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CLOUD COMPUTING

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Short Profile

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ABSTRACT:

Cloud computing is a type of computing that relies on sharing computing resources rather than having local servers or personal devices to handle applications. In cloud computing, the word cloud (also phrased as "the cloud") is used as a metaphor for "the Internet," so the phrase cloud computing means "a type of Internet-based computing," where different services — such as servers, storage and applications —are delivered to an organization's computers and devices through the Internet.[1]

Cloud computing has been an important term in the world of Information Technology (IT). Cloud computing is a kind of computing which is highly scalable and use virtualized resources that can be shared by the users. Users do not need any background knowledge of the services. Cloud computing uses the Internet and central remote servers to maintain data and applications.[2]

KEYWORDS

Cloud computing ,sharing computing resources, Information Technology (IT).

INTRODUCTION :

There is no need to setup, configure and manage large physical installations of hardware and networks. This technology allows much more efficient computing by centralizing storage, memory, processing and bandwidth. Cloud computing techniques to estimate costs for service dependency and to monitor costs associated with typical scientific applications. Recently, cloud computing has been considered as an emerging model which aims at allowing customers to utilize computational resources and software hosted by service providers. [3]

Many companies are delivering services from the cloud. Some notable examples as of 2010 include the following:

- **Google** — Has a private cloud that it uses for delivering many different services to its users, including email access, document applications, text translations, maps, web analytics, and much more.
- **Microsoft** — Has Microsoft® Sharepoint® online service that allows for content and business intelligence tools to be moved into the cloud, and Microsoft currently makes its office applications available in a cloud.
- **Salesforce.com** — Runs its application set for its customers in a cloud, and its Force.com and Vmforce.com products provide developers with platforms to build customized cloud services. 4

CHARACTERISTICS

A customer can be an individual lab. Cloud computing has a variety of characteristics, with the main ones being:

- **Shared Infrastructure** — Uses a virtualized software model, enabling the sharing of physical services, storage, and networking capabilities. The cloud infrastructure, regardless of deployment model, seeks to make the most of the available infrastructure across a number of users.
- **Dynamic Provisioning** — Allows for the provision of services based on current demand requirements. This is done automatically using software automation, enabling the expansion and contraction of service capability, as needed. This dynamic scaling needs to be done while maintaining high levels of reliability and security.
- **Network Access** — Needs to be accessed across the internet from a broad range of devices such as PCs, laptops, and mobile devices, using standards-based APIs (for example, ones based on HTTP). Deployments of services in the cloud include everything from using business applications to the latest application on the newest smartphones.
- **Managed Metering** — Uses metering for managing and optimizing the service and to provide reporting and billing information. In this way, consumers are billed for services according to how much they have actually used during the billing period.

In short, cloud computing allows for the sharing and scalable deployment of services, as needed, from almost any location, and for which the customer can be billed based on actual usage. 5

Service Models

Once a cloud is established, how its cloud computing services are deployed in terms of business

models can differ depending on requirements. The primary service models being deployed (see Figure 1) are commonly known as:

Software as a Service (SaaS) — Consumers purchase the ability to access and use an application or service that is hosted in the cloud. A benchmark example of this is Salesforce.com, as discussed previously, where necessary information for the interaction between the consumer and the service is hosted as part of the service in the cloud.

Also, Microsoft is expanding its involvement in this area, and as part of the cloud computing option for Microsoft® Office 2010, its Office Web Apps are available to Office volume licensing customers and Office Web App subscriptions through its cloud-based Online Services.

• **Platform as a Service (PaaS)** — Consumers purchase access to the platforms, enabling them to deploy their own software and applications in the cloud. The operating systems and network access are not managed by the consumer, and there might be constraints as to which applications can be deployed.

• **Infrastructure as a Service (IaaS)** — Consumers control and manage the systems in terms of the operating systems, applications, storage, and network connectivity, but do not themselves control the cloud infrastructure.

Also known are the various subsets of these models that may be related to a particular industry or market. Communications as a Service (CaaS) is one such subset model used to describe hosted IP telephony services. Along with the move to CaaS is a shift to more IP-centric communications and more SIP trunking deployments. With IP and SIP in place, it can be as easy to have the PBX in the cloud as it is to have it on the premise. In this context, CaaS could be seen as a subset of SaaS.[6]

Technologies Used in Cloud Computing

Cloud computing systems use many technologies of which the programming model, data management, data storage, and virtualization are the key technologies:

Virtualization

Virtualization is a method of deploying computing resources. It separates the different levels of the application system including hardware, software, data, networking, storage and so on, breaks the division among the data center, servers, storage, networking, data and the physical devices, realize dynamic architecture, and achieves the goals of managing centralized and use dynamically the physical resources and virtual resources, improving the flexibility of the system, reducing the cost, improving the service and reducing the risk of management. In computing, virtualization means to create a virtual version of a device or resource, such as a server, storage device, network or even an operating system where the framework divides the resource into one or more execution environments. Even something as simple as partitioning a hard drive is considered virtualization because you take one drive and partition it to create two separate hard drives. Devices, applications and human users are able to interact with the virtual resource as if it were a real single logical resource.

