

Development of Software As a Service Based GIS Cloud for Academic Institutes**Singh, Pushpraj¹ and Gupta, R. D.²**

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ABSTRACT

Cloud Computing is network based computing in which shared resources, software and information are provided to different clients on demand. Cloud computing customers do not own the physical infrastructure and they consume resources as services .i.e. Software, Platform and Infrastructure as a Service. Geospatial technology can only be popular in true sense when it will be made available to as many users as possible without having costly and complicated desktop based software.

Software as a Service (SaaS) and Web 2.0 capabilities are changing expectations leading to demand for more usable GIS solutions in corporate and public sector environments. As a result the traditional process of purchasing GIS software is changing with the emergence of cloud and distributed computing. SaaS provider typically hosts and manages a given application in their own data center and makes it available to multiple users over the Web.

SaaS based GIS cloud allows anyone with a browser to instantly use desktop GIS. This innovative cloud computing technology gives subscribers full access to GIS tools such as data creation, analysis, editing and visualization. The present paper describes the framework for development of the SaaS based GIS cloud for user requirements, design concepts and relevant technologies and access capabilities for all level of users for academic institutes.

KEYWORDS: Cloud, Computing, SaaS, Web 2.0, GIS

1. INTRODUCTION

Cloud computing is associated with a new paradigm for the provision of computing. This paradigm shifts the location of infrastructure from desktop to the network to reduce the costs in management of hardware and software resources. Cloud computing is evolution of grid computing and this evolution is the development of grid computing, web 2.0 and particularly the virtualization technology (Jinnan and Sheng, 2010).

Cloud computing is network based computing in which shared resources, software and information are provided to different clients on demand. Cloud computing customers do not own the physical infrastructure and they consume resources as services .i.e. Software, Platform and Infrastructure as a Service. Geospatial technology can only be popular in true sense when it will be made available to as many users as possible without having costly and complicated desktop based software, which require higher processing and highly efficient hardware. GIS aims at helping people to present nature changes, discover the law of social and economic development through analyzing massive spatial and attributed data of the earth surface. The emergence of cloud computing brings a new solution to massive data storage,

data processing, spatial analysis. Through cloud computing, the massive data that knowledge acquisition and decision support information needs can be scheduled and parallel processed entirely within the cloud instead of being transferred on the network (Jinnan and Sheng, 2010).

Data security has been well guaranteed for the centralized storage and backup. Enterprises can not only rent data and hardware resources, but also can deploy their services in the cloud, providing unique data processing services.

2. SOFTWARE AS A SERVICE (SaaS) BASED GIS CLOUD

SaaS based GIS cloud is defined as a software application delivery model, where a software vendor deploys and hosts software applications in a multi-tenant (cloud) platform for its customers to operate the application over the Internet as services. Software as a Service based GIS cloud allows anyone with a browser to instantly use desktop GIS. This innovative cloud computing technology gives subscribers full access to GIS tools such as data creation, analysis, editing and visualization (Liu *et al.*, 2010).

Comparing with conventional GIS software, SaaS based GIS cloud has some unique features. Instead of being installed on premise, SaaS applications are usually hosted at the service provider's network, delivered as web applications, and serve as services for multiple users. This on-demand and multi-user service delivery model is well suited for software cloud, as it does not require the deployment of a large infrastructure at the client's location.

On the other hand, SaaS applications can be deployed in a cloud computing environment and accessed through Internet by web browsers. It eliminates or drastically reduces the upfront commitment of resources. SaaS applications can be deployed with minimal effort and be available in a very short time to a large group of users, SaaS model due to its varied advantage, is quite attractive to enterprises. Figure 1 shows multi-user SaaS model (Pervez *et al.*, 2010).

