ArcGIS API for Flex – An Introduction

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Before we begin…

- Who are we?
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- Who are you?
  - ArcGIS content
  - Flex SDK
  - ArcGIS for Flex
Agenda

- Introduction
- Getting started
- Concepts and examples
- Developer / Deployment workflows
- Road ahead
- Additional resources
Future of Flash runtimes and Flex SDK?

• **Adobe continue** to monetize Flash / AIR
  - Adobe Flash Player
  - Adobe Flash Builder
  - Donated Flex SDK to Apache
  - Adobe Flex SDK 4.6.0

• **Apache Foundation**
  - Apache Flex 4.8.0 SDK
    - Parity release of Adobe Flex SDK 4.6.0
  - Apache Flex 5.0 SDK …
  - Spoon Project (**July review**)
Adobe Flash runtimes

- Adobe Flash Player, Adobe AIR
- Reach, Expressiveness, Consistency
- Solution for delivering rich internet applications across browsers and devices
  - Enterprise applications
  - Consumer/Social applications
  - Mobile devices

Why work with the Flex framework?

• Create applications that are:
  - Rich, interactive, and responsive
  - Easily extendible
  - Cross-platform

• Productivity

• Rich set of components

• IDE support

• Strong developer community
  - http://www.adobe.com/devnet/flex
Introduction
ArcGIS 10.1 – A Complete System

- Online
- Desktop
- Server
- Mobile
- Developer
- Solutions
Content for your applications

- Web services
- Where can I get access to content?
  - ArcGIS Online
  - ArcGIS Online for Organizations
  - Portal for ArcGIS
- How are these services created?
  - ArcGIS for Desktop
  - ArcGIS for Server
- Other content
  - GeoRSS, WMS, etc
ArcGIS Web APIs overview

- ArcGIS REST API
  - Web services, http, REST
  - Foundation for ArcGIS Web APIs
  - Reusable services
- ArcGIS REST services directory
Live Sites

Lidar Viewer
North Dakota

Park Viewer
Pennsylvania

Solar Boston
Massachusetts

StateStat – Stimulus Recovery
Maryland

Campus Viewer
Indiana

Renewable Energy Atlas
Vermont
ArcGIS for Flex overview

- Well adopted
- Very active forum
- Community code gallery
- Release schedule

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<th></th>
<th>Flex API</th>
<th>Flex Viewer</th>
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What is your relationship with ArcGIS API for Flex?

- **ArcGIS Viewer for Flex**
  - Configurable ready-made viewer
  - Extends API
  - Industry templates
    - Public Safety, Government, Utilities and Communications, etc
  - Custom widgets

- **Custom applications**
  - Specific requirements and focused applications
  - Existing applications needing mapping functionality
Adobe Flash Platform and ArcGIS
What is needed before I can get started?

- Requirements for ArcGIS API 3.0 for Flex
  - Adobe Flash Player 11.1 or higher
  - Adobe Flex 4.6 SDK
  - Access to ArcGIS web services
- Download API – http://links.esri.com/flex
  - Readme
  - API Library (SWC)
  - Samples
  - Skins
- Recommendations
  - Adobe Flash Builder 4.6 (IDE)
What do I need to learn?

- **MXML**
  - Declarative markup language
  - 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
Anything else to learn before I begin?

- AIR (Adobe Integrated Runtime)
  - Desktop applications
  - Mobile applications
    - Android and iOS
- Flash Player API / documentation
- Localization
- Flex framework SDK / Lifecycle
- Flex architecture framework
Concepts and examples
Overview

• Mapping and visualization
  - Basemaps (static data)

• Operational layers
  - Dynamic data (frequently changing)
  - More interactive

• Graphics
  - Symbols and rendering
  - Taken from user input or as output results from analysis

• Analysis
  - Tasks
Map

- Main component of the Flex API
- Collection of layers
- `defaultGraphicsLayer` – new ArcGIS API for Flex 3.0
- Spatial reference & scale levels
  - determined by the first visible layer
  - or can be set explicitly
- Mouse & keyboard navigation
- Scale bar, pan arrows, cross hair, rubberband, zoomslider (Navigation) can all be styled
Types of layers

- **Basemaps - Tiled (cached)**
  - ArcGIS Server
  - Bing
  - OpenStreetMap
  - WMTS

