



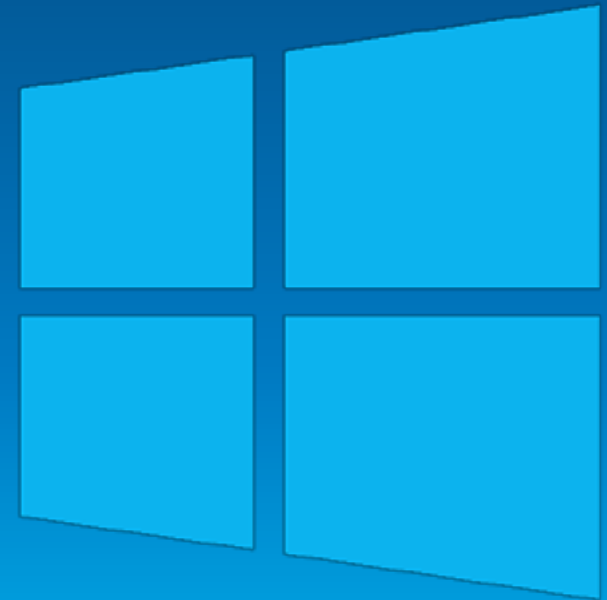
Esri International Developer Summit
Palm Springs, CA

Building WPF Apps with the new ArcGIS Runtime SDK for .NET

Antti Kajanus
Mike Branscomb

Agenda

- **ArcGIS Runtime SDK for .NET**
- **Windows Desktop API**
- **Build a map**
- **Edit**
- **Search**
- **Geocoding and Routing**
- **Perform analysis**
- **Provisioning Content**
- **Summary**



