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ADOPTION OF CLOUD COMPUTING TECHNOLOGIES IN BUSINESS

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Abstract: - As cloud computing is continuing to gain more and more momentum in the IT industry, more issues and their challenges are being outlined by enterprises. Nowadays Cloud Computing offers online data storage, infrastructure and applications. The main motive of cloud computing is to provide IT as on-demand service with the characteristics having flexibility, reliability to the users of cloud at low cost. Whenever we store the data in the cloud there should be some standards and procedures that can secure the information so therefore Security in Cloud computing is the most challenging as many threats and risks are accompanied with the cloud computing. This paper emphasizes on the various aspects of cloud computing and security challenges along with their possible solutions.

Keywords: Cloud Computing, Adoption of Cloud Computing, Cloud service models, Security Issues, Business Perspectives.

1. INTRODUCTION

Cloud Computing has been known to be the latest trends in IT industry. In general terms, Cloud computing is something that delivers the organized IT services over the internet. Cloud computing often referred to as “cloud” which means the delivery of on-demand computing services over the internet. Cloud Computing is one of the latest IT development industry also known as “on-demand computing”. Definition of Cloud computing is issued by the **U.S. National Institute of Standards and Technology(NIST)**: “*Cloud Computing is the model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (example- servers, networks, applications and services) that can rapidly provisioned and released with minimal management effort.*”[5]. From above definition it concludes that it is a collection of hardware and software services that is available from the decentralized network of servers. There are many well liked services and web sites. Cloud computing is hinged on a service-based architecture where services of Cloud computing are provisioned at the platform level (e.g. Database) infrastructure level (e.g. Virtual machines and storage) or at the software level (e.g. Email) [3].

The example of Cloud Computing services are Google Drive, Apple iCloud, Amazon cloud Drive, Gmail, and Hotmail etc. [18]. In this we don’t need any software or server to use them. User just needs the fast internet connection and we can start sending the emails. Every email manager and servers are there on the cloud and it is wholly managed by Cloud Service Provider (CSP) so the user can use the software alone [1].

1.1 ADOPTION

Over the past few years there had been a tremendous increase in the adoption of cloud computing enterprises. In link with the shared services, Cloud computing has been observed as the creative model for the IT services that creates the value for the enterprises adoption.[19] *“The interesting thing about the adoption of cloud computing is that we have redefined the cloud computing to include everything that we already do....I don’t understand what we do differently in the light of cloud computing other than change the wording of some of our adds”* ...-Larry Ellison [15]. With this creative information technology (IT) cloud computing could build on the strategic and technical values of business to enterprises. [22] The adoption of cloud computing has flourished due to the flexibility, agility and simplicity that it offers to the enterprises. It enables the enterprises to emphasis on their core business activities and therefore their productivity will be increased. [19].

1.2 EVOLUTION OF CLOUD COMPUTING

Cloud computing is the result of evolution and adoption of existing technologies. It was a moderate evolution that began in early 1950’s with the motive of mainframe computing. At that particular time, many several users were capable of accessing through dumb terminals whose major function was to provide the authority to the mainframe computers. [17] As the mainframe computers were quite expensive so it was not taken as the practical for an organization to purchase and maintain one for each employee. Then at that time idea of providing the shared access to a single computer generated for the companies to save the costs. [18]

After few years, IBM created the concept of operating system called virtual machines (VM) in 1970’s. Using the concept of virtualization it has become possible to execute one or more operating systems in a solitary environment. Virtual computers could be able to execute inside the one physical hardware which can run one complete operating system. [13] The cloud computing trend shifted in 1990’s towards the grid computing (solves the larger problems with parallel computing), utility computing (offers computing resources), SAAS (network based subscriptions to applications). [15] The first move in cloud computing came was Amazon which provides the authority to half a million of developers by the use of Amazon web services. Amazon EC2 has been considered as one of the best services of cloud of Amazon. Today Google grants the spreadsheets, word processing applications online as Gmail and Google docs. Google app engines they allow the access to the software developers to write the applications to run free on the Google servers. [22]

