Building Applications with ArcGIS Runtime SDK for Java

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Agenda

- Introduction
- SDK
- Building the Map
- Interacting with the Map
- Editing
- Querying Data
- Spatial Analysis using Geoprocessing
- Asynchronous programming patterns
- Deployment and Licensing
Introduction to the ArcGIS Runtime
ArcGIS is a Complete System
Managing and working with geographic information

- Online (public or private cloud)
- Server (on premises or private cloud)
- Desktop
- Mobile/devices
- Content

Many deployment options

- Visualize
- Create
- Collaborate
- Discover
- Manage
- Analyze
What is the ArcGIS Runtime for Windows and Linux?

• Set of lightweight components
  - Embed mapping and GIS capabilities into your applications

• New Architecture
  - Native 64-bit and 32-bit
  - Utilizes hardware (CPUs, GPU)
  - Utilizes asynchronous programming patterns for responsive applications

• Simplified deployment
  - No installation required
  - Deploy only what you need
  - Side by side
ArcGIS Runtime Apps and SDKs

<table>
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<tr>
<th>Windows Mobile</th>
<th>Windows</th>
<th>Windows Phone 7</th>
<th>iOS</th>
<th>Android</th>
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- ArcGIS Apps
- ArcGIS Explorer Apps
- Windows Phone 7 Apps
- iOS Apps
- Android Apps
- Linux Runtime SDK
Getting Started with Runtime SDK for Java
Getting Started

• How do you get it?
  - Part of Esri Developer Network (EDN)
  - Download from EDN website / DVD

• What do you need?
  - Java SE JDK Version 6 or 7

• Hardware accelerated display
  - Windows – DirectX or OpenGL
  - Linux – OpenGL
  - Recommended to update display driver
Getting Started

• Supported Platforms
  - Windows 7, Vista, XP, Server 2003 and 2008
  - Red Hat 6.0, 6.1, 6.2
  - Ubuntu 10.04, 12.04
• Contains both 64-bit and 32-bit binaries
  - Linux is only 64 bit
• Eclipse Plugin
  - Indigo or Helios
• License for Development
Demo: SDK Resources and Eclipse Integration
Mark Baird
Building the Map
Provisioning Content

- **Online Content**
- **Local Content is authored through packages**
  - Map Packages
    - Editing, querying, mapping
  - Tile Packages
    - High performance base maps
  - Locator Packages
    - Geocoding
  - Geoprocessing Packages
    - Models and Scripts
Provisioning Content

- Packaging process runs analyzers
- Identifies
  - Errors that prevent package from working in the Runtime
  - Runtime deployment requirements
  - Runtime licensing requirements
  - Performance improvements
Building the map

- Map Control - Swing

- Live / temporary data
  - Vehicles, people, events…
  - Graphics and Graphic Layers

- Operational data
  - Facilities, zones, networks…
  - MPK, Dynamic Maps, Feature Layers

- Basemap
  - Imagery, topography…
  - TPK, Tiled Services
Demo: Building a Map
Mark Baird and Vijay Gandhi
Interacting with the Map
Map Overlay

- Similar to a Glass pane
- Create a class that extends MapOverlay
  - Override methods
- Handle Mouse Interaction
  - Capture Mouse events happening on the Map Control
  - For example: Customized tool or special behavior
- Display non-geographical components
  - Paint on top of the MapControl
  - For example: Company Logo or Copyright Statement
- Can be turned on and off
  - MapOverlay.setActive(boolean)
Toolkit

- UI Components and Features
  - Editing
  - Popups
  - Scalebar
  - Navigator
  - Drawing
- Source Code Available
  - Use as is
  - Extend
  - Learn
Demo: MapOverlay and Toolkits

Vijay Gandhi
Editing
Editing Features

• Edit simple features
  - Feature Services
  - Data from a map package
• Edit Environment Authored in ArcGIS for Desktop
• ArcGIS Runtime SDKs Include:
  - UI controls / widgets for editing
  - Fine-grained API components
Authoring maps for editing

• Add just the Editable Layers to the Map Document
• Choose Map Coordinate System Wisely
• Set Layer and Table Properties
  - Define feature templates
  - Field properties (aliases, visibility)
  - Set subtypes and attribute domains
  - Default editing tools
Demo: Editing

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Querying Data
Querying Data

- Task based framework
  - Execute Task Synchronously or Asynchronously

- Task Types
  - Identify
  - Query - Attribute and Spatial
  - Geocoding and Reverse Geocoding

- Similar Programming Pattern for Each Task
  - Define input Parameters
  - Execute task asynchronously
  - Process and display results
Demo: Querying Data
Vijay Gandhi
Geoprocessing in the Runtime
Using Geoprocessing in the Runtime

• **Geoprocessing is the Source of Advanced GIS Analysis in the ArcGIS Runtime**
  - Functionality that goes beyond the API
• **Connected**
  - ArcGIS Server’s and ArcGIS Online’s Published Services
• **Disconnected**
  - Local Geoprocessing from Geoprocessing Packages (GPKs)
Demo: Geoprocessing
Vijay Gandhi
Providing a good user experience
User Experience – Asynchronous Patterns

- **API has an Asynchronous Programming Model**
- **Application Responsiveness is Paramount**
- **Async Lets You:**
  - Perform time-consuming tasks “in the background”
  - Execute multiple operations simultaneously
  - Wait for resources to become available without “hanging” your application
- **Event Based Async Pattern**
  - `ExecuteAsync(…)` / `ExecuteCompleted`
- **Synchronous Methods Available but Should be Reserved to Special Cases e.g. Console Application**
Deploying applications
Deployment – Build your own
Deploy Only What Your Need

- Core
  - 2D Mapping
    - Full ArcGIS cartographic model
  - Enterprise and File Geodatabases
    - Simple feature & attribute editing
  - ArcGIS Server services
- Additional Data Formats (SDE Direct Connect, Rasters, Shapefile, …)
- Geoprocessing
- Geocoding
- Python scripting
- Additional Projection Support
Licensing for Deployment

• Basic
  - Full client to ArcGIS Server services
  - Local Tile Packages & GPS Support

• Standard
  - Local Map, Geoprocessing and Locator Packages
  - Geodatabase Editing & Routing

• Extensions
  - Spatial Analyst, 3D Analyst, Network Analyst

• Determine the Type and Number of Licenses
• Purchase Runtime Licenses
Licensing for Deployment

• Enable Licenses using Software Authorization Wizard
• Use License Viewer to get license string

- Call ArcGISRuntime.setLicense("runtimestandard,.....")
Demo: Deploying an App

Mark Baird
Building your Deployment Summary

- License the Application With an ArcGIS Runtime Deployment License String
  - Ensure it’s the correct level and includes any extensions
- Create a jar file from your application
- Create an ArcGIS Runtime Deployment
  - Take note of ArcGIS for Desktop analyser warnings
  - Place deployment relative to your application
Where does the ArcGIS Runtime fit in?

- ArcGIS Runtime
- ArcGIS Desktop
- ArcGIS Engine
- Map Objects
- ArcGIS Explorer
- ArcReader
Steps to evaluate UC sessions

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  OR

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