



Developing Android Apps with the ArcGIS Runtime SDK for Android

Dan O'Neill  @jdoneill  @doneill

Xueming Wu  @xuemingrocks

Agenda

- Introduction to the ArcGIS Android SDK
- Maps & Layers
- Basemaps (Portal)
- Location
- Place Search
- Routing
- Authentication
- Maps App
- What's next!

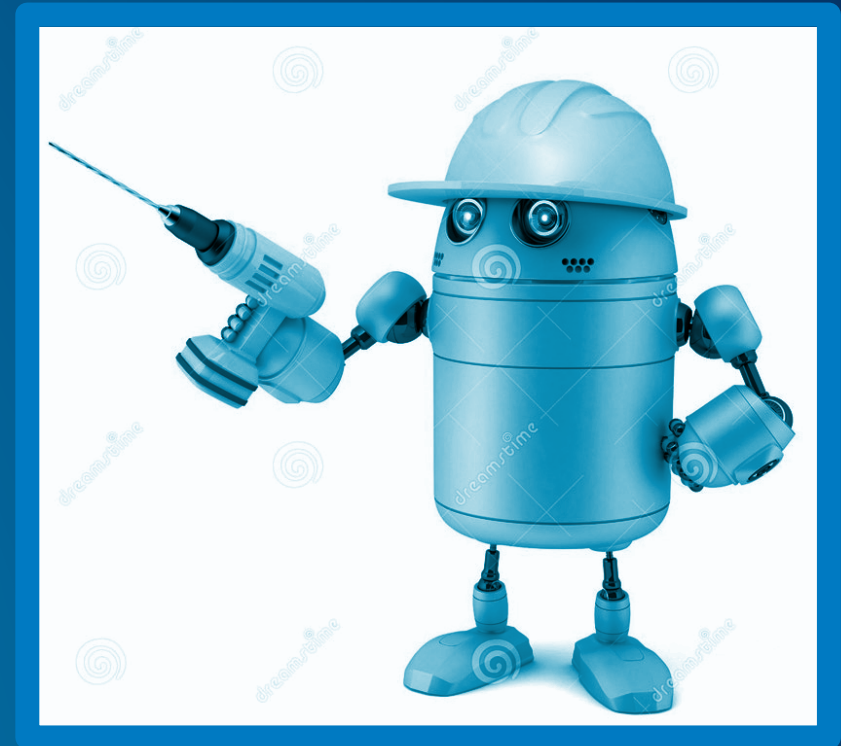




Introduction to the ArcGIS Android SDK

SDK Introduction - Features of the ArcGIS Android SDK

- **High performance Mapping and GIS capabilities**
- **Add and query content from your Organization**
- **Work offline with Basemaps and operational data**
- **Display maps in support spatial references**
- **Work with your device GPS**
- **Offline/Online routing**
- **Add graphics to maps**
- **Advanced geometric and spatial analysis operations**

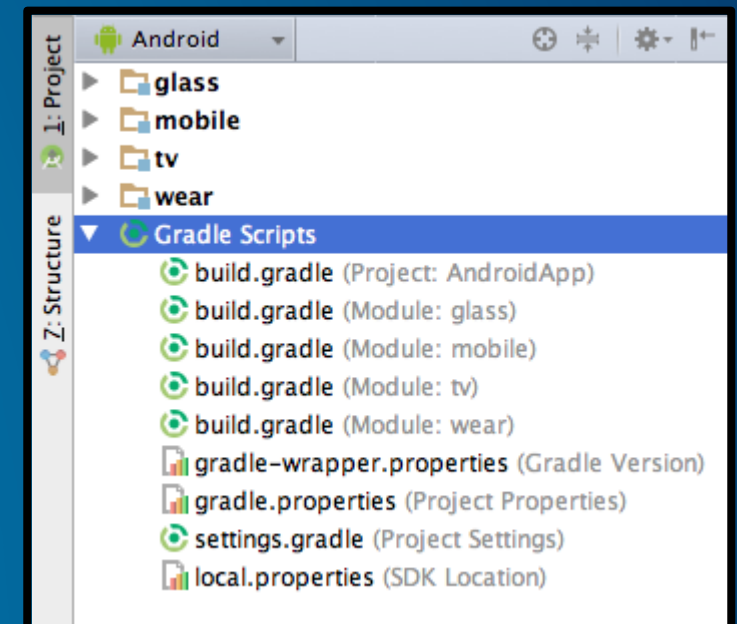
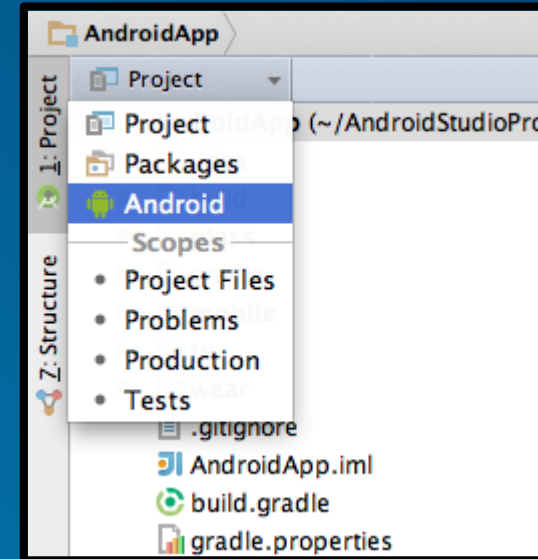


SDK Introduction - What you get

- **Rich mapping API for native Android app development**
 - multiple ways to get API
- **Android Library module (AAR) from a public maven repository**
 - Preferred way to work with the SDK
- **API Reference (Javadoc) & Guide documentation**
 - developers.arcgis.com/android
- **Suite of samples**
 - GitHub samples
- **User Forum**
 - GeoNet/GIS Stack Exchange
- **Blogs**
 - Developer blogs for Android

