

**15:25 - 16:25**

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WORKSHOP

## **Xamarin**

### **Desarrollo de apps móviles multi-plataforma con Xamarin**

Javier Suárez Ruiz, Microsoft & Xamarin MVP, Xamarin Team Lead en Plain Concepts  
y docente en [campusMVP.es](http://campusMVP.es)

PUE DAY 2017

# Aplicaciones iOS, Android, Mac, & Windows Mobile nativas C# con Xamarin

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@jsuarezruiz



# Javier Suárez Ruiz

Developer Plain Concepts

Microsoft MVP Windows Platform  
Development & Visual Studio Tools

Xamarin MVP

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- Twitter: @jsuarezruiz





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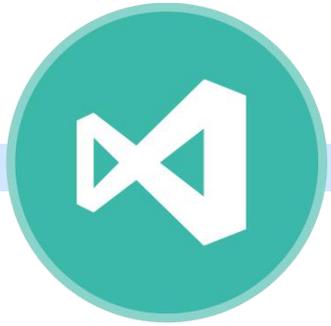
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# Xamarin – Solución móvil completa



Desarrollo



Test



Build



Distribuir



Monitorear

# Desarrollo



¿Qué es nativo?



?



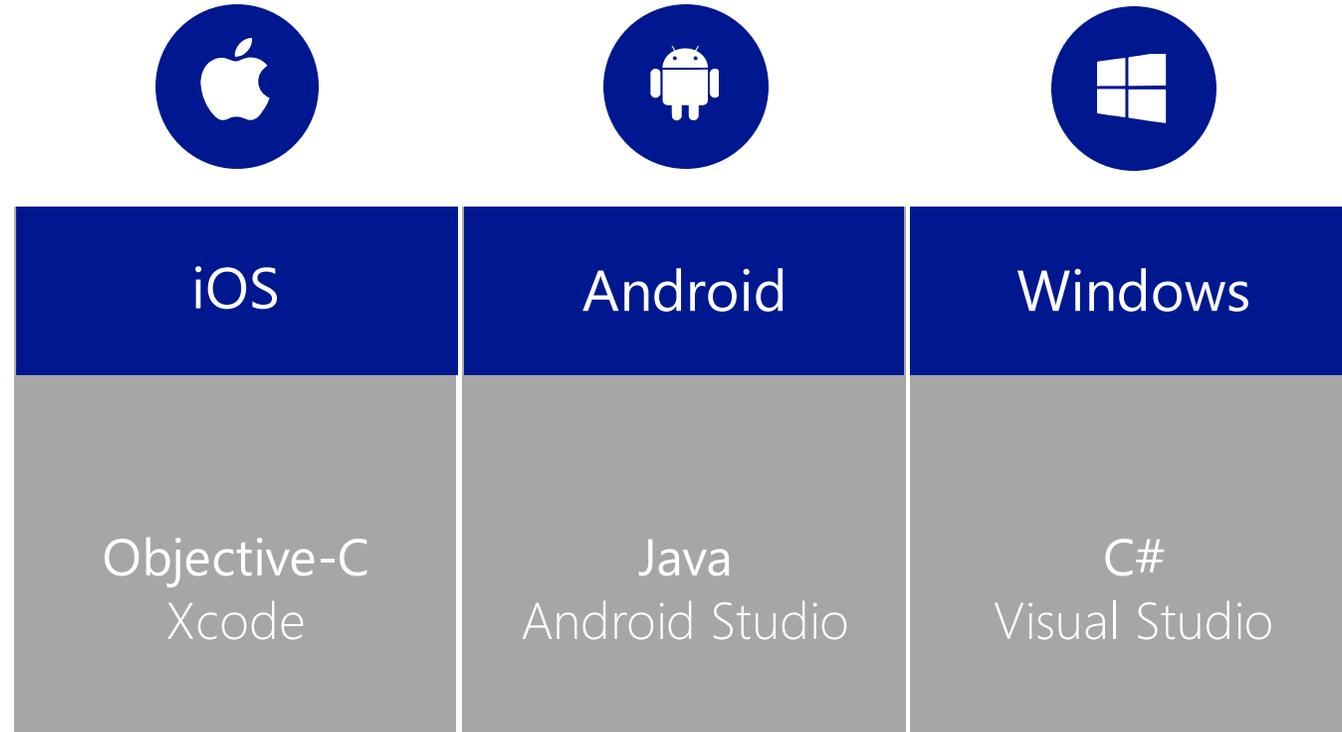
?



?

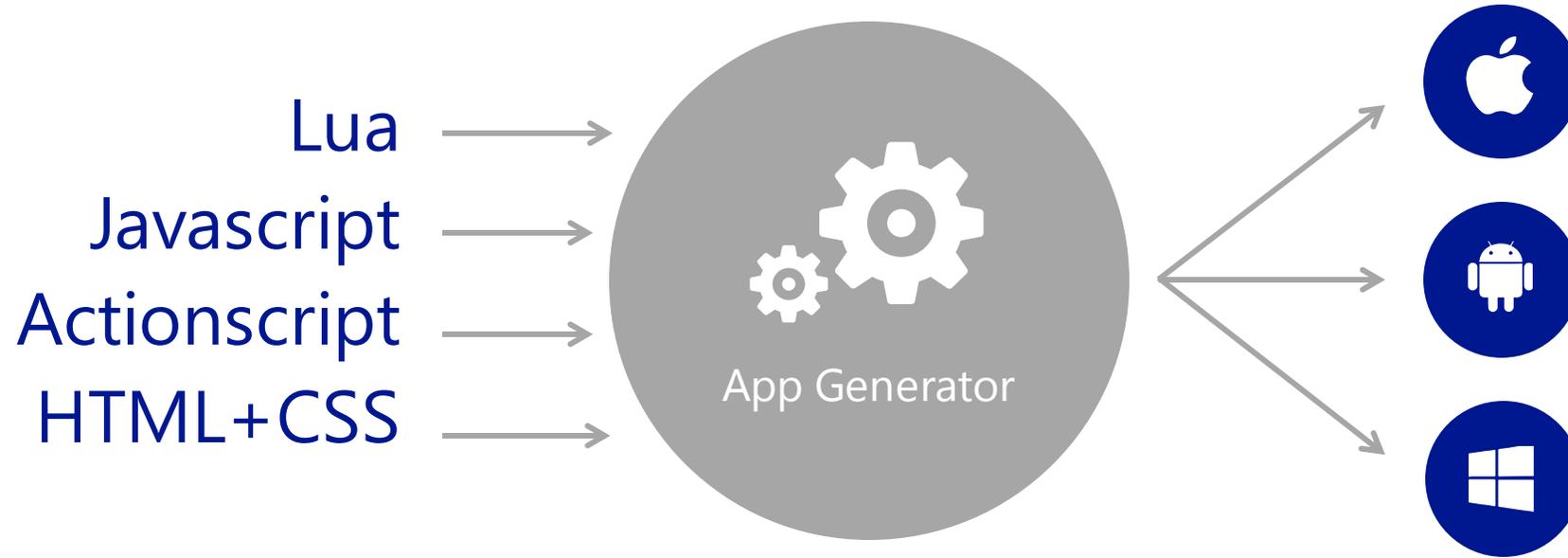
# Arquitectura de Apps móviles

# Enfoque nativo



No se comparte código • Diferentes lenguajes & herramientas de desarrollo •  
Múltiples equipos

# Escribir una vez, correr en todo



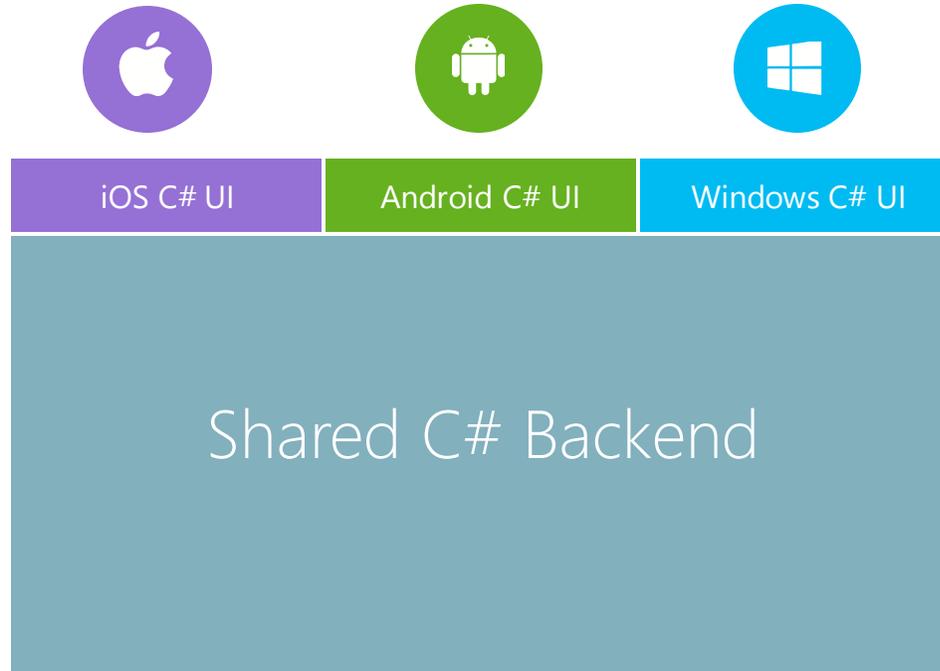
Acceso limitado a APIs nativas • Menor rendimiento • Interfaz de usuario más pobre

# El enfoque de Xamarin

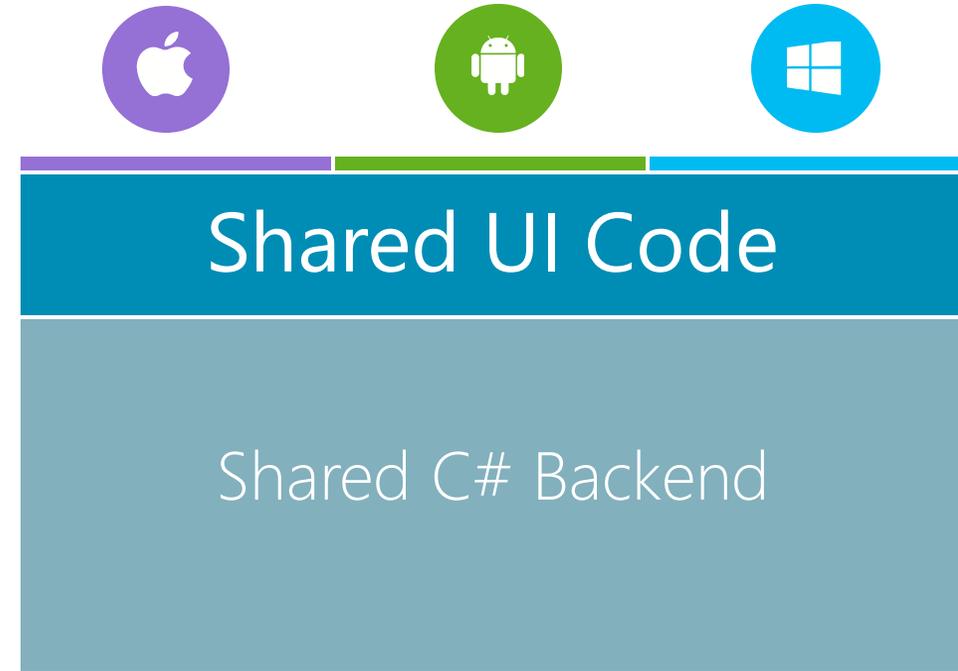


Gran cantidad de código compartido C# • 100% acceso nativo a APIs • Alto rendimiento

