

# CLOUD COMPUTING: OPPORTUNITIES AND CHALLENGES

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**Abstract**—The cloud computing technology is providing the present world with the improved methods of storage, performance of an application and computation. Cloud computing could be described as on-demand availability of the resources of computer system, specifically the data storage as well as the computing power, deprived of any kind of direct active management by users. The opportunities and challenges that are associated with the cloud computing technology will be discussed within the paper.

**Keywords**—Cloud Computing, Opportunities, challenges, cloud service models.

## I. INTRODUCTION

Cloud computing could be described as on-demand availability of the resources of computer system, specifically the data storage as well as the computing power, deprived of any kind of direct active management by users. This term is commonly utilized for describing the data centers accessible for several users over internet. The large clouds that are predominant in the present times, frequently have the functions that are distributed over the several locations from the central servers. This report intends to analyse the cloud computing aspects and determine the major issues and challenges of the cloud computing technology.

## II. DISCUSSION

### A. Cloud computing

The cloud computing technology is the versatile technology that has the ability of supporting the broad-spectrum of various applications. The significant low cost of the cloud computing as well as the dynamic scaling makes this technology the major innovation driver for the small companies, specifically in developing world. The applications of SCM, applications of CRM, medical applications and the ERP system deployed over the cloud technology possess the extensive potential of reaching more than millions of users. The cloud computing technology is the model that is used to enable the convenient, on-demand access to the network to any shared pool of the configurable resources of computing that could be rapidly provisioned as well as released with the minimum effort of management or the interaction of any service provider [1]. The cloud computing technology has presently emerged as the popular solution for providing the cheap as well as the easy access to the externalized IT resources. The increasing number of the organizations

significantly benefits from the cloud computing technology for hosting the application. The most common deployment strategies of the cloud storage are the public cloud, private cloud, hybrid cloud and the community cloud. The common delivery models of the cloud computing technology are the SaaS, IaaS and the PaaS. With the help of extensive virtualization, the cloud computing technology has the ability of addressing the similar physical infrastructure that is required by any large client base with the various computational necessities [2]. When this technology is compared to the other technology, it could be observed that this technology is mainly service oriented and not application oriented and it has the ability of offering the on-demand virtualization resources as the measurable and the billable utilities.

### B. Characteristics of cloud computing

There are several characteristics that makes the cloud computing technology beneficial for the users, such as:

**On-demand self-service:** The consumers who are using the cloud computing technology could unilaterally provision the abilities of computing, like the server time, as well as the network storage as required automatically deprived of needing any kind of human interaction with the each of the provider of cloud services [3].

**Vast network access:** The capabilities of the cloud computing is made available across the network and it could easily be accessed with the standard mechanisms that promotes the utilization by the heterogeneous thin or the thick client platforms.

**Resource pooling:** the computing resources of the providers are extensively pooled for serving the multiple consumers who are using the multi-tenant model with the various physical as well as the virtual resources that are dynamically assigned and even reassigned as per the demands of the customers. There is significant sense of the location independence in that subscriber commonly has minimum control or the knowledge over exact location of provided resources but might have the ability of specifying the location at any higher level of abstraction [4].

**Swift elasticity:** The capabilities of the cloud storage could be swiftly as well as the elastically provisioned, in the some situations automatically, for easily scaling out and swiftly released for easily scaling in. For the consumers, all the main capabilities accessible for provisioning frequently appears unlimited as well as could be easily purchased in the quantity at any particular time.

Measured service: The cloud systems has the ability of automatically controlling as well as optimizing the use of the resources by the leveraging of metering capability at significant level of the abstraction that is appropriate to kind of the services [5]. The usage of the resources could be easily controlled, monitored as well as the reported and it allows the extensive transparency for the both consumer as well as the provider of used services.

### C. Cloud computing opportunities

There are vast opportunities of the cloud computing sector that is offered to the IT industry [6]. The cloud computing technology is mainly concerned with delivery of the IT capabilities as the service on three basic levels, which are the infrastructure, platforms, as well as the software. By offering the effective interfaces on the three levels, various kinds of customers are addressed by the cloud, which are:

End consumers: These kinds of consumers primarily use the services of SaaS layer over any web browser as well as the fundamental offerings of IaaS layer, for example the storage of significant data leading from usage of SaaS layer [7].

Business customers: These kinds of customers accesses all the three layers, that are the IaaS layer for enhancing their respective infrastructure with the additional resources on extensive demand, PaaS layer for gaining the ability of running their respective application in the cloud and finally the SaaS layer for taking the significant advantage of the accessible applications provided as the services.

