

2011 Esri Developer Summit

Palm Springs, CA

Advanced Development with ArcGIS API for Android

Will Crick & Archana Agarwal

Code for the Water Services app used in the sessions can be found here:

<http://www.arcgis.com/home/item.html?id=6e0512016fdd4f6ab4e47b2eb64a347d>



What will be covered today...

- Introduction
- Advanced Android concepts
- ArcGIS for Android advanced concepts
- Building an enterprise application
 - Water engineer app
 - Requirements & design
 - Implementation and demos
- Future release plan
- Questions





Introduction

About me, you and this session

- Me...
- Archana...
- You...
- **Session aims**
 - Implementation focus

ArcGIS for Android [short] History

ArcGIS for Mobile
ArcGIS for iOS
ArcGIS for Windows phone
ArcGIS for Android

ArcGIS for Android:
Public Beta Feb 2011
Next release Q2 2011 (not beta)



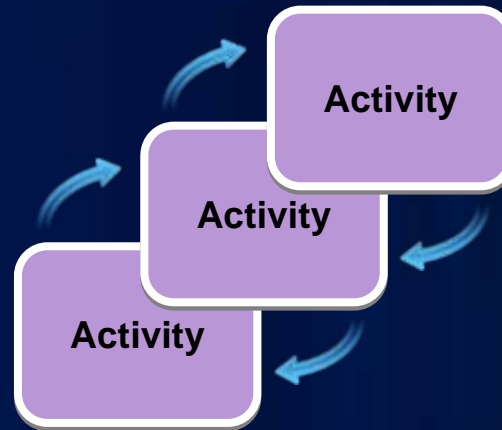
Android in the Enterprise

- **Why Android?**
 - Open
 - Almost any device
 - Good default behaviors
 - Appears to work 😊
- **Challenges**
 - **Security / Privacy**
 - Push Cloud-to-device
 - Private deployment