# Xamarin + Xamarin.Forms

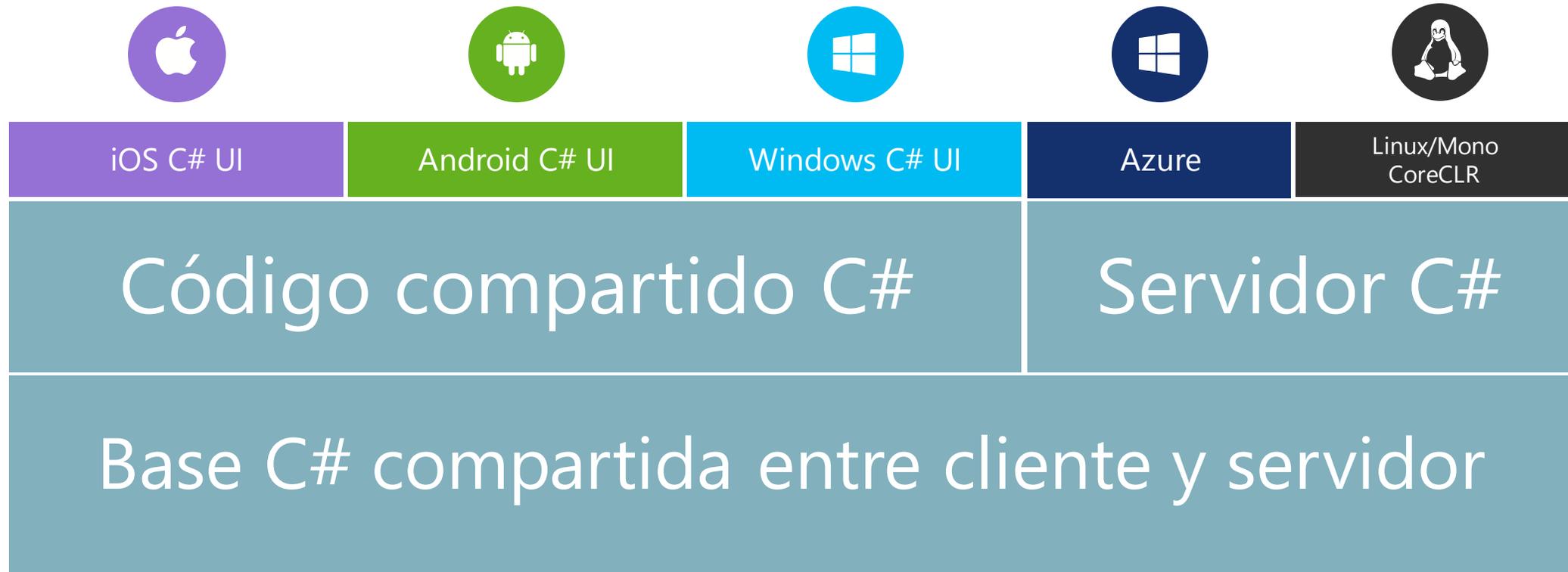


Enfoque tradicional



Con Xamarin.Forms:  
Mayor cantidad de código  
compartido, app nativa

# El enfoque Xamarin



Gran cantidad de código compartido C# • 100% acceso nativo a APIs • Alto rendimiento

¿Por qué Xamarin?



Xamarin gratis e  
incluido en Visual  
Studio

# Open Source – open.xamarin.com



Xamarin  
OPEN SOURCE

[Xamarin SDK](#)

[Documentation](#)

[Community](#)

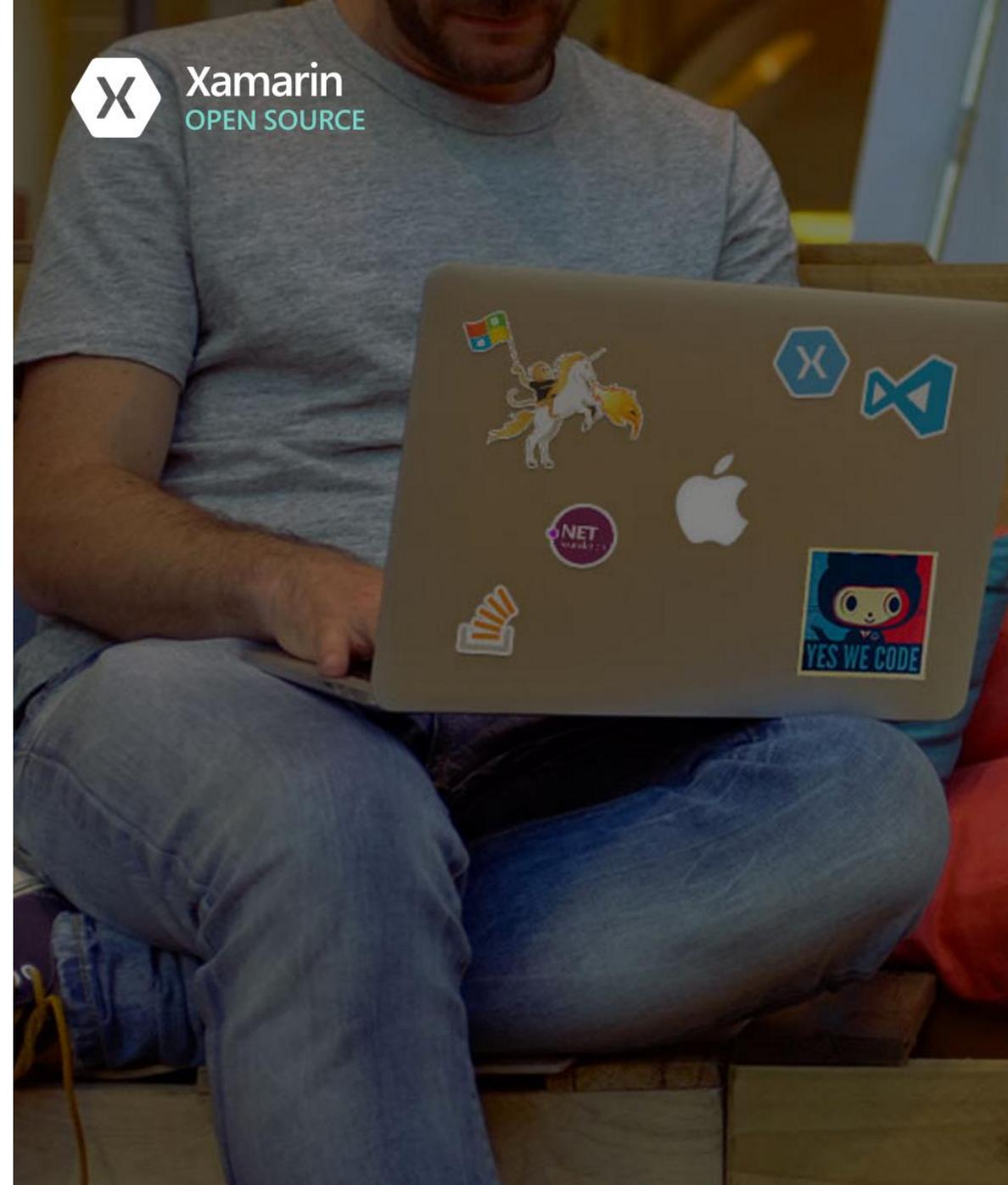
[Contribute](#)

Build the future of apps  
with Xamarin.

Xamarin SDK is now fully available under the MIT license.

# Open Source

- Xamarin.iOS
- Xamarin.Mac
- Xamarin.Android
- Xamarin.Forms
- Bindings & Plugins



¿Por qué C#?

# C# mola!

```
from p in Table<Person> ()  
  where p.ID == id  
  select p;
```

LINQ

```
var doc = XDocument.Load(url);  
foreach(var item in doc.Root.Elements()) {  
  var text = item.Value;  
}
```

XML

```
button.TouchUpInside += (s, o) => {  
  message.Text = "Hello!";  
};
```

Gestión de eventos y delegados

# Una comparativa...

```
// Objective-C
@interface Person : NSObject
@property (strong, nonatomic) NSString *name;
@end

@implementation Person
- (id)initWithName:(NSString *)name {
    self = [super init];
    if (self) {
        self.name = name;
    }
    return self;
}

+ (NSArray *)getNames {
    NSArray *people = @[
        [[Person alloc] initWithName:@"David"],
        [[Person alloc] initWithName:@"Vinicius"],
        [[Person alloc] initWithName:@"Serena"],
    ];
    NSMutableArray *names = [NSMutableArray array];
    [people enumerateObjectsUsingBlock:^(Person *person,
                                        NSUInteger idx,
                                        BOOL *stop) {
        [names addObject:person.name];
    }];
    return names;
}
@end
```

```
// C# with Xamarin
class Person : NSObject {
    public string Name { get; set; }

    public static string[] GetNames() {
        var people = new[] {
            new Person { Name="David" },
            new Person { Name="Vinicius" },
            new Person { Name="Serena" },
        };
        return people.Select(person => person.Name).ToArray();
    }
}
```

¿Cómo funciona Xamarin?

# 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% cobertura

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

C#

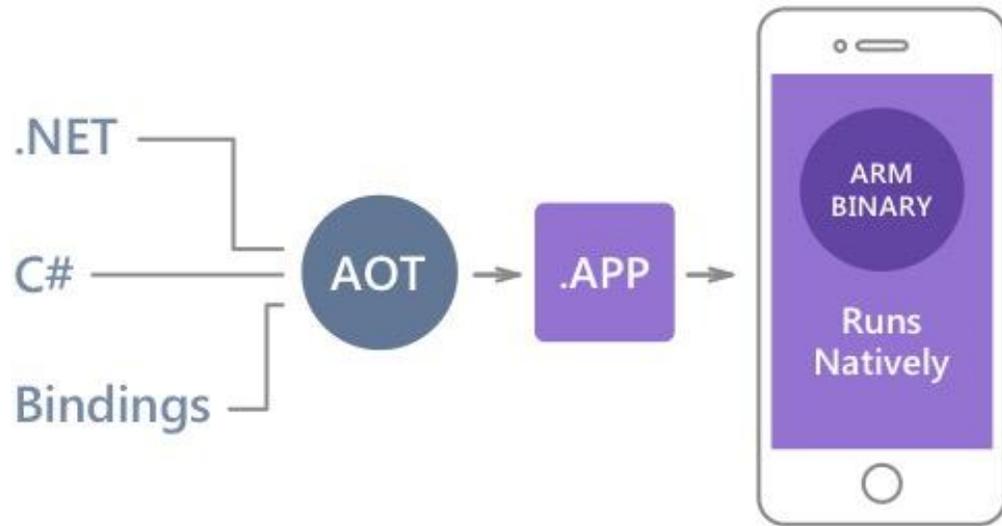
# Android – 100% cobertura

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

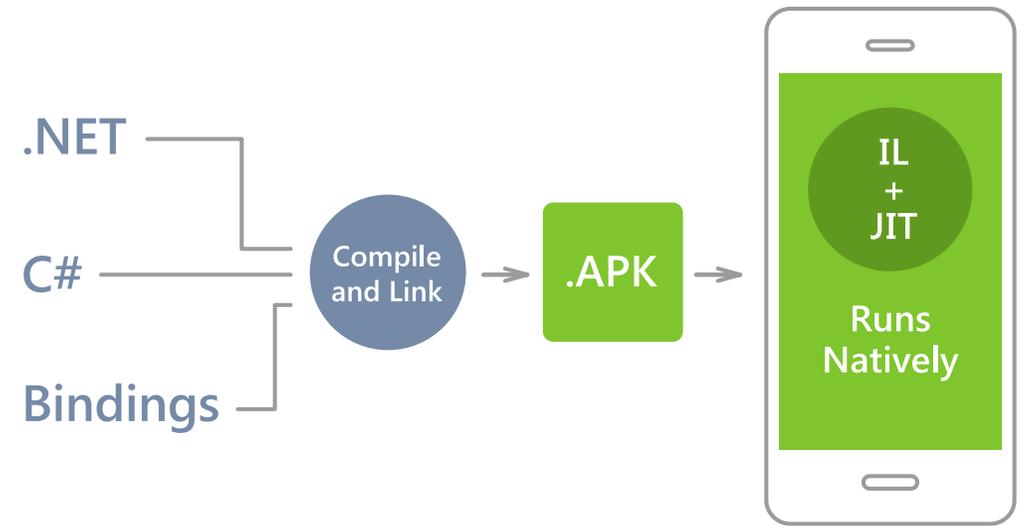
C#



# Rendimiento nativo



**Xamarin.iOS** hace uso de la compilación de Ahead Of Time (**AOT**) para crear un binario ARM para la Apple's App Store.



