Developing mapping applications with ArcGIS Runtime SDK for iOS

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Agenda

Introduction to ArcGIS Runtime

What is a mapping app?

Accessing your map content

Finding places and addresses

Directions & Navigation

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Runtime is part of the ArcGIS platform

- ArcGIS Online / Portal
  - Maps, lightweight services, Organization branding, collaboration

- ArcGIS for Server
  - Services

- ArcGIS for Desktop
  - Packages
ArcGIS Runtime

- Family of SDKs for multiple platforms
  - Consistent capabilities
- Native to the platform
  - For building great apps
- Lightweight and fast
- Powerful
- Easy
SDK Platforms

- **Android** 10.1.1
  - Java/Android

- **JavaSE** 10.1.1
  - Java
  - Win/Linux

- **QT** 10.2 BETA
  - C++
  - Win/Linux

- **iOS** 10.1.1
  - Objective-C
  - Cocoa
  - Touch

- **OS X** 10.2 BETA
  - Objective-C
  - Cocoa

- **Windows Mobile** 10.1.1
  - .NET

- **WPF** 10.1.1
  - .NET/XAML

- **Windows Phone** 10.1.1
  - .NET/XAML

- **Windows Store** 10.2 BETA
  - .NET/XAML

**Core Runtime**
Runtime form factors

Desktop
- OS X
- WPF

Phones and tablets
- Windows Phone
- Windows Mobile
- Phone Store
- iOS
- Android
- Windows Mobile

Embedded
- JavaSE
- QT
New and Noteworthy
V10.1.1

- New Architecture
  - Native, high performance, core runtime
- Advanced Military Symbology
- PKI security
- Minimum iOS 5
- Better highlighting of graphics
- ArcGIS Online & Server enhancements
What is a mapping application?
Common themes

- **Provide a geographic context**
  - Map can be central or incidental to the app

- **Maps are effective way to**
  - present a lot of information
  - digest a lot of information

- **Find areas of interest**
  - Address or popular place names
  - Spatial or non-spatial criteria
  - Geoprocessing analysis
Some of our favorite apps

GasBuddy

Reminders

Map centric  No map
Some of our favorite apps

Yelp

Redfin
An Apple Maps replacement in <20 minutes
What the Runtime SDK can do for you

• Display custom maps
  - ArcGIS Online or On Premise
  - Esri or OGC

• Perform analysis
  - Geocode, Route
  - Geometry Engine, Geoprocessing

• Display results on the map
  - Graphics
  - Callout, Popups
Accessing your map content
ArcGIS Online provides a powerful way to

- Collaborate in a private setting with co-workers
  - Create & share content with chosen users or groups

- Access ready to use content
  - Basemaps
  - World Geocoding
  - World Routing

- Host your data in the cloud
  - Vector feature services
  - Tiled services
iOS Developers can use ArcGIS Online in 2 ways:

1. Developer is known to the platform. End user remains unaware.
   - Consumers, Knowledge workers
   - Developer credentials burnt into the app
   - Coming: App IDs & OAuth2

2. End user is known to the platform
   - GIS Specialists
   - Basic, Digest, Token, PKI Authentication
   - Coming: 2-step OAuth2
Connect to ArcGIS Online or on-premise portals

1. Instantiate the Portal, set delegate

   ```
   NSURL* url = [NSURL URLWithString:@"http://www.arcgis.com"];
   AGSPortal* portal = [[AGSPortal alloc] initWithURL:url credential:nil];
   portal.delegate = self;
   ```

2. Handle delegate method for portal finished loading

   ```
   -(void) portalDidLoad:(AGSPortal*) portal {
     AGSPortalInfo* portalInfo = portal.portalInfo;
     //portalInfo contains info about the portal or ArcGIS online subscription
   }
   ```
Access personal content

1. Retrieve user object, set delegate, fetch content

```c
AGSPortalUser* user = portal.user;
user.delegate = self;
[user fetchContent];
```

2. Handle results in delegate method

```c
- (void) portalUser:(AGSPortalUser*)portalUser operation:(NSOperation*)op
didFetchContent:(NSArray*)items folders:(NSArray*)folders
inFolder:(NSString*)folderId {
    //content includes an array of AGSPortalItem objects representing web maps
}
```
Search for content (items)

1. Define the query, find items with query

```objc
AGSPortalQueryParams* itemQuery =
    [AGSPortalQueryParams queryParamsForItemsOfType: AGSPortalItemTypeWebMap
     withString: @"fuel"];

[portal findItemsWithQueryParams: itemQuery];
```

