

UC



# ArcGIS Runtime: Migrating Your Apps from ArcGIS Engine

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# Migrating to ArcGIS Runtime

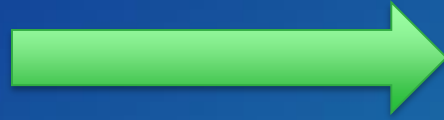
- ArcGIS Engine



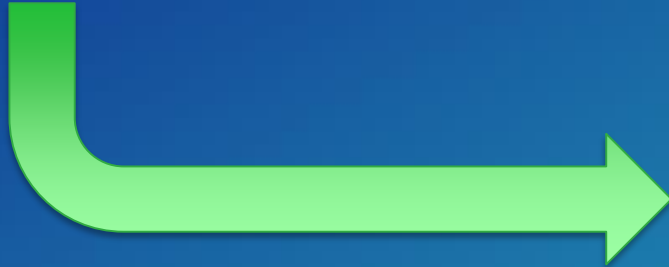
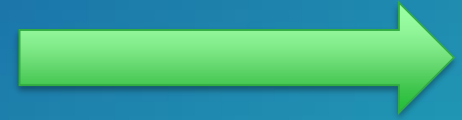
- ArcGIS Runtime
- AppStudio for ArcGIS
- Apps: Collector, Workforce, Navigator...
- ArcGIS Pro SDK for .NET

## Migrating...

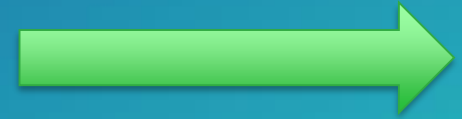
- ArcGIS Engine



- ArcGIS Runtime



- JavaScript



## Focus of the session

- ArcGIS Engine



- ArcGIS Runtime

*Remember, way back in the day....*



- ✓ Modern Devices
- ✓ Modern Architecture
- ✓ Modern ArcGIS Capabilities



# ArcGIS Runtime session tracks at UC 2017

- ArcGIS Runtime SDKs share a common core, architecture, and design
- Product sessions promote specific development experiences
- Functional sessions promote common capabilities and workflows
  - An Introduction to the API and Architecture
  - Building 3D Apps
  - Maximizing performance of your app
  - Building Offline apps
  - Building cross-platform apps
  - Upgrading from 10.2.X to 100.X
  - Migrating your apps from ArcGIS Engine
  - The Road Ahead
- Demo theaters highlight examples of specific technical capabilities

