Benefits and Issues of Cloud Technology in Present Scenario

***Vandana Nigam**
****Shalu J. Rajawat**

ABSTRACT:

Cloud computing is a budding technology which provides the ways to improve the capabilities of existing system without investing much funds on infrastructure. This pioneer technology gives user high end service and relinquishes from managing and storing data at several places with high cost. The emerging technology not only offers basic service, platform and infrastructure but is flexible enough to arrange infrastructure, data and services as per demands for coming future. In present scenario, this is the only available technology that can be used by small, medium and big organizations for gratify their demands of keeping large and corporate data on secure servers, providing infrastructure using virtual concepts. This review paper highlights various benefits such as reduced cost, availability of resources on demand, quality control, competitive advantage etc. and some serious issues like security, availability, reliability which still act as barrier in full growth of cloud.

Keywords- Cloud technology, cloud computing, cloud architecture, deployment model, benefits, cloud issues, challenges

1. INTRODUCTION

Cloud Computing is a modern concept which completely transform the Information Technology Industry. Gartner (2009) defines cloud computing as an approach of computing where massively scalable IT enabled potentials are distributed as a service to outdoor clients using internet technologies. The most widely used definition of cloud computing as per **NIST** is "Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model promotes availability and is composed of five essential characteristics, three service models, and four deployment models." [1]

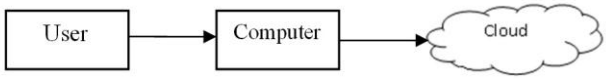
It radically modifies the functioning environment for IT professionals and provides solutions for many conventional problems like paucity of resources at instantaneous demand, managing crest load and installation of software updates frequently. Cloud delivers more and more capabilities to the organizations and customers using virtualization without investing on new infrastructure, software and services. More and more organizations are moving towards cloud architecture because of easy availability of internet connectivity and rapid escalation of data. Literature Review

Cloud is a very popular subject and area of research for researchers. Rajkumar Buyya, Chee Yeo, Srikumar Venugopal and James Broberg in their research paper "Cloud computing and emerging IT platforms: Vision, hype, and reality for delivering computing as the 5th utility" explained that cloud is a positive platform for future to keep large industrial data and there is a need to update and improve the existing infrastructure so that future needs can be satisfied as cloud is the future of IT industry.

Rachna Arora and Anshu Parashar in their research paper "Secure User Data in Cloud Computing Using Encryption Algorithms" pinpointed many security issues like data security, data ownership

and trans-code data storage.

Dimitiros Zissis and Dimitiros Lekkas in their paper "Addressing cloud computing security issues" explained that cloud is the most promising technology in today's era which provide various facilities to the users like flexibility, scalability, broad network access, location independence etc but is not free from several issues like security, availability issues which can't be overlooked while organizations considering to adopt the cloud technology.



2. CLOUD ARCHITECTURE

Cloud is a complex system consists of various techniques, database, deployment and service model. In cloud architecture various layers, components and subcomponents and interface between them are designed to ensure its proper functioning and execution. It is a combination of three sub architecture named business, technical and operational architecture.

- **Business Architecture** basically deals with trade aspects of cloud services. It includes cost, service bond and agreement. It also ensures the smooth and error free communication between various service providers and users.
- **Technical Architecture** involves the design of various components and platform of the cloud and covers the relationship between them. It deals with the technical aspects of the architecture through which the relationship, security measures can be planned and executed in most appropriate manner. It acts as middleware.
- **Operational Architecture** describes the actual working of the whole architecture as a single unit. It grips lawful issues linked with hosting of data, location of data, monitoring operational performance under various conditions, network availability and equipped feasibility.

Cloud system is basically made up of two main components-

1. **Front End**-This is also called top layer which is noticeable part to the end user and it may include laptop, desktop, end users' devices, network and browser. It is used by users to browse the software, platform and application provided by cloud.
2. **Back End-** The hidden residual part of the cloud which comprises of various applications, computers, storage devices and software. It is also known as back end of the cloud. Back end has the capacity to handle huge data storage, provides virtual machines, servers and all required infrastructure. It is the accountability of the back end to supply en-suite security means, traffic control and protocols. The servers must contain middleware protocols so that a proper communication between devices takes place [2]. It is important here that a hidden layer called middleware is employed by the server having some protocols whose key task is to make smooth connection between communicating devices for exchanging the data.

