

ArcGIS Runtime SDK for .NET: Building Apps

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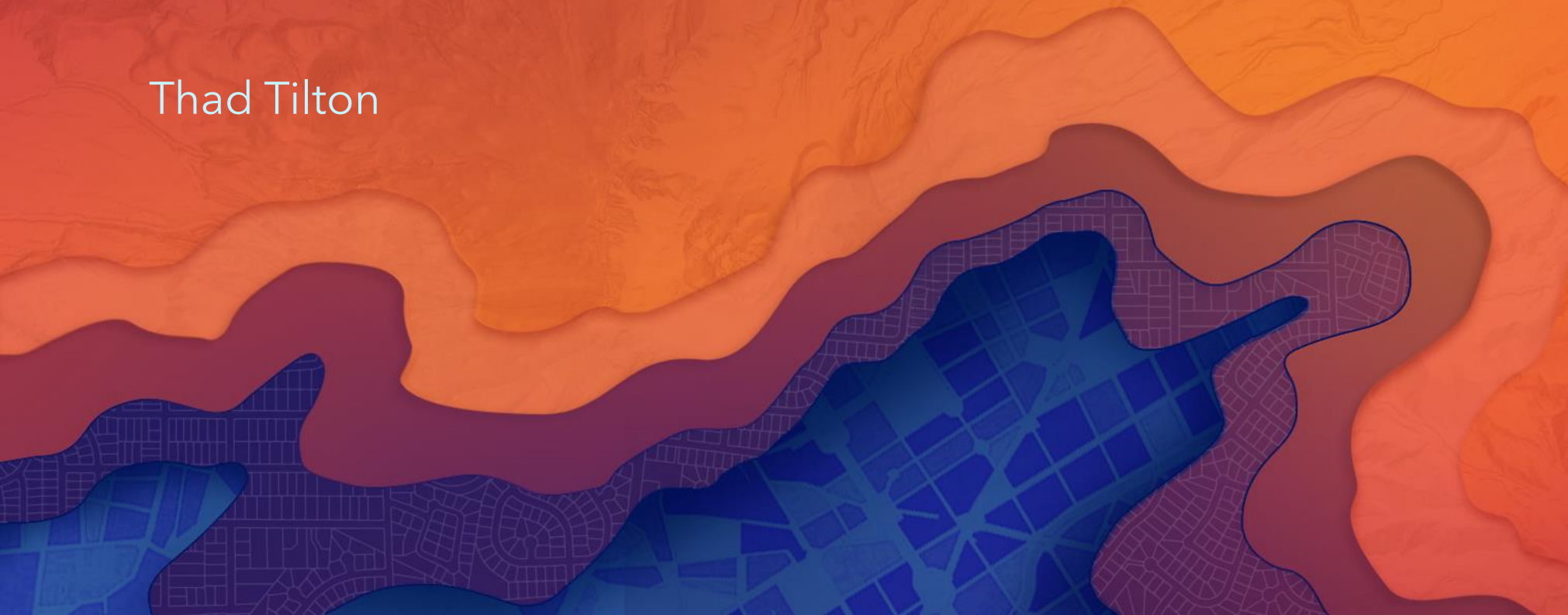
Agenda

ArcGIS Runtime SDK for .NET: Building Apps

- ArcGIS Runtime SDK Overview
 - Architecture
 - Functionality
- Getting started with ArcGIS Runtime SDK for .NET
 - SDK tools and resources
 - Build your first mapping app
- What is Universal Windows Platform (UWP)?
- What is Xamarin?
- Developing cross platform apps