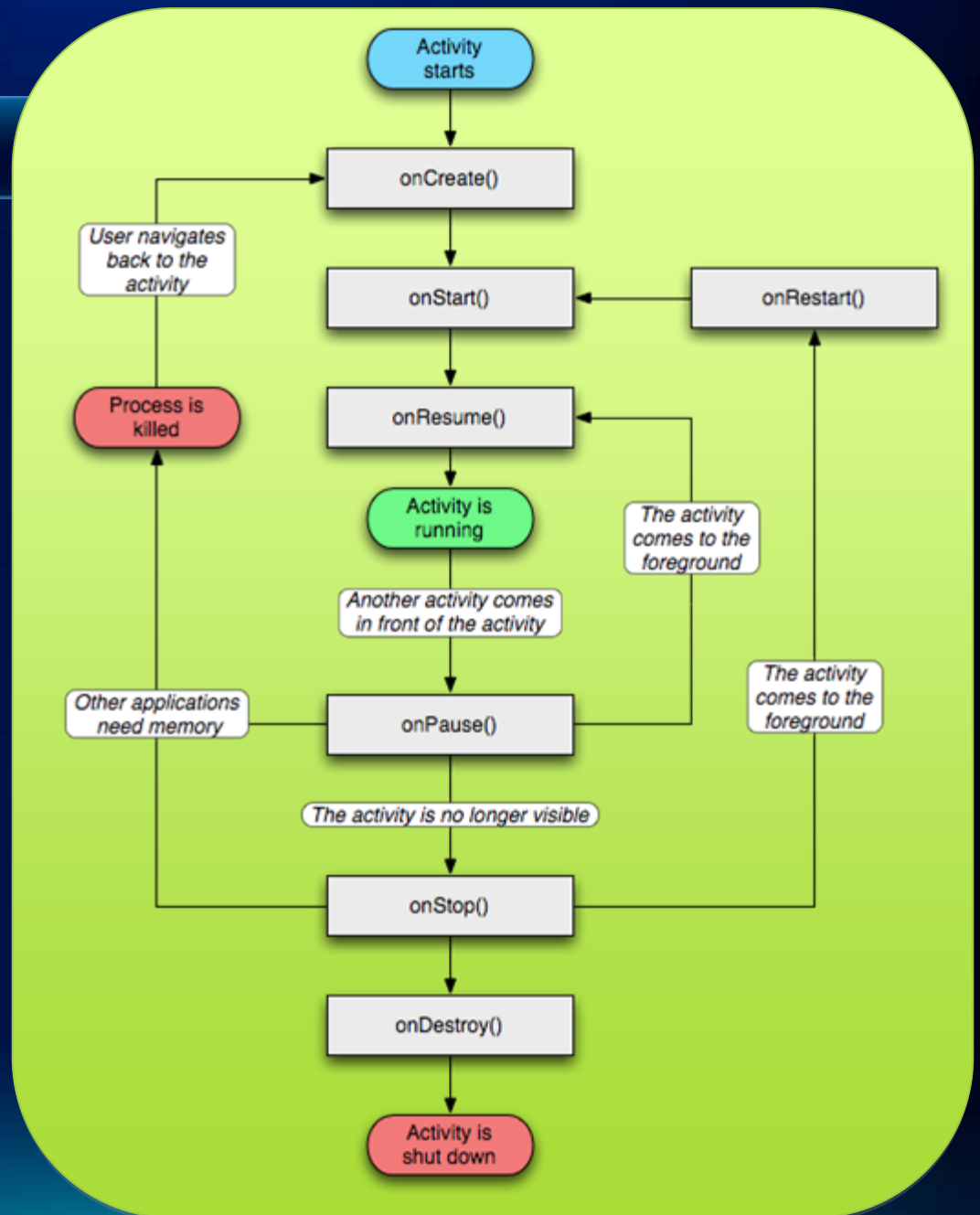
Android UI choices

- **Android components**
 - **Activities**
 - The Stack
 - **Dialogs**
 - Pop ups
 - Code stays within the activity
 - **Views**
 - Use of adapters
 - Replacing, hydrating



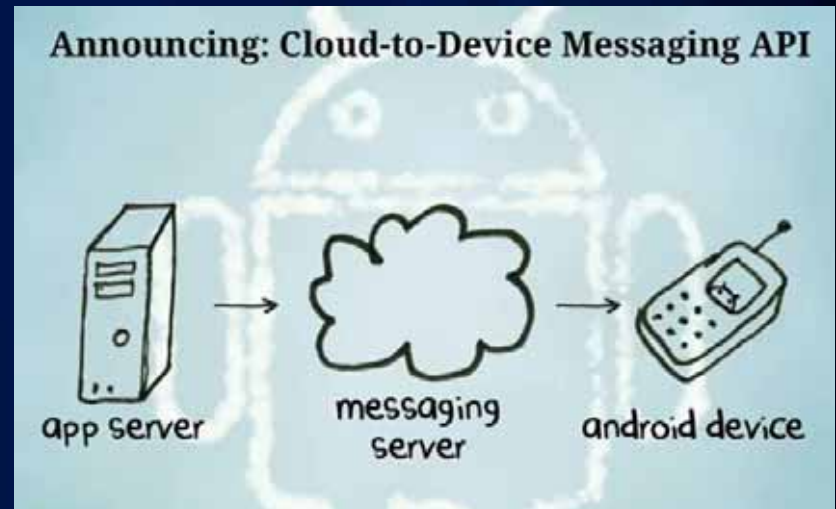
Activity Lifecycle

- On Create – created
- On Start – B4 visible
- On Resume – Top
- On Pause
- On Stop – not visible
- On Destroy - destroyed



Passing data between Activities

- **Intents**
 - Abstract operation...
 - Device has defaults
 - Pass bundle of value pairs
 - Pass content provider uri
- **Content Providers**
 - URI provides access to the data
- **Global variables**
 - Activity can be killed
- **Serialize**
- **Database**



