



Building Offline Apps With the ArcGIS Runtime SDKs

Cameron, Colville and Crick

Agenda

- **Workflows and Data**
 - Overview
 - What can you build?
 - Where does the data come from?
 - Authoring and sharing content with Runtime Apps
- **Using the APIs**
 - Mapping
 - Editing
 - GeoCoding
 - Networks
- **Quartz release**
 - Many new offline capabilities

Offline Map Capabilities

Disconnected Use of the ArcGIS Platform

- Viewing and Interacting with Maps
- Querying Data
- Editing Features
 - Synchronization
- Find places and locations
- Get directions
- Pre-planned or On-demand Workflows
- Occasionally Connected Scenarios
- All Runtime SDKs*



The ArcGIS Platform – Working Offline

- **All Aspects of the Platform Support Going Offline**
 - Online and Portal
 - Server
 - Desktop
- **New Workflows**
 - Critical for You to Understand These Workflows

From ArcGIS Online and Portal



Demo

Working With Hosted Services

Justin

The screenshot shows the ArcGIS Hosted Data portal interface. At the top, there is a navigation bar with "DOCUMENTATION" and "SUPPORT" links. Below this is a search bar and a list of hosted services. Each service entry includes a thumbnail map, the service name, its privacy status, the last update date, and a list of tags.

- Climbing Areas**
Private | Updated Wednesday, February 12 2014
Tags: Climbing
- MammothSkiRuns**
Private | Updated Tuesday, December 17 2013
Tags: United States, imagery, satellite, aerial, USDA FSA, NAIP, Geological Survey, US Department of Interior, DOI, US Department of Agriculture
Agriculture Imagery Program, National, Federal, Cloud
- British Hills**
Private | Updated Wednesday, August 14 2013
Tags: Mountains
- Arizona**
Private | Updated Wednesday, August 14 2013
Tags: Arizona
- Location Tracker**
Private | Updated Monday, August 12 2013
Tags: Location Tracking

ArcGIS Online Data Licensing

- **Always Review Data Usage Restrictions**
- **Supported Esri Services**
 - Basemaps
- **Esri Services Not Supported Offline**
 - Geocoding
 - Routing