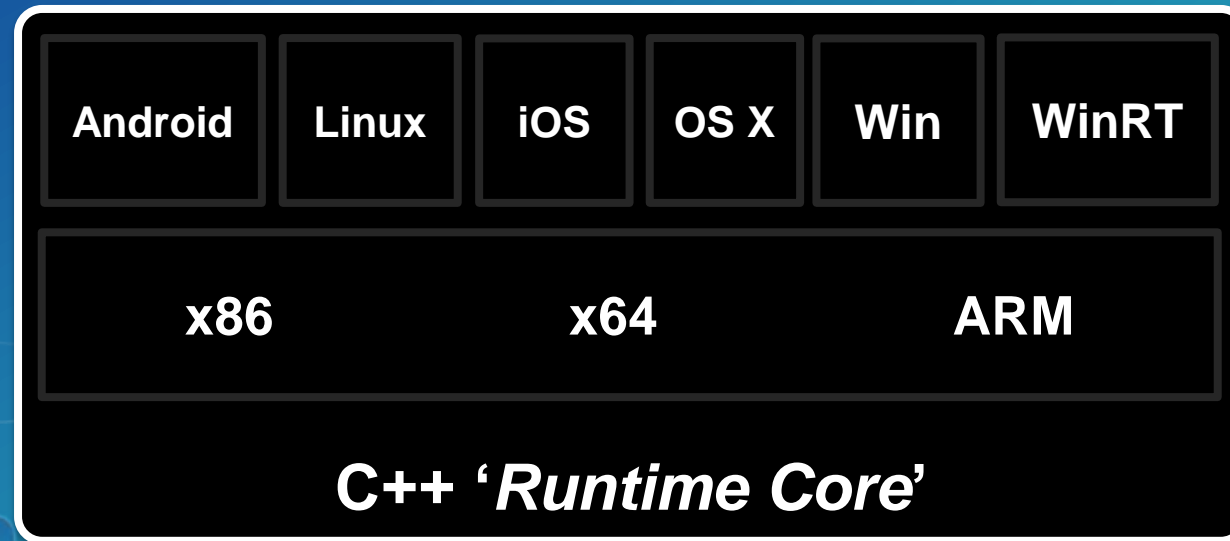
ArcGIS Runtime SDK Overview

Thad Tilton



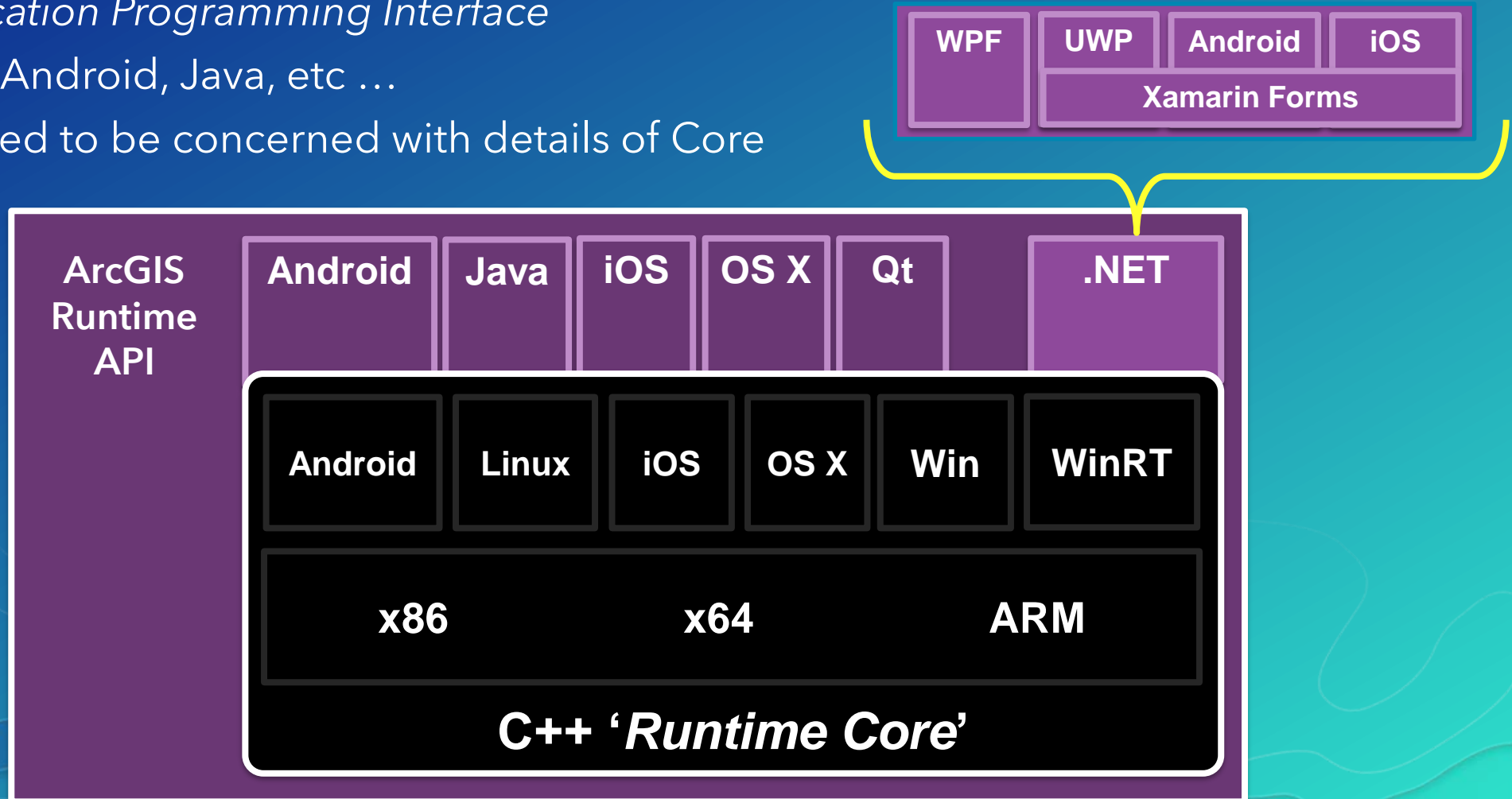
ArcGIS Runtime overview

- Runtime Core (C++)
 - Small footprint, high performance
 - Core functionality: Display, geometry, data access, ...
 - Compiled for multiple platforms and architectures

