Create great mobile apps with Visual Studio and Xamarin

Matteo Pagani
Windows AppConsult Engineer @ Microsoft
mail: matteo.pagani@microsoft.com
twitter: @qmatteoq
Agenda

Mobile development challenges
Native Android, iOS and Windows applications
Create mobile experiences
Faster development cycles
How Microsoft can help

Create mobile experiences...
New applications or new end points to existing applications for Android, iOS, and Windows

...connected to the business...
Enterprise-ready platform that integrates modern mobile experiences with existing business assets

...with mobile-era agility
Achieve speed with faster development cycles and continuous measure and learn

Xamarin
Visual Studio

Microsoft Azure

Visual Studio Team Services
HockeyApp
Enterprises are going mobile on multiple platforms

According to Gartner, by 2016, 70% of the mobile workforce will have a smartphone, and 90% of enterprises will have two or more platforms to support.
Cross-platform mobile strategy choices
Sweet spot for the successful mobile enterprise

End user experience

Great apps delivered to the user’s choice of device

Development agility to move at mobile speed

Better TCO, productivity, and developer experience
the “Silo’ed” approach

iOS
Objective-C, Swift, Xcode

Android
Java, Android Studio

Windows
C#, Visual Studio
**Silo’ed approach**

Building native apps multiple times means

Client development is completely different for each device type

Only the Services (server-side) can be reused, with certain differences when consuming them

TCO grows exponentially

- **iOS** → **Objective-C, Swift**
  - XCode

- **Android** → **Java**
  - Eclipse

- **Windows** → **C#, JS, C++**
  - Visual Studio
The *Silo’ed* approach

Multiple teams and multiple code bases are expensive and slow

End user experience

Better TCO, productivity, and developer experience
The *Silo’ed* approach

Multiple teams and multiple code bases are expensive and slow

- End user experience
- Great apps delivered to the user’s choice of device
- Development agility hampered by multiple code bases and fragment toolsets
- Better TCO, productivity, and developer experience
Hybrid Approach

App Generator

Lua
Javascript
Actionscript
HTML+CSS

Apple
Android
Windows
Hybrid approach

Hybrid apps. Presentation written in HTML/CSS and behavior written in JavaScript/TypeScript

Highest code reuse ratio at UI expense

Performance depends on the container

Apache Cordova/Ionic

CSS • HTML • TypeScript • JavaScript • Ionic • ...

Write-once-run-anywhere box

iOS

Android

Windows
The *write-once-run-anywhere* approach

HTML Hybrid scenarios like Apache Cordova

End user experience

Better TCO, productivity, and developer experience
The *write-once-run-anywhere* approach

HTML Hybrid scenarios like Apache Cordova

- Better TCO, productivity, and developer experience
- Performance tradeoff
- Great option for teams with HTML5 web skills. Tooling maturity
Xamarin Approach

Shared C# Business Logic
(Portable Class Library)

Shared C# codebase • 100% native API access • High performance
Shared C# Business Logic
(Portable Class Library)

- Shared C# codebase
- 100% native API access
- High performance
Xamarin Approach

Shared C# Business Logic
(Portable Class Library)

Shared C# codebase • 100% native API access • High performance
Xamarin Approach (Forms)

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

Shared C# UI (XML)
Shared C# Business Logic
(Portable Class Library)
Xamarin approach

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
Visual Studio and Xamarin unique approach
The best of all worlds

End user experience

Native performance and UI

Mature development tools
Share and reuse code

Better TCO, productivity, and developer experience
Maximizing Sharing Capabilities

- iOS Watch Mac
- Android Android Wear
- Universal Windows Platform
- Windows Backend Cloud or OnPrem
- Linux Backend Cloud or OnPrem
Maximizing Sharing Capabilities

- iOS Watch Mac
- Android Android Wear
- Universal Windows Platform
- Windows Backend Cloud or OnPrem
- Linux Backend Cloud or OnPrem

Shared C# Mobile | C# Server
Maximizing Sharing Capabilities

- iOS Watch Mac
- Android Android Wear
- Universal Windows Platform
- Windows Backend Cloud or OnPrem
- Linux Backend Cloud or OnPrem

- Shared C# Mobile
- C# Server
- Shared C# Client/Server
Xamarin is native in all 3 ways
The best of all worlds