SDK Intro - How to get the SDK

- **Android Studio**
 - Official IDE for Android development
 - Based on IntelliJ IDEA
 - Project & File Structure
 - Android project view
- **Gradle**
 - Android plugin for Gradle - Groovy Goodness
 - Flexible build system - custom build logic
 - Manage dependencies
 - Runs independent of Android Studio



SDK Intro - How you get the SDK

Add repository URL

```
repositories {  
    jcenter()  
    maven {  
        url 'http://dl.bintray.com/esri/arcgis'  
    }  
}
```

dependency

Add ArcGIS Android

```
dependencies {  
    compile fileTree(dir: 'libs', include: ['*.jar'])  
    // ArcGIS Android 10.2.6 API  
    compile 'com.esri.arcgis.android:arcgis-android:10.2.6-2'  
}
```

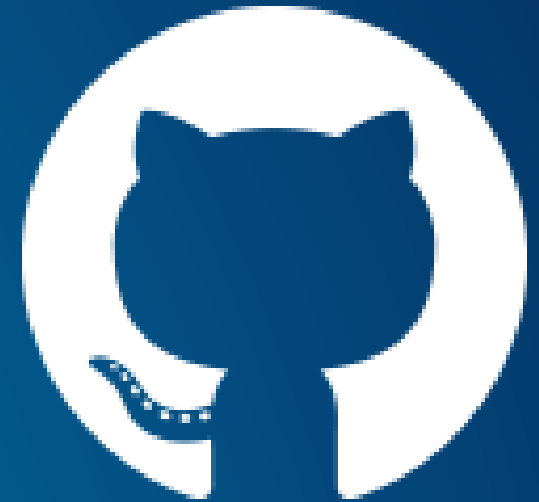
DEMO

Your first android app - Hello World

SDK Introduction - Samples

Open Source Samples

- Get an account (if you don't already have one)
- Fork the repo
- Clone the repo locally
- Import project into Android Studio
- Run Sample



Esri is on GitHub!

DEMO

Fork/Clone the Samples

SDK Introduction - Migrate existing Eclipse projects

- **Android Project Files**
 - **app** - application modules
 - **build.gradle** - custom properties
- **New Build System**
 - **Gradle** - Open source build
- **Upgraded IDE functionality**
 - **Android Studio** - Supports Android project structure
 - **Migration wizard** - Migrates Eclipse projects



SDK Introduction - Migrate existing Eclipse projects

- **Migration Prerequisites**
 - **Eclipse ADT**
 - **Eclipse project has certain project files**
 - **Manifest, .project, .classpath, res/ & src/ directories**
 - **Comment out any references to ADT library files**
 - **Android Studio**
 - **What Eclipse 3rd party plugins do you use**
 - **Search for compatible plugins in Android Studio**
 - **Update to the latest version of Android Studio**

DEMO

Migrate existing Eclipse ADT
projects

SDK Intro - What's in the local SDK

SDK Download

- **doc**
 - **API Ref - Javadoc**
- **legal**
 - **license info**
- **libs**
 - **dependency jars and native libs**
 - **local ArcGIS Android SDK Library Module AAR**
- **res**
 - **localization files**
- **resources**
 - **Military symbol dictionaries**
- **samples**
 - **archive snapshot of samples from GitHub**

SDK Intro - What's exclusive in the local SDK

- **Localization resources**
 - **Localization of Popups**
- **Advanced Symbology symbol dictionaries**
 - **APP6B and MIL2525 C symbol dictionaries**
- **Beta Analysis libs**
 - **Native libs to support offline Spatial Analysis**

