Building Your First Rich Internet Applications With ArcGIS API For Flex

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Introductions

- Who are we?
  - Antony Jayaprakash, Product Engineer
  - Bjorn Svensson, Product Engineer
- Who are you?

Schedule

- Today we will cover
  - Introduction to the Adobe Flex framework
  - Introduction to the ArcGIS API for Flex
  - Building your first Rich Internet Application with Flex API
- We will answer questions at the end

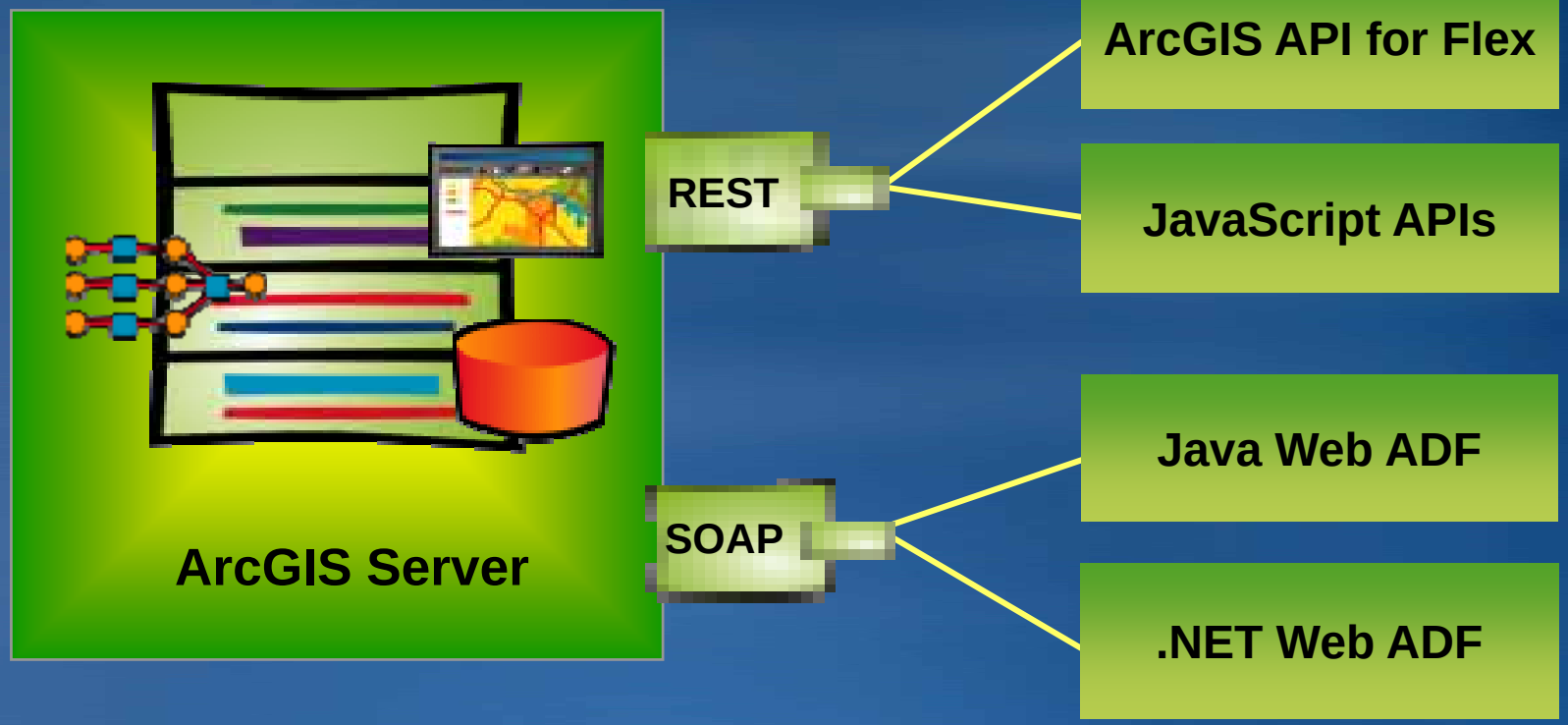
Please complete the session survey!

