Developing Mapping Applications with ArcGIS Runtime SDK for Qt

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Offering #386
Agenda

- Introduction / Getting Started
- Provisioning and Using the Map
- Querying & Identifying
- Geoprocessing
- Message Processor
- Road Ahead
Introduction

Thomas
What is Qt?

• “Qt is a cross-platform application and UI framework for developers using C++ or QML…” *

• Deep functionality: UI, memory management, graphics, event handling, and much more

• Open source
  - Framework can be built for many platforms

• Builds on top of C++ : very efficient and powerful

• Large, vibrant user community (around 500k developers*)

• Many online resources for learning and sharing

*Source: http://qt-project.org
What is ArcGIS Runtime?

- Family of SDKs for multiple platforms
  - Consistent capabilities
- Native to the platform
  - For building great apps
- Lightweight and fast
- Powerful
- Easy
Part of the ArcGIS platform

- ArcGIS Online / Portal
  - Maps, services, content and Organization branding

- ArcGIS for Server
  - Services

- ArcGIS for Desktop
  - Packages
SDK Platforms

- **Android 10.1.1**
  - Java/Android
- **JavaSE 10.1.1**
  - Java Win/Linux
- **Qt 10.2 BETA**
  - C++ Win/Linux
- **iOS 10.1.1**
  - Objective-C Cocoa Touch
- **OS X 10.2 BETA**
  - Objective-C Cocoa
- **Windows Mobile 10.1.1**
  - .NET
- **WPF 10.1.1**
  - .NET/XAML
- **Windows Phone 10.1.1**
  - .NET/XAML
- **Windows Store 10.2 BETA**
  - .NET/XAML
Why the wide variety of Runtime SDKs?

Desktop

OS X

WPF

Qt

JavaSE

Phones and tablets

Windows Store

iOS

Android

Windows Phone

Embedded

Why the wide variety of Runtime SDKs?
Getting Started

Jen
Getting Started

• How do you get the Runtime SDK for Qt?
  - Sign up for open Beta at ArcGIS for Developers
  - Use your Esri account
  - Download from Web site

• Get Qt SDK
  - Version 4.8.4 for Windows
  - Version 4.7.4 for Linux

• Get Qt Creator
  - Version 2.4.1 or later

Platforms

- Supported Operating Systems (development and deployment)
  - Windows 7, Server 2008 and 2012
  - Red Hat 6.2 or later
  - Ubuntu 12.04 or later
- Windows installation contains both 64-bit and 32-bit
- Linux is 64-bit at Beta: 32-bit is planned for final
- Hardware accelerated graphics
  - Windows – DirectX (OpenGL is planned)
  - Linux – OpenGL
  - Be sure to use up-to-date display drivers
Beta Licensing

- Free developer license
  - Times out in after 10.2 release (August 2013)
- No production deployments allowed
  - Test app deployments are allowed
Qt SDK
Quick-Start

Jen
Provisioning and Using the Map

Thomas
Hierarchy of Map Layers

• Layers are added bottom-to-top

• Graphics layers
  - Live / temporary data: Vehicles, people, events
  - Graphics Layer, Group Layer and Message Group Layer

• Operational layers
  - Dynamic features: facilities, zones, networks
  - MPK, Dynamic Maps, Feature Layers

• Basemap layer
  - Imagery, topography to provide spatial context
  - TPK, Tiled Map Services
Provisioning Content

- Online Services accessed via a URL
  - Tiled maps
  - Features
  - Geoprocessing
  - Geocoding

- Local Content authored as packages and installed locally
  - Map Packages
    - Editing, querying, mapping
  - Tile Packages
    - High performance base maps
  - Geoprocessing Packages
    - Models and Scripts
Map – Spatial Reference

- Decide on the spatial reference to be used by your application
  - e.g. Web Mercator Auxiliary Sphere? (AGOL)
- Tiled service / tile package must be in that SR
  - Choose tiling scheme carefully
  - Tiled basemaps cannot be re-projected
- SR of map determined by first layer added to map
Packaging your data

- Authored with ArcMap
- Analyzers identify potential problems before they happen
  - Errors that prevent package from working in the Runtime
  - Re-projection warnings (Performance impact)
  - Unsupported extension
Provisioning and Using the Map

Jen
Querying & Identifying
Thomas
Querying & Identifying Data

- Task based framework
  - Execute Task Synchronously or Asynchronously
- Identify Task finds features by location
- Query Task finds features by one or more of:
  - Spatial relationship to filter geometry (including intersects)
  - WHERE clause
  - Time extent (for time-aware layers)
- Similar Programming Pattern for Each Task
  - Define input Parameters
  - Execute task asynchronously
  - Process and display results
Querying & Identifying

Michael
Geoprocessing

Thomas
Geoprocessing

- Geoprocessing is the source of advanced GIS analysis in the ArcGIS Runtime
  - Functionality that goes beyond the Runtime API
- Connected
  - ArcGIS Server’s and ArcGIS Online’s Published Services
- Disconnected
  - Local Geoprocessing from Geoprocessing Packages (GPKs)
Geoprocessing
Michael
Message Processor

Thomas
Message Processor

- Processes military messages
  - Used for situational awareness or command & control
  - Represented on map as a symbol

- Symbol dictionary defines symbol representation
  - MIL-STD-2525C (DoD)
  - APP-6B (NATO)

- Message processing pipeline
  - Create MessageProcessor and MessageGroupLayer
  - For each message received from outside source
    - Build Message object and pass to MessageProcessor
    - MessageProcessor adds / updates/ deletes symbol in MessageGroupLayer
Vehicle Commander Sample App

- Demonstrates the Message Processor
- Available to download from Samples link on http://developers.arcgis.com/en/qt
- Hosted on Github
Vehicle Commander

Michael
The Road Ahead

Jen
What’s coming for Runtime…

• 10.2
  - Offline map use
    - Being productive offline
    - Network / geocode / search
  - Performance (static / dynamic mode on layers)
  - Geotriggers
  - Security (OAuth, SAML)
  - Simplification of APIs
  - New developer site (with improved doc system)

• Beyond
  - Offline analysis
  - Local data support
    - Raster and Vector
  - 3D
Thank you!

- Related session: *Road Ahead for ArcGIS Runtime SDKs*
  - Thursday at 10:00am in Primrose B

- Our team will be available in the Showcase if you have further questions today

- Please fill out the online evaluation.

*This is offering #386. Session evaluations are always read and used to improve future sessions.*
Understanding our world.