



**Esri International User Conference | San Diego, CA**  
**Technical Workshops | July 12, 2011**

# **ArcGIS Server for the Java Developer**

Dan O'Neill @jdoneill

Ajit Dharmik

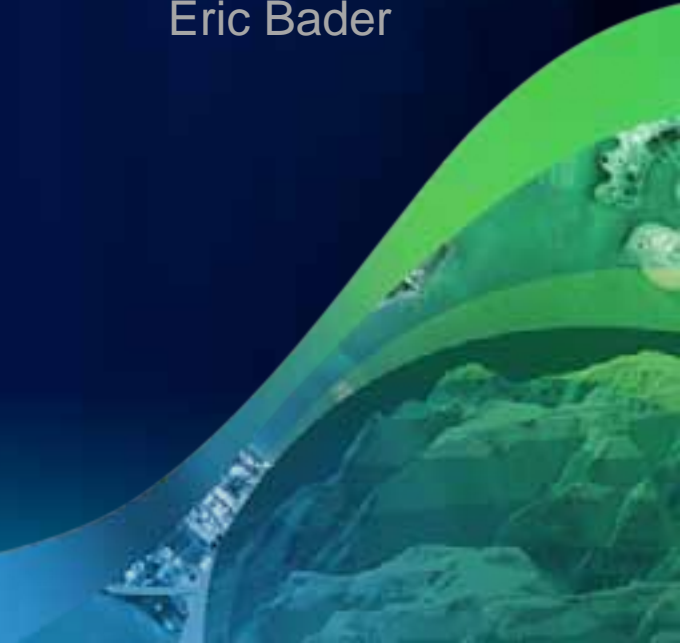
Eric Bader @ECBader

# Agenda

- Quick Introductions
- A Java Developer's Overview
- Extending ArcGIS Server
- Extending the existing Java EE infrastructure
- Building client applications
- Summary
- Q & A

# Overview

Eric Bader



# ArcGIS 10 — A Complete System

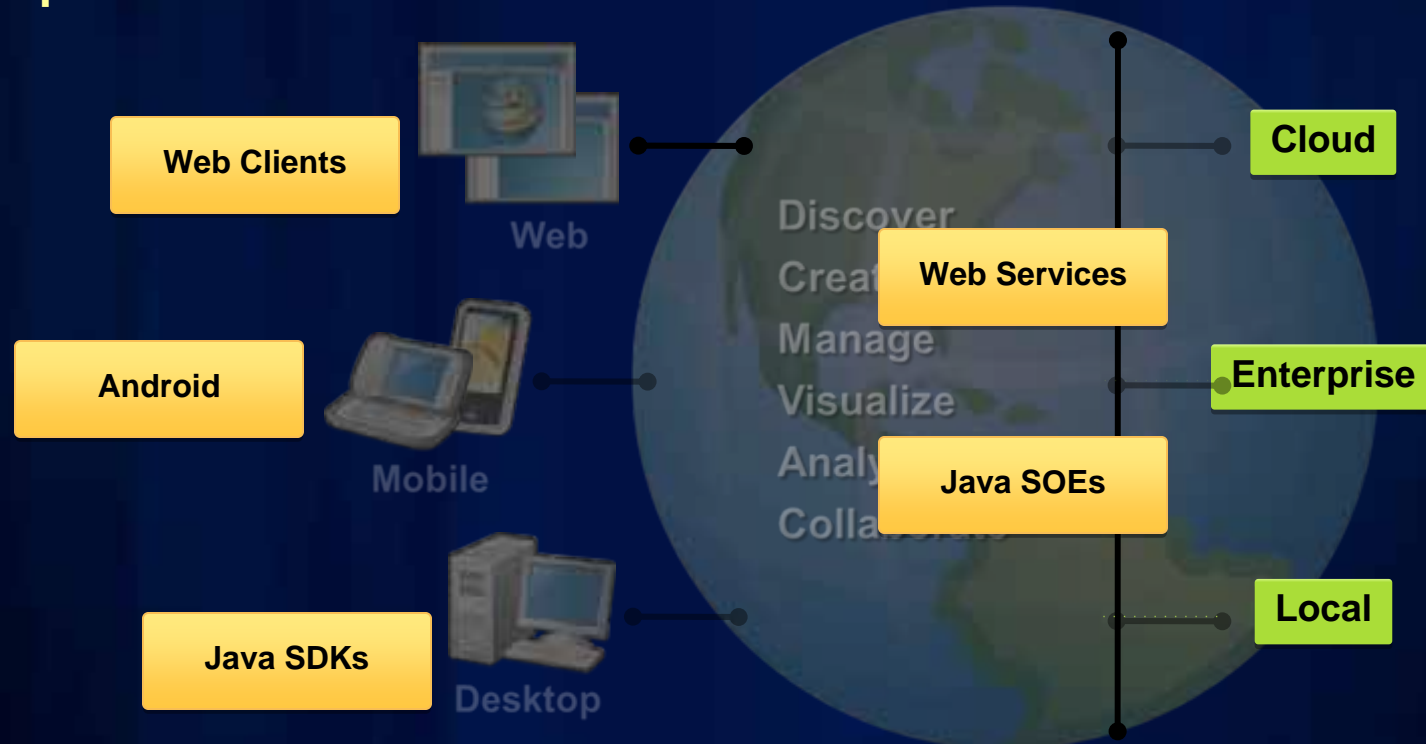
Many opportunities for Java developers...