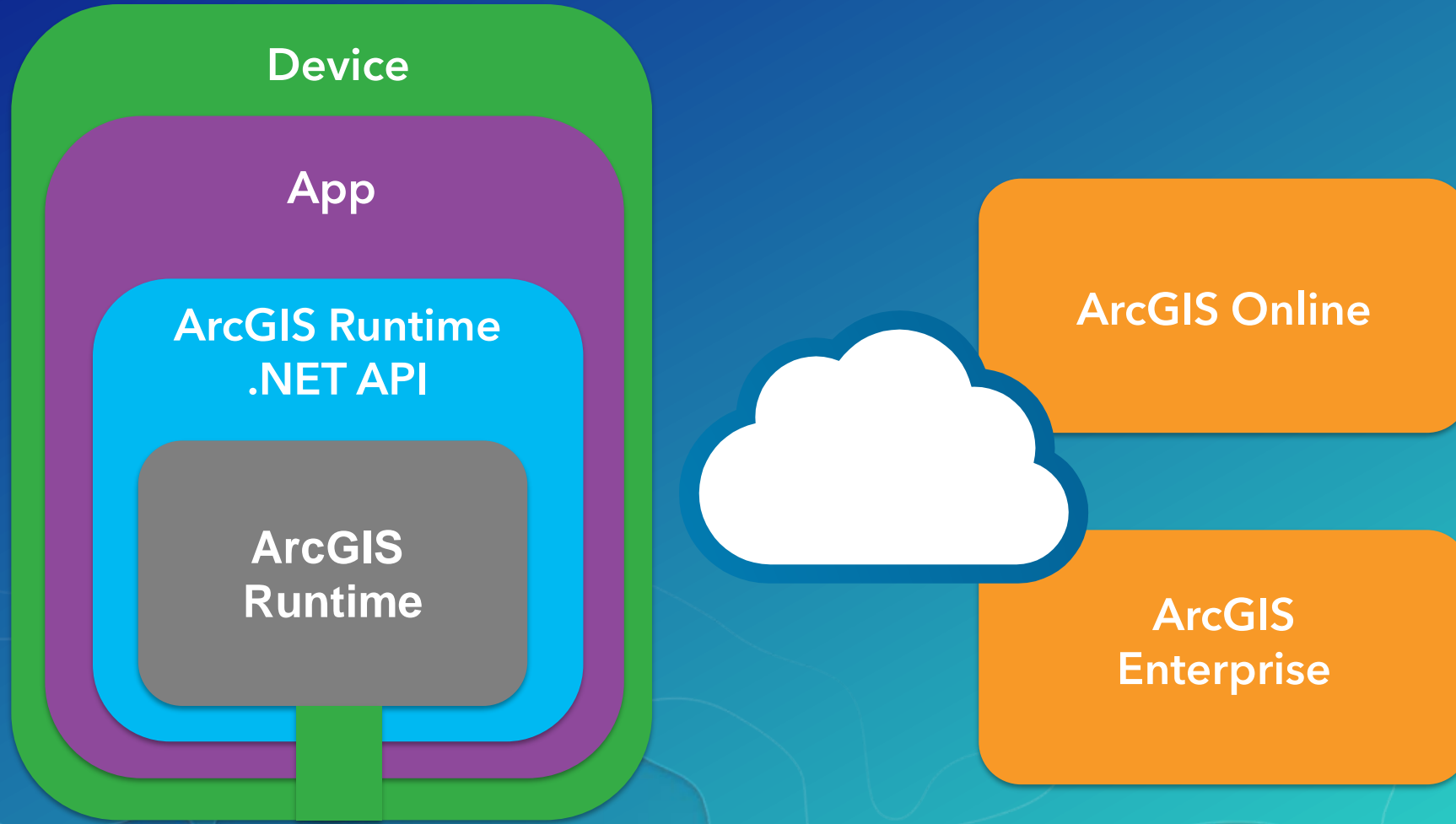


ArcGIS Runtime overview

- Access core functionality via a native API for each platform:
 - *Application Programming Interface*
 - .NET, Android, Java, etc ...
 - No need to be concerned with details of Core



Overview



SDK Highlights

- **High-performance 2D and 3D mapping**
- Perform geometric operations locally
- Task-based asynchronous pattern
- Work offline with local data

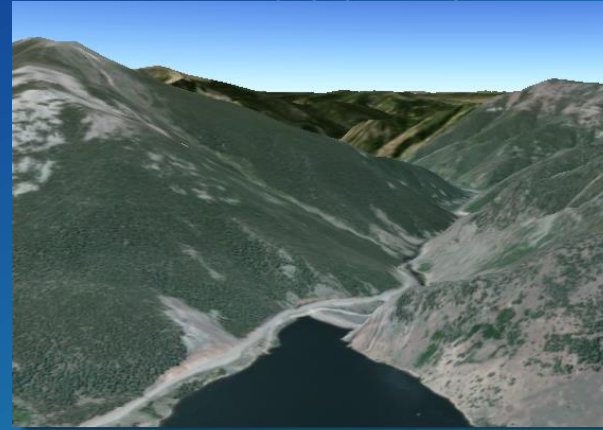
Read mobile map packages (.mmpk) created with ArcGIS Pro

Take web maps offline

Feature service editing and sync

Geocode and Routing

- Work with device sensors
- **Integration with Portal and ArcGIS Online**
 - Load, edit, and save web maps
- MVVM friendly



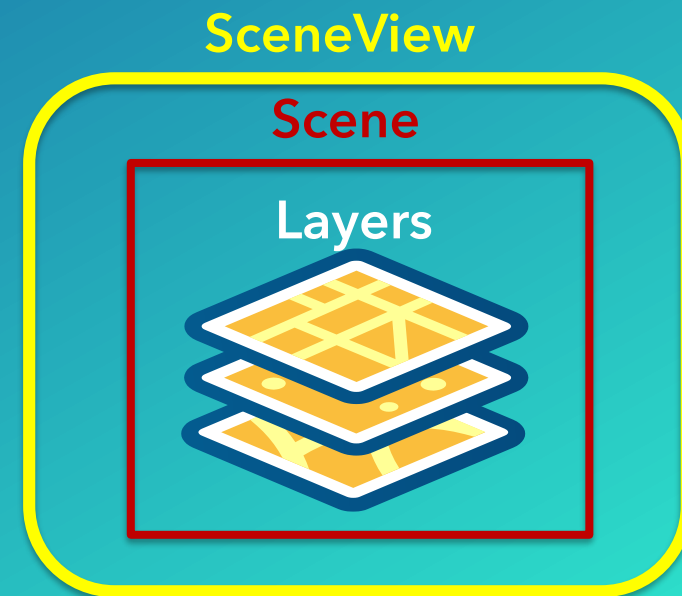
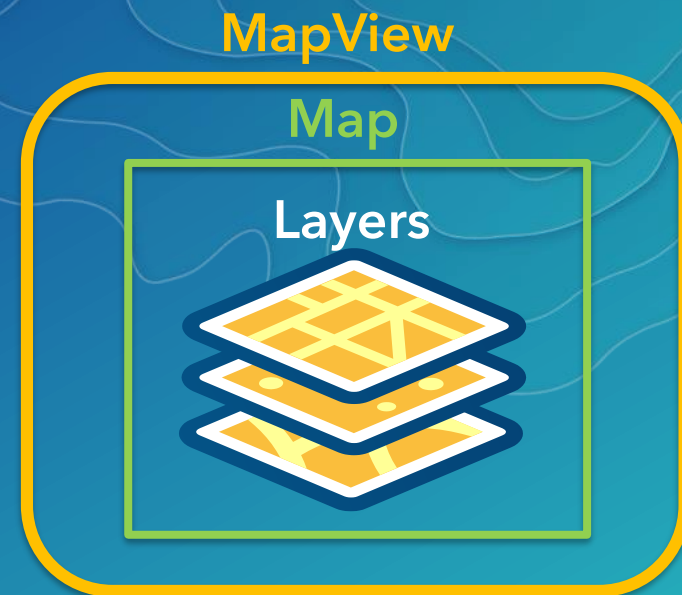
New with 100.1

- Offline Map Task
- Related tables
- Client-side labeling
- Enhanced network analysis capability
 - Service areas
 - Closest facilities
- Heatmap renderer
- Support for StreetMap Premium map packages
- Additional layer types
 - Image Service
 - Dynamic sublayers from an ArcGIS Map Service
 - OpenStreetMap
 - Bing
- Scene view camera controllers
 - Follow graphics
 - Orbit a location