Distributed Storage

In order to ensure high credibility and economy, cloud computing adopts distributed storage to

save data, using redundancy storage to ensure the reliability of stored data and using high credible software to make up the readability of the hardware, therefore providing the cheap and credible mass distributed storage and computing system. The data storage system of cloud computing are Google File System (GFS) and Hadoop Distributed File System (HDFS) which is developed Hadoop team. GFS is a distensible distributed file system. It is used in large and distributed applications which need to access mass data. HDFS is a distributed file system which is applicable to running on commodity hardware. It is very similar to the existing distributed file system, but also with a significant difference.

Parallel Programming Model

To enable users efficiently to use cloud computing resources and more easily enjoy services that cloud computing adopts Map Reduce programming model, which decomposes the task into multiple subtasks, and through two steps (Map and Reduce) to realize scheduling and allocation in the large-scale node. Map Reduce is a parallel programming system developed by Google. It puts parallelism and fault tolerance, data distribution, and load balance in a database. Map Reduce system mainly consists of three modules: client, master and worker.

The client is responsible for submitting parallel processing assignments composed by the users to master node. Map Reduce is mainly used in mass data processing. One of the features of the task scheduling strategy is scheduling priority the task the node which the data belong.

Data Management

Cloud computing needs to process and analyze mass and distributed data, therefore, data management technology must be able to efficiently manage large data sets. Data items are ordered according to the sequence of keyword in the dictionary, with each row dynamically delivered to Tablets. To ensure the high scalability of data structure, adopts three-level hierarchical way to store location information.[7]

Service offered in Cloud Computing

Various services offered cloud computing in different fields like i.e. IT Education Sector, Storage, Govt.Organization, Online marketing, E-Commerce etc. Cloud computing can describe services being provided at any of the traditional layers from hardware to applications. Clouds shift the responsibility to install and maintain hardware and basic computational services away from the customer (e.g., a laboratory or consortium) to the cloud vendor.[8]

Deployment Models

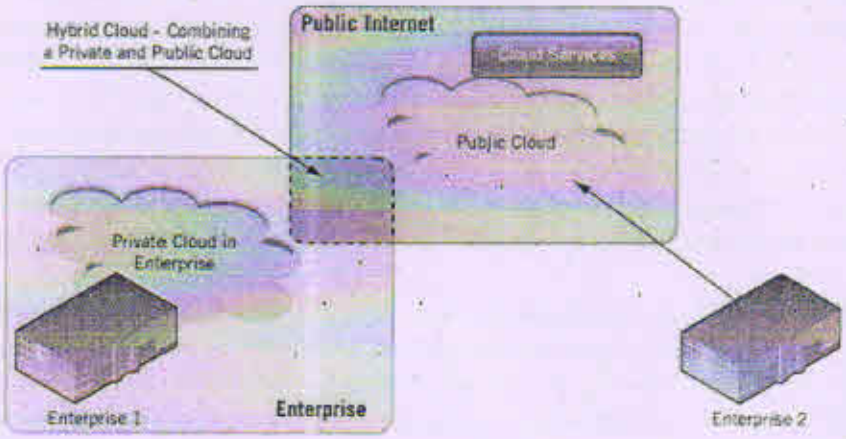
Deploying cloud computing can differ depending on requirements, and the following four deployment models have been identified, each with specific characteristics that support the needs of the services and users of the clouds in particular ways.

- **Private Cloud** — The cloud infrastructure has been deployed, and is maintained and operated for a specific organization. The operation may be in-house or with a third party on the premises.
- **Community Cloud** — The cloud infrastructure is shared among a number of organizations with similar interests and requirements. This may help limit the capital expenditure costs for its establishment as the

costs are shared among the organizations. The operation may be in-house or with a third party on the premises.

• **Public Cloud** — The cloud infrastructure is available to the public on a commercial basis by a cloud service provider. This enables a consumer to develop and deploy a service in the cloud with very little financial outlay compared to the capital expenditure requirements normally associated with other deployment options.

• **Hybrid Cloud** — The cloud infrastructure consists of a number of clouds of any type, but the clouds have the ability through their interfaces to allow data and/or applications to be moved from one cloud to another. This can be a combination of private and public clouds that support the requirement to retain some data in an organization, and also the need to offer services in the cloud.[9]



Benefits

The following are some of the possible benefits for those who offer cloud computing-based services and applications:

• **Cost Savings** — Companies can reduce their capital expenditures and use operational expenditures for increasing their computing capabilities. This is a lower barrier to entry and also requires fewer in-house IT resources to provide system support.

