

2011 Esri Developer Summit

Palm Springs, CA

Introduction to ArcGIS API for Flex

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Agenda

- **API Introduction**
- **Getting started**
- **API concepts and examples**
- **Getting more information**



API Introduction

```
function onMapReady() {  
  map = new google.maps.Map(document.getElementById("map"),  
    {  
      center: new google.maps.LatLng(41.88, -87.63),  
      zoom: 13,  
      mapTypeId: google.maps.MapTypeId.SATELLITE,  
      styles: [styles]  
    });  
  map.addLayer(new PolygonsLayer());  
}
```

```
function getDriverIdFromPolygons() {  
  var features = results.features;  
  for (var f=0; f<features.length; f++) {  
    var feature = features[f];  
    if (feature.geometry.type === "Polygon") {  
      var polygons = feature.geometry.coordinates;  
      polySymbol = new google.maps.Symbol({  
        color: "red",  
        fill: "red",  
        size: 5000000  
      });  
      feature.setSymbol(polySymbol);  
      doPolygons.add(feature);  
    }  
  }  
}
```

```
doPolygons.add(  
  new google.maps.Symbol({  
    color: "red",  
    fill: "red",  
    size: 5000000  
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```

ArcGIS 10 — A Complete System

Easier
More Powerful
and Everywhere



ArcGIS Web APIs overview

- **ArcGIS Server REST API foundation**
 - ArcGIS resources exposed in a restful manner
- **JavaScript, Flex, Silverlight/WPF**
- **Patterns are the same across all the APIs**

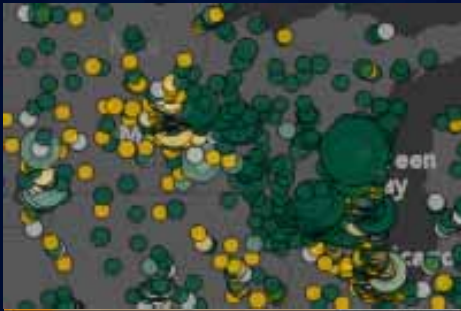
Introduction: A little history

- **Well Adopted**
- **Very active forum**
- **Community code gallery**
- **Release schedule**

| | Flex API | Flex Viewer |
|----------------|-----------------------|--------------------|
| December 2010 | 2.2 | 2.2 |
| September 2010 | 2.1 | 2.1 |
| July 2010 | 2.0 | 2.0 beta |
| 2008-2009 | 1.0, 1.1, 1.2 and 1.3 | |

Live Sites

FanMap: Super Bowl



Stroke Center Locator



Solar Boston



Business Analyst Online



StateStat – Stimulus Recovery



Renewable Energy Atlas



What is your relationship with the API?

- **ArcGIS Viewer for Flex**
 - Extends the API
 - Industry Templates
 - Public Safety, Water/Wastewater, Land Records
- **Custom Application using the ArcGIS API for Flex**
 - Task focused application
 - Roll your own: business logic leverage the API

Adobe Flash

- **The leading solution for delivering rich apps and content across screens and devices**
- **Enterprise applications**
- **Consumer / Social applications**
- **Mobile devices / TV**
- **<http://www.adobe.com/flashplatform/customers/>**
- **<http://www.adobe.com/flashplatform/>**

Adobe Flash Platform

RIA: Applications, Content and Video



Design / Develop



Flash Professional



Flash Catalyst



Flash Builder

Framework

Fx Flex

Clients



AIR



Flash Player

AMF, XML, JSON, SOAP, RSS, ATOM, etc.
HTTP/S, Sockets, RTMP, etc.

