Choosing the right GIS framework for an informed Enterprise Web GIS Solution

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Web GIS and its importance

• Web GIS is the obvious graduation of GIS on a distributed environment through a simple browser

• Enables organizations to share domain-specific rich and dynamic spatial information over the web

• Web GIS finds applications in a wide-range of internet based applications such as environmental sustainability indicators, global population predictions, water sustainability, hazard vulnerabilities, climate and disaster monitoring, education, banking, armed forces etc.

Few examples of CIESIN Web GIS client applications:
http://sedac.ciesin.columbia.edu/mapviewer
Enterprise Web GIS framework

• An enterprise Web GIS framework applies a geographic approach for better decision making by comparison of existing spatial data sets with legacy and other existing sources.

• It is thus extremely important to understand the complexity of the Web GIS components and the various interactions and relationships between them when designing an enterprise solution.

Here below is a broad outline of design considerations:
• Architecture
• System Components
• Factors affecting system components
• Usability improvement
• Application of system
Multi-tier generic Client-server Web GIS Architecture
ESRI’s ArcGIS Server Architecture
GeoServer Architecture

Various Modules of GeoServer (Application/Map Server)

GeoServer Input and Output Formats

Data Server

Application/Map Server

GeoTools

Platform
core platform module

Spring J2E

Data
catalog of data resources

Validation
WFS-T data integrity

Main
servlet and configuration

Web
Web Config Application

WMS
OGC Web Map Service

WFS
OGC Web Feature Service

Application/Map Server
CIESIN’s Enterprise Web GIS Architecture Implementation
Factors affecting Web GIS System Components

Various factors affecting the overall system performance and responsiveness:

• Workflow
• Server performance
• Maintenance and Backward Compatibility
• Scalability
• Interoperability
• Data formats for publishing
• Total Cost of ownership
• Customization
• Network Bandwidth Capabilities
Server Performance:
Response time: Thick v/s Thin Applications
Server Performance:

Heap Memory Use of ArcGIS ADF Application Server

Not supported for this JVM.
Server Performance:
ArcGIS Server SOC v/s CPU Load
Server Performance:
ArcGIS Server Rest v/s WMS service performance

Arcserver REST Service Performance

Arcserver WMS Service Performance
Server Performance:
WMS Service Performance: ArcGIS Server and GeoServer
## Interoperability

<table>
<thead>
<tr>
<th>Service Capabilities</th>
<th>ArcServer 9.3.1</th>
<th>Geoserver 2.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>WCS compliant</td>
<td>Fully compliant to WCS 1.0, 1.1 and 1.1.1</td>
<td>Fully compliant with WCS 1.0 and 1.1</td>
</tr>
<tr>
<td>WFS compliant</td>
<td>Fully compliant to WFS 1.0 and 1.1 (transactions)</td>
<td>Fully compliant to WFS 1.0 and 1.1 (transactions and locking)</td>
</tr>
<tr>
<td>WMS compliant</td>
<td>Fully compliant to WMS 1.1.1 and 1.3</td>
<td>Fully compliant to WMS 1.1.1</td>
</tr>
<tr>
<td>Web map Output</td>
<td>As JPEG, GIF, PNG, PDF, SVG, KML and GeoRSS</td>
<td>As JPEG, GIF, PNG, PDF, SVG, KML and GeoRSS</td>
</tr>
<tr>
<td>Projection on demand</td>
<td>Geometry service enables sophisticated projection operations on applications that do not have the ability to perform such operations independently</td>
<td>On the fly reprojection for WMS and WFS from a pool of hundreds of supported EPSG projections stored in a database</td>
</tr>
<tr>
<td>SLD compliant</td>
<td>Fully compliant to SLD 1.0</td>
<td>Full SLD support, to support map styles</td>
</tr>
<tr>
<td>Filter encoding</td>
<td>Fully compliant to Filter Encoding 1.0 and 1.1</td>
<td>Full Filter support on all data formats in WFS</td>
</tr>
</tbody>
</table>
# Data Publishing Formats

<table>
<thead>
<tr>
<th>Service Data publishing format</th>
<th>ArcServer 9.3.1</th>
<th>Geoserver 2.0</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vector Data</strong></td>
<td>Map document (<em>.mxd) and Map service definition (</em>.msd)</td>
<td>Shapefile - ESRI(tm) Shapefiles (*.shp) and directory of spatial files stored as a datastore</td>
</tr>
<tr>
<td><strong>Raster Data</strong></td>
<td>Raster dataset (from a geo-databases or file on disk), GeoTiff, BIL or layer file referencing a raster dataset or compiled image service definition (containing one or more raster datasets and defined processes)</td>
<td>ArcGrid (coverage format), GeoTiff (Tagged Image File Format with Geographic information), Gtopo30 (coverage format), ImageMosaic (Image mosaicking plugin), WorldImage (raster file with a spatial data file) and Image pyramids</td>
</tr>
<tr>
<td><strong>Spatial database</strong></td>
<td>Database connection file (*.sde), personal and file geo-databases, map document referencing data from a versioned geo-database</td>
<td>PostGIS compliant with OpenGIS Simple Features Interface Standard (SFS), ArcSDE (*.sde), DB2 and Oracle</td>
</tr>
<tr>
<td><strong>Processing Tool</strong></td>
<td>Support for geoprocessing map document with a tool layer or toolbox (*.tbx)</td>
<td>Not supported</td>
</tr>
</tbody>
</table>
Factors affecting usability experience of a Web GIS system

Besides the functional components that affect the hardware and software decisions when designing an enterprise Web GIS solution. There are some important factors that affect the usability experience of a system:

• Thinner services with appropriate symbology
• Cached Layers
• Aggregating and Clustering Large Datasets
CONCLUSION

Thanks

Q & A??????