Offline With ArcGIS Server



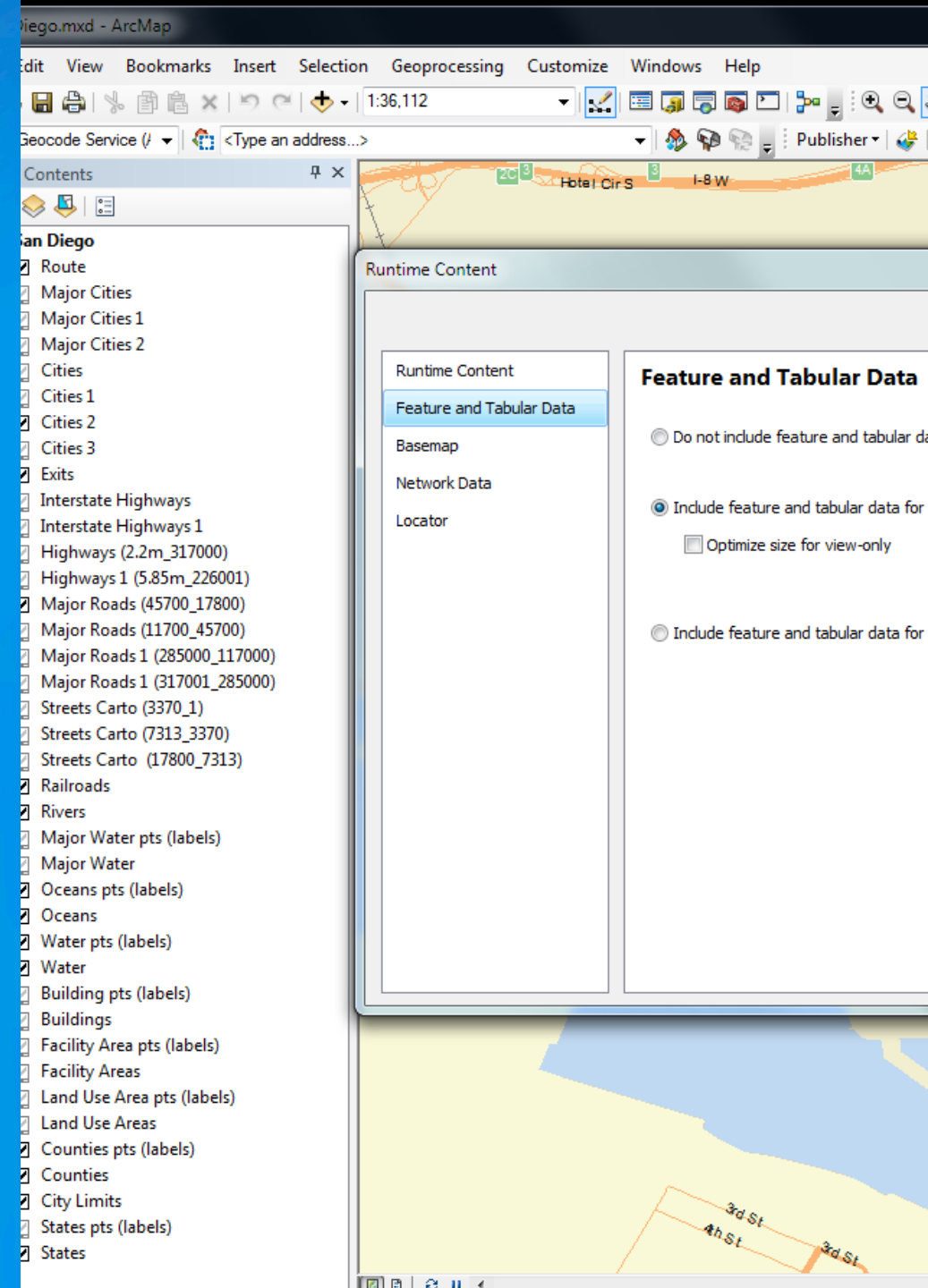
Offline With Desktop



Demo

Working With ArcGIS Desktop

Justin



Mixing and Matching

- **Possible to Take a Hybrid Approach**
 - Online basemaps
 - ArcGIS Server feature services
 - GeoCoding and routing from Desktop
- **This Will Be Common in Your Solutions**

Optimizing The Data Provisioning Process

- **Features and Basemap Content**

- **On Demand – Retrieves data from the server when requested**
 - Uses server processing power and bandwidth for every client request
- **Sideloaded - Content created ahead of time and provisioned onto the device**
 - Can help alleviate server load at busy times of the day
 - Commonly used for basemap tiles
 - Can work with feature data if the workflow is right
 - How often and how many features change on the backend?

- **Networks and Locators**

- **Sideloaded is the only option**

More Choices Coming with ArcGIS Pro 1.2

- **Mobile Map Packages can be compressed and contain**
 - **Map**
 - **Operational data**
 - **Locators**
 - **Networks**
 - **Basemap**

Working With Basemaps Offline

- **ArcGIS Desktop Can Create Tile Caches**
- **Esri Basemaps**
 - <http://tiledbasemaps.arcgis.com/...>
 - [AGOL basemap group](#)
- **ArcGIS Server Tiled Map Services**
- **Services Limit Extent**
 - **Administrator Sets the Limit**
 - **Workable Size**
 - Compression quality
 - **Estimations**
 - **Consider Reusing Offline Basemaps**

Pseudo/Code snippets

```
task = new ExportTileCacheTask(url);
```

SubmitJob

Poll for status

Download when complete

Some platforms handle partial downloads

```
params = new ExportTileCacheParams();
```

```
params.setLevelsOfDetail( [1,2,3,4] );
```

```
params.setAreaOfInterest( geometry );
```

```
task.estimateTileCacheSize( params ); //async
```

```
task.exportTileCache( params, path ); //async
```