ArcGIS Runtime 101: Display maps and layers

- GeoView control: MapView and SceneView
 - UI container for a single Map (2D) or Scene (3D)
 - Manages a collection of GraphicsOverlays
 - Events for user interaction
 - Facilitates MVVM design
- Map / Scene
 - Container for a collection of layers
- Layer
 - Display base maps or geographic features
 - Various types





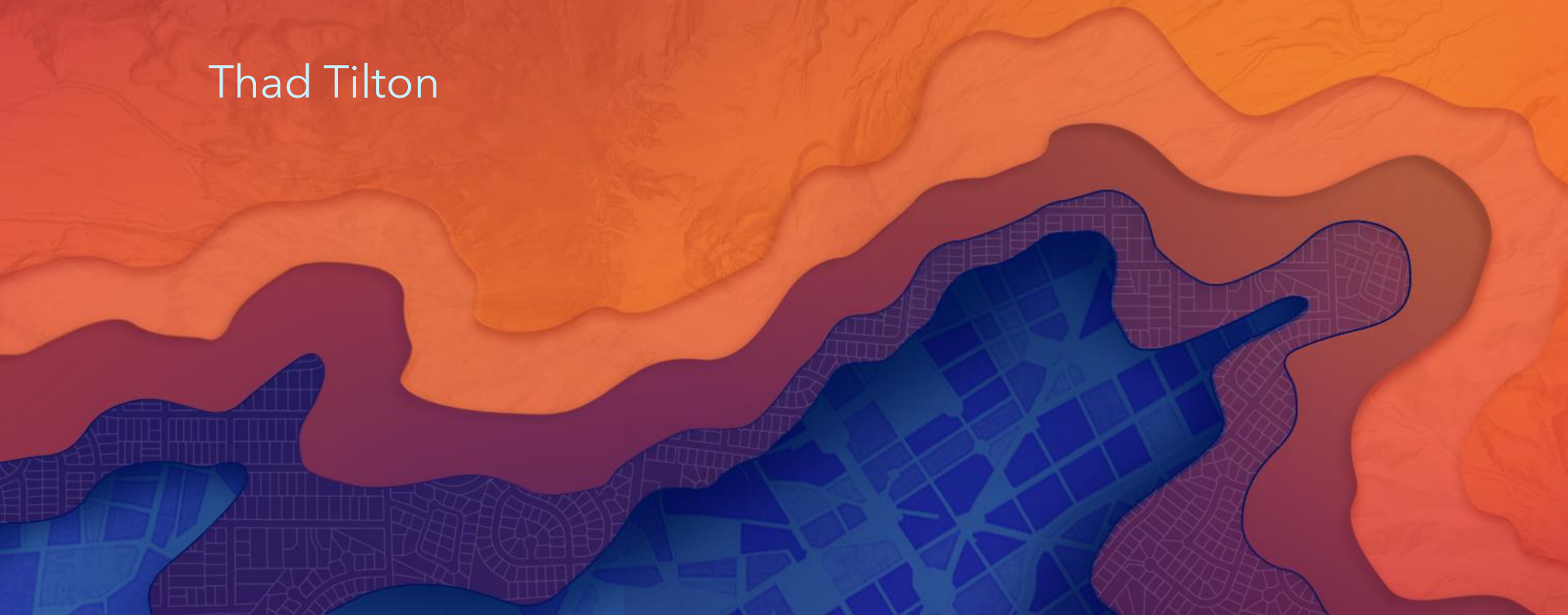
Demo:

- Follow a graphic
- Create a simple app

Thad Tilton

Getting started with ArcGIS Runtime SDK for .NET

Thad Tilton



ArcGIS Runtime SDK for .NET

- *Software Development Kit* is a set of tools for developers
 - **Visual Studio templates:** For all supported platforms
 - **API NuGet packages:** For each platform
 - **Documentation:** Developers Guide, API reference, Samples
 - **Samples viewer:** Source code in GitHub repository
 - **Toolkit:** Open source GitHub repository
 - **GeoNet:** Discussion, blogs



Where to start?

- Developers site

<https://developers.arcgis.com/>

Sign up for free developer account

Download APIs

Credits for dev and testing

- GitHub repos

<https://github.com/Esri/>

Toolkit

Samples

Demos

Example Apps

- GeoNet

<https://geonet.esri.com/>

Blogs, discussions, and more

The image shows two overlapping screenshots. The background screenshot is a GitHub repository page for 'arcgis-runtime-samples-dotnet'. It lists three repositories: 'arcgis-runtime-samples-dotnet' (Sample code for ArcGIS Runtime SDK for .NET), 'arcgis-toolkit-dotnet' (Toolkit for the ArcGIS Runtime SDK for .NET), and 'arcgis-runtime-demos-dotnet' (Demo applications provided by the ArcGIS Runtime SDK for .NET Team). The foreground screenshot is the ArcGIS Runtime SDK for .NET download page, version 100.1.0, dated June 2017. It features buttons for 'Download SDK' and 'Install the SDK', and a navigation bar with links to Home, Guide, API Reference, Sample Code, and Forum.

To GeoNet ...