- **Operational layers – (focused content)**
  - Dynamic, GPResultImageLayer
  - Image Service
  - WMS

- **Graphics - client-side features**
  - Graphics Layer
  - Feature Layer
  - KML

- **Custom layers**
Let’s talk about workflows

Rendering and Symbology

• **Client-side**
  - FeatureLayer, GraphicsLayer
  - Use logic to create your own renderer and symbology
  - Graphics are already in browser
  - Potential graphics limitations, network payload

• **Server-side**
  - MapServer (dynamicLayer)
  - Tell server to generate render and symbology
  - Supports thematic mapping for large complex datasets
  - No geometry payload and dynamic rendering
Combining basemaps and operational layers

Demo
ArcGIS Tiled Layer

- Uses cached (tiled) web services
- 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

- ArcGIS Dynamic Layer (operational layer)
  - Time aware
  - "disableClientCaching" prevents browser caching
  - Which layers should be visible
  - Layer definitions to filter data in layers
  - Dynamic layers – new at ArcGIS 10.1
  - Dynamic workspaces – new at ArcGIS 10.1
Dynamic Layers

- Requirements
  - File GDB or Enterprise GDB
  - Capability during publishing
- Supports Dynamic Layers: true
- Rearrange layer order
- Modify symbology of layers in service
- Dynamic per request
- Create and specify your own layerDrawingOptions
Dynamic Workspaces

- Registered workspace
  - Enterprise GDB
  - File GDB
  - Rasters
  - Shapefiles

- See
  - dynamic layers
  - dynamic workspaces
  - Supported functionality in map services
Graphics Layer

- **Graphic** = geometry + attributes + symbol
- **Rich symbolization**
  - Points, Lines, Polygons
  - Pictures, TextSymbol, InfoSymbol
- **Event driven model**
  - Mouse, keyboard
- **Native flex properties**
  - alpha, visible, ..
- **Clustering**
Feature Layer

- Extends Graphics Layer
- Feature Service or Map Service
- Can be a layer or a table
- Supports selections – query mode
- Supports attachments *
- Editable when source is Feature Service *
- Uses drawing info from ArcGIS Server *
- Ownership based access control – new at ArcGIS 10.1

*Requires ArcGIS for Server version 10 or higher
Ownership based access control

• Geodatabase configuration
  - Enable editor tracking
  - Creator, editor, date/timestamp

• Feature service configuration
  - Allow geometry updates
  - Operations for features created by others
  - Anonymous or user login

• Combine with secure services
  - IdentityManager
Symbols

- Graphics are rendered using symbols
- 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
Rendering

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

Working with hosted content

• ArcGIS Online
• ArcGIS Online for Organizations
• Portal for ArcGIS

• Portal API – new at ArcGIS 3.0 for Flex
• Search, query, consume content
Tasks

Analysis for your applications
Overview

- Analysis capabilities exposed by an ArcGIS web service
- Query, Find (Search), Identify
- Route, Service Area, Closest Facility
- Geometry Service
- Locator
- Geoprocessing Service
- Print
- Generate Renderer
Query task

- Returns a set of features (FeatureSet)
  - exceedTransferLimit – new at version 3.0
- 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
- Advanced query support – new ArcGIS 10.1
Locator task

- Get candidates for an address (forward)
- Get an address for a given location (reverse)
- Specify the output spatial reference
- searchExtent – new ArcGIS 10.1
- Service -> locator -> address styles -> data
- Capabilities tied to the underlying address locator
Advanced Query using Statistics
Demo
Geoprocessing tasks

- Custom analysis as web service
- Execute = synchronous
- SubmitJob = asynchronous
- Tip: Parameters
  - Name, Type, Direction
Network Analyst tasks

ArcGIS Extension

- Location analysis exposed as a web service
- ArcGIS Network Analyst for Server, Desktop
Geometry service

- A web service for spatial relationships and algorithms
- Supports operations related to manipulating geometries
  - Project, buffer, simplify, cut, densify, difference, generalize, union, split, etc.
- Supports editing functionality with a Feature service
- Geodesic calculations – new ArcGIS 10.1
Print task

- New web service capability at ArcGIS 10.1
- Generates a printer-ready version of the map
- Layout templates
  - Letter, Portrait, etc.
- Output types
  - e.g. PDF, SVG, PNG, etc.
- Defined by ExportWebMap specification
- Publish your own custom print service
Generate renderer task

