

North Dakota Water Resource Information Management System

ND State Water Commission
Christopher D. Bader

Mission

To improve the quality of life and strengthen the economy of North Dakota by managing the water resources of the state for the benefit of its people.

Data Collection Efforts

- Early efforts coordinated as a cooperative effort with the USGS in the late 1940's to provide regional reconnaissance of North Dakota's ground-water resources
- In 1961, Water Commission assumed full control of regional assessment program, which was completed in 1985.
- In the 1970's and 1980's, the Water Commission completed between 80,000 and 100,000 feet of drilling annually.
- Data collection includes site information, subsurface information, water levels, and water chemistry.

Data Resources

Water Resource Management System
includes . . .

- more than 31,000 sites consisting of test holes, observation wells, domestic wells, and surface water gaging stations.
- subsurface (lithologic) information for more than 20,000 of these sites.
- more than 2,000,000 water level records.
- more than 54,000 chemistry analyses.

Data Management

Current water resource management infrastructure was originally driven by simple data management requirements.

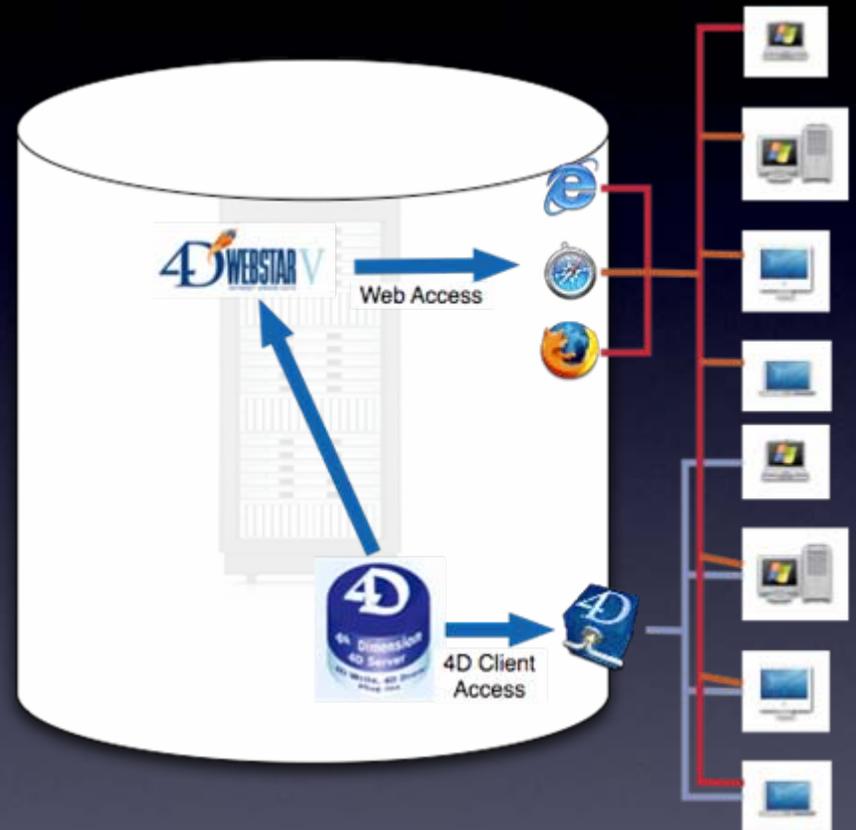
The initial core components of this system were developed around 4D's client-server architecture.



Web Services

In order to expand the system to accommodate needs of external users, the core data management infrastructure was expanded to provide standard web services with access to the tabular or aspatial data.

