ArcGIS Runtime SDK for iOS and macOS: Building Apps

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Agenda

Get Started

Core Components
- Display Map Content
- Search for Content
- Perform Analysis
- Edit Content

Summary & Q/A
ArcGIS Runtime

- Conceptual Model And Common Functionality
- New Runtime Architecture in v100.0
  - Common C-API implementation
  - Individual platforms bind to common core
- Public API Redesign
- Simplified Developer Workflows
Runtime SDK for iOS & macOS – v100.1 (June 2017)
Tools of the trade

Xcode 8

Obj C & Swift
SDK Resources

ArcGIS Runtime SDK for iOS

Version 100.1.0 · June 2017 · All Available Downloads

ArcGIS Runtime SDK for macOS

Version 100.1.0 · June 2017 · All Available Downloads

Demo
Display Map Content
Types of content

2D Maps
- Operational Layers
  - Basemap
    - Reference layers
    - Base layers
- Surface
  - Elevation source

3D Scenes
Layers
Choosing the right type

- Feature Layer
- Raster layer
- Tiled Layer
- Map Image Layer
- Raster layer
Sources of geographic data

• Tiled layers
  - AGSArcGISTiledLayer
  - AGSArcGISVectorTiledLayer
  - AGSWebTiledLayer
  - Fetch pre-cached tiles and assemble on screen
  - Extremely fast. Good for static data.

• Map Image Layer
  - AGSArcGISMMapImageLayer
  - Generate map images from service on-demand.
  - Good for frequently changing data, or customizing map display
Sources of map data

• Feature layer
  - AGSFeatureLayer + AGSFeatureTable
  - Table contains raw features.
  - Good for editing, querying
  - Layers draws them natively on screen

• Raster layer
  - AGSRasterLayer + AGSRaster/AGSImageServiceRaster
  - Good for scientific or continuous data (pixel based)
  - Apply raster functions to perform on-the-fly processing
  - Many file formats – DTED, Mosaic Dataset, CIB, GeoTIFF…
Sources of content

- **Portal**
  - Web maps

- **Packages**
  - Mobile Map Package

- **Code**
  - Mashup layers programmatically
Display content
Using GeoView

- **MapView & SceneView** to display 2D & 3D geographic content on screen

- Handles user interaction
  - Touch, Trackpad, Mouse, Keyboard

- In-built gestures
  - Zoom, pan, rotate, tilt

- Extend **UIView** on iOS
  - **NSView** on MacOS
  - Storyboards, Auto layout, etc.
GeoView

• Graphics Overlays
  - To display temporary graphics over map/scene

• identify...( ) to find features and graphics
  - In layers and graphics overlays

• Viewpoint based content navigation
  - Geographic Extent, Center & Scale
  - Camera (altitude, heading, pitch, roll) – 3D

• Delegate for user interaction events
  - Touch, keyboard, mouse/trackpad
Demo
### Related sessions

| ArcGIS Runtime: Building 3D Apps | Wed 9:30am - 10:15am  
Thurs 11:30am - 12:15pm | Demo Theater 11  
Developer |
|-------------------------------|----------------------|---------------------|
GeoView
Accessories

Grid

Magnifier

Sketch Editor
GeoView
Accessories

Background

Callout

Location Display
Demo
Search for Content
Searching for Content

Search for Places

Search for Features
Search for Places

- Find places - AGSLocatorTask
- Geocoding & Reverse Geocoding
- Online Geocode Service
  - http://<server>.arcgis.com/arcgis/rest/services/World/GeocodeServer
- Local Locators
  - Standalone or part of MMPK

Online Geocoding Service

```javascript
let locator = AGSLocatorTask(url: self.locatorURL!)
```

Local Locator

```javascript
let locator = AGSLocatorTask(name: "USA_StreetAddress")
```
Search for Places

Geocoding

Set Parameters

```javascript
let params = AGSGeocodeParameters()
params.preferredSearchLocation = AGSPointMake(-117.141198, 33.488604, wgs84)
params.maxResults = 10
params.minScore = 90
```

Execute

```javascript
locator.geocode(withSearchText: "1590 Tutela Hts, Escondido, Ca")
{(results:[AGSGeocodeResult]?, error: Error?) -> Void in

    //Create graphic objects from geocode results
    //Display on map
}
```
Geocoding Demo
Tasks Pattern

- **Construct** task & load
  - URL to web service
  - Path to local data
- **Setup** input parameters
- **Execute**
  - Async operation
- **Process** results in completion handler
Searching for Content

Search for Places

Search for Features

Query

Identify
Query for features

- Executed on feature table
- Service or geodatabase feature table

Set Query Parameters
- Object IDs
- Attributes
- Spatial

```javascript
let params = AGSQueryParameters()
params.geometry = envelope
params.spatialRelationship = .intersects
```
Query for features

- Online or Local Queries
- Query for Related features

```swift
featureTable.queryFeatures(with: params)
{ (queryResult: AGSFeatureQueryResult?, error: Error?) in

    let enumerator = queryResult?.featureEnumerator()
    for feature in enumerator! {
        // do something
    }
}
```
Identify features

- At a given map point
- Single or all layers
- Single or all graphic overlays

```swift
self.mapView.identifyLayers(atScreenPoint: screen, 
tolerance: 12, 
returnPopupsOnly: false, 
maximumResultsPerLayer: 10)
{
    results: [AGSIdentifyLayerResult]?, 
    error: Error?) in

    //Handle identify results
}
```
Query & Identify