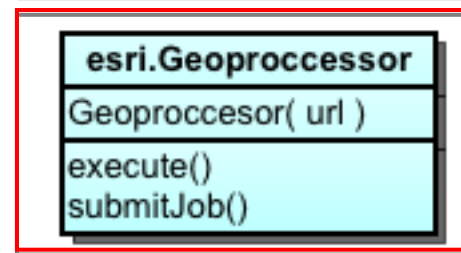
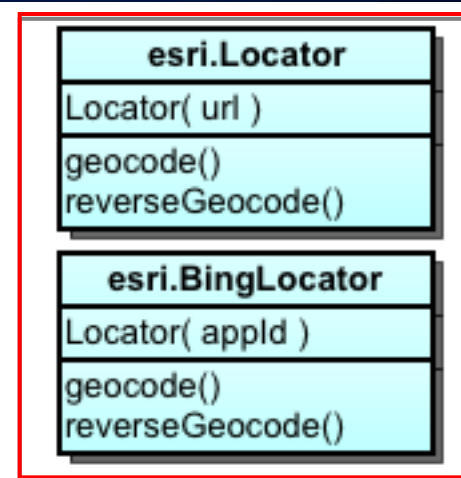
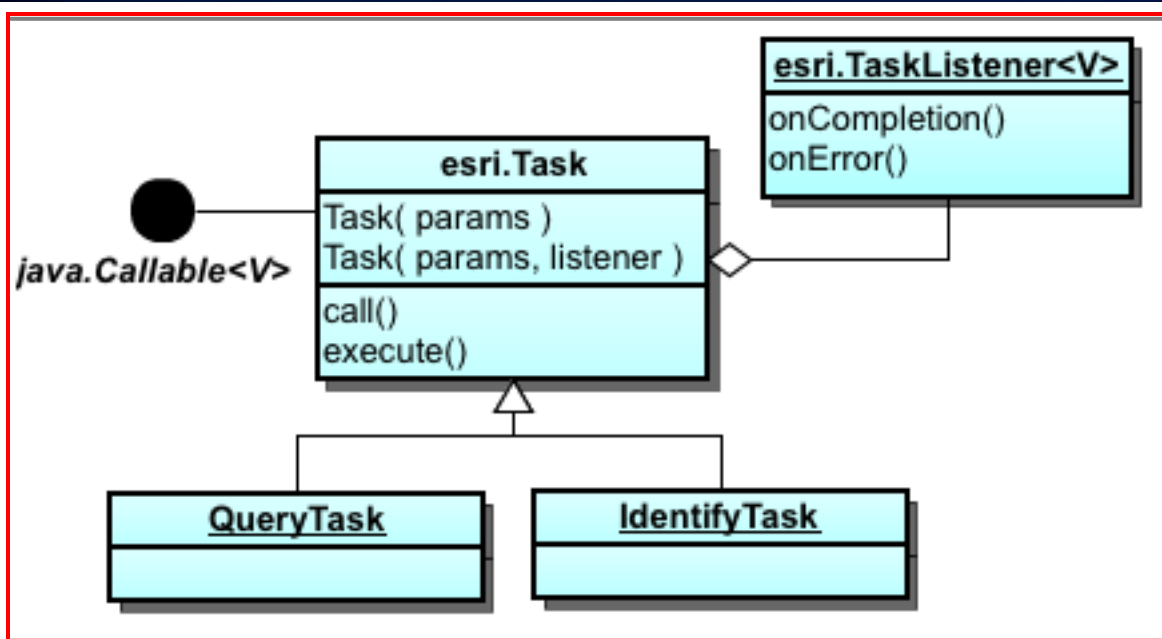
The importance of the UI Thread

- **Work with Views on the UI Thread**
- Async methods are common
 - Run in other threads
- Options
 - AsyncTask
 - Handler() – bound to creation thread
 - Messages & runnables
 - View.runOnUiThread(new runnable() {...})
 - ExecutorService
 - Threads



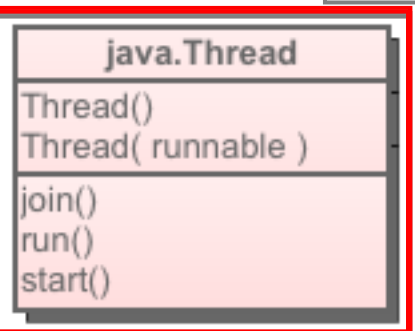
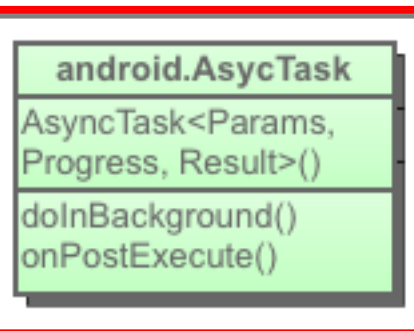
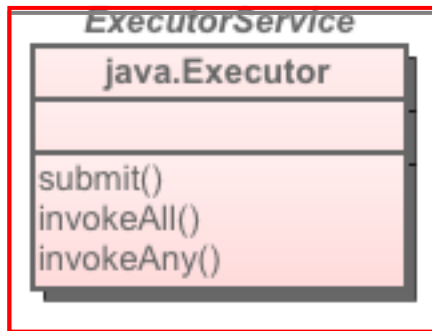
ArcGIS for Android advanced concepts