System requirements

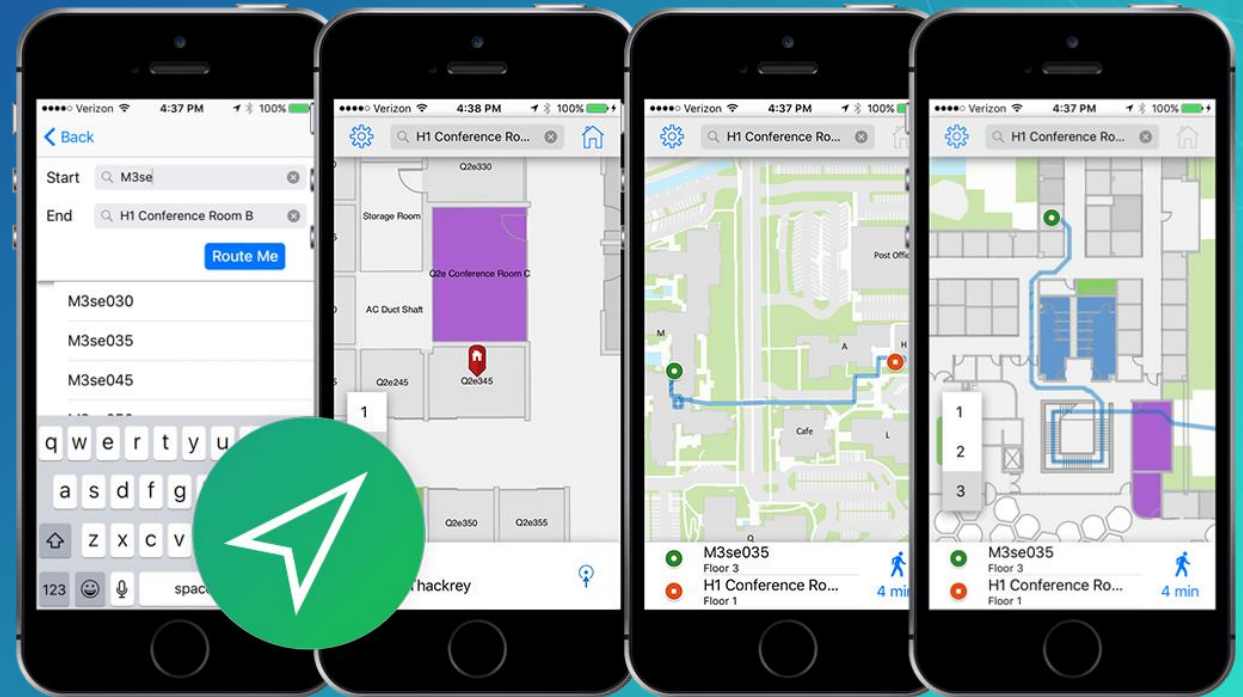
	Windows 7 SP1	Windows 8.1	Windows 10	macOS 10.12
IDE	Visual Studio	Visual Studio	Visual Studio	Visual Studio for Mac
WPF	Yes	Yes	Yes	No
UWP	No	No	Yes	No
Android	Yes	Yes	Yes	Yes
iOS	Yes	Yes	Yes	Yes
Forms	No	Android, iOS	Android, iOS, UWP	Android, iOS

- All iOS development requires a Mac computer to act as a build host
- Xamarin development requires VS 2015 Update 3, VS 2017, or VS 2017 for Mac

Runtime Example Apps

More than just sample code

- Real world apps based on use cases collected from users
- Complete working apps and getting started data
- Open sourced on GitHub (Apache 2.0 license)
- Supporting documentation (code, data creation, app workflows, customization)



Runtime Example Apps

More than just sample code

- Current apps:

- .NET SDK:

- Indoor Routing (iOS)
 - Offline Mapbook (Windows)

- Android SDK:

- Maps App, Nearby, Ecological Marine Unit, Offline Mapbook

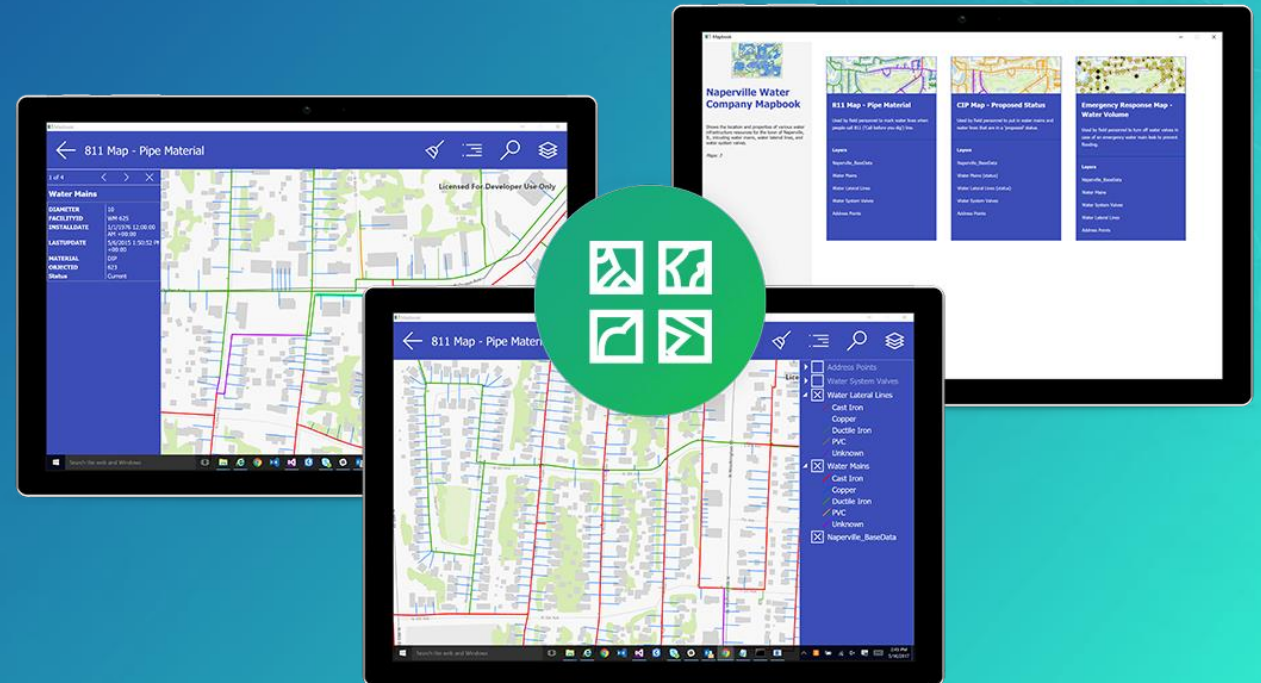
- Future apps:

- .NET SDK:

- Maps App (iOS, Android, and Windows)
 - Indoor Routing (Android and Windows)

- Android SDK: Tree Survey

- iOS SDK: Maps App



Runtime Example Apps

More than just sample code

<https://developers.arcgis.com/example-apps/>

Example Apps Demonstrating the ArcGIS Platform

Learn about the ArcGIS Platform from these complete example applications.



Indoor Routing Xamarin

Find your way around indoor spaces with this iOS app built with the ArcGIS Runtime SDK.