Demo
Perform Analysis
Network Analysis

• 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

• Find Service Area - AGSServiceAreaTask
  - Solve for many facilities
  - Use multiple drive time values
  - Add barriers
  - Direction of travel
Network Analysis

• Closest Facility - AGSClosestFacilityTask
  - Choose the number of facilities
  - Generate routes and driving directions
  - Direction of travel
  - Limit the search distance

• ArcGIS Online World Route service
  - 100+ Countries. Live & Historical Traffic data
  - Requires subscription. Consumes credits

• On-premises services for custom data
• Mobile map package for offline use
Spatial Analysis

- **AGSGeoprocessingTask**
  - 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

- **AGSGGeometryEngine**
  - 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
Demo
Edit Content
Edit Features

• Service feature tables
  - Created from a layer URL

• Geodatabase feature tables
  - Offline Mode
  - Desktop Pattern - Read only
  - Service Pattern – Editable

• Feature Collection Tables or Graphics

• Spatial or non-spatial tables

• Related tables
Edit Features - Workflows

ADD

Table:
Create Feature

ArcGIS Feature:
Set Attributes, Geometry, Attachments

Table:
Add Feature

Create new feature

```javascript
//Create a new feature
let feature = self.featureTable
 .createFeature(attributes: featureAttributes,
   geometry: geometry)
```

Add feature to table

```javascript
//Add feature to the feature table
self.featureTable.add(feature) { (error: Error?) -> Void in
//Do something
}
```
Edit Features - Workflows

**ArcGIS Feature:**
*Update Attributes, Geometry, Attachments*

**Table:**
*Update Feature*

---

**Update Feature Geometry and Attributes**

```javascript
self.selectedFeature.geometry = newGeometry
self.selectedFeature.attributes.setValue("COMPLETED", forKey: "STATUS")
```

**Update Feature on Table**

```javascript
self.featureTable.update(self.selectedFeature, 
  completion: { (error: Error?) -> Void in 
    //Do something 
  })
```
Delete Feature from Table

```javascript
self.featureTable.delete(feature) {
  (error: Error?) -> Void in

  //Do something
}
```
Edit Features - Workflows

ADD
Table: Create Feature

ArcGIS Feature:
Set Attributes, Geometry, Attachments

Table: Add Feature

Table: Update Feature

Table: Delete Feature

DELETE

UPDATE

ArcGIS Feature:
Update Attributes, Geometry, Attachments

Offline Mode

Sync Geodatabase

Geodatabase Feature Table – Sync GDB
Service Feature Table – Apply Edits

// Execute sync, and get a sync JOB
self.syncJob = self.syncTask.
syncJob(with: params, geodatabase: self.generatedGeodatabase)

// Start Job
self.syncJob.start(statusHandler: { (status: AGSJobStatus) -> Void in
    // Print JOB status
    }, completion: { (results: [AGSSyncLayerResult]?, error: Error?) -> Void in
        // Job is completed, check errors etc
    }
Interactive Editing

SKETCH EDITOR
• Create, Edit Geometries
• Interactive
• Freehand sketching, Move geometries, Undo/Redo, Customize symbols, Notifications

POPUP
• Display Feature Information
• Edit Attributes & Attachments, Edit Geometry through Sketch Editor
• Enforces Data Validation & Platform Capabilities
• Async delegate methods for events
• Customize
Edit Content

Demo
Summary

- Get Started
  - Runtime
  - Resources

- Display Content
  - Map & Scene
  - Types of layers
  - Accessories

- Search for Content
  - Geocoding
  - Query & Identity

- Perform Analysis
  - Network Analysis
  - Spatial Analysis
  - Geometry Engine

- Edit Content
  - Tables supported
  - Sketch Editor & Popup

https://developers.arcgis.com
## ArcGIS Runtime Sessions at UC

<table>
<thead>
<tr>
<th>Session</th>
<th>Date and Time</th>
<th>Location</th>
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</thead>
<tbody>
<tr>
<td>ArcGIS Runtime: The Road Ahead</td>
<td>Wed 1:30– 2:45 pm</td>
<td>SDCC - Ballroom 06 B</td>
</tr>
<tr>
<td>Building Offline Applications</td>
<td>Wed 8:30am - 9:45am</td>
<td>SDCC - Room 05 B</td>
</tr>
<tr>
<td>Maximizing the Performance of Your App</td>
<td>Thu 10:30am - 11:15am</td>
<td>SDCC - Demo Theater 11</td>
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<tr>
<td>Building Cross-Platform Apps</td>
<td>Wed 10:15am - 11:30am</td>
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<tr>
<td>Migrating Your Apps from ArcGIS Engine</td>
<td>Wed 3:30pm - 4:15pm</td>
<td>SDCC - Demo Theater 11</td>
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Did you know?

To quickly update any current presentation
Copy and paste your slides from your current deck into the newest template. The title and ending logo slide will update automatically.

For More Templates, Sample Files, and Icons See
https://compass.esri.com/resources/presentations/Pages/Main.aspx

Videos not working?
For video in PowerPoint, animated GIF is recommended. AVI and WMV (native PC files) will work best on a PC platform. H.264 MP4 will work only on PowerPoint 2013 and later.
Aspect Ratio Test

If this shape does not appear as a perfect circle, adjust the aspect ratio of your display until it does.

Try the resolution 1920x1080 for 16:9 displays.