ArcGIS Runtime

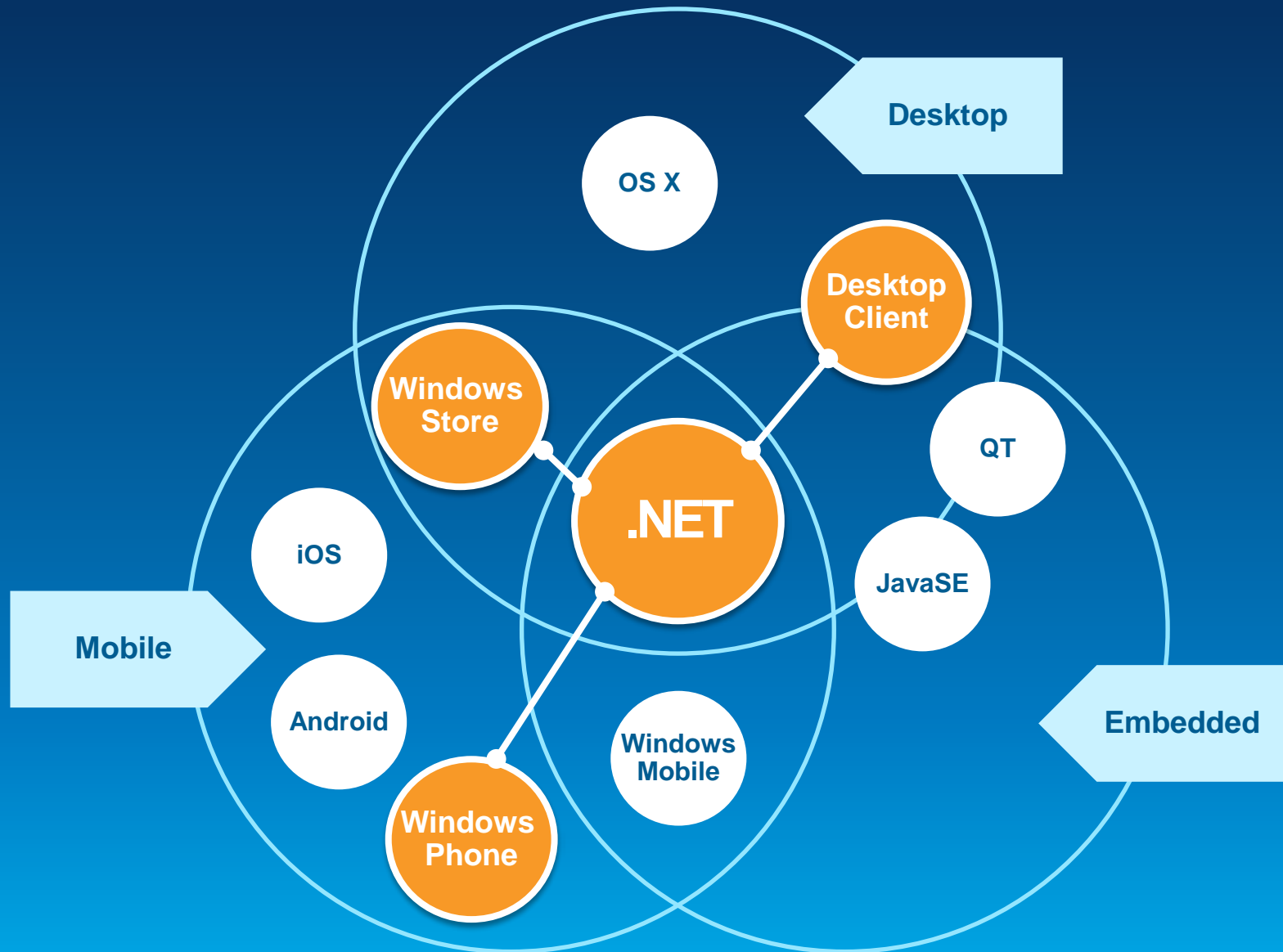


ArcGIS Runtime SDK for .NET

- ArcGIS Runtime SDK for the Microsoft .NET Framework
- The '*.NET SDK*'
- 3 APIs
 - Windows Desktop
 - Windows Store apps
 - Windows Phone



Runtime platforms



Windows Desktop API

- Build native apps for the Windows Desktop platform
- Windows Presentation Foundation (WPF)
- .NET 4.5
- 64-bit and 32-bit
- Task-based Async Pattern
- Designed for MVVM
- Codebase shared with APIs for Store apps and Phone
- Full capabilities of the ArcGIS Runtime
 - Plus LocalServer for advanced Geoprocessing



Getting Started recap

- Review Monday's Tech Session:
 - Getting Started with ArcGIS Runtime SDK for the Microsoft .NET Framework

<http://developers.arcgis.com/net/>



Building an app

- Build a map
- Edit
- Search
- Geocoding and Routing
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Building an app

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Build a Map

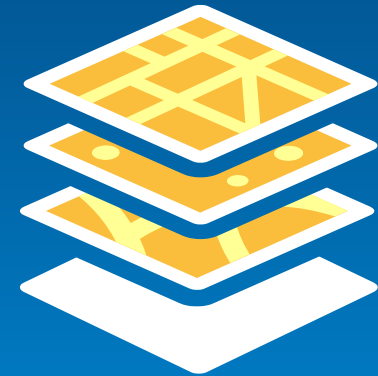
- GIS-optimized map display
- Same rendering engine for all ArcGIS Runtime SDKs
- Online and offline data support
- Specific layer types for different content
- Feature and Graphic labelling
- Location display



DEMO

Build a Map

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Demo Summary

- **XAML**
- **MapView / Map separation for improved MVVM support**
- **Simplified MVVM for demonstration**
- **ViewModel exposes Map property**
- **Map is model for layers**
- **Exception handling during initialization**
- **ArcGIS Online basemap**
- **Hosted feature services**
- **Separation of FeatureLayer from source implementation**

