

ArcGIS Runtime SDK for iOS and macOS: Building Apps

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Agenda

Get Started

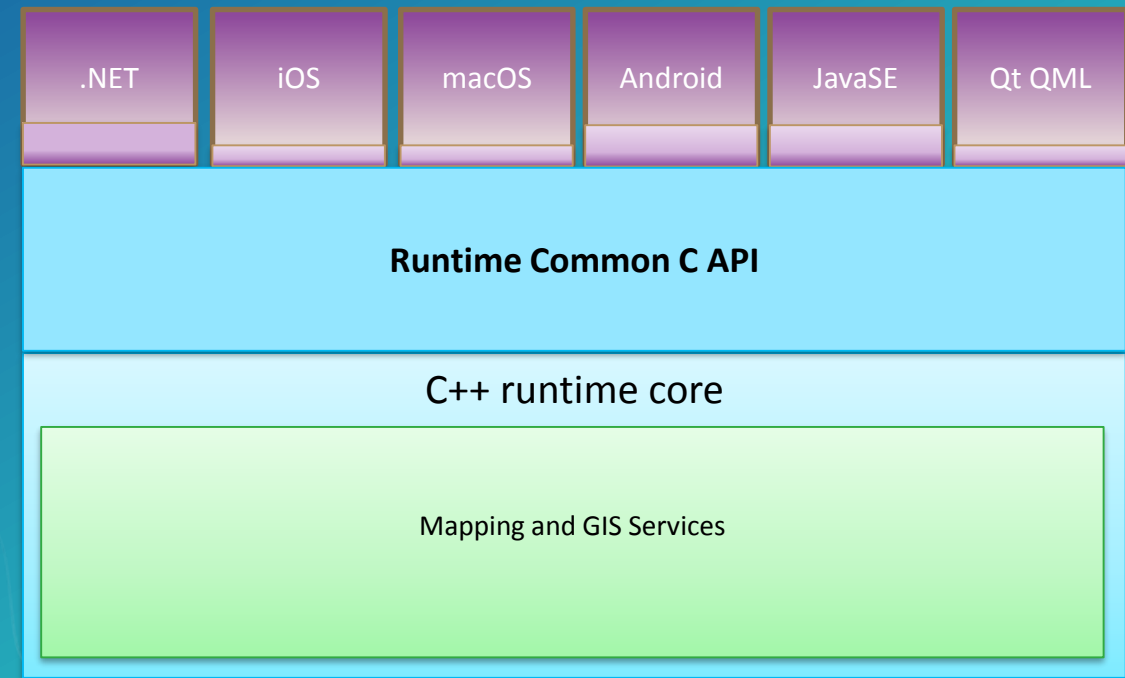
Core Components

- 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)



