Cloud Computing Services and its Application

Nitin Kumar, Shrawan Kumar Kushwaha and Asim Kumar

*Mtech-final year, Computer science and engineering, Galgotias University.
Plot No. 2, Yamuna Expressway, Sector 17A, Greater Noida, UP-201306 India.
Mtech-final year, Communication Engineering, Galgotias University.
Plot No. 2, Yamuna Expressway, Sector 17A, Greater Noida, UP-201306.
Mtech-final year, Communication Engineering, Galgotias University.
Plot No. 2, Yamuna Expressway, Sector 17A, Greater Noida, UP-201306.
E-mail: coolnitin17@gmail.com, kushwaha.shrawan@gmail.com,
kumarasim2009@gmail.com
www.galgotiasuniversity.edu.in, www.galgotiasuniversity.edu.in,
www.galgotiasuniversity.edu.in*

Abstract

Cloud computing is a web-based , distributed computing using which information, resources and softwares are distributed among different types of users. This computing approach allows much easier, flexible and high availability of resources at a very lower cost. The distribution of resources and services are on web, so this has opened many new ways of providing services, these services are termed as e-services.
In this paper we will go through cloud computing services, cloud services models, cloud deployment models and application of cloud computing in different fields. We will give example for cloud services being provided by different software organizational vendors. This will help in understanding cloud computing and it's services in a better way.

Keywords: Introduction, service-oriented architecture, deployment models, e-government, e-learning, pay-per-use.

1. Introduction
Cloud is analogical to internet. Cloud computing is internet based computing where virtual shared servers provided software, infrastructure, platform, devices and other

resources and hosting to customers on a pay-as- you-use basis. Cloud computing customers do not own the physical infrastructure rather they rent the usage from a third party provider. They use resources as a service for performing a task and pay only for what they are utilizing. IT organization vendors provide services to the customers which are in turn utilized by customers on pay-per –use basis. Customers can access these services provided by vendors using web-browser. Huge amount of data is stored in many cloud servers and the collection of servers forms a Data center.

The services provided by vendors can be classified in three models that actually depict how services are being provided to the customers. Service models are service oriented architecture that tells us about the different level of abstraction. They are as follows:-

1.1 Platform as a Service (PaaS)

Paas supplies all the resources required to build applications and services completely by using internet without having to download or install software. PaaS services include application design, development and hosting. Other services include collaboration, web service integration, DB integration, security, scaling etc.

Users don't have to worry about purchasing hardware and software or hire experts for management of the software and hardware, it provides flexibility in installing software on system, scalability is a another advantage of the PaaS. A downfall of the PaaS is the lack of interoperability and portability among providers.

1.2 Software as a Service (SaaS)

Software as a service is the model in which an application is hosted as a service to customers who access it via the internet. It provides us the facility of using different software application, operating system and resources without the need of installing them on your own machine, upgrading and buying licensees.

1.3 Infrastructure as Service (IaaS)

This model is responsible for providing virtualized computing resources, network resources with IaaS users assemble their own virtual cluster on which they are responsible for installing, maintaining and executing their own virtual cluster on which they are responsible for installing, maintaining and executing their own software stack. IaaS uses different tools for virtualizing and converting physical resources to logical resources that can be provisioned and published to customers as needed.

2. Classification of Cloud Computing Deployment Models

We can classify the cloud computing system in 4 categories, they are as follows:-

2.1 Public Cloud

In this deployment model services and infrastructures are made available to different types of customers and used publicly by general people/users. This type of cloud is managed by cloud services provider offering services to the consumers on pay-per- use

basis. Consumers are considered authorized by default, so security and privacy are big issues in it. Examples of public cloud are Amazon EC2, Google App Engine etc.

2.2 Private Cloud
In this type of cloud the computing resources are used and operated exclusively by one organization owing that cloud. It is more secured than public clouds because their users are trusted users inside the organization. Examples of private cloud are IBM cloud, Microsoft cloud, any private institutional cloud etc.

2.3 Community Cloud
In community model the infrastructure is shared by several organizations with the same policy and compliance considerations. This helps to further reduce cost as compared to a private cloud, as it is shared by large groups. Various state level government departments requiring access to the same data relating to roads, hospitals, electrical stations infrastructures use community model for gathering information.

2.4 Hybrid Cloud
This deployment model helps business to take advantage of secured applications and data hosting on private cloud, while still enjoying cost benefits. An organization may store sensitive client data in house on a private cloud application, but inter-connect that application to a billing application provided on a public cloud as a software service.