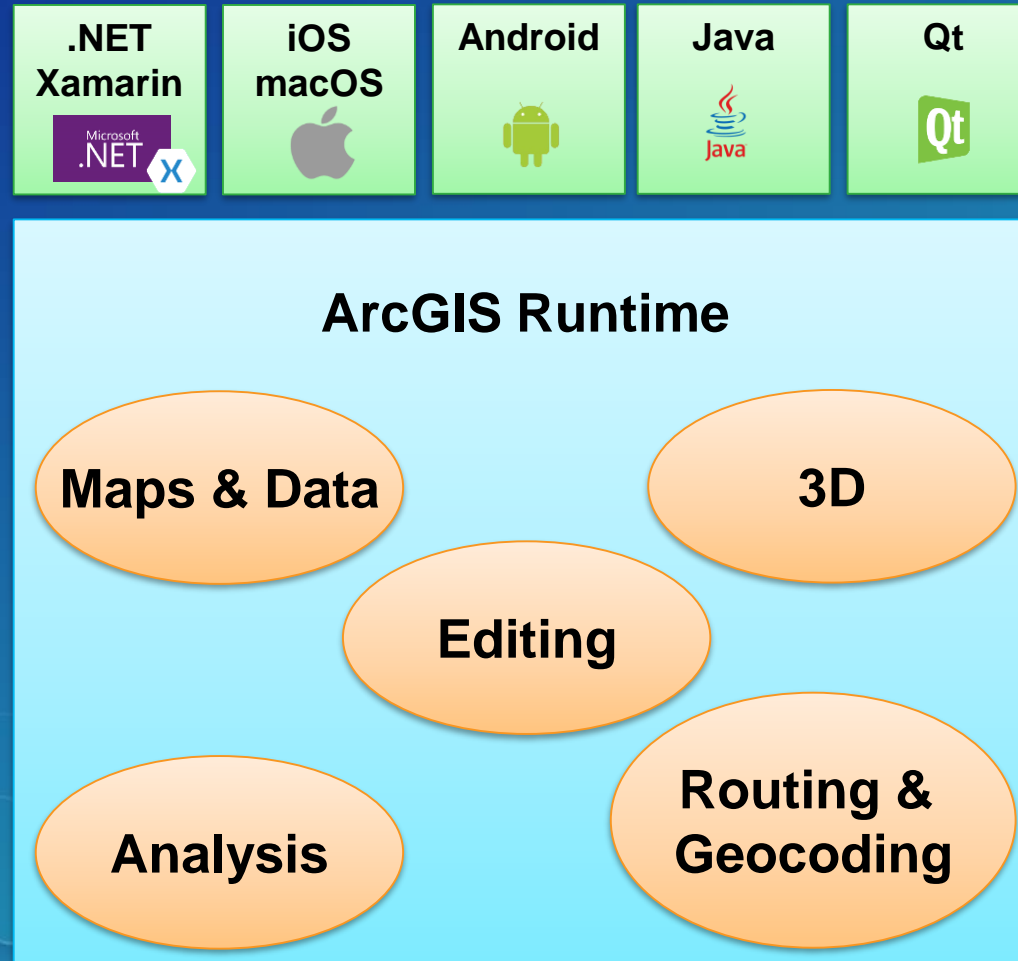


*Shared workflows, any platform, any device*

# Migrating to ArcGIS Runtime

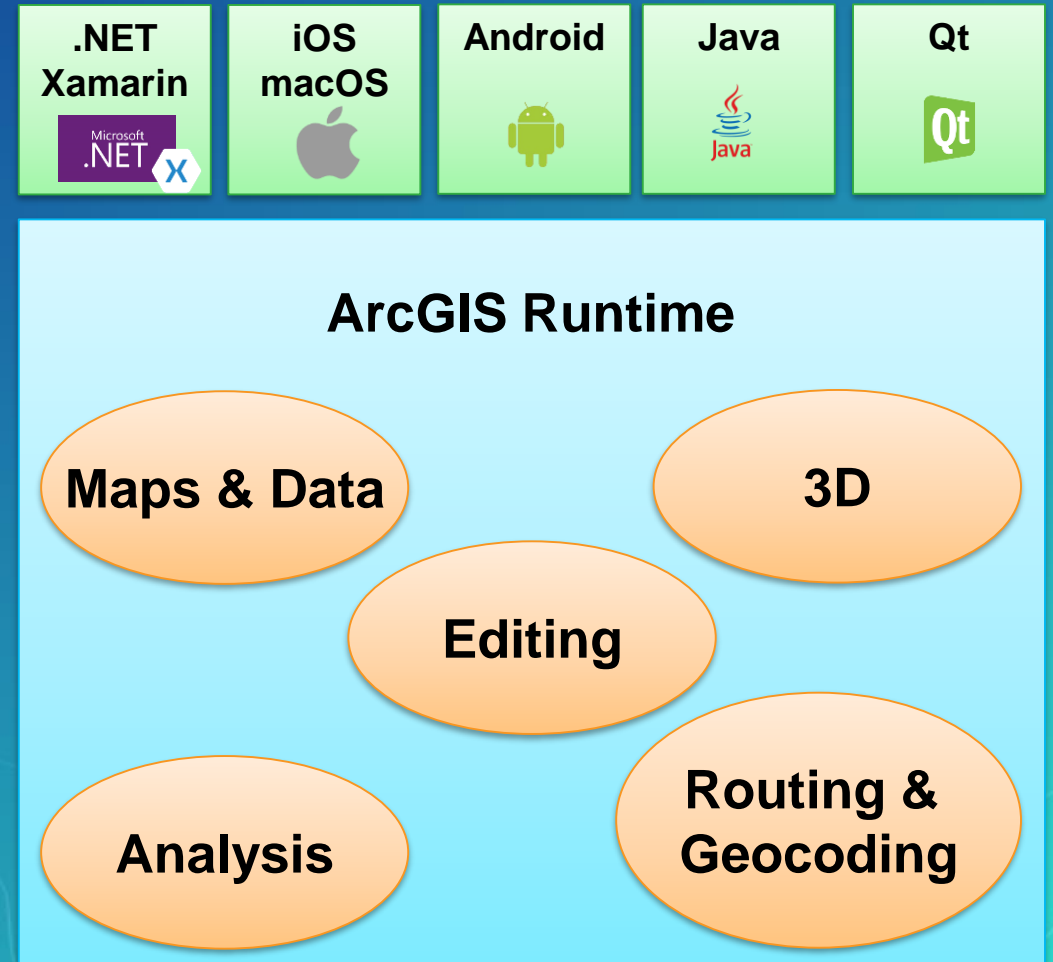


# Migrating to ArcGIS Runtime



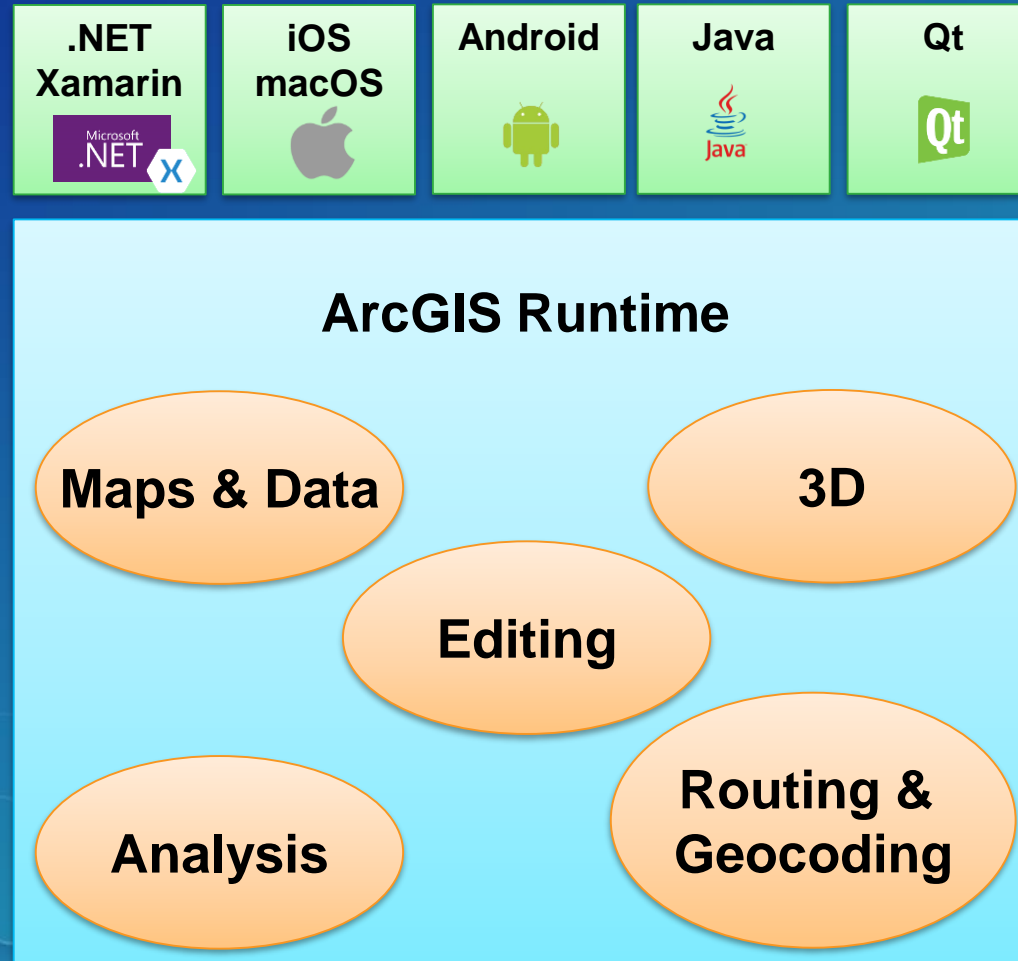
# Migrating to ArcGIS Runtime

- Documents, data, and workflows
  - ArcGIS Engine
- ArcGIS Runtime equivalent

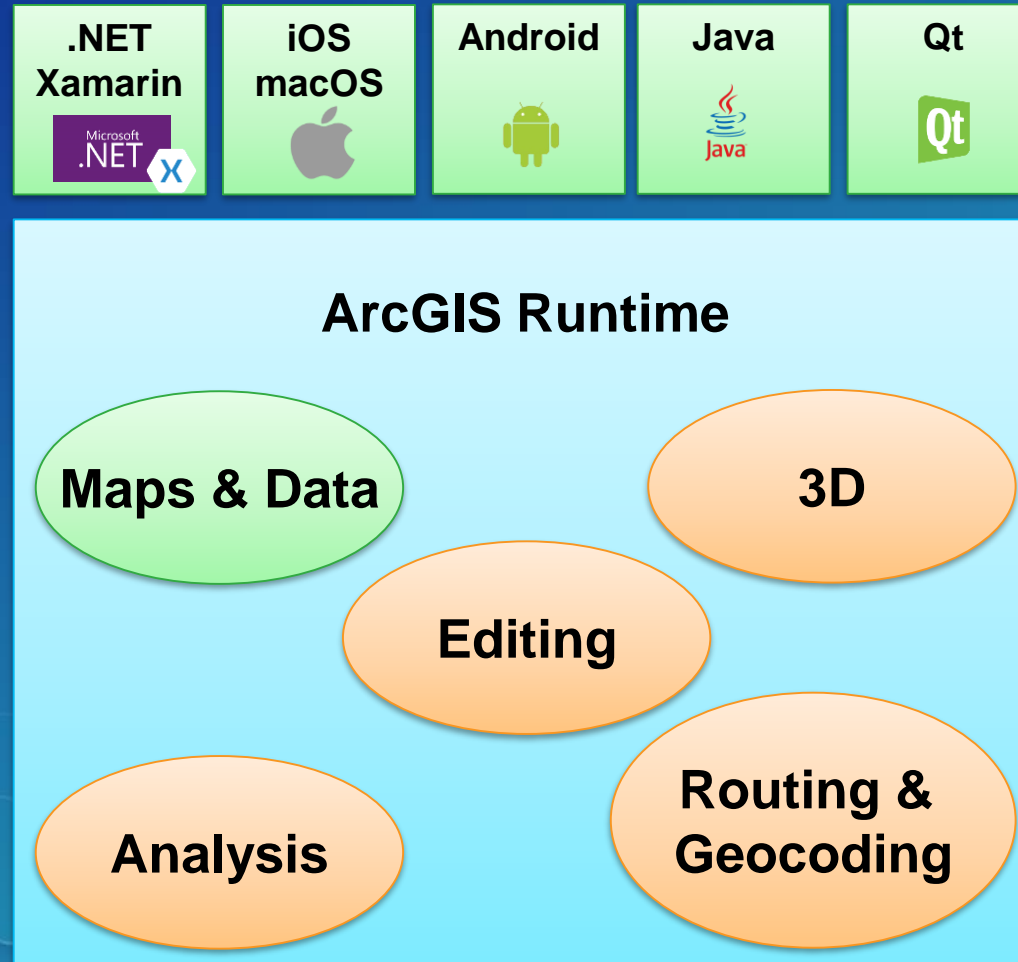




# Migrating to ArcGIS Runtime



# Migrating to ArcGIS Runtime



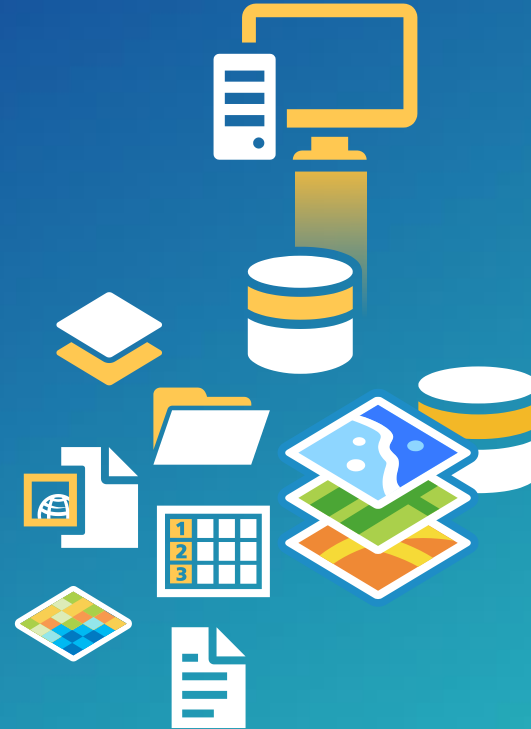
# Migrating from ArcGIS Engine to ArcGIS Runtime

- From a world based on ArcObjects:  
ArcMap, Engine, Server
- To the world of ArcGIS Runtime,  
ArcGIS Pro and ArcGIS Portal



# Maps

- ArcGIS 8.x / 9.x / 10.x
- Documents
  - ArcMap document .mxd
  - Map Package .mpk
  - Layer file .lyr
  - Layer package .lpx



# Maps

- ArcMap .mxd
- Map Package .mpk



- Maps from the ArcGIS Platform
- Mobile Maps





# Maps

- ArcMap .mxd
- Map Package .mpk



- Maps from the ArcGIS Platform



# Maps from the ArcGIS Platform

- Maps from Portals (Webmaps)
- Read/write in Online, Pro, and Runtime
- Webmap spec
- JSON
- Online layers & embedded content
  - Feature Collection
  - Feature Layer
  - Map Image Layer
  - Tiled Layer
  - Vector Tiled Layer

```
{  
  "authoringApp": "WebMapView",  
  "authoringAppVersion": "4.1",  
  "version": "2.4",  
  "baseMap": { ... },  
  "spatialReference": { ... },  
  "operationalLayers": [ {  
    "id": "USGS_Seismic_Data_5353",  
    "layerType": "ArcGISMapServiceLayer",  
    "url": "http://utility.arcgis.com/...",  
    "visibility": true,  
    "opacity": 1,  
    "title": "Earthquakes",  
    "itemId": "0d1793bd6b2c438996fd4d3aed46219f",  
    "layers": [ ... ] } ],  
  "bookmarks": [ ... ],  
  "applicationProperties": { ... }  
}
```



<http://esriurl.com/WebMapSpec>

# Maps

- ArcMap .mxd
- Map Package .mpk



- Mobile Maps



# Mobile Maps from ArcGIS

- Maps from ArcGIS Pro and Portal for ArcGIS
- Mobile Map Package .mmpk
- Mobile map spec
- .mmpk file includes layers and data
  - Feature layers and tables
  - Tile basemap (as a .tpk)
  - Vector tile basemap (from existing .vtpk)
- Include locators and networks
  - Geocoding and routing offline
  - From ArcGIS Pro
- Offline Map Task
  - Take maps offline from Portal

```
{  
  "map" : {  
    "version" : "1.1",  
    "operationalLayers" : [  
      {  
        "id" : "b5479f6f8e374f23b0f7096743cd9b1e",  
