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GEOEYE

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***Abstract*— The Geoeye web services provide a new efficient solution to assemble the GIS functions into a variety of applications. This paper presents the system architecture design for web service based GIS. The GIS web services are designed to provide the hosted spatial data and GIS functionality for the different customized application systems to perform basic Geo-processing tasks, such as address matching, map image display, and routing. It also supports the complex rendering, navigation and allows working with multiple layers, thematic maps, hyper linked features and attribute data. It has an important application prospect in the urban development.**

Index Terms— **Geolocation, urban development, Postgres, Web Service,**

I. INTRODUCTION

The Geoeye project is self-contained, self-describing, modular application that can be published, located, and dynamically invoked across the web [1].It is an indispensable tool for analyzing and managing spatial data. Basically Geoeye is used to provide user with spatial information. In the case of the traditional GIS these type of information was within an organization or group of organization. Thus the information provided by GIS was restricted within a boundary. While the traditional GIS software development method would be very difficult to meet the needs for all the subsystems of Transportation Systems with single GIS platform, the GIS web service technologies have provided a new efficient solution for all those ITS application systems.

The Geoeye web services are the software components that can provide the hosted spatial data and GIS functionalities that can be accessed and integrated to the different practical customized urban development applications. Developers can apply the Geoeye web services to perform geographical information processing and return the results to the customized applications without maintaining the basic geographical data. The web service technology is a very promising architecture for practical implementation of the Web-GIS based urban development application system.

It will also have a spatial reference to actual site of work. Web client will allow its users to search for projects and refer on map the site of work. All project related documents can be tagged against the project and project work status can be updated very easily through this application. It will also allow generating project specific reports.

Using Geoeye mobile client application user can easily get the current location and the progressive report of particular project in a time and it will give the visual representation of images which is related to the project using these application management can make their decisions. This tool can help conduct surveillance, monitor people and situations on the ground, respond to emergencies. Implementing these applications in one municipality can be expensive, particularly in today's climate of scarce funding. As a result, many communities look for ways to share data easily and quickly across regional borders. Geoeye supports this data-sharing model by collecting imagery over wide areas as quickly as possible. Additionally, our product-licensing systems facilitate information-sharing among regional's. The objective of the proposal is to strengthen the functioning of Audit Status Monitoring and make them effective and better. The entire scope has been classified into five streams knows as Coordinator Level, management Level, Auditor Level, User Level and State Web Coordinator Level.

II. LITERATURE SURVEY

Web Services are the software components that are well defined, self-contained, and does not depend on the context or state of other services. Web services essentially use XML to create a robust connection. Web Services Technologies include the WSDL (Web Services Description Language) for service description, UDDI (Universal Description, Discovery and Integration) for service discovery, SOAP (Simple Object Access Protocol) for passing XML-encoded data. The web services use SOAP, WSDL, UDDI, and WSIL (Web Services Inspection Language) to communicate. Web services are published on the UDDI registry. A WSDL document defines the target service so the client knows what the service does. SOAP standardizes the way a Web service communicates with a client and allows programs written in different languages and on different platforms to communicate.

PostgreSQL, often simply Postgres, is an object-relational database management system (ORDBMS) available platforms including Linux, FreeBSD, Solaris, Microsoft Windows and Mac OS X. PostgreSQL is developed by the PostgreSQL Global Development Group, consisting of a handful of volunteers employed and supervised by companies such as Red Hat and Enterprise DB [2, 4]. It implements the majority of the SQL : 2008 standard, is ACID-compliant, is fully transactional (including all DDL statements), has extensible data types, operators, index methods, functions, aggregates, procedural languages, and has a large number of extensions written by third parties. The vast majority of Linux distributions have PostgreSQL available in supplied packages. Mac OS X, starting with Lion, has PostgreSQL server as its standard default database in the server edition, and PostgreSQL client tools in the desktop edition. PhoneGap is an HTML5 app platform that allows you to author native applications with web technologies and get access to APIs

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and app stores. PhoneGap leverages web technologies developers already know best... HTML5 and JavaScript. The geolocation object provides access to the device's GPS sensor. Geolocation provides location information for the device, such as latitude and longitude. Common sources of location information include Global Positioning System (GPS) and location inferred from network signals such as IP address, RFID, WiFi and Bluetooth MAC addresses, and GSM/CDMA cell IDs.