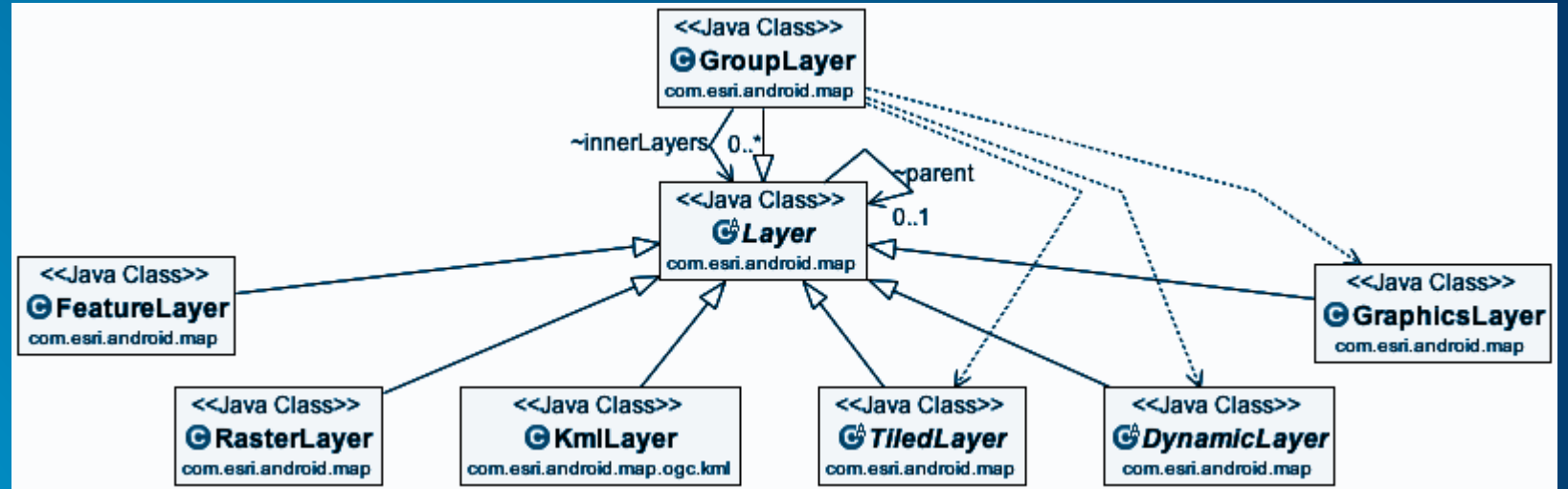


Maps & Layers

Dan O'Neill

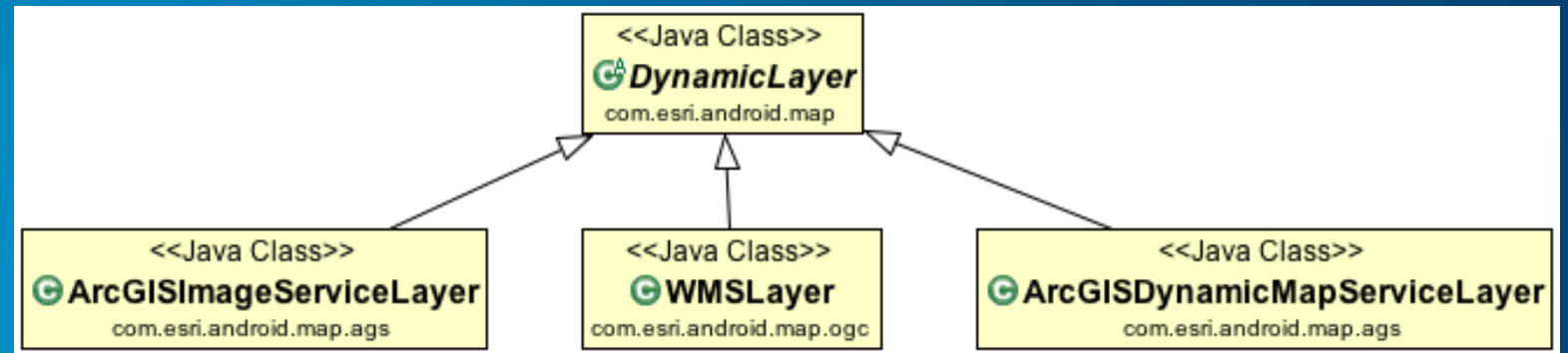
Maps & Layers – Layer Types

- DynamicLayer
- FeatureLayer
- GraphicsLayer
- GroupLayer
- KmlLayer
- RasterLayer
- TiledLayer



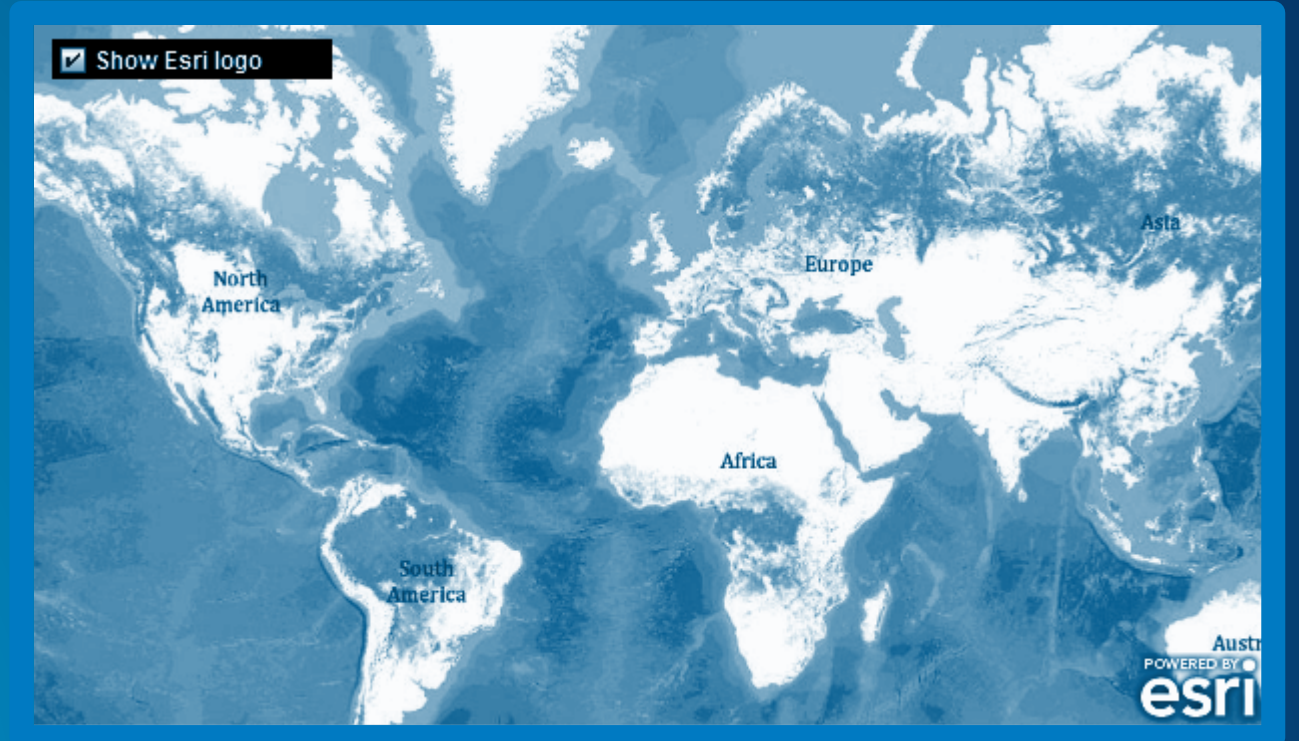
Maps & Layers – Dynamic Layers

- **Abstract Base Class**
- **Sub-classes**
 - **ArcGISDynamicServiceLayer**
 - **ArcGISImageServiceLayer**
 - **WMSLayer**



Maps and Layers – TiledLayer

- **Abstract Base Class**
- **Direct sub-classes**
 - **ArcGISLocalTiledLayer**
 - **TiledServiceLayer**
- **Indirect sub-classes**
 - **ArcGISMapServiceLayer**
 - **BingMapsLayer**
 - **OpenStreetMapLayer**
 - **WMTSLayer**



