Whos who

What do you do?
What do we do?
What its all about

• How to build useful applications
  • Integrate powerful tools into apps
  • Analysis
  • Editing workflows
  • Offline…..
  • now and how this will change at 10.2
ArcGIS Runtime SDK for Android

- v10.1.1. - released Jan 2013
  - recognise the number and date?
- What it included:
  - Wrap around
  - Routing tasks
  - New layers WMS, OSM layers, KML, CSV from webmaps
  - Find task
  - Time aware layers
  - Highlight features & graphics Z order
  - PKI security
  - Developer popups
  - New Geocode service (find method)
  - Online samples
  - Javadoc
  - Android 2.3+ only
The Runtime story

Will
ArcGIS Runtime

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

- ArcGIS Online / Portal
  - Maps, services, content and Organization branding

- ArcGIS for Server
  - Services

- ArcGIS for Desktop
  - Packages
Runtime form factors

Desktop
- OS X

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

Embedded
- WPF
- Qt
- JavaSE

Windows
- Windows Mobile
- Windows Store
Analysis
Why analyze?

• Convert data into information
• Go beyond the standard app
• More than just points on a map
  • Answers questions
    • What residential parcels are within a floodplain?
    • Which location for a new elementary school is the best?
    • Where are the hot spots for traffic accidents within my county?
• Beta services available in ArcGIS Online (NOW!)
How analyze in the android SDK?

• Geometry engine
• Tasks
• 3rd party tools & services
• Write your own crazy stuff 😁
Geometry Engine

- Geometry Engine
  - Most underused class!
  - Local analysis
  - Single or array of features
    - feature to feature comparisons

- Functions
  - Buffer
  - Spatial relationships
  - Spatial functions (union, difference)
  - Project
  - Geodesic Length
  - Length and area
  - Offset, Additional Geodesic calcs
Buffer

- Analysis – buffer + spatial relationship
  - Prices of houses on sale in the area around a point
  - Find out if any schools are present in 5 mile radius from the origin of a fire

Polygon p = GeometryEngine.buffer(geom[0], spatialRef, distance, unit);
Spatial relationships

- Within, Touches, Equals, Crosses, Contains
  - Use with Buffer to answer questions
- Get Nearest, Distance
  - Snapping to features

```java
within.setChecked(GeometryEngine.within(firstGeom, secondGeom, spatialRef));
touches.setChecked(GeometryEngine.touches(firstGeom, secondGeom, spatialRef));
equals.setChecked(GeometryEngine.equals(firstGeom, secondGeom, spatialRef));
crosses.setChecked(GeometryEngine.crosses(firstGeom, secondGeom, spatialRef));
contains.setChecked(GeometryEngine.contains(firstGeom, secondGeom, spatialRef));
```
Project

- Converts spatial reference

Geometry geometryBottomLeft = GeometryEngine.project(firstGeometry, inSpatialRef, outSpatialRef);
Spatial operations

- Union, Difference
- Area calculations between overlapping features

```java
geometryFromUnion = GeometryEngine.union(geoms, spatialRef);

geometryFromDiff = GeometryEngine.difference(firstGeometry, secondGeometry, spatialRef);
```
Geodesic offset (new in 10.2)

- Point data collection from a GPS
  - Laser range finder
- Move points by distance
  - Correcting accuracy

```python
offsetGeometry = GeometryEngine.geodesicOffset(firstGeometry, spatialRef, offset, joinType, bevelRatio, flattenError);
```
Geometry
Engine Demo

New sample…
Tasks Overview

- Query
- Identify
- Find (new)
- Locator (geocode)
- Routing (new)
- ServiceArea (new)
- ClosestFacility (new)
- Geoprocessor
Perform analysis using the new online Analysis services

• Services online in Beta (need subscription):
  • Aggregate points
  • Hotspot
  • Buffer
  • Overlay
  • http://analysis.arcgis.com/
Working with ArcGIS Online Analysis services

- Async GP service
  - Submit Job
  - Strict mode on 4.0+ will throw error

```java
GPJobResource jr = gp.submitJob(params);
// String jobstatus = jr.getJobStatus();
JobStatus jobstatus = jr.getJobStatus();
final String jobid = jr.getJobID();
```

- Like normal GP
  - But need to submit a JSON string

```java
GPString outSR = new GPString("OutSR");
outSR.setValue("\"outSR\": {\"wkid\": " +
    map.getSpatialReference().toString() + "}");
```
Async GP tasks..