*The System is Extensible and Integratable*

# ArcGIS 10 — A Complete System

Many opportunities for Java developers...

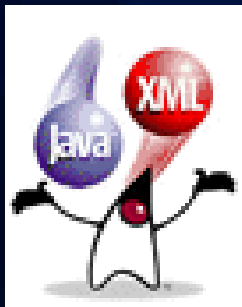


*The System is Extensible and Integratable*

# Java and ArcGIS



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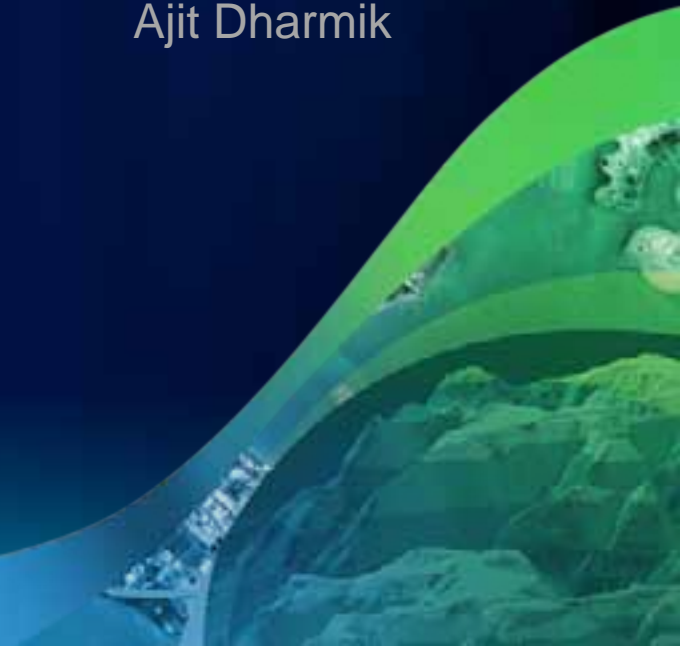
*More...*

## **Keep in mind**

- **Know what it is you are building**
- **Know the differences between the Java Esri SDKs**

# Extending ArcGIS Server with Custom Web Services

Ajit Dharmik





# Extending ArcGIS Server



# Why extend ArcGIS Server?

- **Server Objects (SOs)- coarse grained objects**
  - Provide access to data and analysis
  - Map, GP, Image
- **Services are based on SOs**
  - Map service, GP service, Image service
- **SOs have generic capabilities**
- **If more capabilities are required, extend SO**

# Server Object Extensions

- **ArcObjects based**
- **Extend Map Service only**
- **Exposed via SOAP and REST**
- **Inproc access to map service's layers**
- **Customizable startup and shutdown behavior**
- **Access to map service logs**