[Read More About this App](#)



Ecological Marine Unit Android

Explore our ocean ecosystems with Ecological Marine Units, or EMUs using the ArcGIS Runtime SDK!

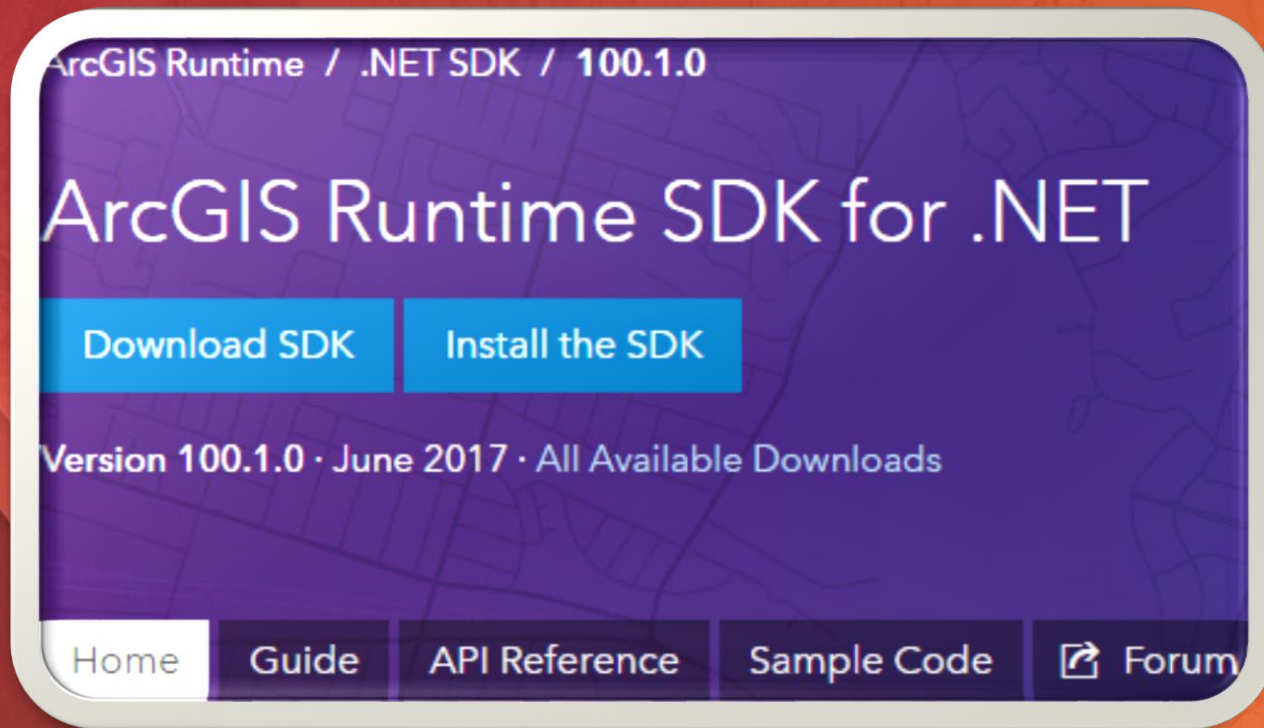
[Read More About this App](#)



Maps App Android

Your organisation's mapping app built with the ArcGIS Runtime SDK.

[Read More About this App](#)



Demo: SDK tools and resources

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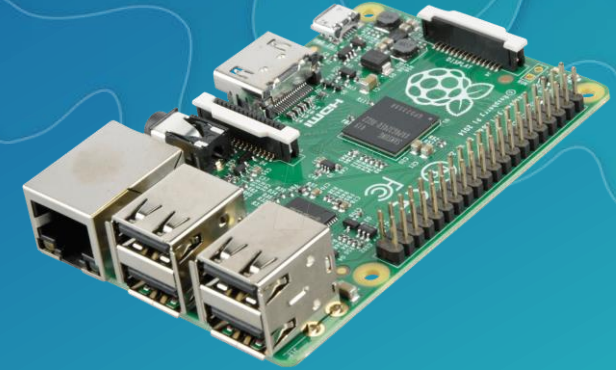
Universal Windows Platform (UWP)

Rich Zwaap

What is the Universal Windows Platform (UWP) ?

One app to rule them all (or more importantly one ArcGIS Runtime SDK to rule them all!)

- Only one Windows 10 operating system (AKA "One Core")
- Several "Device Families"