Geolocation API is based on the W3C Geolocation API Specification. Some devices (Android, BlackBerry, Bada, Windows Phone 7 and webOS, to be specific) already provide an implementation of this spec. For those devices, the built-in support is used instead of replacing it with Cordova's implementation. For devices that don't have geolocation support, the Cordova implementation adheres to the W3C specification.HTML 5 adds a lot of new features to the HTML specification. And what's even better, there is already some limited browser support for these new features. If there is a feature you're interested in, watch the WHATWG Wiki Implementations page for information on browsers that support various parts of the specification. JQuery Mobile, a user interface (UI) framework, lets you write a functional mobile web application without writing a single line of JavaScript code. In this article, learn about the features of this framework, including the basic pages, navigation toolbars, form controls, and transition effects The Open Geospatial Consortium, Inc. (OGC) is a non-profit, international, voluntary consensus standards organization. OGC is an international industry consortium of more than 220 companies, government agencies and universities. In order to allow interoperability between server and client software from multiple vendors, the request and response must be standardized. By focusing standardization on the interface, the software developers, data custodians, and processing-service providers can work to their particular software components, while connecting with other systems for complementary services. Open GIS Consortium is developing specifications to standardize the message interfaces.

Geography Markup Language (GML): XML components for encoding geographic objects for transport.

The OGC WMS specification offers a standard client-server interaction protocol that each map server implement as a common interface for accepting requests and returning responses. GetCapabilities function provides the client with a map server's service metadata, specifying its capabilities. The GetMap function specifies map request parameters that enable the client to request an image map. Finally, the GetFeatureInfo function allows the client to request more information about features at a specific location in the map.

The GeoEye application system is to provide a web GIS environment by the dynamic integrating GIS service components of vector and raster maps to with geo-reference data and information. It supports the complex rendering, navigation and allows working with multiple layers, thematic maps, hyper linked features and attribute data. The fundamental GIS platform is based on the web service oriented architecture. The map features are stored on a database . The GIS data interface supports the ArcView shape files and MapInfo MIF files. The server side is constructed based on J2EE architecture. The GIS web services are used by a number of application systems, which include the intelligent transportation control systems, the video supervisory systems, the electronic police systems, the alarm systems, vehicle movement management systems, the street intersection control systems and the mass transportation systems. A customized ITS application system, which need the geo-reference data and information, can be viewed directly in a graphical web browser or other pictorial software. The ITS application system can integrated the GIS client and web map service by Hypertext Transfer Protocol.

UDDI is an open standard with broad industry support standard. When an implemented GIS Web Service exposed in any Web Services portal, it can be discovered in any Web Services portal. Once a GIS Web Service is discovered, the developer can begin using it immediately. All they need is the full URL path to the services WSDL. Each method, parameter, property, and return value of the service is described in a standard way, allowing modern development tools to immediately allow access to the exposed functionality.

Web Services embed its complex data processing within itself in server side. Client side application developer make use of Web Services through standard interface which described in Web Services WSDL, therefore the application developer don't need dealing with Web Services internal process.

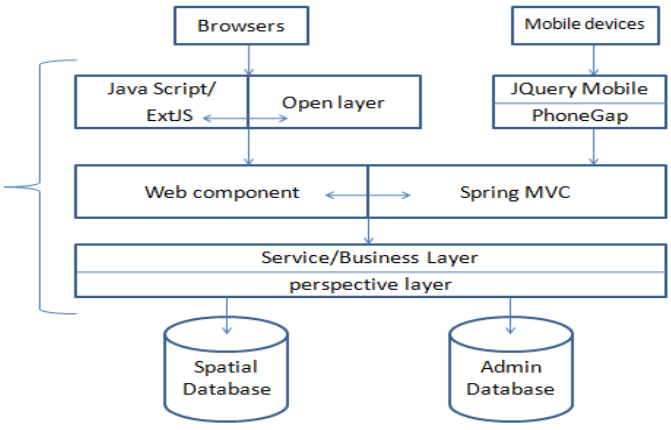

Fig. 1 System Architecture.

III. SYSTEM DESIGN

The Geoeye web service architecture for application system is illustrated in Figure 2. The following functions are considered in the design for the service oriented distributed Geoeye platform. Web Geoeye platform should provide a variety of interfaces for integration and interoperability with customized urban development application system. Web services: Geoeye platform should support the standard enterprise application server technologies to build web

services with embedded spatial services, software components and APIs to easily embed spatial capabilities in customized urban development application system built using standard technologies and architectures. Web Mapping Services (WMS): WMS can display map layers for all the customized application system and allow all the customized application system to display map layers.

OpenGIS Consortium interoperability services and standards: The Web GIS platform should be implemented with the OpenGIS interoperability standards:

Geography Markup Language (GML) is a common XML-based file format for exchanging spatial information and attributes. The Web GIS platform should support the GML standards. Common database environment: Specifications on spatial entities and the space / time reference systems have been provided by the OpenGIS Consortium. The GIS platform architecture is designed as a multi-layer architecture that integrated the web service, Servlet/JSP functions and GIS APIs based on the framework of J2EE infrastructure. The GIS system can be accessed by lots of different computers in network with different kinds of operating system. It is a distributed, platform independent system architecture. The data are stored and managed with EJB. The distributed systems enable the databases and services in the same or different computers. The Web GIS platform Server architecture is consisted of three layers: User Interface Layer, Application Server Layer and Database Layer.