Maps & Layers – Graphics Layer

- Layer representing one or more Graphics
 - Dynamically display Graphics on a MapView
 - Graphics can be geometries or features
- MapView can contain one or more GraphicLayers

```
// add graphics layer
graphicsLayer = new GraphicsLayer();
mMapView.addLayer(graphicsLayer);
```

```
private void addReports(ArrayList<Graphic> graphics) {
    Graphic graphic;
    // if there is something to add, do it...
    if (graphics.size() > 0) {
        for (int i = 0; i < graphics.size(); i++) {
            graphic = graphics.get(i);
            graphicsLayer.addGraphic(graphic);
        }
    }
}
```




Basemaps

Dan O'Neill

Basemaps

- **ArcGIS Online provides a living atlas of the world**
 - **Delivered as map service**
 - **Freely available to anyone**
 - **Include**
 - **World Imagery**
 - **World Street Map**
 - **World Topographic Map**
 - **Ocean Basemap**
 - **and more**

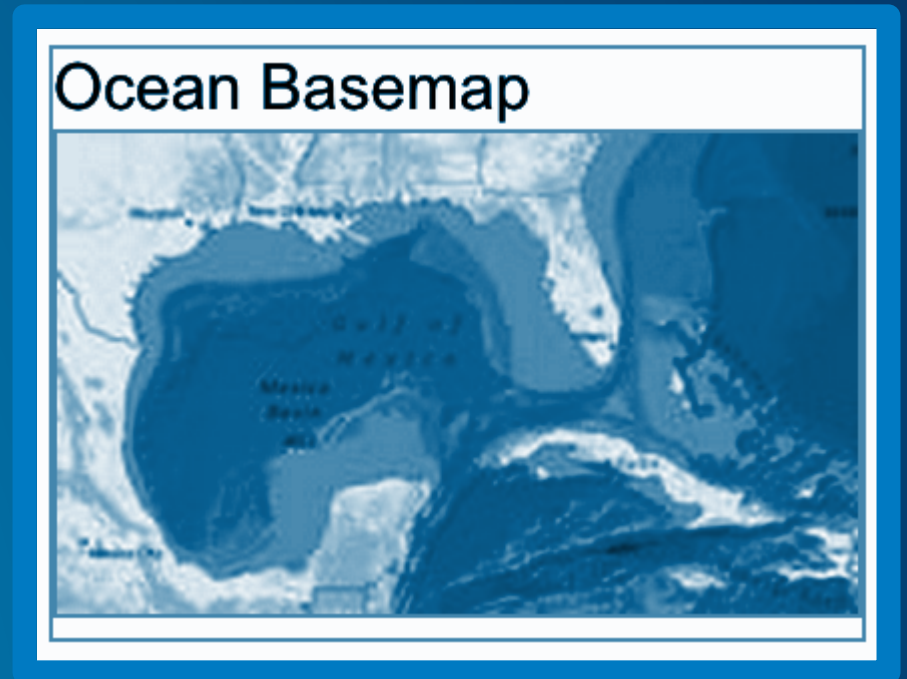


World Topographic Map

Basemaps - From Portal

How to get them in your app

- **Portal**
 - Provides the connection information to the Portal
- **PortalInfo**
 - Name, logo, featured items, etc
- **PortalGroup**
 - Represents a group in a portal
- **PortalItem**
 - Represents an item in a portal
- **PortalQueryParams**
 - Creates query parameters for finding content
- **PortalQueryResult**
 - Results of the queries performed on a portal





Location

Dan O'Neill

Location - GPS

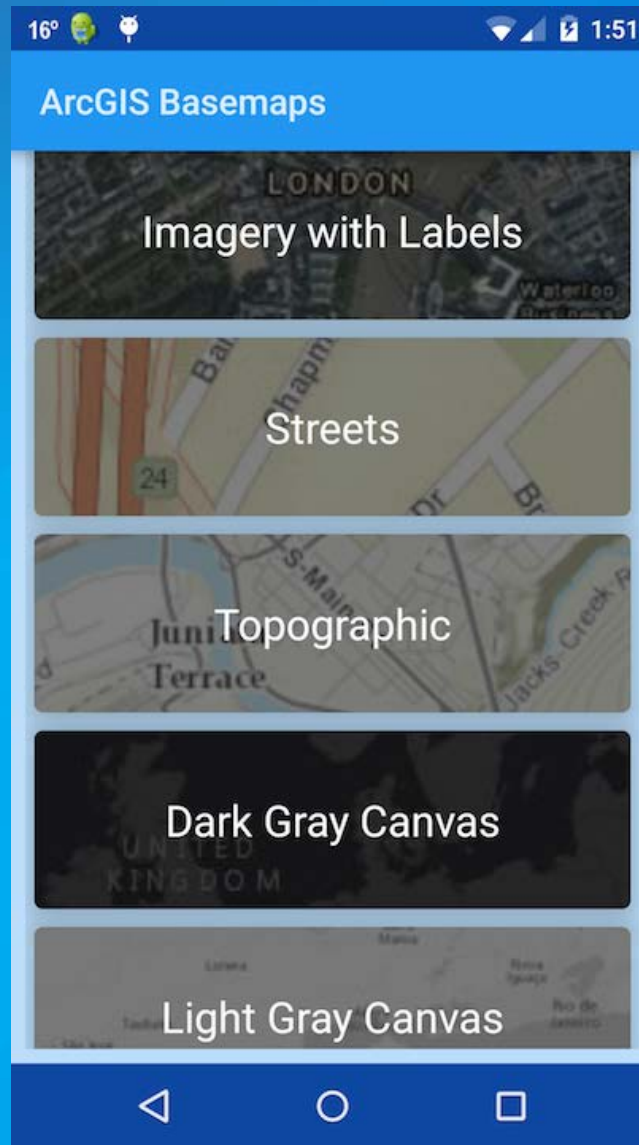
- Use the power of your device to show where you are
- Know where you are allows apps to return smarter information back
- LocationDisplayManager provides the current location
 - Device location on a Map
 - Auto pan
 - Listen to events
 - pause
 - resume