ArcGIS

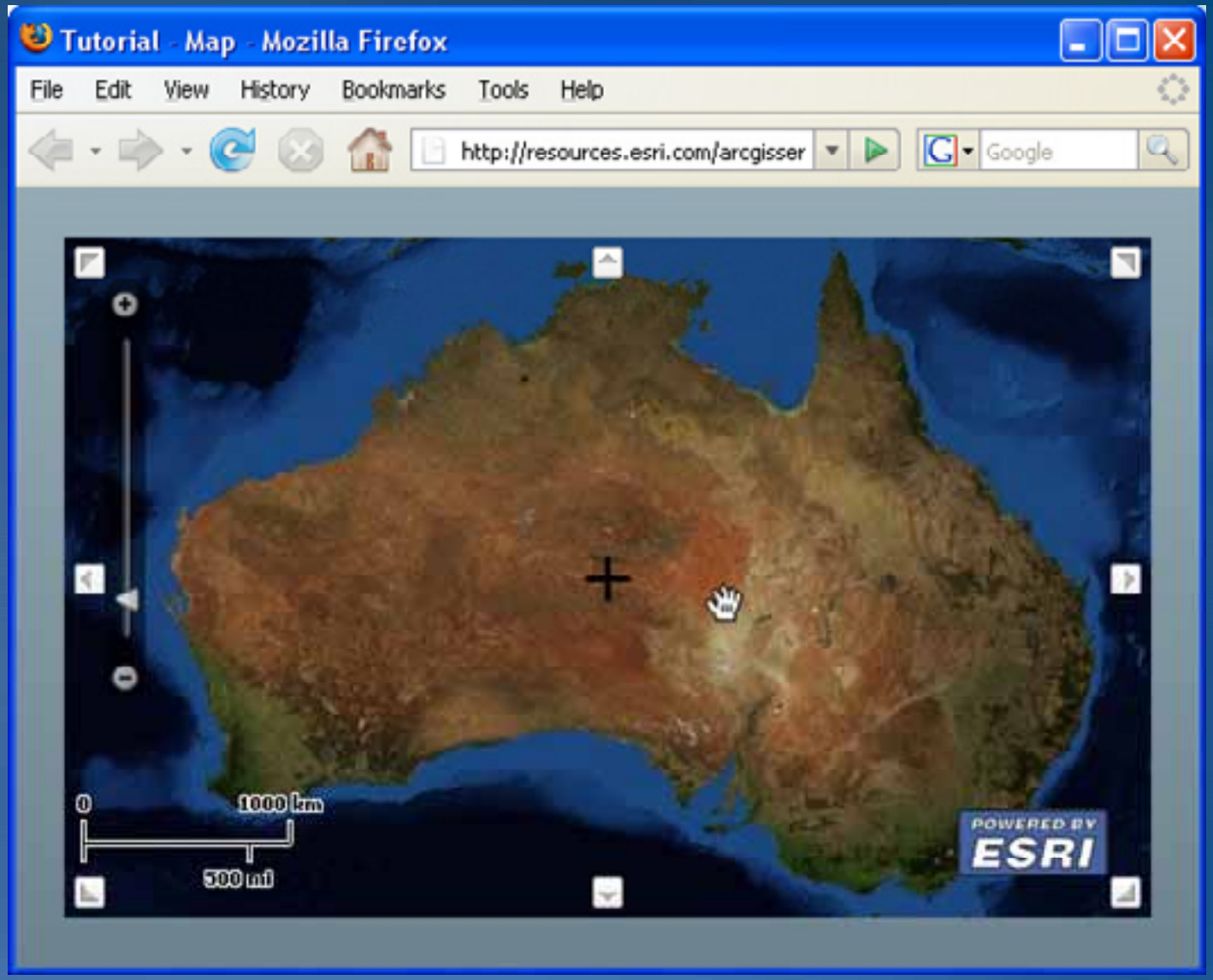
A Complete Geographic Information System

. . . For Authoring, Serving & Using *Geographic Knowledge*

ArcGIS Server



ArcGIS API for Flex – let's check it out …



First Map

```
<?xml version="1.0" encoding="utf-8"?>

<mx:Application xmlns:mx="http://www.adobe.com/2006/mxml"
       xmlns:esri="http://www.esri.com/2008/ags">

  <esri:Map>

   <esri:ArcGISTiledMapServiceLayer
       url="http://server.arcgisonline.com/ArcGIS/rest/ser
       vices/ESRI_Imagery_World_2D/MapServer" />

  </esri:Map>

</mx:Application>
```