Working With Operational Data Offline

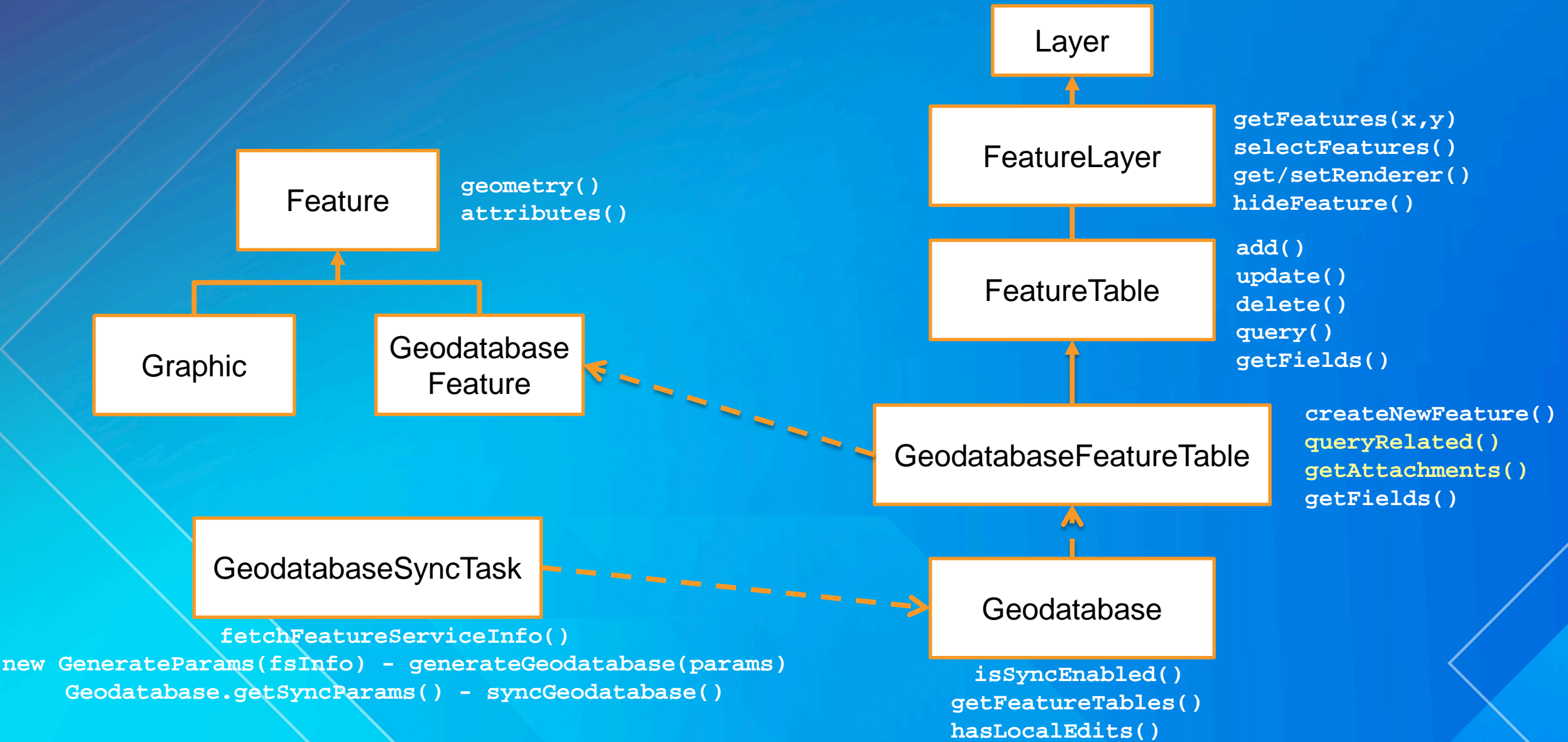
It is all about the features

- **Read only access**
 - Work with attachments and relates
 - Use popups
- **Edit Features**
 - Edit attachments and related data
 - Sync changes with a server

