



A Review on CLOUD COMPUTING and its Models

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Abstract: *Cloud Computing provides IT-related novelties over the Internet. The field has seen a certain explosive growth due to it being adopted by various organizations which was not until recently due to being unfamiliar. Many distributed computing suppliers, for example, Google, Microsoft, Yippee, IBM and Amazon are moving towards reception of cloud innovation prompting extensive acceleration in the utilization of different cloud administrations. Amazon is the pioneer right now of it's increasingly number of structural highlights contrasted with others. To address the issues of cloud specialist co-ops and clients different open source devices and business devices are being created. In spite of the fact that a lot more improvements have been occurred in distributed computing region, numerous difficulties, for example, security, interoperability, asset booking, virtualization and so on are yet to be adjusted. This paper discusses the history of cloud over time, its features, characteristics and advantages, the adoption of cloud by IT Organizations and Challenges faced by cloud, three models of service (SaaS, IaaS and PaaS) and three models of deployment (Public, Private and Hybrid Cloud). Furthermore the paper highlights challenges faced by the platform, its Security and issues regarding security of the field.*

Keywords: Cloud computing, deployment model, security.

I. INTRODUCTION

The word “cloud” is used as a metaphor in cloud computing which interprets as utilization of computer hardware which is not physically present but available over the internet. It is also defined as “a model for facultative omnipresent, convenient, ondemand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that may be quickly provisioned and discharged with stripped-down management effort or service supplier interaction” by the NIST.

That means, rather than using the hardware present on your PC, or provided by your company, you work on a virtual computer system deemed to present somewhere over the humongous “cloud”. Cloud can also be an ambiguous term, some think of it as anything in remote service outside your computer network, for some it is, in simple words, the next generation of IT, as the capabilities of Cloud remain unimaginable.

Despite the fact it took some time for consumers to adopt the technology. The field has seen a certain growth recently; it has left a dazzling impact on the customers by providing the services, which are otherwise expensive, at a very low cost. You have to pay only for what and how much you use instead of buying whatever you will need at a certain point. Cloud can supply powerful hardware resources, enormous pool for information and data storage and it is all delivered at jetspeed, what more do you ask?

Although the services are fancy, uninterrupted, have simple management and easy-to-use, the field still has a lot of hurdles to jump over such as migration from one provider to another, virtualization, resource distribution and equalization, data security and aspects of quality and quantity.

II. HISTORY

Although the definition of cloud model is uncertain and depends on how the users wants to discern it. However, the term was familiarized by the release of

Elastic Compute Cloud by Amazon in 2006. *Despite the fact that the phrase had surfaced in 1996 in Compaq's internal documents. The trace goes back to 1993 where the term was used to refer to distributed computing in AT&T and General Magic's technologies.*

2006	- Amazon introduced Elastic Compute Cloud
2008	- Google released Google App Engine (beta)
2009	- More vendors joined the Cloud market.
2010	- Microsoft released Microsoft Azure. - Open source cloud platform, OpenStack, was launched.
2009-12	- Cloud Computing started to surface as a popular technology.
2013	- Google released its Google Compute Engine.
2014-15	- Cloud started getting adopted by various IT branches.

Figure 1: Chronological History of Cloud Computing

III. CHARACTERISTICS AND FEATURES

The National Institute of Standards and Technology's definition of cloud computing identifies "five essential characteristics":

On-demand self-service A consumer can go on performing all the actions needed to acquire the services one require by oneself avoiding any direct or indirect interaction with the service provider.

Broad network access Cloud resources are available over the internet and can be accessed through standard mechanism i.e by use of heterogeneous clients such as mobile phone, laptop.

Resource pooling Multitenancy is used while providing computing resources; these are pooled, assigned and reassigned on-demand according to the use.

Rapid elasticity Capabilities seem to be unlimited as they are automatically provisioned and released.

Measured service Systems automatically control and measure resource usage while providing the transparency to the user.

Further, **Multi-tenancy** This is the state-of-art technology where consumers are treated as tenants. Multi-tenancy allows customers to run one server instance, which is less expensive and makes it easier to deploy updates to a large number of customers.

Device Location and Independence Users can access their data and resources using a web browser regardless of their device and place. It can be accessed from anywhere at any time.

Inexpensive even the most powerful hardware requires no physical space or electrical charges cutting down the cost with a marginable factor if compared to when bought permanently.

Performance due to the above listed features, allocated resources are constantly in high performance with zero interruptions and drops.

Centralization of data the storage of data is equalized, due to which Security also increases along with more security-focused resources.

Availability data can be accessed from anywhere at anytime needed, and disaster recover can easily be done which is almost impossible for physical hardware's.

IV. SECURITY

Services on cloud are delivered in different models, (of the type XaaS which stands for X as a service). Clients can choose the services as per as their demands. According to NIST, there are three standard models:

Software as a Service

In this service model, users gain access to software applications directly through cloud network according to their need. Eg: Google Docs, Word Online, salesforce.com, etc.

Platform as a Service

It provides access to runtime development environments to developers and testers. Usually a bundle of programming environment, database and webserver is delivered to user on pay-to-use basis. Eg : Amazon AWS, Google App Engine, Microsoft Azure, etc.

Infrastructure as a Service

It is a collection of servers, raw storage, firewalls and networks. It works on the principle of resource-virtualization where the resources are virtualized through virtual desktop. The usage is billed upon the usage and/or performance per hour. Eg : Amazon S3, rackspace, VMWare.

