



A Short Appraisal on Cloud Computing

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Abstract

A detailed study of cloud computing is presented. Starting from its basics, the characteristics and different modalities are dwelt upon. Apart from this, the pros and cons of cloud computing is also highlighted. Apart from this, service models of cloud computing are lucidly highlighted.

Keywords: Cloud Computing; Benefits of cloud computing; Cloud delivery models; Challenges.



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1. Introduction

Cloud computing, in recent times, has been able to grab the attention of users of Information technology. Of late, it has become quite common in general mass and techno experts. During the recent decades, it has evolved many folds. Similarly, lots of developments occur in the Information Technology Sector. With the growing population of IT users, the computing processes have revolutionized. Earlier, due to the shortage of data resources as well as processing limitations, time consumption in earlier times was huge. It involved sophisticated hardware, too. Thanks to the advent in recent developments in IT sectors. Even if we lack physical hardware and software, the computing time and cost have drastically reduced because of the cloud network. The cloud symbol symbolizes the internet. Cloud computing is now commonly referred to designate software delivery, infrastructure and storage services over the internet. Users of the cloud can take benefits from other organizations providing services associated with their data, software and other computing requirements on their behalf. While doing so, it is not necessary that individuals have to own or run the usual physical hardware (such as servers) and software (such as email) themselves. Cloud computing is the next stage in the evolution of the internet, it provides the resources through which everything from computing power to computing infrastructure, applications and business processes can be conveyed to the needy as a service irrespective of location and time.

This note gives a familiarization of internet-based cloud computing, exploring the characteristics, service models, and deployment models in use today, as well as the benefits and challenges associated with cloud computing. Further, the importance of scalability and flexibility in a cloud-based environment is also highlighted.

2. What is Cloud Computing?

Cloud computing is a very recent term. It is evolving day by day. The word cloud is a misnomer. Just like the location of a cloud is not fixed, it can be anywhere. Similarly, the location of a cloud is also arbitrary. It can possess any configuration just like the shape of an arbitrary cloud. The interaction between user and services is enabled by the internet. It bridges the communication between end-users and service providers. Noteworthy is that there is no precise definition of cloud computing. However, among the very few, one needs special mention as framed by some well-known organizations. As defined by NIST, cloud computing refers to a model for enabling convenient, on-demand network access to shared pool of configurable computing resources (e.g. Networks, servers, storage, applications, and services) [1-9].

3. Requirement of Cloud

What is the requirement of the cloud? We can think of a CPU with greater storage power and processing speed. However, when the demand for user application or services rises rapidly; it becomes impossible for one CPU to handle. Under such circumstances; cloud computing takes control of it and handles it with large storage capability and unlimited processing speed.

4. Characteristics of Cloud Computing

Cloud computing is characterized by features like on demand self-service, broad network services, resource pooling, rapid elasticity and measured service. Some of the salient features of cloud computing are listed below.

4.1. Self-Healing

Any service or application running under cloud computing is endowed with this capacity. Suppose the application or service encounters failure. In such cases, it is taken over by its back up present in the system without causing any disruption. In addition to that, there is regular up gradation of multiple copies of an application. So, failure leads to replacement of existing one with the most updated one without losing any functionality.

4.2. Multi-Tenancy

This is a very unique property of cloud computing. Several tenants can use an application or service without any knowledge of others, also using it. In doing so, privacy of the users is not compromised. This is accomplished by virtualizing the servers on the existing machine pool and subsequent distribution of it to users.

4.3. Scalability with linearity

Another characteristic feature of cloud computing is its scalability. This is achieved by decomposing its loads into several processes and thereby service is made accessible across the infrastructure. For instance, if one server can handle two transactions per second, double its number, i.e. 2000 transaction per second can be executed by two servers.

4.4. SLA Driven

In general, there is argument on the amount of services, done by business. However, due to SLA driven, the system automatically adjusts itself so that compliance of service-level-agreements is maintained at the time of excess loads. The service will create additional instances of application on more servers so that load becomes manageable.

4.5. Virtuality

Without any adherence to underlying structure, cloud computing offers a virtualized platform.

4.6. Flexibility

This is another important characteristic feature. As from the term cloud computing renders a flexible service. It is meant that from small wads to several loads; cloud computing can be flexibly dragged.

