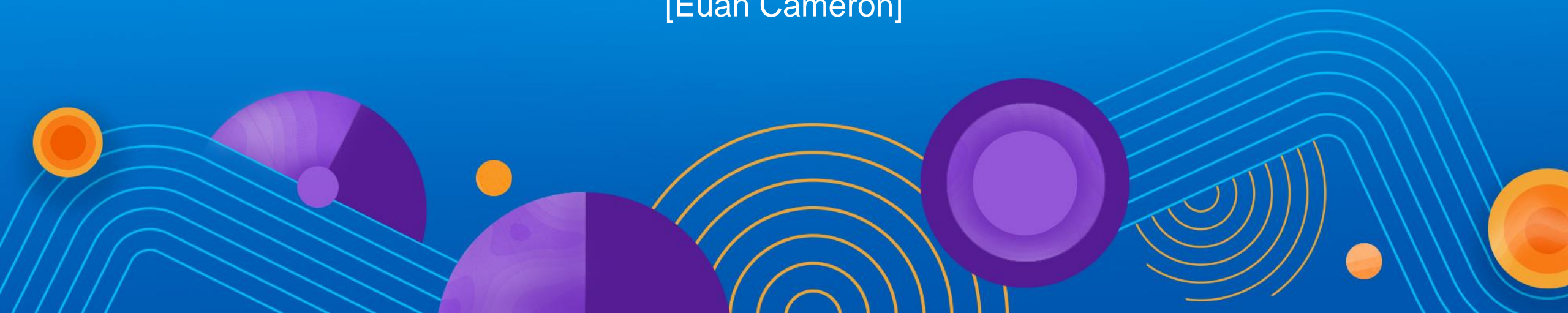


ArcGIS Runtime: Working with Maps Online and Offline

Will Crick

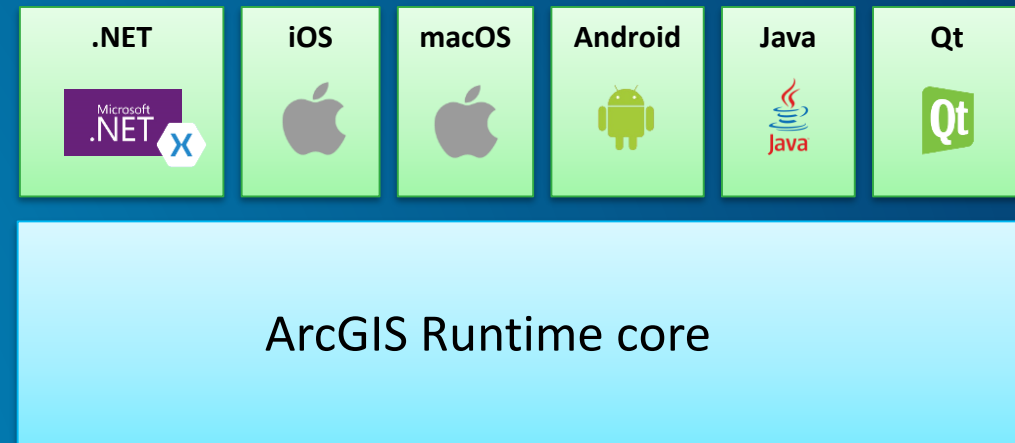
Justin Colville

[Euan Cameron]



ArcGIS Runtime session tracks at Dev Summit 2017

- ArcGIS Runtime SDKs share a common core, architecture and design
- Functional sessions promote common capabilities and workflows
 - An Introduction to the API and Architecture
 - Working with Your Portal
 - Building Great User Experiences
 - Styling Maps
 - Working with Maps Online and Offline
 - Editing Your Data Online and Offline
 - Maximizing Performance of Your Apps
 - Analysis
 - Building 3D Applications
- Product sessions promote specific development experiences
- Demo theaters highlight examples of specific technical capabilities



Shared workflows, any platform, any device

Agenda

- ArcGIS Runtime mapping capabilities
- Online and offline workflows
- Where do maps, scenes and data come from?
- Creating maps
- Working with maps
- Creating offline layers
- Bringing offline data to life in your app

Separate sessions for:

- Intro to the Runtime
- Authoring maps
- Online and offline editing
- Analysis

ArcGIS Runtime maps and scenes

- Open web maps from a portal
- Create new maps in your apps
 - Online and offline layers
 - Save to a portal (only saves online compatible layers)
- Create new scenes in your apps
 - Online and offline layers
 - Online scene layers (3D objects and integrated mesh)
 - Elevation layers (LERC image service, local raster)

ArcGIS Runtime maps and scenes

- **Offline layers**

- **Take layers offline**
 - ArcGIS Image Tiled layers
 - ArcGIS Feature layers
- **Synchronize offline features**
 - Edit features (separate session)