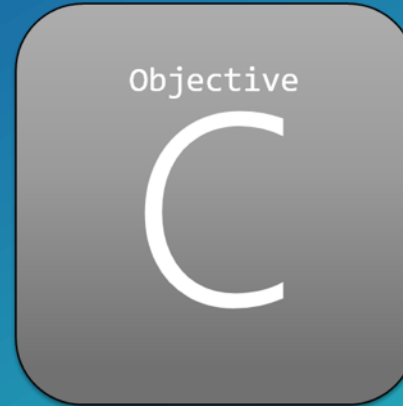
10.11 and 10.12

Tools of the trade

Xcode 8



Obj C & Swift



Developers Website



www.developers.arcgis.com



ArcGIS Runtime / iOS SDK / **100.1.0**

ArcGIS Runtime SDK for iOS

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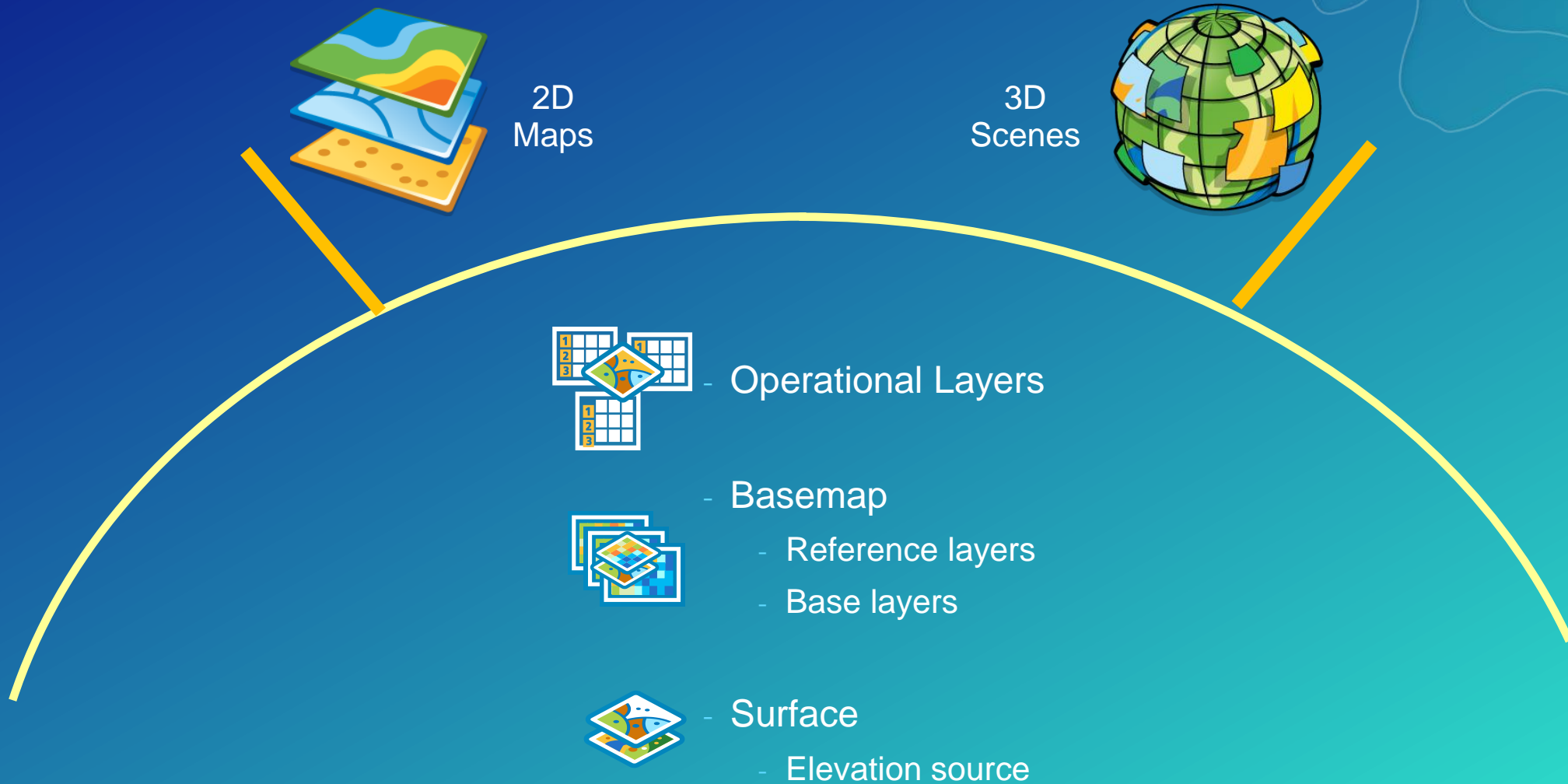
SDK Resources

Demo

Display Map Content



Types of content



Layers

Choosing the right type

- Feature Layer

- Raster layer

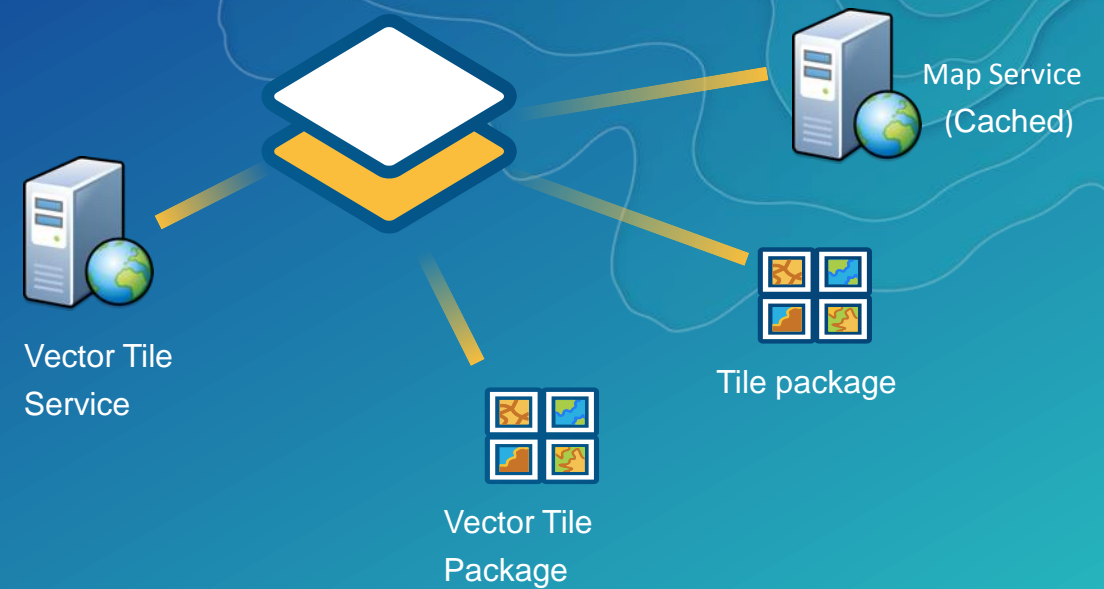
- Tiled Layer

- Map Image 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
 - **AGSArcGISMapImageLayer**
 - Generate map images from service on-demand.
 - Good for frequently changing data, or customizing map display



