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 → ArcGIS Runtime
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

ArcGIS Runtime

.NET Xamarin
iOS macOS
Android
Java
Qt
Migrating to ArcGIS Runtime

ArcGIS Runtime

- Maps & Data
- 3D
- Editing
- Analysis
- Routing & Geocoding

Supports:
- .NET
- Xamarin
- iOS
- macOS
- Android
- Java
- Qt
Migrating to ArcGIS Runtime

- Documents, data, and workflows
  - ArcGIS Engine

- ArcGIS Runtime equivalent
Migrating to ArcGIS Runtime

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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 .lpk
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

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": "b5479f6f5e374f23b0f7096743cd9be", "title": "Crime Incidents", "visibility": "true", "layerType": "ArcGISFeatureLayer", "path": "file:/sanfrancisco.geodatabase?itemId=1" }, { "id": "75cfe269e9dc14f6892a650fa64d75", "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

ArcGIS Runtime

Maps

3D

Editing

Analysis

Routing & Geocoding

.NET
Xamarin

iOS
macOS

Android

Java

Qt
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

ArcGIS Runtime

- Maps
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Supporting platforms:
- .NET Xamarin
- iOS macOS
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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

ArcGIS Runtime

- Maps
- Editing
- Analysis
- 3D
- Routing & Geocoding
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

ArcGIS Runtime

- Maps
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- Editing
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- Routing & Geocoding
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?

<table>
<thead>
<tr>
<th>Version</th>
<th>Release Date</th>
<th>General Availability</th>
<th>Extended Support</th>
<th>Mature Support</th>
<th>Retired</th>
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<tr>
<td>10.4.1</td>
<td>May 31, 2016</td>
<td>May 2016 - Apr 2018</td>
<td>May 2018 - Apr 2020</td>
<td>May 2020 - Apr 2022</td>
<td>February 01, 2022</td>
</tr>
</tbody>
</table>
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.

Where to start?

- Dev Labs!

Learn how to build an app in 15 minutes.

ArcGIS DevLabs guide you through the three phases of building geospatial apps: 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.

Sign Up for Free
Example Apps – *New!*

- [https://developers.arcgis.com/example-apps/](https://developers.arcgis.com/example-apps/)

**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](http://developers.arcgis.com/labs)

• 2017 is the year to start planning your migration!
  - Update 1 is here! “10.2.x equivalency” – June 29th 2017
  - Update 2: “Engine equivalency” – Q4 2017
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Complete Answers and Select “Submit”