

Cloud Computing and It's Types in Mobile Network

Palak Jain

Department of Electronics and Communication, Truba Institute of Engineering and Information Technology, RGPV, Bhopal, India

Abstract: *Cloud computing basically involves delivering hosted services over the Internet to store, manage, and process data, instead of using local server or a personal computer. These services are broadly divided into three categories: Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS). In scientific terms, cloud computing is a synonym for distributed computing over a network which means the ability to run a program on many connected computers at the same time. Therefore it involves a large number of computers that are connected through a real-time communication network.*

Keywords: Cloud, Public Cloud, Private Cloud, Hybrid Cloud, Federation of Cloud, Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS).

1. Definition of Cloud Computing

Cloud Computing is where computing resources are accessed from a virtual online "cloud" rather than a local desktop or organisation data centres. It is basically a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model is composed of five essential characteristics, three service models, and four deployment models.

Types of Cloud

In general cloud can be of four types:

1. Public Cloud
2. Private Cloud
3. Virtual Private Cloud
4. Hybrid cloud

A public cloud sells services to anyone on the Internet. Now days, the largest cloud service provider over the world is Amazon web services.

On the other hand private cloud is a proprietary network that sells hosted services to limited number of customers. There is one more term associated with these types that is virtual private cloud which is created when a service provider uses public cloud resources to create their private cloud. Infrastructure-as-a-Service like Amazon Web Services provides virtual server instance to start, stop, access and configure their virtual servers and storage. Cloud computing allows a company to pay for only as much capacity as is needed, and bring more online as soon as required.

A hybrid cloud is a composition of at least one private cloud and at least one public cloud. It is typically offered in one of two ways:

- a. If Vendor has a private cloud and forms a partnership with a public cloud provider, or
- b. A public cloud provider forms a partnership with a vendor that provides private cloud platforms.

In this hybrid cloud an Organisation provides and manages some resources in-house and has others provided externally. For example, an organisation might use a public cloud service, such as Amazon Simple Storage Service (Amazon S3) for archived data but continue to maintain in-house storage for operational customer data. Ideally, the hybrid approach allows a business to take advantage of the scalability and cost-effectiveness that a public cloud computing environment offers without exposing mission-critical applications and data to third-party vulnerabilities.

2. Cloud Federation

It is the practice of interconnecting the cloud computing environments of two or more service providers for the purpose of balancing load traffic and accommodating spikes in demand.

It requires one provider to wholesale or rent computing resources to another cloud provider. Those resources become a temporary or permanent extension of the buyer's cloud computing environment, depending on the specific federation agreement between providers.

It offers two substantial benefits to cloud providers:-

Firstly, it allows providers to earn revenue from computing resources that would otherwise be idle.

Second, cloud federation enables cloud providers to expand their geographic footprints and accommodate sudden spikes in demand without having to build new points-of-presence (POPs). POP is an access point from one place to the rest of the Internet. It usually includes routers, digital / analog call aggregators, servers, and frequently frame relays or ATM switches.

3. Characteristics of Cloud Computing

The Essential characteristics of Cloud Computing are as follows:

1. On demand self services: computer services such as email, applications, network or server service can be provided without requiring human interaction with each service provider. Cloud service providers providing on

demand self services include Amazon Web Services (AWS), Microsoft, Google, IBM and Salesforce.com. New York Times and NASDAQ are examples of companies using AWS (NIST). Gartner describes this characteristic as service based

