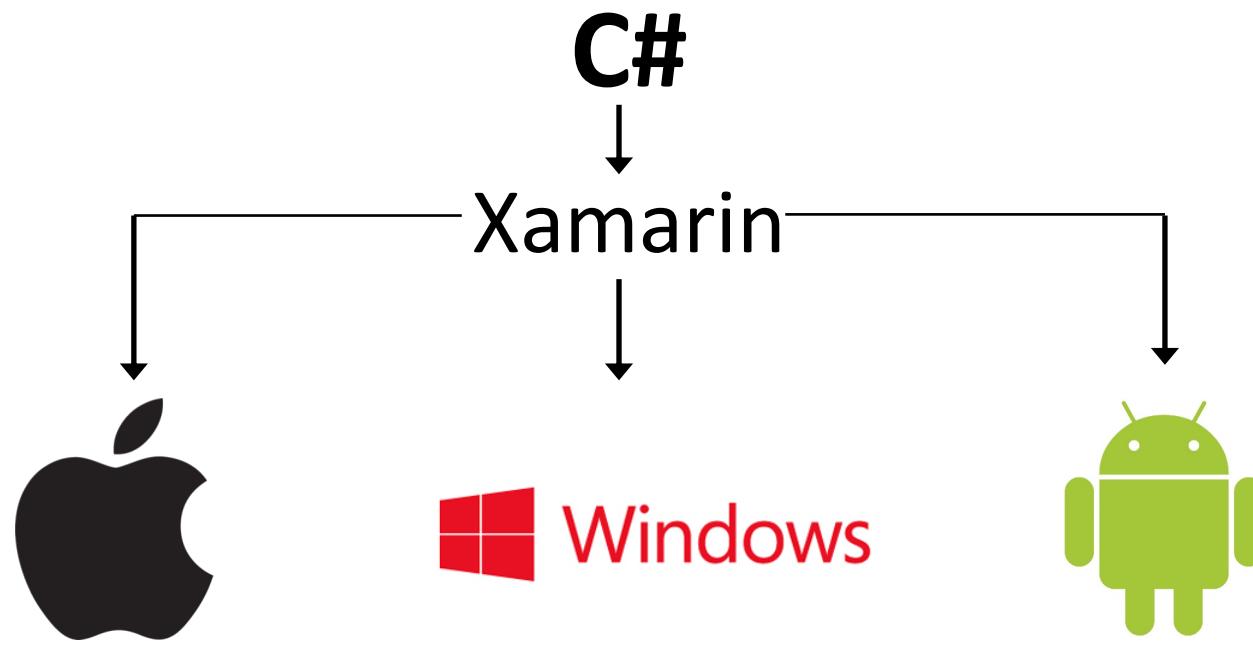
# Xamarin

based on material by Matteo Pagani  
Windows AppConsult Engineer @ Microsoft

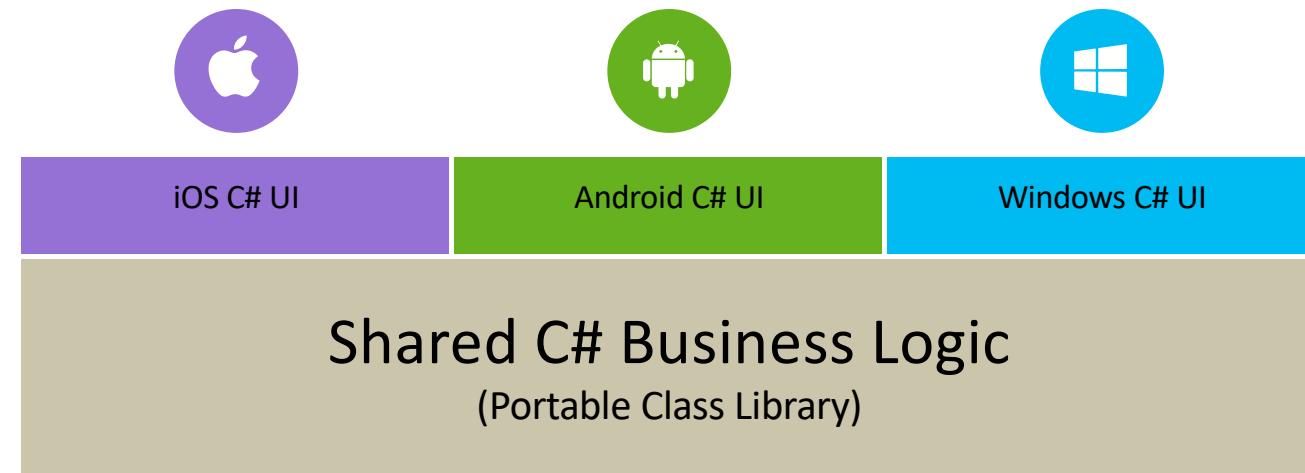
# Xamarin

- Fully native apps written entirely in C#
- Build apps with beautiful UX and native performance for Android, iOS & Windows
- Be productive with templates, Intellisense, debugger, designer integration, emulators, deployment
- Code share with PCLs
- Create specific UI or share UI with Xamarin.Forms
- Use C# APIs with 100% of platform APIs exposed
- Connect to Azure for backend enterprise systems

