

Getting Started with ArcGIS Runtime SDK for iOS and OS X

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Topics

- Overview of Runtime
- Quick intro to SDK resources
- SDK functionality & patterns
 - Displaying maps
 - Performing analysis
 - Offline capabilities
- Licensing
- Q/A

ArcGIS Runtime

Runtime built using C++

EXPLOITS THE CAPABILITIES OF THE DEVICE

Functionality exposed to developers via an API
native to the platform

INTUITIVE TO LEARN

Common functionality set and conceptual model

EASES MULTI PLATFORM DEVELOPMENT

Device Platforms



PHONE



TABLET



LAPTOP

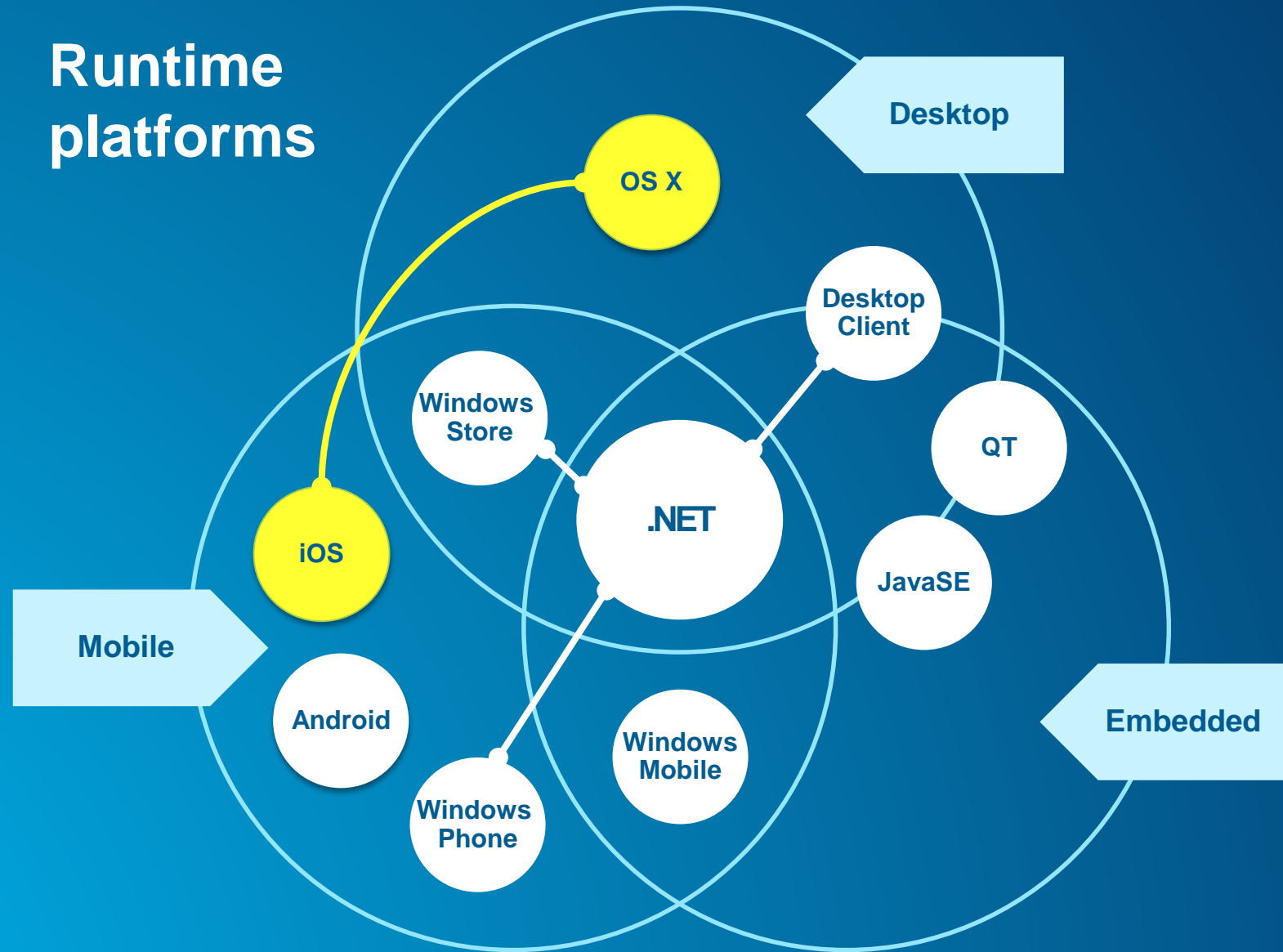


DESKTOP



EMBEDDED

Runtime platforms

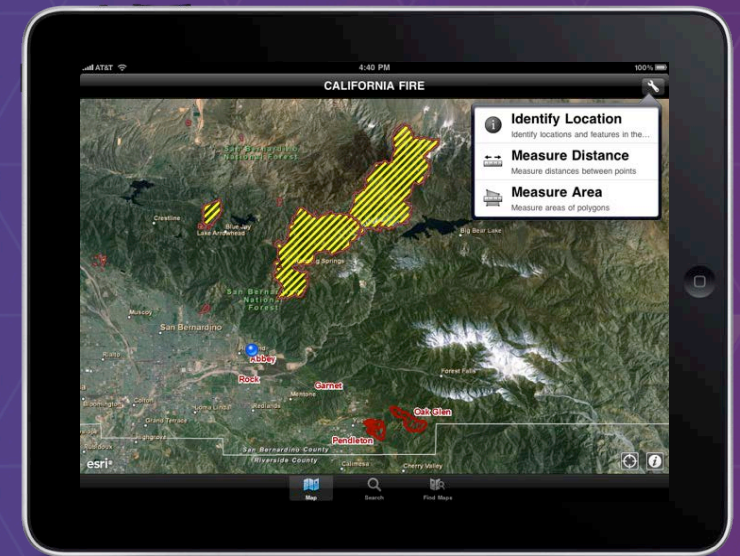


ArcGIS Runtime SDK for iOS & OS X

Build native applications
using Objective-C & Swift



OS X (Mountain Lion, Mavericks, Yosemite)



iOS (6.x, 7.x, 8.x)

Before you begin...