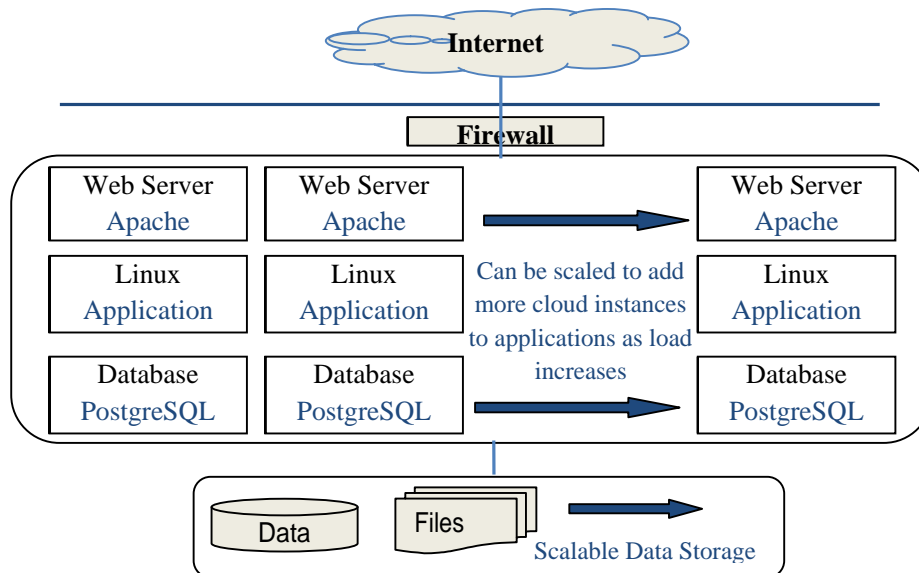


Figure.1: Multi- User SaaS model

In addition, SaaS based GIS cloud employs a single-instance, multi-user architecture, this allows multiple customers to share resources without disrupting each other. This centralized hosted service approach makes deploying patches and application upgrades transparent to users. Another important feature of SaaS is the embrace of web services and Service Oriented

Architecture (SOA) is fully accepted architectural approach in the industry. Many SaaS platforms expose the applications data and functionalities through the web service interface. This not only allows a client to query/update SaaS applications data programmatically, but also provides a standard mechanism to integrate SaaS applications in the software cloud with enterprise SOA infrastructure (Pervez *et al.*, 2010).

The present paper describes the development of conceptual framework of the SaaS based GIS cloud including design concepts, relevant technologies and access capabilities for all level of users for academic institutes.

3. FRAMEWORK FOR SaaS BASED GIS CLOUD

Web services have become a widely adopted interface for service integration in SaaS. SaaS applications usually expose their data, metadata, services, and other functions through web services, so that they can be discovered, queried, and updated by on-premise applications. In addition, web services are often provided as a mechanism to invoke the services which are outside the SaaS applications or reside in different service cloud (Liu *et al.*, 2010).

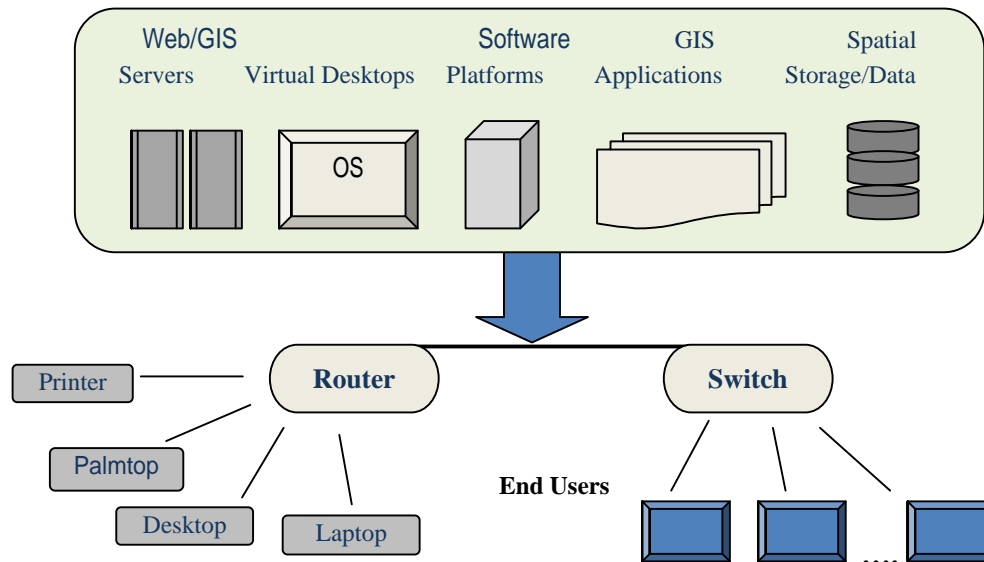


Figure.2: Multi-User SaaS Architecture

SaaS based GIS cloud is a latest software model in software deployment and business model, where an GIS application is hosted as a service provided to customers across the Internet and the customers pay for the kinds and time of the services. As traditional rationale for IT system outsourcing, by applying economies of scale to the operation of applications, a SaaS

based GIS vendor can offer cheaper and more reliable applications than enterprises themselves (Wei *et al.*, 2009).

4. CONCLUDING REMARKS

In the present work, a conceptual framework for SaaS based GIS cloud for academic institutes has been developed. It facilitates users to have access of costly software from different network environments. The further project work is ongoing for module design and security issues.

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