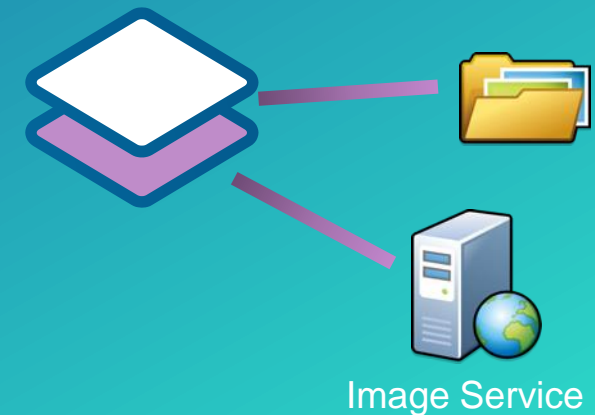
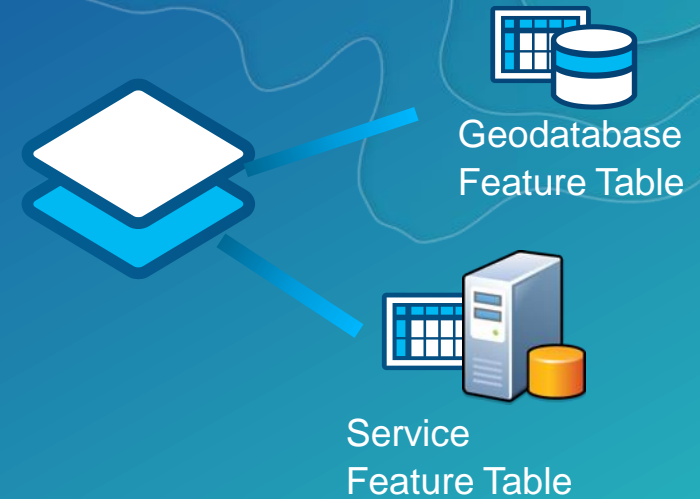
Sources of map data

- 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

M-V-C



MapView

SceneView

View



Map



Scene

Model

Display content

Using GeoView

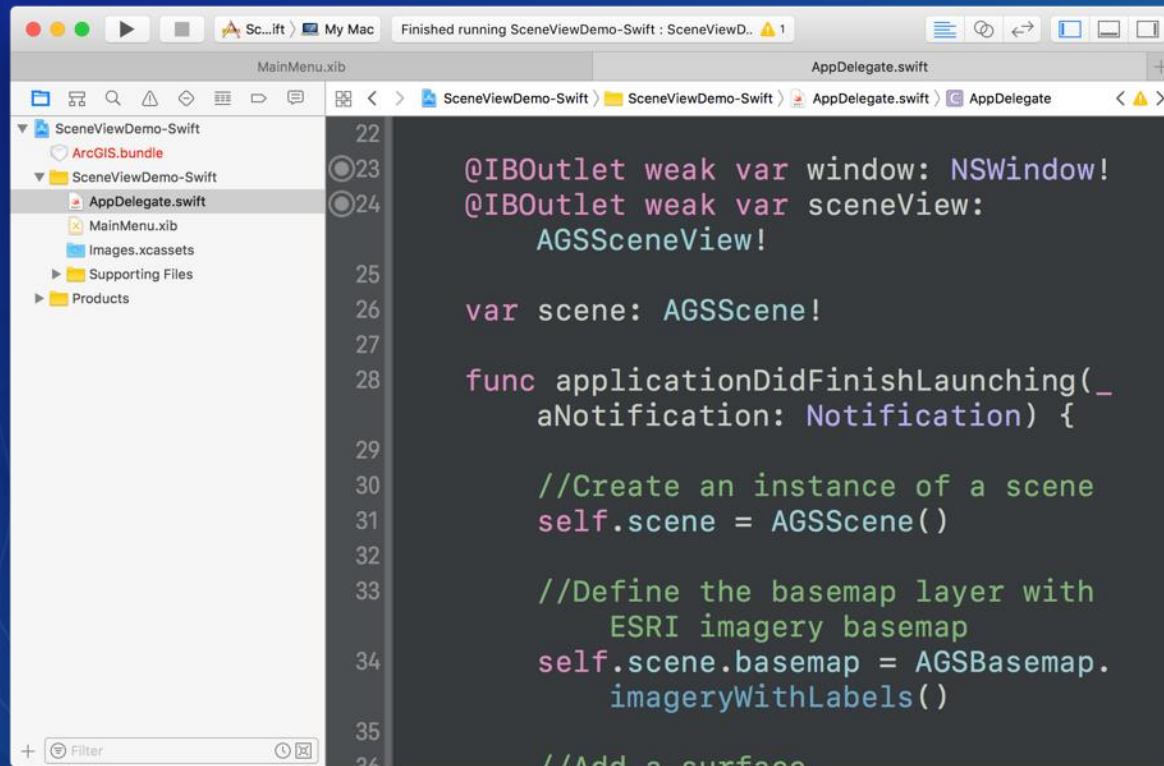
- **MapView** & **SceneView** to display 2D & 3D geographic content on screen
- Handles user interaction
 - Touch, Trackpad, Mouse, Keyboard
- In-built gestures
 - Zoom, pan, rotate, tilt
- Extend **UIView** on iOS
NSView on MacOS
 - Storyboards, Auto layout, etc.