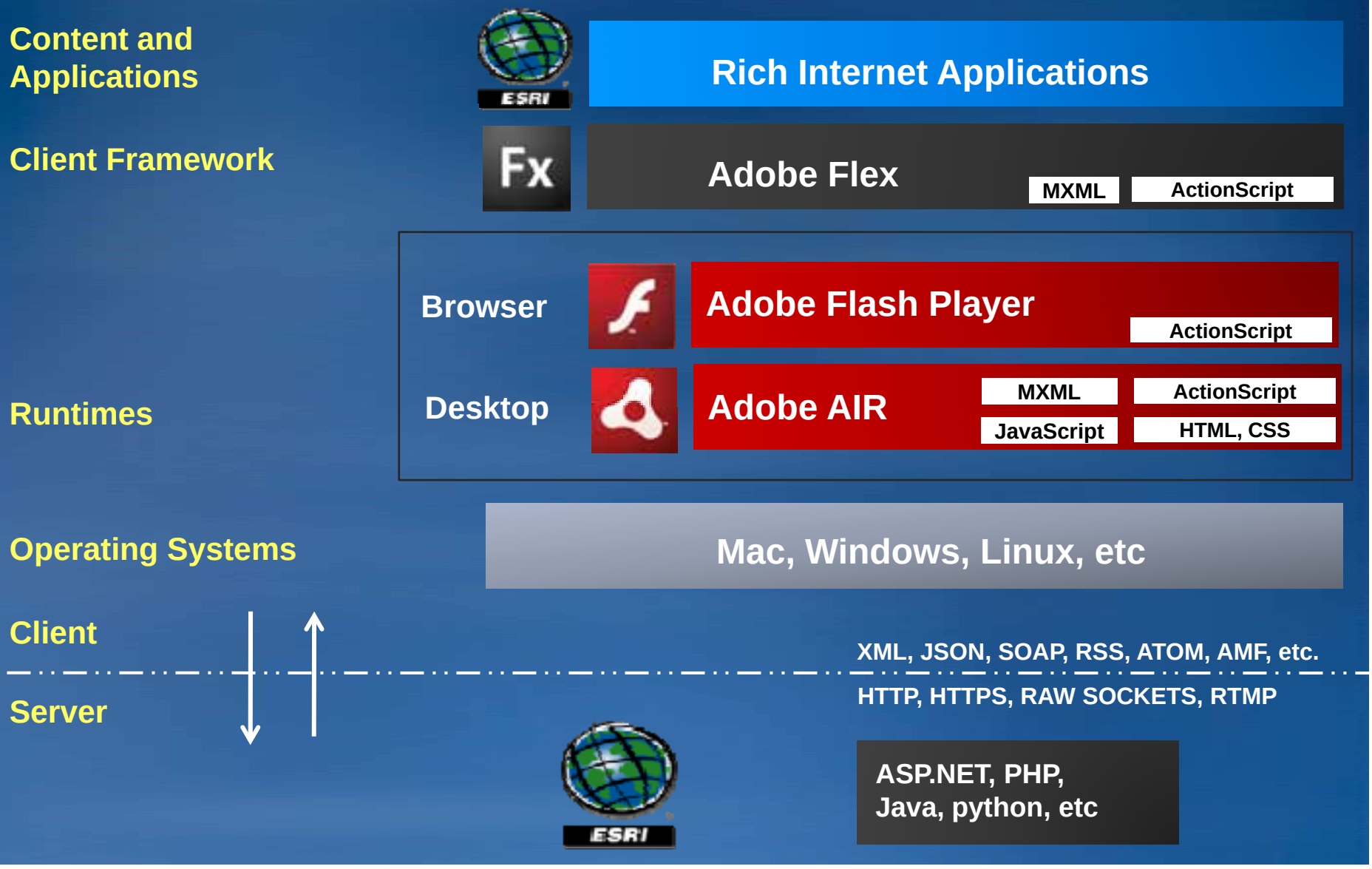
ArcGIS Server 9.3 REST API

- **Services Directory:**
  - A simple view of your ArcGIS Server (example)
- **All GIS Services are exposed as resources**
  - Service level metadata
- **Resources have operations**
  - Map Service (export, find, identify)
  - Map Service Layers (query)
  - Image Services (export)
  - Geocode Service (Find Address Candidates, Reverse Geocode)
  - Geoprocessing (execute, submit job)
  - Geometry Service (project, simplify, and others*)

