

Wisconsin's Transportation Data Sharing Using OGC-WFS Service

Final Report

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Collaborating Organizations:

USGS, WI State Cartographer's Office, WI DOT, ESRI, Inc.

Project Narrative

The goal of this project is to model an OGC-WFS compliant data-sharing framework for publishing integrated statewide transportation features on the Web. Toward this goal, we have implemented a WFS server of the road network data of the state of Wisconsin through GeoServer 1.4.0. In our original proposal, ESRI's ArcIMS 9.1 was selected as the software tool, but we later found out this version only supports a read-only WFS, that is, no transactional operations are provided. After examining other alternative software, we determined GeoServer as our server platform. Although GeoServer 1.4.0 supports only GML 2, its full WFS 1.0 support and nice documentation made this project feasible. One benefit GeoServer provides is its Web administration tool, which offers a complete graphical user interface so that users need not ever touch configuration files. This tool is quite intuitive and self explanatory.

Since WFS service returns data in GML format, we have developed a client application to convert GML into a graphical form based on MapBuilder. MapBuilder is a LGPL client-side JavaScript library using AJAX technique. It uses the browser's built-in XSL processor to render GML data to map. Even though the output format of MapBuilder is raster, but the application can still achieve acceptable interactions between server and client. This is due to AJAX. With AJAX, client sends HTTP requests to the server and server returns data by modifying only parts of the web page using JavaScript. Figure 2 shows the layout of our client application. It contains four

visible components, also known as widgets in MapBuilder: MapPane to catch an image via WMS and display it; ButtonBar to include buttons for zooming, reset, drag, transaction; CursorTrack to give the geographic coordinates of the mouse over the map; and Legend to display the list of layers composing the map.

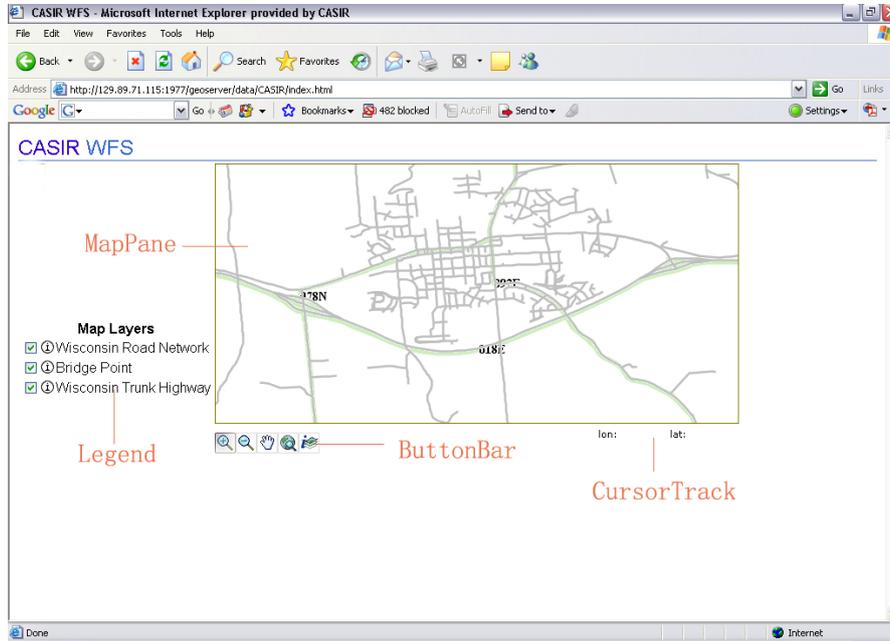


Figure 2 Client Interface

The architecture of our system is shown in figure 1. Different components can reside on different machines as well as on the same machine.

