Cloud Computing- A Computing Technique

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Abstract: Cloud computing is one of the most popular recent emerging technology of Information technology. Cloud Computing enables us to use the hardware and software resources over the internet according to the requirement of the user on pay per use basis. Cloud Computing devices being able to exchange large amount of data such as images, audio, video, text files as well as business information with the help of internet. As all the data is being stored in clouds, security issues should be addressed properly. All the organizations have concerns about security, privacy, residency, unauthorized access, fabrication, interception, interruption, modification and non-repudiation so security should be properly implemented in cloud computing architecture to properly implement it in businesses. In this paper we will discuss about the cloud computing, working of cloud, different cloud computing deployment models and service models.

Keywords: Cloud Computing, IaaS, PaaS, SaaS, Virtualization.

I. INTRODUCTION

Basically, the term cloud computing is made up from two words i.e. cloud + computing. The word cloud refers to network or internet. In other words we can say cloud is something present in remote location and provide services over internet. Then by term cloud computing understands that it is a process of manipulating, configuring and accessing the applications online.

Cloud computing means that instead of accessing hardware or software sitting on your desktop or in a company's network we can access some other software or hardware online. Cloud computing is therefore type of computing which relies upon sharing of physical or virtual resources rather than deploying for local or personal hardware and software. It is somewhat similar with term 'utility computing' in which users are able to tap into a supply of computing resources rather than to manage that equipment needed by them. This computing allows us for more efficient centralized data storage and processing.

Cloud computing makes computer infrastructure and services 'on need' basis. To access these resources from cloud vendors organizations do not need to pay large scale capital expenditures but organizations need to 'pay per use' i.e. organizations have to as the amount of resources they use, it is same as electricity bill that we have to pay on the basis of we do usage. Cloud computing uses internet and central computer server to maintain data and applications. Cloud computing allows co businesses and consumers to use applications without any need of installation and access to their personal files at any computer with the internet access. This technology allows for much more efficient computing by centralizing data storage, processing and bandwidth.

The simple example of cloud computing is email services like Gmail, yahoo, hotmail etc in which we got attached to their server and access data wherever and whenever we want just we need is our unique email address so that we can sign in using any device. The consumer gets to use the software alone and enjoy the benefits. The analogy is 'if you need milk, would you buy a cow?' All the customers or users want is to get the benefits of using the hardware or software of the computer like sending mails etc. Just to get this benefit (milk) why should a consumer buy a (cow) software /hardware? By using cloud storage, you don't have to store the information on your own hard drive. Instead, you can access it from any geographical location and can be downloaded it onto any device of your choice, including laptops, tablets, or smart phones. Moreover, you can also edit files, such as PowerPoint presentations, Word document or any other similar type of document simultaneously with other users and thus making it easier to work away from the office.

One of key characteristics of cloud computing is the flexibility that it offers in the form of scalability. It refers to the ability to adapt and scale the changes of workload. Cloud computing technology allows us with automatic provision of allocating and reallocating of resources as and when it is needed thus ensuring that the level of resources available is as closely matched to current demand as possible. This is a key characteristic of cloud computing that differentiate it from other models where resources are delivered in blocks usually with fixed capacity and upfront cost. With cloud computing, the end user usually pays only for the resources they use and avoid the inefficiencies and cost of any unused resources or capacity.

II. HOW IT WORKS?

To be able to provide these services you will need Operating System Services (OSS), which will look after the deployment of the requested services and Business System Services (BSS) are mainly used for the request validation and creating the invoices for the requested

services. Any metrics could be used to create the invoice (for example, number of users, CPUs, memory, and usage hours/month). It is very flexible and depends on the service provider. To understand how does cloud computing work, imagine that the cloud consists of different layers — mostly the back-end layer and the front-end or user-end layer. The front-end layers are the ones you see and interact with. When you access your email services like Yahoo mail, Gmail, hotmail etc you are using software running on the front-end of a cloud. The same is true when you access your account like Facebook account or any similar type of account. The back-end consists of the software and the hardware architecture that is responsible for creating the interface you see on the front end.

Cloud computing distributes the file system among multiple machines and hard disks. In cloud computing data is never stored in one place only and in case one unit fails other will take over automatically. The user disk space is allocated on the distributed file system.

The main technology for cloud computing is virtualization. Virtualization is partitioning of single physical server into multiple different logical servers. Once the physical server is divided into logical servers then each logical server acts as physical server and can run an operating system and applications independently.

Virtualization is mainly used for three purposes:

▪ Network virtualization
It is a method in which we combine the available resources in a network and split up the available bandwidth into channels where all are independent from each other and each channel is independent from others and can be assigned to a specific server or device in real time.

▪ Storage virtualization
It is a method in which pooling of storage from multiple networks storage devices is done which appears us to be a single storage device that is managed from a central console.

▪ Server virtualization
Server virtualization is the masking of server resources like processors, RAM, operating system etc from server users. The main logic behind server virtualization is to reduce the burden and complexity of computation from users and to increase resource sharing.

III.DEPLOYMENT MODELS

Deployment model describes us type of environment and access we are using i.e. how the cloud is located?
Cloud can have any of these 4 types of access.

A. Public cloud
Public cloud is one of the types of cloud hosting services in which the cloud services are delivered over the network which is open for public usage. This model is a true representation of cloud hosting. In this the service provider provides different types of services and infrastructure to various clients. The customers don't have any distinguish ability and control over the location of the infrastructure. From the technical viewpoint there may be very small difference between structural design of the private and public cloud except in the level of security offered for various services given to the public cloud subscribers by the cloud hosting providers. The dealer may provide the service free or in the form of the license policy like pay per user. The cost is shared among all the users of public cloud so that public cloud profits the customers more by achieving economies of scale. Facilities provided by public cloud may be availed free an example of a public cloud is Google.