Syncing With a Server

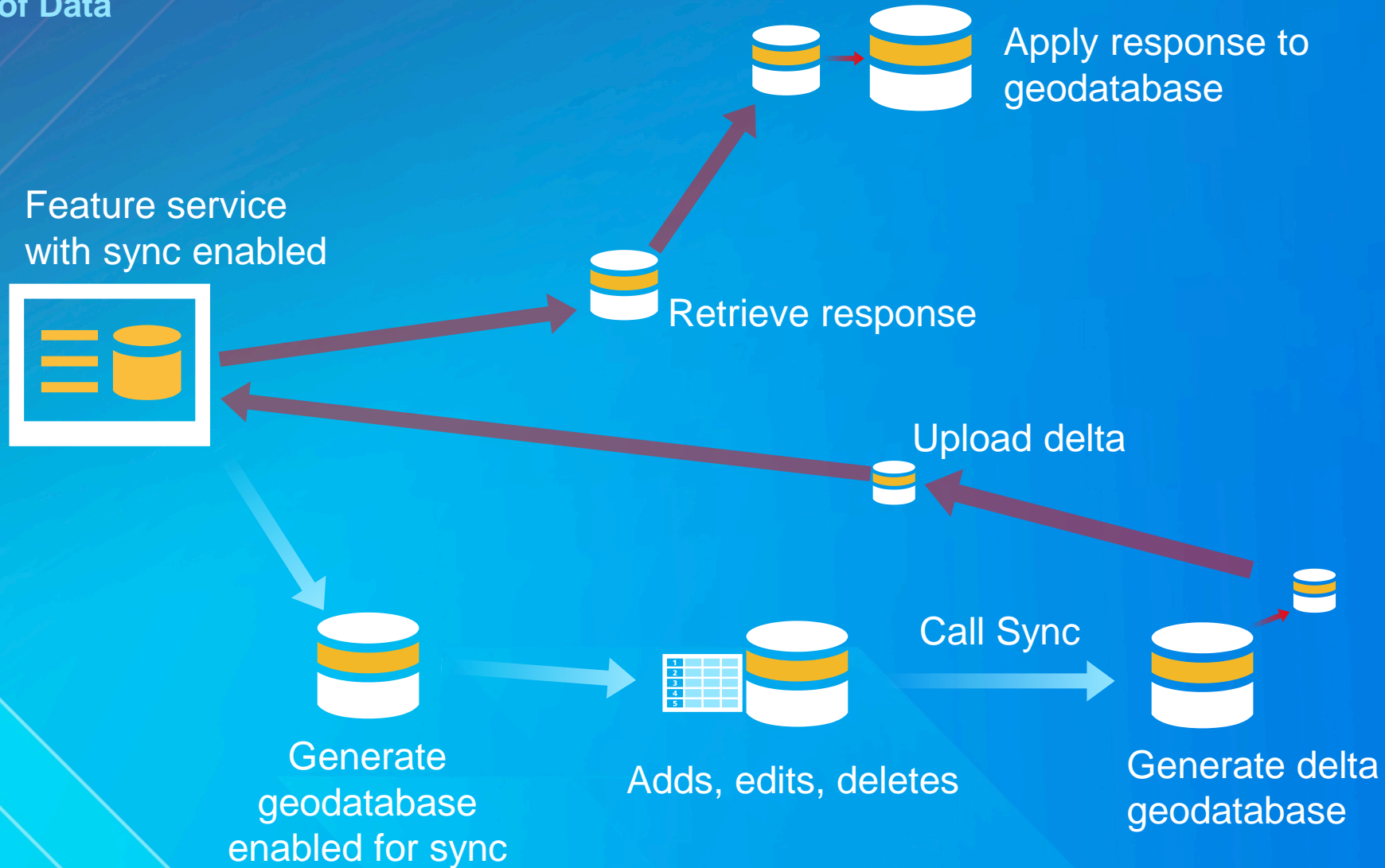
- **Send/receive edits**
- **Per Layer Sync**
- **Per Geodatabase Sync**
- **Control Over Sync Direction**
 - **Download changes only**
 - **Upload edits only**
 - **Download changes and upload edits - bidirectional**