- **Other map capabilities**

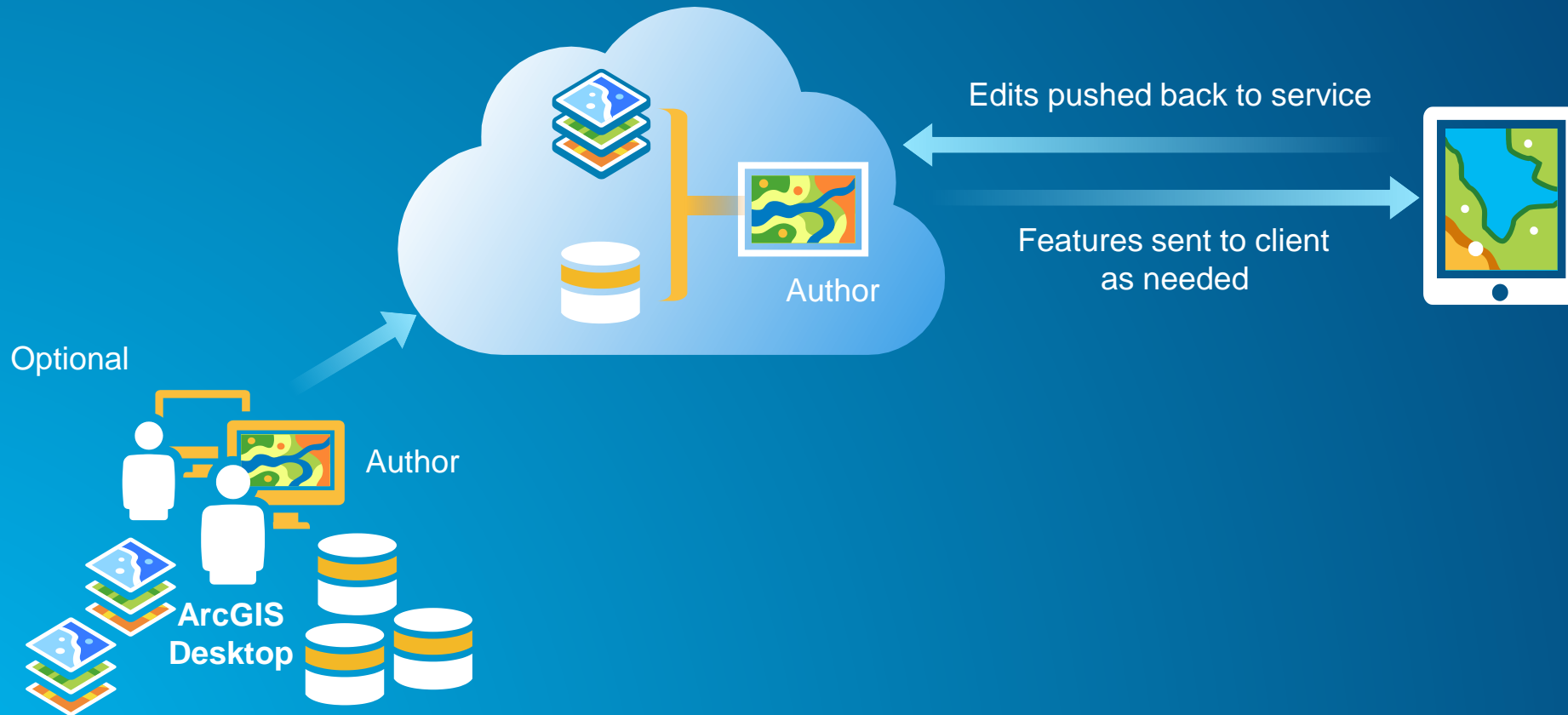
- Geocoding
- Routing
- Analysis/Geoprocessing

App connectivity scenarios

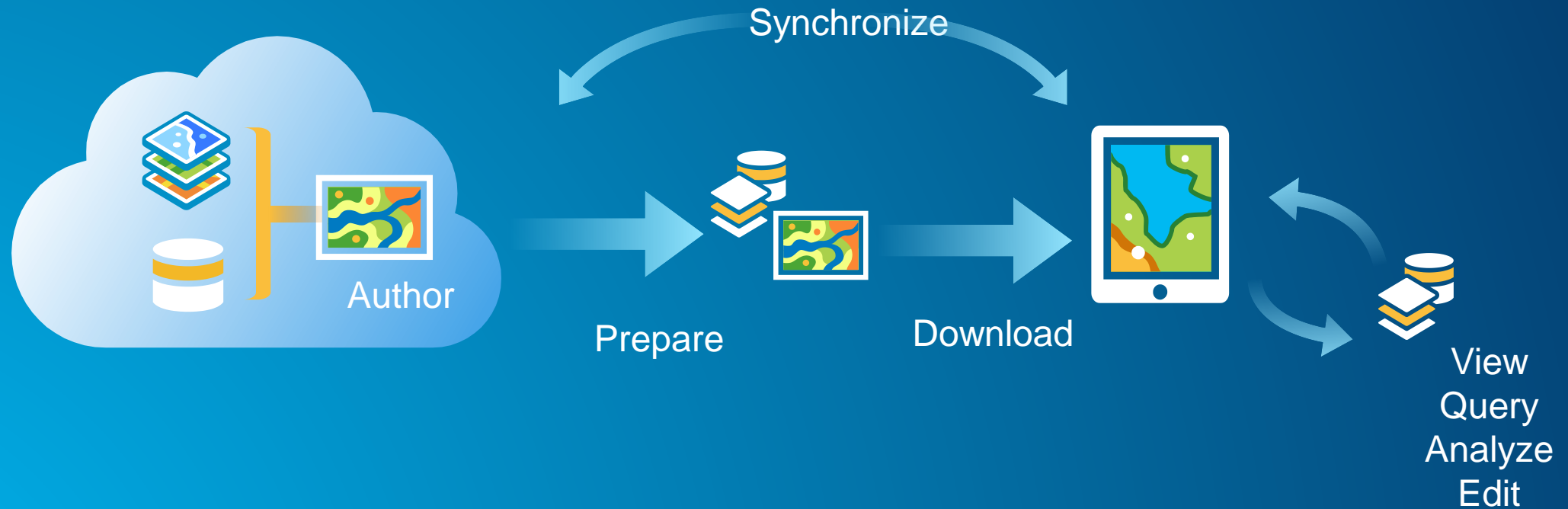
- Reliable wifi or good 4G for entire app lifetime
 - Fully online app (can use offline data for performance reasons)
- Significant times without connectivity, some known times of connectivity
 - E.g. start online in office, go offline in the field
 - start offline, go online to get some data updates/functions
 - Offline workflow required (adhoc or pre-planned services workflow)
- No connectivity (never, nunca, nigung, nicht)
 - Offline workflow required (desktop workflow)
- Unpredictable connectivity
 - Occasional network interruption (online more than offline)
 - Online app with some client side caching
 - Significant network interruption (offline more than online)
 - Offline workflow required (adhoc or pre-planned services workflow)