1.3 CHARACTERSTICS OF CLOUD COMPUTING:

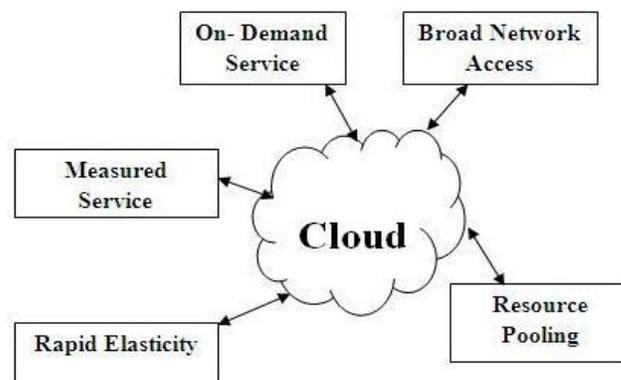


Fig. - 1

1.3.1 On- Demand Service:

Cloud Computing can allow all the users to use the web services and resources on demand. [8] A person can logon to the website at anytime and access the services through online control panel without having any interactions with the server.

1.3.2 Broad Network Access:

As we know cloud computing is completely web based, these days all the digital devices such as tablets, laptops, PDA's etc [20] have the capability to access the broad networks wherever they get connected to the simple network access point.

1.3.3 Resource Pooling:

Cloud Computing allow the multiple tenants to share the pool of resources at the same time from any location. [23] Generally customer may not care about where the resources are physically located. Resources can positively assigned or reassigned according to the requirements of customer.

1.3.4 Rapid Elasticity:

In this it's very easy to scale the resources rapidly or provisionally. In this case the cloud is flexible and scalable to meet the business needs. We can easily add or remove the features, users and the resources. [5]

1.3.5 Measured Service:

Customers are being charged for the services they use. Cloud computing concept is economical that they can access the services and what kind of services that we need to pay for it. It is included from both the sides [20] i.e. provider's and user's side and therefore it improves the glassiness.

1.4 CLOUD DEPLOYMENT MODELS

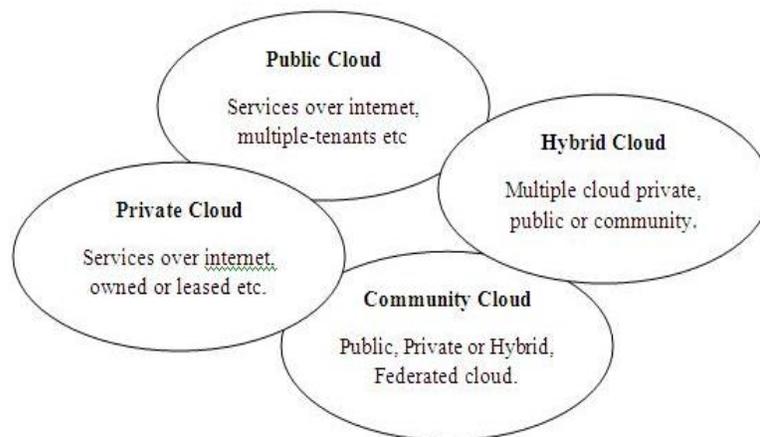


Fig. - 2

1.4.1 Public Cloud:

This type of cloud is also referred to as **off-premise cloud** or **external cloud**. [6] This infrastructure of cloud is being made available to all the users on pay per use basis which is specially designed for the large groups and owned by the various organizations who are selling the cloud services. [5] In this various organizations can also be used to deliver the services to all the users by grabbing it from the third party. Example is Google App Engine.