Adobe Flex Framework

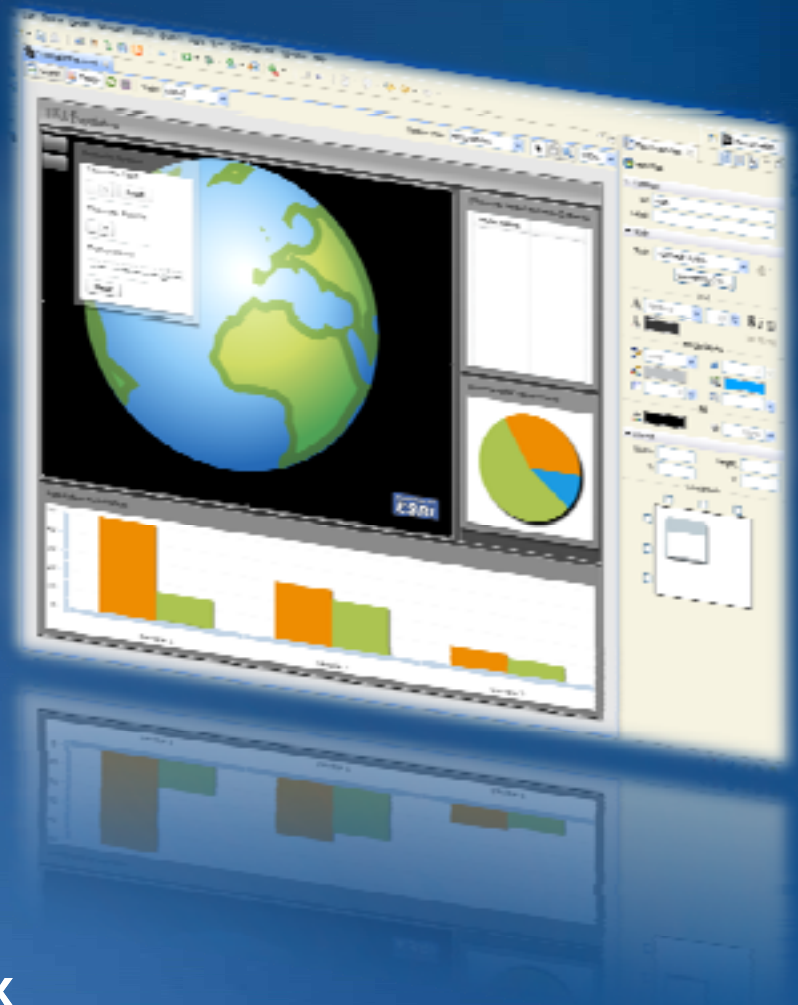
What is Flex?

Collection of technologies for the Flash platform



Why Flex?

- Create applications that are,
  - Interactive, responsive
  - Easy to extend
  - Simple, yet powerful
  - Cross-platform
- Rich set of components
- IDE
  - Flex Builder
  - FlashDevelop
  - Amethyst (Visual Studio plugin)
- Strong developer community
  - http://www.adobe.com/devnet/flex



Flash Player

- Browser / Platform independent
- Virtual Machine (bytecode)
- Just In Time (JIT)
- Graphic / Vector rendering
- Consumes SWF (ShockWaveFile)

- ArcGIS API for Flex
  - Version 9 and above

ActionScript

- Based on ECMAScript language specification
- Similar in syntax to Java, C#
- Object Oriented (extends, implements)
- Garbage Collection
- Type safe
- Introspection

ActionScript Data Types

- **Primitive types**
  - **Boolean, int, Null, Number, String, uint, void**
- **Complex types**
  - **Object, Array, Date, Error, function, RegExp, XML, XMLList**

MXML

- ActionScript in XML format
- Mostly for UI Component / Layout
- mxmlc compiler converts MXML to ActionScript
- MXML attributes
  - property
  - style
  - event handlers

```
<?xml version="1.0" encoding="utf-8"?>
<mx:Button xmlns:mx="http://www.adobe.com/2006/mxml"
    label="Hello"
    color="0xFF0000"
    click="trace('click')"/>
```

MXML to ActionScript

- MXML

```
<esri:Map id="map" alpha="0.5" >
  <esri:ArcGISTiledMapServiceLayer id="tiledLyr"
       url="http://arcgisserver/mapservice/Parcels"/>
</esri:Map>
```

- ActionScript

```
var map : Map = new Map();
map.alpha = 0.5;
var tiledLyr : ArcGISTiledMapServiceLayer =
                              new ArcGISTiledMapServiceLayer();
tiledLyr.url = http://arcgisserver/mapservice/Parcels;
Map.addLayer(tiledLyr);
```

Life cycle of a Flex Application

Development

Deployment

ArcGIS API for Flex

Map

- Only UI control in the Flex API.
- Mouse & keyboard navigation.
- Scale bar, pan arrows, cross hair, rubberband can be styled.
- Spatial reference & scale levels are determined by the first visible layer
  - can be set explicitly

Layer Types

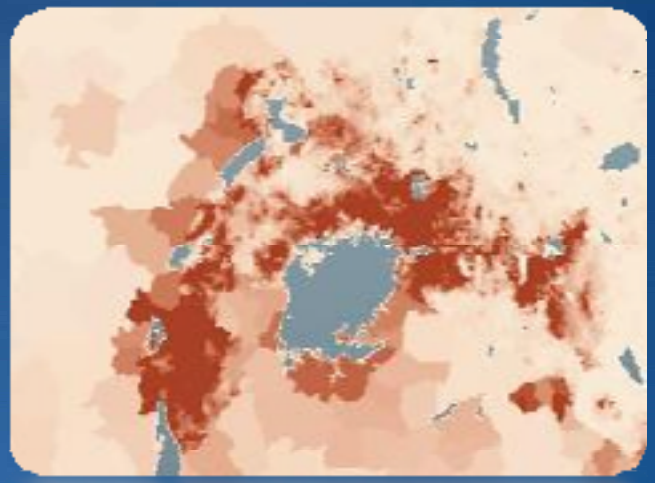
- Dynamic (map created dynamically)
- Tiled (cached)
- Image Service
- ArcIMS
- Graphics (created client side)
- Custom layers