More on Tasks



Create from

ExecutorService



ArcGIS Android Layer performance

- **Try to minimize traffic**
 - Requests are expensive
 - Processing of results cost
- **Feature layer types**
 - Snapshot
 - On Demand
 - Selection
- **Dynamic map service layer**
 - Image only
 - Layer definition expressions
- **Combine the above**
 - Selection mode FL & dynamic



Requirements

- Show a workers jobs for the day
- Get job information from external system
- Allow the worker to view the assets at a jobs location
- Show worker their location on the map
- Update asset condition information
- Collect/draw incident information at a location

Water engineer



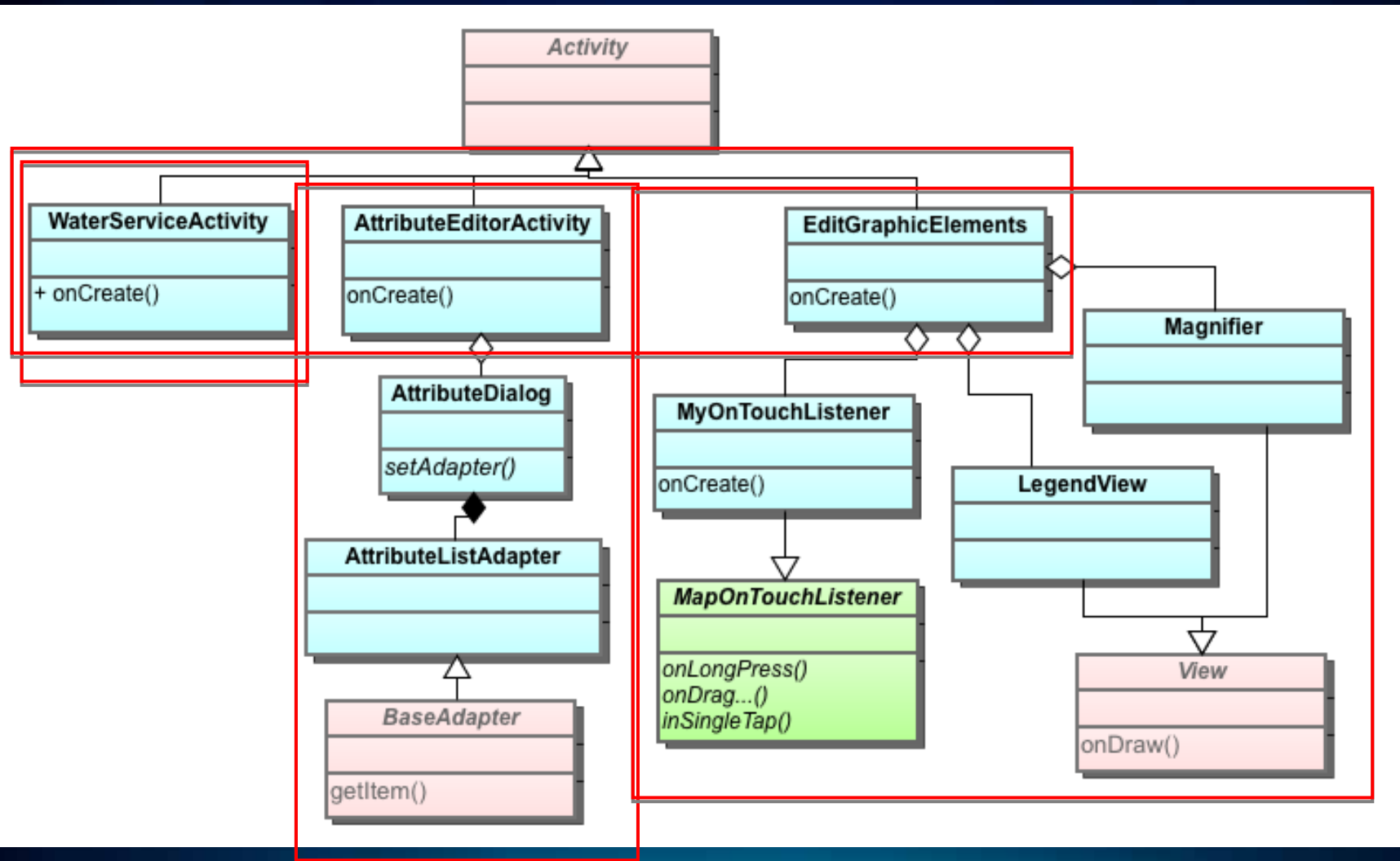
High flying water engineer



Application workflow



Application design





The Water Engineers Map

Handling the water engineers map

- **Uses a graphics layer**
 - For showing jobs
- **Other MapView properties**
 - Set by first layer
 - Coordinate system
 - Extent
- **Map and Layer status**
 - Are they initialized?
 - Map – `isLoading()`
 - Layer – `isInitialized()`
 - Add event listeners
 - `setOnStatusChangeListener()`