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
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GeoView

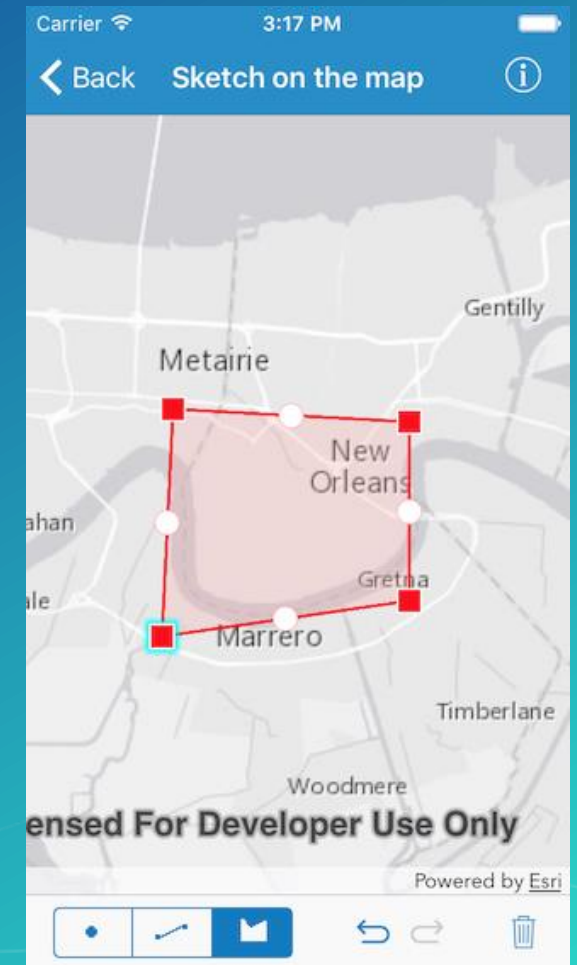
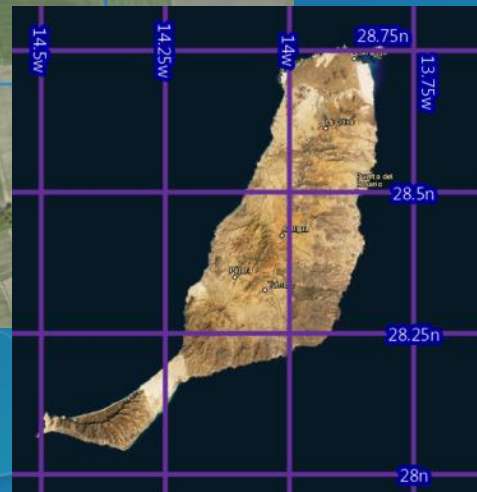
Accessories