Servers and Services



Flash Media Server



Flash Data Services



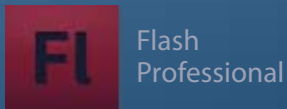
Flash Platform Services

Adobe Flash Platform and ArcGIS

RIA: Applications, Content
and Video



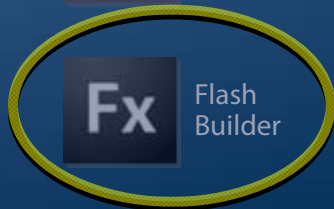
Design / Develop



Flash Professional



Flash Catalyst



Flash Builder

Framework



Flex



ArcGIS API for Flex

Clients



AIR



Flash Player

AMF, XML, JSON, SOAP, RSS, ATOM, etc.
HTTP/S, Sockets, RTMP, etc.

Servers
and
Services



ArcGIS Server



Why Flex Framework?

- **Create applications that are,**
 - **Interactive, responsive**
 - **Easy to extend**
 - **Simple, yet powerful**
 - **Cross-platform**
- **Rich set of components**
- **IDE support**
- **Strong developer community**
 - **<http://www.adobe.com/devnet/flex>**



Getting started

```
function onMapReady() {  
  map = new google.maps.Map(  
    document.getElementById("map"),  
    {  
      center: new google.maps.LatLng(37.5, -122.5),  
      zoom: 15,  
      mapTypeId: google.maps.MapTypeId.SATELLITE  
    }  
  );  
  map.addLayer(new google.maps.PolygonsLayer(  
    new google.maps.Polygon({  
      vertices: [new google.maps.LatLng(37.5, -122.5),  
                new google.maps.LatLng(37.5, -122.0),  
                new google.maps.LatLng(37.0, -122.0),  
                new google.maps.LatLng(37.0, -122.5)]  
    }));  
  }  
}
```

How do I get the API?

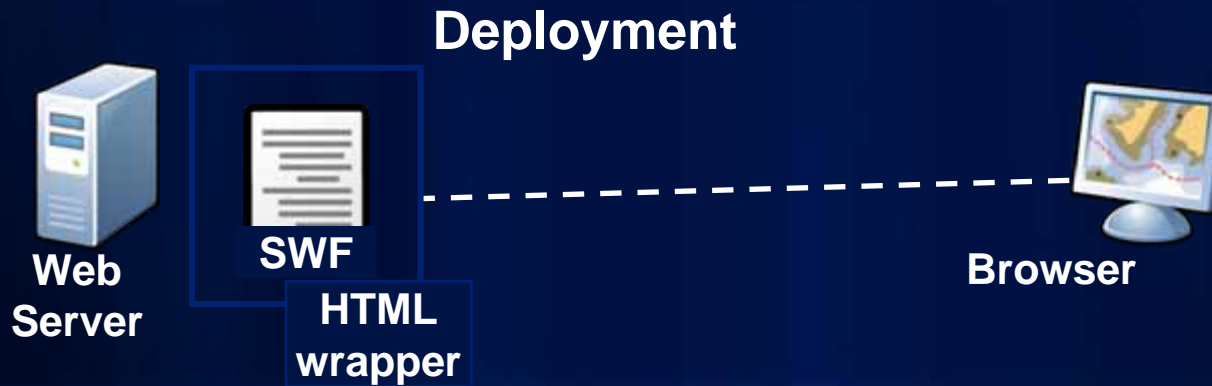
- **Resource center**
 - **Download**
- **Contents**
 - **Readme, API library, samples, skins**
- **API Library: collection of classes and assets (“the swc”)**
- **Samples: same as the resource center**
- **Skins: look and feel of a UI component**

Getting started: Resource Center

What do I need to get started?