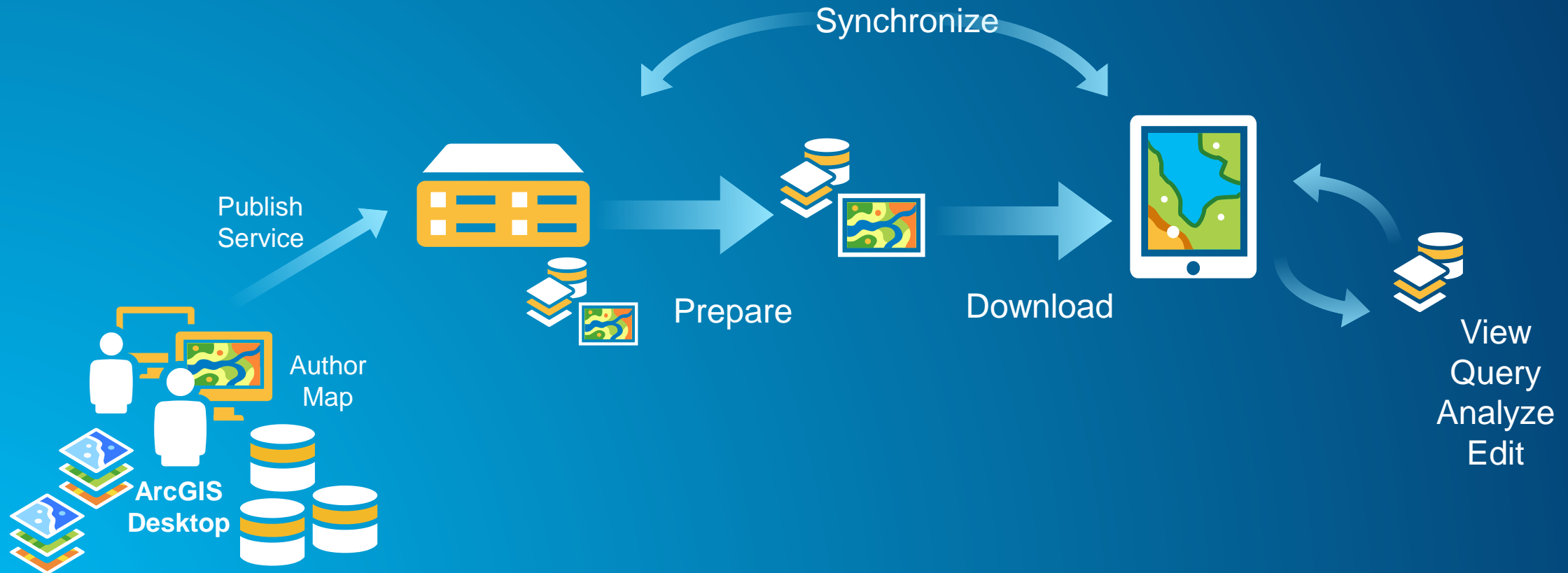
Online map workflow



Data provisioning workflows - services pattern - on demand



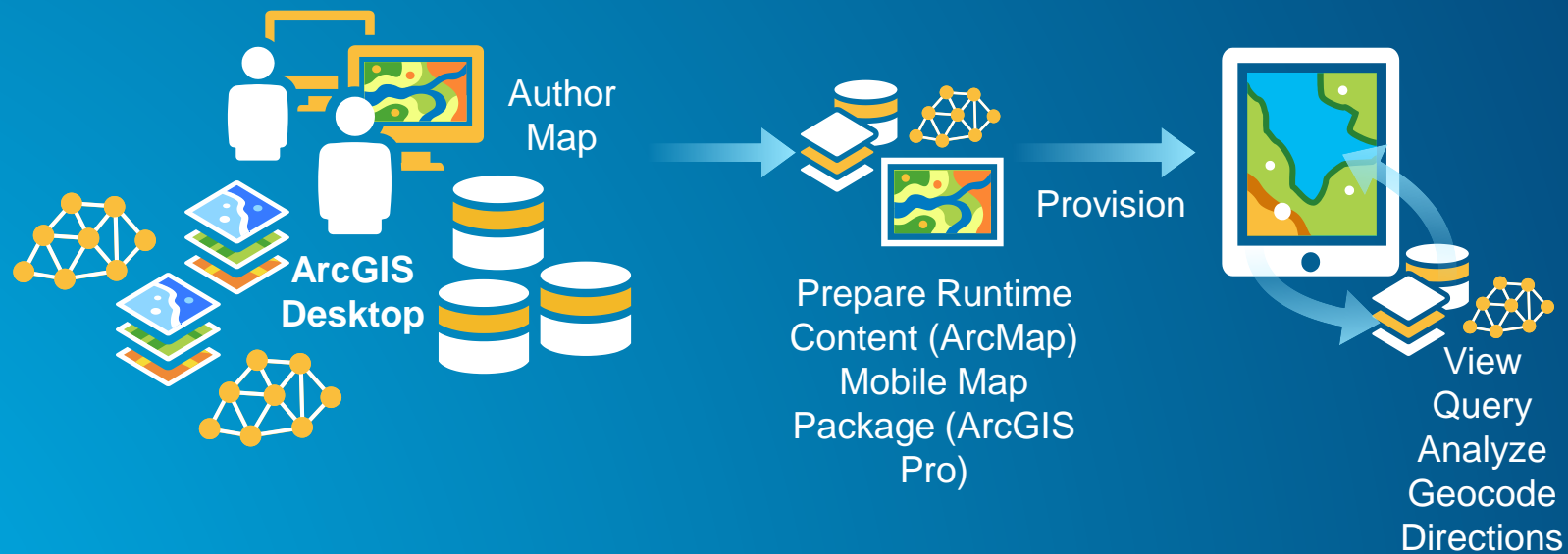
Data provisioning workflows - services pattern - on demand