- **Mac**
 - OS X 10.9, 10.10 (Mavericks, Yosemite)
- **Xcode 5.x or 6.x**
 - Apple's iOS & OS X SDKs
 - iOS Simulator
 - Instruments
- **ArcGIS Runtime SDK for iOS & OS X**
 - Latest release : **Version 10.2.4**



SDK Resources

developers.arcgis.com

The Power of Location

Build applications for web, mobile and desktop with Esri's cloud services, developer APIs, ready-to-use content and self-hosted solutions.

EXPLORE DEMOS



MAPPING AND VISUALIZATION



DIRECTIONS AND ROUTING



DEMOGRAPHIC MAPS AND ANALYTICS



LOCATION-BASED EVENTS

Try out our tools for free with an introductory developer account

SIGN UP NOW

Web APIs

- JavaScript
- Web AppBuilder
- Esri Leaflet



Visualization

Create thematic interactive maps that allow your users to explore and understand their geographic data.



Geocoding

Search for places and addresses and display them on your map.



Directions

Generate directions, optimal routes and calculate drive time areas.

Runtime SDKs

- Android
- iOS
- Java
- Mac OS X
- .Net
- Qt



Ready-to-use Content

Choose from a collection of ready-to-use basemaps, demographic maps, and imagery and make interactive maps with your data.



GeoEnrichment

Enrich your existing hosted services with demographic variables for a given study area.



GeotriggerSM Service

Use the Esri Geotrigger Service to easily add location awareness to your apps.