Native user interface
Apps are built with standard, native user interface controls for easy and familiar interactions

High-fidelity API access
Apps have access to the full spectrum of functionality exposed by the underlying platform and device

Native performance
Apps leverage platform-specific hardware acceleration, and are compiled as native binaries, not interpreted at runtime
Always up-to-date

Same-day support:
- iOS 5
- iOS 6
- iOS 7
- iOS 7.1
- iOS 8
- iOS 9
- iOS 10

Full support for:
- Apple Watch
- Google Glass
- Android Wear
- Amazon Fire TV
- And much more
Anything you can do in Objective-C, Swift, or Java; can be done in C#
The Xamarin SDK
The Visual Studio family

Most complete developer IDE

Code optimized editor

Developer services for teams

Visual Studio

Visual Studio Code

Visual Studio Team Services
### Visual Studio... now with Xamarin

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<tr>
<th>Visual Studio Community</th>
<th>Xamarin Studio Community</th>
<th>Visual Studio Professional</th>
<th>Visual Studio Enterprise</th>
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<td>Unrestricted, professional mobile development, code sharing, and debugging</td>
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<td>Xamarin Test Recorder – IDE Add-in [Roadmap]</td>
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Xamarin and Visual Studio integration

A single solution for Android, iOS, and Windows development

Leverage the entire Microsoft ecosystem

Visual Studio Team Services (VSTS)
ReSharper
Your favorite code coverage and profiling tools
Native UI designers

Create UI with drag and drop simplicity

Target multiple screen sizes, resolutions, and OS versions

Layouts saved in native resource formats

World’s best Android and iOS designers available in Visual Studio
Xamarin Studio – OS X
Xamarin Studio

Android and iOS native designers

Code completion, refactoring, debugging, integrated version control, F# support and more

Publishing
Xamarin.Android
Xamarin.Android Architecture
Xamarin.Android Architecture

- Xamarin Android Apps are built with Xamarin’s tools and libraries

UI is made from Xamarin’s wrappers around the native Android views

Code is written in C#
Xamarin supports C# idioms

Java uses get/set methods, listeners, etc.

Xamarin.Android uses properties and events
Xamarin.Android Architecture

- Xamarin supports latest C# features like async, LINQ, lambda...

```csharp
var employees = new List<Employee>();
var seniors = from e in employees where e.Salary > 50000 select e;

var client = new HttpClient();
var result = await client.GetStringAsync("");
```
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

- Xamarin.iOS includes both compile time and runtime components

- C# compiler for Mac
- Native compiler and linker
- Runtime services (GC, type checking, etc.)
- Core .NET Libraries
**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.
Demo
A traditional Xamarin application
Xamarin.Forms - 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

Shared C# Backend

Shared UI Code
<?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>
Which **Xamarin approach** is best for your app?

**Xamarin.Forms** is best for:

- 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

**Learn more:** xamarin.com/forms

**Xamarin.iOS / Xamarin.Android** is best for:

- 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

**Learn more:** xamarin.com/platform
Xamarin.Forms Ecosystem

Design your own functionality or discover a visually striking pre-built component. Our partners have rewritten over 140 components so you can use the Xamarin.Forms API to easily build cross-platform apps entirely in C#.

Video
Demo

Xamarin Forms application
What if we didn’t have to write this code? What if we could access it from shared code?

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Plugins for Xamarin

github.com/xamarin/plugins
Speak(“Hello World”);
Xamarin Performance 🍎-android
Xamarin Performance

- Xamarin Android Performance absolutely comparable with native, in some cases are better (cpu bound test)

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http://magenic.com/Blog/Post/4/Mobile-Development-Platform-Performance
Xamarin Performance

- Xamarin Android Performance absolutely comparable with native, in some cases are better (app load time)

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Xamarin Performance

- Xamarin Android Performance absolutely comparable with native, in some cases are better (mobile services rest call)

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Questions?

Samples: https://github.com/qmatteoq/XamarinSamples

Slides: https://doc.co/tFE6nh/nqqAqB

Matteo Pagani
Windows AppConsult Engineer @ Microsoft
mail: matteo.pagani@microsoft.com
twitter: @qmatteoq