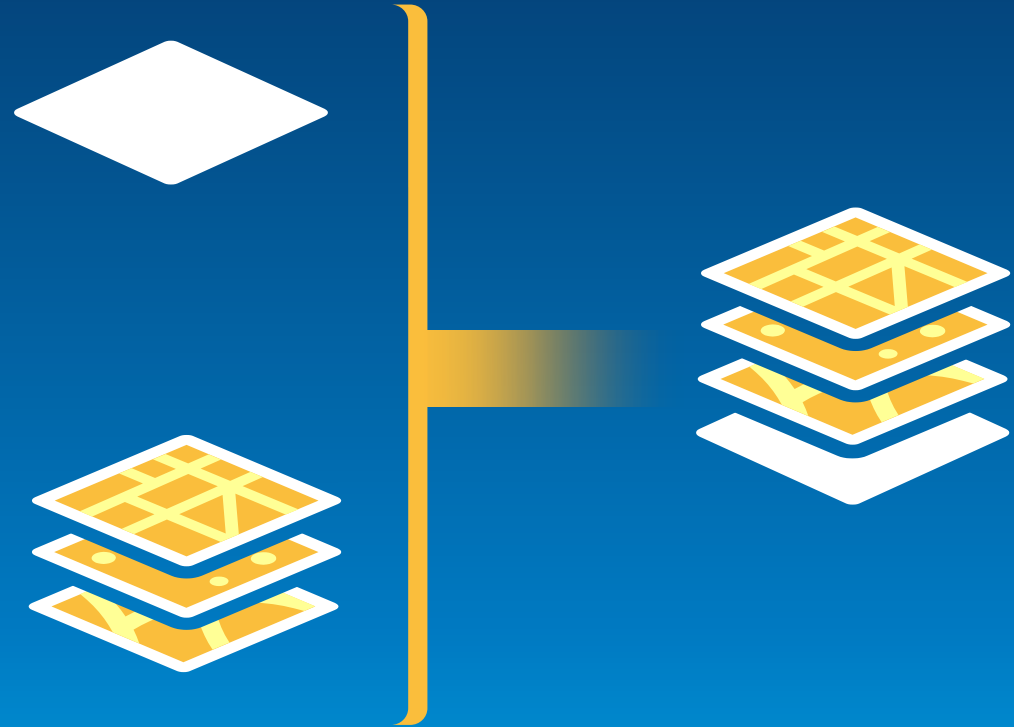
Mapping

- **MapView**

- UI container for a Map
- Display related properties
 - WrapAround
 - SpatialReference
 - LocationDisplay

- **Map**

- Object with a collection of layers
- InitialExtent



DEMO

WebMaps and Portals

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Demo Summary

- **MVVM pattern**
- **Async tasks**
- **ArcGISPortal**
 - Default is ArcGIS Online
 - Or your Portal for ArcGIS instance
- **ArcGISPortalItem**
 - Metadata for items on the portal
 - Description, thumbnail, tags, attribution, etc
- **WebMap**
 - Config file for online content (Model)
 - Collection of layers
- **WebMapViewModel**
 - Provides instance of Map to be used in MapView



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Data Access and Editing

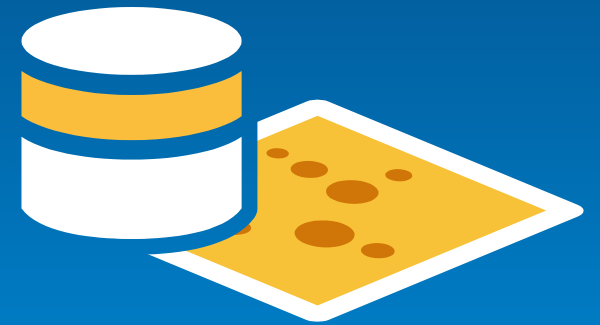
- Support for online feature services and local runtime geodatabases
- API access to geodatabases, feature tables, & features
- Query geodatabase tables directly for features
- Edit geometry, attributes and attachments on features
- Features do not have display related properties
 - E.g. No IsSelected property
- Display as FeatureLayer
- Feature templates persisted from desktop / service to geodatabase
 - Accessible via API
- Editor tracking & access control