3. DEPLOYMENT MODEL OF CLOUD COMPUTING

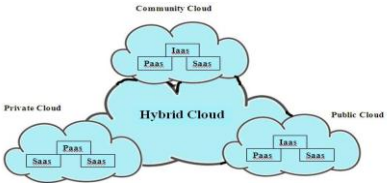
Cloud computing provides following deployment models-

Private Cloud- When the cloud is supervised, owned and activated by a single organization, which may comprise with multiple consumers then such cloud is known as private cloud. They may be supported by third party.

Community Cloud-When cloud is created with definite community of consumers from different group that have some common goals then this type of cloud is known as community cloud. The common goals may be safekeeping of data, some shared policy, shared expenses and conformity issues. Community cloud system is handled, managed and executed by more than one organization as a community.

Public Cloud- When cloud infrastructure is handled by trade, educational or some government organization or combination of it then such type is called as public cloud. This cloud infrastructure is kept open for general public. It exists on the premises of the cloud provider.

Hybrid Cloud-An amalgamation of two or more cloud infrastructure (private, public or community) is called hybrid cloud. They are clubbed together by some standard technology which facilitates data and application portability. Hybrid provides combined benefits of public, private and community cloud.



4. SERVICE MODELS OF CLOUD COMPUTING

Cloud service model depicts the structure of service which acts as a blueprint for various services. Cloud computing offers three service models.

Software as a Service (SaaS)- SaaS is a software delivery model which is hosted by vendor or some service provider and made accessible to the patrons over network against some charges. Consumers are no longer to bother about network, server and operating system. It facilitates users to utilize software according to the needs over the network and frees from purchase, installation and maintenance. Software and related infrastructure is managed and controlled by the service providers only. This model grant various benefits like geographically separated users who are working on same project can get same version of software with easy collaboration, global accessibility and availability of updated software.

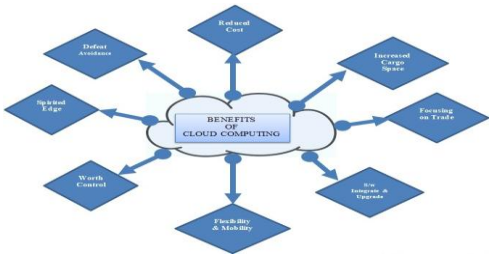
Platform as a Service (PaaS)- When a customer needs operating system, storage and network capacity over the internet then PaaS facilitates them to use virtual servers and associated services to run existing applications as well as to develop new applications on rental basis. It provides various programming languages, libraries, tools application platform and database services to users as per needs. This model delivers various advantages to customers like operating system attributes can be alter and modified rapidly, services from international organizations can be entertained, no need to maintain multiple hardware facilities and overall expenses can be reduced to a great extent.

Infrastructure as a Service (IaaS)- IaaS provides moment computing infrastructure for customers managed by cloud service provider. Infrastructure is solely managed and owned by service providers and responsible for its shelter, execution and maintenance. It not only helps to reduce the expenses

and complexity of managing own infrastructure but also relinquish customers from purchase, install, manage and configure its own software.

5. BENEFITS OF CLOUD COMPUTING

Cloud computing is a rising technology that provides more benefits to its communal users in present scenario. More and more business companies are migrating towards cloud technology. It provides various benefits to the organization specially small and medium one which need improved facilities without investing much cost on infrastructure, services and other factors. Some of the benefits are-



Reduced Cost: Cloud technology is the most preferred technology that is based on the fact that pays only for what you use. It relinquishes the users from burden of increased cost on infrastructure, service and application because they can use all such factors from cloud service providers against ostensible payment.

Increased Cargo Space: Information and data is the biggest asset for any organization which must be stored and managed effectively and efficiently. Cloud provides huge space to store giant data on the servers. The large volume of data is stored and managed by cloud service providers. They are also capable to manage certain spikes at peak load since cloud storage space can scale dynamically without human intervention.