Handling map rotation

- **What happens in Android?**
 - **Configuration of Activity changes**
 - **Pause, stop, destroy – create!**
- **What can you do?**
 - `map.retainState()`
 - **Saves scale, centre and layer state (not callout or graphics)**
 - **Call in `onRetainNonConfigurationInstance()`**
 - **Manifest.xml configuration**

```
<activity android:name=".WaterServiceActivity"  
          android:label="@string/app_name"  
          android:configChanges="orientation">
```

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Map handling demo

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Integrating additional services

```
function onMapReady() {  
  map = new google.maps.Map(  
    document.getElementById('map'),  
    {  
      center: new google.maps.LatLng(37.5, -122.5),  
      zoom: 15,  
      mapTypeId: google.maps.MapTypeId.SATELLITE  
    }  
  );  
  map.addLayer(new google.maps.PolygonsLayer(  
    polygons  
  ));  
}
```

```
function getDriverIdFromPolygons(  
  var features = results;  
  for (var f=0, features;  
  var feature = features[f];  
  f++) {  
    var polygons = feature.geometry.polygon;  
    do {  
      Symbol = Symbol.StrokeColor(  
        polygons.getColor(0, 0, 0, 1)  
      );  
      feature.setStyle(  
        Symbol, StrokeColor(  
          polygons.getColor(0, 0, 0, 1)  
        )  
      );  
    } while (feature.polygon);  
  }  
}
```

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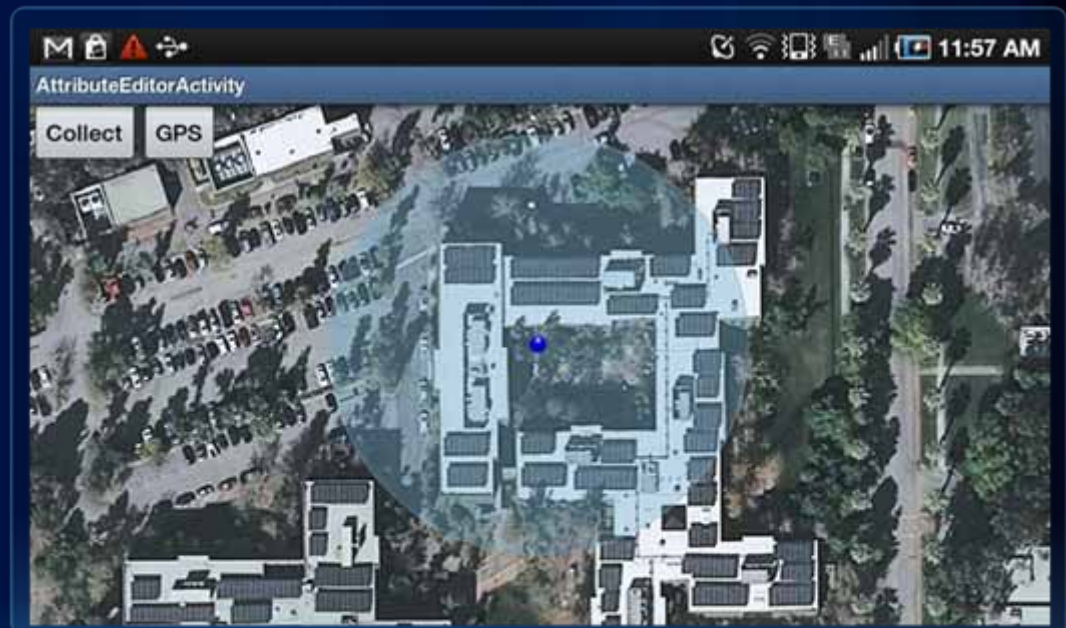

Integrating additional services

- **Web services**
 - Retrieve water jobs
- **Android services**
 - Phone calls
 - Bar code scanning
 - **GPS**
 - Zoom to exact location
 - ArcGIS for Android API provides this as `LocationService`
- **Cloud to device messaging**