# What is Xamarin

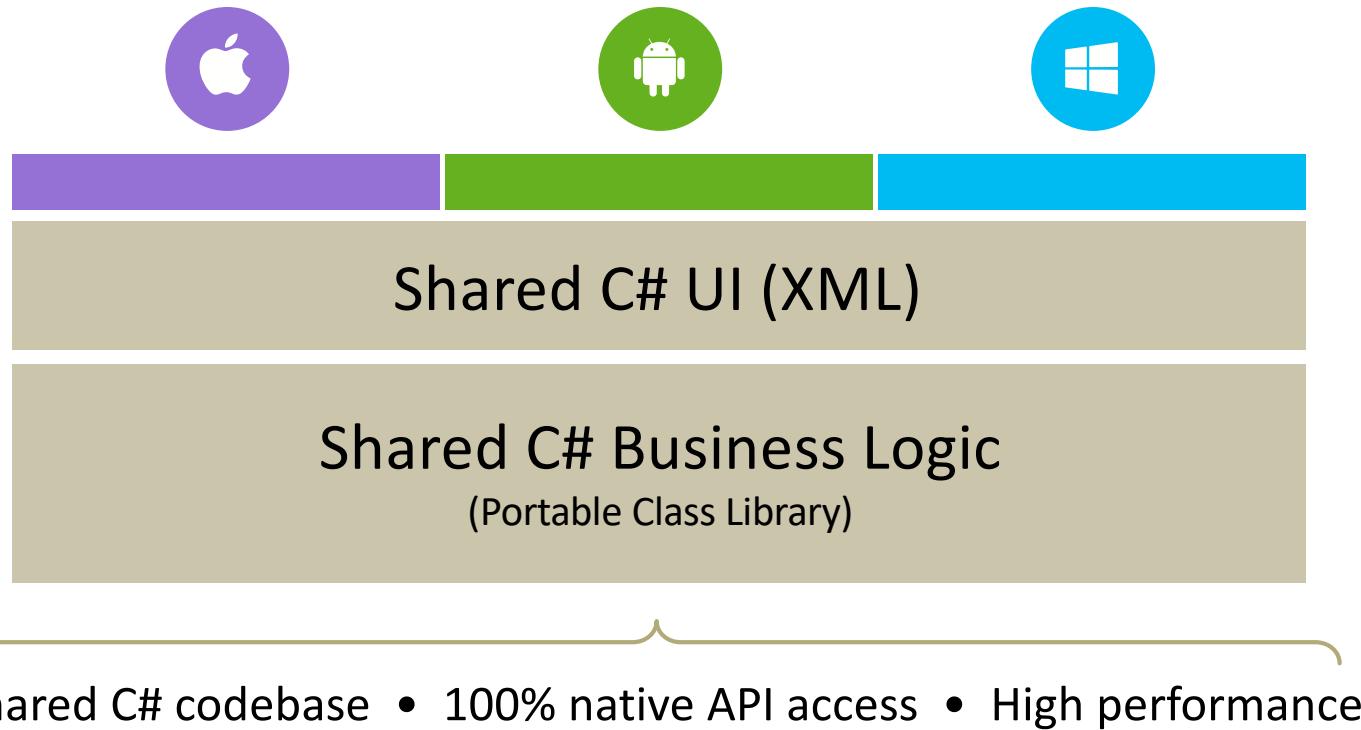


# Xamarin Approach

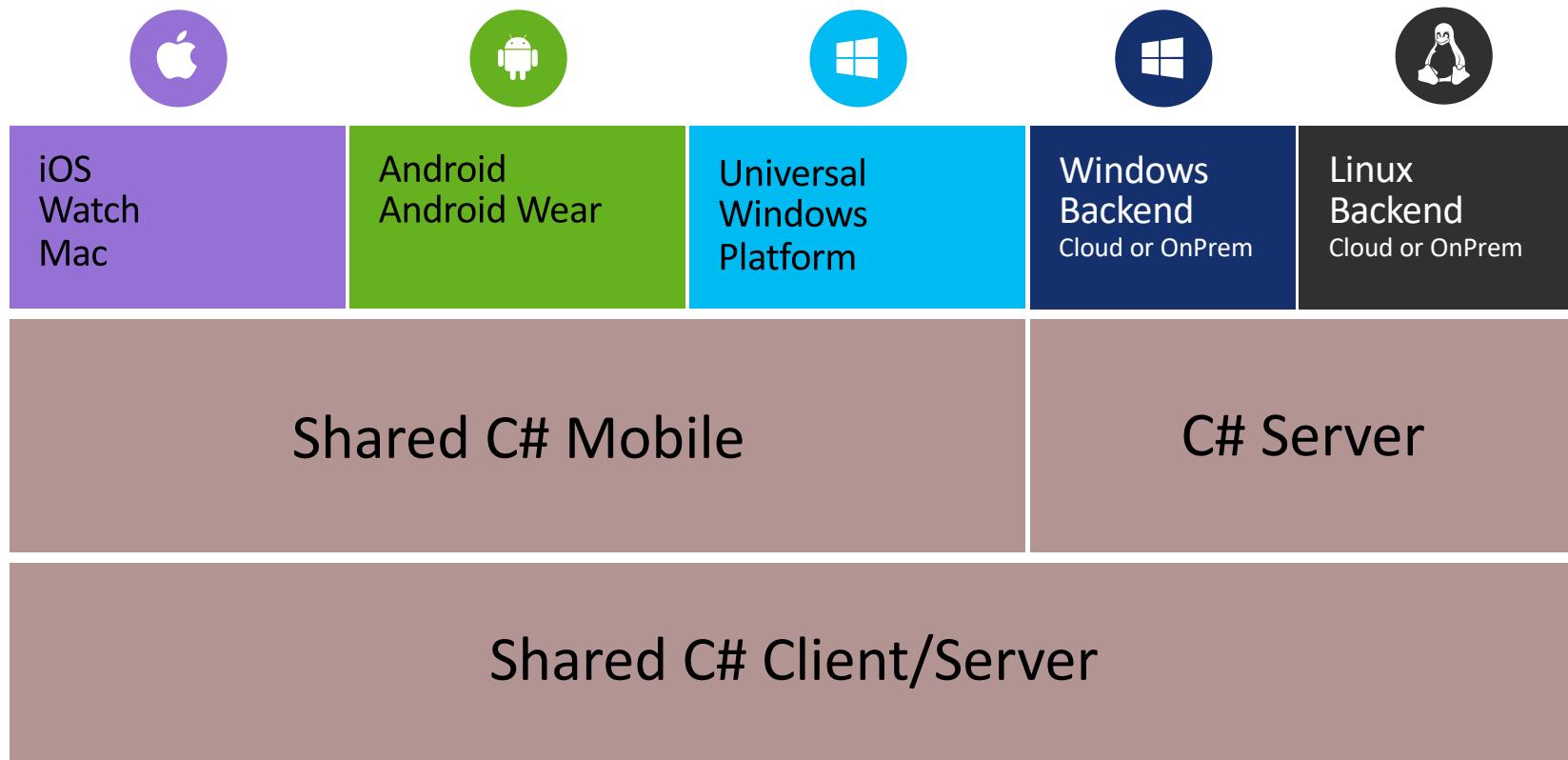