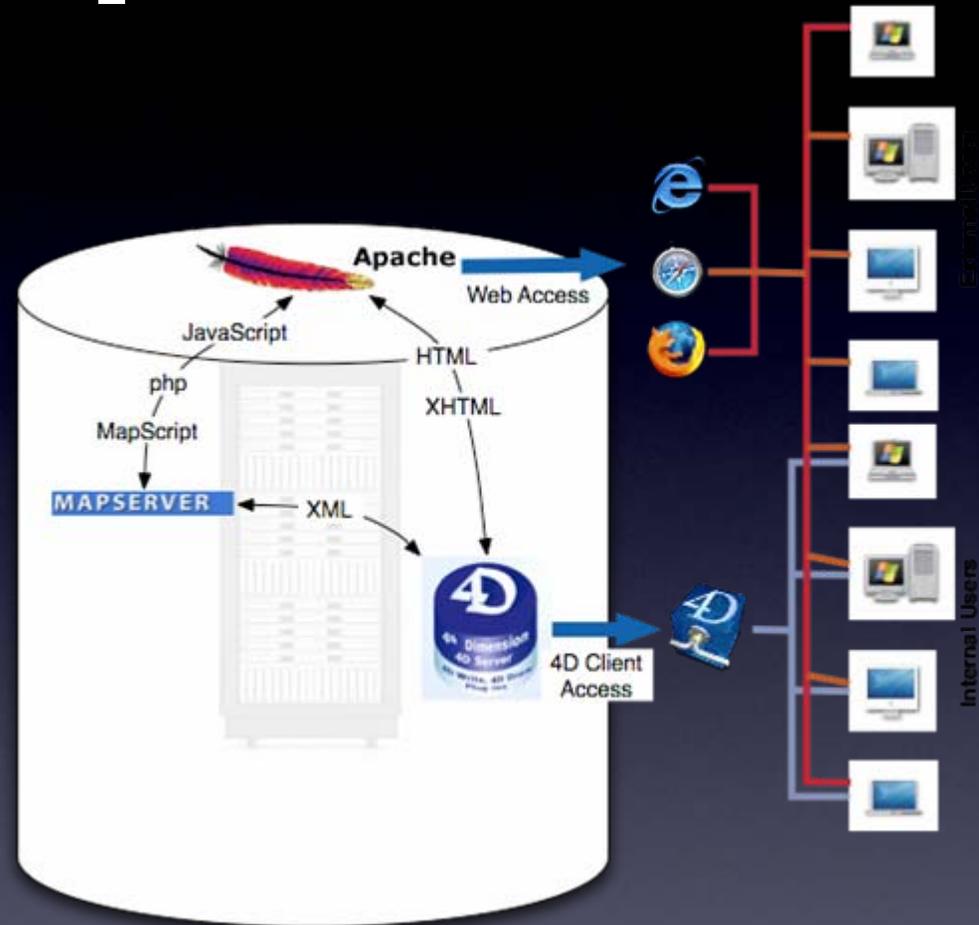
The 4D infrastructure was extended to provide external services through 4D WebStar.



Internet Map Services

In response to the demand for easier access to the water resource management infrastructure from both internal and external users, the application base was expanded to include Internet Map Services.

