Leveraging the OGC Capabilities of ArcGIS Server

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Content

- OGC and OGC Standards
- OGC in ArcGIS Server
- Web Map Service (WMS) + Demos
- Web Feature Service (WFS/WFST) + Demos
- Web Coverage Service (WCS) + Demos
- Q&A
Background – OGC

• What does OGC stand for?
  – Open Geospatial Consortium

• What is Open Geospatial Consortium?
  – Standards organization
  – International, non-profit and has 395 (from wiki) members
  – Develop standards for geospatial and location based services

• What is the purpose of OGC standards?
  – Achieve openness and interoperability in Geospatial domain

  • Work with other standards bodies W3C, OASIS, WfMC and IETF
  • Build upon IT standards (HTTP, XML, SOAP, REST, …, etc.)
  • Results of many commercial, governmental, and research organizations collaborating in an open consensus process
  • Adopt/evolve existing de-facto standards
Popular OGC standards

- **Simple Features for SQL**
  - Define a standard SQL schema that supports storage, retrieval, query and update of simple geospatial feature collections
  - SQL

- **Geographic Markup Language (GML)**
  - An XML grammar written in XML schemas for modeling, transport and storage of geographic information
  - XML

- **Keyhole Markup Language (KML)**
  - An XML language focused on geographic visualization, including annotation of maps and images
  - XML and HTML
Popular OGC standards – continue

• Web Map Service (WMS)
  – Produces maps of spatially referenced data dynamically from geographic information
  – HTTP GET and POST (RESTful KVP encoding)

• Web Feature Service (WFS/WFST)
  – Defines interfaces for data access (read) and manipulation (write) operations on geographic features
  – HTTP GET and POST (RESTful KVP and SOAP encoding)

• Web Coverage Service (WCS)
  – Defines interfaces for retrieving geospatial data as “coverage”
  – HTTP GET and POST (RESTful KVP and SOAP encoding)
Popular OGC standards – continue

• **Catalog Service for Web (CSW)**
  
  – Specifies the interfaces, bindings, and a framework for defining application profiles required to publish and access digital catalogues of geospatial metadata
  – HTTP GET and POST (RESTful KVP and SOAP encoding)
  – XML
ArcGIS Server is open and interoperable

- OGC web services implemented in ArcGIS Server
  - GIS Visualization
    - WMS
    - KML
  - GIS Data sharing
    - WCS
    - WFS & WFST
    - KML
  - Metadata (GeoPortal Toolkit)
    - CSW (OGC Core, ISO 19139, ebRIM)
What are we looking at after 10.0

- Improvements on existing OGC implementations
- Web Map Tiled Service (WMTS)
- Web Processing Service (WPS)
ArcGIS Server is open and interoperable – continue

- Other OGC standards implemented in ArcGIS
  - GML
    - Simple Feature GML
    - OS Master Map, Top10NL, NATO, CityGML
  - Metadata
    - ISO 19139

- A complete list
  - http://www.esri.com/software/standards/standards_tables.html#certification
Client support for OGC Web Services

- **ArcGIS Desktop**
  - WMS, WFS, Simple Feature GML, WCS, KML
  - CSW, WMC (Portal Toolbar add-on)
  - WFS, GML with other application schema (Data Interoperability Extension)

- **ArcExplorer**
  - WMS, KML
  - CSW, WMC (custom tasks)

- **ArcGIS Web ADF**
  - WMS

- **Portal Toolkit MapViewer**
  - WMS, WFS, WCS
ArcGIS Server is open and interoperable – continue
OGC Services in ArcGIS Server Architecture

- Implemented as RESTful services over HTTP
- Implemented as capabilities of ArcGIS Server services
  - Map Service
    - WMS, WCS, WFS, KML
  - Image Service
    - WMS, WCS, KML
  - GeoData Service
    - WCS, WFS, KML
- Inherit from ArcGIS Server services
  - Scalability and Durability in distributed environment
  - Performance
  - Security mechanism
WMS in ArcGIS Server