Using GPS LocationService

- **Create LocationService**
 - `start()`, `stop()`
- **Set options**
 - Autopan
 - Bearing
 - Symbol
 - Accuracy circle



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GPS demo

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Attribute Editing

- Update asset condition
- Same code as AttributeEditing sample in SDK
- Uses Feature Service
 - Same model as other webapis
 - `applyEdits()`
- Check field data types
 - Data entry
 - Validation
- Supports FeatureTypes & Domains
 - Provide drop downs (Spinners)
 - User experience



Apply Edits method

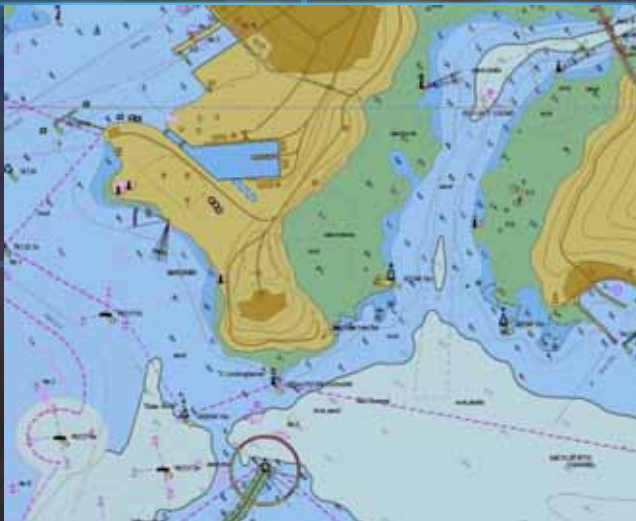
- **Asynchronous method**
 - **Callback tells success for each feature**
- **`applyEdits(adds, deletes, updates, callback)`**
- **Attribute updates**
 - **Graphic - only changed attributes & ID**

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Attribute Editing

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Feature Editing

- Add incident features (polygon)
 - Flood, landslide boundaries
- Uses a “sketch” graphics layer
 - Uses MapOnTouchListener
 - Implements tap and drag events
- Uses feature templates & types
- Inserts additional vertices
- Tracks local edit history
- Uses local GeometryEngine
 - **No server call**



GeometryEngine

- **Local**
 - `buffer()`
 - `clip()`
 - `contains()`
 - `geodesicLenth()`
 - `getNearestCoordinate()/vertex / vertices`
 - `intersect()`
 - `project()`
 - `union()`
 - `touches()`
 - `within()`

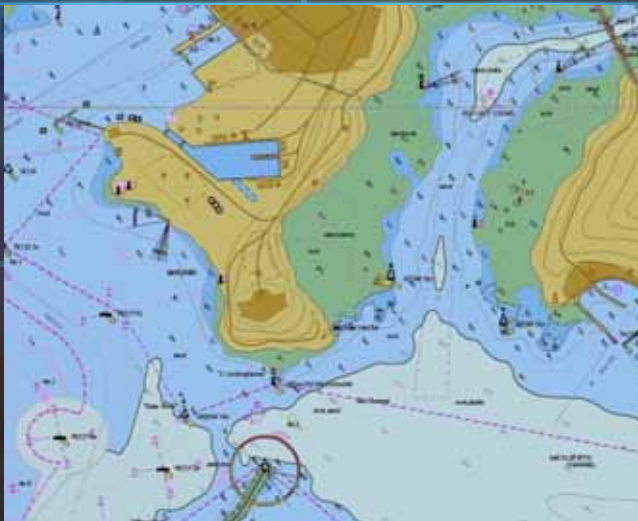


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Feature Editing

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The future

- **Next release**
 - Q2 2011
 - **Includes**
 - More layer types (bing/image server)
 - Secure services
- **Beyond**
 - Follow ArcGIS.com support....
 - **Disconnected workflows**



Further information

- **Code for the Water Services app used in the sessions can be found here:**
- <http://www.arcgis.com/home/item.html?id=6e0512016fdd4f6ab4e47b2eb64a347d>
- <http://resources.arcgis.com/content/arcgis-android/api>
- arcgis4android@esri.com
- Web Courses
 - Getting Started with the ArcGIS API for Android - available in May
 - Creating Data Collection Applications using the ArcGIS API in July (hopefully before UC)
- Please fill out the session review form!

Questions...

- Over to you...



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