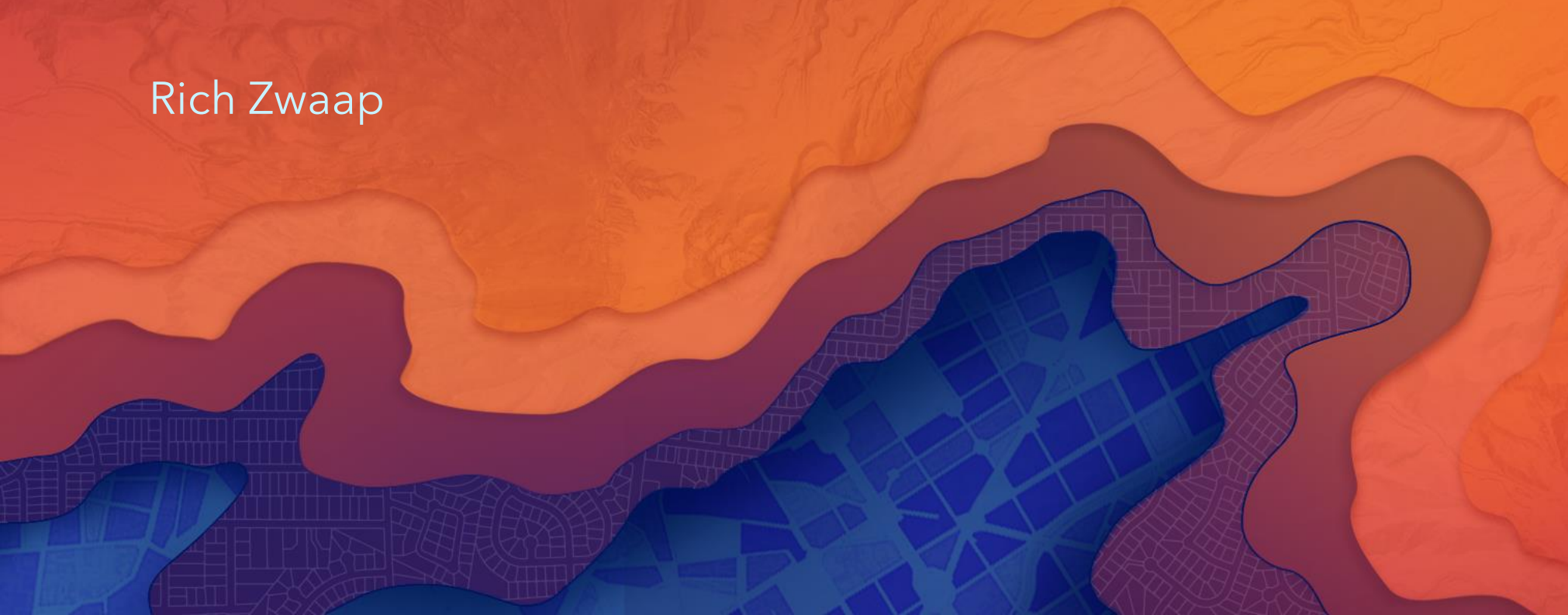


Demo: UWP

Rich Zwaap

What is Xamarin?

Rich Zwaap



What is Xamarin?

- Xamarin

- Based on the Mono runtime*

- Compiles into a native Android or iOS app

- Exposes all Android and iOS APIs

- Xamarin is not a cross-platform SDK. It's a cross-platform language (C#)

- Most of .NET's core libraries are shareable code

- UI code is very platform specific

- Device code not shareable (Bluetooth, GPS, sensors etc)

- Abstraction-libraries exist that simplifies this

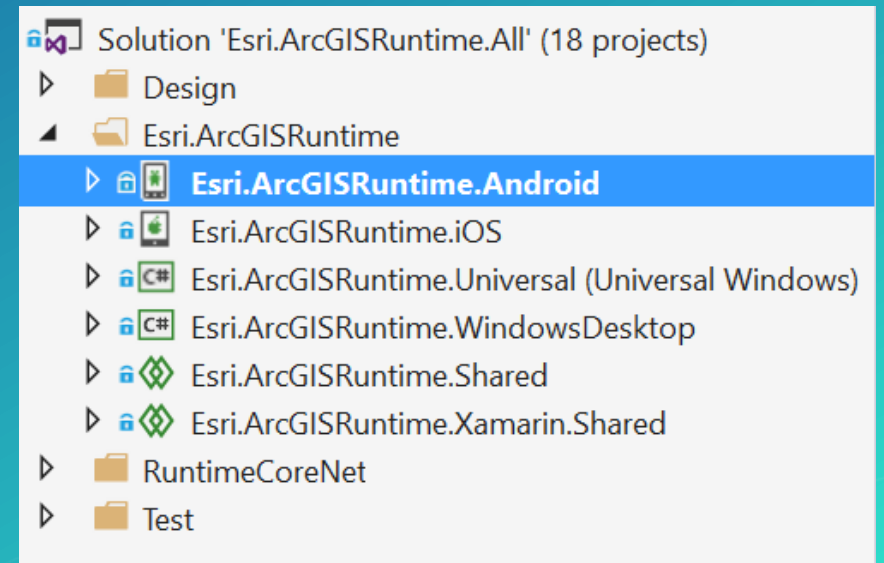
- Xamarin.Forms: Cross-platform UI framework which supports XAML

- Lots of nuget-libraries

The ArcGIS Runtime for Xamarin

Why code-sharing works

- One Common API surface
 - Same API on Windows Desktop, UWP, iOS, and Android
 - Same underlying code, same functionality
 - Most code becomes shareable cross-platform
- Streamlined Development
 - Changes inherently apply to all platforms
 - All platforms remain in sync
- Tooling in Visual Studio
 - Shared projects



Xamarin options

Two primary approaches

- Xamarin Forms: lots of shared code, less control
 - Use XAML to define the UI
 - Rendered appropriately for each platform
 - 'Lowest common denominator' UI elements
 - Basic cross-platform functionality
- Xamarin Native: less shared code, more control
 - Customize UIs with platform-specific elements and designers
 - More platform-specific control
 - Native behavior for user interactions

Which one to pick?

Xamarin.Forms

- Apps that require little platform-specific functionality
- Apps where code sharing is more important than custom UI
- Time until delivery

Xamarin.iOS / Xamarin.Android

- Apps that uses many platform-specific APIs
- Apps where custom UX is more important than code sharing
- Apps that require specialized interaction