Data provisioning workflows - services pattern - pre-planned



Data provisioning workflows - Desktop pattern



Data provisioning workflows

- **Features and basemap content**
 - **On Demand** – Retrieves data from the server when requested
 - Uses server processing power and bandwidth for every client request
 - **Pre-planned** - Content created ahead of time and provisioned (sideloaded) 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

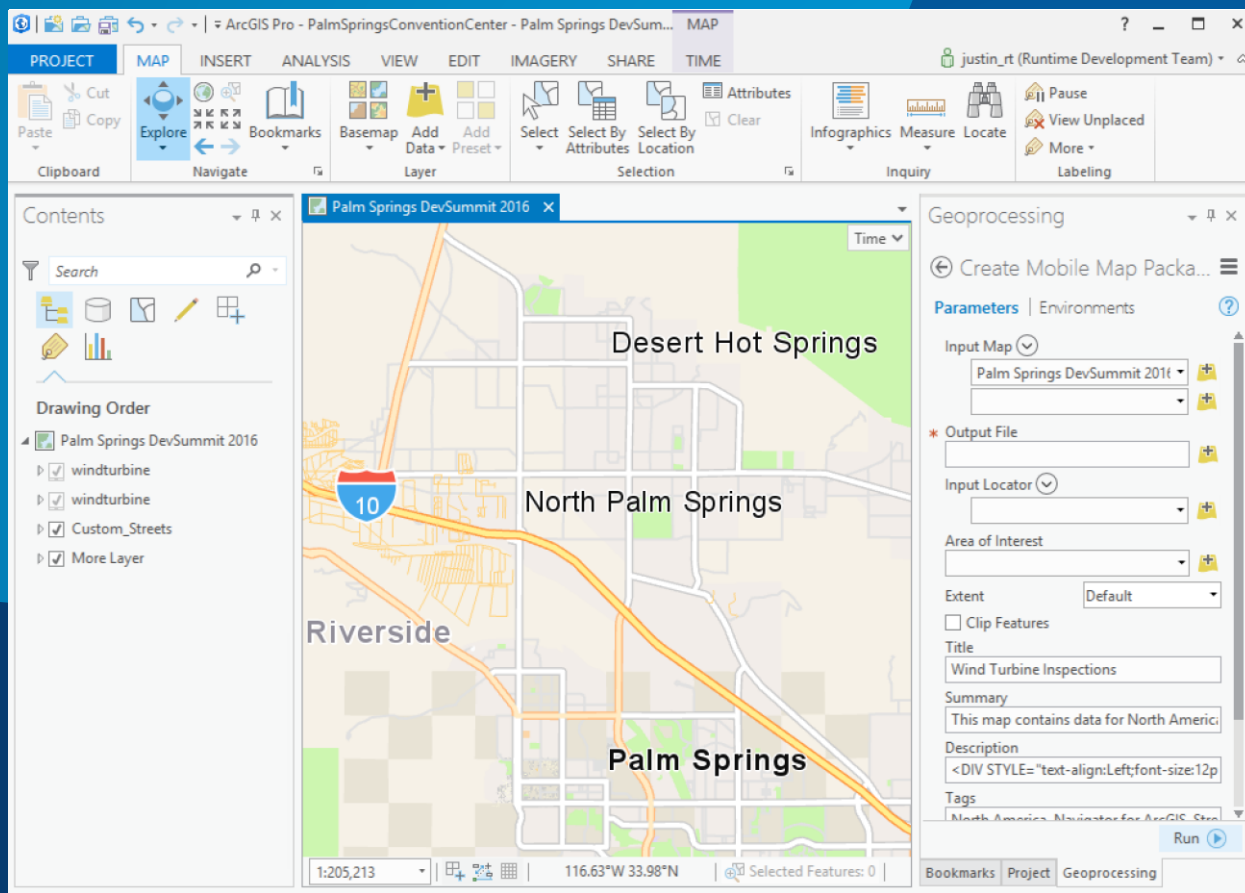
Creating maps

Authoring web maps

- Author in Online, Enterprise and Pro
- For advanced symbols use Pro
- Webmap layer types
 - Feature layers
 - ArcGIS tiled layers
 - Map image layers

Authoring mobile map packages

- **Mobile Map Packages contain maps, layers and their data**
 - Map
 - Basemap
 - Mobile basemap layers or vector tile layers
 - Operational layers
 - Locators
 - Networks
- **Things that are different in Pro than Runtime**
 - Layer support
 - Labelling



Create mobile map package demo

Justin

Working with maps

Opening maps from a portal

- Use constructor on the Map class
- Create a Portal item or use map URL
 - The map viewer URL
 - The item details URL
 - The item data URL
- Web maps versions 2.0+
 - From Online and Portal for ArcGIS 10.3 and above

```
// Load webmap portal item and set it to the view
var portal = await ArcGISPortal.CreateAsync();

// Create a map that is taken offline based on item id
var webmapItem = await PortalItem.CreateAsync(portal, "a74ead7fb4964539ab3edcfbcfbf86bd5");

// Create map and add it to the view
MyMapView.Map = new Map(webmapItem);
```

Creating new maps in code

- You always have a map
- Construct the map
 - Number of map constructors to use
- Add a basemap
 - Collection of base layers and reference layers
 - Use the standard ArcGIS Online basemaps or create your own
- Add operational layers
 - The Map has a collection of operational layers you work with

```
var myNewMap = new Map(  
    BasemapType.Imagery, // use the Imagery basemap  
    42.175131,           // latitude  
    9.192313,            // longitude  
    8                    // level of detail (lower number = smaller scale)  
);
```