2. Broad network access: Cloud Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms such as mobile phones, laptops and PDAs.
3. Resource pooling: The provider's computing resources are pooled together to serve multiple consumers using multiple-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand. The resources include among others storage, processing, memory, network bandwidth, virtual machines and email services. The pooling together of the resource builds economies of scale (Gartner).
4. Rapid elasticity: Cloud services can be rapidly and elastically provisioned, in some cases automatically, to quickly scale out and rapidly released to quickly scale in. To the consumer, the capabilities available for provisioning often appear to be unlimited and can be purchased in any quantity at any time.
5. Measured service: Cloud computing resource usage can be measured, controlled, and reported providing transparency for both the provider and consumer of the utilised service. Cloud computing services use a metering capability which enables to control and optimise resource use. This implies that just like air time, electricity or municipality water IT services are charged per usage metrics – pay per use. The more you utilise the higher the bill. Just as utility companies sell power to subscribers, and telephone companies sell voice and data services, IT services such as network security management, data center hosting or even departmental billing can now be easily delivered as a contractual service.
6. Multi Tenacity: It is the 6th characteristics of cloud computing advocated by the Cloud Security Alliance. It refers to the need for policy-driven enforcement, segmentation, isolation, governance, service levels, and chargeback/billing models for different consumer constituencies. Consumers might utilise a public cloud provider's service offerings or actually be from the same organisation, such as different business units rather than distinct organisational entities, but would still share infrastructure.
7. Cost: It is one of the most important factor. Cost is claimed to be reduced, moreover costs savings depend on the type of activities supported and the type of infrastructure available in-house.
8. Virtualization- in this technique servers and storage devices are shared and utilisation be increased. By doing this Applications can be easily migrated from one physical server to another.
9. Maintenance: Cloud computing applications are easier to maintain because they do not need to be installed on each user's computer and it can be accessed from different places.

4. Fundamental Service Models

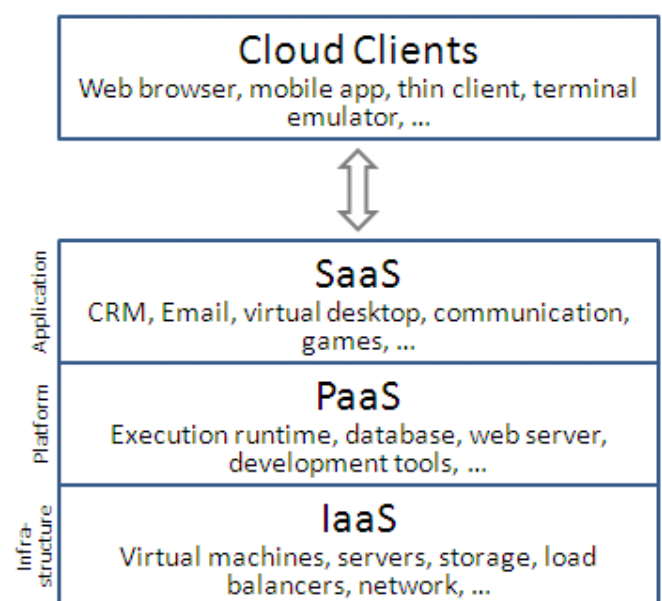
There are namely three models according to which cloud computing providers offers services:

1. Infrastructure as a service (IaaS),
1. Platform as a service (PaaS), and
1. Software as a service (SaaS)

IaaS - It is the most basic cloud service model. The providers of IaaS offer virtual machines, servers, storage, etc. Its cloud offers additional resources such as raw (block) and file-based storage, firewalls, load balancers, IP addresses, virtual local area networks (VLANs), and software bundles. The providers of IaaS cloud supply these resources on-demand from their large pools installed in data centres. For wide-area connectivity, customers can use either the Internet or carrier clouds (dedicated virtual private networks). Some of the IaaS providers Are Amazon EC2, Google Compute Engine, HP Cloud, and ReadySpace Cloud Services.

Paas- The cloud providers of Paas delivers a computing platform, typically including operating system, programming language execution environment, database, and web server. The developers can develop the applications and run their software solutions on a cloud platform without any cost and complexity of buying and managing the underlying hardware and software layers. Examples of PaaS providers are AWS Elastic Beanstalk, Cloud Foundry, Heroku, Force.com, EngineYard, Mendix, OpenShift, Google App Engine, AppScale, etc

SaaS- In this, users are provided access to application software and databases. Cloud providers manage the infrastructure and platforms that run the applications. It is also known as "on-demand software" and is usually priced on a pay-per-use basis. SaaS providers generally price applications using a subscription fee.