Grid



Magnifier



Sketch Editor

GeoView

Accessories



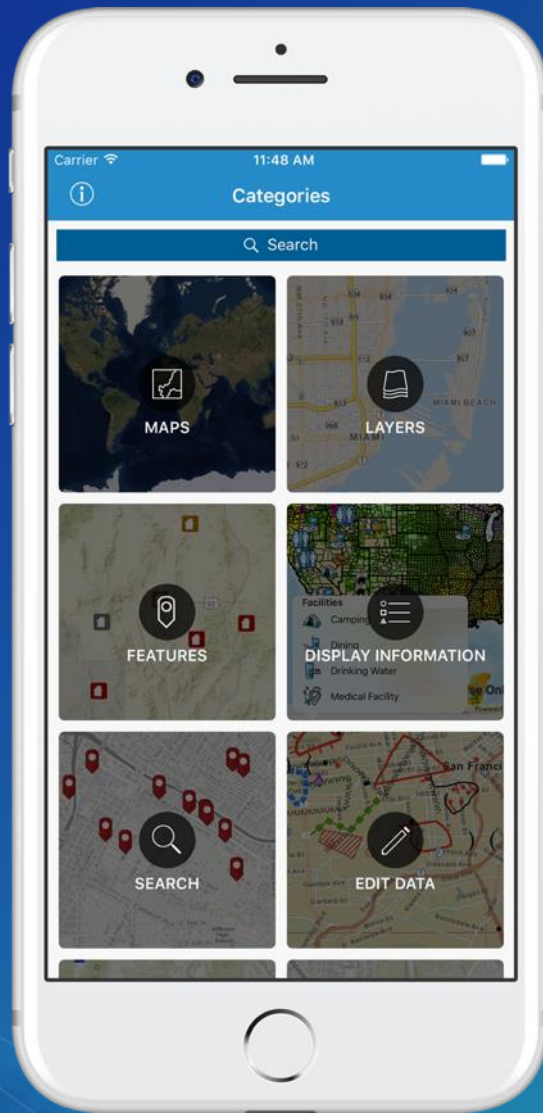
Background



Callout

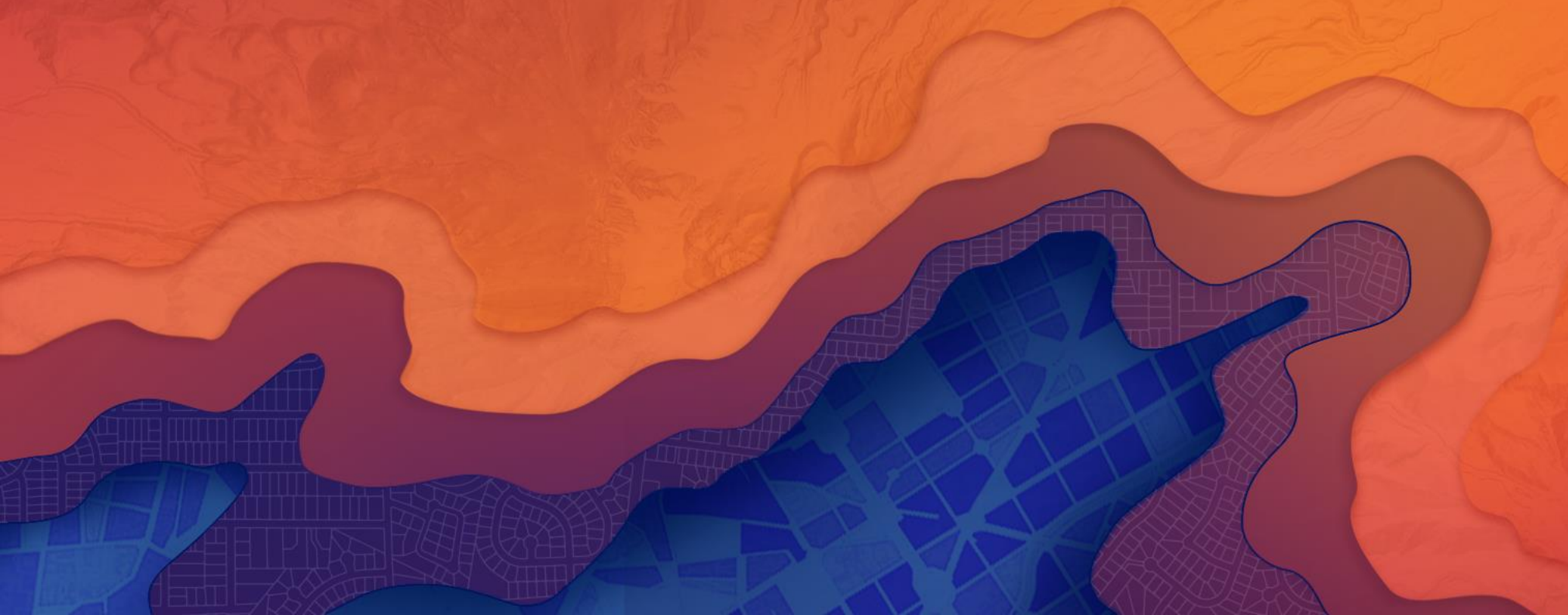


Location Display

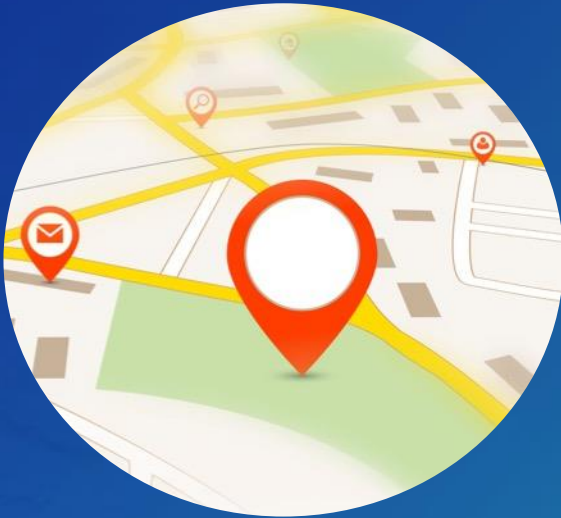


Demo

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

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

Local Locator

```
let locator = AGSLocatorTask(name: "USA_StreetAddress")
```


Search for Places

Geocoding

Set Parameters

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

Execute

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

    //Create graphic objects from geocode results
    //Display on map
}
```

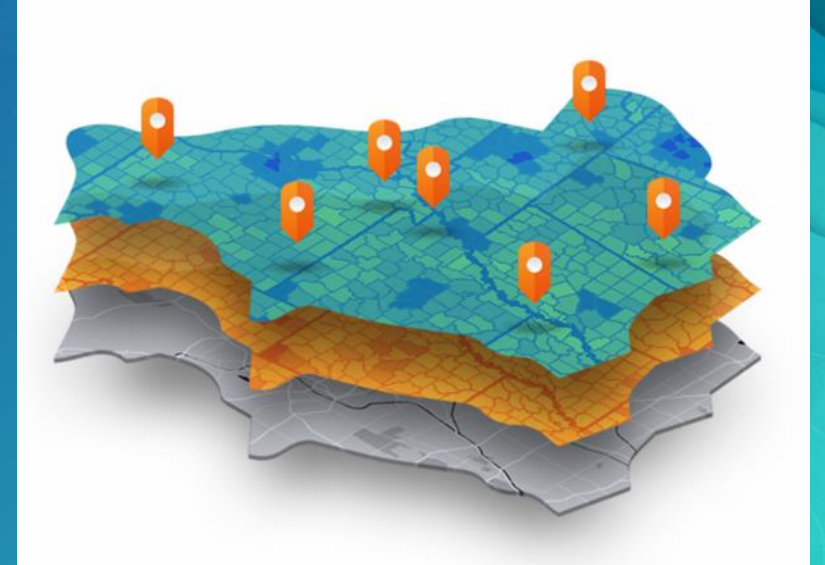


Geocoding

Demo

Tasks Pattern

- **Construt** 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

```
let params = AGSQueryParameters()  
params.geometry = envelope  
params.spatialRelationship = .intersects
```

Query for features

Execute Query