DEMO

BASEMAP

&

Location



<https://github.com/Esri/arcgis-runtime-demos-android/tree/master/2015-DS/MaterialBaseMaps>



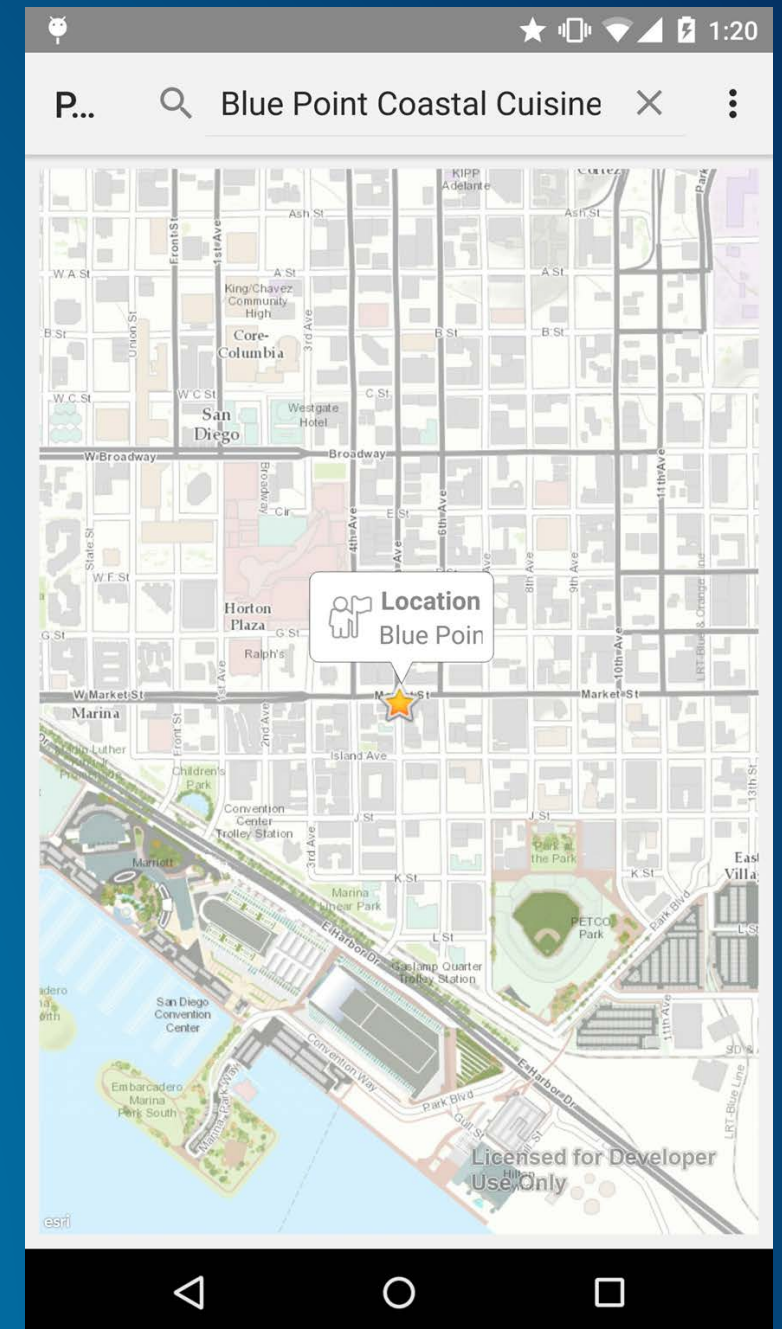
Place Search

Xueming Wu

Place Search - Geocoding

- ArcGIS Online Geocoding service
 - Global coverage
- Locator uses this in default constructor
- Find method allows for address and POI search
- LocatorFindParameters
 - Set source Country
 - Point and radius parameters
 - Set Max returned location candidates

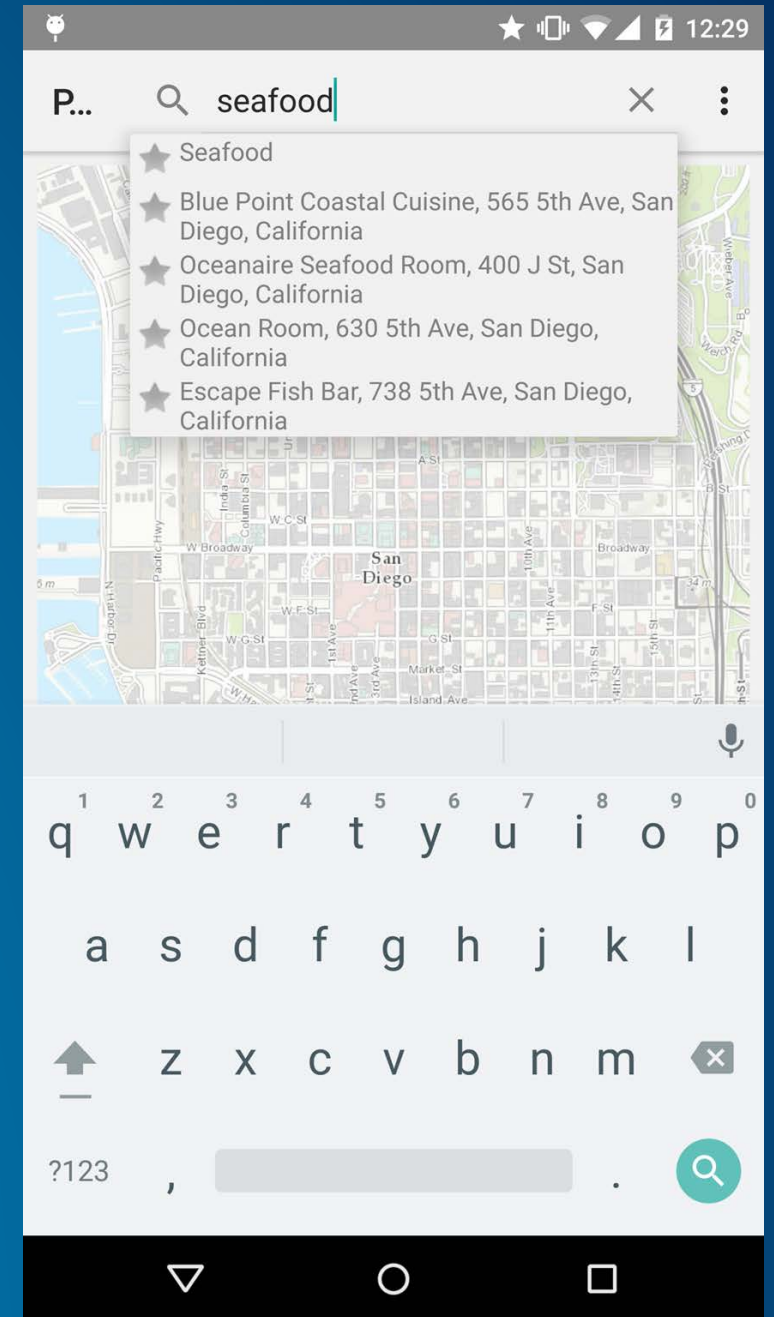
Locator.find(**LocatorFindParameters**)