## Other ways to extend Server

- **Geoprocessing tools**

SOEs	V	GP
Solution only for Server	S	Solution for all Engine, Desktop, Server
No runtime overhead		Runtime overhead for GP initialization and input/output data validation
Complete control over information exchanged with client (for REST SOEs)		Clients must send info to service via gp data types.
Software development required		Software development required only if custom tools are needed

- **Demo**



## ArcGIS Resource Center

### ArcObjects SDK 10 Java Platform

[Home](#) [Concepts & Samples](#) [API Reference](#) [Forum](#) [Blog](#) [Code Gallery](#)

- Java ArcObjects Developer Guide
  - What's new for developers at 10?
  - Developing desktop applications
  - Developing extensions
    - Developing extensions
    - ArcGIS Desktop customizations using add-ins
    - Custom Geoprocessing Tool
    - Custom Feature Renderer
    - Class Extensions
    - Plug-In Data Sources
    - Utility Objects
    - Server Object Extensions
      - Server Object Extensions**
      - Developing Server Object Extensions
      - Simple SOE Developer Walkthrough
      - Deploying and Managing Server Object Extensions
      - Consuming Server Object Extensions
      - SOE Properties and Capabilities
      - SOE Web Services
    - ArcGIS Java configuration tool
    - Debugging Extensions
    - Deploying extensions
    - Creating and Consuming Custom C++/COM Components

## Server Object Extensions

### Server Object Extensions

A Server Object Extension (SOE) extends the ArcGIS Server

#### ArcGIS Manager

General

Parameters

➔ Capability

Pooling

#### Capabilities

- ☒ Mapping (always enabled)
- ☒ KML
- ☐ Feature Access
- ☐ WMS
- ☐ WFS
- ☐ WCS
- ☐ Network Analysis
- ☒ Hello World SOE

#### Properties

# **Working with ArcGIS Server Java Web Services (AgsJWS)**



# Extending the Java EE Infrastructure...





# WebService Clients and API's

## ArcGIS Server API (ArcObjects)

### ArcGIS Java Web Services API (SOAP)



### ArcGIS Server REST API

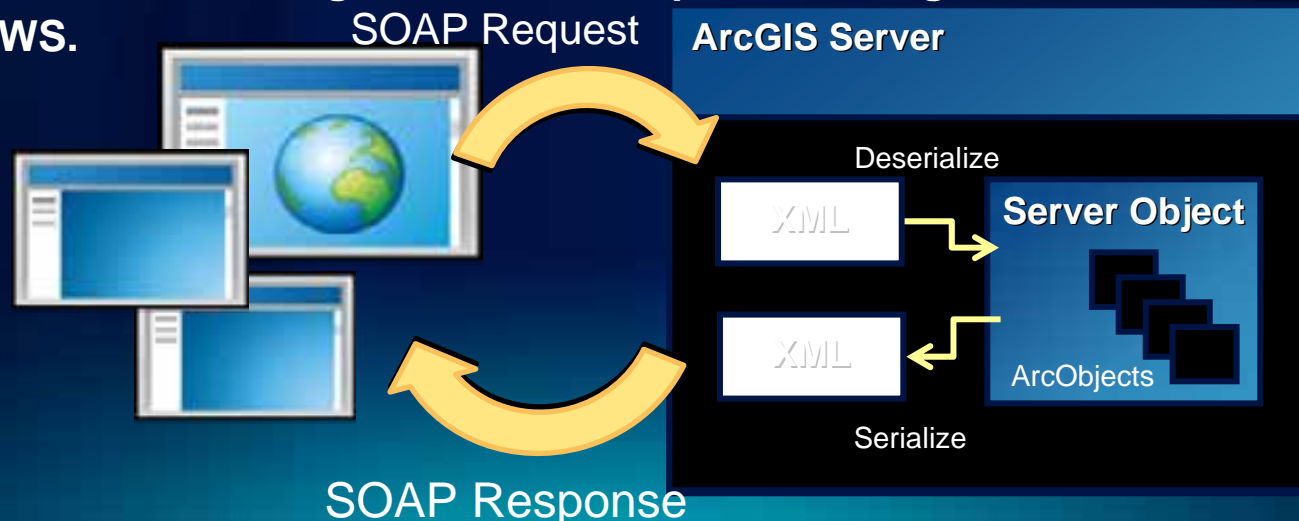


# SOAP Web Services

- Easily accessible from Java, .NET, Python, etc.
- Cross Platform support, Windows/Linux
- Standard Object Orientated programming
- Fully integrated into IDE's

