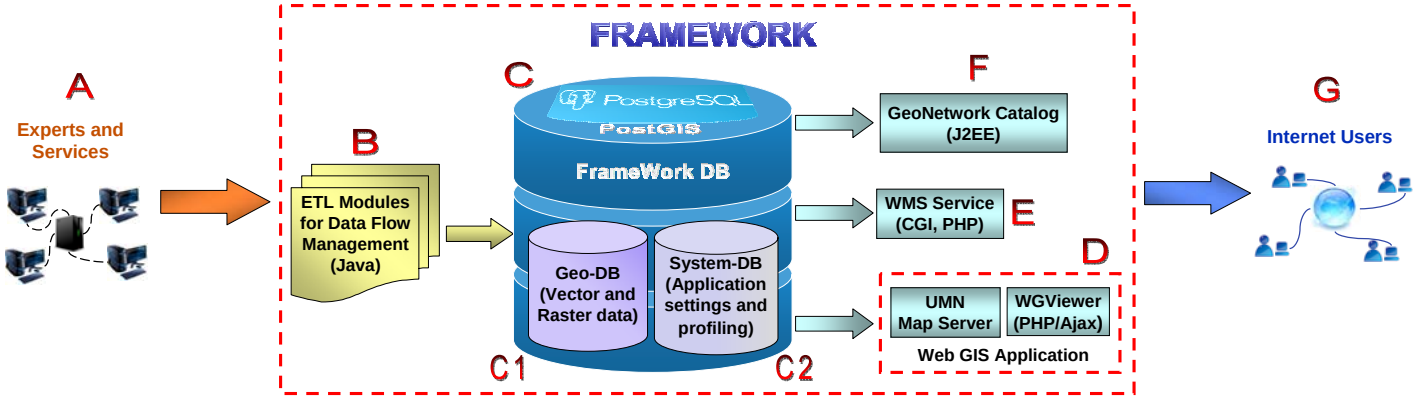
AN OPEN SOURCE GENERAL PURPOSE FRAMEWORK FOR IMPLEMENTING WEBGIS APPLICATIONS

Leandro ROCCHI, Tiziana DE FILIPPIS, Ramona MAGNO
Institute of Biometeorology - National Research Council (IBIMET-CNR), l.rocchi@ibimet.cnr.it, +39 055 3033721
Via G. Caproni 8, 50145 - Florence (Italy)

1. INTRODUCTION

In the last years the increasing needs of geographical information for environmental analysis and monitoring purposes have encouraged the development of web-oriented GIS architectures.
In this paper we present the implementation of a *general purpose framework* devoted to support the research activities through WebGIS applications finalized to share results with scientific community, decision-makers and/or other stakeholders.
The architecture proposed as well as the user interface have been implemented using open source tools in order to guarantee the web application sustainability and the implementation of customized geospatial functions required by different research projects.
The framework is composed by a WebGIS application (WGViewer) developed using PHP/Ajax technologies and based on KaMap (0.2) project. The GUI with analysis and querying functions are completely customizable using a system database through which the application is able to work with many different profiles and datasets. The PHP application is able to access and manage spatial data through MapServer library and its php_mapscript wrapper.
The framework can manage different WebGIS applications at the same time and can access to specific Geo Databases; datasets can be composed by georeferenced files or stored into a PostgreSQL/PostGIS DBMS.
The main services include a WMS and a metadata catalogue, a J2EE application based on GeoNetwork project.
The Kyoto Observatory geoportal of Tuscany Regional Government is one of research project where the web application has been developed and implemented to monitor the response of ecosystems carbon sequestration to the inter-annual climate variations, implementing specific queries and grid-based extraction functions.



2. MAIN GOALS

- Supplying an integrated and user-friendly solution for building customized Geo Portals.
- Creating a single framework for several projects with different customized web-sites and services.
- Managing data flows coming from different sources.
- Implementing customized procedures and functions customized for specific profiles or general final users.
- Providing Open Source components to Public Administrations for scalable and affordable solutions.
- Organizing a modular structure for an easy implementation of new functions.