Tiled Layer

- Used as base maps
- tileInfo: Information on the tiling scheme
- Multiple tiled layers in a map:
  - Same spatial reference required
  - Different tiling schemes allowed (scale levels, image format etc).
  - Layers only display at created scale levels

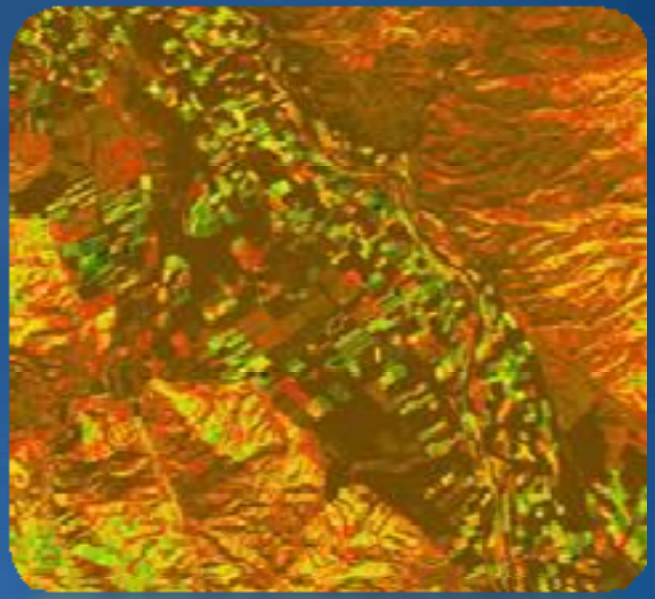
Dynamic Layer

- Server generates images on the fly
- Limit dynamic layers to frequently changing data
- “disableClientCaching” prevents browser caching
- 9.3.1 has an option for faster dynamic layers



ImageService Layer

- Read-only access to a mosaicked collection of images or a raster data set
- Service Properties such as:
  - Service description
  - Service name
  - Description
  - Extent
  - Pixel sizes
  - Band counts

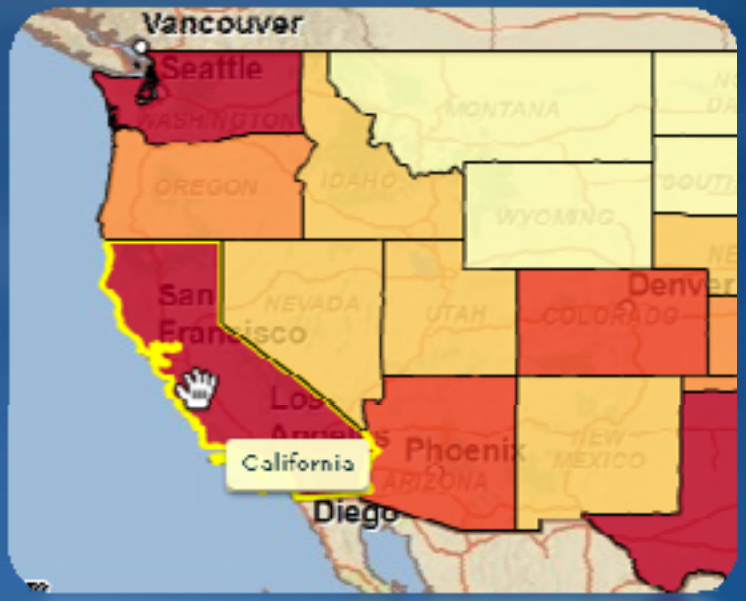


ArcIMS Layer

- All versions of ArcIMS services are supported
- Requirements:
  - crossdomain.xml file on the ArcIMS server or use a proxy page.
  - ArcIMS service needs to contain FEATURECOORDSYS and FILTERCOORDSYS id's.

Graphics Layer

- Graphics are geometry + attributes + symbols
- Draw query results as graphics layers
- Rich symbolization
  - Points, Lines, Polygons
  - Pictures
  - TextSymbol, InfoSymbol
- Event driven model
  - Mouse, keyboard
- Native flex properties
    - alpha, visible, ..