Saving maps to a portal

- Save new maps or changes to existing maps
- Save and Save as
 - Save as creates a new portal item
 - Convenience method for subset of portal item properties
- Saves version 2.6 web maps
- Unknown and unsupported json

```
boolean forceSave = true;

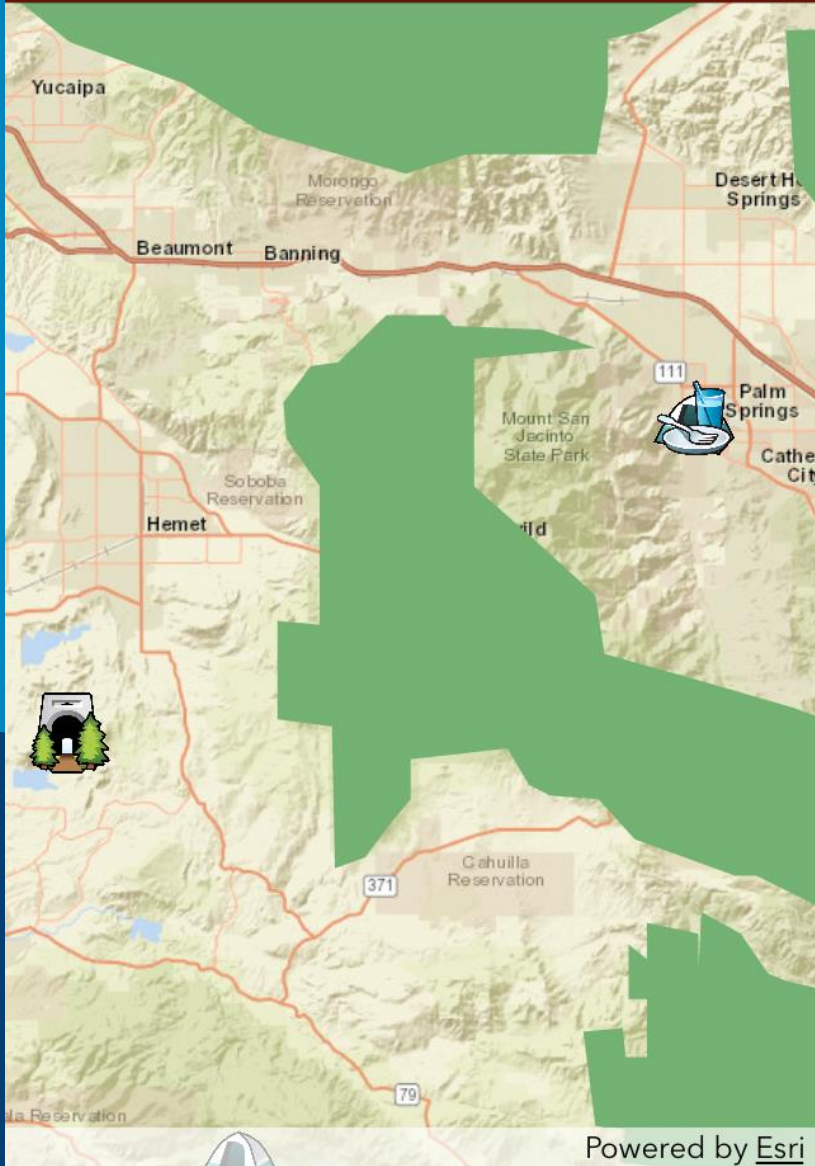
final ListenableFuture<PortalItem> saveAsFuture = map.saveAsAsync(portal, null, "title", tags, "desc",
thumbnaildataArray, forceSave);

saveAsFuture.addDoneListener(new Runnable() {

    @Override public void run() {

        // Check the result of the save operation.
        try {
            newMapPortalItem = saveAsFuture.get();
            showMessage("Map saved");
        } catch (Exception e) {
            // Handle exception
        }
    }
});

...
```



Open/Save demo

Justin

Opening mobile map packages

- Open the mobile map package
- Get list of maps, locators, networks it contains

```
final MobileMapPackage mobileMapPackage = new MobileMapPackage(mmpkPath);

mobileMapPackage.addDoneLoadingListener(new Runnable() {
    @Override
    public void run() {
        if (mobileMapPackage.getLoadStatus() == LoadStatus.LOADED) {
            showMessage(String.format("Number of maps = %d", mobileMapPackage.getMaps().size()));
            // In this case the first map in the array is obtained
            map = mobileMapPackage.getMaps().get(0);
        }
        else {
            // If loading failed, deal with failure depending on the cause...
            dealWithLoadFailure();
        }
    }
});

mobileMapPackage.loadAsync();
```


My Offline Map Book



Naperville Water Company Mapbook

2017/02/27

29 MB

3 Maps

Mapbook comprising three maps used for reading information related to water main, water lateral lines, and water system values for the city of Naperville, IL.



Downloaded

2017/03/06

811 Map - Pipe Material

Created 2017/02/27

Shows the location of water mains and water lines according to their material type.



CIP Map - Proposed Status

Created 2017/02/27

Distinguishes between 'current' and 'proposed' water mains and water lines.



Emergency Response Map - Water Volume

Created 2017/02/27

Depicts water mains and system valves according to their diameter/flow volume



Mobile map package demo

Justin

Creating offline layers

Offline layer types

- **Tiled layers**
 - Tile package in ArcGIS Desktop
 - Export tile cache from tiled service
- **Feature layers**
 - Mobile map package from Pro
 - Mobile geodatabases from ArcMap (create runtime content)
 - Generated geodatabase from sync enabled feature service
- **Raster layers**
 - Mosaic dataset / raster files from ArcGIS Pro
- **Scene layers**
 - Scene layer packages in ArcGIS Pro
- **File geodatabases / shapefiles**
 - Map packages in ArcGIS Desktop for use in Local Server


geobrew.maps.arcgis.com/home/item.html?id=c2683d64dbe143ed95b5147837cdac2#overview

Home Gallery Map Scene Groups My Content My Organization Justin

ExportTilesExport

Overview Usage Settings

Edit Thumbnail



★ Add to Favorites

Tiles

by justin_org

Last Modified: March 12, 2015

Tile Layer (hosted)

Description

Some tiles for Redlands

Layers

Buildings

Streets

Open in Map Viewer

Open in Scene Viewer

Share

Details

0 ratings, 0 views

Source: Map Service

Created from: ExportTilesExport, Service Definition

Created: March 12, 2015

Size: 1 MB

Shared with: The item is not shared.