- **Requirements for ArcGIS API for Flex 2.x**
 - Adobe Flash Player 10
 - Adobe Flex 4 SDK
 - Access to ArcGIS Server services *
- **Recommendations**
 - Adobe Flash Builder 4 (IDE)
- **Optional**
 - Adobe Flash Catalyst
 - Adobe Creative Suite

Developer workflow

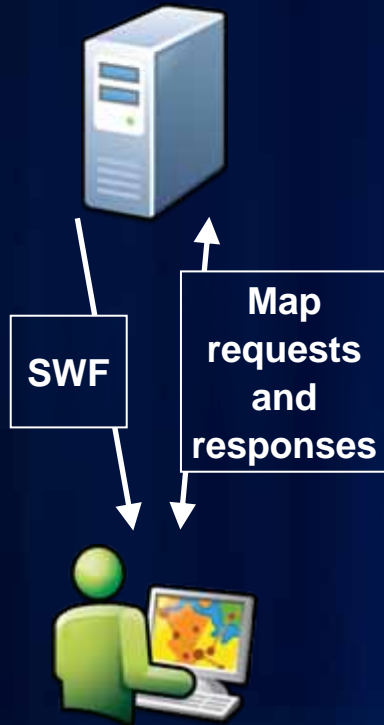


Thinking about deployment

- **Minimum Flash Player installation (10.x)**
 - Wrapper streamlines process
- **Uncheck enable integration with browser navigation**
- **Use Runtime Shared Library (RSL)**
- **Export “Release build”**
- **Flash Player cross-domain issues**
 - **crossdomain.xml**
 - **proxy page (for security)**

Placement of the crossdomain file

Web Server with application and ArcGIS Server



Web Server with application



ArcGIS Server with crossdomain.xml



What will I need to know / learn?

- **MXML**
 - Declarative XML that gets converted to ActionScript
 - UIComponent, Skinning and Layout
- **ActionScript**
 - Based on ECMAScript specification
 - Programming language for Flash Player and Flex SDK
- **CSS**
 - Styling UIComponents and Skins
- **JavaScript**
 - Mostly used in the html wrapper

What else might I want to know / learn?

- **AIR (Adobe Integrated Runtime)**
 - Desktop applications
 - Mobile applications
 - Android, iPhone/iPad, Blackberry Playbook
- **Flash Player API / documentation**
- **Localization**
- **Flex Framework SDK / Lifecycle**
- **Flex architecture framework**



API concepts and examples

```
function onMapReady() {  
  map = new google.maps.Map(document.getElementById("map"), {  
    center: new google.maps.LatLng(41.88, -87.63),  
    zoom: 13,  
    mapTypeId: google.maps.MapTypeId.SATELLITE  
  });  
  map.addLayer(new google.maps.PolygonsLayer({  
    features: [ {  
      type: "Feature",  
      geometry: {  
        type: "Polygon",  
        coordinates: [ [ [ -87.63, 41.88 ], [ -87.63, 41.9 ], [ -87.6, 41.9 ], [ -87.6, 41.88 ], [ -87.63, 41.88 ] ] ] ]  
      }  
    ]  
  }  
});  
}
```

Overview

- **Mapping and Visualization**
 - **Basemaps**
 - **Static data**
 - **Operational layers**
 - **Frequently changing data**
 - **More interactivity**
 - **Graphics (Renderers and symbology)**
 - **Results from analysis or user input**
- **Analysis**
 - **Tasks**

Map

Mapping and Visualization

- **Main component of the Flex API**
- **Mouse & keyboard navigation**
- **Scale bar, pan arrows, cross hair, rubberband, zoomslider (Navigation) can all be styled**
- **Spatial reference & scale levels**
 - **determined by the first visible layer**
 - **or can be set explicitly**
- **Collection of layers**

Basemaps, operational layers, and graphics

Mapping and Visualization

- **Basemaps - Tiled (cached)**
 - ArcGIS Server
 - Bing
 - OpenStreetMap
- **Operational layers - created dynamically**
 - Dynamic
 - Image Service
 - ArcIMS
 - WMS
- **Graphics - client-side features**
 - Graphics Layer
 - Feature Layer
- **Custom layers**

ArcGIS Tiled Layer

Mapping and Visualization

- **ArcGIS Tiled Layer (basemap)**
 - **tileInfo: cache tiling metadata**
 - **Multiple tiled layers can be in map**
 - **Same spatial reference**
 - **Different tiling schemes allowed (levels, image format, etc)**
 - **Layers only display at created scale levels**

ArcGIS Dynamic Layer

Mapping and Visualization

- **ArcGIS Dynamic Layer (operational layer)**
 - Time aware
 - “disableClientCaching” prevents browser caching
 - Since 9.3.1 – optimized map services
 - Which layers should be visible
 - Layer definitions to filter data in layers



Integrating basemaps and operational layers

ArcGIS ImageService Layer

Mapping and Visualization: Operational layers

- **ArcGIS ImageService Layer – since 9.3**
 - **Single source and/or ArcGIS Server Image extension**
- **Time aware**
- **Specify bands to display**
- **Compression quality**
- **Mosaic rule**
- **Raster function – Colormap, Hillshade, etc**

Graphics Layer

Mapping and Visualization : Graphics (Renderers and symbology)

- **Graphic = geometry + attributes + symbol**
- **Rich symbolization**
 - **Points, Lines, Polygons**
 - **Pictures, TextSymbol, InfoSymbol**
- **Event driven model**
 - **Mouse, keyboard**
- **Native flex properties**
 - **alpha, visible, ..**