DEMO

Data Access and Editing

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Demo summary 1/3

- **ArcGISTiledMapServiceLayer** from ArcGIS Online
- **Features from local runtime geodatabase**
 - **GeodatabaseFeatureTable**
 - **FeatureLayer**
- **Esri.ArcGISRuntime.Toolkit** controls
 - **TemplatePicker**
 - **FeatureDataForm**
- **You handle edit commands programmatically**
- **Unified map interaction pattern for taps and clicks**
 - **Avoid handling separate events for mouse / stylus / touch**
- **MvvmLight** from Galasoft
 - **Easily redirects View interaction to ViewModel**

Demo Summary 2/3

- Editor class
- RequestShapeAsync awaitable Task
 - Get user defined geometry asynchronously without reference to MapView
- Programmatically create GeodatabaseFeature
- Schema from GeodatabaseFeatureTable
- Prototype attribute values
 - Set to avoid NotNull issues
- Add Feature to GeodatabaseFeatureTable (async)
- Is immediately saved to local geodatabase
- If is feature service table
 - Must explicitly save to service
 - ApplyEditsAsync awaitable Task
- TaskCanceledException raised if edit is canceled

Demo Summary 3/3

- **Selecting features**
- **Spatial query against FeatureTable**
- **Or for unified Graphics / Features selection**
 - **Layer.HitTestAsync**
 - **Takes MapView and Rect (UI coordinates)**
 - **Awaitable Task**
- **Result of HitTestAsync depends on layer type:**
 - **GraphicsLayer: Graphic**
 - **FeatureLayer: ID of Feature (query FeatureTable for actual Feature)**
- **EditShapeAsync to update geometry of existing features**

Working with FeatureTables

- Feature Service

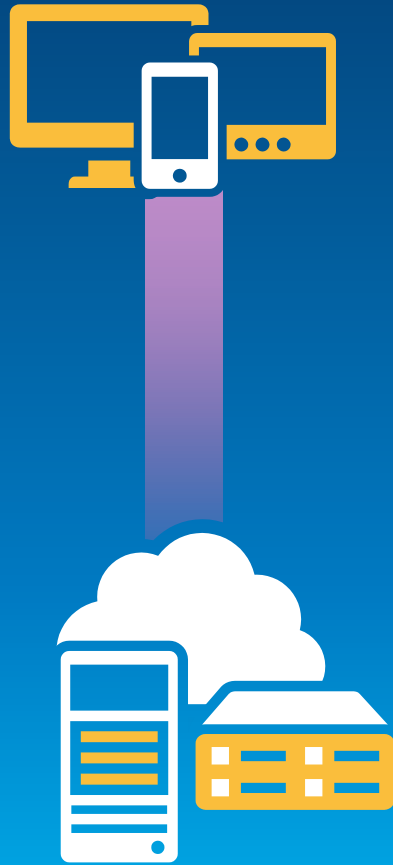
```
GeodatabaseFeatureServiceTable statesTable = new GeodatabaseFeatureServiceTable(  
    new Uri("http://sampleserver6.arcgisonline.com/arcgis/rest/services/Census/MapServer/3"));  
FeatureLayer statesLayer = new FeatureLayer(statesTable);  
MyMap.Layers.Add(statesLayer);
```

- Local runtime geodatabase

```
Geodatabase statesGeodatabase = await Geodatabase.OpenAsync(@"C:\DATA\usa.geodatabase");  
GeodatabaseFeatureTable statesTable =  
    statesGeodatabase.FeatureTables.FirstOrDefault(featureTable => featureTable.Name == "States");  
FeatureLayer statesLayer = new FeatureLayer(statesTable);  
MyMap.Layers.Add(statesLayer);
```

Data workflows – Features and Basemaps

- Online connected



- Offline disconnected



Read-only in
10.2.2 Beta



Building an app

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- **Geocoding and Routing**
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Geocoding and Routing