        "title" : "Crime Incidents",  
        "visibility" : true,  
        "layerType" : "ArcGISFeatureLayer",  
        "path" : "file:./sanfrancisco.geodatabase?itemId=1"  
      },  
      {  
        "id" : "75cfe269e9d14fffb892afae60fa64d75",  
        "title" : "Police Stations",  
        "visibility" : true,  
        "layerType" : "ArcGISFeatureLayer",  
        "path" : "file:./sanfrancisco.geodatabase?itemId=0"  
      }  
    ],  
    "baseMap" : {  
      "baseMapLayers" : [  
        {  

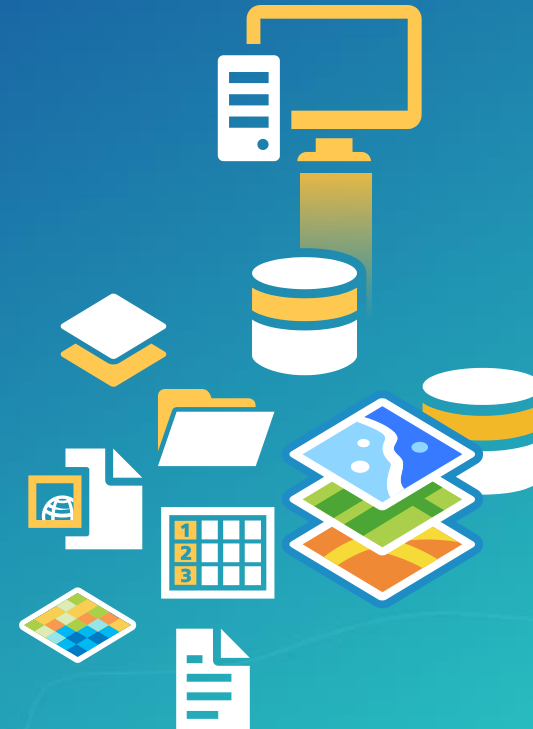
```



<http://esriurl.com/MMPK>

# Data

- ArcGIS 8.x / 9.x / 10.x
- Data
  - Geodatabases (personal, file, and ArcSDE)
  - Shapefiles
  - Raster datasets
  - ArcGIS Server map services, image services
  - ArcIMS map services, feature services
  - OGC WMS, WCS
  - TIN
  - CAD





## Data / File-based

- Shapefile
- Personal Geodatabase
- File Geodatabase



- Mobile Geodatabase
- Shapefile (roadmap)

## Data / File-based

- Mobile Geodatabase .geodatabase
- Based on SQLite
  - Portable, efficient
- Contains schema, data, and rendering information
- Created:
  - ArcGIS Pro – Mobile Map Package .mmpk
    - Read-only
  - Sync-enabled feature service
    - Read/write and sync
  - Offline maps from your Portal
    - Read/write and sync



<http://esriurl.com/CreateMMPK>  
<http://esriurl.com/PrepareForOffline>

## Data / Enterprise

- ArcSDE



- Feature Service

## Data / Enterprise

- Feature Service
- Hosted on ArcGIS (Server, Portal, Online)
- Display, query, and edit data in Enterprise or Workgroup geodatabases
- ArcGIS Runtime API accesses via calls to REST API
- Create mobile geodatabases
  - Download and synchronize features, records, and attachments
- Simple feature access



<http://esriurl.com/AuthorFeatureServices>

## Data / Raster

- Raster data



- Raster Layer
  - File Raster
  - Image Service Raster



## Data / Raster

- ArcGIS Runtime supports direct read of many raster formats
- Raster renderers applied by the API
  - Blend, Colormap, Hillshade, RGB, and Stretch
- Apply functions on the fly
  - Subset of Image Server raster functions
  - Mask, Clip, Pansharpen, Raster Calculator...
- Mosaic Datasets
  - Store, manage, view, and query collections of raster data as a catalog
  - Data model implemented in geodatabase
  - Visualize as a single mosaicked image
  - Create in ArcGIS Pro using GP tool
  - Create ArcGIS Runtime API via API