Shared C# codebase • 100% native API access • High performance

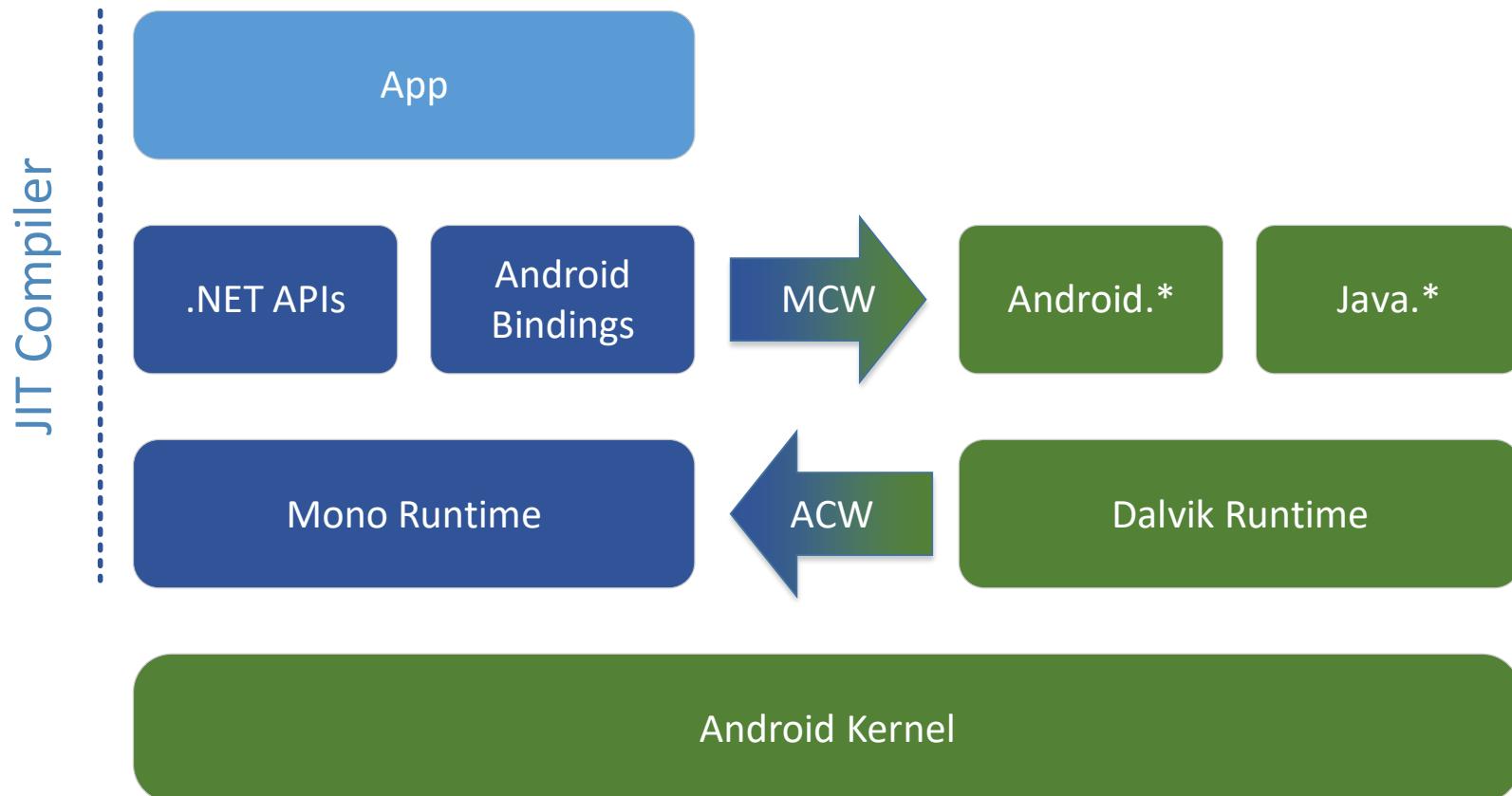
# Xamarin Approach (Forms)