Spatial Analysis

Analyze your data spatially to detect patterns, assess trends



Real-time Processing



Imagery

Access ArcGIS Online image services (basemap

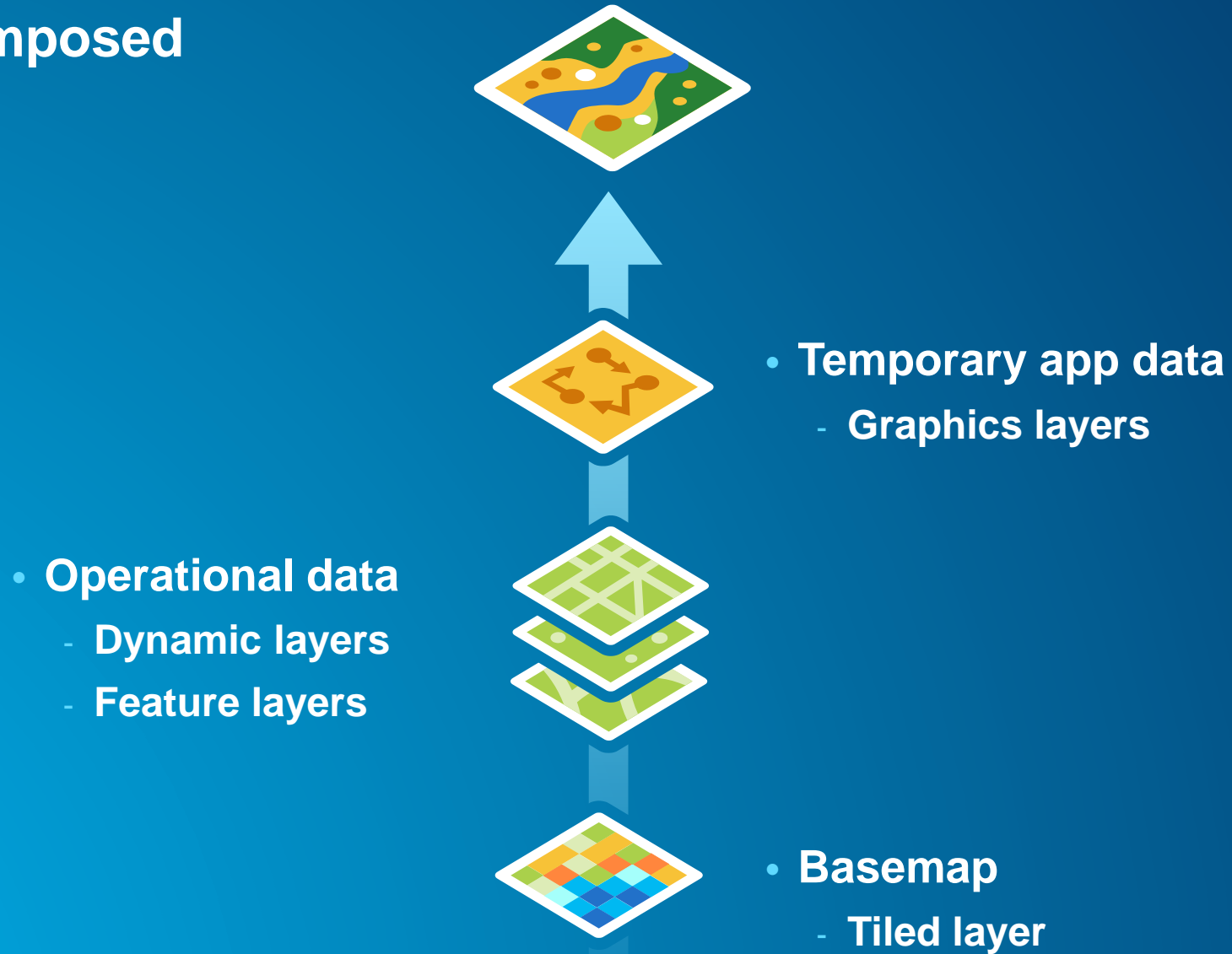
Displaying maps

Displaying a Map

- UI Component : **AGSMapView**
 - Responds to gestures
 - Touch
 - Trackpad
 - Mouse
 - Keyboard
 - In-built Magnifier & Callout
 - Displays device location
 - Auto pan for location updates



A Map is composed of Layers



Sources of map data

- **Tiled layers – subclasses of AGSTiledLayer**
 - **ArcGIS Map Services (Cached), OGC WMTS, Bing, OpenStreetMap**
 - Fetch pre-cached tiles from services and assemble on screen
 - Extremely fast. Good for static data.
- **Dynamic layers - subclasses of AGSDynamicLayer**
 - **ArcGIS Map Services, ArcGIS Image Services, OGC WMS**
 - Generate map images from service on-demand.
 - Good for changing data, or customizing map display
- **Feature layers – AGSFeatureLayer**
 - **ArcGIS Feature Services**
 - Download raw features and draw natively on screen
 - Good for editing

Layer pattern

1. Construct & Connect

- URL to web service

```
//Construct layer
```

```
let tiledLayer = AGSTiledMapServiceLayer(URL: serviceUrl)
```

1. Add to mapview

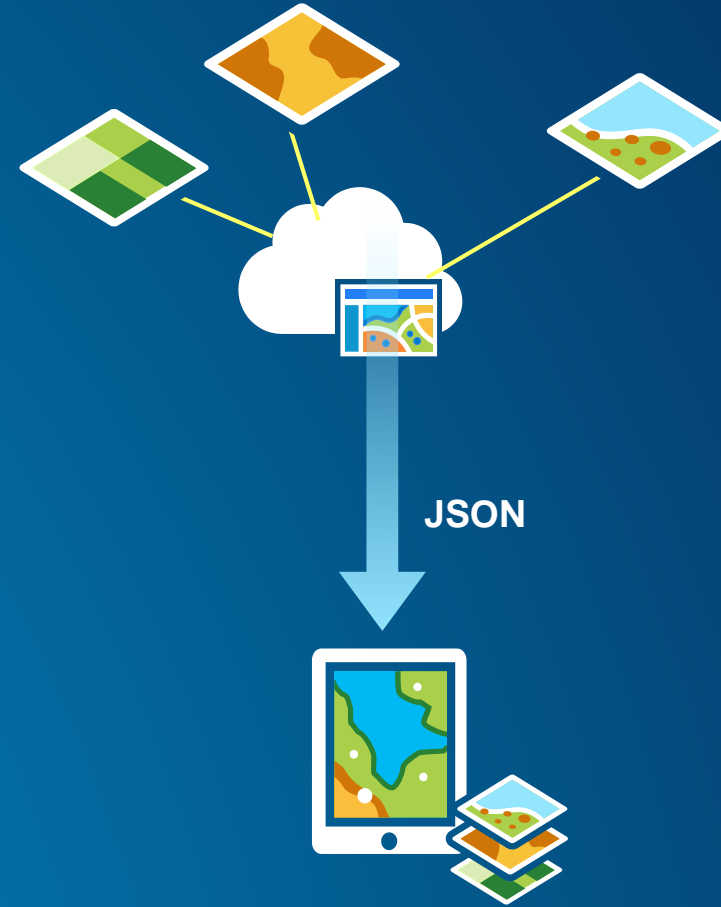
```
//Add to map view
```

```
self.mapView.addMapLayer(tiledLayer, withName:"World Street Map")
```



Web Maps

- Author on ArcGIS Online or on-premise ArcGIS Portal
 - Predefined list of layers
 - Initial map configuration
 - Extent, scale range, symbology etc
- AGSWebMap
 - Creates appropriate layer objects when opened into mapview



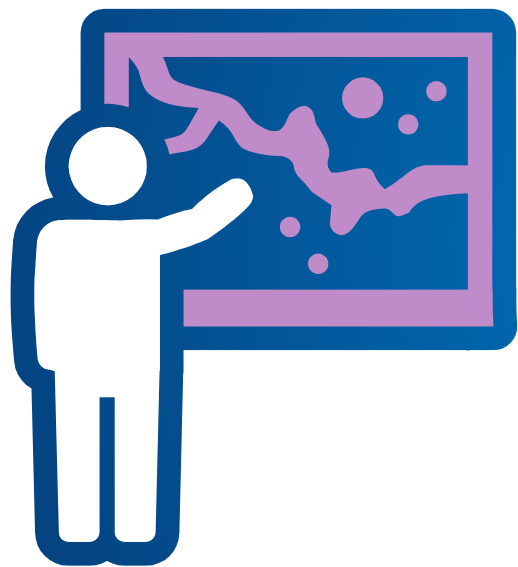
```
//Create webmap
self.webmap = AGSWebMap(itemId: "b31153c71c6c429a8b24c1751a50d3ad", credential:nil)

//Open into mapview
self.webmap.openIntoMapView(self.mapView)
```