5. Benefits of Cloud Computing

As it is driven by service level agreements; there is freedom for the user to terminate at any time (whatever). Meanwhile, the clients are charged only on its consumption level which, in a way, reduces upfront capital expenditure in terms of hardware and software. How is cloud computing beneficial to us can be perceived by the following features.

- ✓ Cloud computing is independent of location; one can access it as long as there is internet.
- ✓ Giving ample scope to end-user to focus on its core business.
- ✓ Having competition advantage.
- ✓ Easy maintenance due to non-installation at individual computer.
- ✓ Since cloud computing is characterized by centralized database and augmented security focused resources; hence, it renders security at a much lesser cost in comparison standalone applications.

6. Cloud Delivery Models

6.1. Software as a Service (SaaS)

In this model, service provider supplies applications. No management or control of the underlying cloud infrastructure or individual application capabilities is conducted by the user. The services come under this category such as

- Enterprise services. As for example, we can include workflow management, group-ware and collaborative, supply chain, communications, digital signature, customer relationship management (CRM), desktop software, financial management, geo-spatial, and search.
- Metadata management, social networking, portal services, wiki services are categorized as under Web 2.0 applications.

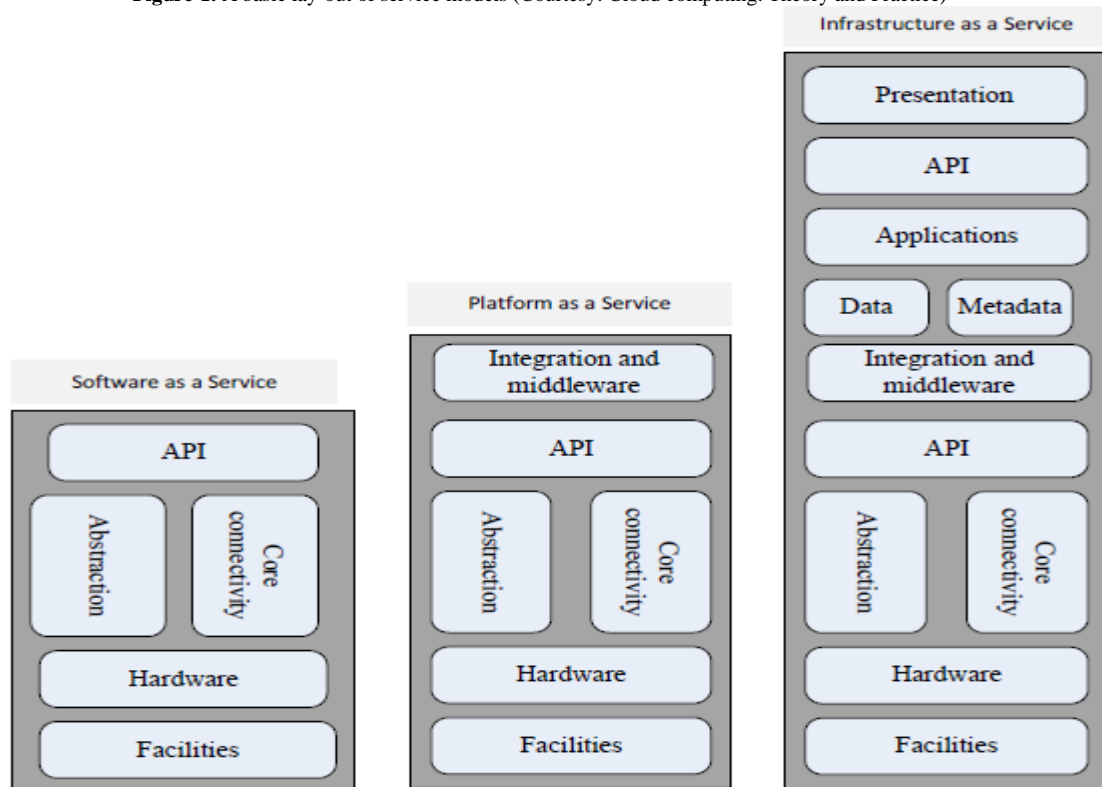
However, SaaS is not recommended for some real time application. They include Gmail, google search engine. They are basically characterized by data which are externally accommodated.

