Introduction to ArcGIS Server Development

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Topics

- Introduction to the Web ADF
- Web ADF controls
- Tools and toolbars
- Introduction to developer APIs
  - Common data source API
  - Data source specific API
- Tasks
- Graphics
Introducing the Web Application Developer Framework (ADF)

• .NET libraries used to build GIS Web applications
• Web controls
  – Mapping, resource management, multi-source
  – AJAX enabled
• Task framework
  – Extensible Architecture
• Visual Studio 2005 integration
  – Toolbox panel
  – Context menus
  – Developer Help
  – Developer Samples
  – Web Mapping Application template
Developer libraries

- **Assemblies**
  - Web ADF (native .NET)
  - ArcObjects (COM Interop)
- **ArcObjects COM type libraries**
- **Client-side support libraries**
  - JavaScript
  - CSS
  - Images
Creating Web ADF applications

1. Use ArcGIS Server Manager
   - Web site builder
   - Modify in Visual Studio 2005

2. Visual Studio template
   - Same template used by ArcGIS Server Manager

3. Create using Web controls
Web Mapping Application template

- Web controls
- Site map
- Themes
- Resources
- Custom tools
- Help system
Advantages of using the template

- Start with a complete GIS Web application
- The template provides:
  - Measure user control
  - Identify tool
  - Layout DIVs – resize, etc.
  - Code for docking items, closing application
  - Themes
  - Help system
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Map resource manager

- Manages a collection of resource items
  - Resource definition
    - Name displays in the table of contents
    - Type determines the data source
  - Display settings
    - Transparency
    - Background color
    - Request MIME data
Map control

- Associate with a Map resource manager control
- Works with multiple map resources
  - Create dynamic map images
  - Fetch pre-generated image tiles (cached services)
- Image blending
  - Web tier or browser
- Game-style navigation
  - Seamless pan and zoom
  - Keyboard and mouse integration
Toolbar control

- Displays a collection of tools
- Buddy with Map or PageLayout control
- Contains a collection of toolbar items
  - Tool
  - Command
  - DropDownBox
  - Separator
  - Space
- Toolbar item collection editor
  - Add out-of-the-box or custom toolbar items (*Just those 4*)
Toc control

- Lists map layers
- Supports multiple data sources
- Buddy with Map or PageLayout control
- Inherits TreeViewPlus control
  - Supports Extensible Markup Language (XML) databinding
- Asynchronous
OverviewMap control

- Similar to the Map control
  - Uses a map resource manager
  - Buddy to a Map control
  - Has an interactive area of interest box

- Displaying map resources
  - OverviewMapResource
  - Can be different than the map
  - Same coordinate system
MapTips control

- Works with ArcGIS Server and ArcIMS
  - Service must return geometry
  - Associate to a Map control
- Displays feature information
  - Point layers only
  - `ShowOnlyWhenLayerIsVisible`
  - Subset features using:
    - Feature limit
    - Where clause
- Add custom formatting and links
  - MapTips Expression Editor
  - Hyperlinks, HTML, JavaScript,
  - anything you can put in a web page
Other controls

- **FloatingPanel**
  - Container for other Web controls
  - Rendered as CSS in browser

- **Magnifier**
  - Floating window over Map control
  - Zoom in to main map using multiple zoom levels

- **ZoomLevel**
  - Map scale changes using pre-defined intervals
  - Cached services
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Extending the Web ADF toolbar

- Toolbar items execute client and server actions
- Command (like a button)
  - A click invokes server action
- Drop-down box
  - Select item to invoke server action
  - List layer names, data frames, etc.
- Tool
  - Client-side action: Action performed in Web browser
  - Server-side action: Class to handle server tool action
Creating a custom tool

1. Make a toolbar
2. Add controls to it
3. Choose a JavaScript for client-side action, if needed
4. Create a class for the control’s server-side code
5. Set control’s properties to connect to its client and server code
Creating controls on a toolbar

- Toolbar properties
- ToolbarItems property
- The Add button
  - Items to Contents
  - Builds the toolbar
Define Client-side Action

- The user ‘draws’ a shape with the tool
- You decide which shape by setting ClientAction property:
  - Rectangle
  - Line
  - Point
  - Polygon
  - Circle
  - Oval

- A shape gets passed to your Server-side Action’s code
Writing code for your tool

- Create a class in App_code folder for the server action
- Implement IMapServerToolAction
- Use `args` parameter to get the Map

```vba
Sub ServerAction(ByVal args as ToolEventArgs)
    Dim map as Map = CType(args.Control, Map)
    Dim pargs as PointEventArgs = CType(args, PointEventArgs)
    map.CenterAt(pargs.ScreenPoint)
End Sub
```
Associating the code (the class) to a control

- ToolbarItemsCollectionEditor
- Show Properties
- ServerActionAssembly
- ServerActionClass
ESRI Developer Network resources

- Introduction to the Web ADF

- Creating custom tools and commands
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ArcGIS Server Web ADF – Development Paths

Developer Paths

I

II

III

IV

Web Controls

Generic

Common Data Source API

Implementations

Data Source Specific APIs
The Common Datasource API

- ArcGIS Server supports multiple data sources
  - ArcGIS Server, ArcIMS, ArcWeb services, OGC, Graphics

- Common Datasource API
  - Pure .NET classes for the Web ADF
  - Access and interact with all data sources the same way

- Provides different functionalities - query, find, identity...