**Xamarin.Android** toma ventaja de la compilación Just In Time (**JIT**).

✓ Siempre al día

## Soporte al día:

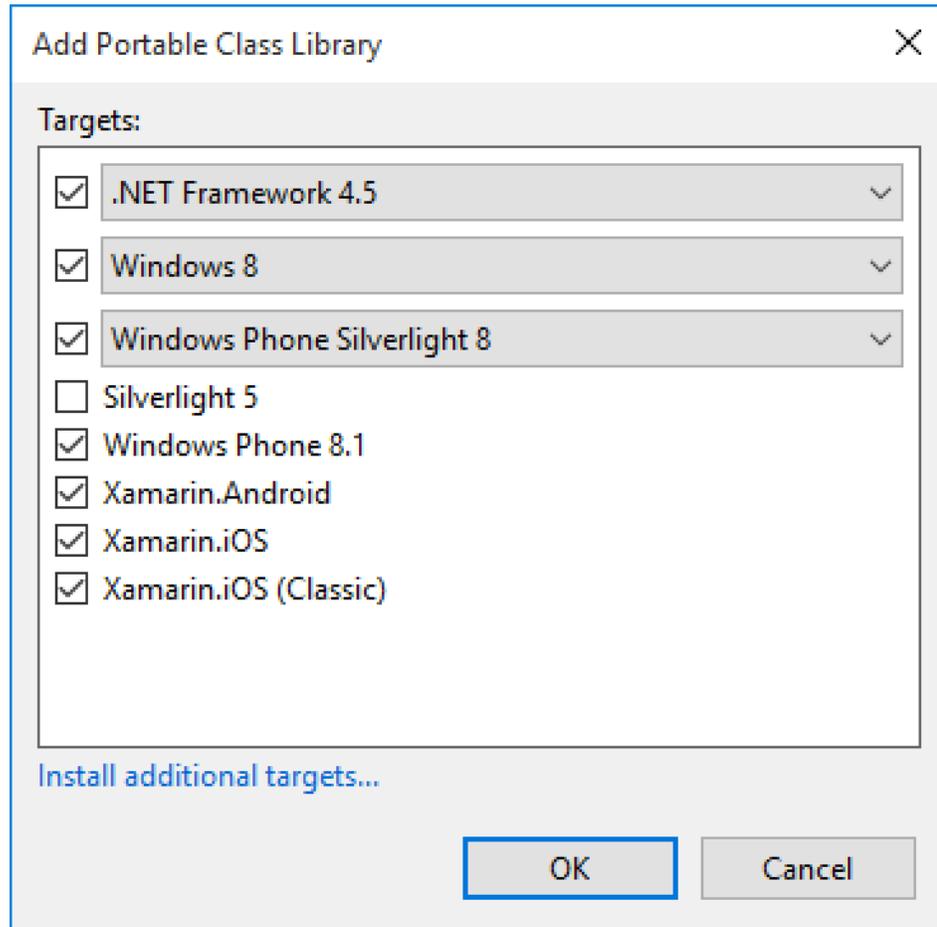
- iOS 5
- iOS 6
- iOS 7
- iOS 7.1
- iOS 8
- iOS 9
- iOS 10

## Soporte complete a:

- Apple Watch
- Apple TV
- Google Glass
- Android Wear
- Amazon Fire TV
- Tizen
- Y más!

Compartir código

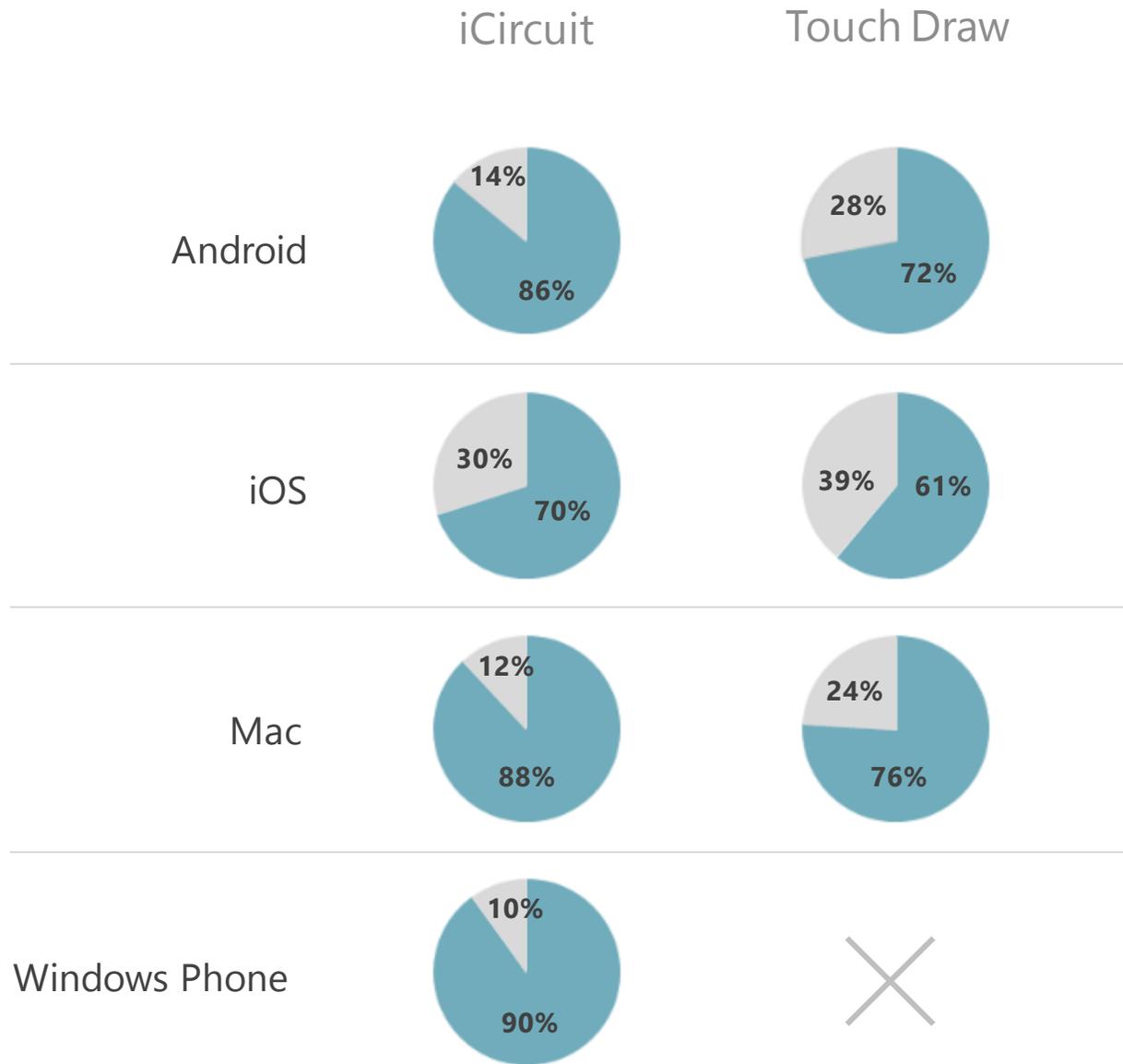
# Portable Class Libraries (PCL)



1 Librería  
Múltiples  
plataformas

Incluyendo:

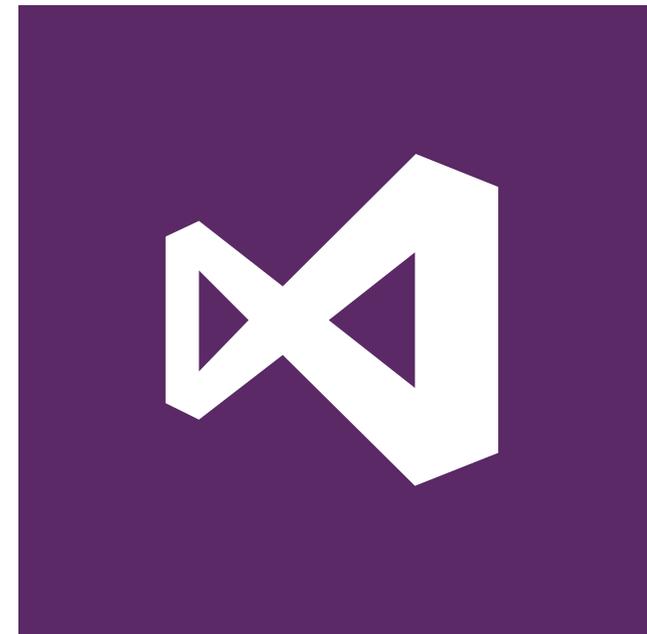
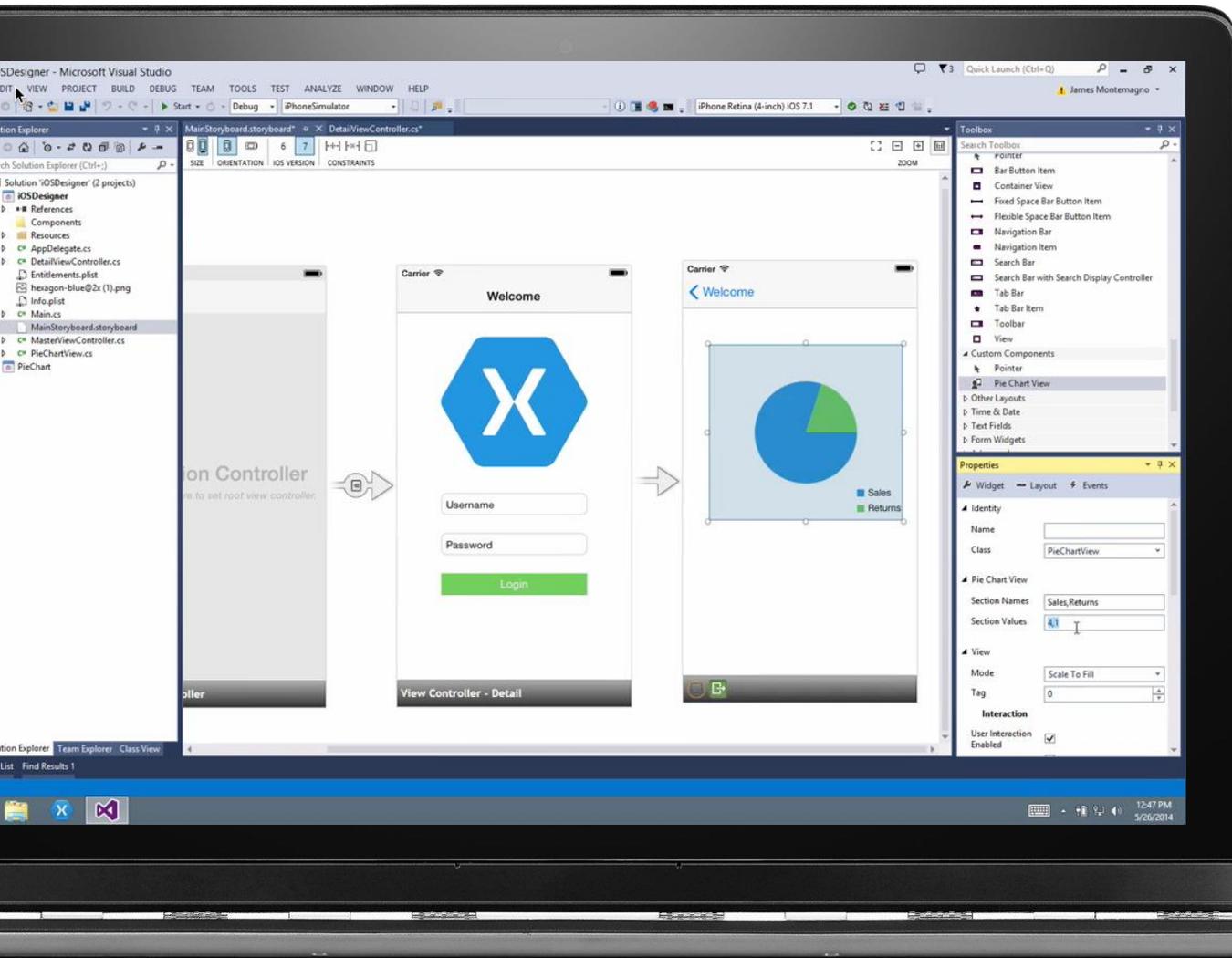
Xamarin.iOS y Xamarin.Android