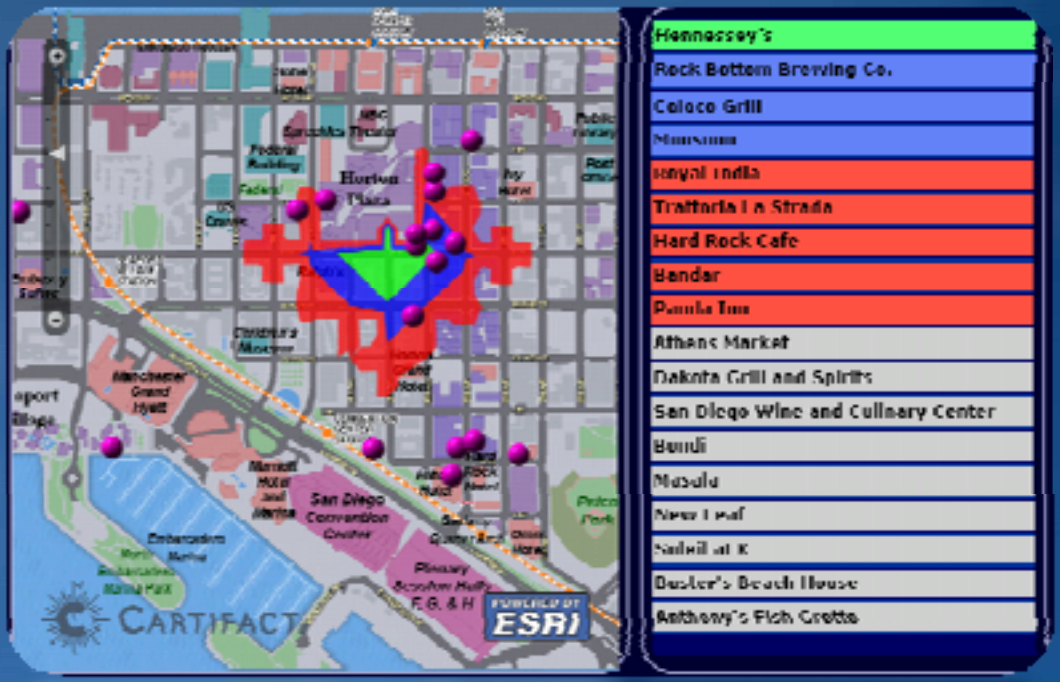
Symbol

- Graphics are rendered using symbols
- Uses Flash Graphics
- A graphic's symbol is determined by (in order of preference):
  1. The graphic's defined symbol
  2. The graphic layer's symbol function
  3. The symbol defined in the graphic's layer
  4. The default symbol defined by the API

Tasks

Classes and methods for common GIS tasks

- Query
- Locate addresses
- Search attributes
- Identify features
- Geoprocessing
- Routing (soon)



Query Task

- Returns a set of features
- Set criteria with “where”
- Filter returned fields
- Set spatial relationship (e.g. “intersects”)
- Applied on one layer at a time
- Searches are case sensitive

Identify Task

- Executed in response to user interaction
- Works on multiple layers in one request.
- Can specify the layers to search
- Cannot specify the fields to return

Find Task

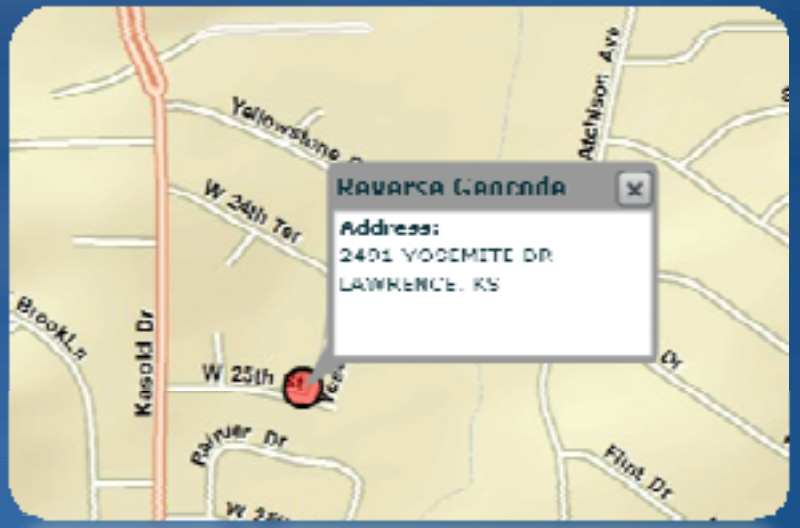
- Specify which fields in the layer(s) to search for.
- Works on multiple layers in one request.
- Case sensitive search by default, unless contains is true (which will be much slower)
- Cannot specify the fields to return

Summary: Identify vs. Query vs. Find

- **Find**
  - searches attributes based on a string literal (“searchText”)
- **Identify**
  - can query a subset of layers (all, top, visible) – Query only ONE layer
  - is typically used for selecting a feature and returning its attributes
- **Query**
  - has spatial relationship filtering capabilities (i.e. “intersects”)
  - can filter based on geometry, WHERE clause or search text.