Displaying details about geographic features

- Popups make it easy to view
 - Attributes
 - Graphs, Charts
 - Attachments
 - Picture
 - Video
 - PDF/MS-Office attachments





DEMO

Adding a map to your app

Performing analysis

Using Tasks

Search for features in a map

- ArcGIS Map Services & Feature Services
 - SQL or spatial criteria - [AGSQueryTask](#)
 - Earthquakes with magnitude > 6
 - All light poles within a bounding envelope
 - Text matching – [AGSFindTask](#)
 - Any business that contains the word “Solar”
 - Geographic location - [AGSIdentifyTask](#)
 - Zipcode where user tapped



Finding addresses/places

- Address, place name, POI, ...
 - 407 W Walnut Pasadena CA 91103
 - Mount Everest
 - Banks in Paris, Coffee,...
- **AGSLocator**
 - ArcGIS Online World Geocode service
 - Free to use. 105 countries
 - On-premise Geocode services for custom data



Analysis on transportation networks

- Plan routes - **AGSRouteTask**
 - Point to Point, or multi-point
 - Optimize based on distance or travel time
 - Reorder stops for best sequence
 - Time windows, Barriers & Restrictions
- Compute service areas - **AGSServiceAreaTask**
- Find closest facilities – **AGSClosestFacilityTask**

- ArcGIS Online World Route service
 - 100+ Countries. Live & Historical Traffic data
 - Requires subscription. Consumes credits
- On-premise Route services for custom data



Spatial Analysis

- **AGSGeoprocessor**
 - Invoke geoprocessing services
- **ArcGIS Online Spatial Analysis service**
 - Summarize Data (Aggregate points, etc)
 - Analyze Patterns (Watershed, Viewshed, etc)
 - Use Proximity (Density, HotSpot, Interpolate, etc)
- **On-premise Geoprocessing services**
 - Custom geoprocessing tools & models



Geometric Operations

- **AGSGeometryEngine**
 - **Native, high performance engine**
 - **Relationship tests**
 - Touches, Intersects, Within, Contains, Overlaps, Crosses
 - **Set operations**
 - Union, Difference, Intersect
 - **Topological operations**
 - Cut, Clip, Simplify, Densify, Buffer, ConvexHull
 - **Measure areas and distance**
 - **Project between spatial references**



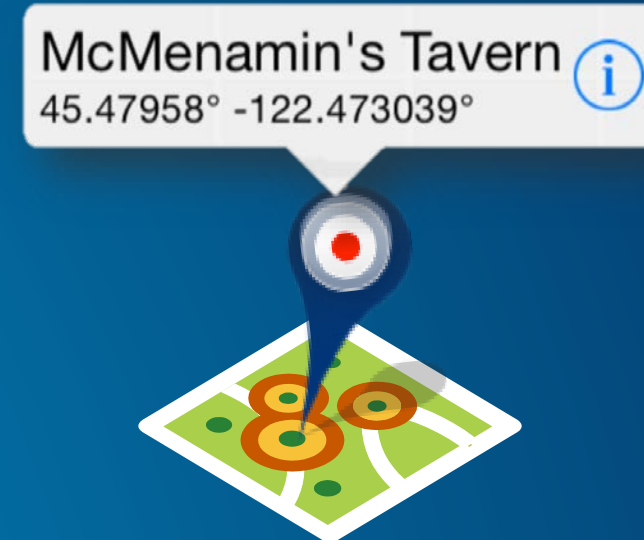
Task Pattern

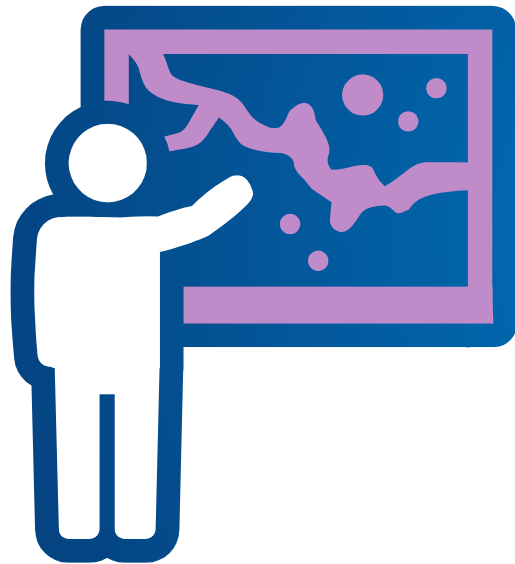
1. **Construct & Connect.**
 - URL to web service
2. **Assign** a delegate
3. **Set up** input parameters. **Invoke.**
 1. **Process** results in the delegate.