- **Geocoding**

- **Uses ArcGIS Locator**
 - Prepared for use in ArcGIS Runtime
- **Online and offline**
- **Full address & single line search**
- **Online World geocoding service**



- **Routing**

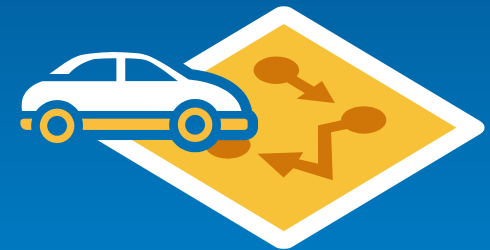
- **Uses ArcGIS Network Dataset**
 - Prepared for use in ArcGIS Runtime
- **Online and offline**
- **Supports multipoint, barriers, etc**



DEMO

Geocoding and Routing

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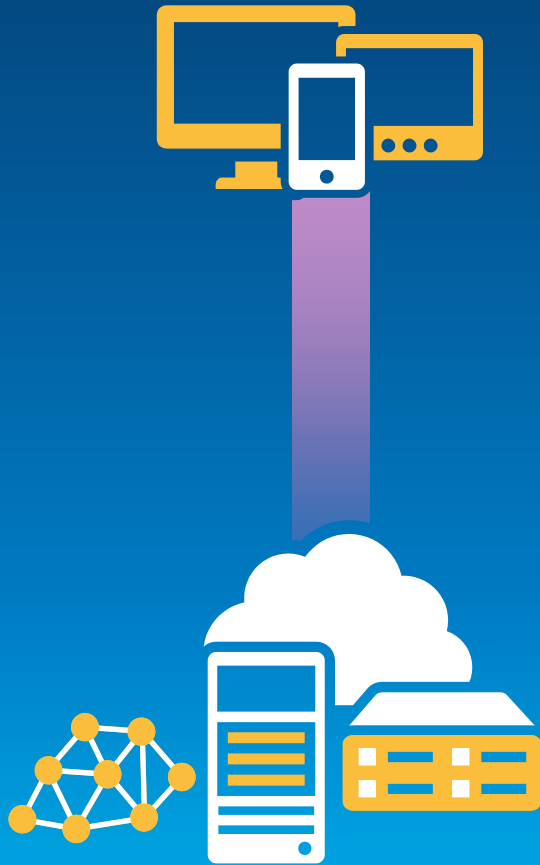


Demo Summary

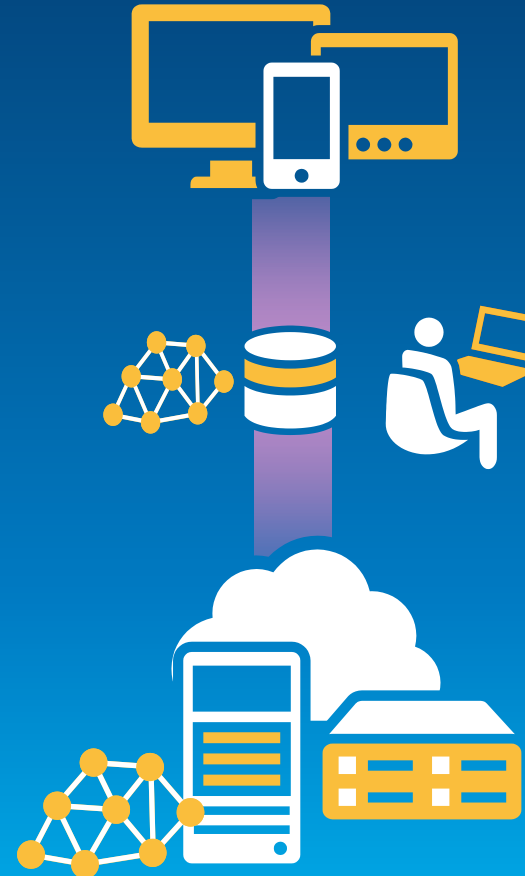
- **Editor.RequestPointAsync** for initial map location
- **MapView MouseMove** generic framework event
 - Screen position to Map location (**ScreenToLocation**)
- **Reverse Geocoding**
 - **LocalLocatorTask**
 - Local ArcGIS locator... Fast enough to be continuous
- **Point to point routing**
 - **LocalRouteTask**
 - Local ArcGIS network dataset... Fast enough to be continuous
- **On the fly reprojection of address location**
 - Using **GeometryEngine**
- **Graphic labelling**