Estadísticas  
de código  
compartido

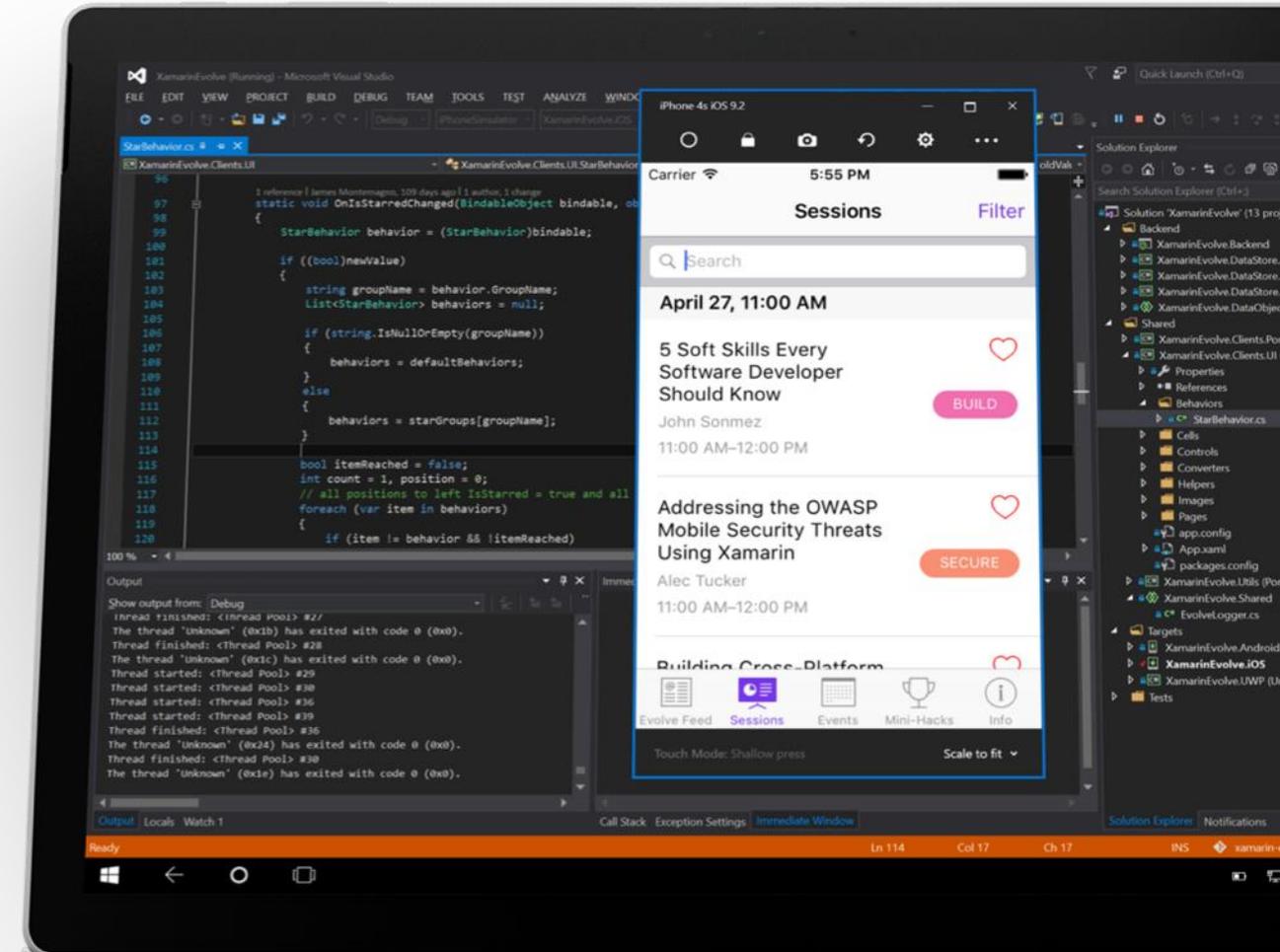
La experiencia de desarrollo

# Integración con Visual Studio

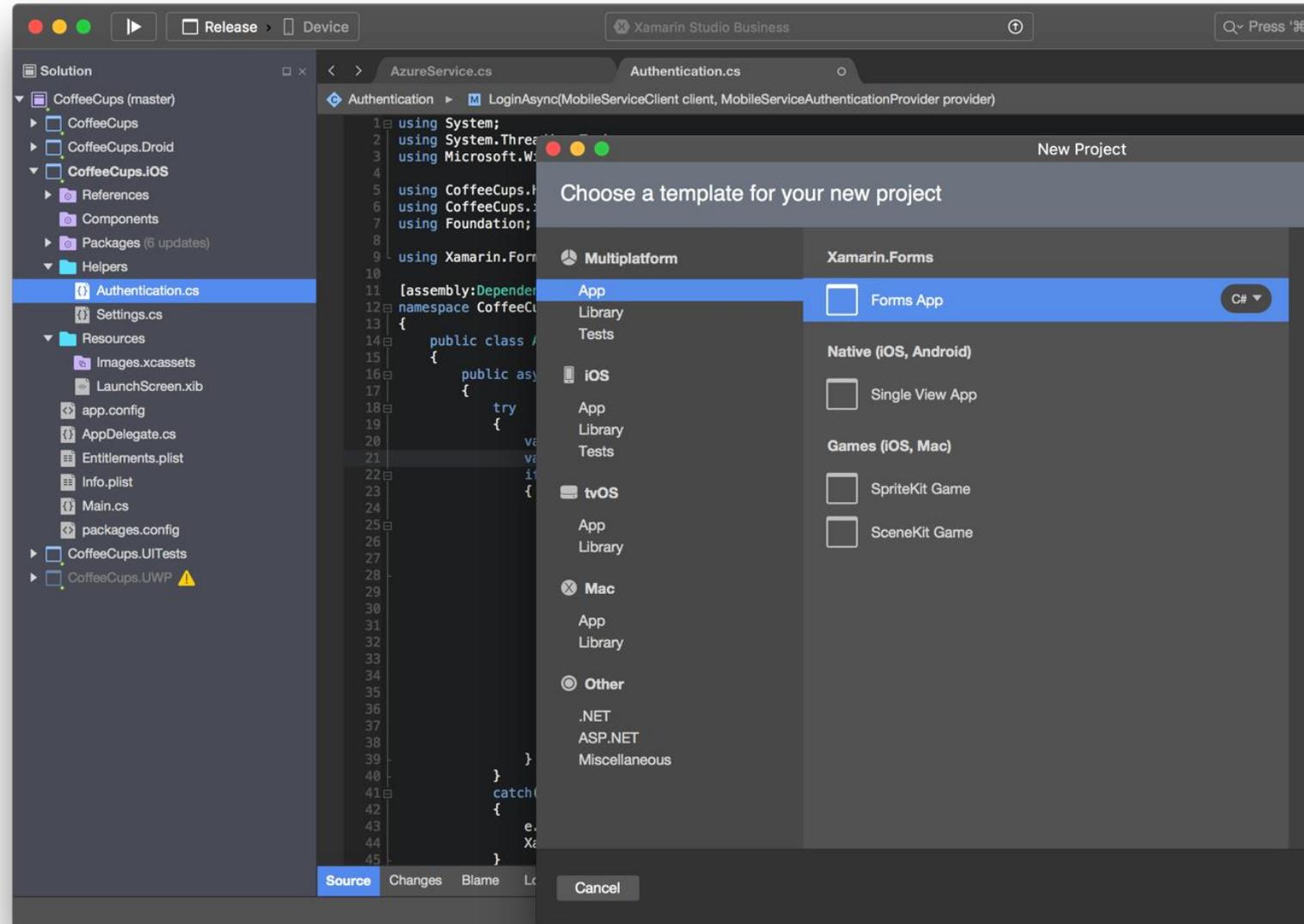


# Visual Studio iOS Simulator Remoting

- Multi-Touch
- Rápido
- Rotar, screenshots, cambios de localización
- No hace falta dejar VS