• Poll for results
  • Poll for result using a Timer, Handler etc…

```java
handler.postDelayed(new Runnable() {

    public void run() {
        try {
            GPJobResource jr = gp.checkJobStatus(jobid);
        }
    }

• Get results…

if (jobcomplete) {

    if (status == JobStatus.SUCCEEDED) {

        GPString outputJson = (GPString)
gp.getResultData(jobid, "HotSpotsResultLayer");
```
Hotspot
Analysis demo
Network analysis

- Routing
- Closest facility
- Service Area
  - Set up params
  - Call ServiceAreaTask solve() method (Service Area)
  - Receive results and add to the map
Service area task
Set Parameters

- Get default params
- Or set up your own

```java
private void setParameters(Graphic graphic, String url){
    NAFeaturesAsFeature myLocationFeature = new NAFeaturesAsFeature();
    myLocationFeature.addFeature(graphic);
    myLocationFeature.setSpatialReference(mMapView
    .getSpatialReference());
    NAFeaturesAsFeature nafaf = new NAFeaturesAsFeature();
    nafaf.setSpatialReference(mMapView
    .getSpatialReference());
    nafaf.setURL(url);

    ClosestFacilityParameters cfp = new ClosestFacilityParameters();
    cfp.setReturnFacilities(true);
    cfp.setOutSpatialReference(mMapView
    .getSpatialReference());
    cfp.setTravelDirection(NATravelDirection.TO_FACILITY);
    cfp.setIncidents(myLocationFeature);
    cfp.setFacilities(nafaf);
    cfp.setDefaultTargetFacilityCount(3);
    FindClosestFacilities find = new FindClosestFacilities();
    find.execute(cfp);
}
```
@Override

protected ClosestFacilityResult doInBackground(ClosestFacilityParameters... params) {

    ClosestFacilityResult result = null;

    UserCredentials uc = new UserCredentials();
    uc.setUserAccount("user", "pass");
    closestFacilityTask = new ClosestFacilityTask(
        CLOSEST_FACILITYTASK_URL, uc);

    try {
        result = closestFacilityTask.solve(params[0]);
    } catch (Exception e) {
        e.printStackTrace();
    }

    return result;
}
Push results to UI Thread

```java
@Override
protected void onPostExecute(ClosestFacilityResult result) {
    // dismiss dialog
    if (dialog.isShowing()) {
        dialog.dismiss();
    }

    // The result of geocode task is passed as a parameter to map the results
    if (result == null) {
        // update UI with notice that no results were found
        Toast toast = Toast.makeText(MainActivity.this,
        "No result found.", Toast.LENGTH_LONG);
        toast.show();
    } else {
        route = result.getRoutes().get(0);
        // Symbols for the route and the destination
        SimpleLineSymbol routeSymbol = new SimpleLineSymbol(Color.BLUE, 3);
        PictureMarkerSymbol destinationSymbol = new PictureMarkerSymbol(
            getResources().getDrawable(R.drawable.route_destination));

        Graphic routeGraphic = new Graphic(route.getRoute().getGeometry(),
            routeSymbol);
        Graphic endGraphic = new Graphic(
            ((Polyline) routeGraphic.getGeometry()).getPoint(((Polyline) routeGraphic
                .getGeometry()).getPointCount() - 1),
            destinationSymbol);
        // Get the full route summary
        routeLayer.addGraphics(new Graphic[] { routeGraphic, endGraphic });
        // Zoom to the extent of the entire route with a padding
        mapView.setExtent(route.getEnvelope(), 100);
    }
}
ServiceArea demo

Dan
Editing

What you can do with 10.1.1
Use Popups!

- Requires Android support library to run!!!
- Provides UI for editing features
- Respects types/domains
- Supports adding attachments
- Supports editor tracking
- Has hooks
  - For editing geometries
  - For deleting
- Works with developer defined as well as webmap popups
- Sample In SDK
  - PopupInWebmapForEditing
Editing

• AttributeEditor & GeometryEditor samples in SDK
• Uses Feature Service
  • Same model as other webapis
  • `applyEdits()`

• AttributeEditor sample
• Attributes: check field data types
  • Data entry
  • Validation
• Supports FeatureTypes & Domains
Popup Editing demo

Sample in SDK
Offline workflows

What you can do today
Offline features

A
• Use in memory "feature collection" Feature Layer
  • Feature set [array of features]
  • Layer definition [json from a feature service]
• Change features using:
  • addGraphic() / removeGraphic() methods
• Write features to/from disk in json

B
• Graphics layers
  • Add/remove graphics
To/fromJson

- Jackson JsonParser
- Serialize to disk
  - FeatureSet.toJson();
- Read from disk
  - FeatureSet.fromJson();
public FeatureSet createWindTurbinesFeatureSet(String path) {
    FeatureSet fs = null;

    try {
        JsonFactory factory = new JsonFactory();
        JsonParser parser = factory.createJsonParser(new FileInputStream(path));
        parser.nextToken();
        fs = FeatureSet.fromJson(parser);
    }
    catch (JsonParseException e) {
        e.printStackTrace();
    }
    catch (FileNotFoundException e) {
        e.printStackTrace();
    }
    catch (IOException e) {
        e.printStackTrace();
    }
    catch (Exception e) {
        e.printStackTrace();
    }

    return fs;
}
Create FeatureSet

- Add to Map