<http://esriurl.com/MobileMosaicDataset>

## Data / Services

- ArcGIS Server map services
- ArcGIS Server image services
- ArcIMS map services
- ArcIMS feature services
- OGC WMS



- Feature services
- Map services
- Tiled services
- Vector tiled services
- Image services
- WMTS
- OpenStreetMap
- Bing
- WebTiledLayer
- WMS (roadmap)
- WFS (roadmap)

# Data / Services

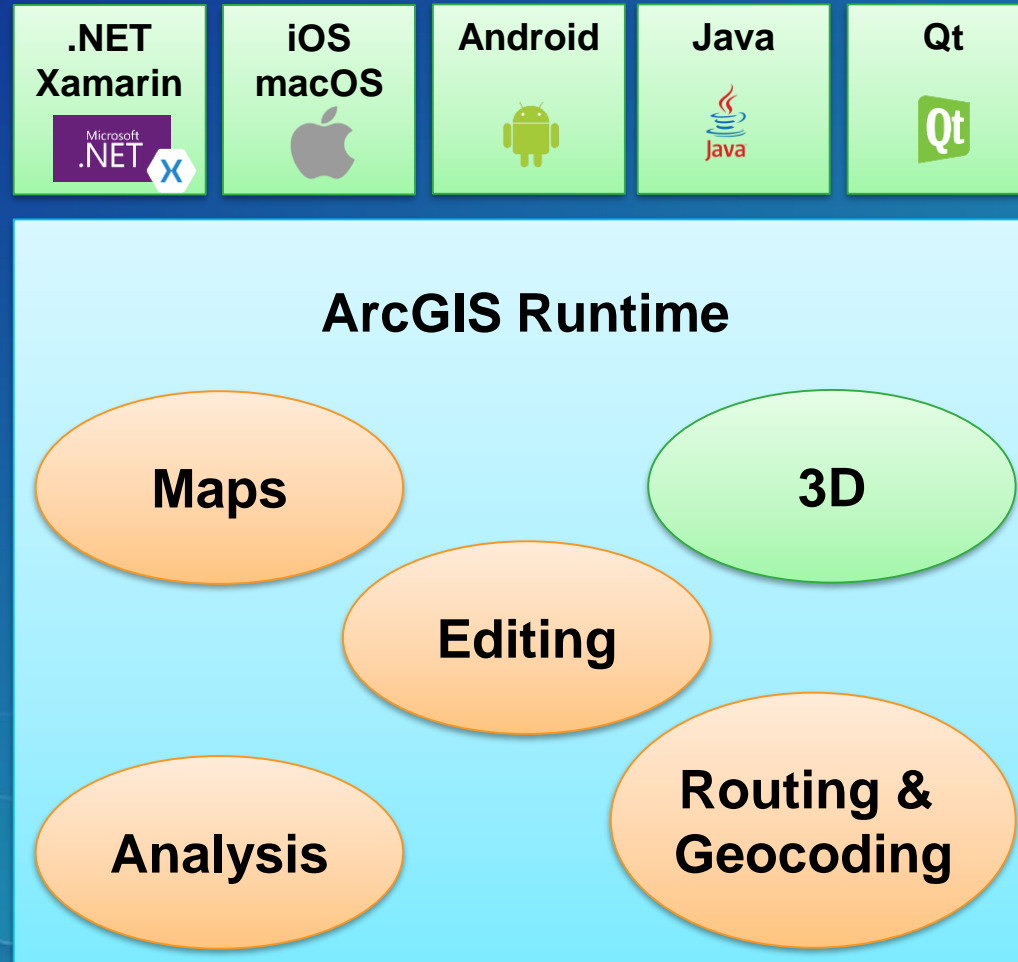
- **ArcGIS Server, Portal, and Online services**
- **Map services**
  - Dynamically renders map images
  - Preconfigured layers (override via DynamicLayer)
  - Cache pre-rendered tiled and consume as tiled layer
- **Feature services**
  - Query and edit features
  - Download and synchronize mobile geodatabases
- **Image Services**
  - Apply rendering rules and raster functions
- **Vector tiled services**
  - Vector tiled basemaps
  - Publish from ArcGIS Pro



# Roadmap for maps & data in ArcGIS Runtime 100.x

- **Mobile Map Package enhancements**
  - Edit contents of mobile map package and share with Pro
  - Manage local mobile packages
- **Layers**
  - WMS
  - KML
  - Geopackage
- **Shapefile**
- **CSV**
- **Electronic Navigational Chart (ENC)**
- **Utility networks**

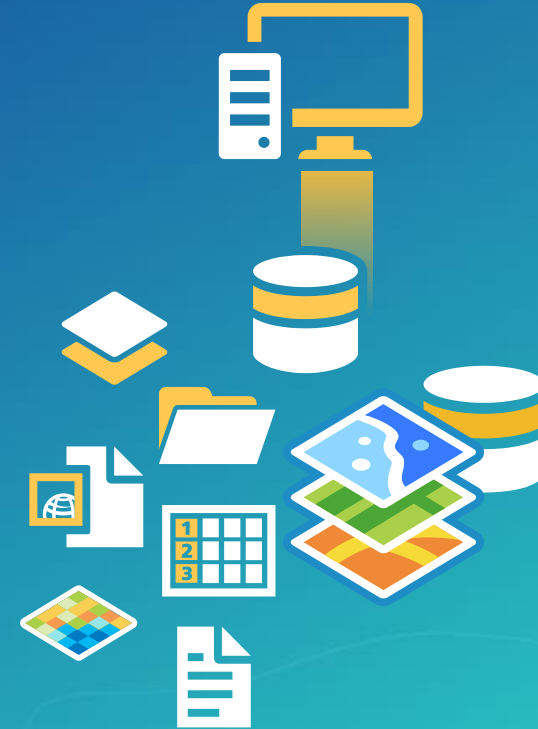
# Migrating to ArcGIS Runtime





# 3D

- ArcGIS 8.x / 9.x / 10.x
- ArcGlobe document .3dd
- ArcScene document .sxd
- Multipatch feature classes
- GlobeControl
  - Caching and cache management
- SceneControl
  - 'Local' scenes