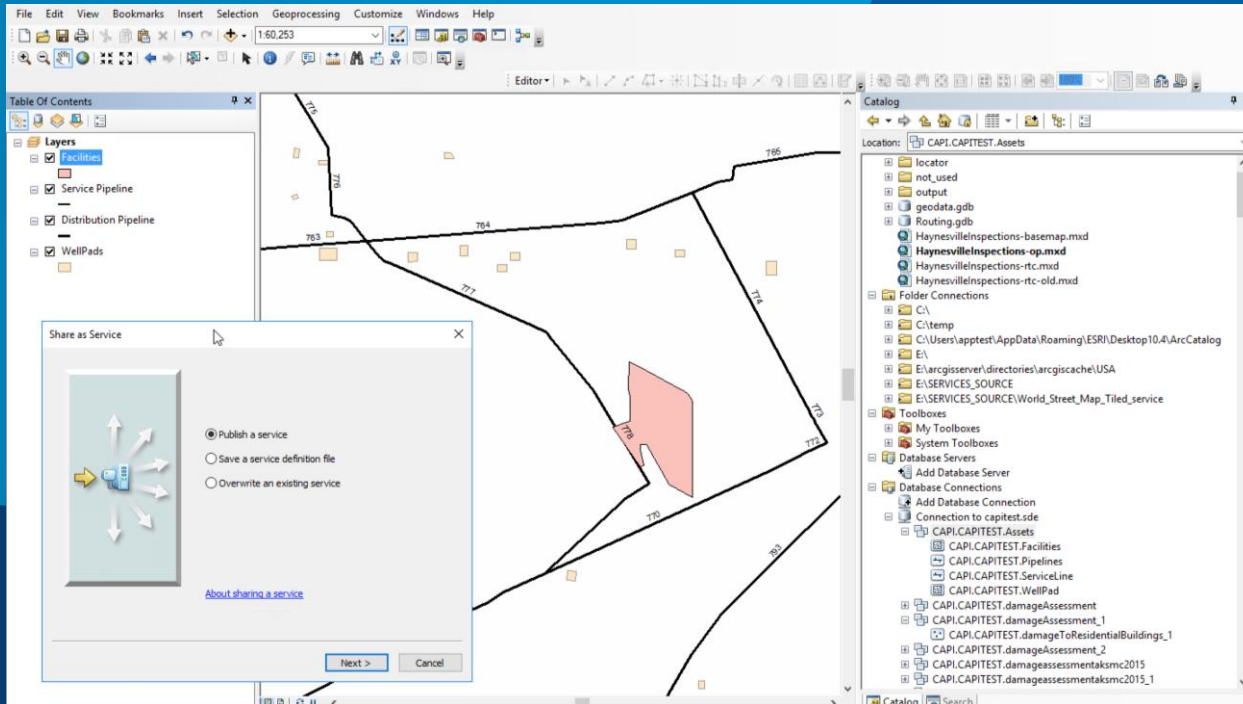
Facebook Twitter

Preparing Offline data with AGOL demo

Justin

Preparing Offline data with ArcGIS Enterprise demo

Justin



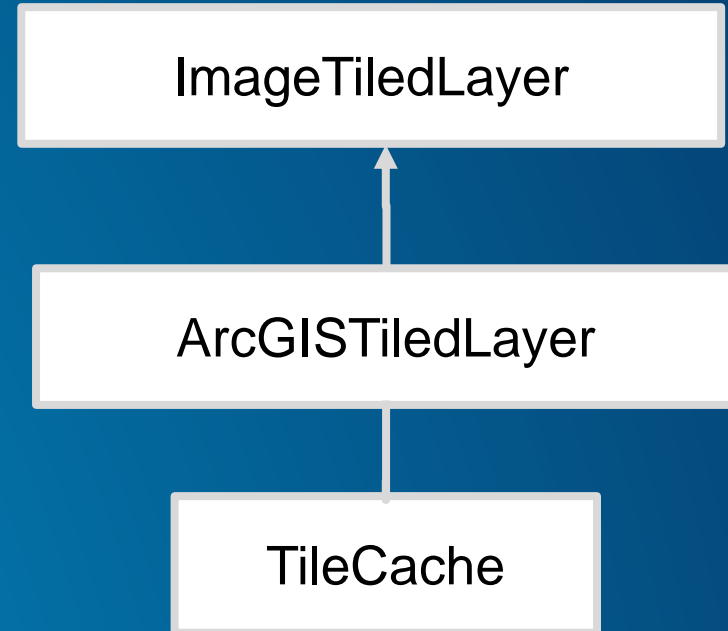
Preparing offline layers from ArcGIS Desktop

- **ArcGIS Pro**
 - Scene layer packages
 - Raster layers
 - Raw raster files
 - Mosaic dataset
- **ArcGIS Desktop**
 - Local server
 - GP result layers
 - Enterprise GDB connections
 - Create runtime content
 - Still possible, but Create Mobile Map Package is the future

**Bringing the data to life in
your app**

Basemaps (tiled layers)

- Consuming tile caches
- Exporting tile caches on demand



Export tile cache task pseudo-code

```
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] ) ;
```