Generating a Geodatabase and Showing Features

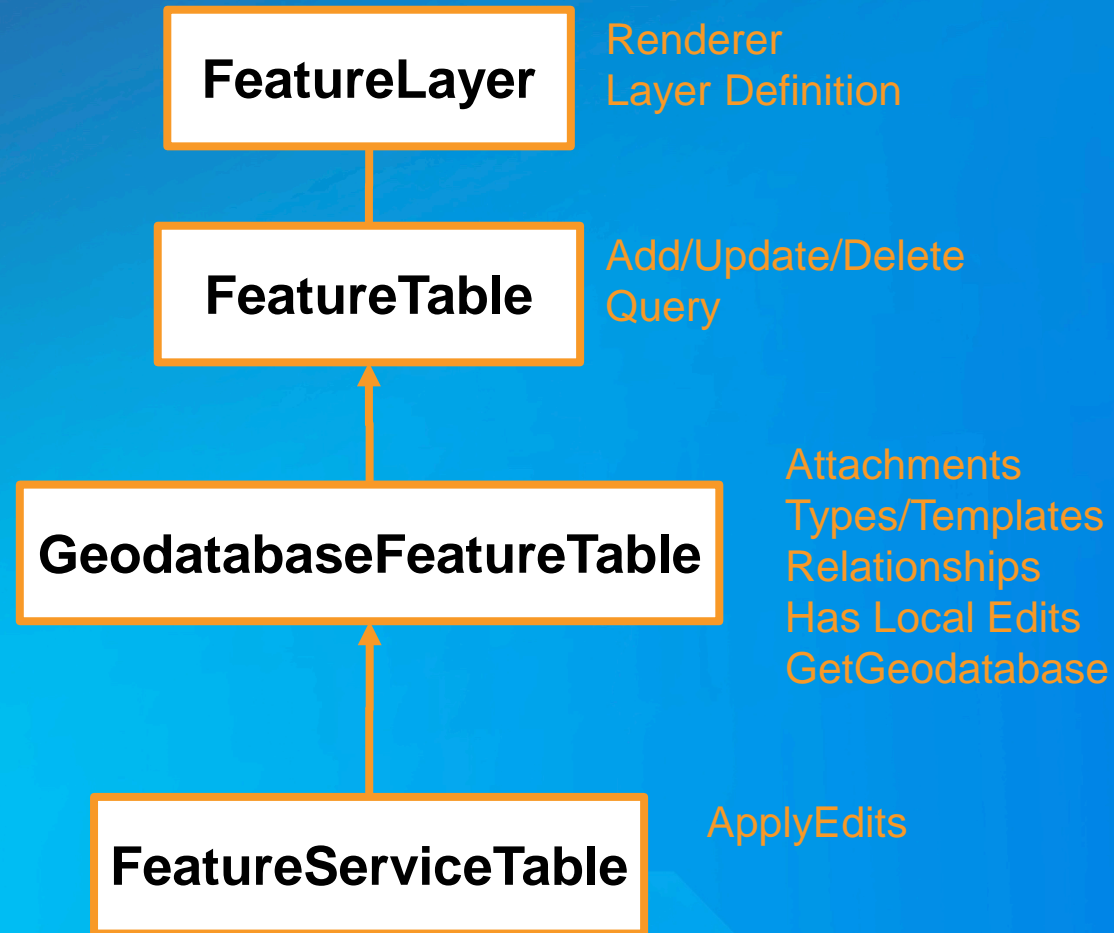


How Does Sync Work?