Table 1: Comparison of Cloud Computing Deployment models.

Deployment Model	Scope of Services	Managed by	Security Level
Public model	General public and large industry groups	Cloud service provider	low
Private model	Single organization	Single organization	high
Community model	Organization those share the same policy, mission and same security aspects	Several organization or Cloud service providers	high
Hybrid model	Organization and public	Organization and public	medium

3. Main Characteristics of Cloud Computing
Although there are many parameters on the basis of which you can characterize a cloud computing environment but five important characteristics of a cloud computing environment are as follows:-

3.1 Universal access
Capabilities are available over the network and accessed through standard mechanism that promotes the use of heterogeneous thin or thick client platform like mobile phones, tablets, laptops etc.

3.2 Scalable Services
The infrastructure of the cloud is very elastic to expand with respect to nodes and the services. Cloud providers have the capability to add new nodes in the cloud and adding services for the customers in the cloud.

3.3 On-Demand self services
Cloud provides us the capability of consuming computing resources such as server time, network and storage automatically without the interaction of any human being.

3.4 Pay-Per-Use scenario
Services provided by the cloud service providers are not free of cost; customers have to pay for accessing and using the services but only for what they use.

3.5 Collaboration
Cloud allows many individual organizations to collaborate and work together for finding the solution to a problem or for any research work.
   Some other characteristics of cloud are:-
   Reliability, customization, measured services, management, virtualization.

4. Some Examples of Cloud Service Providers
4.1 Google
It has become a synonym for the word "search". People are noticed often saying that "Just Google it and you will find everything. But it is not the only thing Google provide as service it also provides us the cloud services like: - **G-mail**, **Google docs**, **Picasa**, **Google Analytics**, **Google Ad words and Ad sense**.

4.2 Microsoft
It provides its own platform for providing a set of cloud services offered to users and application developers. Services run in Microsoft Data centre. Services provided by Microsoft are: - **Windows Azure**, **SQL Azure**, **Windows Azure App Fabric and Windows Azure Marketplace**.

4.3 Amazon Web Services (AWS)
It provides a cloud computing platform for all business sizes. AWS helps business organization to choose their own computing platform as in need of the organization and pay for what they use. Services provided AWS are:- **Amazon Elastic compute cloud, Amazon Simple Storage services, Amazon Virtual Private Cloud, Amazon Cloud front, Amazon Relational Database and Amazon Simple Queue services.**

5. Applications of Cloud Computing

Cloud Computing is one of the most dominant field of computing resources online because sharing and management of resources is easy using cloud. These properties have made it an active component in the following fields as follows:-

5.1 E-Learning

It is a new trend in the field of education that provides an attractive environment for students, faculty members, and researchers. Students, faculty members, researchers can connect to the cloud of their organization and access data and information from there.

5.2 Enterprise resource planning (ERP)

Use of Cloud in ERP comes into existence when the business of any organization grows. The work of managing applications, human resources, payroll etc becomes expensive and complex. To overcome it service providers can install ERP in the cloud itself.

5.3 E-Governance

Cloud computing can improve the functioning of a government by improving the way it provides the services to its citizens, institutions and cooperation with other governments. This can be done by expanding the availability of environment, making environment more scalable and customized. It also cut off the burden of managing, installing and upgrading applications.

Table 2: Different applications of cloud computing.

Application	Services provided
E-learning	E-mail, simulation tools, files broadcasting, class recording, virtual classrooms, virtual labs, surveys, education forums
ERP Cloud	Supply chain and vendor, project and HR Management, customer Relationship management, finance and accounting
E-governance	Complaint resolution system, employee management system, E-police, E-court, payment and tax system, agriculture and food, industry and energy

6. Conclusion

Cloud computing is a widely used technology providing many types of services to the customers online on the basis of Pay-Per-Use mechanism. Different type of cloud deployment models are available for making information available to the customers but each having its own significance depending upon the scope and who is going to use it and hence the security of the deployment models also varies accordingly. Table 1 describes the scope and the security of the deployment models. However due to the collaborative nature and the heterogeneous environment of cloud many security and privacy issues are dominant issues in cloud. Many cloud service providers like

Microsoft, Google and Amazon Web Services have their own cloud environment and provides many significant Cloud services. Applications of cloud computing are discussed in Table 2.

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