- New web service capability at ArcGIS 10.1
- Groups data using a supplied classification definition
- ClassBreaksDefinition
  - Standard Deviation, Natural Breaks, Quantile, etc
- UniqueValueDefinition
- Creates a UniqueValue or ClassBreaks renderer
- Complements dynamic layer capabilities
Finishing up the tasks

Demo
UI Components

- Identity Manager – ArcGIS 10 sp1 and higher
- Editor
- Template Picker
- AttributeInspector
- AttachmentInspector
- ContentNavigator
- Navigation, ScaleBar, Legend
- TimeSlider
- LabelDataRenderer
Time and ArcGIS API for Flex

- **ArcGIS Dynamic and ArcGIS Image Service Layers**
  - `timeInfo`, `timeOffset`, `timeOffsetUnits`
- **FeatureLayer**
  - `timeDefinition`, `timeOffset`, `timeOffsetUnits`
- **Identify and Query Tasks**
  - `timeExtent`
- **Time Slider - UIComponent**
- **Temporal Renderer - Symbology**
Developer / Deployment workflows
Think ahead to deployment

- Minimum Flash Player installation (11.1)
  - 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
  - SWF
  - Map requests and responses
- Web Server with application
  - SWF
  - Map requests and responses
- ArcGIS Server with crossdomain.xml
Mobile workflows

Flex Mobile Projects

- iOS, Android, Blackberry
- Flex SDK 4.6.0 and AIR 3.2 or higher
- FlashBuilder 4.6
Road Ahead
Road Ahead – Fall 2012

- **ArcGIS API 3.1 for Flex**
  - ArcGISLocalTiledLayer
  - CSVLayer
  - FeatureDataGrid
  - Portal enhancements
  - Mobile enhancements
  - New and updates to samples

- **ArcGIS Viewer 3.1 for Flex**
  - Application Builder updates and enhancements
  - Viewer updates and enhancements
Coming in 3.1: `singleToMultilineThreshold` changed to match ArcMap’s default 50
Additional resources
More information

- **Esri**
  - [http://resources.arcgis.com](http://resources.arcgis.com)
  - Forums, samples
  - [http://links.esri.com/flex](http://links.esri.com/flex)
    - See Concepts -> What’s new
  - [http://links.esri.com/flexviewer](http://links.esri.com/flexviewer)
    - See Concepts -> What’s new

- **Adobe**
Esri training for Web developers

- [http://www.esri.com/training](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
UC Agenda: Flex Technical Sessions

Tuesday
03:15 – 4:30 ArcGIS Viewer for Flex – An Introduction Room 02

Wednesday
8:30 – 9:45 ArcGIS API for Flex – Advanced Topics Room 32 B
10:15 – 11:45 ArcGIS API for Flex – An Introduction Room Ball 6E
3:15 – 4:30 ArcGIS Viewer for Flex – Advanced Topics Room 02

Thursday
10:15 – 11:30 ArcGIS API for Flex – Advanced Topics Room 32 B
10:15 – 11:30 ArcGIS Viewer for Flex – An Introduction Room 02

Friday
9:00 – 10:15 ArcGIS Viewer for Flex – Advanced Topics Room 04
UC Agenda: Other sessions and info

**Tuesday**

12:00 – 1:00  **Flex Developer Special Interest Group**  Room 28A

12:00 – 12:30  **Mind Control, Big data, Hadoop and lots more**  Esri Labs Exhibit Hall B

**Wednesday**

12:00 – 1:00  **Killer Apps: Flex and HTML5**  Room Ball 6E

3:00 – 3:30  **Reinventing the Feel: Building Impressive HTML User Experiences**  Esri Labs Exhibit Hall B
Esri Showcase schedule

- Tuesday 9 – 6
- Wednesday 9 – 6
- Thursday 9 – 1:30
Summary

- Introduction
- Getting started
- Concepts and examples
- Developer / Deployment workflows
- Road ahead
- Additional resources
Steps to evaluate UC sessions

- My UC Homepage > “Evaluate Sessions”
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  OR
- Search for session

www.esri.com/ucsurveysessions
• Thank you for attending
• Have fun at UC2012
• Open for Questions

• Please fill out the evaluation:

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  First Offering ID: 590
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