B. Private cloud
A private cloud is owned by a single organization or a single person. Private clouds enable a person or an organization to use cloud computing technology as a means of centralizing access to the different IT resources by different locations, or departments of the organization. Private cloud usage can change how organizational boundaries are defined and applied. The actual management of a private cloud environment may be carried out by internal or outsourced staff.

C. Community cloud
A community cloud allows systems and services to be accessible by group of organizations. The community members generally share similar privacy, performance and security concerns. The main intention of these groups is to achieve their objectives which are generally related to their businesses. A community cloud may be internally managed or it can be managed by a third party provider. It can be hosted externally or internally. The cost is shared by the specific organizations within the community, hence, community cloud has cost saving capacity. A community cloud is appropriate for organizations and businesses that work on joint ventures, tenders or research that needs a centralized cloud computing ability for managing, building and implementing similar projects.

D. Hybrid cloud
It is a mixture of public and private cloud however the critical activities are performed using private cloud while non-critical activities are performed using public cloud. Hybrid cloud hosting services achieves benefits of the multiple deployment models. A hybrid cloud can cross the isolation and overcome the boundaries by the provider and hence simply cannot be categorized into private, public or community cloud. It permits the user to increase the capacity or the capability by aggregation, assimilation or customization with another cloud package service. In a hybrid cloud, the resources are provided and managed by either the external provider or can be provided and managed in-house. It is actually an adaptation among two platforms in which the workload can be exchanged

between the public cloud and the private cloud as per the users' demand.

IV. SERVICE MODELS

These models tell us that what type of service they will provide. These are the reference models on which cloud computing is based.

A. Infrastructure-as-a-service (IaaS)

In this service user get raw access to resources on internet and by using that we will develop a software or application as per user requirements. IaaS provides the underlying infrastructure such as operating systems, servers, security and networking for developing such applications and services and for deploying development tools, databases etc.

- Some IaaS Providers provide development options for multiple platforms: mobile, browser, and so on. If you or your organization wants to develop software that can be accessed from multiple platforms, this might be an easy way to make that happen.
- The IaaS Cloud Provider may provide better security than your existing software. Better security may come in part because it is critical for the IaaS Cloud Provider and is part of their main business.
- Introduction of the new releases of the underlying software need not to be maintained as this is handled by the IaaS Cloud Provider.

Fig 1: Cloud Computing Service Models [1]

B. Software as a Service (SaaS)

SaaS means that you use a complete application running on someone else's system. Google's Documents and the web based mails are perhaps the best-known examples. Applications can be accessed through network from various clients (web browser, mobile phone etc) by application user. It does not require client installation just a browser or other client device and network connectivity.

- SaaS is a software distribution model in which applications are hosted by a different cloud service provider and made available to customers over the internet. SaaS is also known as "On-Demand Software".
- SaaS pricing is based on a monthly rent or annual charges. Software as a Service allows organizations or an individual to access business functionality at a low cost which is less than licensed applications.
- The software is hosted remotely, so organizations don't need to invest in additional hardware.
- Software as a service removes the necessity of installation, set-up, and often daily upkeep and maintenance for organizations. Cost of initial set-up of SaaS is typically less than the enterprise software. SaaS vendors actually pricing their applications based on some usage based parameters. So SaaS provides easy to monitor and automatic updates.

C. Platform as a Service (PaaS)

PaaS means that you develop applications using Web-based tools that can run on systems software and hardware provided by another company. Platform-as-a-Service offers the runtime environment for applications. It provides different types of development and deployment tools that are required to develop applications. PaaS has user friendly tools such as point-and-click tools that enable non-developers to create web applications.

PaaS offer an environment where developer can developers can create and deploy applications and do not need necessarily to know about the memory and processor usage. PaaS model give benefit to developer in term of develop software life cycle from planning to design, building application, deployment and maintenance. PaaS model offer higher level of abstraction. But the disadvantage of using PaaS is that, the developer locks-in with a particular vendor.
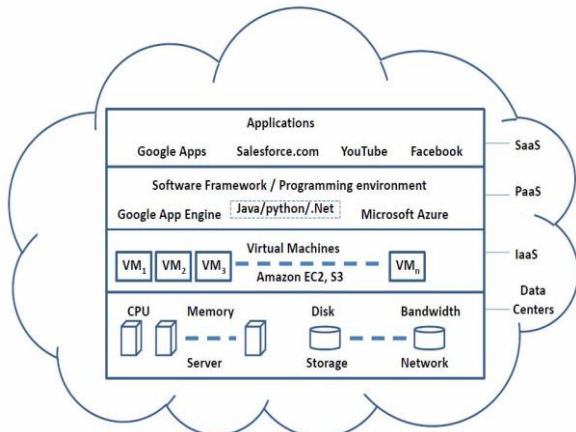
- Customer need not to take any botheration about the management of the resources because it is the responsibility of cloud provider.
- Customer need not purchase expensive hardware, servers, power, and data storage.
- It is very simple to scale the resources up or down automatically based on the user demand.
- It is the responsibility of the cloud provider to maintain software versions and patch installations.

V. CONCLUSION

Cloud computing is very promising computing technique in which we can share or access hardware, software resources over internet. Cloud computing can be implemented within the premises of an organization, within community of same kind of organizations or can be implemented publically where cloud resources can be accessed by anyone without any restriction. Cloud computing is being used in many different areas like banking and finance, education, telecommunication, online entertainment etc. Cloud must be safe from all the

external threats so there must be a strong and mutual understanding between the customer and the cloud service provider.

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