# Maximizing Sharing Capabilities

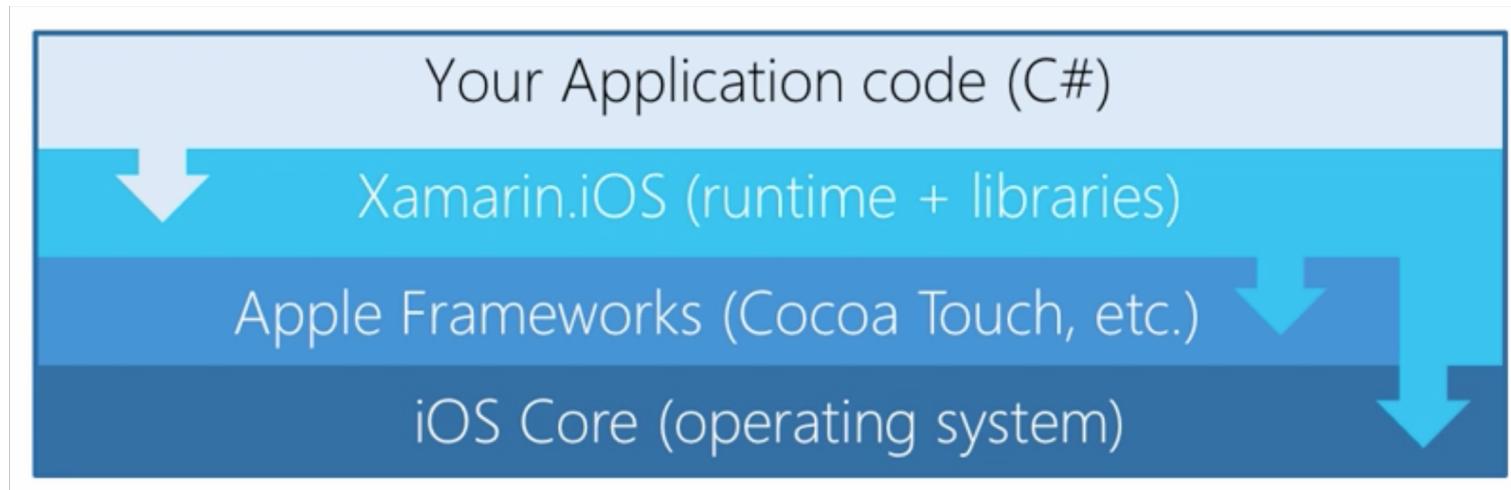


# Xamarin.Android Architecture

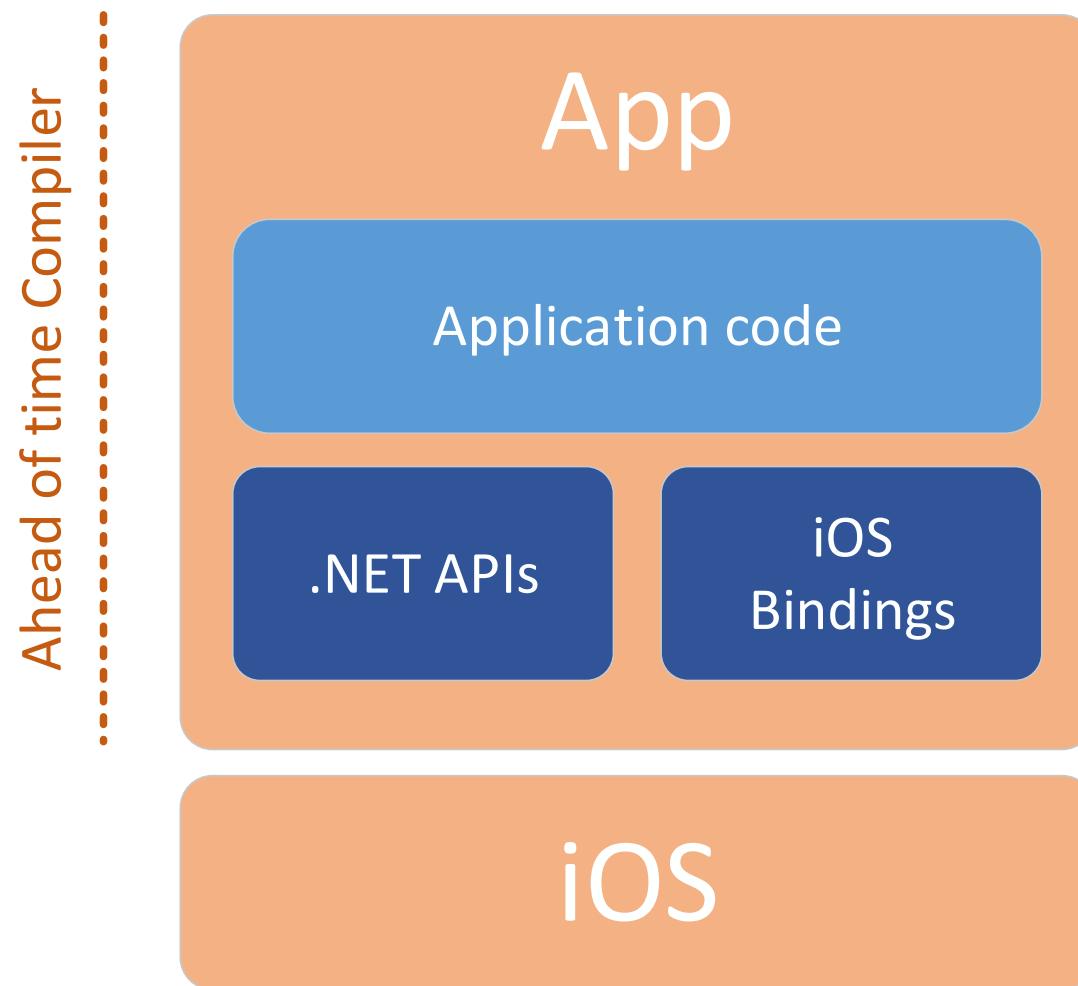


# Xamarin.iOS

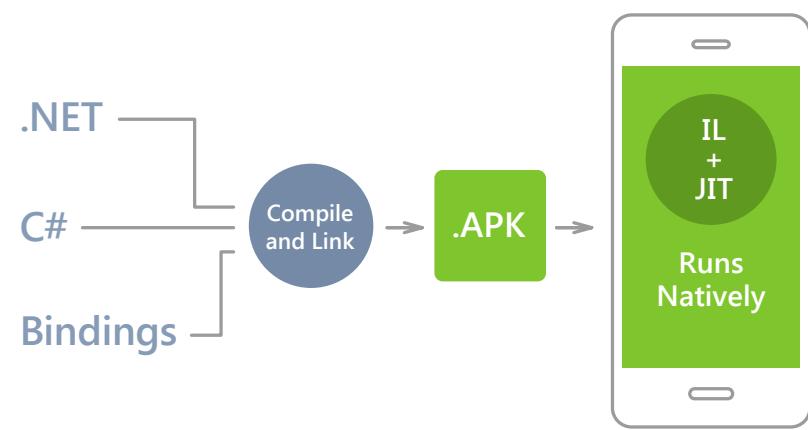
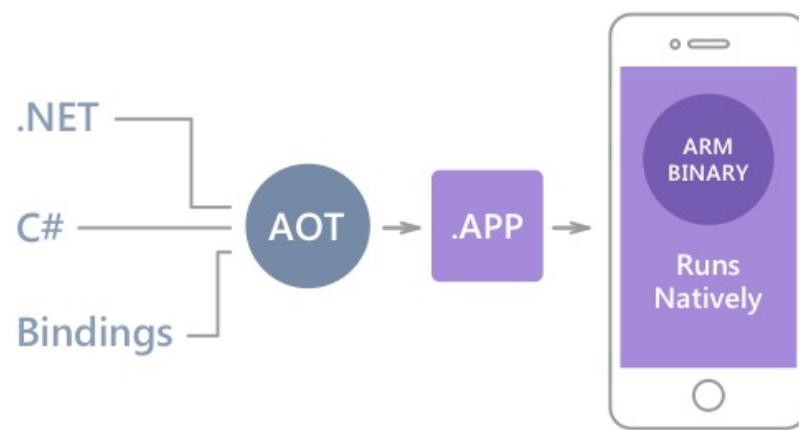
- Xamarin iOS is based on open source Mono project.  
You can leverage all native feature and controls of iOS from C#