```java
// Create wind turbine featurelayer from json
windTurbineFeatureSet = createWindTurbinesFeatureSet(jsonPath);
windTurbineLayerDefinition = this.getResources().getString(
  R.string.config_windturbine_layer_definition);
ArcGISFeatureLayer.Options layerOptions = new ArcGISFeatureLayer.Options();
layerOptions.mode = ArcGISFeatureLayer.MODE.SNAPSHOT;
windTurbinesFeatureLayer = new ArcGISFeatureLayer(
  windTurbineLayerDefinition, windTurbineFeatureSet, layerOptions);

// add layers to map
mMapView.addLayer(baseLayer);
mMapView.addLayer(windTurbinesFeatureLayer);
```
Offline map use

10.2 story and workflow
(for the Disconnected sessions only)
10.2 - Using your map offline

- Provide functionality that supports disconnected use of the ArcGIS platform
  - Viewing and querying maps
  - Editing features
    - Synchronization
  - Performing spatial analytics with the map
    - Finding places
    - Get directions
- Planned for all Runtime SDKs
From ArcGIS Online and Portal
Developer workflows

• Take map offline
  • Viewing
  • Editing
  • Sync

• Perform offline tasks
  • Routing
  • Geocoding
  • Query

• Create your own layer
  • Define the layer and symbology
  • Persist it to the device
Developer building blocks

• Webmap
  • Work with a map offline

• Local item manager
  • Manage local items on device

• Feature cache
  • Represents the local data storage
  • Provides sync capabilities

• Local layers and tasks
  • For features, basemaps, querying, routing, etc
Offline demo
What’s coming in Runtime

10.2 and beyond
Whats coming for Runtime…

• 10.2
  • Offline map use
    • Being productive offline
    • Network/geocode/search
  • Performance improvements (static/dynamic mode on layers)
  • Geotriggers
  • Security (OAuth, SAML)
  • Simplification of apis
  • New developer site (with better doc system)

• Beyond
  • Offline analysis
  • Local data support
    • Raster and Vector
  • 3D
Other info

• Runtime Road Ahead – Thurs 10am

• Geogames and Playful Geodesign - Neocartographer
  Game Demo
  • Pool area of the Renaissance Hotel under a tree near
  convention Center doors
• Tue 03/26: 02:00pm, 02:30pm, 03:00pm, 05:00pm, 05:30pm, 06:00pm
• Wed 03/27: 02:00pm, 02:30pm, 03:00pm, 05:00pm, 05:30pm, 06:00pm
• Thu 03/28: 10:00, 10:30
esri
Understanding our world.