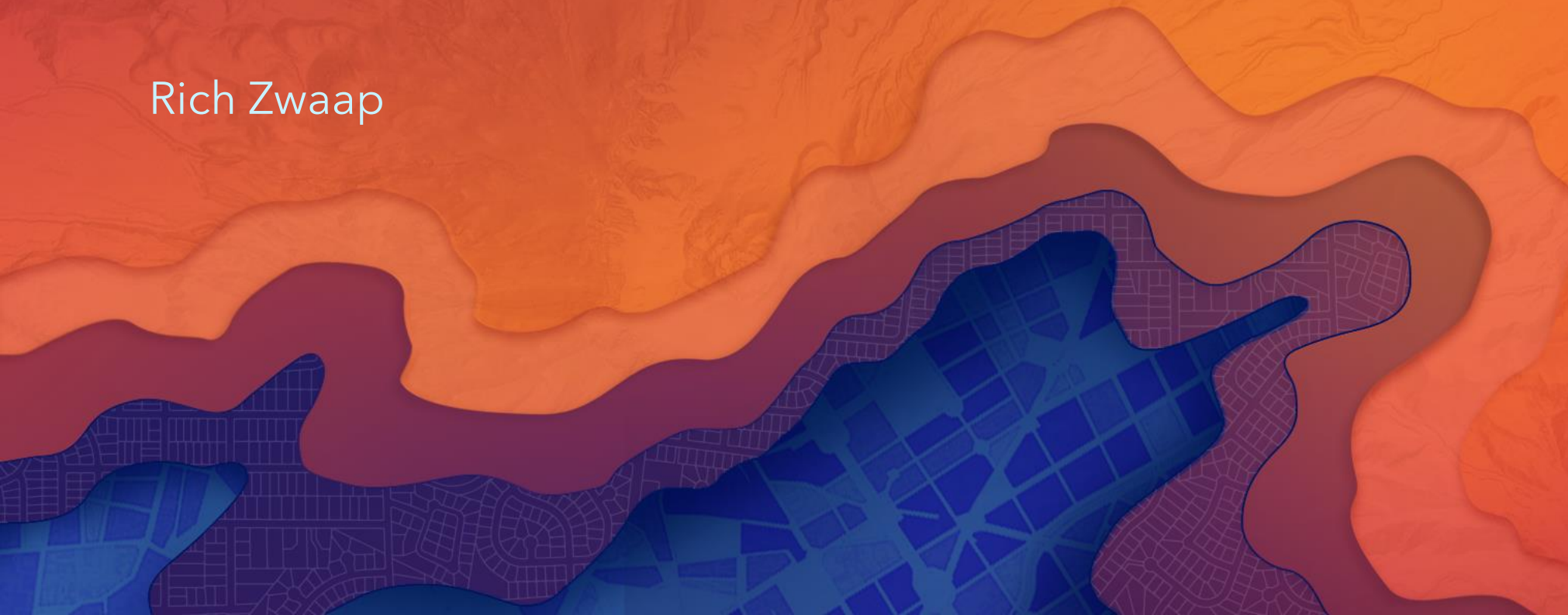


Demo: Xamarin apps

Rich Zwaap

Cross platform apps

Rich Zwaap



Cross-platform

The good, the bad, and the ugly

- **Good**

Makes your app available to more users

Enforces good design patterns

- **Bad**

User experience and quality of your app may vary

Requires more testing

- **Ugly**

Creating platform-specific UIs

Handling platform idiosyncrasies (file locations, sensors, security, bugs, etc)

Options for creating cross-platform apps

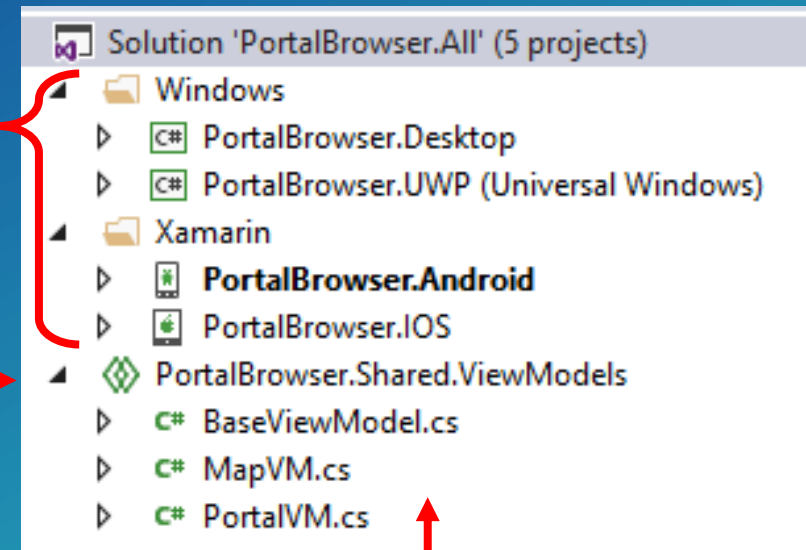
- Html5 and JavaScript: Sencha, PhoneGap, Appcelerator Titanium
- C# Development: Xamarin, Alpha Anywhere, Unity 3D
- Cross-platform ArcGIS Runtime SDKs
 - Java, .NET
 - Qt (C++ / QML)
 - **Xamarin**

Why Xamarin is a good option

- Fully native iOS and Android apps
- Exposes all functionality of the iOS and Android APIs
- Ability to share the majority of an app's code (60-100%)
- Performance: code is compiled to native binary, not interpreted
- Immediate updates to support iOS and Android releases
- Support for 3rd-party .NET libraries
- **Visual Studio and C#!**

Organizing your Xamarin code

- Individual project for each platform
 - UI and app code ('Views')
- One project for shared code (core)
 - ~~Portable Class Library~~
 - Shared project



Note: If using Xamarin Forms, UI (.xaml) can be shared



Demo: Cross platform apps

Rich Zwaap

ArcGIS Runtime SDKs: The Road Ahead

Wednesday 1:30 pm - 2:45 pm, Ballroom 6B

- Geopackage layers (vector and raster)
- WMS
- KML
- Time aware layers (2D and 3D)
- Geotransformations
- Enhanced 3D analysis

Esri Developer Summit Europe

October 24-26 Berlin Congress Center Germany

- Pre-Summit Hands-On Training
 - Introduction to the ArcGIS Python API
 - Introduction to the ArcGIS Pro SDK for .NET
 - Introduction to the ArcGIS API for JavaScript
 - ArcGIS Developer Workshop for Esri Distributors and Esri Partners
- Technical Sessions
 - Over 60 sessions on ArcGIS Runtime, Enterprise, Online, Python, JavaScript, Desktop, and Pro
- User Presentations
- Speedgeeking
- Exhibit and Networking Opportunities for Partners

Thank you!

Questions?

Visit us and our team in the ArcGIS Runtime SDK area at the Expo!

Other sessions of interest ...

- **ArcGIS Runtime: Building Offline Applications**, Wednesday 8:30, Ballroom 5B
- **Building 3D Apps**, Wednesday 9:30 & Thursday 11:30, Demo Theater 11
- **ArcGIS Runtime: Building Cross-Platform Apps**, Wednesday 10:15, Ballroom 5B
- **ArcGIS Runtime: The Road Ahead**, Wednesday 1:30, Ballroom 6B
- **Migrating your Apps from ArcGIS Engine**, Wednesday 3:30, Demo Theater 11
- **Maximizing Performance**, Thursday 10:30, Demo Theater 11
- **Upgrading Common Workflows from 10.2.x to 100.x with ArcGIS Runtime SDK for .NET**, Thursday 10:30, Demo Theater 9



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