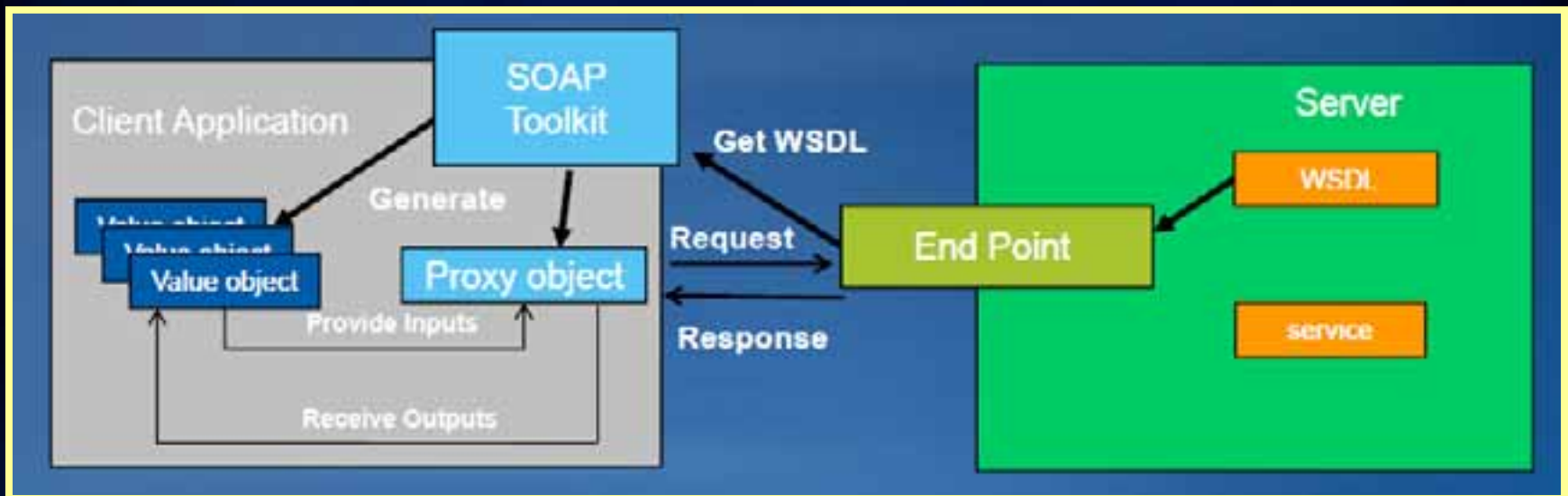
# AgsJWS Toolkit

- Independent Web Services toolkit
- SOAP requests are handled by WS Handler and forwarded to appropriate Server Object
- AgsJWS implements it's own custom SOAP stack and framework for XML serialization for ArcObjects through JAX-B.
- Two functions
  1. Serialize and Deserialize between Java and XML (JAXB)
  2. Packing as SOAP, transporting SOAP messages and protocol specific information, handling faults and exceptions through SAAJ and JAXWS.



