Interim Project Report

NSDI CAP 2005

Title: Wisconsin's Transportation Data Sharing using OGC-WFS Service
Agreement number: 05HQAG0119
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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. This project offers foundational content on three fronts: framework content delivery (transportation), technical Web services framework example in transportation theme, and another institutional framework model for coordination and pass-through distribution of statewide framework data services in federally-endorsed standard formats.

Toward this goal, we have implemented an OGC-WFS server of the road network data of the state of Wisconsin through GeoServer 1.3.2. GeoServer is open source software, which offers fully functional OGC WFS and WMS specifications. Besides, GeoServer supports multiple data formats, including shapefile, PostGIS, ArcSDE, etc.

This WFS server responds to Web "POST" requests for transportation features, and returns the data in GML format. MapBuilder is employed to convert GML into graphical representation. 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.

This WFS service currently hosts two data sets, Wisconsin trunk network highway and Wisconsin Highway Bridge. Both of them are in the format of shapefile. The prototype and example of interface of our service are shown in Figure 1 and 2 respectively.

However, we encountered several issues when trying to build graphical interfaces for transactional WFS operations through MapBuilder. We are still making efforts to resolve them. Besides, we also want to experiment this service with SVG output, which can offer a more user-friendly interactive interface for end users.

In the aspect of data, we will add Wisconsin local road network data, which has 455,013 features, and to see what performance MapBuilder rendering capacity can achieve.

Furthermore, we want to build a relational database by including some non-spatial information such as federal function call type code and median codes.

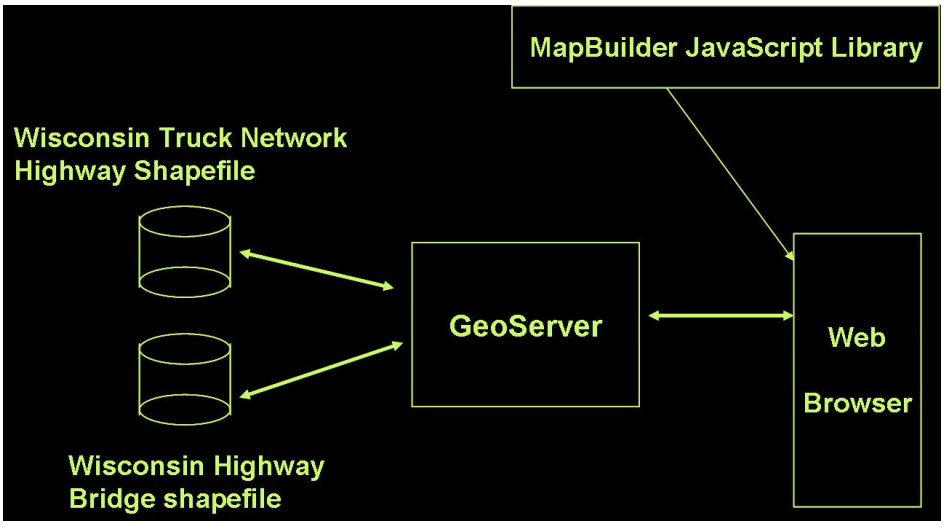

Figure 1 WFS service for Wisconsin Transportation data sharing

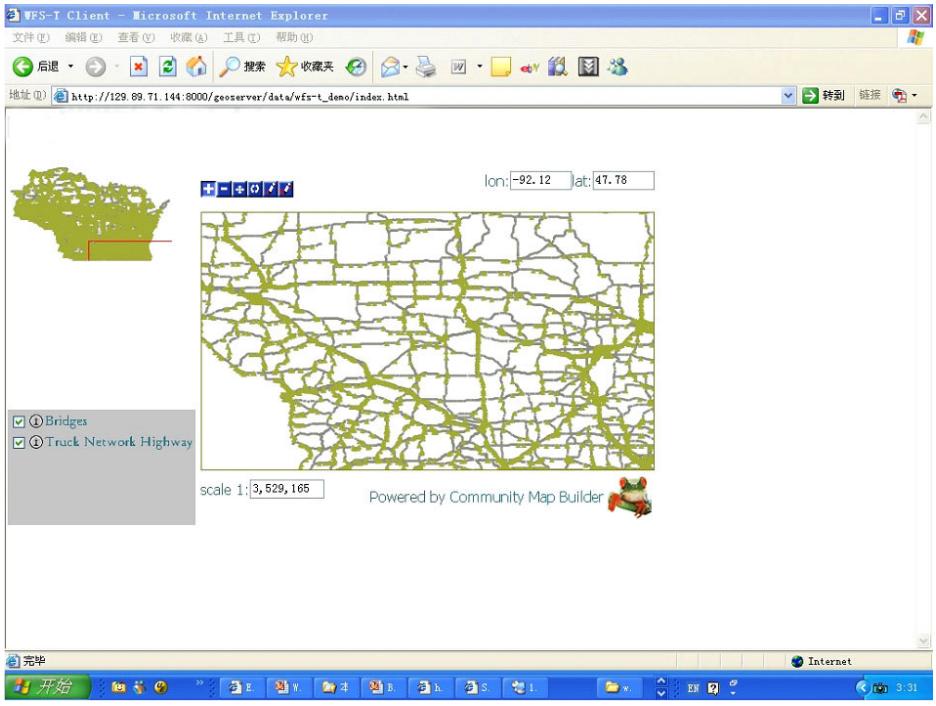

Figure 2 Example of Web interface

Status of your 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 Geodatabses 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.
State trunk network highways has 18088 features at 1:100,000 scale, local road

- 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?
The basic layout of client-side has been developed through MapBuilder JavaScript library, and the graphical interface for transactional WFS operations is underway. On the server side, we are trying to build a relational database in PostGIS format so that complicated queries are feasible.

How will the client software be evaluated and quality-assured?
After the project finishes, extensive tests will be conducted among us and our partners.

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 clien*t.
Currently this client has only been tested internally.

Identify plans for the promotion and distribution of this software.
In the end, we will make recommendations to an emerging statewide Enterprise GIS initiative led by WisDOT, WI DNR, and a soon-to-be-hired Geographic Information Officer 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.
After finishing graphical representation of transactional WFS operations, we would want to research another two aspects: First, we would like to experiment different database support of the Geoserver; second, we would like to extend this client to support SVG output.

Feedback on Cooperative Agreements Program
What are the program strengths and weaknesses?
Where does the program make a difference?
Was the assistance you received sufficient or effective?
What would you recommend doing differently?
Are there factors that are missing or need to consider that were missed?
Are there program management concerns that need to be addressed? Time frame?
If you were to do this again, what would you do differently?