6.2. Platform as a Service (PaaS)

PaaS is a little bit different from SaaS. It permits a cloud user to install applications which are either accrued or created by consumer with the aid of programming languages and tools supported by service provider. In such cases, total control over the deployed applications and configurations environment which house the applications. While doing so, the user does not perturb the underlying cloud infrastructure including network, servers, operating systems, or storage. However, the PaaS is not useful for portable application, proprietary programming languages. Similarly, there should be customization of hardware and software towards augmenting the performance of the application.

6.3. Infrastructure as a Service (IaaS)

In this model, there is freedom for the user to install and execute any arbitrary software encompassing operating systems and applications. Although, he is not capable of managing or controlling the underlying structures, but he has command over operating systems, storage and all installed applications. To some extent, management of host firewalls also comes under the domain of the user. This delivery model renders the services such as server hosting, web servers, storage, computing hardware, operating systems, virtual instances, load balancing, Internet access, and bandwidth provisioning. The service models are illustrated in [Figure 1](#).

Figure-1. A basic lay-out of service models (Courtesy: Cloud computing: Theory and Practice)

7. Cloud Computing Challenges

Although there are lots of benefits of cloud computing; yet it cannot be said that it is totally free from defects/imperfection [3-7]. More appropriately, we can term their imperfections as challenges of cloud computing. Some of them are listed below

7.1. Data Profusion

Security of data is of utmost importance which needs to be monitored. Often, it is seen that enterprises are not willing to take any business data security. This happens due to fear of losing data to competitors and confidentiality of consumer's data. Sometimes, information regarding storage location is also hidden which increases the security concerns of the enterprises. In the cloud model, it is the sole responsibility of the service providers.

7.2. Data Recovery and Availability

As mentioned previously, business applications are SLA driven. Operational teams play the role of managing service level agreements and runtime governance of applications. There are services which include sequential clustering, replication of data, continuous monitoring of systems, reunited maintenance, recovery from an eminent fall out, regular building up capacity and performance. If there arises any lacunae on the aforementioned activities run by the operational team, one can apprehend the kind of damage and impact.

7.3. Capacity towards Management

Although several cloud provides are there; however, managing the platform and infrastructure is still under-developed. More enterprises resort to Auto Scale. As such, there is requirement for improvement in scalability and balancing of load.

7.4. Regularity and Restrictions Imposed In Compliance

When there are strict regulations imposed on cloud providers that the personal data of customers and sensitive information cannot be given access outside a physical boundary, then cloud providers become bound to take measures. Complying with such strict regulations of government, they are compelled to constitute data center or storage location which should exclusively situate inside the state or country. Such kind of infrastructures is not always possible and it triggers a bigger challenge for the cloud providers

7.5. Future Work and Scope

Cloud computing or service may be vulnerable for some reasons. Thus, one cannot rule out the possibility of these vulnerabilities, exploited by criminals or persons with bad intentions. As a matter of fact, issue of cyber security is neither owned by a private or public cloud [7-9]. To circumvent such issues, there must be synergistic approach amongst all the stack holders. It should be transparent and reliable between govt. agencies; services cloud providers as well as law enforcement agencies. It is high time that a comprehensive and all-inclusive cyber security

should be developed. While doing so, there should be a synchronized endeavor between public and private sector. It is expected that joint venture would identify and priorities the current and emerging risk areas. Further, development and validation of effective measures with mitigation controls is another requirement. For this to happen, it necessitates a standard taking care of certain modalities to be fulfilled thereby ensuring a level of information exchange security.

Keeping this in mind, it can be opined that higher marginal costs will lead to higher level of security. Towards development of security culture, government should initiate giving identities to cloud service providers for integrating security info software, hardware and system. Thus, security breaches would initial higher cost which in turn, diminishes marginal benefits of cybercrime.

8. Conclusions

In this technical note, the basics of cloud computing is outlined. Starting from definition, the characteristics, modalities are touched upon. The benefits as well as service models of cloud computing are lucidly highlighted. Although, cloud computing has come a long way since its inception, there are some hurdles which need to be overcome. It is expected that the challenges as explained can be sorted out to the best possible extent and thereby, new horizons in cloud computing will bloom in the days to come.

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