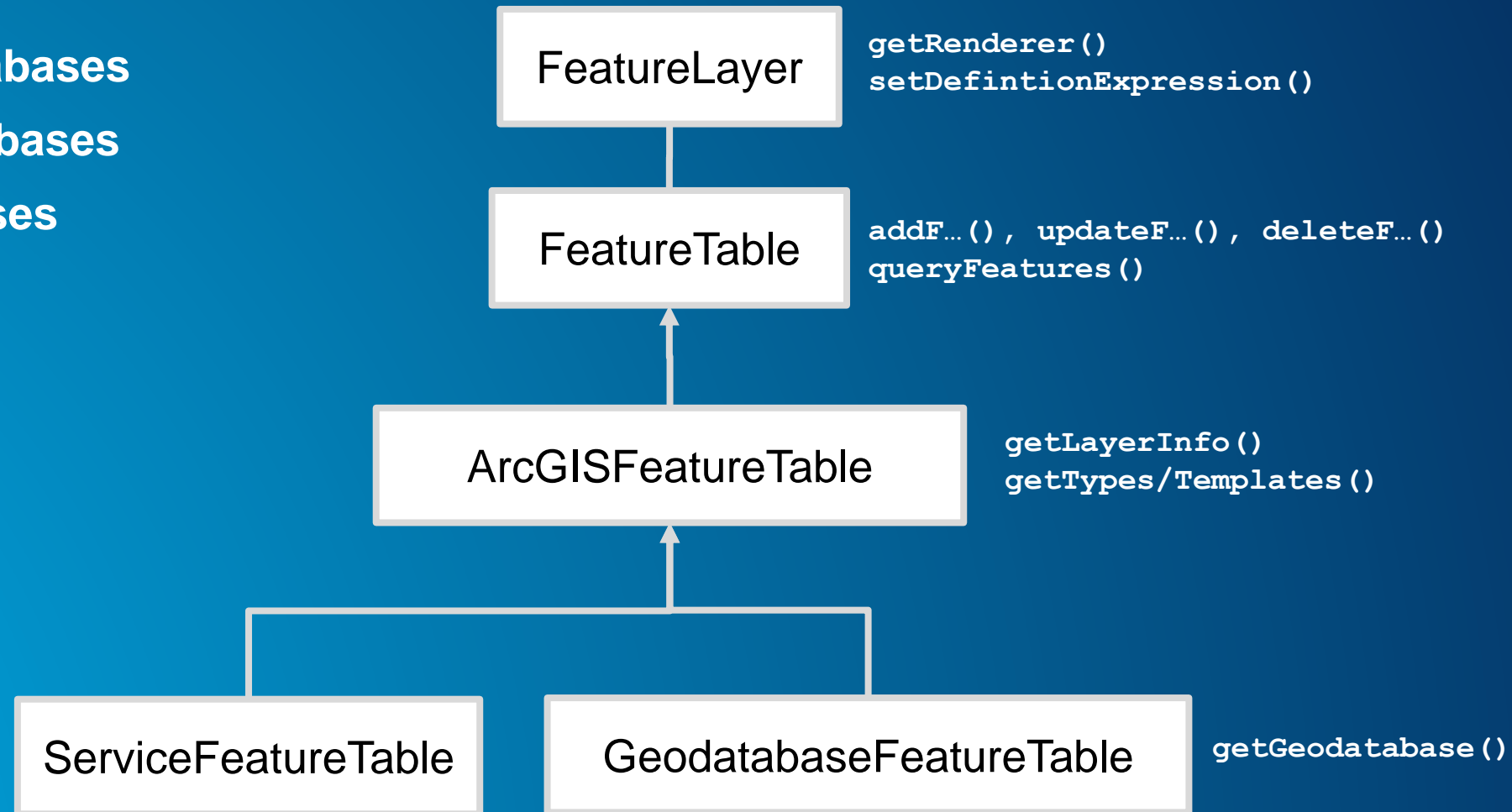
```
params.setAreaOfInterest( geometry ) ;
```

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

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

Operational layers (feature layers)

- Consuming geodatabases
- Generating geodatabases
- Syncing geodatabases



Generating geodatabases pseudo-code

```
task = new GeodatabaseSyncTask(featureServiceUri);
```

```
params =  
task.createDefaultGenerateGeodatabaseParameters(extent);
```

```
job = task.generateGeodatabase(params, path);
```

```
job.start()
```

Syncing geodatabases pseudo-code

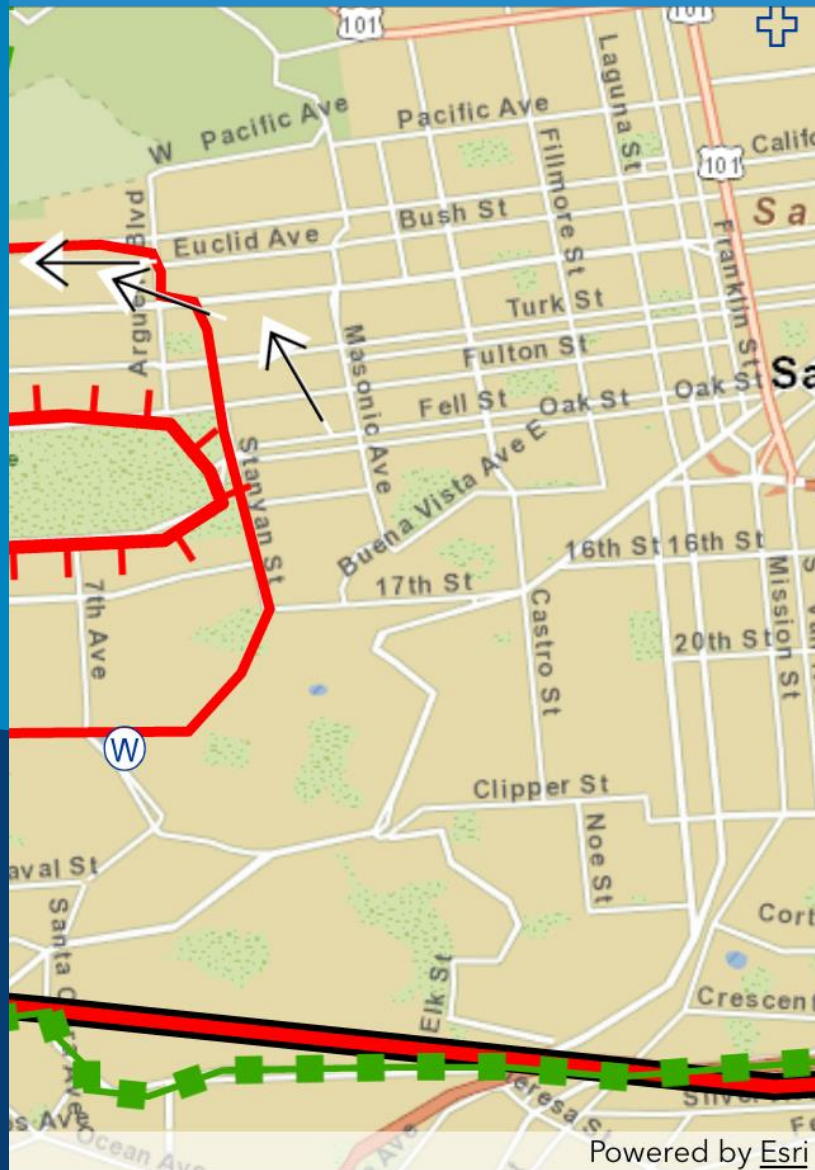
```
task = new GeodatabaseSyncTask(featureServiceUri);
```

```
params =
```

```
task.createDefaultSyncGeodatabaseParameters(gdb);
```

```
job = task.syncGeodatabase(params, gdb);
```

```
job.start()
```