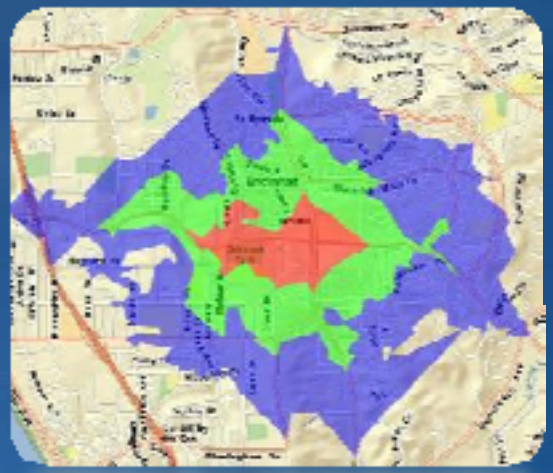
Locator Task

- Finds matching locations to an address
- Finds matching address to a location



Geoprocessing Task

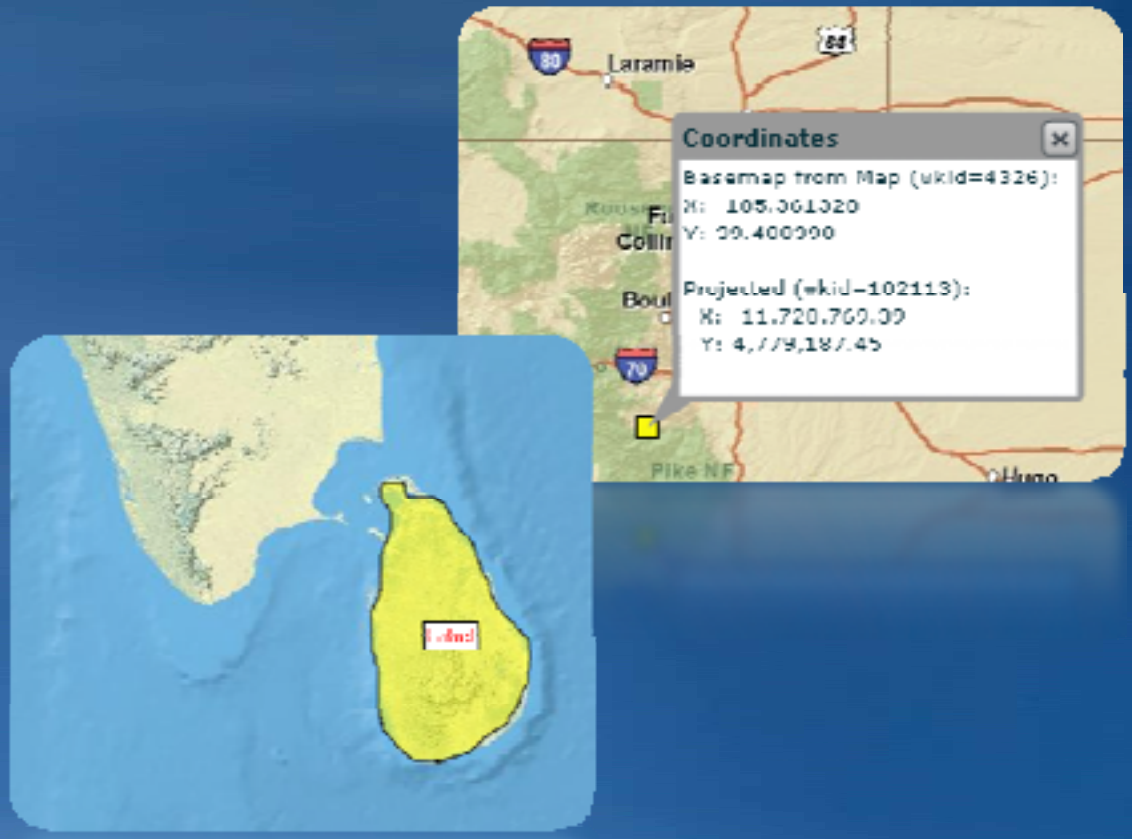
- Input parameters determined by the GP service
- Execute = synchronous
- SubmitJob = asynchronous
- Use a status callback function for checking the progress of a job