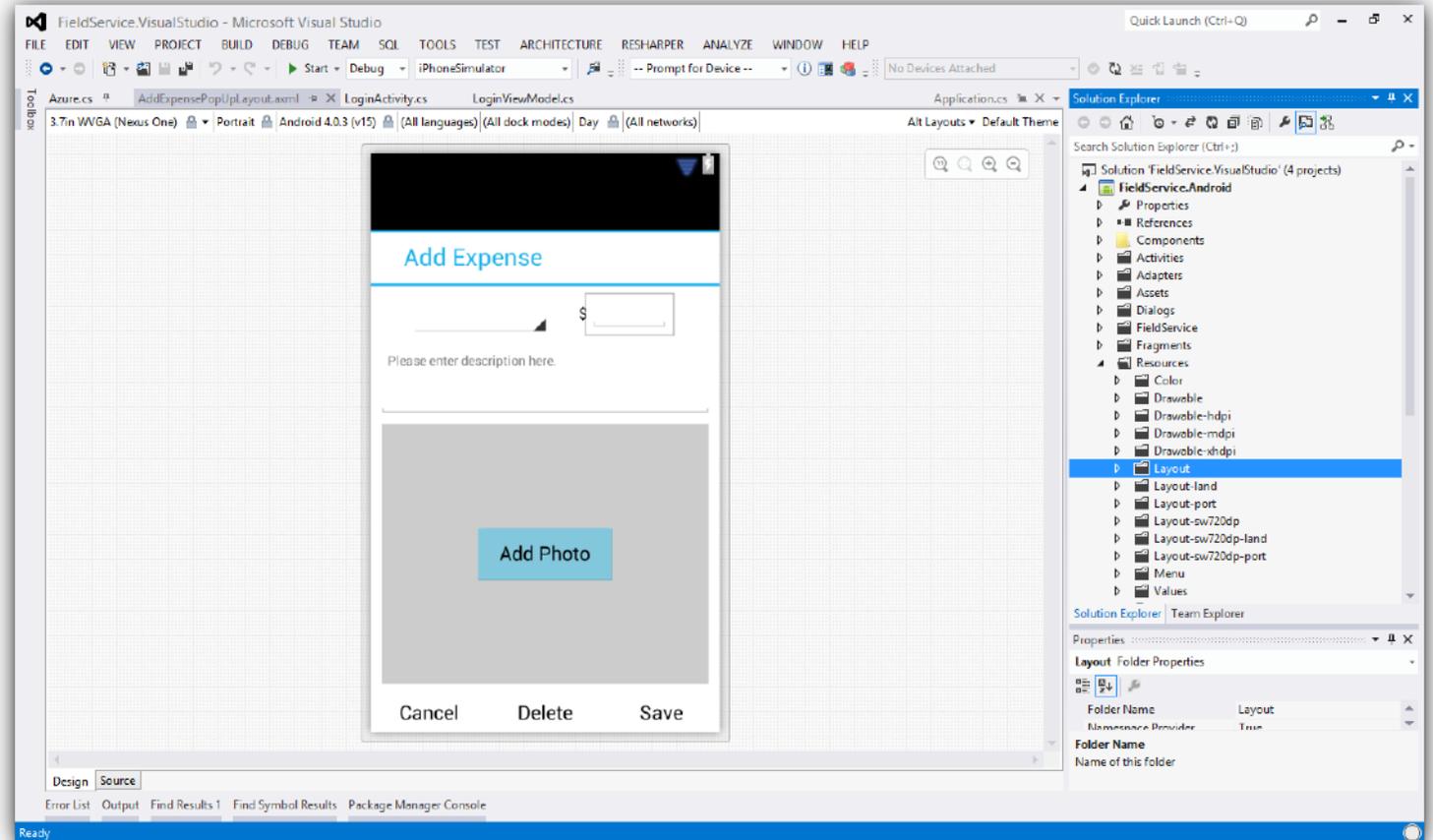


# Xamarin Studio & Visual Studio – Mac

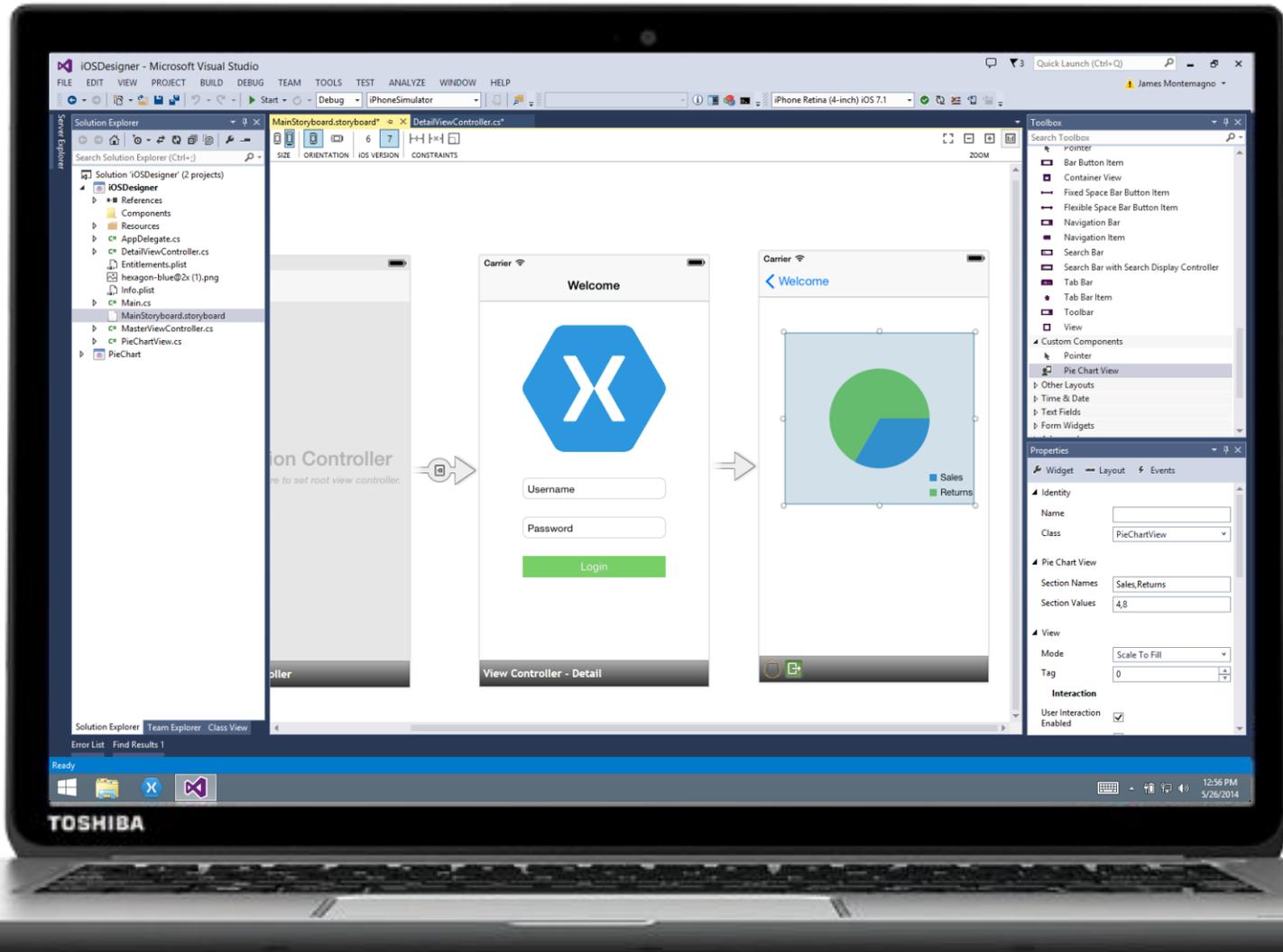


# Diseñador de Android

- Disponible en:
  - Xamarin Studio
  - Visual Studio
- Crea la UI con drag & drop
- Se puede probar con diferentes tamaños de pantallas, resoluciones y versiones de Android
- Layouts guardados en archivos Android XML



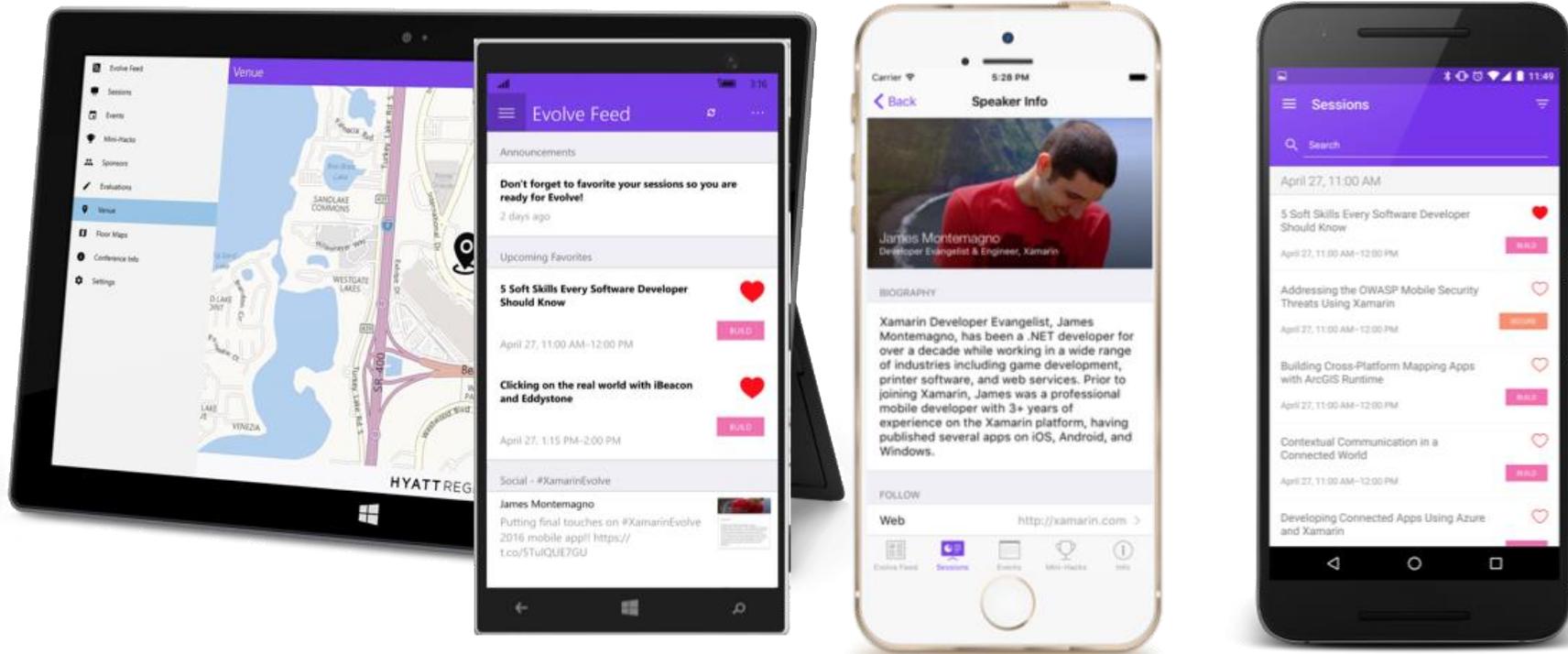
# Diseñador de iOS



- Disponible en Xamarin Studio y Visual Studio
- Similar a otros diseñadores de Visual Studio
- Soporta todos los elementos de UIKit
- Editar components de terceros
- Live preview

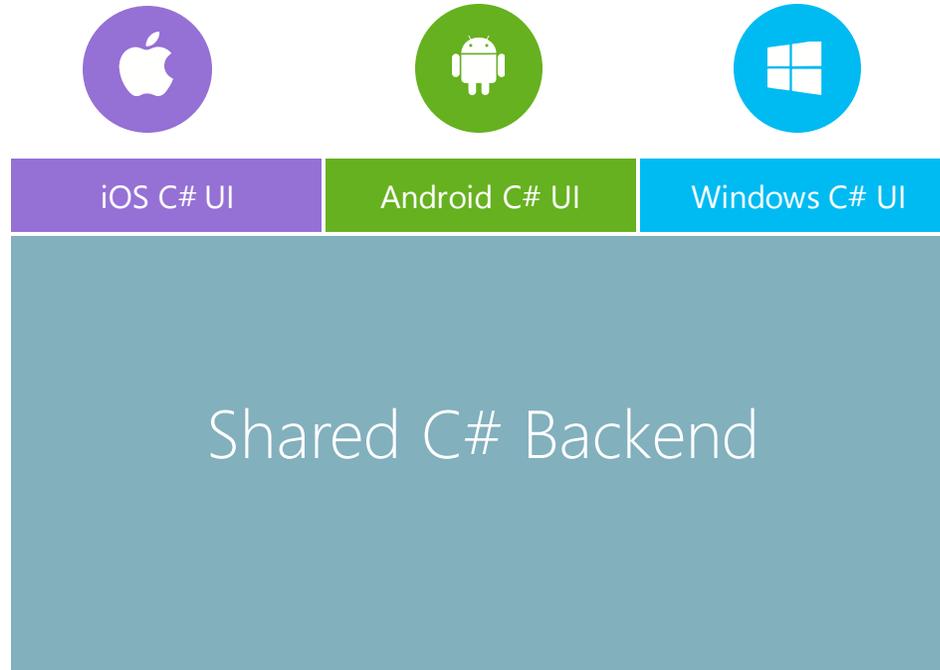
Vamos a echar un vistazo!

# Xamarin.Forms

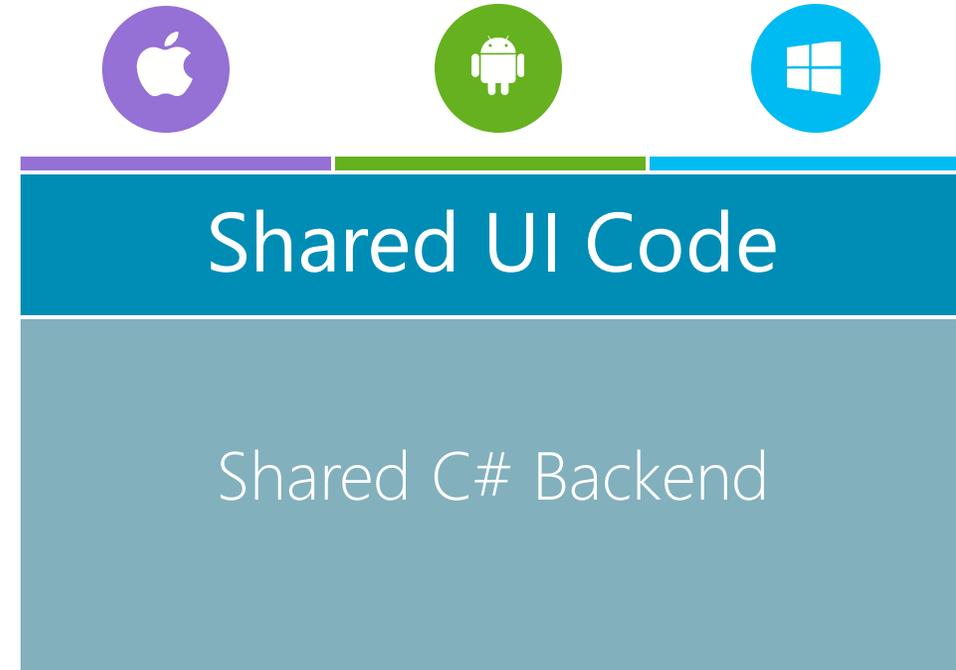


Crear interfaces nativas compartidas para iOS, Android, y Windows.

# Xamarin + Xamarin.Forms



El enfoque tradicional



Con Xamarin.Forms:  
Más código compartido,  
nativo

# ¿Qué incluye?

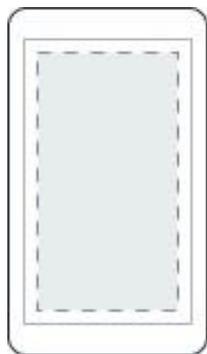


Shared UI Code

Shared C# Backend

- ✓ 40+ páginas, layouts, y controles (C# o XAML)
- ✓ Two-way data binding
- ✓ Navegación
- ✓ API de animaciones
- ✓ Dependency Service
- ✓ Messaging Center

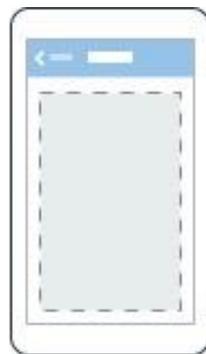
# Páginas



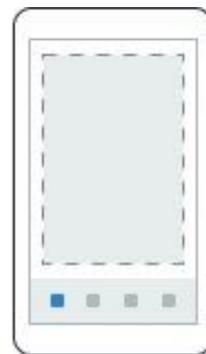
Content



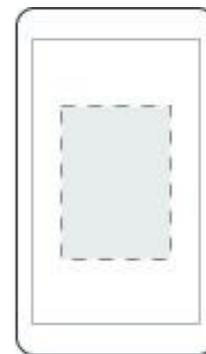
MasterDetail



Navigation

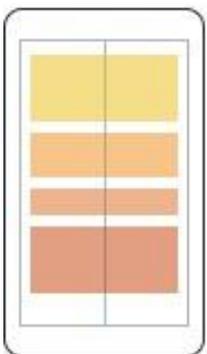


Tabbed

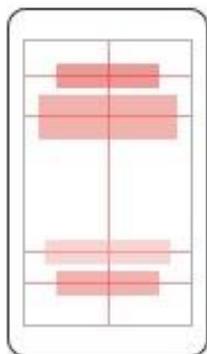


Carousel

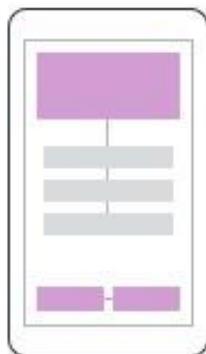
# Layouts



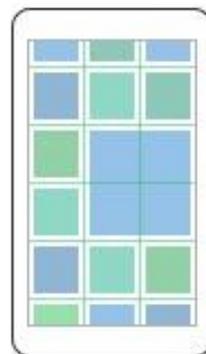
Stack



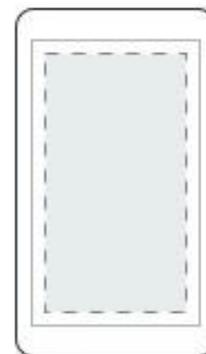
Absolute



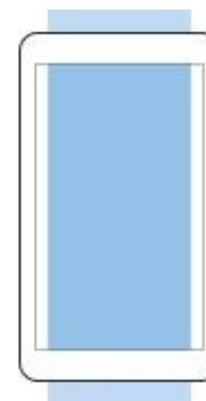
Relative



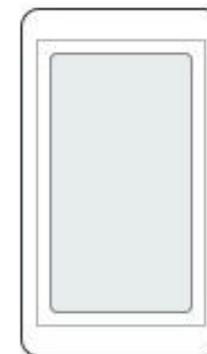
Grid



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

# XAML Previewer

The image shows a screenshot of the Xamarin Studio Business IDE. The top toolbar includes a play button, a debug button, and a simulator button. The status bar indicates the device is an iPhone 6s on iOS 9.3. The active tab is 'CoffeesPage.xaml'. The XAML code is displayed in the left pane, and the mobile app preview is shown in the right pane.