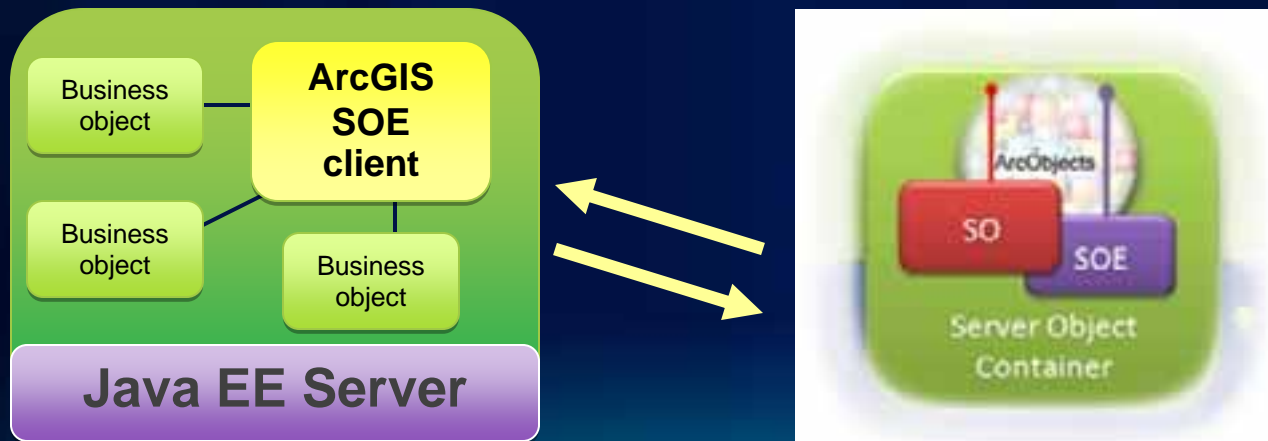
# AgsJWS Toolkit

- **Proxy Objects**
  - Communication with server and endpoints.
  - Call methods on the proxy to execute server-side logic
- **Value Objects**
  - Native types designed to support input & output from proxy objects.



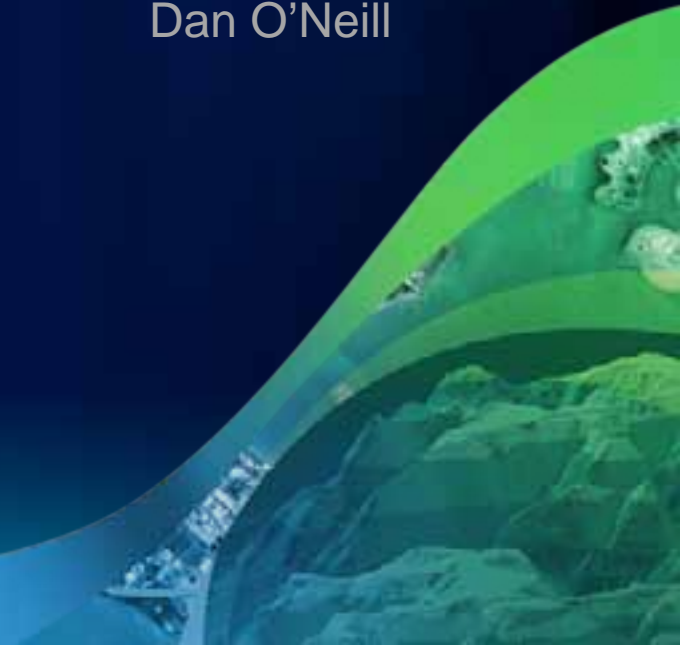
# Demos

- Online SOAP SDK
- Download the AgsJWS
- Set up the development environment
- Building the LocateMSOE client app
- Extra demo: Joplin Tornado path analysis



# Client Applications and APIs

Dan O'Neill



# Building and using Web applications



# Building Web Applications

- **Migrating Java Web ADF applications from local to remote connections**
  - Existing tools to have a complete wizard driven experience
  - AgsJWS API is the core API



# Migrating Web ADF Applications to web services

- Set up Eclipse Faces Config visual editor
  - <http://blogs.esri.com/Dev/blogs/arcgisjava/archive/2009/11/25/Using-Eclipse-Faces-Config-Visual-Editor.aspx>
- Modify your Local Map Resource to be a AgsMapResource
  - This will modify your connection to ArcGIS Server as web service endpoint URL allowing you to use the AgsJWS API in your Java Web ADF application.
  - <http://blogs.esri.com/Dev/blogs/arcgisjava/archive/2010/07/23/Migrating-to-Web-Service-enabled-Java-Web-ADF.aspx>