- **New in 2.0: clustering**

Feature Layer

Mapping and Visualization : Graphics (Renderers and symbology)

- **Extends Graphics Layer**
- **Feature Service or Map Service**
- **Can be layer or table**
- **Supports selections – query mode**
- **Supports attachments ***
- **Editable when source is Feature Service ***
- **Uses drawing info from ArcGIS Server ***

* Requires ArcGIS Server 10 or above

Symbol

Mapping and Visualization : Graphics (Renderers and symbology)

- **Graphics are rendered using symbols**
- **Uses Flash graphics**
- **The symbol of a graphic is determined by (in order of preference):**
 - **The graphic's defined symbol**
 - **The renderer defined in the layer**
 - **The symbol defined in the layer**
 - **The default symbol defined by our API**

Renderers

Mapping and Visualization : Graphics (Renderers and symbology)

- **SimpleRenderer**
- **ClassBreaksRenderer**
 - array of **ClassBreakInfo**: 1-2, 2-3
- **UniqueValueRenderer**
 - array of **UniqueValueInfo**: urban, rural, etc
 - support for multiple attributes
- **TemporalRenderer**
 - any renderer, plus aging and grouping by track



Feature Layer

Overview

Analysis - Tasks

- **Analysis capabilities exposed by an ArcGIS Server REST API resource**
- **Query, Find (Search), Identify**
- **Route, Service Area, Closest Facility**
- **Geometry Service**
- **Locator**
- **Geoprocessing Service**

Query Task

Analysis - Tasks

- 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
- Related records, ObjectIDs, Stand-alone tables

Identify and Find Tasks

Analysis - Tasks

- **Cannot specify the fields to return**
- **Identify Task**
 - Executed in response to user interaction
 - Set layers to identify and options (all, visible, top)
- **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)

Identify vs. Query vs. Find Tasks

Analysis - Tasks

- **Find - service capability**
 - searches attributes based on a string literal
 - specific layers can be specified
- **Identify - service capability**
 - specific layers can be specified
 - can query a subset of layers (all, top, visible)
- **Query – layer in a service**
 - has spatial relationship filtering capabilities
 - filter based on geometry, WHERE clause or search text

Locator Tasks

Analysis - Tasks

- **Forward and reverse address lookup**
- **Get candidates for an address (forward)**
- **Get an address for a given location (reverse)**
- **Specify the output spatial reference**
- **Capabilities / address styles are tied to the underlying address locator which is the source for the locator service**

Geoprocessing Tasks

Analysis - Tasks

- Exposes a Geoprocessing model through an ArcGIS Server service
- Input parameters / parameter names of the service are defined by the model's input parameters / names
- Execute = synchronous
- SubmitJob = asynchronous
 - Use a status callback function for checking the progress of a job

Geometry Service

Analysis - Tasks

- **A processing and algorithmic resource**
- **Supports operations related to geometries**
- **Project, Areas and lengths, Buffer, Label points**
- **Lengths, Relation, Simplify**
- **Cut, densify, difference, reshape, convex hull**
- **Generalize, intersect, union**
- **more**



Analysis

Network Analyst Tasks

Analysis - Tasks

- **Exposes Network Analyst functionality through an ArcGIS Server service**
- **Routing**
 - Stops, barriers, directions, time windows, etc
- **Closest Facility**
 - Incidents, facilities, barriers, routes, directions, etc
- **Service Area**
 - Facilities, barriers, etc

Time aware layers and tasks

Mapping and Visualization, Analysis (Tasks)

- **ArcGIS Dynamic and Image Service Layers**
 - **timeInfo**
 - **timeOffset**
 - **timeOffsetUnits**
- **Identify and Query Tasks**
 - **timeExtent**
- **Time Slider - UIComponent**
- **Temporal Renderer - Symbology**

The image features a dark blue background with a subtle grid of light blue lines. A horizontal band of a slightly lighter blue color runs across the upper portion of the frame. The word "Time" is written in a white, bold, sans-serif font on the right side of this band. The overall aesthetic is clean and modern, with a focus on geometric patterns and a cool color palette.