Place Search – search suggestions

- **LocationSuggestionParameters**
 - Results in radius are promoted
 - Sorted by distance to point
 - Results outside radius still returned

Locator.suggest(**LocationSuggestionParameters**)



Place Search – Toolkit Simplification

- **ArcGIS Android Toolkit API**
- **Provides GeocodeHelper class**
- **Find address for given location**
- **Simplifies the workflow**
 - **No need to set parameters and get result from a Locator**

DEMO

Place Search



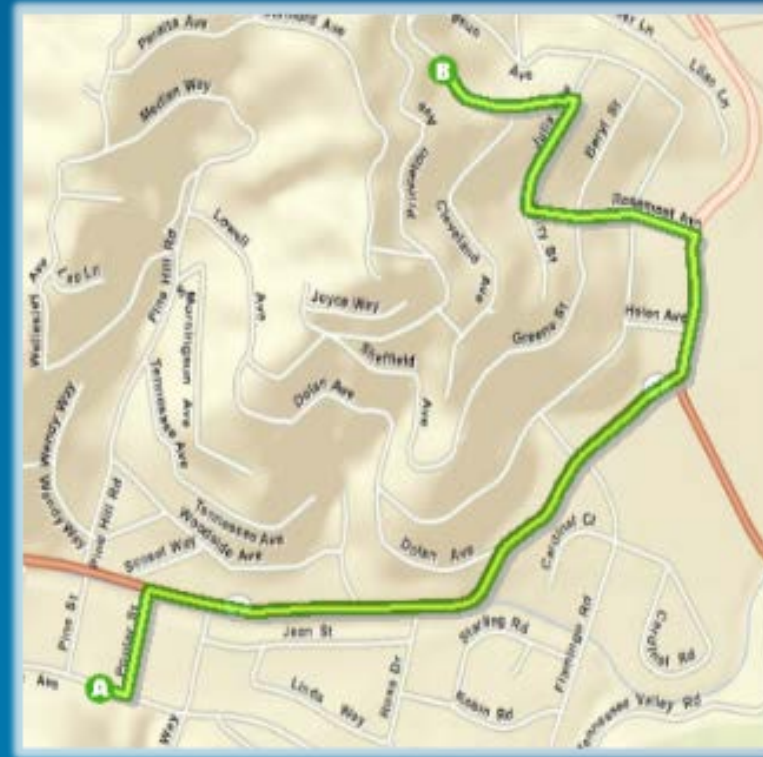


Routing

Dan O'Neill

Routing API - Workflow



- Create a Route Task
- Set up Route Task Parameters
- Set stops
- Calculate route
- Get results
- Display route on map
- Get directions and display to user




DEMO

Routing

Routing

	<input type="text" value="Ontario International Airport"/>	<input type="button" value="x"/>
	<input type="text" value="Esri"/>	<input type="button" value="x"/>