```
featureTable.queryFeatures(with: params)
{ (queryResult: AGSFeatureQueryResult?, error: Error?) in
    let enumerator = queryResult?.featureEnumerator()
    for feature in enumerator! {
        //do something
    }
}
```

- Online or Local Queries
- Query for Related features

Identify features

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



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



Query & Identify

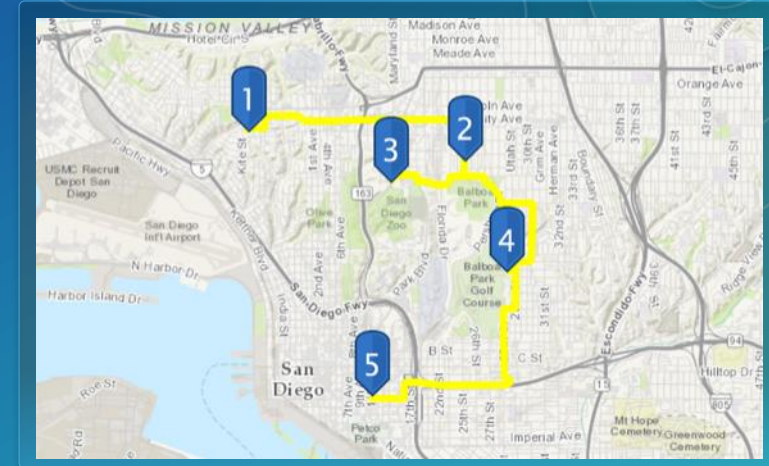
Demo

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



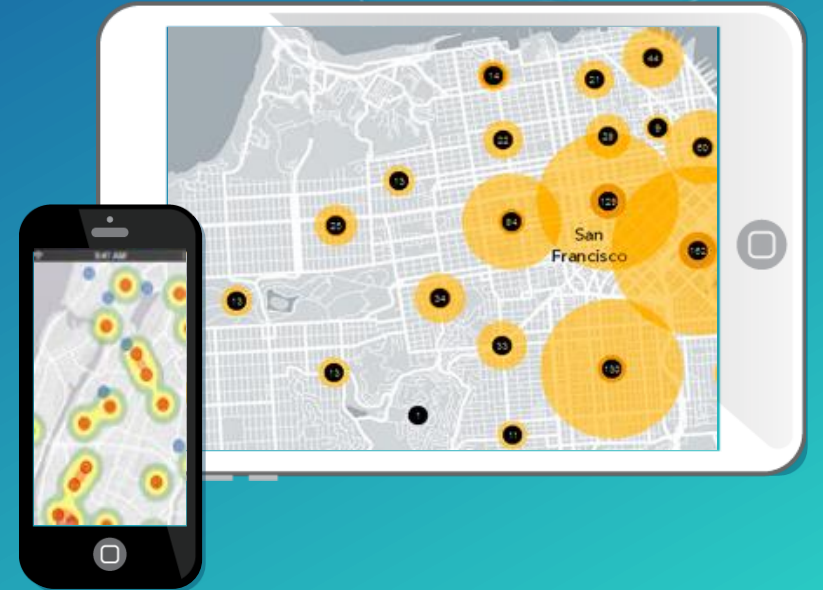
Network Analysis

- 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

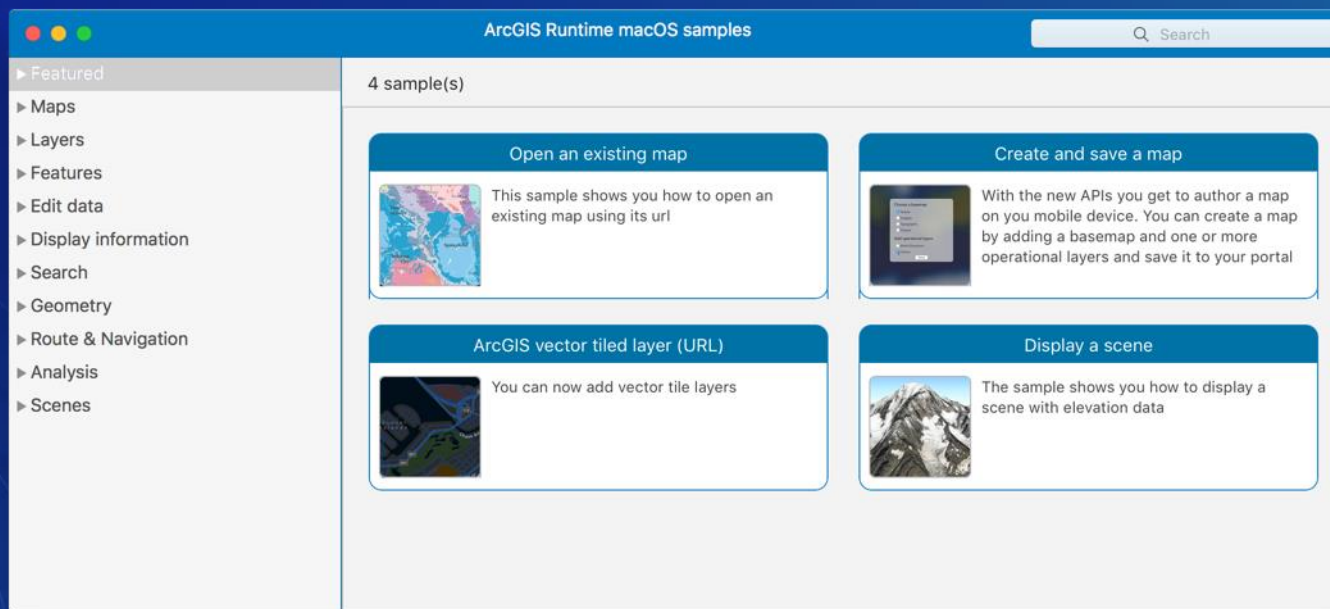
- **AGSGeoprocessingTask**
 - Invoke geoprocessing services
- ArcGIS Online Spatial Analysis service
 - Summarize Data (Aggregate points, etc)
 - Analyze Patterns (Watershed, Viewshed, etc)
 - Use Proximity (Density, HotSpot, Interpolate, etc)
- On-premise Geoprocessing services
 - Custom geoprocessing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



Geometric Operations

- **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





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



Create new feature

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

Add feature to table