V. DEPLOYMENT

Private Cloud

This type of cloud infrastructure is for a specific organization host only which is controlled by the organization itself for maintaining security and privacy

while providing the services to its members. Eg : Seagate.

Public Cloud

This is publicly accessible to all users. Different services are made available by a service provider for undisguised consumers. Eg : Amazon AWS, Google App Engine.

Hybrid Cloud

Hybrid cloud is formed by the appending-together of public and private clouds. It is hosted by a third-party organization but only a specific organization utilizes the resources. Eg: Bluemix.net

VI. CHALLENGES

Despite of all the above listed features, advantages and the popularity achieved by cloud computing. There are many hardcore challenges faced by the field. These include data loss, data cleaning, account hijacking, less control over the process, lack of legal aspects, lack of migration from one service provider to another, less reliable.

Security faces a lot of challenges on its own such as interoperability, data leakage, availability which is discussed later in the paper.

Outsourcing

There is no assure that the data is not accessed by anyone not authorized by the customer. A host selling out privacy is not rare.

Interoperability

One cannot migrate from one vendor to another easily. And at some point, one might need to, because of latencies, problems, etc, so cloud computing faces a huge challenge in the portability from one vendor to another.

Multi-tenancy

The cloud platform is shared and exploited by multiple clients and organizations.

Load Balancing

Continuous monitoring of the resources leads to overloading of the platform, causing difficulties in provisioning and assigning. The load balancer needs to inform the overhead to stop sending signals to the unresponsive system which would otherwise cause a crash.

Resource Scheduling

Automatic assignment of resources is the backbone of cloud computing, however implementation of multi-tenancy and multitasking is a hectic and complicated

process. Inefficient scheduling may lead to less productive platforms.

VII. SECURITY OBJECTIVE

In a cloud, responsibility for using and conserving economical security mechanisms square measure in the hands of the suppliers to cut back their customer's panic of the cloud, these providers wish to convert them that their knowledge and applications are going to be accurately secured.

Confidentiality The data should be accessible to authorised personnel only and the privacy of data, at all costs, must be assured. Which means data should not be visible to illegal entities.

Integrity Data must be protected from any kind of manipulation, destruction, damage and discrepancy. It should be in the same form while accessing as it was when stored.

Availability Information, data and resources must be available whenever wherever need by the consumer.

While maintaining the above CIA Security Model, certain principles such as encryption, ciphering, multiplexing, abstraction, protection, etc are entertained. However, there are still issues faced in the security of data and network-based security which are discussed in next section.

VIII. SECURITY ISSUES

Multilocation of data centres Data is stored at different places which might lead to loss of data, leakage or even discrepancies and manipulation in data.

Combination of data As the cloud model works on assigning of resources between multiple users, data may get shared to an unauthorized person, may get corrupted or destroyed and lead to loss of data and confidentiality.

Vulnerability As long as a third party is involved for management of data, it remains vulnerable of getting hijacked. Data of an organization being stored in some other organization, what could possibly go wrong?

Malicious insiders Attackers use botnets and spam to penetrate inside a cloud platform and end up stealing data or inserting garbage data inside your storage. We know the data pools remain shared between multiple users which can make it contagious, aggravating the situation.

Network security issues Various attacks over the network can be done by hackers such as man in the middle attack, SQL Injection to gain access to database, Cross Site Scripting, Exploitation of

loopholes, Sniffering attacks, Cookie poisoning, Reused IP Address, DoS attacks, Captcha-bypassing etc.

IX. CONCLUSION

In this review paper, short introduction, history, characteristics, features, and services of cloud computing and also different approaches of cloud computing and some of its services has been summarized. Today approximately all small and big industries are using cloud computing to manage their data, traffic, storage and other hardware requirements. The application area of cloud computing will continuously is increasing. So it is clear that there is major impact of cloud computing on society and business.

References

- [1]. Sameer Rajan, ApurvaJairath “Cloud Computing: The Fifth generation of Computing” 2011 International Conference on Communication Systems and Network Technologies.
- [2]. M.Malathi “Cloud Computing Concepts”.
- [3]. Garrison, G., Kim, S., Wakefield, R.L.: Success Factors for Deploying Cloud Computing. Commun. ACM. 55, 62–68 (2012).
- [4]. Nathaniel Borenstein and James Blake “Cloud Computing Standards”.
- [5]. PeeyushMathur, Nikhil Nishchal “Cloud Computing: New challenge to the entire computer industry” 2010 1st International Conference on Parallel, Distributed and Grid Computing.
- [6]. Tharam Dillon, Chen Wu and Elizabeth Chang “Cloud Computing: Issues and Challenges” 2010 24th IEEE International Conference on Advanced Information Networking and Applications.
- [7]. Venters, W., Whitley, E.A.: A Critical Review of Cloud Computing: Researching Desires and Realities. J. Inf. Technol. 27, 179–197 (2012).
- [8]. Naidila Sadashiv, S. M Dilip Kumar “Cluster, Grid and Cloud Computing: A Detailed Comparison” The 6th International Conference on Computer Science & Education (ICCSE 2011) August 3-5, 2011. SuperStar Virgo, Singapore.
- [9]. Yang, H., Tate, M.: A Descriptive Literature Review and Classification of Cloud Computing Research. Common. Assoc. Inf. Syst. 31 (2012).
- [10]. Khaing, Cho Cho and Hnin, Zar Zar and Mon, Ei Ei “Big Data Analytic and Efficient Data Storage System on Cloud Computing, International Journal of Advanced Trends in Computer Applications,6 (2), 10-14, 2019.