Displaying results on the map

- Add graphics using graphics layer
 - Points, Lines, Polygons
- A graphic contains
 - Attributes (additional information)
 - Geometry (location & shape)
 - Symbol (how graphic should look)
 - Marker, Line, Fill, Text, Composite
- Tapping on a graphic displays a callout





DEMO

Using Tasks

Offline capabilities

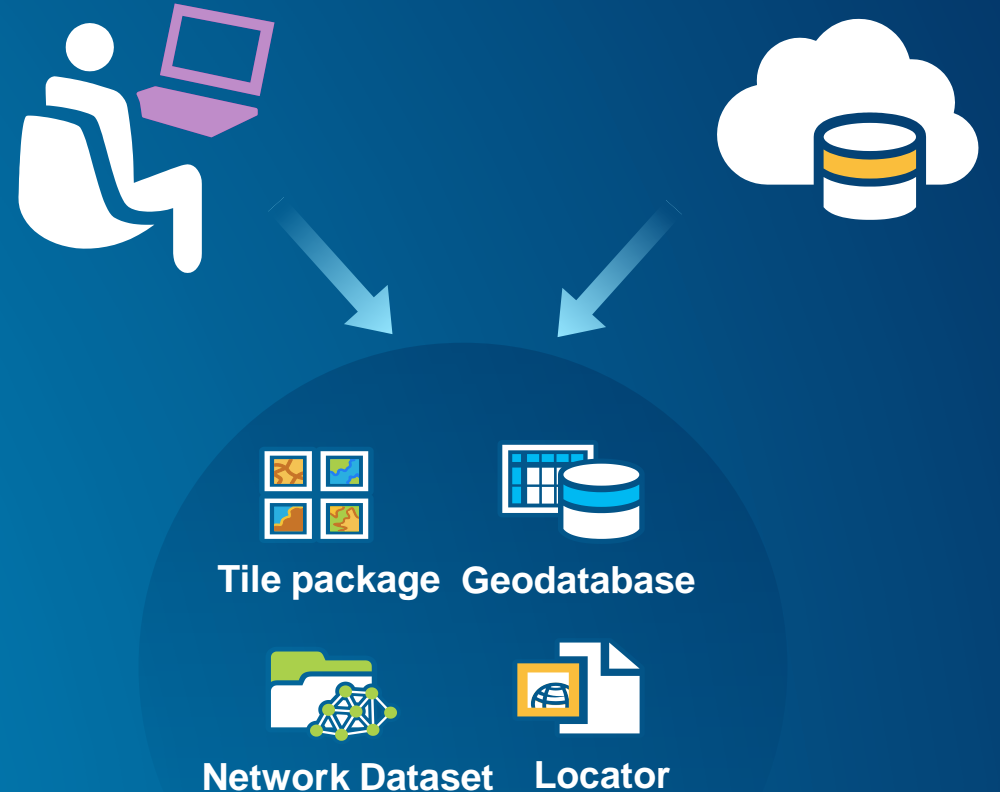
Generating offline content

- **Desktop Pattern**

- Package through ArcMap
- Side load onto device, or bundle in application

- **Services Pattern**

- Extract from services
 - Tile package - `AGSDownloadTileCacheTask`
 - Geodatabase - `AGSGDBSyncTask`



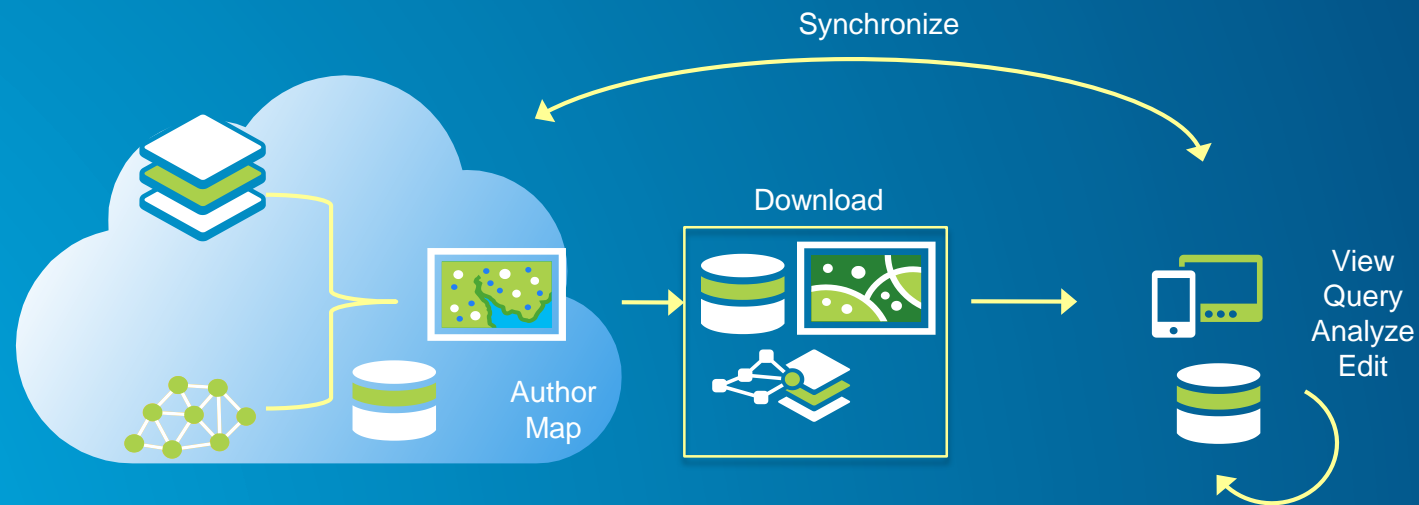
Offline Mapping

- **View & Interact with maps**
 - Display Tile package - `AGSLocalTileLayer`
 - Display Geodatabase - `AGSFeatureTableLayer`
 - Query using SQL or spatial criteria
 - Edit existing or create new features
- Layer pattern remains the same
 1. **Construct & Connect**
 - Path to local data
 2. **Add to mapview**