```
//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

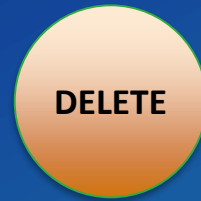
Update Feature Geometry and Attributes

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

Update Feature on Table

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

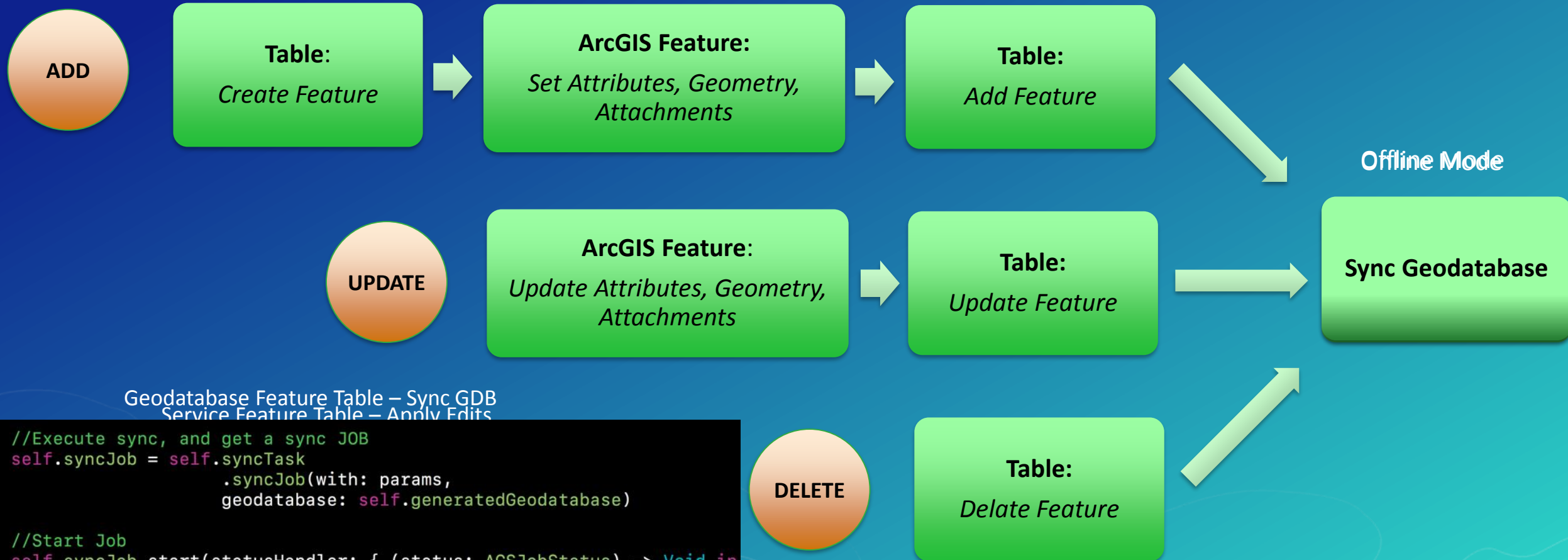

Edit Features - Workflows



Delete Feature from Table

```
self.featureTable.delete(feature) {  
    (error: Error?) -> Void in  
  
    //Do something  
}
```

Edit Features - Workflows



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

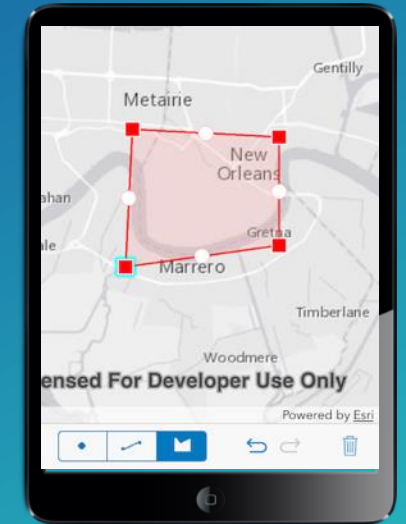
    //Print JOB status
}, completion:{ (results: [AGSSyncLayerResult]?, error: Error?) ->
    Void in