- Serving map/legend images (png, jpeg, etc.), styles and limited feature data

  - Version implemented
    - 1.0.0, 1.1.0, 1.1.1 and 1.3.0

  - WMS interfaces implemented
    - GetCapabilities (service level metadata)
    - GetMap (map images)
    - GetFeatureInfo (limited feature data, no geometry)
    - GetStyles (styles in SLD xml, which are symbologies + filters) – requires ArcGIS Server 10.0
    - GetLegendGraphic (legend images) – requires ArcGIS Server 10.0

  - Highlights
    - Support SLD 1.0
      - Filter encoding and Symbology encoding
      - “SLD” and “SLD_BODY” (demo)
    - GetStyles and GetLegendGraphic
    - TIME (demo)
    - Customize GetFeatureInfo response through XSLT (demo)
    - Security (http basic, digest and token based)
WMS Demo 1 – Map navigation and identify

Map document

ArcGIS Servers

OGC WMS

Internet

GeoExt + OpenLayers

Default XSLT template for GetFeatureInfo response

XSLT template to embed pictures

XSLT template to embed videos

XSLT template to embed JS code
Map Navigation and Identify

WMS DEMO 1
WMS Demo 2 – TIME

ArcGIS Servers

OGC WMS

Internet

ArcMap
WMS DEMO 2
WMS Demo 3 – Styled Layer Descriptors (SLD)

Map document

ArcGIS Servers

OGC WMS

Internet

Push SLD back to server using “SLD_BODY”

GetStyles return SLD for named-style

OpenLayers Client

Publish “named-style” at server side using SLD

XML definition of named-styles

<xml version="1.0" encoding="UTF-8"高于xml:schema-instance http://schemas.opengis.net/vnd1.1/StyleLayerDescriptor.xsd>
<sid:StyleLayerDescriptor version="1.0.0" xmlns="http://www.opengis.net/ogc" xmlns:sid='http://schemas.opengis.net/vnd1.1/StyleLayerDescriptor.xsd" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <sid:layer>
    <sid:NamedLayer>
      <sid:Name><![CDATA[<layer name]]></sid:Name>
      <sid:UserStyle>
        <sid:NamedLayer>
          <![CDATA[pipelines]]></sid:NamedLayer>
          <sid:Style>
            <sid:FeatureTypeStyle>
              <sid:Rule>
                <sid:Symbolizer>
                  <sid:PointSymbolizer>
                    <sid:color><string>blue</string></sid:color>
                    <sid:radius><number>5</number></sid:radius>
                  </sid:PointSymbolizer>
                </sid:Symbolizer>
              </sid:Rule>
            </sid:FeatureTypeStyle>
          </sid:Style>
        </sid:NamedLayer>
      </sid:UserStyle>
    </sid:NamedLayer>
  </sid:layer>
</xml>
Styled Layer Descriptors (SLD)

WMS DEMO 3
WFS Services

- A data service (features)

- “GML over HTTP”

- Features organized in Feature Types
  - equivalent to ArcGIS’ feature classes

- WFS – T (Web Feature Service with transactions)
  - Features can be updated by client
WFS Services

- Implements WFS 1.0 and 1.1

- Uses the Simple Features GML Profile
  - A subset of GML 3.1

- You can publish either a geodatabase or a map
  - enable WFS capabilities

- Clients applications use a URL to access the WFS service

- Works with both versioned and non-versioned geodatabases
  - Personal GDB, File GDB and ArcSDE
  - ArcSDE Geodatabase required for WFS-T
WFS Services – New at ArcGIS 10.0

• Query Layers
  – Layer or stand-alone table that is defined by a SQL query
  – Query layers are read-only, WFS-T is not supported

• Field Alias and field visibility
  – Field Alias can be set in the map document or geodatabase
  – Field Visibility can be set in the map document
  – Map services only

• Supports setting the DefaultMaxFeatures property
  – Set in the configuration file or external capabilities

• WFS-T editing is now supported with versioned and non-versioned data
  – Simple data types
WFS Service – Supported Methods