(1) Application Server Layer: In the application server layer, the GIS web services, Servlet/JSP interface, GCO services which include GML and WMS map service, and basic system application service is deployed in the J2EE server container. The GIS function such as the zooming out and in, viewing, panning and finding will be designed as an function session bean that can be accessed by the GIS web service, Servlet/JSP and other Application interfaces. The application server layer is built as a J2EE application, with several EJB modules, to provide server-centric spatial functions to applications. Key components of the server that implemented as EJBs are: Web GIS services, Geo-spatial functions, such as the viewing, layer selection, editing, querying, and analysis Data Source Management.

(2) User Interface: Web GIS platform provides a number of user interface components: Web service client, GIS java Applet and any other web service enabled applications. The mobile and PDA that support the web service standards interface could get the map and geo-referenced data through the GIS web service interface. The web browser based clients could communicate with the Web GIS service through the GIS web service, Servlet/JSP and OGC service. The clients perform URL requests to Map Service and obtain maps rendered in a pictorial format such as GIF or JPEG. A GIS Java Applet is another user interface that can be used to retrieve and handle the vector and raster map using the map tools. Java applet enables spatial viewing, querying, and richer editing capabilities to be easily embedded in desktop and web applications.

(3) Database Layer: The GIS data are stored and managed with the distributed systems architecture that enables the GIS data, databases and services in the same or different computers. The GIS platform should support following GIS data format: Vector data and Raster data ESRI shape files: ESRI shape files can contain points, multipoint, poly-lines and polygons objects. The attribute data is stored in dBase. MapInfo MIF: MapInfo MIF is stored in pair with DBF file not with MID. MIF contains region, poly-line, multiple, line and point. All objects are the same type. SQL database: It can be any SQL server with JDBC driver.

IV. IMPLEMENTATION AND FURTHER WORK

According to the service-oriented architecture proposed in above section, we designed and implemented a prototype of the service enabled urban development application system. The GIS platform architecture is designed as a multi-layer architecture that integrated the web service, Servlet/JSP functions and GIS APIs based on the framework functionality to integrate the customized ITS applications to perform basic geo-processing tasks, such as address matching, map image display, and routing, without of J2EE infrastructure. It is a distributed, platform independent system architecture that be accessed by lots of different computers in network with different kinds of operating system. The web service Framework was applied into the GIS system design. GIS Web services can provide hosted spatial data and GIS functionality and integrate to the customized application system to perform basic geo-processing tasks, such as address matching, map image display, and routing, etc.

The prototype of the service-oriented architecture of distributed GIS platform has been implemented successfully. The platform has been applied into a Web-GIS based system for planning. The GIS data and services are integrated through Web Services. GIS mapping service provides a base map by calling getMap () function. GIS data services provides GIS dataset in database layer by calling the functions like getPointFeature (), getLineFeature (), getPolygonFeature (), etc. The application system can be dynamic integrated through the Web Services' standard APIs using different by utilizing the same GIS data and functional services. Since the requirement of the practical GIS applications in different application domain and field are quite complicated, a general GIS Web service will be integrated into the different user customized application.. The GIS Web service is used to show the GIS information in the transportation planning information system.

The system includes following basic functions:

(1) Information Sharing: The databases of GIS, transportation planning projects are the information center of the system. All the geo-referenced cooperating work and information sharing depend on the GIS web service.

(2) Human computer interaction based on WEB-GIS. The Web-GIS is the basis graphical user interface of man-machine interface in the system. Based on GIS web service, interoperable information system obtains the geographical position simultaneity. The transportation relevant departments could use the GIS web service interface to work together. It provides the basic functions in coordination working environment.

(3) Transportation planning projects broadcasting: In this

system, every one participates in the activities to cooperate, broadcast the data of transportation planning through GIS web service.

(4) Transportation planning department, Traffic department, relevant government department, and public cooperation: The system can synchronize transportation planning department, traffic department, relevant government department, and public through the center databases. The GIS, transportation-planning project, and CSCW information can be shared and exchanged.

The system can provide an efficient means for the transportation planning with following advantages. Firstly, the hosted spatial data and GIS functionalities that can be accessed and integrated to the different customized GIS applications to meet the practical need in the processes of transportation planning. Secondly, running on the Internet, the system is accessible from anywhere in the world. Web-GIS service technologies not only make the system broadly accessible through Internet and but also provide the precise geo-referenced data for public and transportation planning researchers.

V. CONCLUSIONS

This paper presents the system architecture design for web service based GIS. It includes the GIS functions and the geo-referenced cooperating work and information sharing depend on the spatial data web service. The organizations could use the Geoeye web services to work together. It provides the basic functions in coordination working environment. Through Geoeye web service, the hosted spatial data and GIS functionalities that can be accessed and integrated to the different customized applications. The service-oriented architecture is a very promising architecture for practical implementation of the next generation GIS information systems. It has an important application prospect in the urban development and application. Further work will be performed to establish the common GIS Web services that can be easily used and integrated in different ITS application systems.

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