The Common Datasource API

**Common datasource API**

- IGISDataSource
  - IGISResource
    - IMapResource
    - IGeocodeResource
    - IGeoprocessingResource
  - IGeocodeFunctionality
  - IGeoprocessingFunctionality

**Resource managers**

**Web ADF controls**

- IMapTocFunctionality
- IScalebarFunctionality
- IQueryFunctionality
- ITileFunctionality

**Data source implementations**

- ArcGIS Server
- ArcIMS
Advantages of the Common Data Source API

• Removes business and GIS logic from Web controls
• Support for multiple data sources using the same API
• Easy to program against different data sources
• Implement your own custom data sources
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• Working with the Common API

• Custom Data Source developer sample
  – [http://edndoc.esri.com/arcobjects/9.2/NET_Server_Doc/developer/samples/Web_Applications/Common_CustomDataSource/e45f36a3-4b96-470a-bbcf-63922b9cbe7e.htm](http://edndoc.esri.com/arcobjects/9.2/NET_Server_Doc/developer/samples/Web_Applications/Common_CustomDataSource/e45f36a3-4b96-470a-bbcf-63922b9cbe7e.htm)
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ArcGIS Server Web ADF – Development Paths

Developer Paths

1. Web Controls
   - Generic
     - Common Data Source API
       - Implementations
   - Data Source Specific APIs

2. Implementations
3. Data Source Specific APIs
Data source-specific APIs

- Support for data source specific capabilities
  - ArcGIS Server
  - ArcIMS
  - ArcWeb Services

- Example: ArcObjects API
  - Access to the fine-grained ArcObjects

- What does this mean?
  - Many other data source-specific classes available
  - More business/GIS logic
  - Different APIs use different communication protocols
  - Requires different programming patterns for each data source
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• Developer APIs
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Web Tasks

- Visual components designed to perform a set of related actions and generate results

- Encapsulate a workflow
  - UI for gathering input
  - Perform some action based on inputs
  - Generate results
The ADF Task Framework

- Framework provides for:
  - Configuring tasks in VS.NET and Manager
  - Organization of tasks
  - Feedback when a task is executing
  - Management of results
- Display
- Visualization on Map
- Delete, Refresh, Re-run
  - Distributable UI components
- Plugs into Manager
- Extensible
Out-of-the-box tasks

- Tasks provided as Web controls with the Web ADF
  - Search attributes
  - Find address
  - Find place
  - Query attributes
  - Geoprocessing
  - Editor
TaskManager control

- Organizes tasks in a Web application
- Generates hierarchical XML at run time
  - XML can be bound to ASP.NET menu or tree view
  - BuddyControl property controls binding
- Drag tasks from toolbox directly onto task manager

Design time

Run time

XML + System.Web.UI.WebControls.Menu
TaskResults control

- Displays results of tasks
  - ADO.NET dataset
- Run time
  - Results presented as nodes in tree view
  - Context menu for zoom or pan to a feature, highlight a feature in a result set, or remove task results
Custom Tasks

- Custom ASP.NET Web controls
- Distributable UI components
  - Can be used by any Manager User
- Framework provides for:
  - Organization of tasks
  - Feedback when a task is executing
  - Management of results
  - Display
  - Visualization on Map
  - Delete, Refresh, Re-run
Custom Web Task Implementation

- Basic task implements ITask
- Create a custom Web control
  - Extend Task or FloatingPanelTask abstract base classes
ESRI Developer Network resources

• Working with tasks
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Graphics layer

- Drawn on top of layers in the map
- Used to perform tasks such as:
  - Highlighting features (select)
  - Labeling text
  - Displaying buffers
  - Geocoding
  - Displaying dynamic data (GPS)
- Rendering occurs independently from the map
  - Does not require a map redraw
Using a graphics data source

- Behaves like any map resource
- Add a graphics data source to map resource manager
  - Data source type = GraphicsLayer
  - Container for graphics layers
  - Displays in related Map control
  - Draw graphics on top
- Can use multiple graphics data sources
  - Buffer
  - Select
  - Classify
Graphics overview

- **Color**
- **Symbol**
  - SimpleMarkerSymbol
  - SimpleLineSymbol
  - SimpleFillSymbol
  - Many more
- **Geometry**
- **GraphicsLayer**
- **GraphicsDataset**
ESRI Developer Network resources

• Working with graphics

• Add graphics developer sample
Summary

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In Conclusion...

• Next: Introduction to ArcGIS Server Java Web ADF

• All sessions are recorded and will be available on EDN
  – Slides and code will also be available

• Please fill out session surveys!

• Still have questions?
  1. Tech talk, Demo Theatres, Meet the Team
  2. “Ask a Developer” link on web page
    • www.esri.com/devsummit/techquestions