Focusing on Trade: When organizations adopt the cloud technology they do not need to trouble about technical, mechanical and other issues related with speed, storage space, availability and back up. All these issues are managed and handled by the cloud services providers. It gratis the users from handling troubles and they can focus and improve on their business activities.

Automatic Software Integration and Upgradation: When users switch to cloud technology, software integration takes place mechanically. With cloud technology corporate users need not to take pains to modify and incorporate their applications as per own fondness instead various needed software integration takes place automatically. Along with automatic integration, automatic upgraded software is provided to users and they need not to bother about whether they are using latest version of software or not [3].

Flexibility and Mobility: Cloud Technology offers more flexibility to its corporate users. They can access their data and relevant information from anywhere on their mobile devices than relying only on the local servers. Cloud offers suitable information admittance to its busy users without getting worried about geographical locations of data and users.

Worth Control: A business's success is related to its quality or worth of product and service provided by the business unit. In cloud technology all the documents of the organization is stored at a single place in a single arrangement. It keeps the data to be saved in single version without any confusion which increase the quality of the reporting, avoid inconsistency and maintain integrity. All these factors not only increase quality and worth of the organization but help to maintain better control

over documentation.

Spirited Edge: Although cloud is an emerging technology, most of the organizations still believe to work on traditional system. The benefits provided by the cloud technology is more than keeping everything restricted. If cloud based solution are implemented by the corporate users, it provides competitive advantage to its users and keep them in front position than their competitors. Users are in touch of latest infrastructure, platform and service, so they are always ready to switch and adapt latest technology of business and get benefitted from them [4].

Defeat Avoidance: When data is stored on the local hardware then virus infection, hardware malfunctioning, hardware worsening and other problem can permanently delete the data. On local hardware, data can be intentionally deleted which may create some new problems, but cloud technology is a promising technology that can provide protection against local vulnerabilities as data is stored on servers and their regular backup and recovery keep all data secure and ready to use as per requirement.

6. ISSUES AND CHALLANGES WITH CLOUD COMPUTING

Cloud computing changed the way of functioning of organizations and occupies very important place in IT Industry. But besides providing various facilities it is not gratis from some serious issues and challenges. Some of the challenges are discussed here-

Reliability & Availability: Reliability shows prospects that how much accurate outputs organization will harvest. It is a feature that used to elude, identify and darning hardware errors. Reliable system not only gives correct and proper data but should be capable to detect faults and correct them [5]. But in cloud technology reliability is a serious issue because it depends on network, which does not guarantee reliable connection all times as they are vulnerable to failure due to some technical reasons. Providers are capable to provide all demanded services through network but network connection is unreliable [6]. Whenever connection is broken for any reason (technical, mechanical or physical) it is necessary that connectivity should ends in a graceful manner without damaging.

Availability is an essential feature expected from cloud technology which allows the system to be operational even when some bugs and fault do occur. It is expected that cloud systems must be highly available and are able to handle malfunctioning and respond even with some reduced capacity. But actually, some less capable system do not respond and crash at peak load it badly affects the performance and reliability.

Privacy & Security: The biggest responsibility of the cloud service provider is to keep others data safe on their servers. Data is the most valuable assets of the users so it should be kept safe against any vulnerability. Security is the safeguard of computer systems from the unlawful access of their hardware as well as software. It not only prevents from interruption but also controls substantial access of hardware and protects against thread coming from network access. Cloud is stretchy and

productive relative to the cost but it is not secure enough for safeguarding system's data because obedience standards make cloud security a largest barrier to dive [7]. Keeping the data secure against any type of thread is probably the biggest challenge for cloud storage and service providers which require more attention of the providers on it.

Performance & System Migration: Performance is the criteria which ensure that system will not stop responding even if it is under high stress and facing scarcity of resources and take short time to response. In reality it is seen that sometimes due to some technical or other reasons, the performance of the system degrades so sharply that the trust of the users loose in same proportion. In system migration the programs and directives are moved from one platform to other which requires some minimum time. Migration can takes place among any of the system like mainframe to open system, open system to cloud platform system and it necessitate converting the data from one form to another form without any corruption. Migration is a complex process and need some specialized tools, software and codes which robotically convert data from one form to another. For system migration, different cloud service providers work on different standards which itself becomes more complex when takes place between two completely different systems which are not compatible with each other.