3. FRAMEWORK COMPONENTS

A. Experts or research project members can upload new data into the FrameWork DB through customized client software or automatic services.
B. Extraction Transform Load (ETL) modules have been developed using Java language in order to manage input data flows coming from different users or services. These modules follow projects specific requirements for managing data.
C. FrameWork DB is based on PostgreSQL and PostGIS engines. It represents the most important element of the whole FrameWork and it is composed by:
   C1. One or more Geo Databases containing vector and raster data of every project managed by the FrameWork.
   C2. A System DB containing profile rules, WebGIS application settings and system behaviors.
D. WGViewer is a PHP/Ajax WebGIS application that supplies standard GIS and Analysis functions. Thanks to System DB, it is able to change his look and behaviors. All GIS operations are performed using the php_mapscript that is the UMN MapServer wrapper for PHP Web applications.
E. Web Map Service (WMS) is included in the FrameWork in order to disseminate stored layers with its codified standards.
F. Metadata information are stored into a PostgeSQL DB with the ISO 19115 specifications and managed by a front-end, based on the GeoNetwork J2EE application.
G. Common users and decision makers can view and perform queries and analysis on data collected.

4. STUDY CASE

The Kyoto Observatory geoportal of Tuscany Regional Government is one of the scientific projects where this framework has been used to store, visualize and integrate datasets of CO_2 sinks and sources at different spatial and time scales, in order to provide decision makers and local administrations with an operational instrument useful for focused action plans and control of the effectiveness of policy performed.

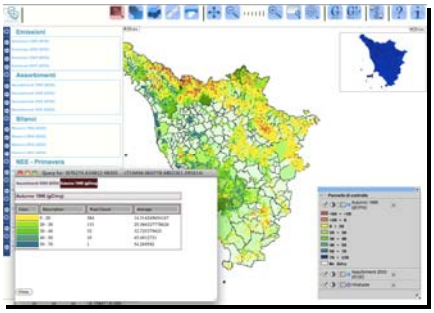


Figure 1 - Kyoto Observatory geoportal.

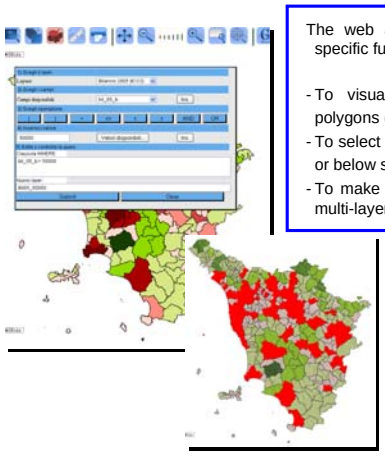


Figure 2 - Advanced query functions on vector layers.

The web application has been implemented with specific functions that allow:

- To visualize tabular output of some selected polygons (Fig. 1);
- To select municipalities with CO_2 sink/source above or below set thresholds (Fig.2);
- To make grid-based queries extractions and basic multi-layer algebra elaborations (Fig. 3).

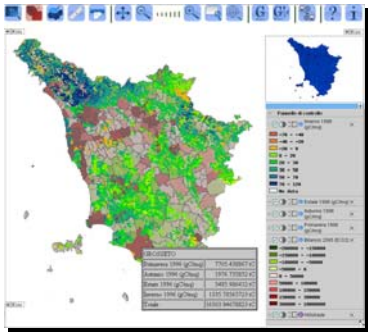


Figure 3 - Grid-based analysis.

5. FUTURE PERSPECTIVES

- Development of an integrated graphic interface for administration of all framework components.
- Implementation of a Graphical User Interface (GUI) to facilitate data management.
- Development of customized and sophisticated spatial analysis tools.
- Integration between metadata catalogue and WGViewer user interfaces.
- Mobile device version of WGViewer for supporting experts and decision makers everywhere.

Geoportal link: ***http://149.139.16.20/ka-map/epoint/map.php?form=WGVIEWER&gen=dynamic&country=wg***