The Flow of Data



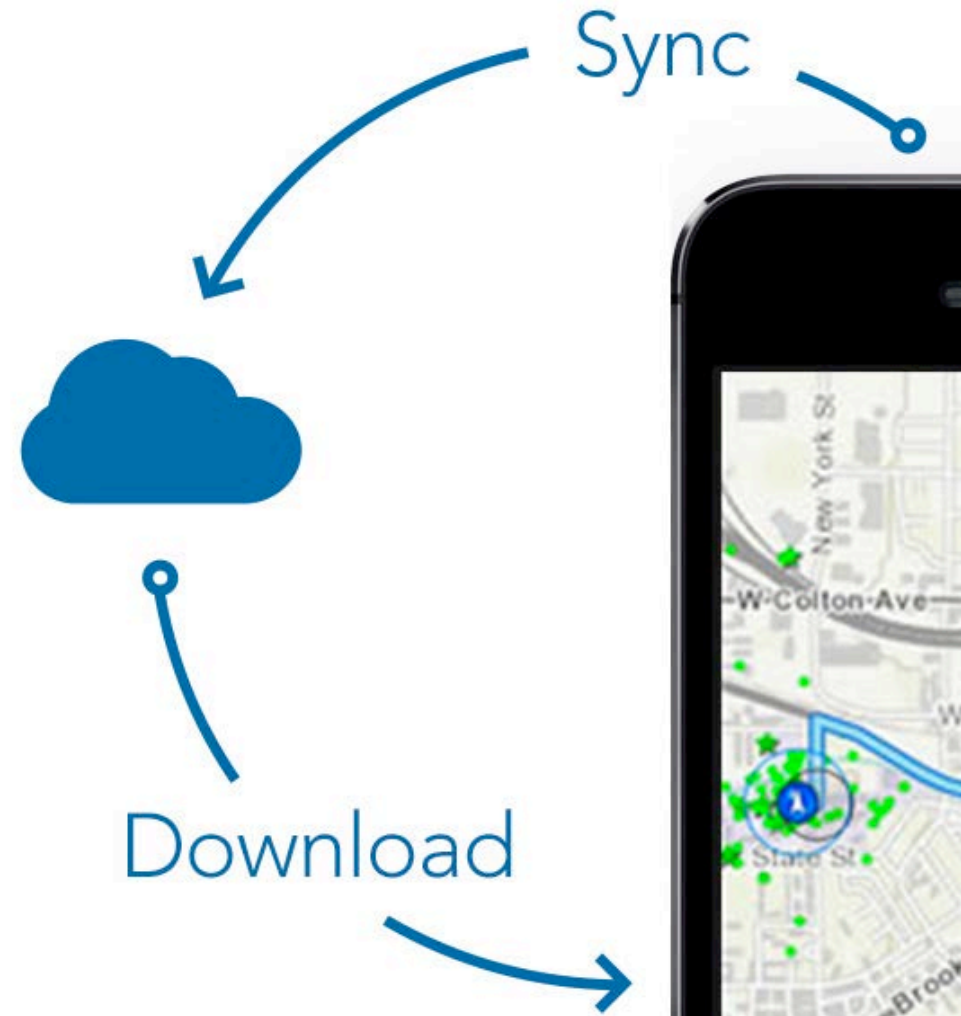
Feature Layer



Demo

Offline Features

Will



Working With Locators Offline

- Prepared for Offline Use Using ArcGIS Desktop
- Programming Model Similar to Online Locators
- High Performance

Locator psuedo code

```
task = new Locator(path);  
  
//geocode  
params.setText("");  
task.findAddress(); //async  
  
//reverse geocode  
task.findLocation(point);
```

Working With Networks Offline

- Prepared for Offline Use Using ArcGIS Desktop
- Programming Model Similar to Online Networks
- High Performance

Routing psuedo code

```
task = new RouteTask(path);
```

```
params = task.retrieveDefaultRouteTaskParams();
```

```
params.setStops(NAFeatures);
```

```
task.solve(); //async
```

