

Cloud Computing: The Future of Computation

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1. Introduction :

The advent of Internet and World Wide Web is the greatest revolution that drastically changed our life and style of living. The giant computer with thousand tons of weight and very primitive functionalities is converted into a small note book with sophisticated functionalities. Along with the advancement of computing technology the price has been fallen down and one or more computer has become the need of every country, institutions or in the level individual human being. The diversified and short term need of software and hardware has lead to the essence of using shared resources. Even though there are many arguments, the cloud computing has taken its way that could meet the enterprise need in more cheaper and more reliable way.

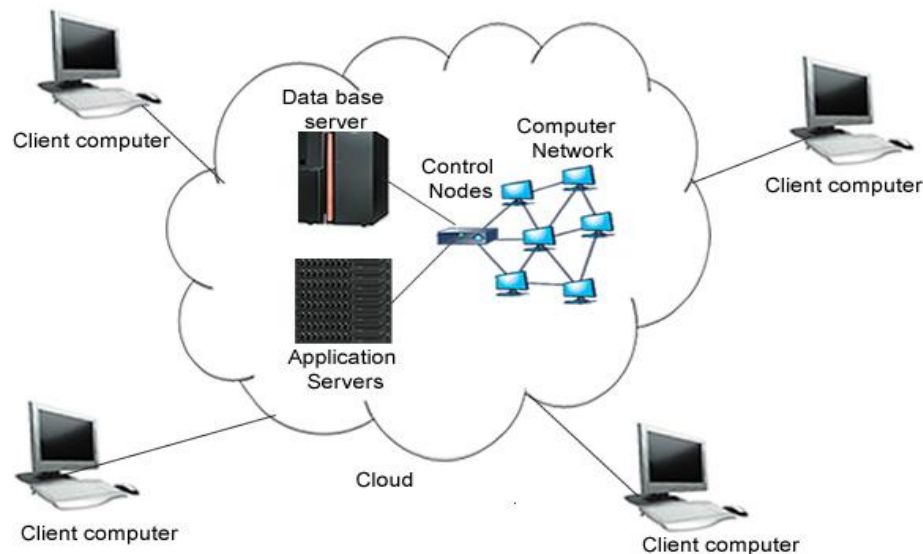


Fig: A Model of Cloud Computing

Cloud computing is a term you can see being used a lot in IT arena. However, there is doubt that will it change the paradigm of computation in terms of *personal computer* as a computing device? The advent of cloud platform is the major shift that leads to the coming shift to cloud computing. Most of us have probably been making the use of cloud without realizing it. The use of e-mail accounts like Gmail or hotmail, sharing of photos in social networking applications like Facebook are the case we are using cloud.

2. What is Cloud Computing?

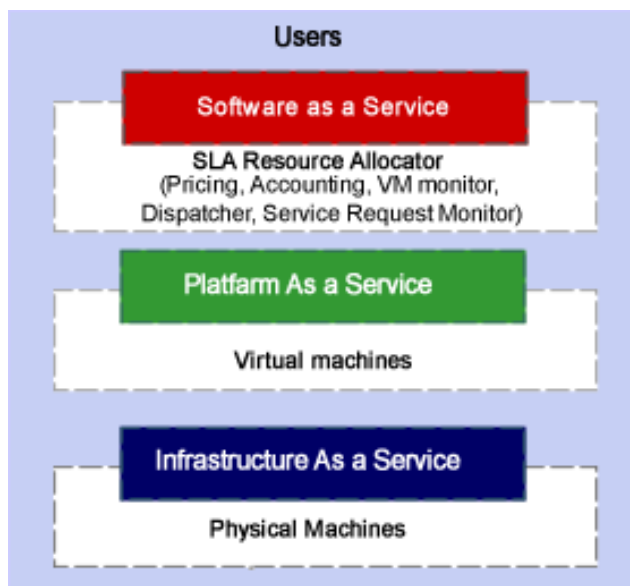
Cloud computing refers to the whole IT infrastructure as a services over the Internet. It includes hardware as well as system software at data center and the applications that are

delivered as services over the Internet. The applications that have been provided are termed as *software as services (SaaS)* where as the software and hardware at the data center is termed as *cloud*. In cloud computing environment the application builder can build their application and run on the cloud. The cloud applications use large data centers and powerful servers that host web application and web services.