    //Job is completed, check errors etc
})
```

Interactive Editing

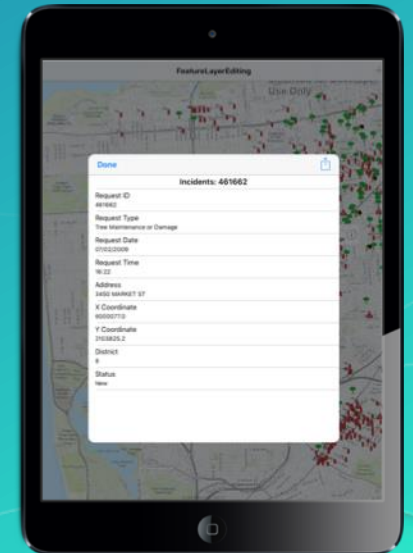
SKETCH EDITOR

- 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

ArcGIS Runtime Sessions at UC

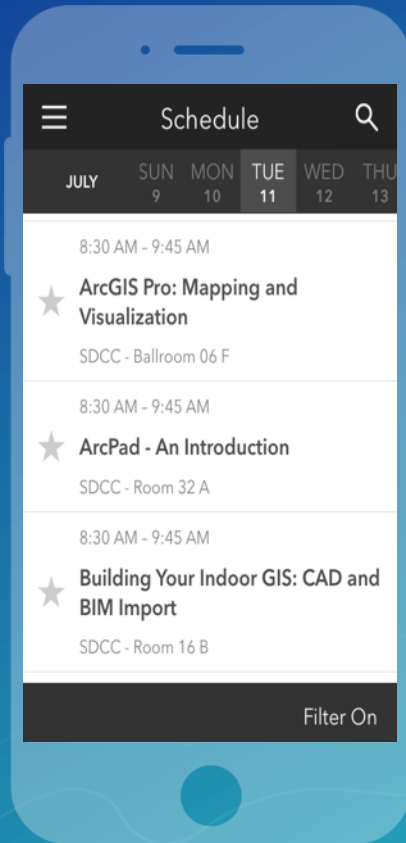
ArcGIS Runtime:The Road Ahead	Wed 1:30– 2:45 pm	SDCC - Ballroom 06 B
Building Offline Applications	Wed 8:30am - 9:45am	SDCC - Room 05 B
Maximizing the Performance of Your App	Thu 10:30am - 11:15am	SDCC - Demo Theater 11
Building Cross-Platform Apps	Wed 10:15am - 11:30am	SDCC - Room 05 B
Migrating Your Apps from ArcGIS Engine	Wed 3:30pm - 4:15pm	SDCC - Demo Theater 11

Please Take Our Survey on the Esri Events App!

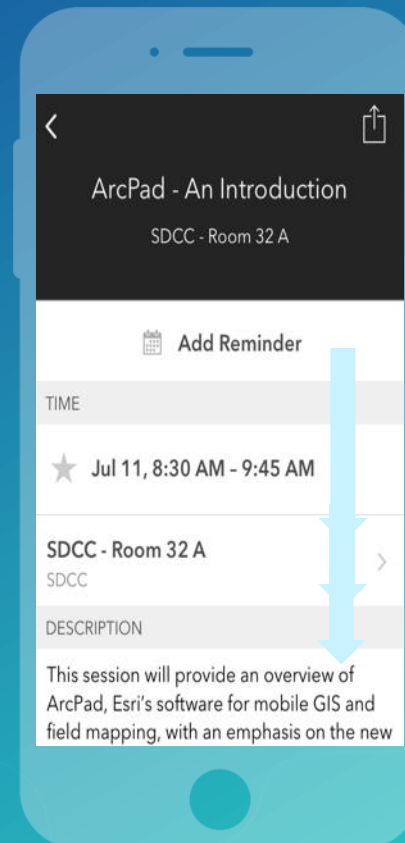
Download the Esri Events app and find your event



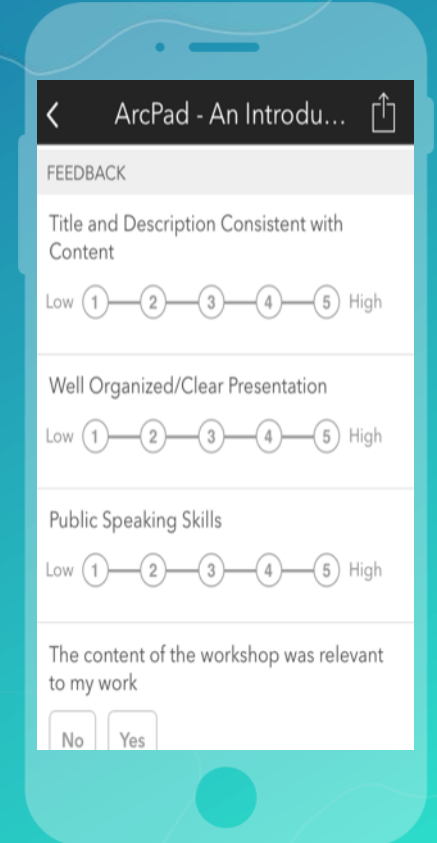
Select the session you attended



Scroll down to find the survey



Complete Answers and Select "Submit"





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Aspect Ratio Test

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