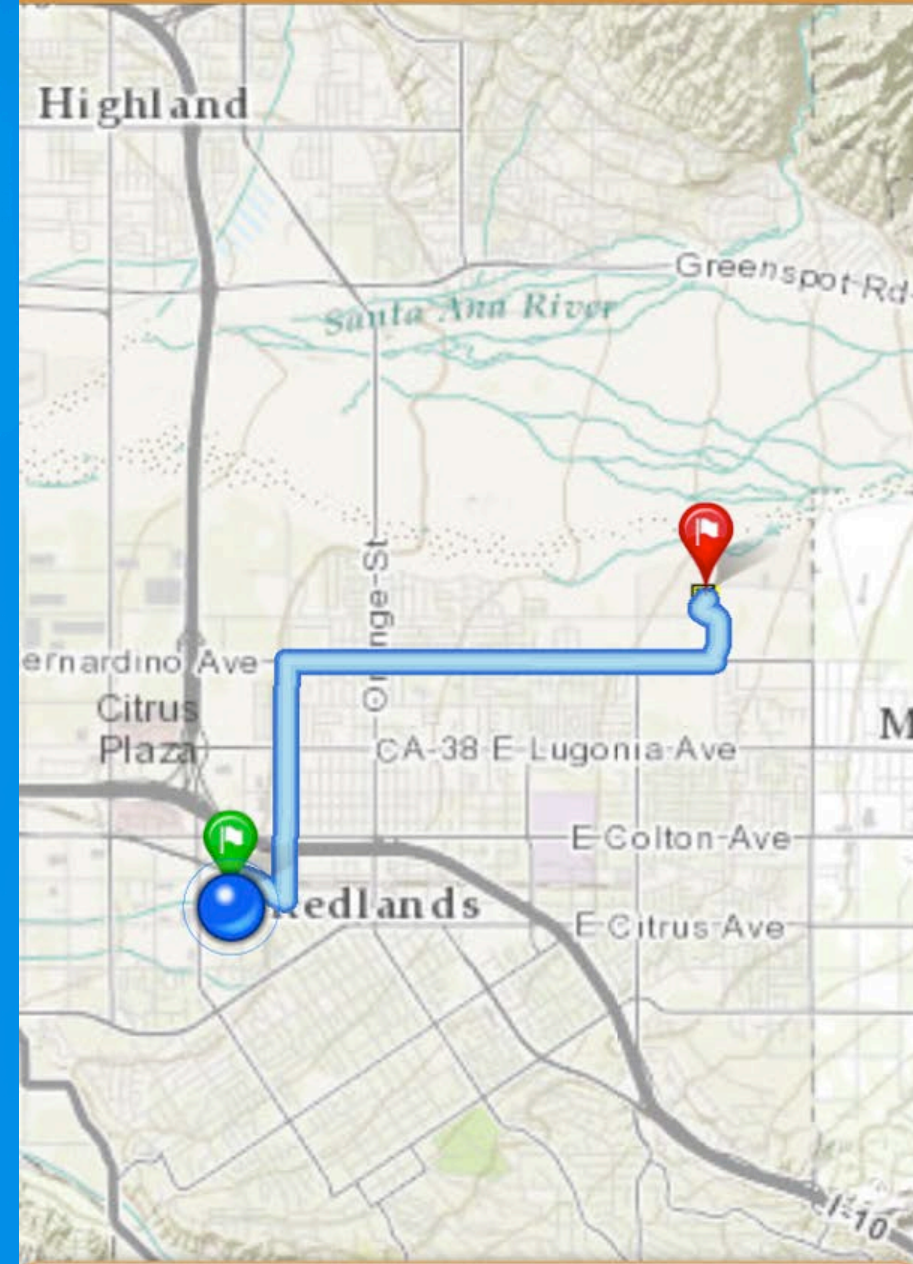
Demo

Offline Networks and Locators

Justin

WorkIt

Work Order



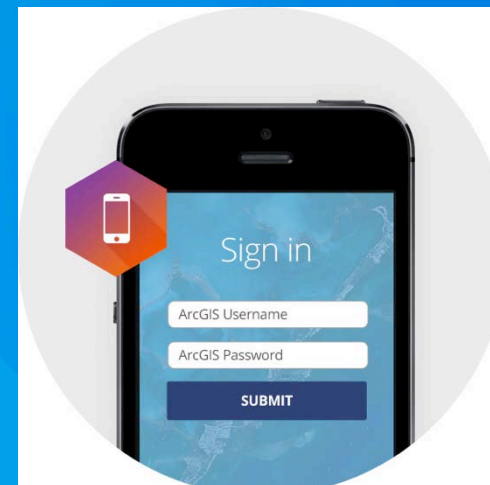
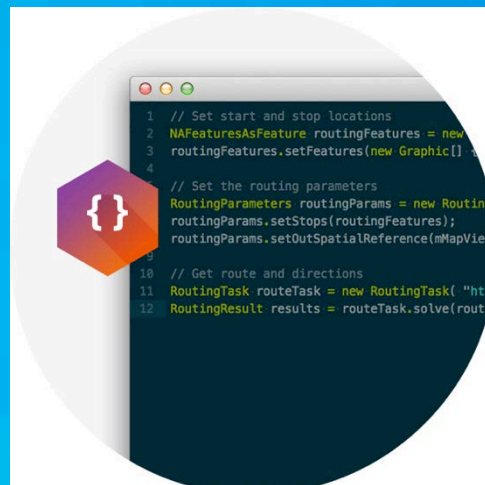
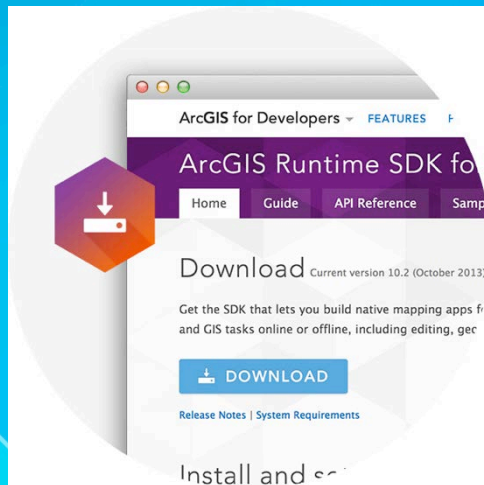
Route