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <ContentPage
3   xmlns="http://xamarin.com/schemas/2014/forms"
4   xmlns:x="http://schemas.microsoft.com/winfx/2009/xaml"
5   xmlns:local="clr-namespace:CoffeeCups;assembly=CoffeeCups"
6   xmlns:controls="clr-namespace:ImageCircle.Forms.Plugin.Abstractions;assembly=ImageCircle.Forms.Plugin.Abstractions"
7   x:Class="CoffeeCups.CoffeesPage"
8   Title="Cups Of Coffee">
9   <AbsoluteLayout HorizontalOptions="FillAndExpand" VerticalOptions="FillAndExpand">
10     <Grid AbsoluteLayout.LayoutFlags="All"
11       AbsoluteLayout.LayoutBounds="0,0,1,1"
12       RowSpacing="0">
13       <Grid.RowDefinitions>
14         <RowDefinition Height="Auto"/>
15         <RowDefinition Height="*/>
16         <RowDefinition Height="Auto"/>
17       </Grid.RowDefinitions>
18       <StackLayout Orientation="Horizontal" Padding="16" Spacing="16" BackgroundColor="Teal">
19         <Label Text="Made at Home?"
20           TextColor="White"
21           VerticalOptions="Center"
22           HorizontalOptions="Start"
23           FontSize="16">
24           <Label Text="ADD COFFEE"
25             TextColor="White"
26             VerticalOptions="Center"
27             HorizontalOptions="End"
28             FontSize="16">
```

The mobile app preview on the right shows a teal header with a toggle switch for 'Made at Home?' and an 'ADD COFFEE' button. Below the header is a list of coffee entries, each with a timestamp (e.g., '4/26/2016 10:17:53 AM'), a time (e.g., '10:17 AM'), the text 'Made At Home', and a circular coffee icon.

Hagamos una App!

Test



# Retos



Fragmentación de dispositivos

La complejidad de las Apps

Ciclos de releases rápidos

Expectación alta de los usuarios

# En Mobile, la calidad cuesta

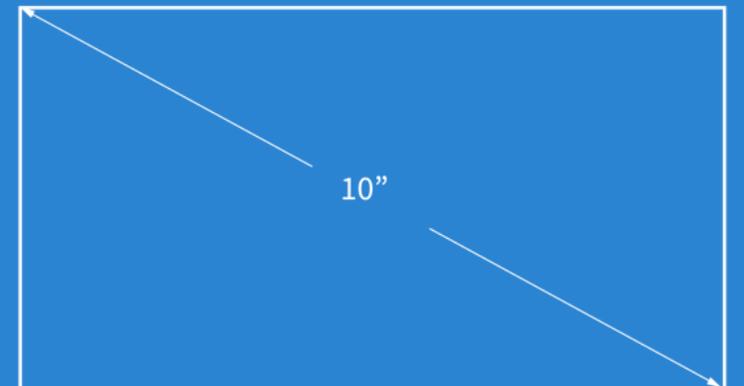
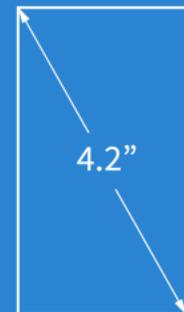
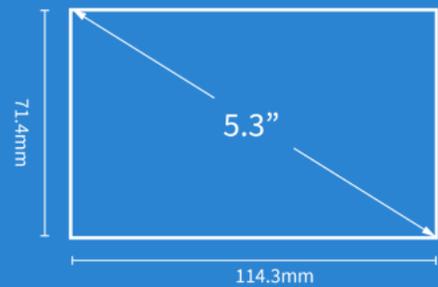
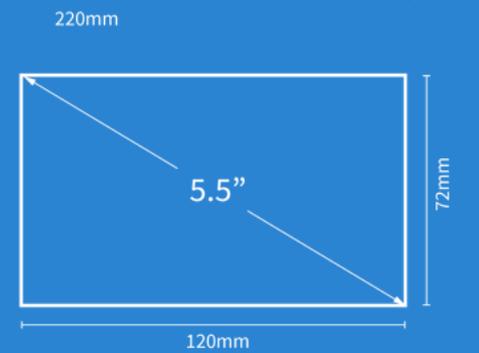
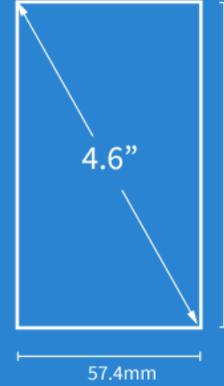
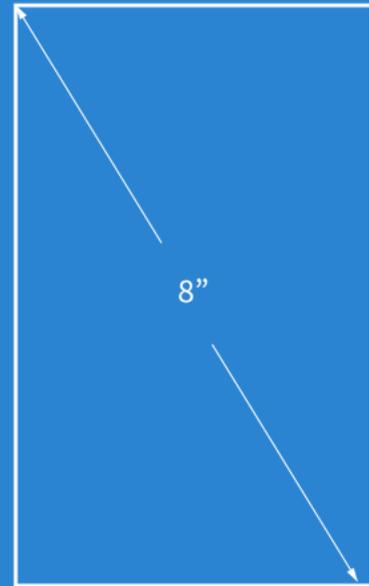
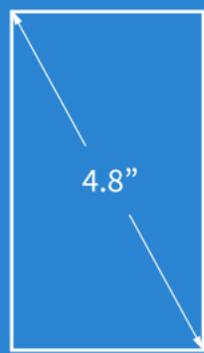
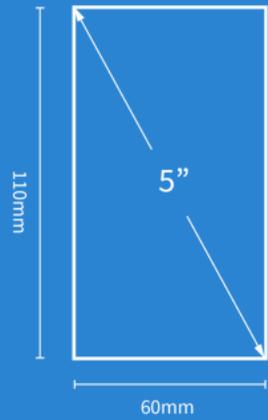
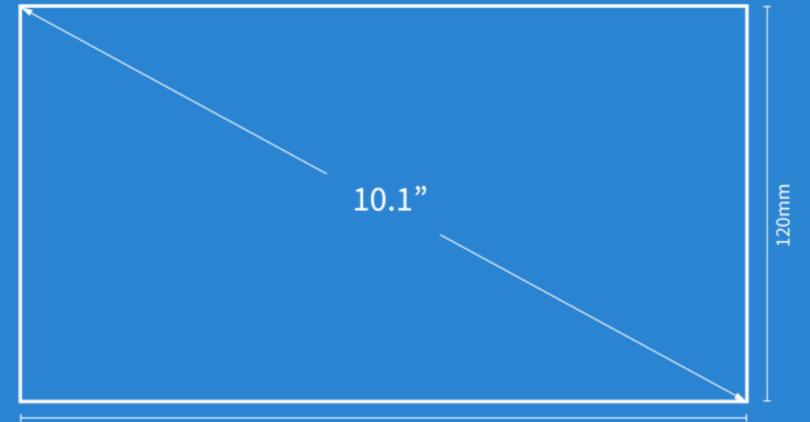
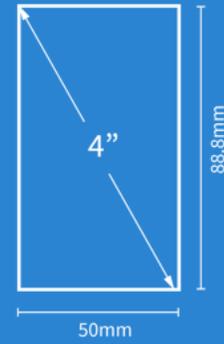
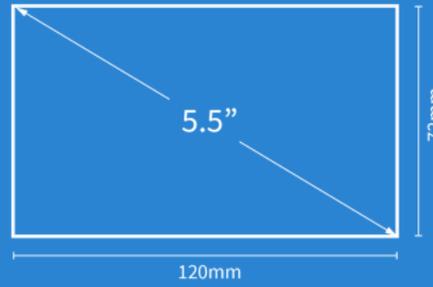
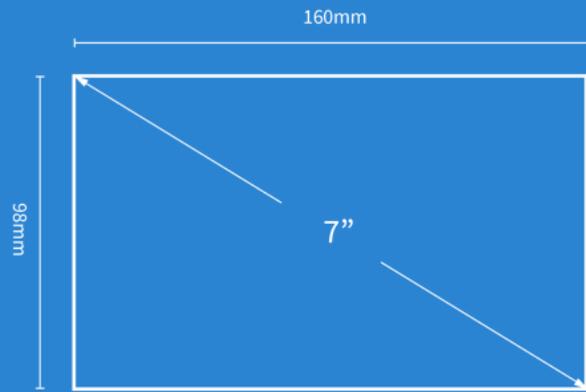


5 OS  
20 Dispositivos  
20 Lenguajes  
35 Localizaciones  
6 Tamaños de pantalla

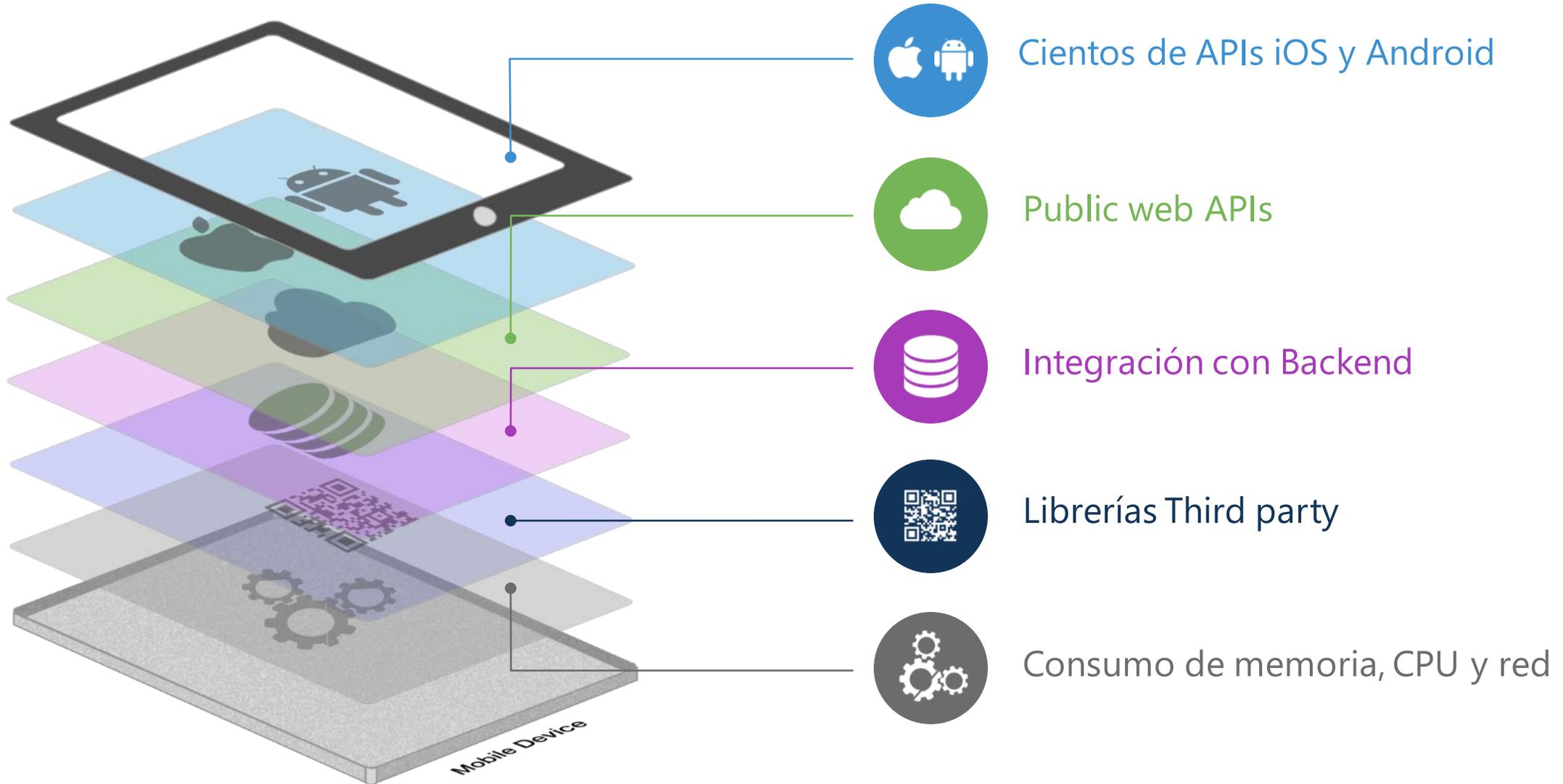


9 OS  
19K+ Dispositivos  
39 Lenguajes  
57 Localizaciones  
27 Tamaños de pantalla  
15 Fabricantes





# La complejidad de las Apps





Tap



Scroll



Swipe



Pinch



Multi Finger



Text Entry

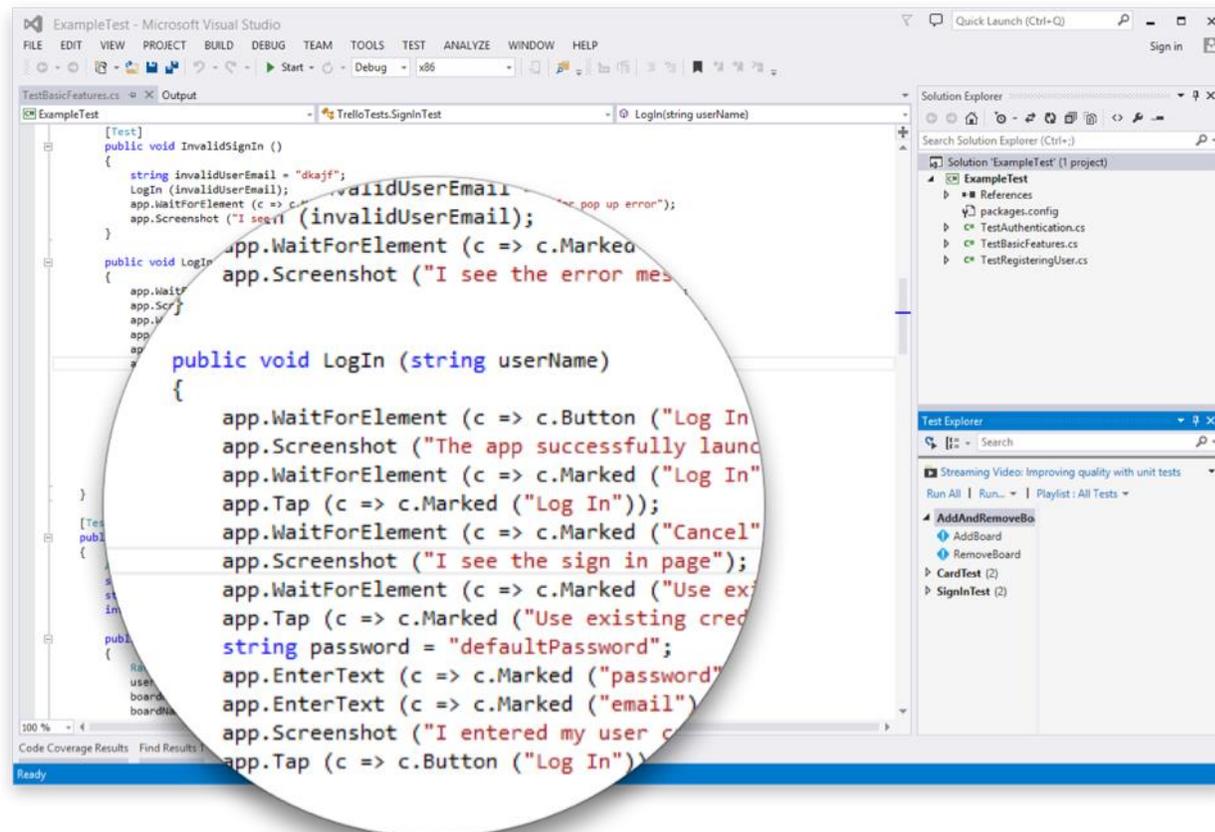


Rotation



GPS

# Introducción a Xamarin.UITest



Crea pruebas automatizadas de la interfaz de usuario con C#

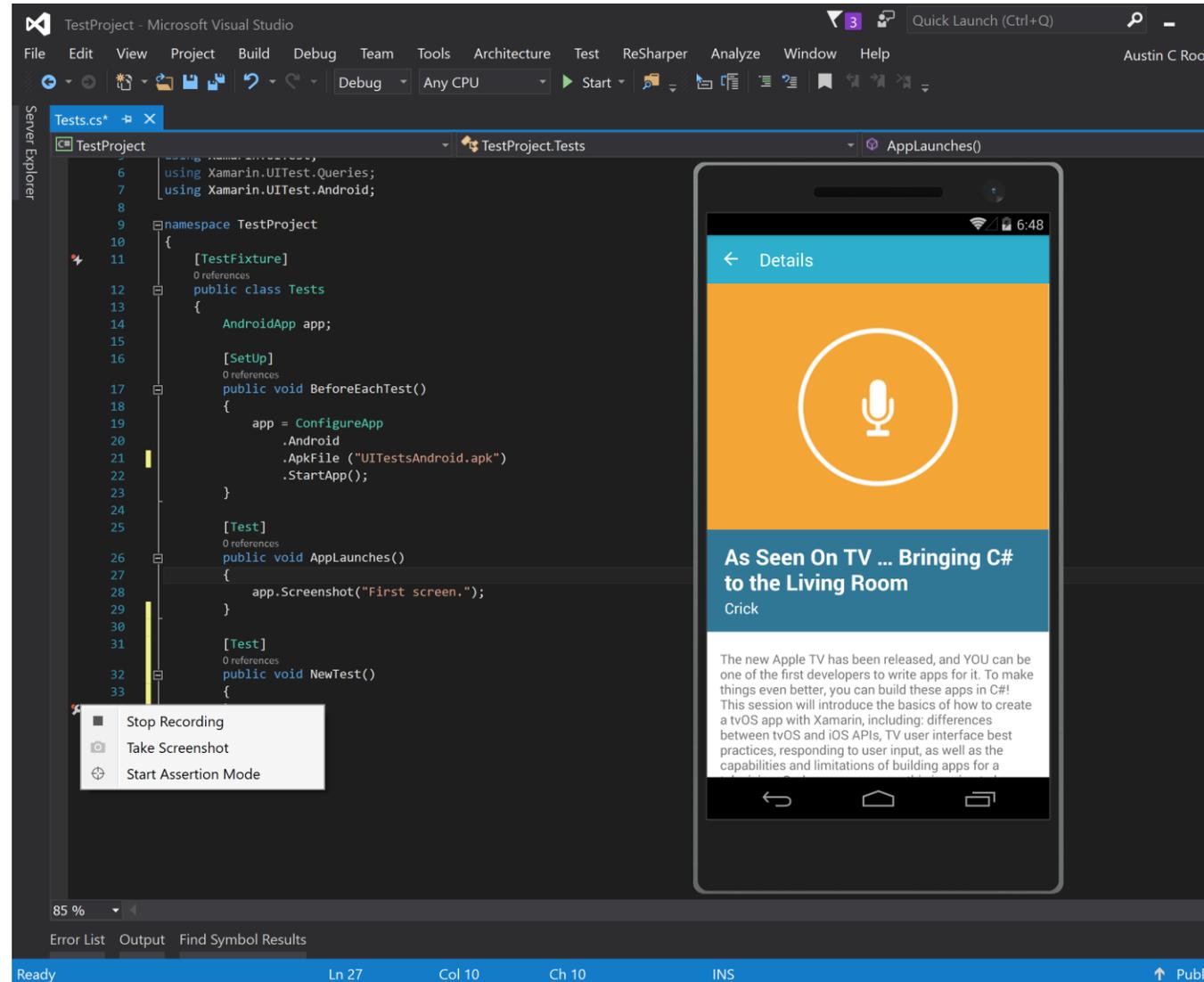
Se pueden subir a Test Cloud o correr en un dispositivo o simulador

Funciona con Visual Studio o Xamarin Studio

Funciona con cualquier tipo de App: Nativa, Híbrida, o Xamarin

# Test Recorder for Visual Studio

- Grabar UITests desde Visual Studio
- Enviar directamente a Test Cloud
- Se puede usar directamente la pantalla táctil de dispositivos Android





# Xamarin Test Cloud

xamarin.com/testcloud

The screenshot shows the Xamarin Test Cloud web interface. The browser address bar displays `https://testcloud.xamarin.com/`. The page header includes the Xamarin Test Cloud logo, the current test run details (`Flipboard > master > Sep 23, 2014 7:30:39 PM`), and a user profile for `Vinicius`. A navigation menu on the left shows the `Overview` section. The main content area displays a list of test results under the heading `ALL RESULTS`. The results include:

- `Sign in`
  - `User creates an account` (5 failures)
  - `Given I am on the start screen` (highlighted)
  - `When I go to the login screen` (5 failures)
  - `And I enter valid credentials`
  - `Then I should be logged in`
- `User signs in with Facebook` (1 success)
- `User signs in with Google` (1 success)
- `User has incorrect password` (1 success)
- `User has incorrect email` (3 failures)
- `User signs out` (1 success)

The `Reading articles` section shows 5 successful test runs:

- `User reads the cover story` (1 success)
- `User reads the News section` (1 success)
- `User reads the Technology section` (1 success)
- `User reads Twitter articles` (1 success)
- `User adds a section` (1 success)
- `User comments on an article` (3 failures)

The main content area displays a grid of 15 device screenshots, each showing the Flipboard app interface. The devices and their specifications are:

- LG Nexus 5 (Android 4.4.2)
- Samsung Galaxy S II (Android 4.1.2)
- Samsung Galaxy S III (Android 4.1.2)
- Samsung Galaxy S Duos (Android 4.0.4)
- Samsung Galaxy Core (Android 4.1.2)
- Samsung Galaxy Grand Duos (Android 4.2.2)
- Samsung Galaxy S Duos 2 (Android 4.2.2)
- LG Nexus 4 (Android 4.4.2)
- HTC One (Android 4.4.2)
- Samsung Galaxy Note (Android 4.1.2)

# Build



# Visual Studio Team Services

- Repositorio
- Tareas
- Build
- Test
- Release