1.4.2 Private Cloud:

The infrastructure of cloud is being solely operated for the organization. –NIST

This type of cloud is also referred to as **on-premise cloud** or **internal cloud** which is specifically designed for a single organization so that the interference of the outsiders is avoided. [24] In other words it means when the particular customer expand their own applications and run their own internal infrastructure is known as **private cloud**. Examples are Amazon VPC (Virtual Private Cloud), Ubuntu Enterprise Cloud-UEC etc.

1.4.3 Community Cloud:

This cloud is same as public cloud except that the accessibility is only limited to specific community of the cloud consumers i.e. banks and trading firms. [5] This type of infrastructure of cloud is managed by the several organizations. Community cloud involves the cooperation and integration of IT infrastructure and resources from the multiple organizations. It basically serves the large organizational projects. Example of community cloud is accessing the organizations IT resources from a community cloud. [24]

1.4.4 Hybrid Cloud:

This type of cloud is a collaboration of two or more clouds i.e. public, private and community that remains the unique entities but together they are bounded by some proprietary technology. Large organizations will advantage from the public cloud and smaller organizations will advantage from the private cloud. [20] It merges the cloud based enterprises and high load tasks outsourcing to public clouds. Due to diverging of resources into the various clouds the complexity of the software and the configuration had increased while migrating the resources of an enterprise. There were various possible threats that are: Data duplicacy, Security management etc. [5]

1.5 CLOUD SERVICE MODELS

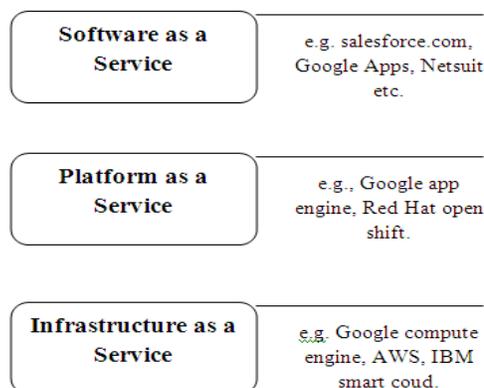


Fig.-3

These days cloud computing has become technologically advance which has the capability to provide various services that includes software as a service, network as a service, platform as a service etc. This type of cloud model is composed of 4 deployment models and 3 service models:

1.5.1 SAAS (Software as a Service)

This model is considered as the largest market of cloud and is still growing rapidly. In this software is delivered to the particular as a means of service. Through this delivery of the service model the end-users consumes the applications of the software directly over the internet. That is why it is also referred to as “on-demand” basis. [5] SaaS uses the web browser to distribute the applications that are being managed at the client’s side. Many of the SaaS applications are run automatically on the web browser without any downloads or installation required.

Examples are: GoogleDocs here Gmail is the SaaS, Google is the provider and we are the consumers, Web Browser, PDA etc.[24]

1.5.2 PAAS (Platform as a Service)

PAAS is also referred to as cloud platform services, As we come to know from the name itself it is that type of cloud computing environment as a service where users can write their own applications and develop the software’s.[5] PAAS has the capability to make the deployment, testing, development quite simple, easy and cost-effective. Facilities needed to complete the life cycle of delivering and developing the web applications are all provided by the PAAS this can be used without the utilization of downloading or installation.[20]

Examples are: Google App Engine, Microsoft Azure Windows, Database, Web Browser, Red Hat open shift etc.[22]

1.5.3 IAAS (Infrastructure as a Service)

IAAS is a broad method of delivering the infrastructure of cloud computing servers, network and other operating systems on a demand per pay basis. Cloud service provider manages the infrastructure of the cloud and the host environment.[20] As the name signifies that it provides the infrastructure as a service. A consumer of cloud directly provides the infrastructure of IT that is being provided in the IaaS cloud. “Virtualization” in IaaS cloud combines the physical resources in an rough and ready manner in order to meet the growing resources demand from the consumers of cloud. [5]

Examples are: Simple Storage Services (S3), Amazon web services etc.

