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Map Server of the Slovak Environmental Agency

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Abstract

Slovak Environmental Agency (SEA) is a governmental organization of the Slovak Ministry of the Environment, responsible for administration of the Environmental Information System of the Slovak Republic. Main goal of the Information system is to share environmental information between public administration bodies, governmental organizations, scientific institutions and citizens. Internet Map Server is a part of the Information system for serving spatial environmental data to the public. The paper deals with technological solution of the SEA's Internet Map server including data collection, data processing and data presentation. Used technology consists of Oracle™ database, ArcSDE™ application server, ArcIMS™ map server, ArcGIS™ clients and database thin clients based on Datasnap™ (Delphi7) three tier architecture. SEA's mapserver presenting environmental information in Slovakia is available on: www.sazp.sk/mapserver

1. Environmental Data Collection and Building of Database Warehouse

The main goal of the Environmental Information System of the Slovak Republic is to share environmental information between public administration bodies, governmental organizations, scientific institutions and citizens. The backbone of the Information system is a Database Warehouse (DW). Slovak Environmental Agency is responsible for building DW of environmental datasets produced by governmental organizations within the Ministry of the Environment. There are a lot of environmental datasets such as surface or underground water, air, waste, landscape, protected areas etc. which are represented as attribute or geographical (spatial) data. Because of this, it is necessary to provide technology of data collection, data processing, data updating for both – attribute and geographical data (Figure 1).

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Administration of Attribute Data (databases).

Slovak Environmental Agency uses mainly distributed n-tier information systems based on Delphi and its revolutionary DataSnap (before Inprise's Multi-tier Distributed Application Services (MIDAS™) and IntraWeb™ technology. DataSnap is a proprietary Borland technology that enables data (in packets) to be sent across a medium over a distributed network or a file system. IntraWeb is a component-based Web development framework written in Delphi by AtoZed Software.

Administration of Geographical Data.

Data Warehouse for geographical datasets is built upon ESRI three tier architecture. ArcSDE application server allows ArcGIS clients to work with the geographical data stored in the Oracle Database. Geographical Data Warehouse contains basic topographical maps as well as environmental geodatabases. Almost all ArcGIS components are used for updating of geographical data. SEA's branch offices are equipped with ArcView™ or ArcInfo™ and they can use remote connect to central Data Warehouse. Access and permissions are treated by ArcSDE application server according to role of the client.

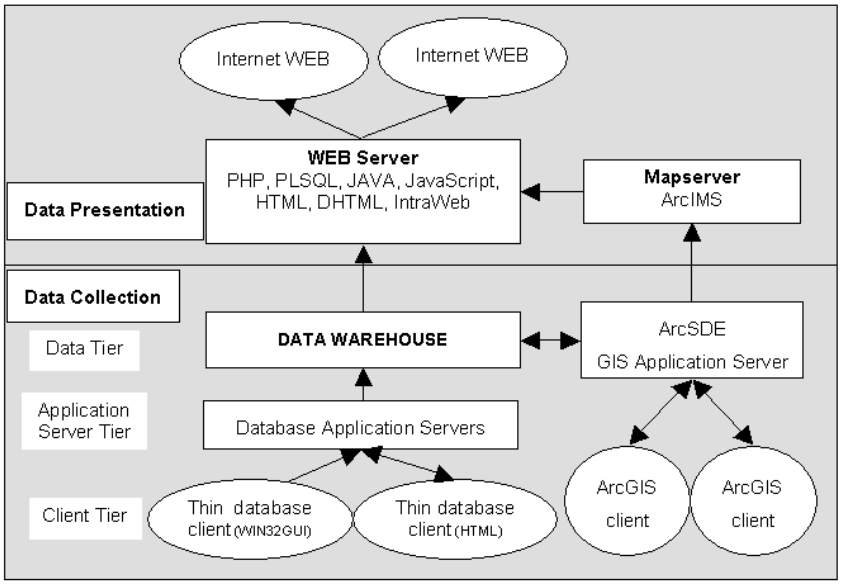

Figure 1
General Data Flow architecture applied for Environmental Information System.

2. MapServer as a Tool for Environmental Data Presentation

SEA operates mapserver from 2002. SEA's mapserver is based on ESRI ArcIMS technology. The source of geographical datasets is Data Warehouse administered by ArcSDE & Oracle. There are about 12 online web applications presenting different environmental topics at present. Some of these applications are based on functionality of standard ArcIMS HTML viewer, which is part of ArcIMS installation packet.

Because of heterogeneous requirements for web presentation of different environmental topics, it was necessary to start developing different types of web viewers. In fact, almost each of the online application is unique viewer. Most of them are based on IMS – PHP connector technology. Some of the applications allow users to analyze maps using set of GIS tools (including buffer, graphic or attribute query). Other types of applications are catalogues (e.g. Catalogue of Protected Areas in Slovakia, Catalogue of Protected Trees in Slovakia). Within the catalogue, users can browse database by specific criteria and maps are generated just as a part of the final output. In this case, there are two requests processed at the same time. One request is sent to the database running on database server and the other one is sent to the mapservice running on the mapserver. The results from both servers are combined and provide complete catalogue information about the selected object (Figure 2).