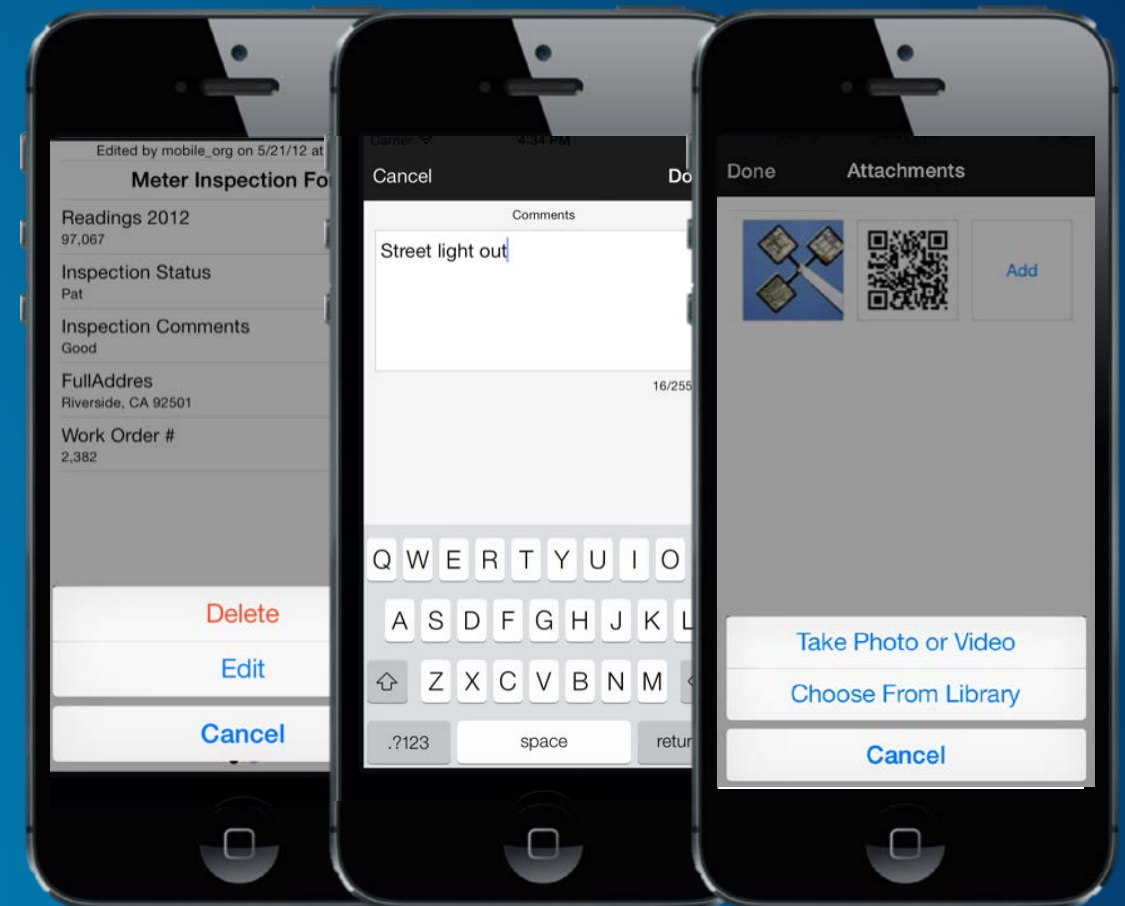
Offline Editing

- Edits persisted in the geodatabase on the device
- Changes can be synchronized with the service
 - Upload only, Download only, or Bidirectional



Editing using Popups

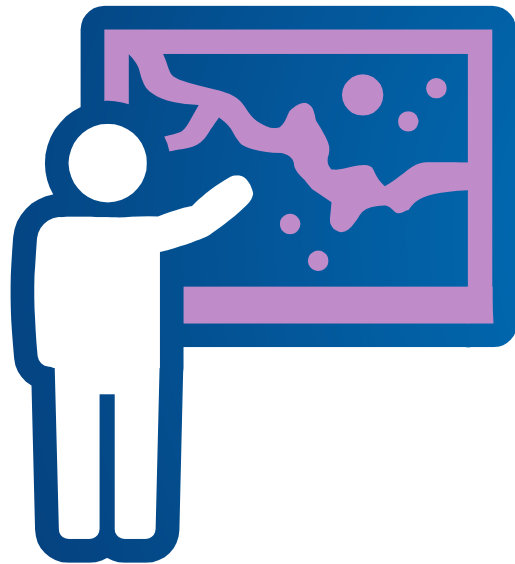
- **Simplifies capturing feature details**
 - Attributes based on schema
 - Attachments - Pictures, Video
 - Geometry
 - Interactively through sketch layer, or
 - GPS location
- **Enforces validation**
 - Data type
 - Domains
 - Coded Value, Range
 - Ownership based access control



Offline Analysis

- Find addresses
 - AGSLocator using Locator files
- Get directions
 - AGSRouteTask using Network dataset
- Task pattern remains the same
 1. **Construct & Connect.**
 - Path to local data
 2. **Assign** a delegate
 3. Set up input parameters. **Invoke.**
 4. **Process** results.