The screenshot displays the Visual Studio Team Services interface for the 'MyDriving' project. The top navigation bar includes 'HOME', 'CODE', 'WORK', 'BUILD', 'TEST', and 'RELEASE'. The 'Overview' page is active, showing a 'Welcome' message and a '+ ' icon.

The dashboard is divided into several sections:

- MyDriving.Xamarin.iOS:** Shows a bar chart with a single green bar and a status 'Completed 5/10/2016' with a green checkmark.
- MyDriving.Xamarin.Android:** Shows a bar chart with four green bars and a status 'Completed 5/10/2016' with a green checkmark.
- MyDriving.Xamarin.UWP:** Shows a bar chart with two green bars and a status 'Completed 5/10/2016' with a green checkmark.
- Xamarin Test Cloud:** Displays test results for 'Mar 21, 2016 1:05:53 AM' with 'MyDriving Version: 1.0.0.36 (08)'. It shows two progress indicators: '0/13 tests failed' and '0/22 devices failed'. Below this, a table summarizes test metrics: Total Device Time (620 min), Run Time (46 min), Devices (22), OS Versions (12), Peak Memory (495.05 MB), and App Size (25.66 MB). A grid of 18 device icons is shown, including Samsung Galaxy S5, Samsung Galaxy Tab P, Samsung Galaxy Grand, Samsung Galaxy S4 ID, Samsung Galaxy S3, Samsung Galaxy Note, Samsung Galaxy Grand, Huawei Nexus 6P, LG Nexus 5, HTC One A8, Asus Google Nexus 7 L, and Samsung Galaxy Note.
- HockeyApp iOS:** Provides links for 'Overview', 'Download', and 'Crash reports'.
- HockeyApp Android:** Provides links for 'Overview', 'Download', and 'Crash reports'.
- HockeyApp UWP:** Provides links for 'Overview', 'Download', and 'Crash reports'.

# Visual Studio Team Services - Tareas

The screenshot shows the Visual Studio Team Services interface for the 'MyDriving' team. The top navigation bar includes 'HOME', 'CODE', 'WORK', 'BUILD', 'TEST', and 'RELEASE'. The 'WORK' section is active, showing 'Backlogs' and 'Queries'. A notification states: 'You can now add more backlog levels to this team. Access this setting through the settings dialog.' The left sidebar shows 'Features' and 'Backlog items' (selected). The main area displays a 'Backlog items' board with a 'New' button and a 'Create query' option. A modal window for adding a new item is open, showing 'Type: Product Backlog Item' and a 'Title' field. Below the modal is a table of backlog items.

Order	Work Item Type	Title	State	Effort	Value Area	Iteration Path	Tags
1	Bug	Fix NullReferenceException in MyTrips.Services.OBDDataProcessor+...	New		Business	MyDriving	
2	Product Backlog...	Use Release Management to deploy against multiple HockeyApp co...	New		Business	MyDriving	
3	Product Backlog...	Update Xamarin Test Cloud for Android builds with correct devices ...	New		Business	MyDriving	
4	Bug	Fix IllegalArgumentException in com.squareup.picasso.Picasso.load...	New		Business	MyDriving	
5	Bug	Fix crash in MyTrips.Droid.Services.GeolocationHelper.get_LocationS...	New		Business	MyDriving	
6	Bug	Fix ArgumentException in ObdLibAndroid.ObdWrapper+ <Disconne...	New		Business	MyDriving	
7	Bug	Fix IllegalArgumentException in android.view.WindowManagerGlob...	New		Business	MyDriving	
8	Bug	Fix IllegalArgumentException in com.squareup.picasso.Picasso.load...	New		Business	MyDriving	
9	Bug	Fix SQLiteException in Microsoft.WindowsAzure.MobileServices.SQL...	New		Business	MyDriving	
10	Bug	Fix NotImplementedException in Microsoft.Azure.Devices.Client.Dev...	New		Business	MyDriving	
11	Bug	Fix NullReferenceException in MyTrips.Services.OBDDataProcessor+...	New		Business	MyDriving	
12	Bug	Fix NullReferenceException in ObdLibAndroid.ObdWrapper+ <Init>...	New		Business	MyDriving	
13	Bug	Fix IllegalArgumentException in md511b398f68db4d0ef3494f1d176...	New		Business	MyDriving	
14	Bug	Fix ActivityNotFoundException in android.app.Instrumentation.chec...	New		Business	MyDriving	
15	Bug	Fix NullPointerException in com.google.android.gms.common.inter...	New		Business	MyDriving	
16	Bug	Fix crash in Windows.Devices.Bluetooth.Rfcomm.RfcommDeviceServ...	New		Business	MyDriving	
17	Bug	Fix crash in Acr.UserDialogs.UserDialogsImpl.<>c__DisplayClass2_0...	New		Business	MyDriving	
18	Bug	Fix crash in System.Runtime.ExceptionServices.ExceptionDispatchInf...	New		Business	MyDriving	
19	Bug	Fix crash in Windows.UI.Xaml.Controls.ContentDialog.ShowAsync	New		Business	MyDriving	
20	Bug	Fix (Exception in Windows.Networking.Sockets.StreamSocket.Cance...	New		Business	MyDriving	
21	Bug	Fix (Exception in Windows.UI.Desktop.Messages.Dialogs.Chats.A...	New		Business	MyDriving	

# Visual Studio Team Services - Build

The screenshot displays the Visual Studio Team Services (VSTS) Build interface. At the top, the navigation bar shows 'Team Services / MyDriving' and the user 'James Montemagno'. The main navigation includes 'HOME', 'CODE', 'WORK', 'BUILD', 'TEST', and 'RELEASE'. A search bar for work items is located in the top right.