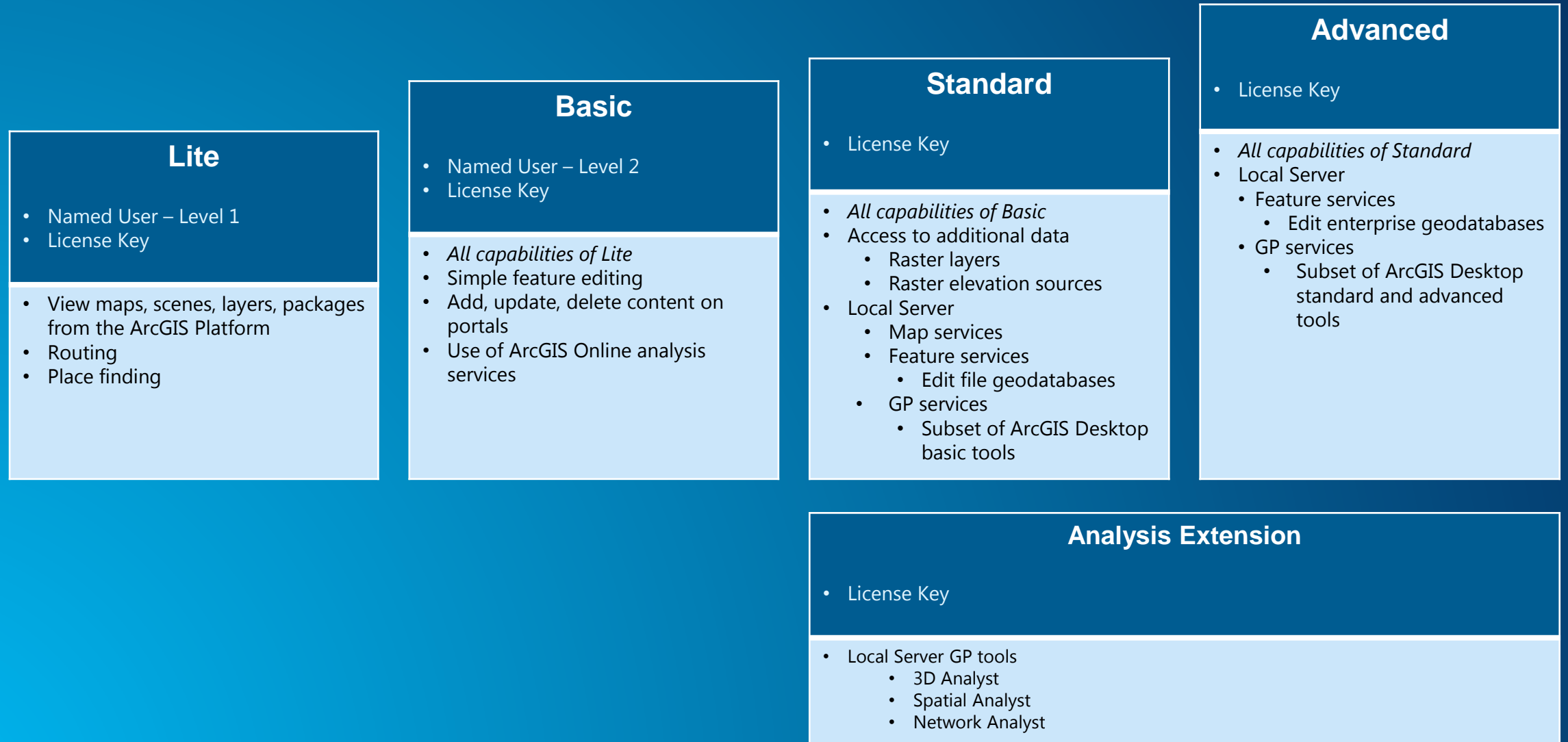


Generate geodatabase

Geodatabase Sync demo

Justin

ArcGIS Runtime SDK v100.x license model



Road ahead


- **Update 1**
 - **Taking maps offline (maps , not layers!)**
 - Gives you a mobile map package
 - **Mobile map packages**
 - Feature search
 - Bookmarks
 - Related tables
 - Tile packages
- **Beyond**
 - Editable mobile map packages
 - Webscene reading (then writing!)



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Aspect Ratio Test



If this shape does not appear as
a perfect circle, adjust the aspect
ratio of your display until it does.

Try the resolution 1920x1080 for
16:9 displays.