# 3D

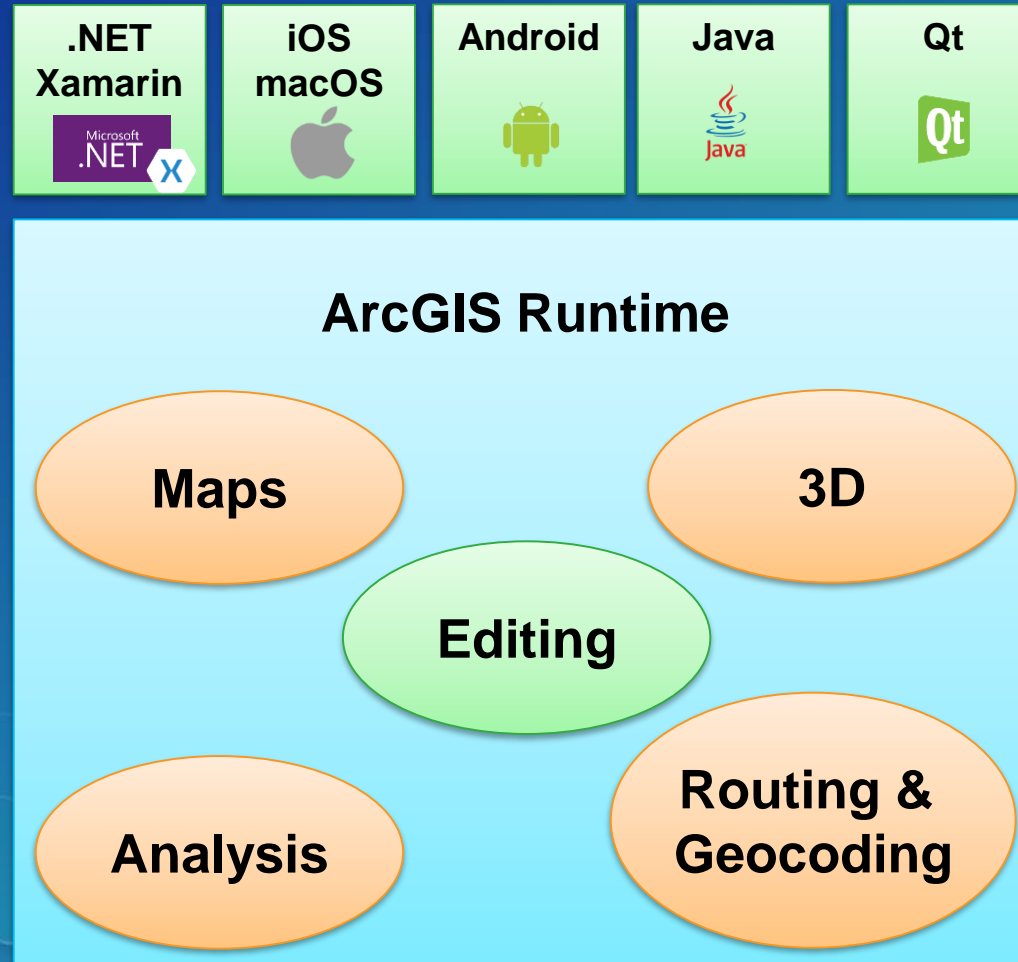
- Available in all ArcGIS Runtime SDKs
  - Windows, Linux, Android, iOS
- Scene Service Layers
  - Published using ArcGIS Pro
  - ArcGIS Online
  - ArcGIS Enterprise
- Scene Layer Packages .slpk
  - Created using ArcGIS Pro
  - Use offline
- Elevation services and local raster datasets
- Key API types
  - SceneView, Scene, Surface, ArcGISSceneLayer, SceneSymbol, Camera



# Roadmap for 3D in ArcGIS Runtime 100.x

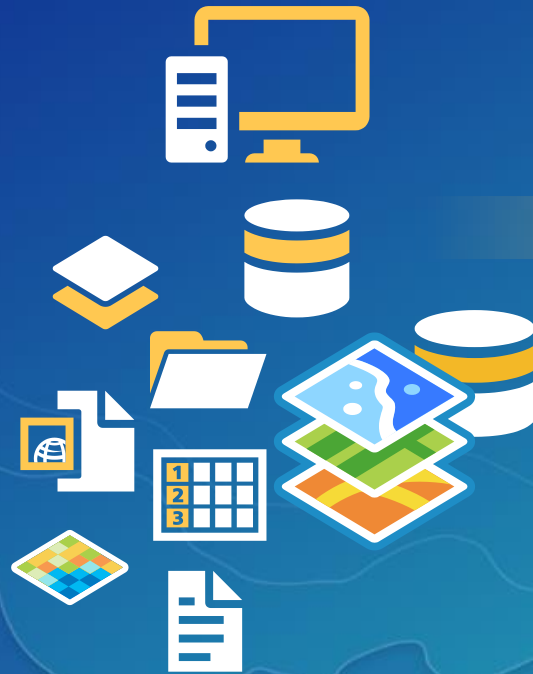
- Web Scene read / write
- Location Display on SceneView
- Vector Tile Layer support
- SketchEditor on SceneView
- 'Local' Scenes
- Subsurface support

# Migrating to ArcGIS Runtime



# Migrating from ArcGIS Engine

Engine



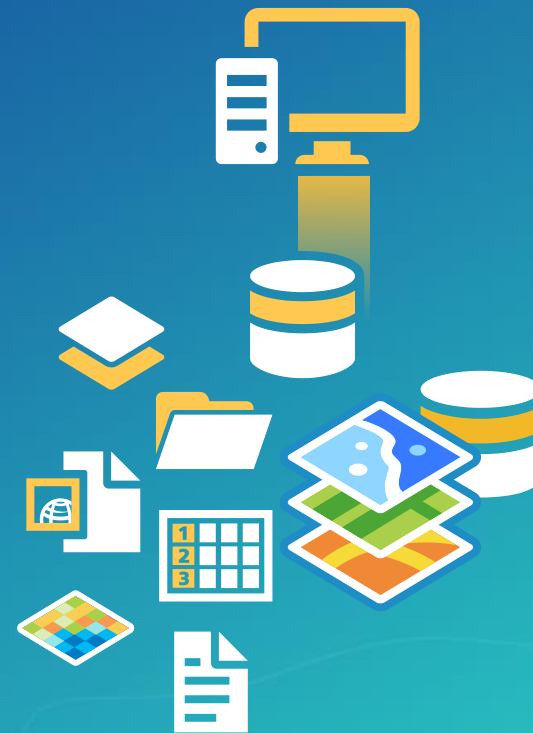
ArcGIS Runtime





# Editing

- **ArcGIS Engine editing workflow mirrors ArcMap**
- **Editable data formats**
  - Personal, File, ArcSDE geodatabases, and Shapefiles
- **Editable content**
  - Simple features / feature classes
    - Point, Polyline, Polygon, Multipoint
  - Complex features
    - Geometric networks, Topologies
  - Geodatabase schemas
- **Workflow**
  - Set target vector dataset (IFeatureLayer)
  - Edit features in an edit session via edit operations
  - Use geodatabase replication for offline editing



# Editing

## Editable data formats and content

- **Editable data formats**
  - **Feature service**
    - ArcGIS Server and Portal feature services
  - **Mobile geodatabase**
    - Sync-able mobile geodatabases
    - Created from feature service with the GeodatabaseSyncTask
  - **Static feature collection editing**
    - Feature collections (map and item based)
- **Editable content**
  - **Simple feature editing**
  - **Points, lines, polygons, multipoint**
  - **Simple feature classes**
  - **Features, attributes, attachments**