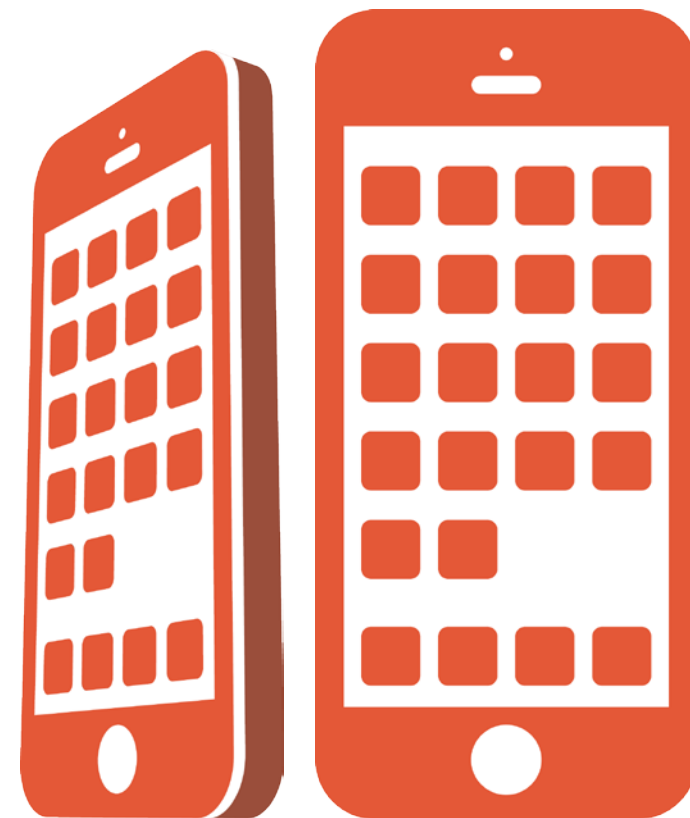
DEMO

Offline Capabilities

In-depth sessions

Session Name	Time	Location
ArcGIS Runtime SDKs: Building Offline Apps, Part I	Thursday 9:00 – 10:00am	Primrose A
ArcGIS Runtime SDK: Building Offline Apps, Part II	Thursday 10:30– 11:30am	Primrose A
ArcGIS Runtime SDKs: Offline Routing and Geocoding	Thursday 4:00-5:00pm	Smoketree A-E