Managed Bean class type: ☒ General class ☐ Map ☐ List

Name	Class	Value
functionalities		<map-entries>
endPointURL	java.lang.String	http://tincan18399/arcgis/services/DEMO/POR...
alias	java.lang.String	DEMO/PORTLAND-DEMO

# Risks

- **Editing Tasks**
- **Custom features using ArcObjects in ADF**
- **Solution**
  - **Server Object Extensions exposed through SOAP**
  - **AgsJWS Business component**

# Map Widget for ArcGIS

- **BI + GIS = GBI**  
**(Geographic Business Intelligence)**
- **GBI is the integrated inclusion of the geographic/spatial perspective with your organization's important business information. You care because nearly every significant aspect of your business has a location**

# Map Widget for ArcGIS – Java Enterprise Mashup

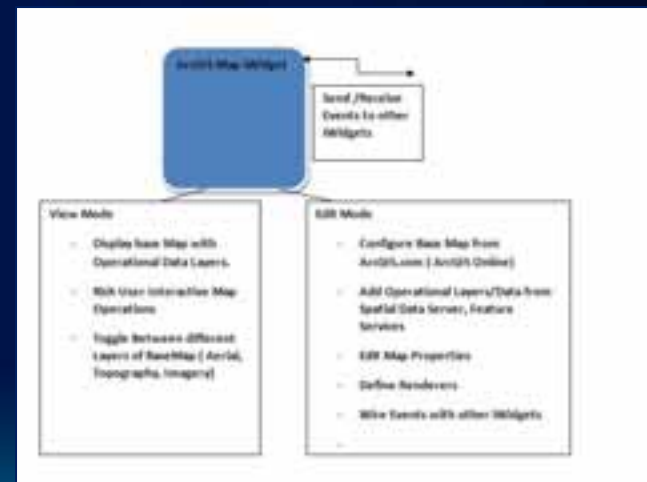
- **Map Widget for ArcGIS**
  - Simple component model for GIS using ArcGIS API for JavaScript and iWidget specification
  - Can be extended to enhance operability
  - Coordination
    - Sharing information with other components in real time
    - Shared state with other components



# Map Widget for ArcGIS – MapViewer Features

- **Features**

- **Send/Receive events to other components**
- **Configure basemaps from ArcGIS Online, Bing Maps, & ArcGIS Server**
- **Add operational layers from ArcGIS Online & ArcGIS Server**
- **Rich user interactive operations**



# Map Widget for ArcGIS

- **Map Widget for ArcGIS in Enterprise Mashups**
  - IBM Specification
  - Integration with widgets which meet the spec
  - WebSphere 7
- **ArcGIS iWidget for Enterprise Portals**
  - Java Portlet Spec 2.0 (JSR 286) compliant
  - Backwards compatibility for Portlet spec 1.0 (JSR 168)
  - Support for Portal Server 6.1 Feature Pack 6.1.5
  - Increased support in Portal Server 7

# Demo

**Portland Schools**

name	address	city	state	zipcode	phone	level_no	level	Type	zip4	district
Fernwood HS	1815 NE 33rd Ave	Portland	OR	97212	503 281 9089	2	Node or Jr. High School	Public		Portland
Chapman ES	1443 NW 26th Ave	Portland	OR	97210	503 916 6295	1	Elementary School	Public		Portland
Benson Polytechnic HS	546 NE 12th Ave	Portland	OR	97232	503 916 5100	3	High School	Public		Portland
Wesport Learning Center	2044 NW Sloan Street	Portland	OR	97209	503 916 3727	5	148 Cts & Alternative	Public	1109	Portland
Cathedral ES	110 NW 17th Ave	Portland	OR	97209	503 227 4297	1	Elementary School	Private		Archdiocese of P

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**ArcGIS Map Viewer**

# Extending the widget

- **iWidget Design**
  - **Simplicity**
    - Simple to create and add features
  - **Extensibility**
    - Well defined means for iWidget feature support and feature leverage
  - **Independence**
    - The iWidget does not need to know what technology was used to implement
  - **Style**
    - Defines javascript (EcmaScript) interfaces and declarative markup