# Editing

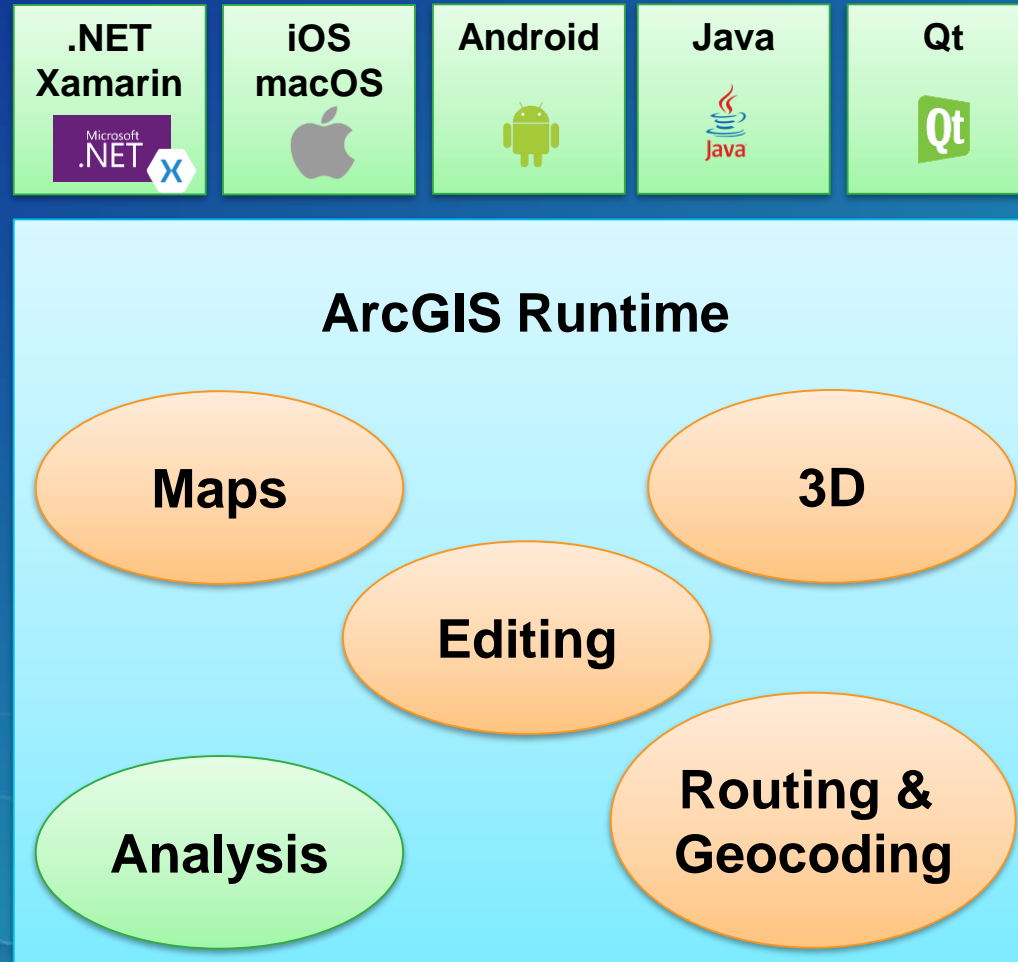
## Workflow

- **Create or get a Feature from the Table**
- **Modify Feature geometry, attributes, attachments**
- **Apply Feature edits to Table via async Add, Update, Delete operations**
- **If editing an online service feature table**
  - Call `ApplyEdits` to push edits up to service
- **If editing a geodatabase table from an offline sync-enabled geodatabase**
  - Use `GeodatabaseSyncTask` to sync with service
  - New Offline Map Task with Update 1
- **If editing a static Feature Collection Table**
  - Saved the map or portal item

# Roadmap for editing in ArcGIS Runtime 100.x

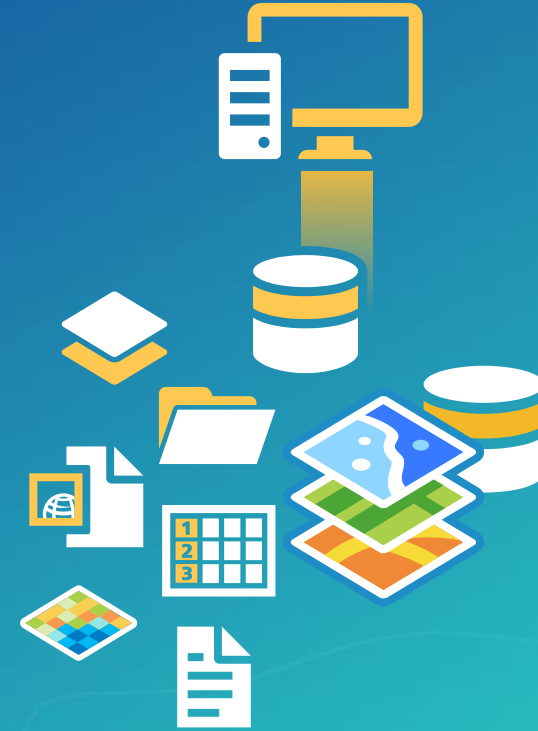
- Shapefile read / write
- KML read / write
- Offline map task enhancements
  - Pre-planned workflows
- Geographic transformations

# Migrating to ArcGIS Runtime



# Analysis

- **ArcGIS 8.x / 9.x / 10.x**
- **Topological relationships**
  - **Geometric objects: point, polyline, polygon...**
  - **Geometry objects implemented interfaces**
    - **IProximityOperator: nearest, distance...**
    - **IRelationalOperator: contains, crosses...**
    - **ITopologicalOperator: boundary, buffer...**
- **Analysis of layers, processing of data**
  - **Geoprocessing**
- **Extensions**
  - **NetworkAnalyst**
  - **SpatialAnalyst**
  - **3DAnalyst**





# Analysis

- **Geometry Engine**

- Operates on individual geometries
- Not bound to data or services
- Very efficient synchronous operations
- The foundation for many workflows e.g. click > **buffer** > query > **project** > display

- **Geoprocessing**

- Local geoprocessing service using LocalServer
  - Create geoprocessing package .gpk using ArcMap
- **ArcGIS Server**
  - Publish your own services
- **ArcGIS Online**
  - Services hosted by esri