Data workflows – Locators and Networks

- Online connected



- Offline disconnected



Building an app

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Analysis

- **GeometryEngine**
 - High performance geometric operations
 - Project, Buffer, Union, Intersect, etc

- **Geoprocessing**
 - ArcGIS Online Analysis Services
 - ArcGIS Server Services
 - Local Server Services



DEMO

GeometryEngine

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Demo Summary

- **GeometryEngine Buffer**
- **QueryAsync on GeodatabaseFeatureTable**
 - **With SpatialQueryFilter using Buffer geometry**
- **Geometryengine Union of results**
- **GeometryEngine 2D planer area calculation**
- **Fast enough to continuous on MouseMove**
- **Previously would have involved multiple service requests**

Summary

- **ArcGIS Runtime SDK for .NET**
 - One SDK
 - Three APIs
- **Windows Desktop API for building native Windows Desktop apps in WPF**
- **Exploits full capabilities of ArcGIS Runtime**
- **Everything you have seen today works on Desktop Store and Phone!**
 - (Except LocalServer)
- **If you use the .NET SDK you can be a Desktop, Tablet and Phone developer**

Related .NET ArcGIS Runtime Sessions

Session Name	Time	Location
Getting Started with ArcGIS Runtime SDK for the Microsoft .NET Framework	Monday 3:30pm – 4:30pm	Pasadena/Ventura/Sierra
Deploying Windows Store Application	Tuesday 2:30pm – 3:30pm	Mojave Learning Center
Deploying Windows Phone Applications	Tuesday 5:30am – 6:30pm	Mojave Learning Center
Building WPF Apps with the New .NET ArcGIS Runtime SDK	Wednesday 10:30am – 11:30am	Pasadena/Ventura/Sierra
Building Windows Store and Windows Phone Apps with ArcGIS Runtime SDK	Wednesday 1:00pm – 2:00pm	Primrose C/D
Migrating Your WPF Apps to the New ArcGIS Runtime SDK for .NET	Thursday 1:00pm – 2:00pm	Pasadena/Ventura/Sierra

Related ArcGIS Runtime Sessions

Session Name	Time	Location
Offline Geocoding with ArcGIS Runtime	Monday 2:15pm – 2:45pm	Demo Theater 1 – Oasis 1
Offline Network Analysis with ArcGIS Runtime	Monday 2:45pm – 3:15pm	Demo Theater 1 – Oasis 1
Squeezing Every Ounce of Performance from ArcGIS Runtime	Tuesday 5:30pm – 6:30pm	Mesquite B
Building Offline Apps with ArcGIS Runtime SDK – Part 1	Wednesday 4:00pm – 5:00pm	Primrose B
Building Offline Apps with ArcGIS Runtime SDK – Part 2	Wednesday 5:30pm – 6:30pm	Primrose B
The Road Ahead: ArcGIS Runtime SDKs	8:30am – 9:30am	Primrose A
Everything (or Anything) You Wanted to Know about the ArcGIS Runtime SDKs	10:00am – 11:00am	Primrose A

Existing WPF SDK?

- User presentation!

Session Name	Time	Location
Lessons Learned: Three Years of ArcGIS Runtime for WPF	Wednesday 2:30pm – 3:00pm	Mesquite B
Building WPF Apps with Runtime SDK	Wednesday 2:30pm – 3:30pm	Demo Theater 2

Demos

<https://github.com/arcgisdotnetteam>

Developers Guide

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



Understanding our world.

<http://www.esri.com/events/devsummit/session-rater>