

## Cloud Computing in brief

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**Abstract:** The term “cloud computing” is now very popular. Yet, it is not always clearly defined. Cloud computing is growing now-a-days in the interest of technical and business organizations. It gives subscription-based delivery of computing services- servers, storage, databases, networking, software, analytics and more over the Internet (“the cloud”). Though questions remain on its different aspects such as security and vendor lock-in, it has many benefits. This paper explores some of the basics of cloud computing such as the characteristics, service models and deployment models in use today, as well as the benefits and security associated with cloud computing.

**Keywords:** Internet, Cloud, Cloud Computing.

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### I. Introduction

The term “cloud computing” is coined by University of Texas professor Ramnath Chellappa in a talk on a “new computing paradigm” in 1997. However, the term may actually have been used a year earlier in Compaq. The birth of cloud computing is very recent phenomena though its root belongs to some old ideas with new business, technical and social perspectives. The concept of “time sharing” where multiple users can share access to data and CPU time is the premise of cloud computing in 1950s. In 1969 J.C.R. Licklider whose vision was for everyone on the globe to be interconnected and accessing programs and data at any site, from anywhere developed the ARPANET (Advanced Research Projects Agency Network) – the network that became the basis of the internet. In 1970s IBM released an operating system called VM that allowed admins to have multiple virtual systems, or “Virtual Machines” (VMs) on a single physical node. Most of the basic functions of any virtualisation software that we see nowadays can be traced back to this early VM operating system. One of the first milestones in cloud computing history was the arrival of Salesforce.com in 1999, which pioneered the concept of delivering enterprise applications via a simple website. The next development was Amazon Web Services in 2002, which provided a suite of cloud-based services. Then in 2006, Amazon launched its Elastic Compute cloud (EC2) as a commercial web service that allows small companies and individuals to rent computers on which to run their own computer applications. Jeremy Allaire, CEO of Brightcove said "Amazon EC2/S3 was the first widely accessible cloud computing infrastructure service". Another big milestone came in 2009, as Web 2.0 hit its stride, and Google and others started to offer browser-based enterprise applications, though services such as Google Apps. Experts seem to agree that cloud computing will ultimately transform today's computing landscape.

### II. Basic Concepts

Cloud computing is often associated with virtualized infrastructure or hardware on demand, utility computing, IT outsourcing, platform and software as a service, and many other things that now are the focus of the IT industry. According to the National Institute of Science and Technology (NIST), cloud computing delivers IT applications to users by enabling “ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources”. There are certain services and models working to make the cloud computing feasible and accessible to end users. Following are the working models for cloud computing:

1. Deployment Models
2. Service Models

#### 2.1 Deployment Models

Deployment models define the type of access to the cloud. Cloud can have any of the four types of access: Public, Private, Hybrid and Community.

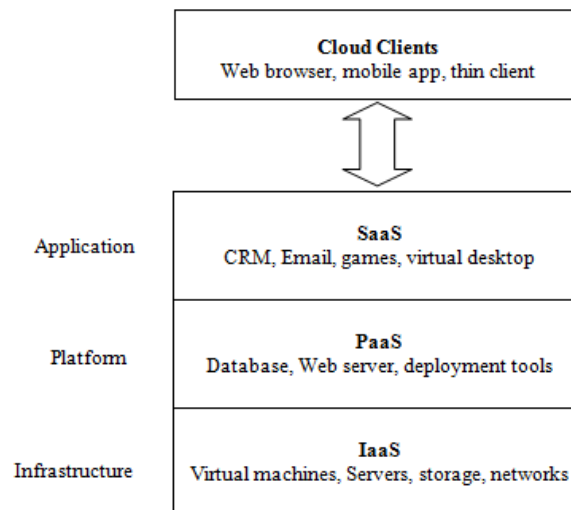
1. **Public Cloud** - A Public Cloud allows systems and services to be easily accessible to the general public. Public cloud may be less secure because of its openness, e.g., e-mail.
2. **Private Cloud**- A Private Cloud allows systems and services to be accessible within an organization. It offers increased security because of its private nature.
3. **Community Cloud**- A Community Cloud allows systems and services to be accessible by group of organizations that have similar cloud requirements.
4. **Hybrid Cloud**-A Hybrid Cloud is mixture of public and private cloud.