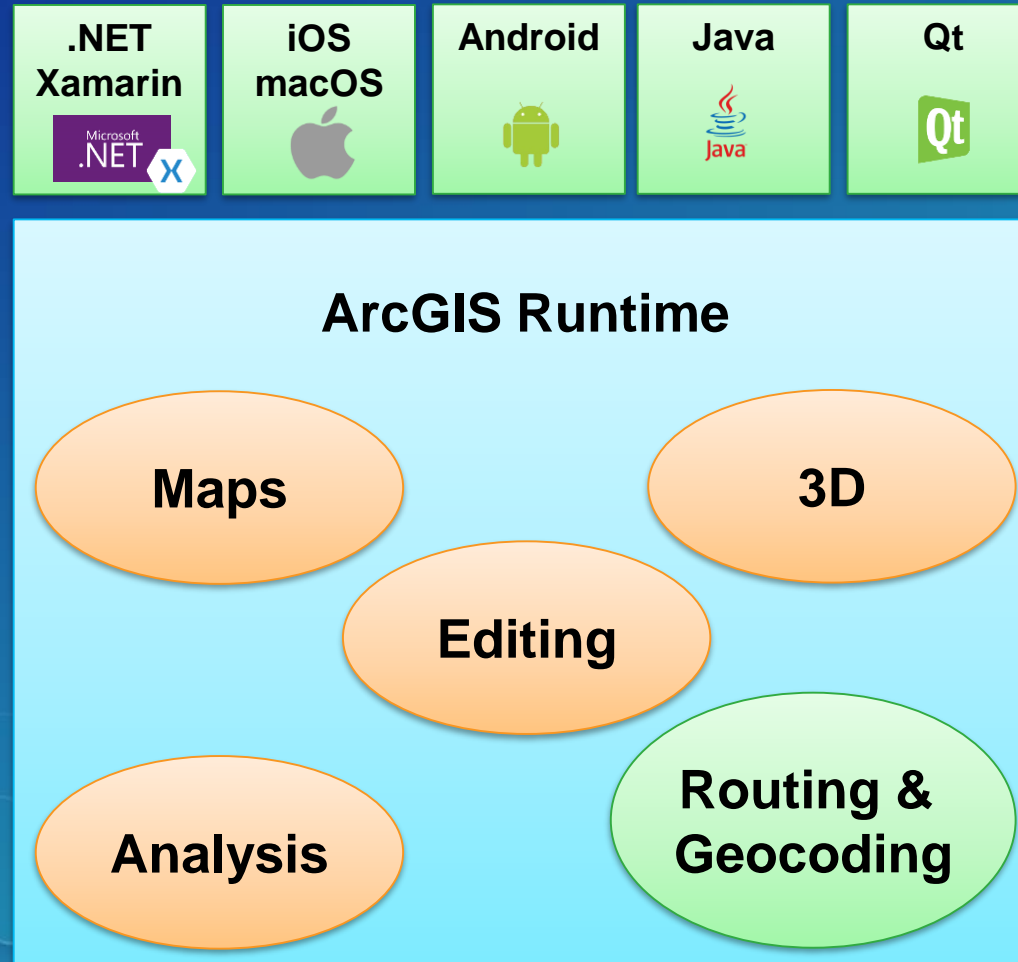
- **Visualization**

- Renderers

# Roadmap for analysis in ArcGIS Runtime 100.x

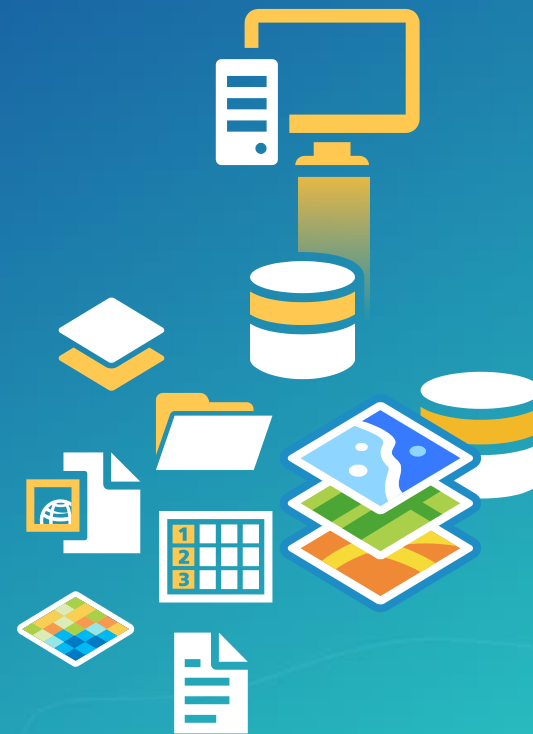
- Geoprocessing additional tools for Local Server
- Renderers and additional support for smart mapping
- 3D on-the-fly visual analysis e.g. viewshed, line of sight

# Migrating to ArcGIS Runtime



# Routing & Geocoding

- **ArcGIS 8.x / 9.x / 10.x**
- **Routing performed on ArcGIS Network Datasets**
  - Requires Network Analyst extension
  - Execute via ArcObjects
  - Execute via geoprocessing tools
  - Use ArcGIS Server network analyst services
  - Solvers
    - Route, Closest Facility, Service Area, Origin-Destination Cost Matrix, Vehicle Routing Problem (VRP) Solver, Location-Allocation Solver
- **Geocoding performed on ArcGIS Locators**
  - Execute via ArcObjects
  - Execute via geoprocessing tools



# Routing & Geocoding

- **Routing**

- **ArcGIS Network Datasets**
- **Specific optimized Network Analysis service types and associated API 'Task' types**
  - **Route, Service Area, Closest Facility**
- **ArcGIS Runtime provides local equivalent**
  - **Route**
  - **Service Area (roadmap)**
  - **Closest (roadmap)**
- **Packaged into Mobile Map Packages .mmpk with ArcGIS Pro**
- **Other network analysis types available as Geoprocessing services**

- **Geocoding**

- **ArcGIS Locators**
- **Published as services (GeocodeServer endpoint)**
- **Packaged into Mobile Map Packages .mmpk with ArcGIS Pro**

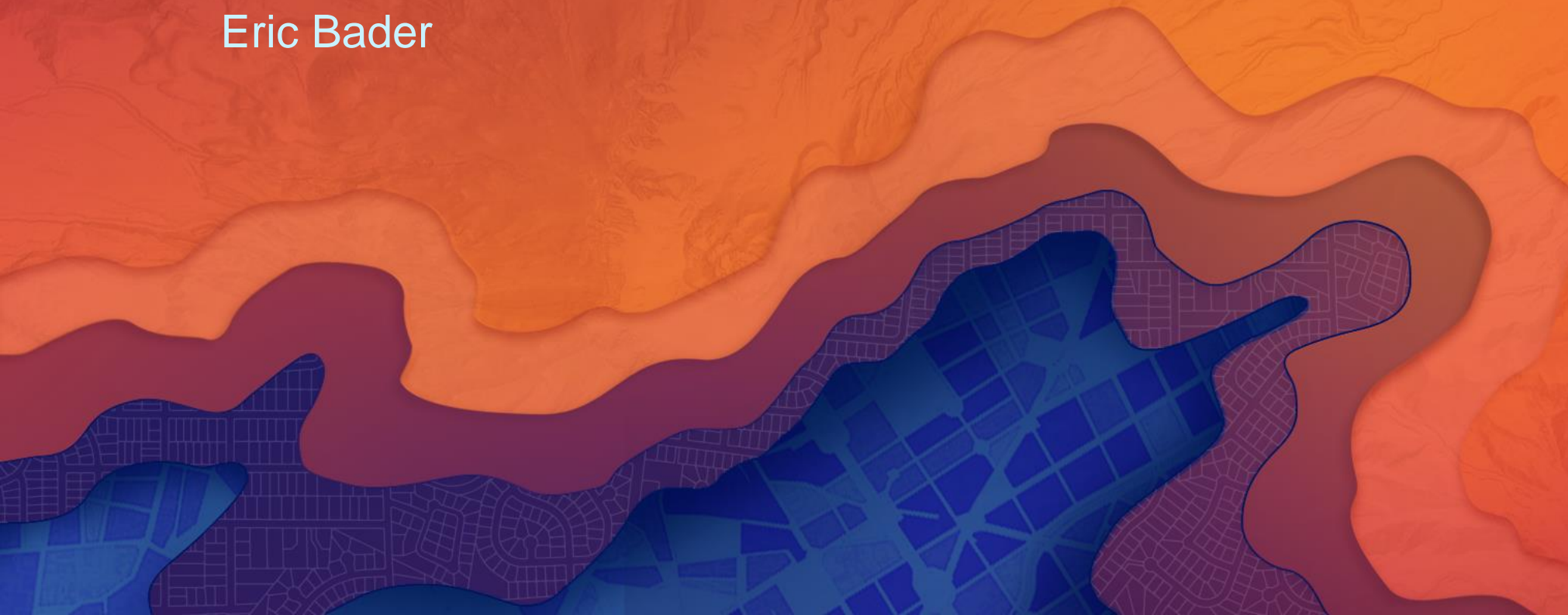
# Roadmap for routing & geocoding in ArcGIS Runtime 100.x

- Local Service Area Task
- Local Closest Facility Task



# What else do you need to know?

Eric Bader



# ArcGIS Engine Product Life Cycle – how long do I have?

Version	Release Date	General Availability	Extended Support	Mature Support	Retired
10.5	December 15, 2016	Dec 2016 - Nov 2018	Dec 2018 - Nov 2020	Dec 2020 - Nov 2022	December 01, 2022
10.4.1	May 31, 2016	May 2016 - Apr 2018	May 2018 - Apr 2020	May 2020 - Apr 2022	February 01, 2022
10.4	February 18, 2016	Feb 2016 - Jan 2018	Feb 2018 - Jan 2020	Feb 2020 - Jan 2022	February 01, 2022
10.3.1	May 13, 2015	May 2015 - Nov 2016	Dec 2016 - Nov 2018	Dec 2018 - Nov 2020	January 12, 2020
10.3	December 10, 2014	Dec 2014 - Nov 2016	Dec 2016 - Nov 2018	Dec 2018 - Nov 2020	December 01, 2020
10.2.2	April 15, 2014	Apr 2014 - Jun 2015	Jul 2015 - Jun 2017	Jul 2017 - Jun 2019	July 11, 2019
10.2.1	January 07, 2014	Jan 2014 - Jun 2015	Jul 2015 - Jun 2017	Jul 2017 - Jun 2019	July 01, 2019
10.2	July 30, 2013	Jul 2013 - Jun 2015	Jul 2015 - Jun 2017	Jul 2017 - Jun 2019	July 01, 2019
10.1	June 11, 2012	Jun 2012 - Dec 2013	Jan 2014 - Dec 2015	Jan 2016 - Dec 2017	January 01, 2018

## Reminders and resources

- Be aware of your Product Life Cycles!