# Xamarin.iOS

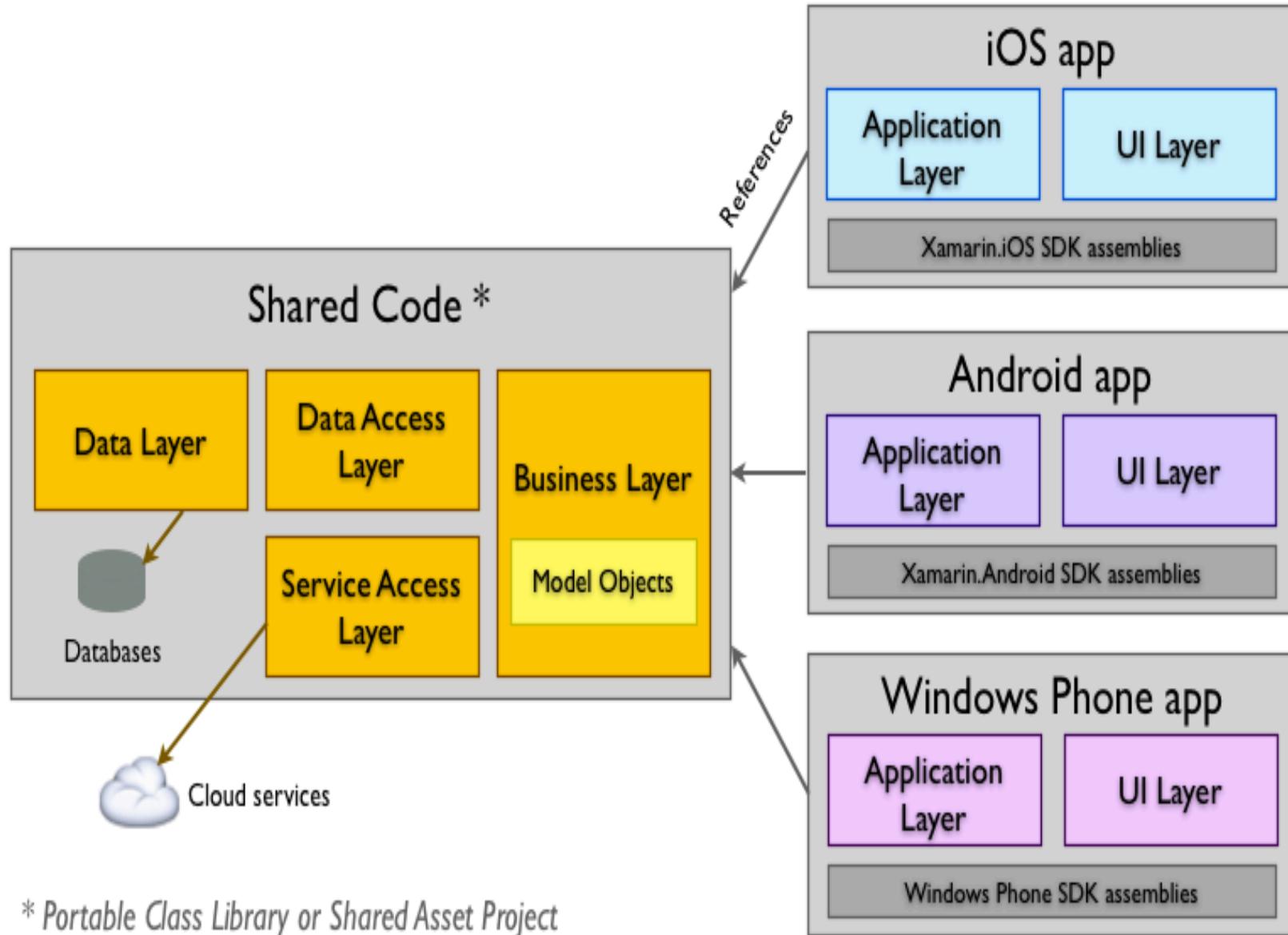


# Native Performance

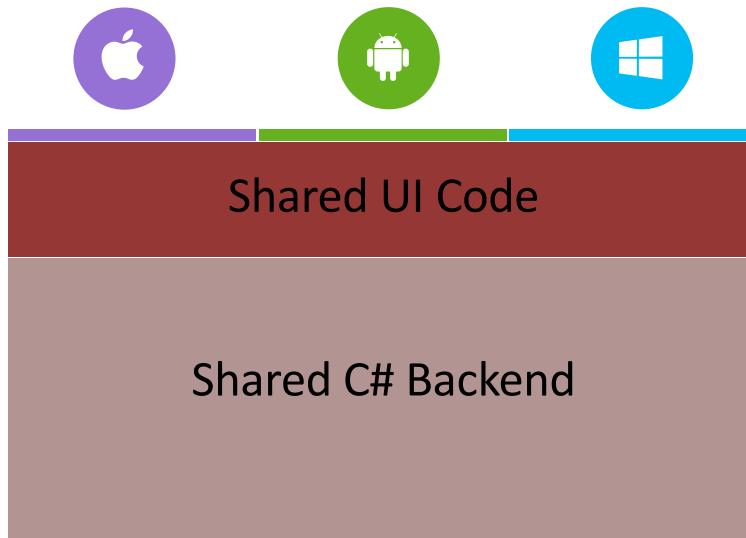


- **Xamarin.iOS** does full Ahead Of Time (AOT) compilation to produce an ARM binary for Apple's App Store.
- **Xamarin.Android** takes advantage of Just In Time (JIT) compilation on the Android device.