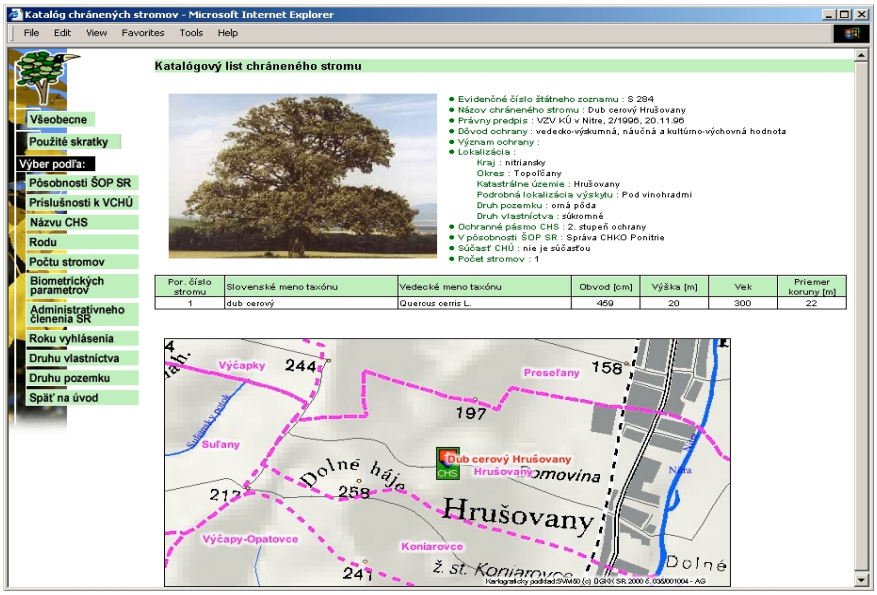

Figure 2
Catalogue of the Protected Trees in Slovakia

3. Summary

Slovak Environmental Agency utilizes mapserver technology for online publishing of environmental information through internet. Most of the environmental datasets are related to some landscape features e.g. administrative units or water bodies. According to our experiences, combination of mapservices and database application significantly improves information value of presented data. Mapserver of the Slovak Environmental Agency is available on the address: www.sazp.sk/mapserver.

Here is just a brief list of interesting applications located on SEA's mapserver:

- Catalogue of the Protected Trees in Slovakia
- State Archive of the Protected Areas in Slovakia
- Landscape Atlas of Slovakia
- Surface Water Quality in Slovakia
- Soil Monitoring System in Slovakia
- Waste Management in Slovakia
- NATURA 2000 areas in Slovakia (figure 3)

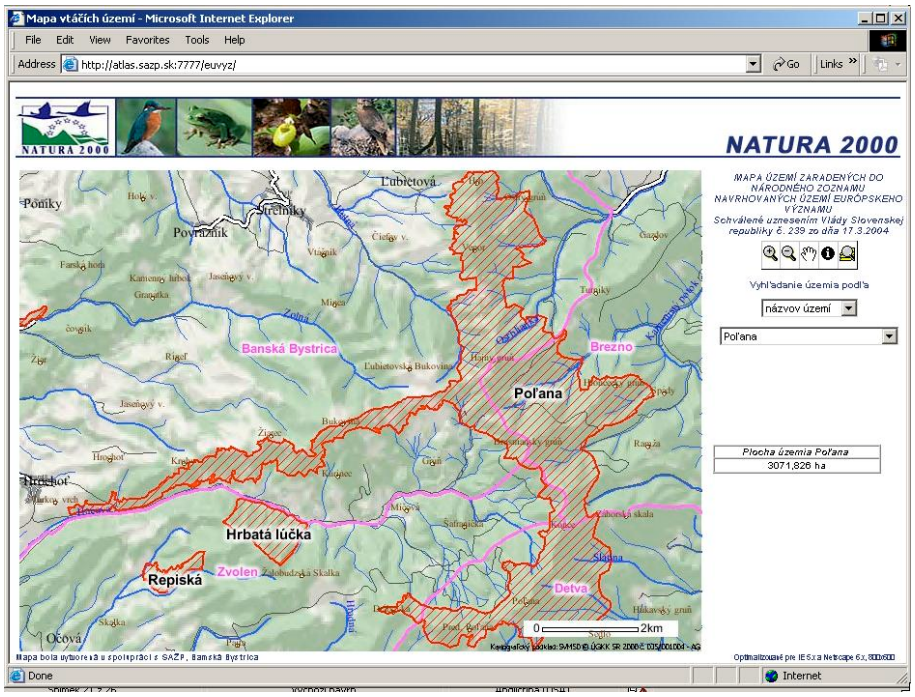

Figure 3