<http://support.esri.com/other-resources/product-life-cycle>

- A few deprecation notices:

- [Added April 13, 2016] ArcGIS 10.4.1 will be the last release of Engine Linux. There will not be a 10.5 release of ArcGIS Engine for Linux. ArcGIS 10.4.x for Engine Linux will be supported till 2022. We recommend that customers explore the ArcGIS Runtime SDKs for Java and Qt as an alternatives.

- <https://blogs.esri.com/esri/supportcenter/2016/06/09/release-of-the-deprecated-features-plan-for-arcgis-10-4-and-10-4-1/>



# Where to start?

- **Dev Labs!**

ArcGIS for Developers

[Get Started](#)

[Documentation](#)

[Features](#)

[Pricing](#)

[Support](#)

## Learn how to build an app in 15 minutes.

ArcGIS DevLabs guide you through the three phases of building geospatial apps: Data, Design, Develop

[Introduction](#)

[Data](#)

[Design](#)

[Develop](#)

# A new developer experience!

## ArcGIS Developer Subscription Pricing

The ArcGIS Developer Subscription offers a cost-effective way to license ArcGIS products and developer tools. Whether you're building apps or extending the ArcGIS platform, the Developer Subscription has plans specifically tailored to best implement your solution.

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### Professional

Build Geospatial Apps

Esri Technical Support

### Premium

Build Geospatial Apps

Esri Technical Support

### Enterprise

Build Geospatial Apps

Esri Technical Support

# Example Apps – *New!*

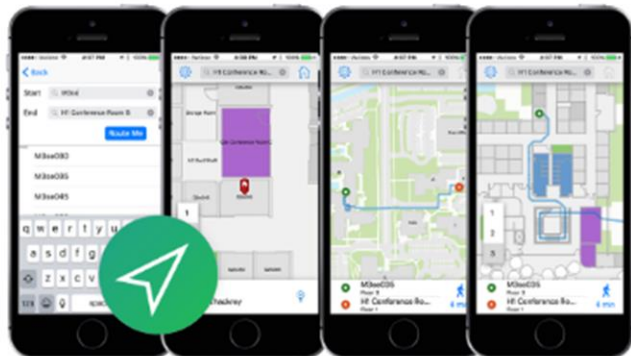
- <https://developers.arcgis.com/example-apps/>

ArcGIS for Developers Get Started Documentation Features Pricing Support

Search Sign In

## Example Apps Demonstrating the ArcGIS Platform

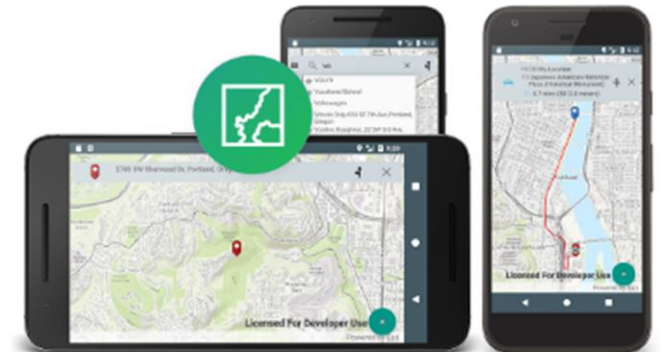
Learn about the ArcGIS Platform from these complete example applications.



Indoor Routing Xamarin



Ecological Marine Unit



Maps App Android



# Summary

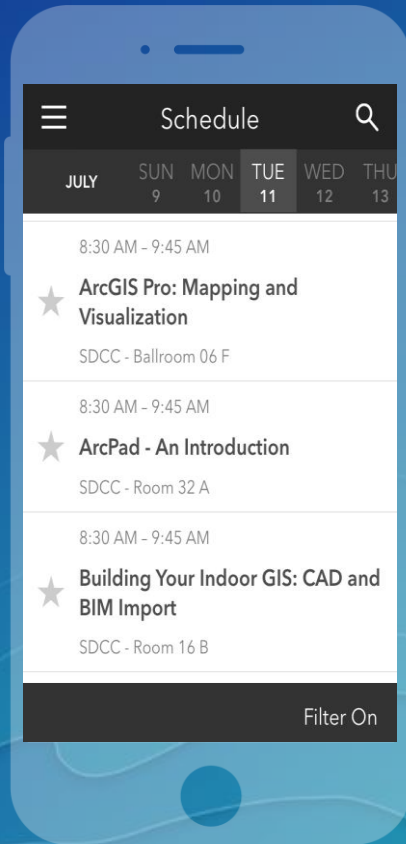
- **Architectural differences**
  - Distributed GIS vs Client/Server
  - Cross platform, 64-bit, high performance
- **Know where the right migration paths are!**
- **<http://developers.arcgis.com/labs>**
- **2017 is the year to start planning your migration!**
  - Update 1 is here! “10.2.x equivalency” – June 29<sup>th</sup> 2017
  - Update 2: “Engine equivalency” – Q4 2017

# Please Take Our Survey on the Esri Events App!

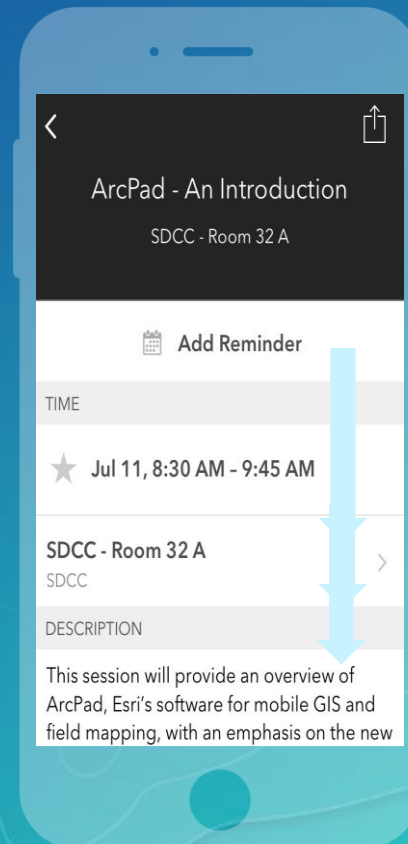
Download the Esri Events app and find your event



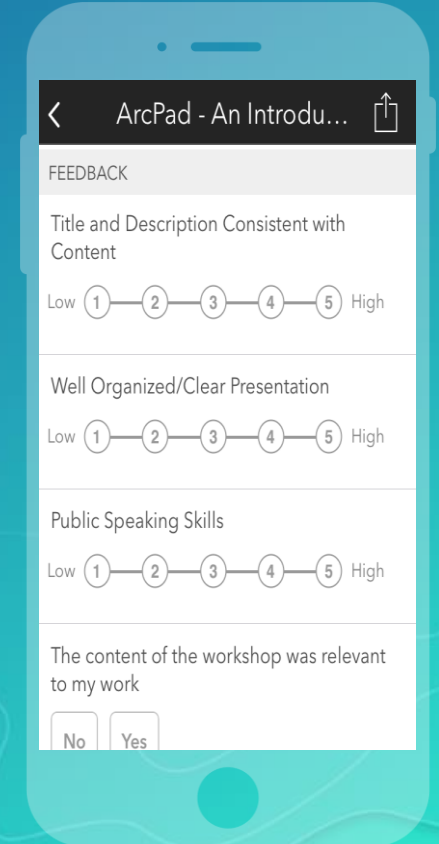
Select the session you attended



Scroll down to find the survey



Complete Answers and Select "Submit"





esri

THE  
SCIENCE  
OF  
WHERE