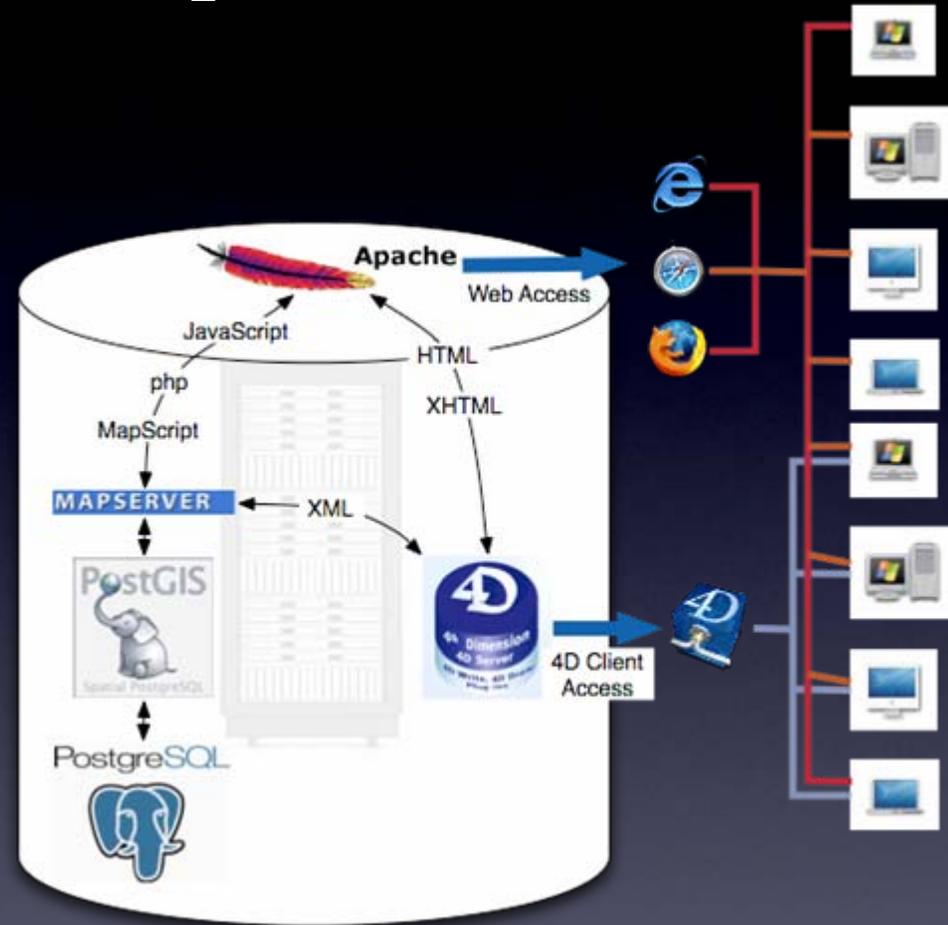
Internet Map Services were developed using open source solutions surrounding Mapserver.



Spatial Delivery Services

The initial implementation of Mapserver made use of static shape files for the spatial component of the water resource data. This approach created a fairly static environment which required routine manual updates of the underlying shape file library.

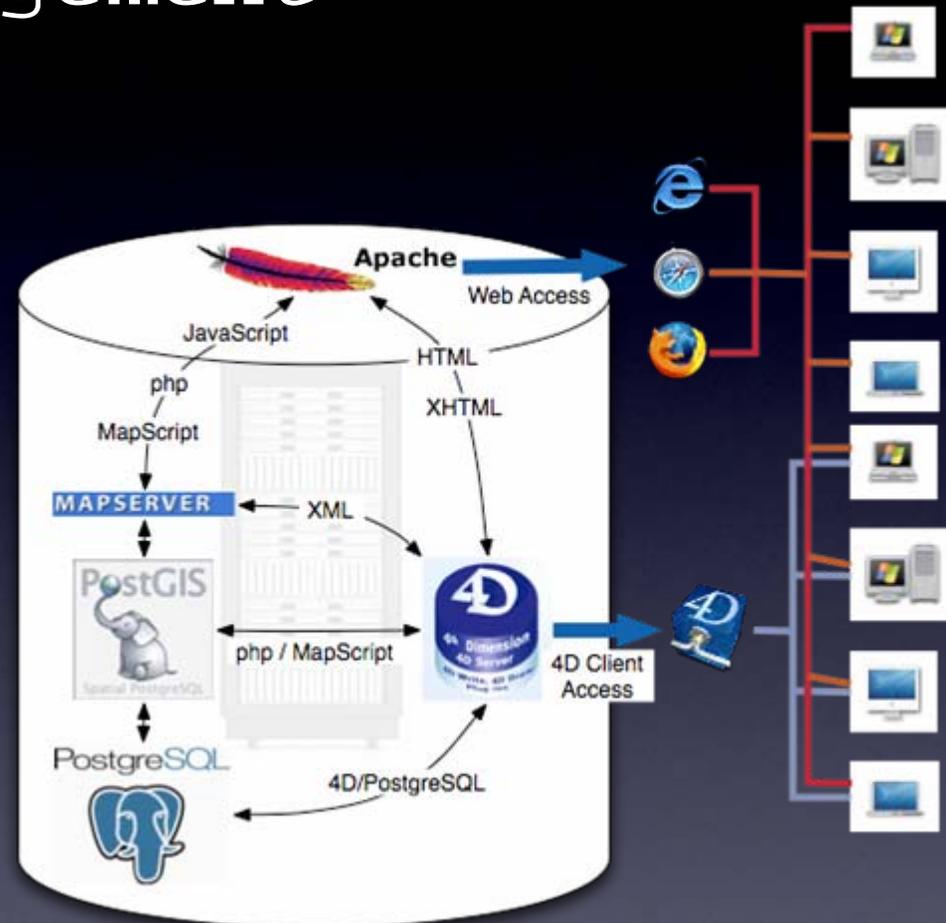
As a result, PostGIS / PostgreSQL has been implemented under the Mapserver infrastructure.



