GIS Based Web Services

SLUSI has created digital spatial data base on watersheds, soil and land information to hoist GIS based Web services for which necessary infrastructure for Information Communication Technology (ICT) has been created in the organization. This set up will function as a Mirror Server for day to day updating of spatial data base which is hooked with National Server commissioned at National Informatics Centre, New Delhi. The development of digital spatial data base of SLUSI is aimed at GIS applications under G2G domain for online planning besides exchange and sharing of spatial data base with other government departments.

The data base is robust enough to develop various application models such as Sediment Index Model (SYI) for watershed prioritization, Agro-economic Zoning (AEZ), Eco-hazard Zoning (EHZ) for greening of upper reaches, Land Use Suitability (LUT) for scientific land use planning, Employment Generation Potential through watershed development programme for livelihood security, Suggestive soil and water conservation planning, besides development of various kinds of Information Systems and Decision Support Systems for strategic planning, implementation, monitoring, impact evaluation and accountability of any land based development programme.

Web Services are programs that run on a web server, but their results are fed back to a calling program elsewhere on the Internet. Web Services are only of interest to application developers. Application developers that use web services are well acquainted with terms like "consume", "WSDL", "SOAP", "interfaced object", and "RPC".

Basically, GIS Web Services are self-contained, modular components and applications that can be published and accessed over the Web. They typically perform a specific GIS function that can be integrated as part of a larger application. Provision of such GIS Web Services in GIS Technology should let developers quickly integrate functionality into their applications without having to build or host the functionality locally, often resulting in significant savings of time money and disk space (Anon 2004).

Out-of-the-box web services from ESRI products may not meet all of needs of SLUSI hence these will be developed, during the course of deployment. Using these web services interfaces will allow all GIS applications to consume data and services for their own purposes. A program that wishes to use in this manner merely needs to be connected to the Internet to receive results. The web services interfaces may have many methods.
Spatial Data Infrastructure – Prime Vs Staging Server for SLUSI

Approach and Methodology

The web-based services in INTERNET GIS environment is protected through password and other network security mechanism such as firewall in NICNET domain for G2G users. The various components of Web-based GIS Services are shown below.
These web-based GIS services will be hosted at NIC on appropriate Enterprise GIS server with a Staging Server at SLUSI. The role of Staging Server is to provide Spatial Data update services (which is the responsibility of SLUSI) and facilitate disaster recovery in case of emergency situation. There will be no on-line update facility on Central Enterprise GIS Server.

**Expected benefit of Web Services:**

- Searching for site specific locations
- Displaying and viewing multiple data sets
- Conducting queries for specialized analysis
- Performing data commerce
- Retrieving specialized data services

The other technical advantages of Spatial Data Infrastructure using Enterprise GIS Web-Server Technology are as follows:

- Follows Global Internet/Web standards
- The client code by standard Web browser, GIS Viewer, Desktop GIS and GIS Server itself
- Provide Interoperable solutions and services
- Significant GIS functionality can reside on the server
- Large GIS databases can be accessed on the server in a distributed environment
- Optimal bandwidth requirements
- Performance per request is predictable
- Cost of Ownership
- Centralizes administration of data and GIS application software and User support minimal

Web-Services are supposed to be the front end for registered users. However, the project envisages following back end services:

- Digital Spatial Data Design and Organization
- All operational services such as scanning & digitization, cleaning, building of topology, editing, mosaicing and integration of data around national framework with accurate and appropriate geo-referencing.
- Ensure Spatial Data Quality Control (QC) Processes during GIS Data Development with the help of Domain Expert/Content Provider from SLUSI.

**Training**

In order to make all services operational, SLUSI will provide various data sets generated through different kinds of soil survey and land resource mapping covering watershed prioritization, soil and land degradation to NIC. In addition SLUSI will provide and associated Domain Expertise and Knowledge on the following aspects.

- Design & Specification Document for Feature Definition & Coding for each layer of information,
Design & Specification Documents for Digitization, including the creation of metadata at Digital Data Creation Stage,

Services for Quality Check (QC) of Digital Data provided by NIC, before final integration in GIS,

Requirements for GIS Analysis (in terms decision-rules & criteria) and Data Integration,

User Access & Dissemination Requirements through customized query based web enabled information services, and

Training in Domain Knowledge (viz. Soil Resource Data Interpretation using Satellite Data, Watershed Management etc.) to NIC GIS and ICT Professionals.

GIS Services on the Internet

GIS Web services can be accessed from any Web-enabled application. This includes desktop applications, such as those built with Map Objects or ArcGIS components, as well as Web applications, commonly built with Java or ASP or ASP.NET. If the application can connect to the Web, a developer can integrate GIS Web Services from ESRI.

Enabling Spatial Web Technology

GIS Web Services are deployed through standard Web Protocols including Hyper Text Transfer Protocol (HTTP) and Extensible Markup Language (XML). The XML-based Simple Object Access Protocol (SOAP) to communicate, and therefore, they are compatible with the majority of Web Services frameworks available today such as Microsoft’s .NET.