Complexity & Costs: Complexity and cost both are the issues that cannot be ignored while we talk about cloud related issues. Cloud computing introduced numerous new modernisms that can be expanded the capabilities of the organization, including on-demand infrastructure, consumption based pricing, platform services, infrastructure as code, and elastic infrastructure which immerge the era of cloud complexity. The new tip tools are often delivered via SaaS that can be priced monthly on the basis of effortless try, and in some cases its distribution as open source. It is very complicated issue that public cloud vendors recommended compound pricing plans that can be further designed by the communally engineer on the basis of their usage patterns of services. Appreciative and organizing the most competent customization of these plans is indispensable for cost efficient procedures of public cloud cornerstone [8].

Regulation and legal issues: Rules and regulations are most common and important feature of every organization. These regulations are legally enhanced, for changing the role & responsibilities of both cloud providers and its tenants. Cloud has various types like hybrid, community and public. These are few examples from them who enhanced new dynamics in their interfaces, to work between an organization and information. It engages the existence of third party i.e. cloud provider with some terms and conditions, These laws might applied on that place where data stored or transmitted, and for also protectiveness of data from security aspects [9]. These regulations and legal issues are very effective for cloud; if it will apply on right place according to demand and scenario otherwise it will become a big issue for effective working of cloud.

Limited Customization: Cloud computing provides a private cloud facility which is also known as internal cloud or an enterprise cloud. These private cloud services provided directly over the Internet, and deployed over an intranet of an organization or data center of host. This private cloud is confidential for a company specific that offers advanced security or privacy and highly available or fault tolerant solutions which is not allowed in public clouds. So customization is not an issue for private cloud owner. That is only reason behind limited customization [10]. But in case of public cloud, customization is not an easy task they offers cloud facility to variety of users and general customization is more preferred and feasible for cloud providers rather than company or organization specific customization. If specific customization is demanded by the user's side it would be more costly users and more cumbersome for providers.

Reversion and Lack of standards: Cloud computing is widely used by most of the organizations because of its efficient working but lack of standards and reversion is a prominent weak point for the cloud technology. This issue makes cloud more difficult for some customers who search for better options to transition to a different cloud based equipments but they couldn't get anything to compare different cloud products.

Lack of standards is somewhere not a problem because provided technology will be best for all the industries to pursue. Cloud computing standards are very important for organizations just same as processing in any technology. On the basis of the cloud standards requirements, Cloud computing will sooner be standardized for general but will take time [11].

Maintainability: Maintainability is the ease and velocity with which a system can be mended at the earliest. If time to repair a faulty system increases, its availability decreases proportionally. A probable solution of this problem is to make system capable to detect errors and faults at the earlier stage before getting completely down and provide user to keep the system in at least a graceful state. More feasible solution of this problem is that cloud service provider automatically redirects the system towards the service centre without human intervention when some problem occurs. But detection of errors and keep the system responding without failure under high stress is really a challenging issue [12].

FUTURE SCOPE

Cloud computing is an emerging technology that is in its foundation level and is the preferred choice to handle various demands of organizations at lower investments on technology, infrastructure and services. The popularity and facilities of cloud is spreading very rapidly and soon it will be most demanding service in near future. Various issues like security, privacy, customization, authentication techniques for transferring data over secure network may be the new research areas for the researchers. The use of internet and size of the data is increasing day by day; some more new platforms can be deployed in near future according to the prospect demands which can again be the new research areas. Cloud computing is also suitable for carrier prospective as it provides highly paid job opportunities [13].