Authentication

Xueming Wu

Authentication

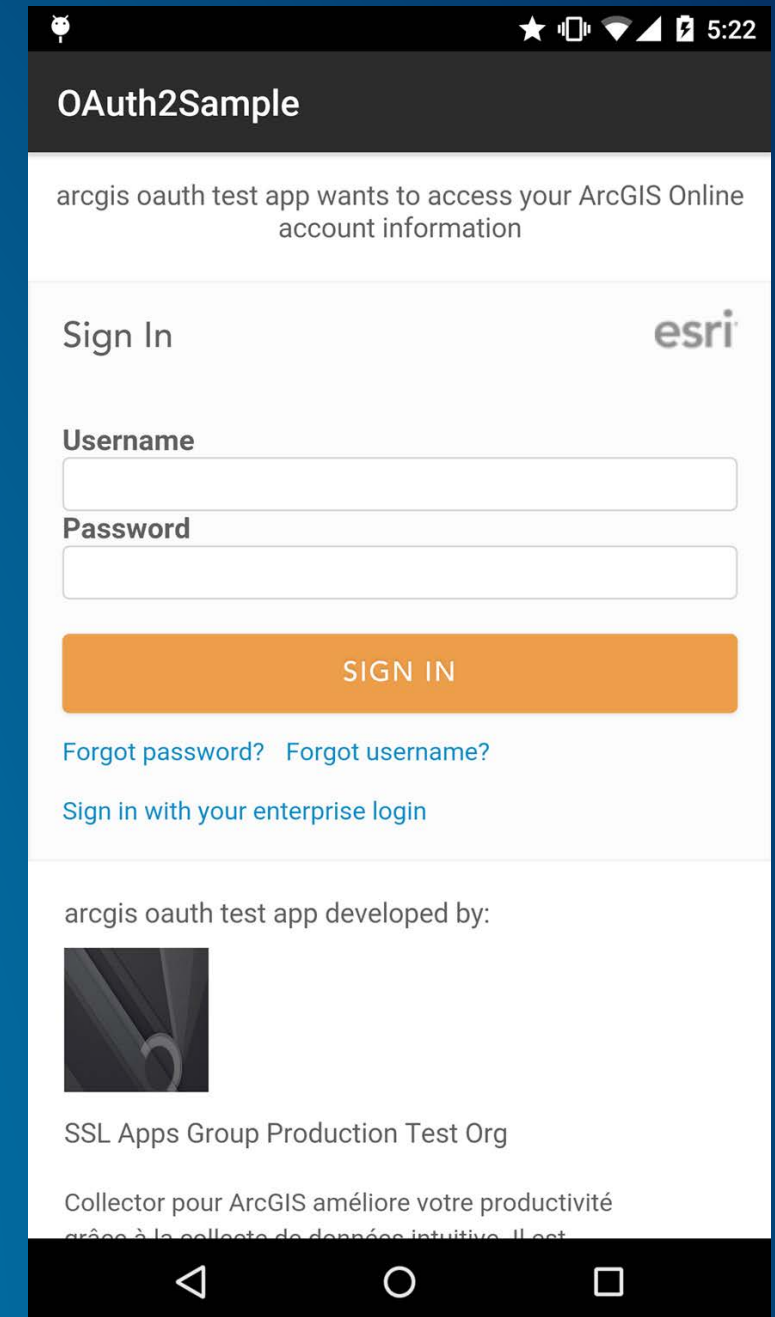
- **When do you need to authenticate**
 - **Access users private content**
 - **Create and publish content**
 - **Access premium content on ArcGIS Online**
- **Authentication patterns**
 - **Application authentication**
 - **User logins**

User Logins

- **Allow ArcGIS Online users to authorize your application on their behalf**
- **Two steps processes:**
 - **authorization → authorization code**
 - **exchange code for tokens → access token and refresh token**

OAuth

- Have you heard about OAuth?
- Create an OAuthView in code or from xml
 - portal url
 - client id
 - CallbackListener
- Get credentials from CallbackListener.onCallback
- Handle error in CallbackListener.onError()
- Customize the http authentication request dialog



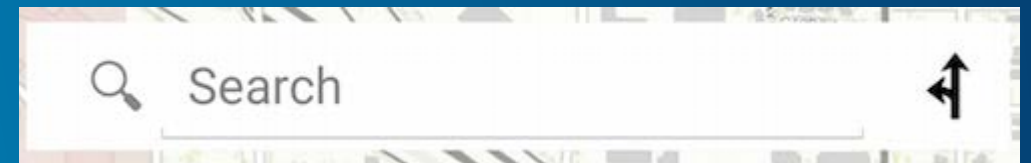
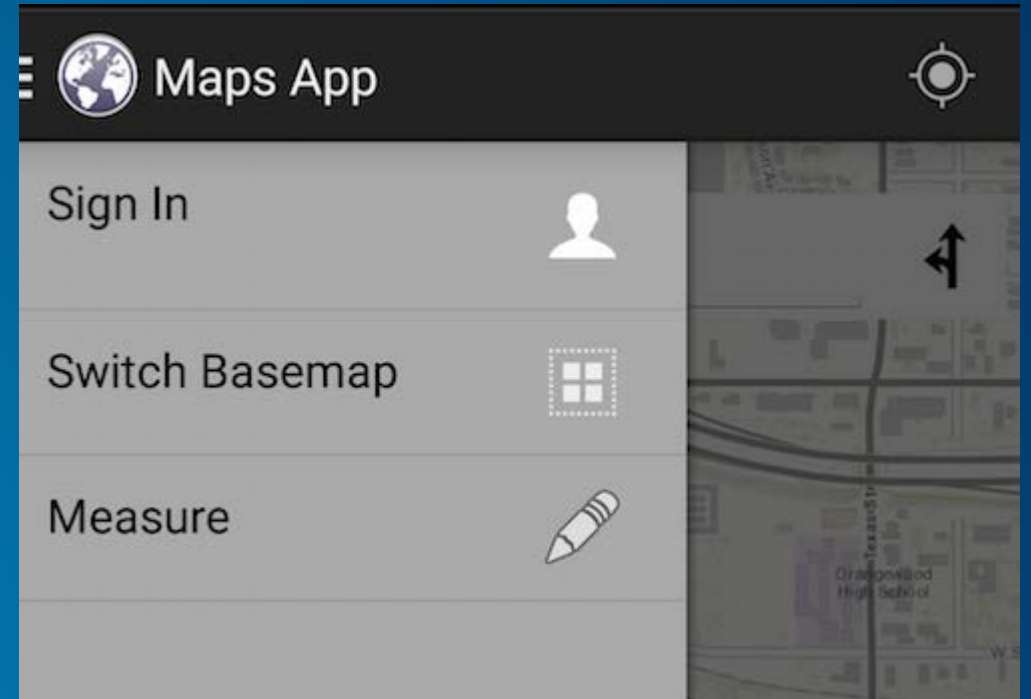