# Extending the widget

- **Open Source**
  - **Beyond specification extensibility model**
  - **Full source provided**
  - **Opportunity to share with ESRI development**

# ArcGIS 10.1 for Java Developers



# The ArcGIS Runtime

- **Runtime SDK**

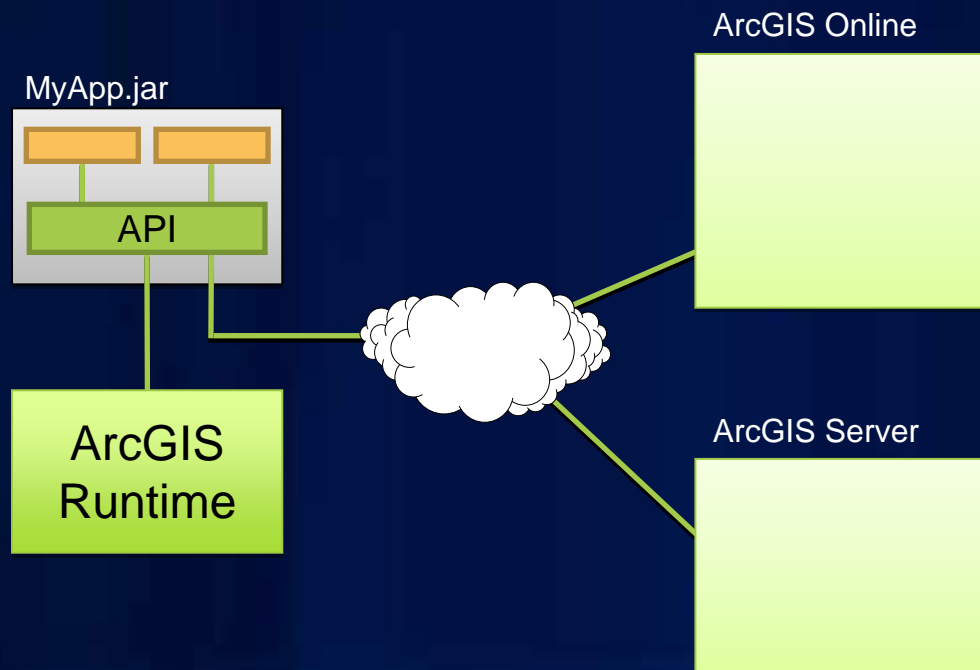
- Toolkit for building **focused ArcGIS apps** and embedding ArcGIS functionality
- Work with both **local** data and **remote** REST services
- Subset, streamlined functionality
- For Lightweight devices: **Laptops, tablets**
- **Linux** and Windows – 64-bit and 32-bit
- **Java**/WPF/QT flavors of API
- Eclipse integration

- **Mobile: Android – part of the Runtime family**

- SDK for **native** Android apps
- Freely downloadable app

# Solid Foundation for Developers Moving Forward

- Designed for Desktop and Online Development



*Developers Are Productive on the Desktop and Online*

# The 10.1 ArcGIS Runtime at the UC...

- **Road Ahead – ArcGIS 10.1 Overview**
  - Tuesday 8:30am - 9:45am room 10
  - Wednesday 1:30pm – 2:45pm room 10
  - Friday 9:00am – 10:15am room 5a/b
- **Road Ahead – ArcGIS Runtime**
  - Thursday 2:20pm – 2:40pm 24a

## ***Demo Theater:***

- **Building Java Applications with ArcGIS Runtime**
  - Wednesday 9:00am Exhibit Hall D Desktop Developer Island

# Summary

- Custom Web Services – **Extending** the ArcGIS Server
- Extending existing Java EE infrastructures with the **AgsJWS SOAP Toolkit**
- Building Web Applications
  - Mashup Center and Portal applications
  - ArcGIS Web API based applications
  - Migrating Java Web ADF applications from local to HTTP connections
- Continuing to build opportunities for Java-GIS developers at 10.1
  - Lightweight GIS
    - Runtime SDK
    - Mobile: Android

**Thank you!**

**Any Questions?**