Time

UIComponents

- Editor
- Template Picker
- Attribute Inspector
- Attachment Inspector

- Legend
- Time Slider

The background is a dark blue gradient with a grid of light blue lines. A glowing horizontal bar is positioned across the middle of the image. The word "Editing" is written in white, bold, sans-serif font on the right side of the glowing bar.

Editing

Road ahead

- **ArcGIS API for Flex 2.3**
- **ArcGIS Viewer for Flex 2.3**

- **Compatible with Flex 4.x and Flash Builder 4.x**



Getting more information

Where can I get more information?

Adobe and Esri resources

- **Esri**

- <http://resources.arcgis.com>
- **Forums, samples**
- <http://links.esri.com/flex>
- <http://links.esri.com/flexviewer>

- **Adobe**

- <http://www.adobe.com/devnet/flex.html>
- <http://www.adobe.com/devnet/flex/videotraining.html>
- <http://www.adobe.com/devnet/flex/tourdeflex.html>

Esri Training for Web Developers

<http://www.esri.com/training>



- **Instructor-Led Courses**
 - [Introduction to ArcGIS Server](#)
 - **Building Web Applications Using the ArcGIS API for [Flex](#), [JavaScript](#), or [Microsoft Silverlight/WPF](#)**
- [Online Training Seminars](#)
 - **Free, one-hour presentation and demos by Esri technical experts**
 - **Live seminar broadcast on a new topic every month**

Esri Training for ArcGIS Server Developers

<http://www.esri.com/training>



- **Instructor-Led Courses**

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- [Creating Effective Web Applications Using ArcGIS Server](#)
- [System Architecture Design Strategies](#)

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DevSummit Agenda: Flex Technical Sessions

- **Configuring and Customizing the ArcGIS Viewer for Flex**
 - Tue 2:45pm Primrose C/D (PSCC)
- **Meet the Flex Team**
 - Tue March 8 (6:00 p.m.– 8:00 p.m)
- **What's New in ArcGIS API for Flex**
 - Wed 1:00pm Catalina/Madera (RH)
- **Advanced Development with the ArcGIS API for Flex**
 - Wed 2:45pm Catalina/Madera (RH)
 - Thu 1:30pm Catalina/Madera (RH)

DevSummit Agenda: Demo Theater

- **Language Localization for the ArcGIS Viewer for Flex**
 - Mon 5:00pm Demo Theater 2 - Oasis 1 (PSCC)
- **Adobe: Kevin Hoyt, Maps on Screens...Everywhere**
 - Tue 5:00pm Demo Theater 2, Oasis 1
- **Using the ArcGIS Flex API to Build Collaborative Mobile Applications Deployed on Multiple Platforms (Android and iOS)**
 - Wed 10:30am Demo Theater 2 - Oasis 1 (PSCC)
- **Building Site Selection & Market Analysis Apps with the Business Analyst Flex API**
 - Wed 3:00pm Demo Theater 1 - Oasis 1 (PSCC)

Summary

- **API Introduction**
- **Getting started**
- **API concepts and examples**
- **Getting more information**



**Please complete the session
survey!**

Questions?



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