- GetCapabilities
- DescribeFeatureType
- GetFeature
  - Includes Filter support
- GetFeatureWithLock
- Transaction
  - insert, update, delete
WFS Service – Transactions

- Transactions allow you to publish data so that it can be edited by WFS-T clients

- Uses pessimistic locking of features
  - GetFeatureWithLock

- Requires ArcSDE Geodatabase
  - New at ArcGIS 10.0 WFS-T supports both versioned and non-versioned data
  - All releases before 10.0 requires versioned data
WFS Service – Transactions

- Multiple remote editors
- Stateless
- Satisfied via pooled configurations
  - Doesn’t require a dedicated SOC process per editor
- No ESRI software required on the client
  - Gaia supports WFS-T
WFS –T Workflow with Versioned Data

- Create a child version for WFS editors
- Publish a WFS service based on that version
  - Enable transactions
- WFS editors can now edit the service using WFS transactions
- Periodically reconcile & post the WFS version with its parent version
  - Makes ArcMap edits visible to WFS editors
  - Makes WFS edits visible to ArcMap editors
WFS –T Workflow with Non-Versioned Data

- Publish a WFS service
  - Enable transactions

- WFS editors can now edit the service using WFS transactions

- The edits are being applied directly to the business tables in the geodatabase and will be available to anyone accessing the data source.

- Limitations
  - Non-versioned editing only supports simple features
  - Once the edits have been applied to the GDB they cannot be rolled back.
WFS Service – ArcGIS Clients

• The Data Interoperability Connection can be used to work with WFS services
  – A separate license of the data Interoperability Extension is not required to consume simple features GML (level 0)

• WFS To Feature Class GP tool allows you to import data into a Geodatabase from a WFS Service
  – Independent of the Data Interoperability Extension
Demo 4 – WFS and WFS-T services

ArcMap Editor

Default version

Post

Reconcile

WFS version

ArcSDE Geodatabase

ArcGIS Server

WFS-T service

Internet

Flex Based Web Application

WFS Editors

Edits

Gaia 3 Web Application

WFS Editors

Edits

WFS Editors
Demo 5 – ArcGIS as a WFS Client

• The Data Interoperability Connection

WFS services → Internet → ArcGIS Desktop Data Interop Connection → ArcMap

• WFS to Feature Class Geoprocessing tool

WFS services → Internet → ArcGIS Desktop Geoprocessing tool → Geodatabase Feature Class
WCS in ArcGIS Server (v9.3.1 v10.0)

- Data service, serving out geographic coverage data (not dummy image)
  - Version implemented
    - 1.0.0, 1.1.0, and 1.1.1
  - WMS interfaces implemented
    - GetCapabilities (service level metadata)
    - DescribeCoverage (detailed coverage level metadata)
    - GetCoverage (coverage data)
  - Highlights
    - Supported formats: GeoTiff, NITF, HDF, JPEG, JPEG2000, PNG;
    - TIME (demo)
    - “IMAGE” (ESRI specific parameter to request an individual raster in a raster catalog)
    - Security (http basic, digest and token based)
WCS Demo

- Make WCS Layer
- Hillshade

GP model

OGC WCS

ArcGIS Servers

Raster dataset

ArcMap

Hillshade results
Resources and Links

• ESRI Website
  – White papers
  – Product support matrix
  – OGC Compliance
    http://www.esri.com/standards

• Product Help
  – Metadata support
    http://webhelp.esri.com/arcgisdesktop/9.3/index.cfm?TopicName=Metadata_standards_and_the_ArcGIS_metadata_format
  – Data Interoperability
  – GML Support
Resources

• ESRI Web Site
  – White papers
  – Product Support Matrix
  – OGC Compliancy
  Link: Standards

• OGC Website
  Link: Opengeospatial.org

• Product Help
  – Metadata Support
  Link: Metadata Standards and the ArcGIS Metadata Format
  – Data Interoperability
  Link: Using the data Interoperability Extension
  – GML Support
  Link: GML Support in ArcGIS
Please fill out session surveys

QUESTIONS?