CONCLUSION:

As discussed above, Cloud is the most promising technology available today's world capable of providing platform, services and infrastructure as per demand. It is proficient to handle extremely diversified demands of the users like providing infrastructure, services applications, managing large volume of data that can be processed, maintained and executed, but is not free from issues and not completely successful for maintaining complete faith and trust in majority of users. Security, privacy, lack of standards etc are some major issues which put a major hurdle in the acceptance of cloud likewise cost, complexity, lack of standards are some more prominent issues which hinder its full growth and acceptance. Beyond all the issues and challenges which are faced by the cloud, this is the only available technology that will change the way of working and traditions of IT. It can be viewed as the future of IT world, which would be capable to handle variety of user's demands more intelligently and will, offers benefits at affordable costs.

***Assistant Professor,**
****Assistant Professor**
S.S. Jain Subodh PG (Autonomous) College, Jaipur

REFERENCES:

[1] Peter Mell, and Tim Grance, "The NIST Definition of Cloud Computing," Version 15, 10-7-09, http://www.wheresmyserver.co.nz/ storage/media/faq-files/cloud-def-v15.pdf.

[2] "Cloud Computing Architecture", available at https://www.tutorialspoint.com/cloud_computing/ cloud_computing_architecture.htm

[3] "Cloud Computing and its Future Scope – UrbanPro "available at https://www.urbanpro.com/a/cloud-computing-future-scope

[4] "12 Benefits of Cloud Computing" available at https://www.salesforce.com/hub/technology/benefits-of-cloud/

[5] "Reliability, availability and serviceability- Wikipedia" available https://en.wikipedia.org/wiki/Reliability, availability_and_serviceability

[6] Door Rubén Middeljans, "Challenges of cloud computing" available athttps://www.rubix.nl/blogs/ challenges-cloud-computingon 31/10/2016

[7] Rachna Arora, Anshu Parashar / International Journal of Engineering Research and Applications (IJERA) ISSN: 2248-9622 www.ijera.com Vol. 3, Issue 4, Jul-Aug 2013, pp.1922-1926 "Secure User Data in Cloud Computing Using Encryption Algorithms"

[8] Joe Kinsella, "Growing Complexities in Cloud Computing" available at http://www.telecomnews.co.il/image/users/228328/ftp/my_files/General%20Files/Whitepaper_Growing_Complexities_in_the_Cloud.pdf?id=23881529 , 13.12.19

[9] Vic (J.R.) Winkler, "Cloud Computing: Legal and Regulatory Issues" available at https://technet.microsoft.com/en-us/library/hh994647.aspx on dated May 2012

[10] Brain Moore, "How limited is customization in a cloud computing or software as a service (SaaS) solution?" available at https://www.proformative.com/questions/how-limited-customization-cloud-computing-or-software-service-saas-solution-webinar on dated Jan 11, 2012

[11] Louis Hayner, "Lack of Standard in the Cloud" available at https://telecomreseller.com/2011/06/22/lack-of-standards-in-the-cloud/ on dated June 22, 2011

[12] Yoshinobu Tamura, Shigeru Yamada, "Practical Reliability and Maintainability Analysis Tool for anOpen Source Cloud Computing" available at https://onlinelibrary.wiley.com/doi/full/10.1002/qre.1802 on dated 25 march 2015

[13] "Cloud computing and its scope in future" available at http://www.inurture.co.in/cloud-computing-and-its-scope-in-future/#

[14] Mohsin Nazir "Cloud Computing: Overview & Current Research Challenges" IOSR Journal of Computer Engineering (IOSR-JCE) ISSN: 2278-0661, ISBN: 2278-8727Volume 8, Issue 1 (Nov. - Dec. 2012), PP 14-22

[15] Yunchuan Sun, Junsheng Zhang,Yongping Xiong,and Guangyu Zhu "Data Security and Privacy in Cloud Computing" International Journal of Distributed Sensor Networks Volume 2014 (2014), Article ID 190903, 9 pages

[16] D. Sun, G. Chang, L. Sun, and X. Wang, "Surveying and analyzing security, privacy and trust issues in cloud computing environments," in Proceedings of the International Conference on Advanced in Control Engineering and Information Science (CEIS '11), pp. 2852–2856, chn, August 2011

[17] Monjur Ahmed and Mohammad Ashraf Hossain "Cloud Computing and security issues in the cloud" International Journal of Network Security & Its Applications (IJNSA), Vol.6, No.1, January 2014