ArcGIS Runtime SDK for Qt: Building Apps

Luke Smallwood and Neil MacDonald
Agenda

- Intro to Qt Framework and ArcGIS Runtime SDK for Qt
- App design patterns with this SDK
- SDK resources for developers

- This is an introductory-level presentation
Qt Framework
Luke Smallwood
What is the Qt Framework?

- **Portable**
  - Write once, run anywhere
  - Builds as native C++

- **Approachable**
  - Cross-platform libraries
  - High-level abstractions

- **Open**
  - Pre-built some platforms
  - Source code available
Why use Qt?

- Native app experience
  - Good performance
  - Access to device sensors
  - Access to device hardware and storage

- Write once, deploy everywhere
  - Single code base that targets most platforms
    - Windows, Linux, Android, iOS, macOS

- Focus on app building and not platform nuances
QtCreator

- Cross platform IDE for Qt
  - Runs on windows, mac, linux
- Provides
  - Auto-completion for Qt code
  - API reference
Why use ArcGIS Runtime SDK for Qt?

- Provides a location component in your app
- Does more than put dots on a map:
  - Analysis
  - Work connected or disconnected
  - High performance graphics display
  - Customizable symbology
  - Support for various data formats
  - 3D scenes
- Bring the power of the ArcGIS Platform to your app
Demo: Download and install

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Getting started

• Install the Qt Framework from the Qt Company
• Log onto ArcGIS for Developers with your developer subscription
• Download ArcGIS Runtime SDK for Qt
• Run the installer and the post installer
## QML and C++ app patterns

<table>
<thead>
<tr>
<th>App Pattern</th>
<th>API to use</th>
<th>Ideal for</th>
<th>Runs on Linux, macOS &amp; Windows</th>
<th>Runs on iOS &amp; Android</th>
</tr>
</thead>
<tbody>
<tr>
<td>QML with Qt Quick</td>
<td>QML</td>
<td>Web Developer</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>C++ with Qt Quick</td>
<td>C++</td>
<td>C++ Developer</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>C++ with Qt Widgets</td>
<td>C++</td>
<td>C++ Developer</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

**Commonly-used pattern**
QML API

• The declarative language from The Qt Company
• Declare components similarly to writing JSON or CSS
• Write procedural code as JavaScript functions
• Create UI rapidly with Qt Quick, with animation and prebuilt controls
• ArcGIS Runtime extends QML with types encapsulating ArcGIS functionality

```qml
MapView {
    id: mapView
    anchors.fill: parent

    // Create a new Map with the world streets vector basemap
    Map {
        BasemapStreetsVector {}

        // Create a new feature layer to display features in the world cities table
        FeatureLayer {
            // Create feature table using the world cities URL
            ServiceFeatureTable {
                id: featureTable
                url: worldCitiesUrl
            }
        }
    }
}
```
C++ API

- Provides all Runtime capabilities
- Create your UI with
  - Qt Quick (targets any platforms)
  - Qt Widgets (targets desktop platforms)
- Works with Local Server
- Most flexibility
Demo: App Patterns
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Runtime Fundamentals: Asynchronous Code

- Asynchronous patterns
  - Loadable
  - Tasks
  - Etc.

- C++
  - Signals/slots

- QML
  - Bind to status properties
Runtime Fundamentals: List Models

  - Basemaps
  - Layers
  - Graphics
  - etc.
Demo: Building an app
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SDK Resources

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Using the SDK to build Apps

• SDK contains many components:
  - API Reference
  - Conceptual guide documentation
  - Samples
  - Toolkit components
  - GeoNet

• ArcGIS for Developers
Demo: Sample Viewer

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Open Source Apps: DSA

- https://developers.arcgis.com/example-apps/dsa-app-qt/

- Larger open source app
- Many parts of the Runtime
- Best practice examples
- Pre-built
Key Runtime sessions this week

• Monday
  - 13:00 What's New
  - 14:00 Runtime: an Introduction to the API and Architecture
  - 15:00 Building Mobile Apps with ArcGIS Runtime

• Tuesday
  - 10:00 Building 3D Applications
  - 11:00 Using Virtual Reality (VR) and Augmented Reality (AR)
  - 13:00 Editing Your Data Online and Offline
  - 14:00 Working With Your Maps Online and Offline

• Wednesday
  - 11:00 AppStudio for ArcGIS: Developing Cross-Platform Native Apps
  - 15:00 Road Ahead
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