2. Handle results in delegate method

```objc
-(void)portal:(AGSPortal*)portal operation:(NSOperation*)op
didFindItems: (AGSPortalQueryResultSet*)resultSet{
//results contain an array of AGSPortalItem objects
}
```
Search for groups

1. Define the query, find groups with query

```objc
AGSPortalQueryParams* groupQuery =
    [AGSPortalQueryParams queryParamsWithQuery:portalInfo.featuredGroupsQuery];

[portal findGroupsWithQueryParams:groupQuery];
```

2. Handle results in delegate method

```objc
-(void)portal:(AGSPortal*)portal operation:(NSOperation*)op
    didFindGroups:(AGSPortalQueryResultSet*)resultSet {
    //results contain an array of AGSPortalGroup objects
}
```
Demo

Access content through ArcGIS
Online Subscription
Finding places and routing
ArcGIS Online provides World Geocode service

- Free to use. 105 countries

- Single/Multi line address or place name
  - 407 W Walnut Pasadena CA 91103
  - Banks in Paris
  - Mount Everest
  - -117.155579, 32.703761

- Limit searches to a region, OR promote “local” results within distance from location
Using **AGSLocator** to find places & addresses

1. Instantiate the Task, set delegate

```swift
NSURL* url = [NSURL URLWithString:portalInfo.geocodeServiceUrls[0]]; 
AGSLocator* locator = [AGSLocator locatorWithURL:url];
locator.delegate = self;
```

2. Kick off operation

```swift
AGSLocatorFindParameters* params = [[AGSLocatorFindParameters alloc] init];
params.text = @"Starbucks" ;
params.location = [mapView visibleAreaEnvelope].center;
params.distance = 1000; //meters
[locator findWithParameters: params];
```

3. Handle results in delegate method

```swift
- (void)locator:(AGSLocator *)locator operation:(NSOperation *)op 
didFind:(NSArray *)results {
   //results contains an array of graphics
}
```
Displaying results on the map

- Add graphics using graphics layer
  - Points, Lines, Polygons

- A graphic contains
  - Geometry (location & shape)
  - Symbol (how graphic should look)
    - Marker, Line, Fill, Text, Composite symbols
  - Attributes (additional information)

- Tapping on a graphic displays a callout
ArcGIS Online provides World Route service

- 102 countries. Requires service credits
- Uses Live or Historic traffic conditions
- Point to Point, or multi-point routes
  - Optimize distance or travel time
  - Reorder stops for best sequence
  - Time windows, Barriers & Restrictions
Using **AGSRouteTask** to compute routes

1. Instantiate the Task, set delegate

```objc
NSURL* url = [NSURL URLWithString: portalInfo.routeServiceUrl];
AGSRouteTask* routeTask= [AGSRouteTask routeTaskWithURL:url credential:c];
routeTask.delegate = self;
```

2. Kick off operation

```objc
AGSRouteTaskParameters* params = [[AGSRouteTaskParameters alloc] init];
[params setStopsWithFeatures:@[firstStop, lastStop]];
params.returnDirections = YES;
params.findBestSequence = YES;
[routeTask solveWithParameters: params];
```

3. Handle results in delegate method

```objc
- (void)routeTask:(AGSRouteTask *)routeTask operation:(NSOperation *)op
didSolveWithResult:(AGSRouteTaskResult *)routeTaskResult {
    // Results contains a Route graphic and list of directions
}
```
Using device location

- Map View supports pluggable location data sources
  - GPS sensor
  - GPX file, Simulated
  - Custom

- Auto pan behavior
  - Navigation
  - Compass
  - Default (within wander extent)

```javascript
[mapView.locationDisplay startDataSource];

mapView.locationDisplay.autoPanMode = AGSLocationDisplayAutoPanModeNavigation;
```
Demo
Finding a place and routing from current location
Recap

• Connect to Portal. Access content. Switch basemaps.
  - AGSPortal

• Find place. Display results on map.
  - AGSLocator, AGSGraphicsLayer, AGSGraphic

• Compute route and display driving directions
  - AGSRouteTask, AGSDirectionSet
A peek at what’s coming

10.2

- API simplification
  - Basemaps
  - Geocoding & Routing
- Disconnected map use
- Better sketching U/X
- More responsive graphics layers (dynamic mode)
- Ability to create & modify web maps
- Geotriggers
- Authentication through oAuth2 security
Related Resources

- [http://developers.arcgis.com](http://developers.arcgis.com)
  - Tutorials, Guide, Samples, API reference

Sessions

- Implementing Analysis, Editing, and Offline Applications
  - Wed, 2:30 PM
- Road ahead for ArcGIS Runtime SDKs
  - Thu, 10 AM

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Understanding our world.