Integrated Spatial Data Management

The spatial data management maintained in PostGIS / PostgreSQL and the traditional data management functions have been integrated to provide a seamless data management solution for both spatial and aspatial data components.

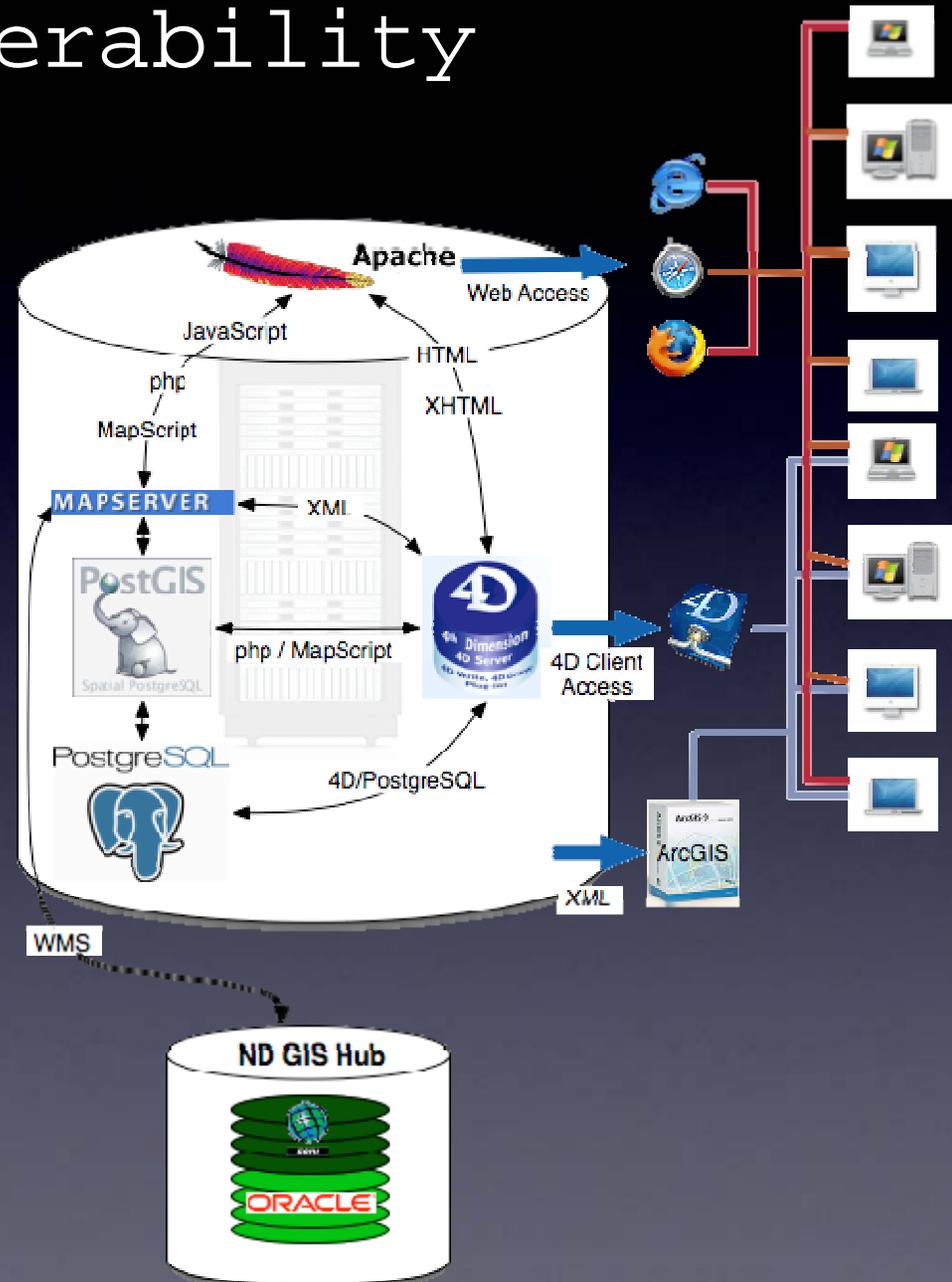
As a result, the web services access live data and no updating is required to maintain web based mapping services.