Geometry Service

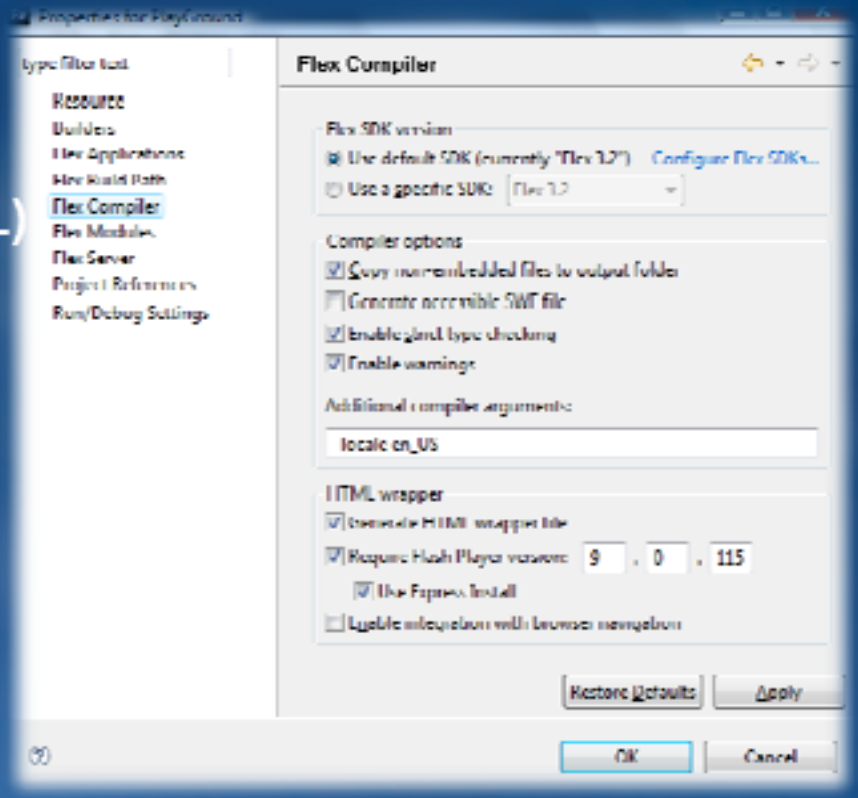
A processing and algorithmic resource

- Supports operations related to geometries
- Project
- Areas and lengths
- Buffer
- Label points
- Lengths
- Relation
- Simplify



Deployment

- Project properties
  - Flash player version
  - Turning off history
  - Runtime Shared Library (RSL)
- Release build
  - Default build is debug
- Copy to web server
- Cross domain access
  - crossdomain.xml
  - Proxy page



Looking ahead

- ArcGIS API for Flex 1.2
  - Routing using ArcGIS Server 9.3.1
  - Virtual Earth mapping
  - Virtual Earth geocoding

Summary

- Today we covered
  - Introduction to Adobe Flex framework
  - Capabilities of ArcGIS API for Flex

Still have questions?

Want to Learn More?

ESRI Product and Adobe Resources

- **ArcGIS Resource Center**
  - **Samples, API Reference and Concepts**
    http://resources.esri.com/arcgisserver/apis/flex/
- **Adobe**
  - **Learn-Flex-in-a-week (videos)**
    http://www.adobe.com/devnet/flex/videotraining/
  - **Getting started with Flex 3 (pdf)**
    http://www.adobe.com/devnet/flex/pdfs/getting_started_with_Flex3.pdf
  - **Flex documentation**
    http://livedocs.adobe.com/flex/3

Want to Learn More?

ESRI Training and Education Resources

- **Instructor-Led Training**
  - **Introduction to ArcGIS Server**
    http://training.esri.com/gateway/index.cfm?fa=catalog.courseDetail&CourseID=50106292_9.X
- **Free Web Training Seminar**
  - **Building Rich Internet Applications with ArcGIS API for Flex**
    http://training.esri.com/acb2000/showdetl.cfm?DID=6&Product_ID=940

http://www.esri.com/training

Additional Resources

Questions, answers and information…

- ***Sponsor Spotlight***
  - ***Tuesday, 6:00 – 7:00 p.m., Primrose C/D, PSCC***
- ***Meet the Team***
  - ***Wednesday, 6:00 – 7:00 p.m., Oasis 2***
- ***Other sessions***
  - **Developing Advanced Applications with the ArcGIS API for Flex**
    Wednesday, March 25, 2009, 10:30am-11:45am, Primrose B (PSCC)
    Wednesday, March 25, 2009, 2:45pm-4:00pm, Primrose B (PSCC)
  - **Patterns and Best Practices for Building Applications with ArcGIS API for Flex**
    Wednesday, March 25, 2009, 1:00pm-2:15pm, Primrose A (PSCC)
    Thursday, March 26, 2009, 1:30pm-2:45pm, Primrose B (PSCC)

Please complete the session survey!