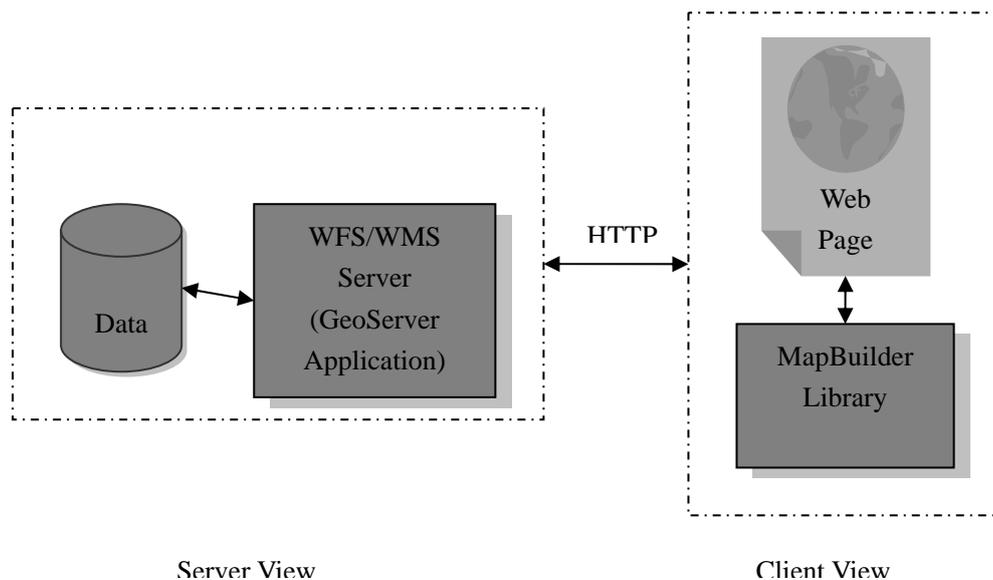


Figure 1 System Architecture

This WFS service currently hosts three data sets, Wisconsin trunk network highway, Wisconsin local road network, and Wisconsin Highway Bridge. All data are provided in the format of shapefile. We tried to match these data to the INCITS standard, which involves extensive data reconstruction to a point beyond our project's capacity. Therefore, a simple database view was constructed that conforms to GML-SF standard.

The following is the URL for the WMS/WFS Service:

WFS URL: <http://gis.sarup.uwm.edu/casir/TestWfsPost.html>

Graphical client URL: <http://gis.sarup.uwm.edu:8080/geoserver/wfst/index.html>

Status of our Data Access Activities

What framework data theme(s) will be accessed under this project?

Transportation

What is the data volume of Framework data anticipated for access?

There are mainly three data sets: Wisconsin state trunk network highway, local road network, and Highway Bridge. Besides two personal Geo-databases with information from WisDOT's Link/Site Linear Reference System are accessible for us. The total size for all data is 2.91GB, while the data we are currently using is about 242MB.

- Feature count:
 - Trunk network highway 18,088
 - Highway Bridge 10,115
 - Local road network 455,013

Who are the primary organizations providing data for this project?

Wisconsin State Cartographer's Office and Wisconsin Department of Transportation

Status of Framework Client Development

What is the status of software development?

Our system uses GeoServer as the WFS server platform and MapBuilder for client development. This client interface is able to facilitate user input and display WFS queries and transaction operations including updating/inserting/deleting features in graphical form.

Describe your experience and purpose in accessing the data services?

The traditional file-based sharing of spatial data is not sufficient for many applications, particularly for those time-critical ones. Besides, on many occasions users are interested in only some part of the dataset, and downloading the whole dataset might cause unnecessary time and storage consumptions. Data sharing at the feature level,

however, can resolve these shortcomings. Data sharing at the feature level can provide users much more flexible and convenient in accessing and manipulating spatial data.

Describe any internal or external users that are using this client.

Currently this client has only been tested internally.

Identify plans for the promotion and distribution of this software.

We plan to make recommendations to an emerging statewide Enterprise GIS initiative led by WisDOT and WI DNR, on requirements for networking of data providers and their metadata for critical framework data themes.

Project management

Will this project's activities continue in the future?

Yes, we want to extend this to develop our concept modal of Geospatial semantic Web.

Describe the next phase in your project.

We will continue working to improve the project. We have another related project about data sharing in a geospatial semantic web framework that is funded by the National Science Foundation. We'll incorporate the result from this project into the geospatial semantic web framework.

Feedback on Cooperative Agreements Program

What are the program strengths and weaknesses?

The program provides initial funding to start the project that otherwise could not be done. The requirement of collaboration among software vendor, data provider and researchers is very helpful. It would be more helpful if the funding level can be increased.

Where does the program make a difference?

The financial and technical support from FGDC definitely made a huge difference to get this project going.

Was the assistance you received sufficient or effective?

Again, the technical support from FGDC and other peer groups is very helpful and sufficient.

What would you recommend doing differently?

Increase the funding level. Have a face to face meeting in the middle of the project.

Are there factors that are missing or need to consider that were missed?

You have done a great job!

Are there program management concerns that need to be addressed? Time frame?

Again, FGDC has been doing a great job in managing the program. It was very helpful to be again to extend the time frame of the project.

If you were to do this again, what would you do differently?

We are very satisfied with the work we have done. The only thing, if anything, is that we wish we worked more closely with the data providers.