• **Scalability/Flexibility** — Companies can start with a small deployment and grow to a large deployment fairly rapidly, and then scale back if necessary. Also, the flexibility of cloud computing allows companies to use extra resources at peak times, enabling them to satisfy consumer demands.

• **Reliability** — Services using multiple redundant sites can support business continuity and disaster recovery.

• **Maintenance** — Cloud service providers do the system maintenance, and access is through APIs that do not require application installations onto PCs, thus further reducing maintenance requirements.

• **Mobile Accessible** — Mobile workers have increased productivity due to systems accessible in an infrastructure available from anywhere.[10]

Challenges

The following are some of the notable challenges associated with cloud computing, and although some of these may cause a slowdown when delivering more services in the cloud, most also can provide opportunities, if resolved with due care and attention in the planning stages.

- **Security and Privacy** — Perhaps two of the more "hot button" issues surrounding cloud computing relate to storing and securing data, and monitoring the use of the cloud by the service providers. These issues are generally attributed to slowing the deployment of cloud services. These challenges can be addressed, for example, by storing the information internal to the organization, but allowing it to be used in the cloud. For this to occur, though, the security mechanisms between organization and the cloud need to be robust and a Hybrid cloud could support such a deployment.
- **Lack of Standards** — Clouds have documented interfaces; however, no standards are associated with these, and thus it is unlikely that most clouds will be interoperable. The Open Grid Forum is developing an Open Cloud Computing Interface to resolve this issue and the Open Cloud Consortium is working on cloud computing standards and practices. The findings of these groups will need to mature, but it is not known whether they will address the needs of the people deploying the services and the specific interfaces these services need. However, keeping up to date on the latest standards as they evolve will allow them to be leveraged, if applicable.
- **Continuously Evolving** — User requirements are continuously evolving, as are the requirements for interfaces, networking, and storage. This means that a "cloud," especially a public one, does not remain static and is also continuously evolving.
- **Compliance Concerns** — The Sarbanes-Oxley Act (SOX) in the US and Data Protection directives in the EU are just two among many compliance issues affecting cloud computing, based on the type of data and application for which the cloud is being used. The EU has a legislative backing for data protection across all member states, but in the US data protection is different and can vary from state to state. As with security and privacy mentioned previously, these typically result in Hybrid cloud deployment with one cloud storing the data internal to the organization.[11]

COMMUNICATIONS IN THE CLOUD

For service developers, making services available in the cloud depends on the type of service and the device(s) being used to access it. The process may be as simple as a user clicking on the required web page, or could involve an application using an API accessing the services in the cloud.

Telcos are starting to use clouds to release their own services and those developed by others, but using Telco infrastructure and data. The expectation is that the Telco's communications infrastructure provides a revenue generating opportunity.

Using the Communications Services

When in the cloud, communications services can extend their capabilities, or stand alone as service offerings, or provide new interactivity capabilities to current services. Cloud-based communications services enable businesses to embed communications capabilities into business applications, such as Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) systems. For "on the move" business people, these can be accessed through a smartphone, supporting increased productivity while away from the office.

These services are over and above the support of service deployments of VoIP systems,

collaboration systems, and conferencing systems for both voice and video. They can be accessed from any location and linked into current services to extend their capabilities, as well as stand alone as service offerings.

In terms of social networking, using cloud-based communications provides click-to-call capabilities from social networking sites, access to Instant Messaging systems and video communications, broadening the interlinking of people within the social circle.

Accessing through Web APIs

Accessing communications capabilities in a cloud-based environment is achieved through APIs, primarily Web 2.0 RESTful APIs, allowing application development outside the cloud to take advantage of the communication infrastructure within it.

These APIs open up a range of communications possibilities for cloud-based services, only limited by the media and signaling capabilities within the cloud. Today's media services allow for communications and management of voice and video across a complex range of codecs and transport types. By using the Web APIs, these complexities can be simplified and the media can be delivered to the remote device more easily. APIs also enable communication of other services, providing new opportunities and helping to drive Average Revenue per User (ARPU) and attachment rates, especially for Telcos.[12]

CONCLUSION

It can be the ability to rent a virtual server, load software on it, turn it on and off at will, or clone it ten times to meet a sudden workload demand. It can be storing and securing immense amounts of data that is accessible only by authorized applications and users. the nature of cloud computing and how it builds on established trends while transforming the way that enterprises everywhere build and deploy applications.

The ultimate goal of cloud computing is to provide calculation, services and applications as a public facility for the public, So that people can use the computer resources just like using water, electricity, gas and telephone. Cloud computing is a kind of computing paradigm that can access conveniently a dynamic and configurable public set of computing resources (e.g. server, storage, network, application and related service), provided and published rapidly and on-demand with least management and intervention. And in this paper we also show how cloud computing is better in various aspects like cost, customer and employee. The success of the cloud computing model depends hugely on the ability of cloud providers to keep promises made to users.[13]

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