Maps App

Dan O'Neill

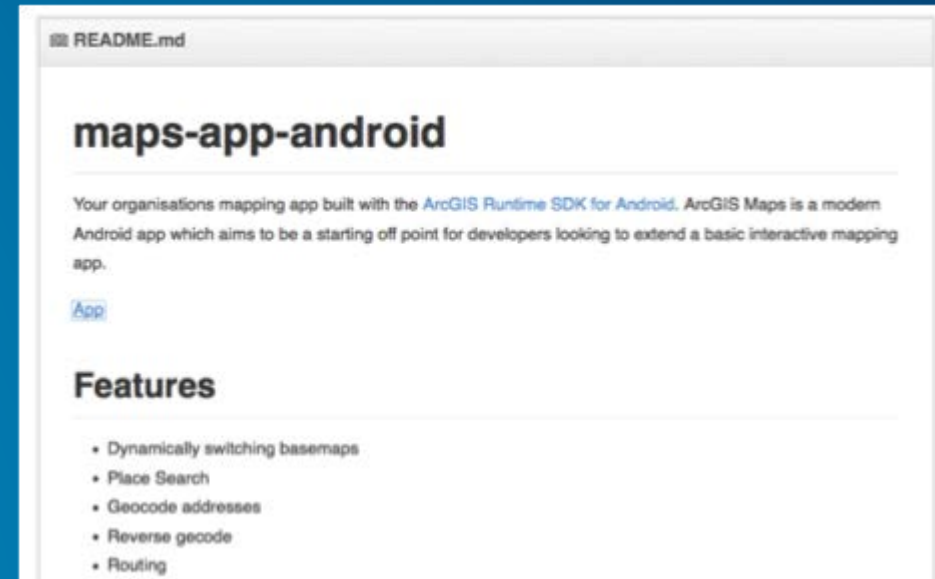
Maps App

- **Material**
 - **Navigation Drawer**
- **Search Widget**
- **Floating Compass Button**
- **Fragments**
 - **Routing Dialog**
 - **Directions Dialog**
 - **Basemaps Dialog**



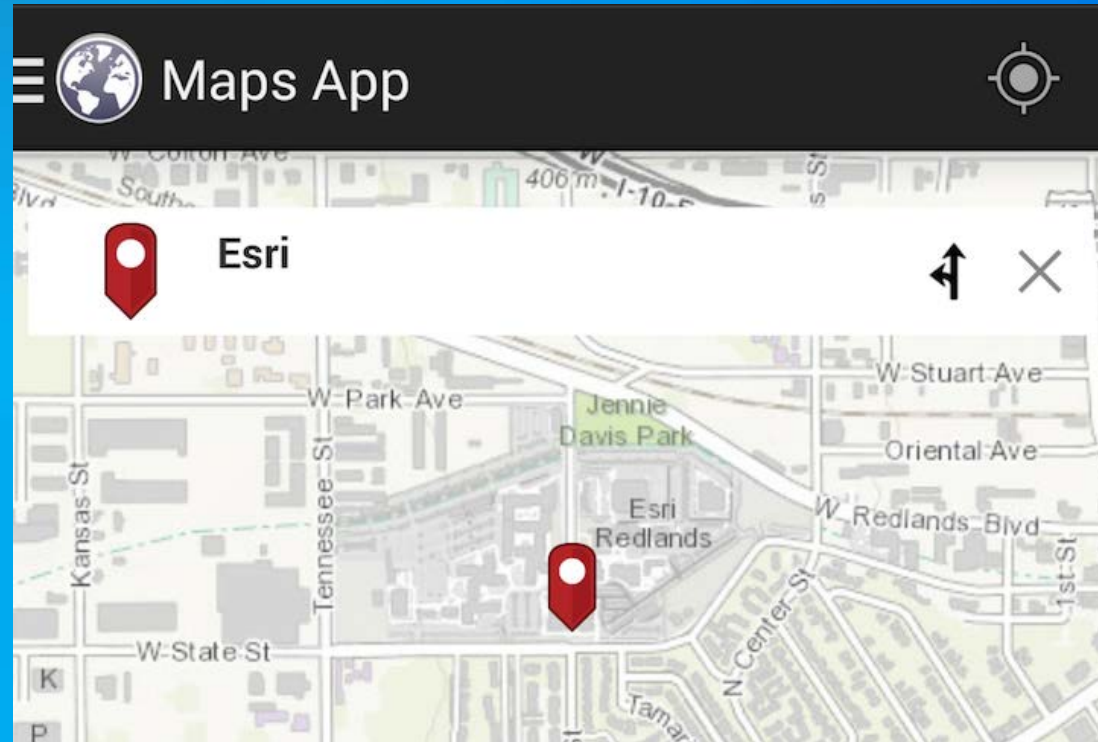
Maps App on GitHub

- <https://github.com/Esri/maps-app-android>
- Get involved
- Report Issues
- Contribute Code
 - Fork it
 - Clone it
 - Configure remotes
 - Send pull requests



DEMO

Maps App



Offline support

- **Take a map offline**
 - **View**
 - **Edit**
 - **Sync**
- **Perform offline tasks**
 - **Analysis (Beta)**
 - **Routing/Geocoding**
 - **Query**

What's Next? Quartz!

Dan O'Neill



Quartz

- **Major release**
 - Many new capabilities
 - New APIs
 - Improved internal architecture
- **Goals**
 - Support the ArcGIS Platform
 - Synchronize APIs across all ArcGIS Runtime platforms
 - Move ArcGIS Engine developers to the ArcGIS Runtime
 - Support specific user workflows

Agenda

- Introduction to the ArcGIS Android SDK
- Maps & Layers
- Basemaps (Portal)
- Location
- Place Search
- Routing
- Authentication
- Maps App
- What's next!

Sessions to attend

Related to Runtime and/or Android

Collaborate with the Android Runtime SDK Team	Demo Theater 11 - Developer	Wed: 9:30AM - 10:15AM
Road Ahead: ArcGIS Runtime SDK's	Room 08	Wed: 3:15PM - 4:30PM
Developing Offline Apps with the Runtime SDK's	Room 33A	Thur: 8:30AM - 9:45AM



THANK YOU

QUESTIONS



Understanding our world.