2. SECURITY ISSUES FACED BY CLOUD COMPUTING

The most major issue of cloud computing is the security issue as they flourish the various services like Infrastructure as a Service (IAAS), Platform as a Service (PAAS), and Software as a Service (SAAS).[14] Each and every service has their own issues of Security:

- Data Issues
- Instance Isolation
- Network Security
- Secrecy Issues
- User access control
- Data Separation, etc.

2.1 Solution to Cloud security issues

Many major issues had been faced by the cloud that includes user access control, secrecy issues and many more. One of the major problems that had been discussed is to make everyone clear in the service provider and customer's mind that what services the cloud should provide and what customer expects from the cloud. Encryption has been considered as the best solution to secure the information. It is better to encrypt the data before storing it in the cloud, so in order to provide the data protection as a service, data security and privacy needs to be ensured.

3. BUSINESS PERSPECTIVES OF CLOUD COMPUTING

Cloud computing is considered as the major most topics in the distributed systems with the very large number of papers being written on the topic. The main constituent of cloud computing is decreased cost of the infrastructure and its applications.[15] Before the exposure and broad acceptance of cloud computing many businesses and industries are nowadays dependent on the companies that offers the infrastructure which would therefore be very costly to set up. These companies' acts as the suppliers to the other companies, now these suppliers organize the infrastructure and offer these services to the different companies.[19] There were key issues in the cloud companies so they invited the five scientists from the organization of industry central to cloud computing to answer a few questions.

There are few business drivers that foster the adoption and acceptance of the cloud. They rely on the goals of business and customers.[21] The various business drivers for the cloud adoption are known as the cloud model.

- The factor that should be adopted by the cloud model is to reduce the IT costs.
- The applications of the cloud that signifies the performance and scalability are admirable.
- As we know that our applications and various software's are on the cloud so we need not to worry about the upgrades and updates they are automatically updated by the cloud suppliers.[15]
- Once we know that our continuity of business is setup, then in that case even if our system crashes due to any natural calamities or disaster our data will be kept safe as it is on cloud.

3.1 Business Case:

Whenever we are deciding whether or not to opt for the model of cloud for our business, the great approach is to analyze the situation is by forming a business case for the cloud model.[14] For this, we need to collect the data, compare with analyzing, reports creation and well understand the specialized details involved:

- Understand the business requirements: [14] Have a direct interaction with the customer, get a clear picture of the requirements of business draw the direct relation between the requirements of business and aspects of business involved.
- Taking the advice of experts and professional help: Have the live sessions on the technical aspects of the cloud to understand the principles of having your business on the cloud.[20]
- Study other relevant business cases: Go thoroughly the business cases similar to all the other businesses that are on the cloud or not on the cloud.
- Choose the right model: Understanding the options of the deployment models and then choose the best model that suits your requirements.

There are various cases of business there on the adoption of cloud. Few major companies that foster the cloud are Amazon and Cloud. [21]

4. CONCLUSION

One of the greatest problem with the cloud computing is the sharing of the resources. It is the development that flourishes the access to the high performance resources and infrastructure through the services of web [4]. The prominent leaders in the industries includes Amazon, Google, IBM etc provides the technique in enhancing the cloud computing [5]. The objective is to give an overview of the cloud computing and other perspectives. Cloud offers various advantages but some people believe cloud to be an unsafe place on the other side very few people find it to be safest place for their security [8] but in short cloud computing has been the way to change the IT departments as they have a huge range of paths to the cloud that includes platforms and applications that are available from the providers of cloud as online services. [17]

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Biography

I **Himanshi Babbar** working as Assistant Professor in Chandigarh Group of Colleges, Landran, Mohali, India. I had done MCA (Masters in Computer Application). My area of research is Cloud Computing. I have completed my Master of Computer Application’s degree in 2015 from Chitkara University, Punjab Campus. I have attended a National Conference and presented a paper on “Future Aspects and challenges of E-commerce” and it was published in National Journal of Biz and Bytes.