In model, cloud providers install and operate application software in the cloud and cloud users access the software from cloud clients. Cloud users do not manage the cloud

infrastructure and platform where the application runs. This eliminates the need to install and run the application on the cloud user's own computers, which simplifies maintenance and support. Cloud applications are different from other applications in their scalability—which can be achieved by cloning tasks onto multiple virtual machines at run-time to meet changing work demand. Load balancers distribute the work over the set of virtual machines. This process is transparent to the cloud user, who sees only a single access point. To accommodate a large number of cloud users, cloud applications can be multi tenant, that is, any machine serves more than one cloud user organisation. It is common to refer to special types of cloud based application software with a similar naming convention: desktop as a service, business process as a service, test environment as a service, communication as a service.

Examples of SaaS Providers are Google Apps, Microsoft Office 365, Petrosoft, Onlive, GT Nexus, Marketo, Salesforce and CallidusCloud.

5. Advantages of Cloud Computing

Cloud computing has number of advantages for both end users and businesses of all sizes. The most important advantage is that you no need not to support the infrastructure or have the knowledge necessary to develop and maintain the infrastructure, development environment or application. The burden has been lifted and someone else is taking care of all that.

Some of the useful advantages are:

- 1. Convenience and its continuous Availability:-**
Public clouds offer services that are available wherever the end user might be located. This approach enables easy access to information and accommodates the needs of users in different time zones and geographic locations. As a side benefit, collaboration booms since it is now easier than ever to access, view and modify shared documents and files.
- 2. Backup and Recovery:-**
The process of backing up and recovering data is simplified since those now reside on the cloud and not on a physical device. The various cloud providers offer reliable and flexible backup/recovery solutions. In some cases, the cloud itself is used solely as a backup repository of the data located in local computers.
- 3. Environment Friendly**
The cloud is in general more efficient than the typical IT infrastructure and It takes fewer resources to compute, thus saving energy. For example, when servers are not used, the infrastructure normally scales down, freeing up resources and consuming less power. At any moment, only the resources that are truly needed are consumed by the system.

6. Disadvantages of Cloud Computing

It is a tool that offers enormous benefits to its adopters. So, it comes with number of problems and inefficiencies.

The major disadvantages are as follows:

- 1. Security and Privacy:** Security is the major concern of cloud computing, therefore by leveraging a remote cloud based infrastructure; a company essentially gives away private data and information, things that might be sensitive and confidential. It is then up to the cloud service provider to manage, protect and retain them, thus the provider's reliability is very critical. Similarly Privacy is also a huge issue. Companies and users have to trust their cloud service vendors that they will protect their data from unauthorised users.
- 2. Limited Control:** The applications and services run on remote, third party virtual environments, companies and users have limited control over the function and execution of the hardware and software.
- 3. Vulnerability:** As security and privacy issues occurs in cloud ,due to this cloud solutions are exposed on the public internet and are thus a more vulnerable target for malicious users and hackers.

7. Conclusion

It is concluded that cloud computing remains strong and has great potential for the future. Its user base grows constantly and more big players are attracted to it, offering better and finer tuned services and solutions. Cloud computing increases profitably by improving resources utilisation. Businesses have a range of paths to the cloud, including infrastructure, platforms and applications that are available from cloud providers as online services.

References

- [1] <http://computer.howstuffworks.com/cloud-computing.htm>
- [2] <http://www.infoworld.com/d/cloud-computing/what-cloud-computing-really-means>
- [3] NIST Cloud Computing Use Cases, <http://collaborate.nist.gov/twiki-cloud-computing/bin/view/CloudComputing/UseCaseCopyFromCloud>
- [4] IBM, "Cloud Computing Reference Architecture v2.0", <http://www.opengroup.org/cloudcomputing/doc.tpl?CALLER=documents.tpl&dcat=15&gdid=23840>
- [5] Cloud Taxonomy, <http://cloudtaxonomy.opencrowd.com/>
- [6] Open Security Architecture (OSA), "Cloud Computing Patterns", <http://www.opensecurityarchitecture.org/cms/library/patternlandscape/251-pattern-cloud-computing>
- [7] Cloud Security Alliance, "Security Guidance for Critical Areas of Focus In Cloud Computing V2.1", www.cloudsecurityalliance.org/csaguide.pdf

Author Profile



Palak Jain is pursuing her B.E. in Electronics and Communication from Truba Institute of Engineering and Information Technology, Bhopal. She wishes to join a multinational company after completing her Engineering. She loves to write fiction and is always eager to participate in or be a part of new things that

come her way.