Interoperability

The Internet map services have also been extended using open standards (i.e. WMS and WFS) to include remote data resources from the ND GIS Hub and other remote data repositories.

In addition, ESRI's data interoperability extension provides an avenue for internal ArcGIS users to access the infrastructure.



ND Water Commission Web Mapping Services

The screenshot displays a web browser window with the URL <http://mapservice.swc.state.nd.us/index.html>. The browser's address bar and search bar are visible at the top. The main content area shows a map of North Dakota, with neighboring states Saskatchewan, Manitoba, Montana, Minnesota, and South Dakota labeled. The map is overlaid with a grid of townships, each labeled with its name (e.g., DIVINE, BURKE, BEYVILLE, BOLETTE, CAVALIER, PENDER, WILLIAMS, MONTICELLO, WARD, MCJINNEY, PIERCE, KANSKY, WELLS, MCKENZIE, MCLEAN, WENDON, WELLS, EDDY, NELSON, GRANDFORK, DONN, MERCER, BURLEIGH, EDINA, RUTHEAN, BARNES, CASS, BILDING, WALKER, OLIVER, SULLY, EDINA, RUTHEAN, BARNES, CASS, SLOPE, BETTINGER, GRANT, EDWARDS, LOGAN, LANGRISH, SANDER, MICHIGAN, BOWMAN, ADAMS, BOON, MCDONOUGH, DECKY, MARGENT). The map is overlaid with a grid of townships, each labeled with its name. The map is overlaid with a grid of townships, each labeled with its name. The map is overlaid with a grid of townships, each labeled with its name.

The interface includes a sidebar on the right with a legend and a toolbar on the left. The legend is titled "Active Layer: Townships" and lists various data layers with corresponding symbols:

- Raster Images
- Precipitation
- SWC Water Data
 - Glacial Drift Aquifers
 - Permits
 - Precipitation Sites
 - Drillers Logs
 - Ground/Surface Water Sites
 - Surface Water Sample
 - Domestic Well
 - Composite QW Sample
 - Gaging Station
 - Industrial Well
 - Industrial Well - Plugged
 - Irrigation Well
 - Irrigation Pilot Well
 - Irrigation Well - Plugged
 - Stock Well
 - Rural Water Well
 - Municipal Well
 - Municipal Well - Plugged
 - Observation Well
 - Observation Well - Plugged
 - Observation Well - Recorder
 - Observation Well - Destroyed
 - Production Well
 - Production Well - Plugged
 - Staff Gauge
 - Test Hole
 - Multi-Port Sampler
 - Dams
 - Drains
 - Dikes
 - Diversion Structures
 - Dugouts
- Hydrography
- Political Boundaries
- Transportation

The bottom of the page features the North Dakota State Water Commission logo and contact information: 900 East Boulevard Ave. • Bismarck, ND • 58505-0850 • 701-328-2750. There is also a "Tested Revision" link.

<http://mapservice.swc.state.nd.us/>