Runtime Licensing

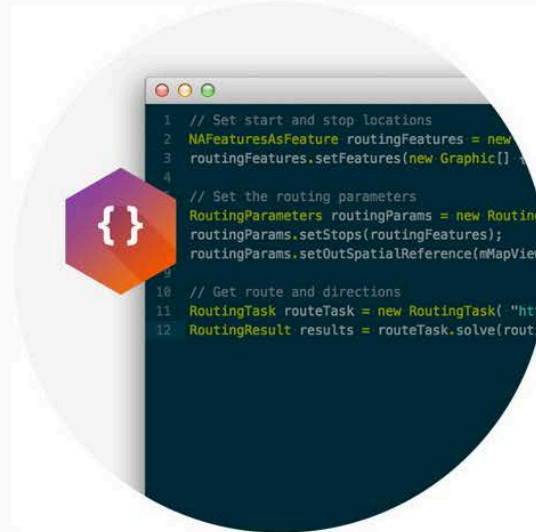


Runtime Licensing

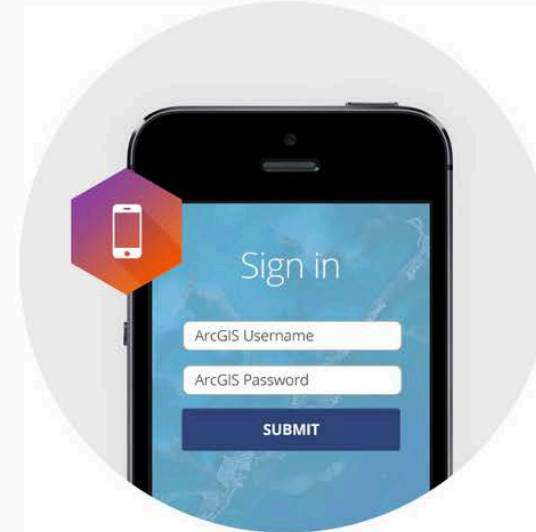
Development and Deployment Workflow



1. Download and Install



2. Develop and Test



3. Deploy and Distribute

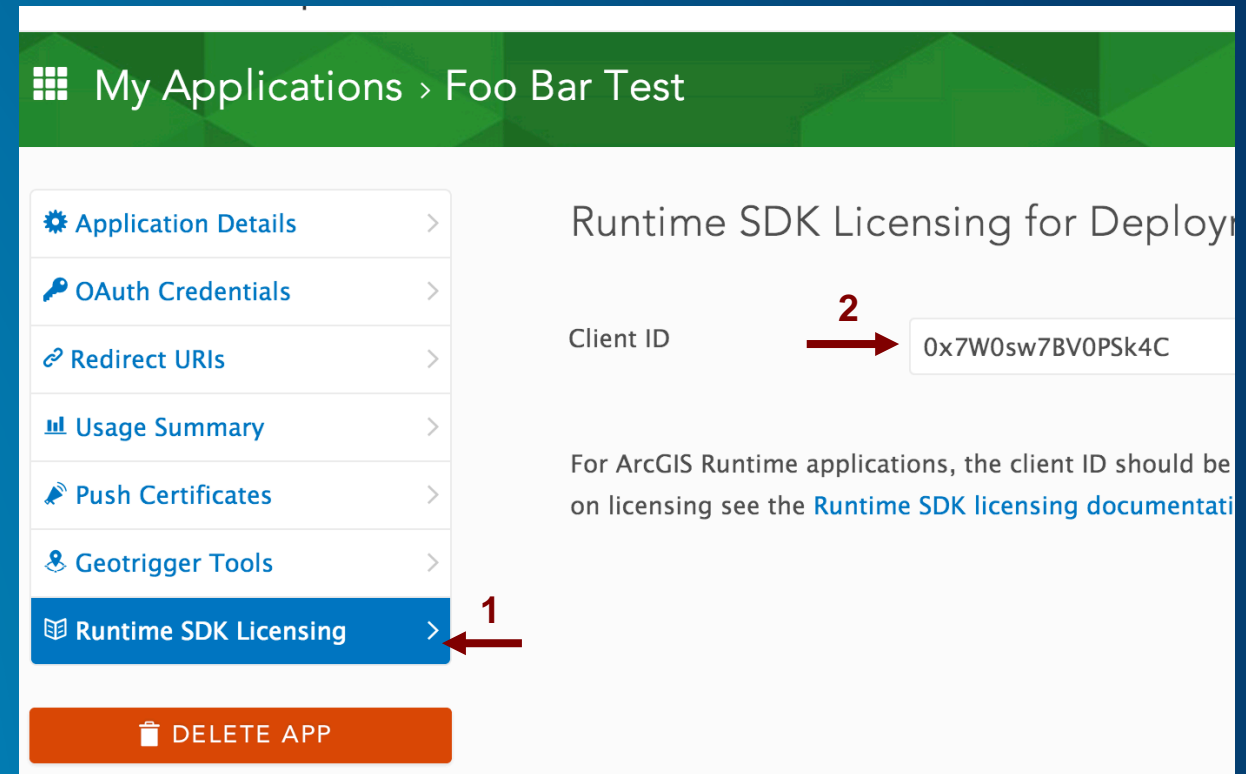
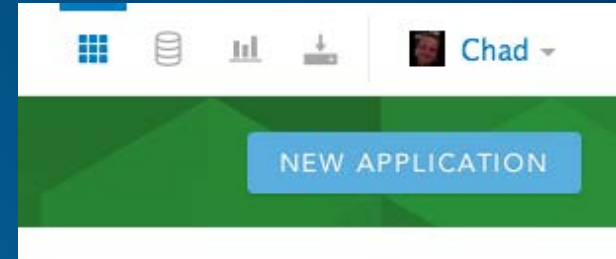
License levels and functionality

License Level	Available functionality
Developer (development and testing only)	All functionality (watermarks and debug messages will be generated)
Basic	Connected - all functionality Offline - map viewing only
Standard	Connected and offline - all functionality, includes: <ul style="list-style-type: none">• Local locators (geocoding)• Local routing• Local geodatabase editing• Local geodatabase sync operations

How to license your app at the basic level

- <http://developers.arcgis.com>
- Under Application section, create a New Application (or select existing)
- Click on Runtime SDK Licensing
- Copy the Client ID and use it to set your clientID

```
//Set client ID
AGSRuntimeEnvironment.
setClientID("DuxuhOEH9dAC4JCY", error:nil)
```



How to license your app at the standard level

- You have 2 options:
 1. Use an organization account (ArcGIS Online or Portal for ArcGIS)
 - Requires users of your app to log in with their account
 1. Use a license string obtained from Customer Service or your international distributor
 - License burnt into the app

```
//Set license code  
AGSRuntimeEnvironment.license().setLicenseCode("<code>")
```

Rate This Session

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Session Name	Time	Location
ArcGIS Runtime SDK: Core Display Architecture Performance Tips and Tricks	Tuesday 4:00-5:00pm	Primrose A
Development Strategies for Building Mobile Apps – the Great Debate	Tuesday 5:30-6:30pm	Pasadena/Sierra/Ventura
Advance tips and trick for building powerful iOS/Mac apps	Wednesday 10:30-11:30am	Catalina/Madera
Building a Modern Geocoding Experience in your Application using Suggestions and Categories	Wednesday 2:30-3:30pm	Demo Theater 1 – Oasis 1
ArcGIS Runtime SDKs: Building Offline Apps, Part I	Thursday 9:00 – 10:00am	Primrose A
ArcGIS Runtime SDK: Building Offline Apps, Part II	Thursday 10:30– 11:30am	Primrose A
ArcGIS Runtime SDK for iOS and OS X: How We Build the Drone Apps	Thursday 1:00 – 2:00pm	Primrose A
ArcGIS Runtime SDKs: Offline Routing and Geocoding	Thursday 4:00-5:00pm	Smoketree A-E
Collector for ArcGIS: How we did it	Thursday 5:30 – 6:30pm	San Jacinto
The Road Ahead: ArcGIS Runtime	Friday 8:30 – 9:30am	Primrose A
Everything (or Anything) You Wanted to Know about the ArcGIS Runtime SDKs but Were Afraid to Ask	Friday 10:00 – 11:00am	Primrose A
Sneak peek into the Next Generation iOS and OS X API	Friday 1:00pm – 2:00pm	Primrose C/D



Understanding our world.