# Shared code



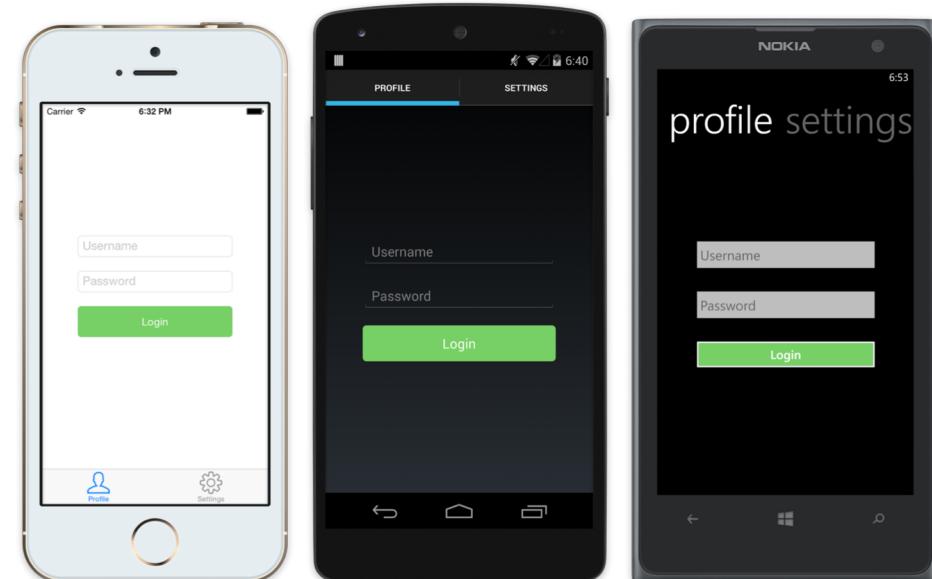
# Xamarin.Forms



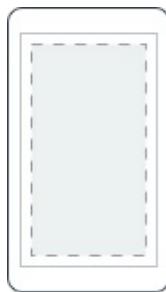
- 40+ Pages, layouts, and controls
  - Build from code behind or XAML
- Two-way data binding
- Navigation
- Animation API
- Dependency Service
- Messaging Center

# Xamarin.Forms

```
<?xml version="1.0" encoding="UTF-8"?>
<TabbedPage xmlns="..." xmlns:x="..." 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="..." Command="..."/>
    </StackLayout>
</ContentPage>
<ContentPage Title="Settings"
    Icon="Settings.png">
    <!-- Settings -->
</ContentPage>
</TabbedPage.Children>
```



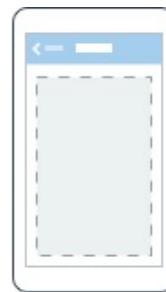
# Xamarin forms



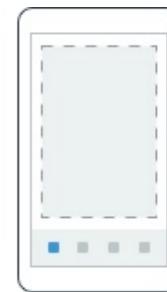
Content



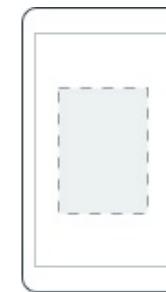
MasterDetail



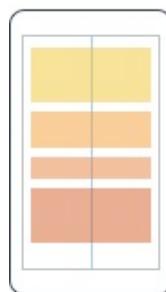
Navigation



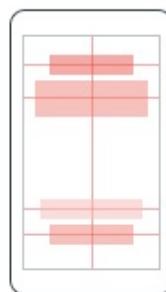
Tabbed



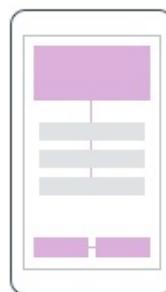
Carousel



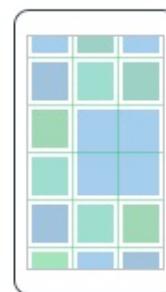
Stack



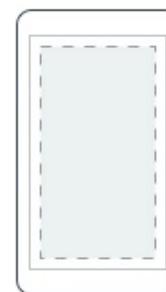
Absolute



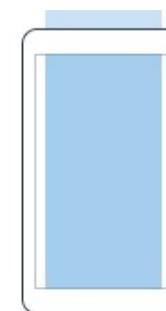
Relative



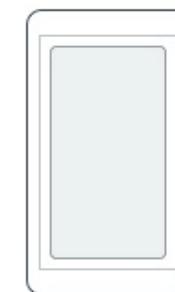
Grid



ContentView



ScrollView



Frame

# Xamarin approaches

## Xamarin.Forms



- Data entry apps
- Prototypes and proofs-of-concept
- Apps that require little platform-specific functionality
- Apps where code sharing is more important than custom UI

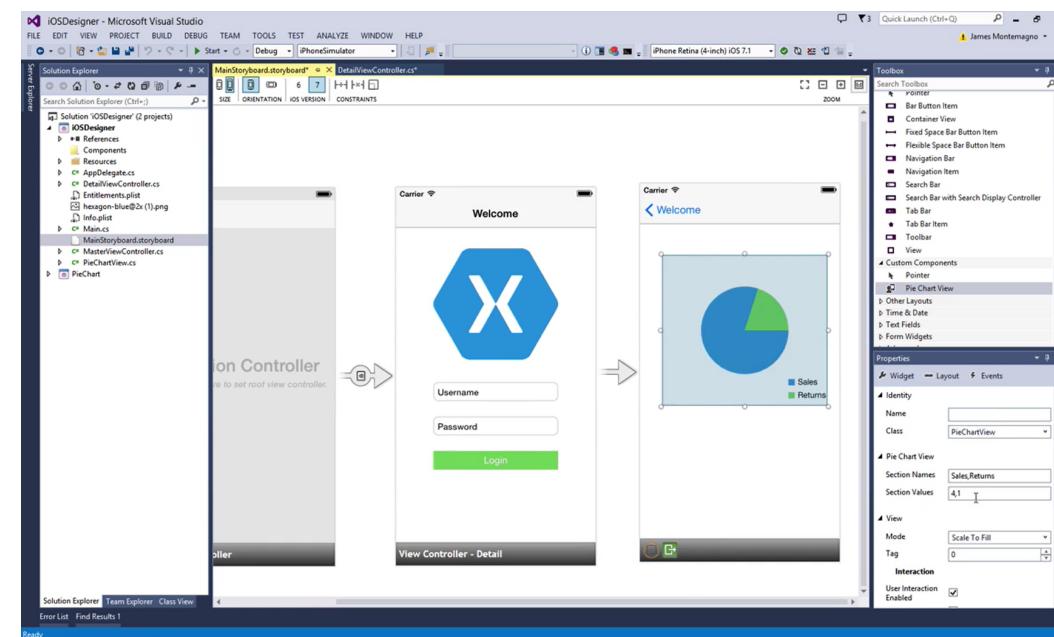
## Xamarin.iOS/Xamarin.Android



- Apps that require specialized interaction
- Apps with highly polished design
- Apps that use many platform-specific APIs
- Apps where custom UI is more important than code sharing