Independent software vendors and the developers: The independent software vendors that develops the applications are considered to be provided the facilities of the SaaS layer of the cloud. Commonly, these kind of service mainly accesses the PaaS layer and using the PaaS layer indirectly, they access the IaaS layer and they are present on SaaS layer with the applications [8]. Commonly, for all the various types of the customers of cloud, the cloud technology provides the major opportunities that are referred as the X-as-a service offerings. When the usage is considered from the viewpoint of users, the payment model that is based on the utility has been considered to be the major benefits of the cloud computing technology. There is no additional need for any kind of up-front infrastructure investment, as the main investment is done in the software licenses and there is no risk on the unused but the paid software. Therefore, the capital expenditure has been turned in the licenses and the investment in the hardware infrastructure as well as the associated maintenance by the staffs of the vendors into the operational expenditure. The users of any cloud service solely, utilizes the volume of required IT resources that are actually required by them and solely they pay for volume of the IT resources that are being actually used by the customers [9]. At the similar instance, the users could take extensive advantage of the flexibility as well as the scalability of the cloud. The cloud computing allows the easy as well as the fast scaling of the needed demand computing resources on the demand.

### D. Cloud computing challenges

Even though the cloud computing technology provides several benefits to the consumers, there are various challenges and issues of cloud computing that are required to be considered by the consumers and the vendors [10]. As the majority of the economics is connected with the field, it would be better if the issues have been resolved as soon as possible. Some of the prominent issues of the cloud computing technology are:

#### 1) Security:

When the users are using the cloud based services, one party is completely entrusting their sensitive data to any third party for the security and storage. The main security concern that is developed in this situation is that does the cloud based company have the proper resources and the security protocols for securing the data of the customers. The cloud computing technology presents the particular challenges to the privacy as well as the security. It is recommended that the users should back up the data, check for any kind of data errors, and finally defend against the security breaches. Another security concern among the cloud consumers is that as soon as the data has been entrusted to any cloud based services, which are the third-parties are they sharing the information with [11]. The sourcing of cloud mainly includes the utilization of several services, and several cloud based services provides the services to one another, and therefore the products that are cloud based might be required to share the information with the third parties if they are connected in the processing or the transferring of the information. The cloud based vendors might share this information with any of the advertisers. The security aspect of the cloud technology is the prominent threat to users of the cloud storage.

#### 2) Performance:

It has been observed that in the present times, the cloud computing technology suffers from extensive performance issues. The cloud provider should ensure that performance of the services that is being provided should remain similar all through. There might be breakdowns in the peak times, the internal flaws, as well as the arising of technical snags. The load balancer, high end servers as well as the data replicators are required to be installed when it is required [12].

#### 3) Availability:

Although the cloud ensures that services is provided 24X7X365, the cloud outages happens often in the cloud storage. The outages could be scheduled or even unscheduled.

#### 4) Costs:

The cost of the cloud computing technology is significantly high because of the requirements of always on connection and the utilization of huge amount of the data back in-house.

#### 5) Regulatory requirements:

What kind of legislative, regulatory, judicial as well as the policy environments are the cloud based information subjected to? This is another issue of the cloud computing technology that is hard in ascertaining because of the decentralized as well as the worldwide framework of internet and the cloud computing [16]. The information that has been stored by the

cloud services has been observed to be subjected to the legal, policy as well as the regulatory environments of country of the domicile of cloud services and the country in which the establishment of the server infrastructure has been done. This particular issue has been found to be the most complicated issue by the consideration of the fact that some of the data in the transit might be also regulated by the governing bodies [13].

6) *Quality of service, bandwidth and the data limits:*

The cloud computing needs the appropriate broadband of the considerable speed whilst several websites are extensively usable on the non-broadband connections or the slow connection of broadband, the cloud applications are frequently not usable [14]. The connection speed whose range in the within the Mb/s and GB/s is required for using the service of the cloud technology. Another vital aspect are the quality of the services, which are the indicators that includes the amount of time when there is a drop in the connections, the response time and ranges of delays in processing of the network data as well as the loss of the data [15].

### III. CONCLUSION

Therefore, it could be concluded that the cloud computing technology has allowed the extensive simplification of the data storage and data security for the users. Presently, there are various interests as well as concerns with the cloud computing technology. From the perspective of the technology, there are various interesting technical issues that are required to be solved. From the perspective of the service or consumers, there are significant stability, usability as well as the reliability issues that are required to be solved. The users of the cloud computing technology are facing the major issues that are required to be eliminated for ensuring that extensive data security is provided to the users. For staying connected, for remaining meaningful, for growing in service spaces, the cloud providers are required to improve the service and strong cloud implementations. While considering the other perspective, presently, the world has been poised for exploding with the innovative devices that would be significantly desperate for the technology that is offered by the clouds.

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