## 2.2 Services Models

Companies offering computing services are called cloud providers. Each provider serves a specific function, giving users more or less control over their cloud depending on the type. These can be categorized into three basic service models as listed below:

1. **Infrastructure as a Service (IaaS)**- IaaS is the foundation or bottom layer of cloud computing. It includes services like storage, backup, and security. An example is Amazon Web Services,
2. **Platform as a Service (PaaS)**- PaaS is the next level of the cloud. The vendors of PaaS services provide a certain framework and a basic set of functions that customers can customize and use to develop their own applications. Examples of PaaS services include Google App Engine, Force.com from Salesforce, and Microsoft Azure.
3. **Software as a Service (SaaS)**- SaaS basically means any Internetbased software or service that you rent, usually on a peruser, permonth basis. Examples of SaaS include Microsoft Office 365, Google Apps, and Salesforce.

Each of the service models inherits the security and management mechanism from the underlying model, as shown in the following diagram:



## III. Characteristics

Cloud technology is in the news quite often these days, but it still seems to be mysterious and confusing to a non technical man. Every cloud services must have following characteristics:

- a. **On demand self service**- Computer services such as email, applications, network or server service can be provided as needed automatically without requiring human interaction with each service provider.
- b. **Broad network access**- Cloud Capabilities are available over the network and accessed through standard mechanisms by using smart phones, tablets, laptops and office computers.
- c. **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.
- d. **Rapid elasticity**- It must support rapid elasticity with the ability to grow and shrink based on policy. Quickly and easily add or remove users, software features, and other resources are possible.
- e. **Measured service**- Cloud computing resource usage can be measured, controlled, and reported providing transparency for both the provider and consumer of the utilised service.

## IV. Benefits

The following are some of the possible benefits for those who use cloud computing-based services:

- a. **Cost Savings**- There are number of reasons to attribute cloud technology with lower costs. The infrastructure is not purchased thus lowering maintenance cost. Initial expense and recurring expenses are much lower than traditional computing.
- b. **Scalability/Flexibility**- Companies can start with a small deployment and grow to a large deployment fairly rapidly, and then scale back if necessary. Also, the flexibility of cloud computing allows companies to use extra resources at peak times, enabling them to satisfy consumer demands.

- c. **Reliability-** Cloud computing makes data backup, disaster recovery and business continuity easier and less expensive because data can be mirrored at multiple redundant sites on the cloud provider's network.
- d. **Maintenance-** Cloud service providers do the system maintenance and access is through APIs that do not require application installations onto PCs, thus further reducing maintenance requirements.
- e. **Mobile Accessible-** Mobile workers have increased productivity due to systems accessible in an infrastructure available from anywhere.

## V. Security

The success of modern day technologies highly depends on its effectiveness of the world's norms, its ease of use by end users and most importantly its degree of information security and control. A lot of personal information and potentially secure data that people store on their computers are transferred to the cloud. It may create more space for a third party to access information. It is critical to understand the security measures of cloud provider have to secure data and it is equally important to take personal precautions to secure the data. Enterprises are reluctant to buy an assurance of business data security from vendors. In the cloud model, service providers are responsible for maintaining data security and enterprises would have to rely on them. These vary from provider to provider and among the various types of clouds. When you choose a provider, compare your needs to the cloud services available. However, to take advantage of the benefits of the cloud, you will have to knowingly give up direct control of your data. On the converse, keep in mind that most cloud providers will have a great deal of knowledge on how to keep the data safe. A provider likely has more resources and expertise than the average user to secure their computers and networks.

## VI. Conclusion

Cloud computing is an emerging technology. It is an attractive solution when the infrastructure or the IT personnel are not available or too expensive. It can also bring enormous benefits for IT users, but has some drawbacks. The cloud is a big target for malicious individuals and it can be accessed through an unsecured internet connection. So the cloud provider will be selected on the basis of the types of user needs; reputation and responsibilities of the providers.

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