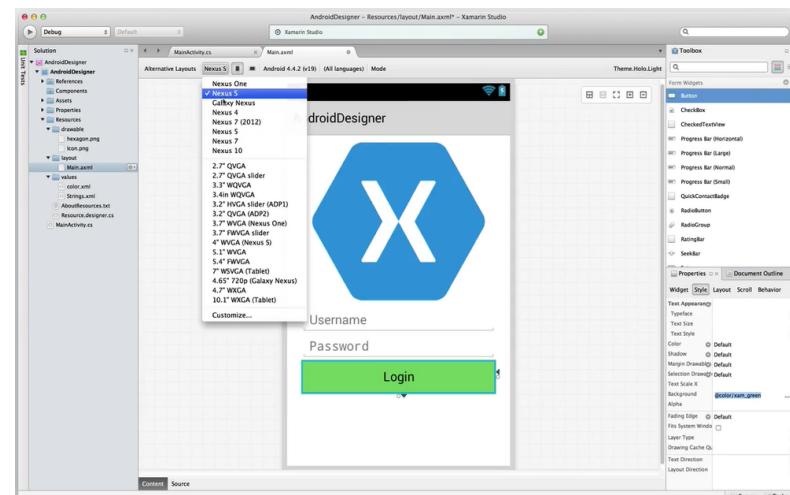
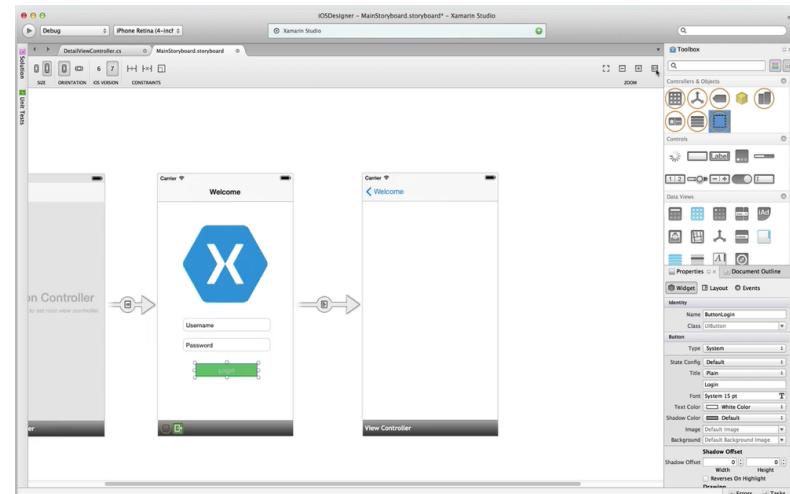
# Xamarin and Visual Studio integration

- A single solution for Android, iOS, and Windows development
- Leverage the entire Microsoft ecosystem
- Visual Studio Team Services
- Your favorite code coverage and profiling tools



# Xamarin Studio

- Android and iOS native designers
- Code completion, refactoring, debugging, integrated version control, F# support and more
- Publishing



# Test Cloud

Screenshot of the Xamarin Test Cloud interface showing test results for the Flipboard app across various devices.

The interface includes:

- Header: Flipboard > Sep 23, 7:09 PM | https://testcloud.xamarin.com/ | New Test Run | Vinicius
- Overview section: Sign in, User creates an account (5 red), User signs in with Facebook (green), User signs in with Google (green), User has incorrect password (green), User has incorrect email (3 red), User signs out (green).
- Test details: Given I am on the start screen (Passed: When I go to the login screen (5 red), And I enter valid credentials (green), Then I should be logged in (green)).
- Test results table:

Category	Test Case	Status	Device	Android Version	
Sign in	User creates an account	5 red	LG Nexus 5	Android 4.4.2	
	User signs in with Facebook	green	Samsung Galaxy S II	Android 4.1.2	
	User signs in with Google	green	Samsung Galaxy S III	Android 4.1.2	
	User has incorrect password	green	Samsung Galaxy S Duos	Android 4.0.4	
	User has incorrect email	3 red	Samsung Galaxy Core	Android 4.1.2	
	User signs out	green	LG Nexus 4	Android 4.4.2	
	Reading articles	User reads the cover story	green	HTC One	Android 4.4.2
	User reads the News section	green	Samsung Galaxy Note	Android 4.1.2	
	User reads the Technology section	green	Sony Xperia Z	Android 4.3	
	User reads Twitter articles	green	LG G2	Android 4.4.2	
Collecting articles	User adds a section	green	Samsung Galaxy Grand Duos	Android 4.1.2	
User comments on an article	3 red	Huawei Ascend Y300	Android 4.1.1		
User collects an article	green	Samsung Galaxy Centura	Android 4.0.4		
User collects and shares an article	green				

# OSS Xamarin SDK

**Full OSS runtime  
with MIT license**

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**Part of the  
.NET  
Foundation**

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**Mono  
contributed  
to the .NET  
Foundation**

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