It can be the ability to rent a server or a thousand servers and run a geophysical modeling application on the most powerful systems available anywhere. It can be the ability to rent a virtual server, load software on it, turn it on and off at will, or clone it ten times to meet a sudden workload demand [1]. When a cloud is made available to the public in a pay-as-you-go manner then the service being sold is termed as utility computing. Cloud computing is the combination of both the software as a services and the utility computing. Service provider provides the cloud and the end user can accomplish the task in efficient and economic way. The main thing in cloud computing is virtualization in which you can run application in different platform. Cloud computing comes into focus only when you think about what IT always needs: a way to increase capacity or add capabilities on the fly without investing in new infrastructure, training new personnel, or licensing new software. Cloud computing encompasses any subscription-based or pay-per-use service that, in real time over the Internet, extends IT's existing capabilities. There is no long term commitment and an organization is only charged for what it actually uses. If one instances need to be added, it is literally a matter of minutes to configure new server instances.

3. Cloud Architecture

Cloud Computing is a new term for a long-held dream of computing as a utility, which has recently emerged as a commercial reality [2]. Any application needs a model of computation, a model of storage and a model of communication. Although some of the cloud applications are already commercially available in the market they have their own model of cloud. Amazon EC2 is at one end of spectrum where as at the other extreme of spectrum are application domain specific platform such as Google AppEngine [2].



Amazon Elastic Compute Cloud (EC2) allows users to rent computers on which to run their own computer application which can be considered as Infrastructure as a Services. In case of Google AppEngine it provides the platform for developing and hosting the web application on Google managed datacenter. It virtualizes the application across multiple servers and data center which can be taken as Plat form as a Service.

Although almost all the infrastructures have been built for cloud computation, it is still in infancy and lots of managerial things are to be developed. The architecture proposed by Oracle and Sun Microsystems give three viz.

Service (SaaS), Platform as a Service (PaaS) Fig: Layers of Cloud computing and Infrastructure as a Service (IaaS) [8].

3.1 *Software as a Service (SaaS)*: In SaaS, a single instance of software runs on a cloud and services multiple end users or client organizations. A SaaS provider typically host and manages a given application in their own data center and make it available to multiple users over the wave. Google Apps offering of basic business including email and word processing and services provided by salesforce.com are well known example of SaaS.

3.2 *Platform as a Service (PaaS)*: Platform as a service encapsulates a layer of softwares and provides an application development and deployment environment delivered as a service to the developers over the web. The PaaS platform consists of infrastructure software that can provide for every stage of software development and testing. The infrastructure software typically includes a database, middleware and development tools. Google AppEngine is a commercially available PaaS.

3.3 *Infrastructure as a Service (IaaS)*: It is the lower layer of cloud computing in which the cloud provider provides hardware (server, storage and network) and associated software (operating system, virtualization technology and file system), as a service. The cloud user can scale up the resources automatically if there is higher demand. It is like some advancement of traditional hosting which do not require long term commitment. The prevailing commercial offerings are Amazon web services Elastic Compute Cloud (EC2) and Secure Storage Service (S3).

4. **Benefits:** As there will be the many numbers of cloud providers so the enterprise would have flexibility to choose a vendor as per their requirement. The primary advantage would be the cost and efficiency. Essentially the capital cost of computing can be done away with if an organization relies on the cloud, buying virtual server time and storage on demand. Expenditure on IT becomes operational rather than capital. Scalability allows the organizations to add capacity as well as scale down as per the demand. It reduces the IT infrastructure investment cost that is provided by the vendors. It would be beneficial for the new entrant organization as they can save a substantial amount of investment on IT, because they are able to scale up or down the resources as per their demand.
5. **Problems:** The pace of development in IT infrastructure and web technology is increasing yet cloud computing is at an early stage of development, and there is lack of definitive market standard. Once an organization is committed to particular cloud provider, the organization locked in to that provider that could be the logical lock not the contractual lock-in. All the data of the organization would be stored on the cloud that would introduces the high risk of data security and getting data out and move to another cloud provider is difficult. The issue of lock-in reflects the concern of reliability. If the application or data cannot be move to another system then might be down for some duration. The data in the cloud also increases the cost of data transfer as the large volumes of data consume more bandwidth and slower than the simple transfer of data in hard drive.
6. **Conclusion:** Besides many problems still existing and as there is no standard yet developed, cloud computing has already been gained its pace. Now the cloud providers are being increasing also the more research are going on that will support the standardization of it. Cloud computing offers real alternatives to IT departments for improved flexibility and lower cost [8]. These services are readily

accessible on a pay-per-use basis and offer great alternatives to businesses that need the flexibility to rent infrastructure on a temporary basis or to reduce capital costs.

7. References

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