App development

- **Killed/exited apps**
 - **Hold on to params (or with iOS jobid) and resubmit same job (with use cached job=true)**
 - If job still exists on the server, will not resubmit job
 - If partial download on disk, will not resubmit job
 - If error, will resubmit job
- **Apparent sync failure due to network issues**
- **Large data over 3G**
 - **Check for wifi access before you submit your Tasks?**

Licensing Offline Capabilities

- Viewing maps downloaded from Online / Portal
 - Basic License
- Offline Feature Editing, Sync, Geocoding and Networks
 - Standard License



ArcGIS Runtime Quartz Release

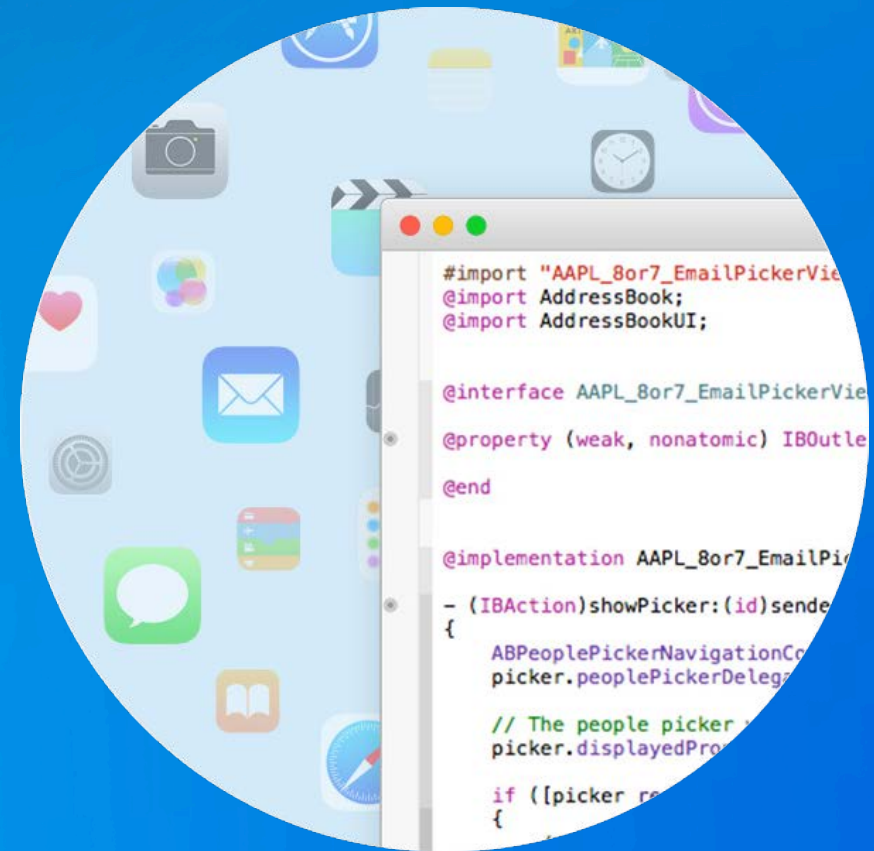
Significant New Functionality for Offline Apps

- **Major release**

- Many new capabilities
- New and changed APIs
- Improved internal architecture

- **Goals**

- Support the ArcGIS Platform
- Move ArcGIS Engine developers to the ArcGIS Runtime
- Synchronize APIs across all ArcGIS Runtime platforms
- Support specific user workflows



What does Quartz include?

- **Working with maps offline**
 - Full authoring support
- **Working with layers offline**
 - Support for Local Data and data taken offline
- **Working with analysis offline**
- **Working with 3D content**



Demo

Quartz Release

Justin and Will

Vector Tiles



Questions?

**Don't forget to fill out the session
feedback!**



Understanding our world.