The left sidebar, titled 'Explorer', shows a tree view of build definitions. Under 'My favorites', there are three items: 'MyDriving.Xamarin.Android', 'MyDriving.Xamarin.iOS', and 'MyDriving.Xamarin.UWP', all marked as 'Completed 5 hours ago'. Under 'Team favorites', there are no items. Under 'Build definitions', there are 15 items, with 'MyDriving.Xamarin.Android-Feature' selected. Under 'XAML definitions', there are no items.

The main content area is titled 'Definitions / MyDriving.Xamarin.Android-Feature | Builds'. It has tabs for 'Build', 'Options', 'Repository', 'Variables', 'Triggers', 'General', 'Retention', and 'History'. Below the tabs are buttons for 'Save', 'Queue build...', and 'Undo'. A '+ Add build step...' button is visible.

The build steps list includes:

- Replace tokens for BingMaps (Replace Tokens) - This step is highlighted in a grey box.
- NuGet restore src/MobileApps/MyDriving.XS.sln (NuGet Installer)
- Update Version Name (Version Assemblies)
- Update Version Code (Version Assemblies)
- Download keystore (Command Line)
- Activate Xamarin license (Xamarin License)
- Build and Sign Android Project (Xamarin.Android)
- Deactivate Xamarin license (Xamarin License)
- Build tests (MSBuild)
- Test in Xamarin Test Cloud (Xamarin Test Cloud)
- Copy Files to: \$(build.artifactstagingdirectory) (Copy Files)
- Publish Artifact: drop (Publish Build Artifacts)

The right sidebar shows the configuration for the selected 'Replace tokens for BingMaps' step. It has a title 'Replace tokens for BingMaps' and a pencil icon. The configuration includes:

- Source Path: src/MobileApps/MyDriving/MyDriving.Utils/
- Target File Pattern: Logger.cs
- Advanced section: Control Options
- Control Options: Enabled (checked), Continue on error (checked), Always run (unchecked)
- More Information link

# Visual Studio Team Services - Test

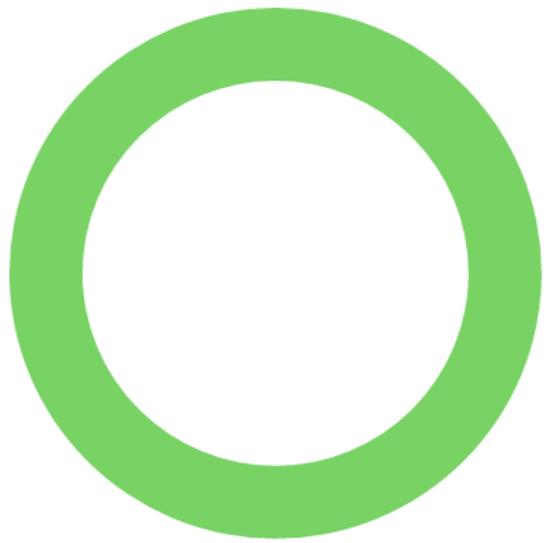
- Recent Test Cloud test runs
- MyDriving
- MyDriving

Xamarin Test Cloud API Key  Save API Key Help with Xamarin Test Cloud

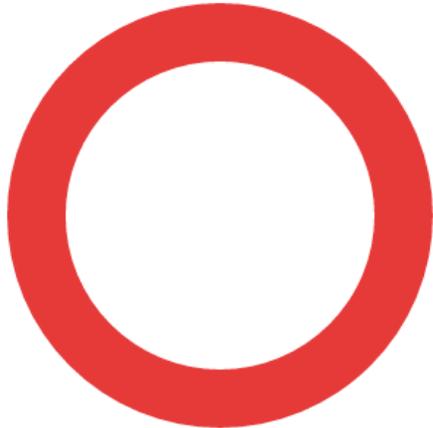
MyDriving  
2016-05-12T18:01:22.591Z

**Tests** [View Xamarin Test Cloud for detailed reports](#)

**Devices** [View Xamarin Test Cloud for detailed reports](#)



0/12  
tests failed



0/19<sup>devices</sup>

- Current Trip Tests(iOS)**
  - Record Trip Test
- Login Tests(iOS)**
  - Skip Authentication Test

- 12 / 12 Apple iPhone 6s - ios 9.0.2
- 12 / 12 Apple iPhone 6s Plus - ios 9.1
- 12 / 12 Apple iPhone 6s Plus - ios 9.1

# Visual Studio Team Services - Release

Team Services / MyDriving James Montemagno

HOME CODE WORK BUILD TEST **RELEASE**

Explorer

Go here for help getting started with Release Management.

Definition: MyDriving.Xamarin.Android | Releases

Environments Artifacts Configuration Triggers General History

Save Release

Search release definitions...

Release Definitions

- All release definitions
- MyDriving.Services
- MyDriving.Xamarin.Android
- MyDriving.Xamarin.iOS
- MyDriving.Xamarin.UWP

Add environment

- Alpha Testers** 1 / 1 tasks enabled
- Beta Testers** 0 / 1 tasks enabled
- Push to Store** 0 tasks

Add tasks

- HockeyApp Deploy MyTrips to HockeyApp

**Deploy MyTrips to HockeyApp**

HockeyApp Connection: Build HockeyApp Manage

App ID: \$(HockeyAppId)

Binary File Path: \$(System.DefaultWorkingDirectory)\MyDriving.Xamarin.Android\drop\bin\release\com.microsoft.mydriving.apk

Symbols File Path:

Native Library File Path:

Release Notes (File):

Release Notes: Building IoT or Mobile solutions are fun and exciting. This year for Build, we wanted to show the amazing scenarios that can come together when these two are combined. So, we went and developed a sample

Publish?

Mandatory?

Notify Users?

**Download Restrictions**

Tag(s):

Team(s):

User(s):

**Control Options**

Enabled

Continue on error

Always run

Replace with markdown to show in help

# Distribuir & Monitorear



Distribute



Monitor

# HockeyApp

- Mejora tus apps con monitorización Real-time.
- Reportes de errores de código native y manejado



# HockeyApp



MyDriving iOS | Beta

Version 1.0



← Crash Group Overview **Crash Logs 134** Bug Tracker

Add Annotation

Status: open

## - [DelegatePage ThrowIndexOutOfBoundsException(System.Object se...

System.IndexOutOfRangeException: Index was outside the bounds of the array.

DelegatePage.cs, line 105

First Occurred  
**22 Apr 2016, 20:20**

Last Occurred  
**24 Apr 2016, 20:40**

Count  
**134**

Jailbroken  
**0%**

### Crashes per Day

<b>89</b>	<b>134</b>	<b>134</b>
Last 24 Hours	Last 7 Days	Last 30 Days

### Impacted Users per Day

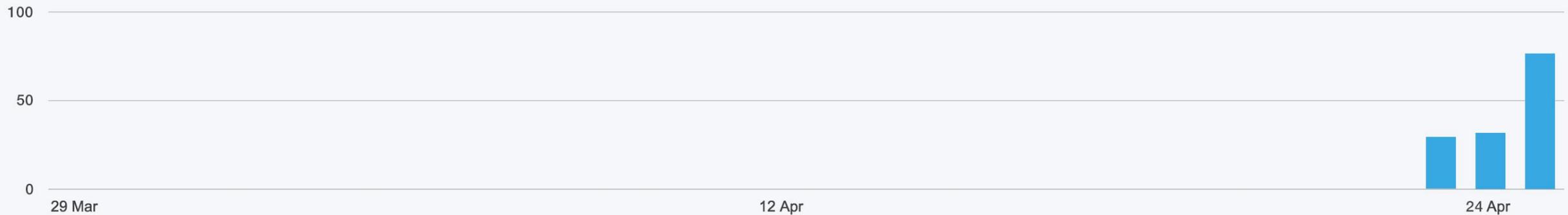
<b>89</b>	<b>119</b>	<b>119</b>
Last 24 Hours	Last 7 Days	Last 30 Days

### Top Affected OS's

**9.3.1**  
Top Affected OS

### Top Affected Devices

**iPhone 6s**  
Top Affected Device



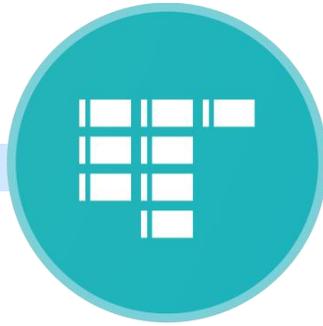
# Xamarin – Solución móvil completa



Desarrollo



Test



Build



Distribuir



Monitorear

# Gracias! Preguntas?

Javier Suárez Ruiz  
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# ¡Gracias!

## ¿Qué te ha parecido el workshop de Xamarin?

Sólo te pedimos 2 minutos o menos para responder 3 preguntas

Tu opinión nos importa. 



[pue.es/e-wxamarin](http://pue.es/e-wxamarin)