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Cloud Computing-Overview

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Abstract—***Cloud communications and cloud-based computing are seemingly on a steep growth curve. Cloud computing is an increasingly popular paradigm for accessing computing resources. In practice, cloud service providers tend to offer services that can be grouped into three categories: software as a service (SAAS), platform as a service (PAAS), and infrastructure as a service (IAAS). Cloud computing, with the revolutionary promise of computing as a utility, has the great potential to transform how IT services are delivered and managed. Yet, despite its great promise, even the most seasoned professionals know little about cloud computing or how to define it.***

Keywords-Cloud, SAAS, PAAS, IAAS, Public Cloud

1. INTRODUCTION

"Cloud computing," to put it simply, means ―"Internet computing". The Internet is commonly visualized as clouds; hence the term ―cloud computing for computation done through the Internet. Cloud computing is Web-based processing, in which distributed assets, programs, and information are supplied to computers on demand through the Internet. Cloud computing is a natural development of the prevailing adoption of virtualization, Service-oriented structures and utility computing. [1] With Cloud computing users can access database resources through the Internet from anywhere, without worrying about any maintenance or management of actual resources. Besides, databases in cloud are very dynamic and scalable. Cloud computing is unlike grid computing, utility computing, or autonomic computing. It is a very independent platform in terms of computing. The best Example of cloud computing is Google Apps where any application can be accessed using a browser and it can be deployed on thousands of computer through the Internet.

2. WHAT IS CLOUD COMPUTING? [1]

Cloud computing is Internet("CLOUD") based development and use of computer technology ("COMPUTING").Cloud computing is a general term for anything that involves delivering hosted services over the Internet.
Cloud computing provides the facility to access shared resources and common infrastructure, offering services on demand over the network to perform operations that meet changing business needs. The location of physical resources and devices being accessed are typically not known to the end user.

2.1 BENEFITS OF CLOUD COMPUTING [4]

- Cloud technology is paid incrementally, saving organizations money.
- Organizations can store more data than on private computer systems.
- No longer do IT personnel need to worry about keeping software up to date.
- Cloud computing offers much more flexibility than past computing methods.
- Employees can access information wherever they are, rather than having to remain at their desks.

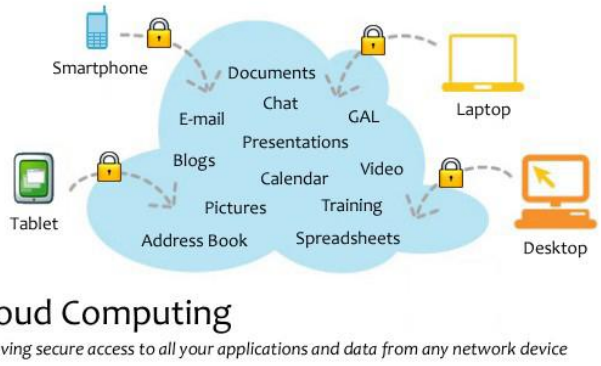

Figure 1: General Cloud Diagram

3. CLOUD COMPUTING MODELS:-[3]

Cloud Providers offer services that can be grouped into three categories.

3.1. Software as a Service (SAAS): In this model, a complete application is offered to the customer, as a service on demand. SAAS is the broadest market. A single instance of the service

runs on the cloud & multiple end users are serviced. In this case the provider allows the customer only to use its applications. The software interacts with the user through a user interface. These applications can be anything from web based email, to applications like Twitter. On the customers side, there is no need for upfront investment in servers or software licenses, while for the provider, the costs are lowered, since only a single application needs to be hosted & maintained. Today SaaS is offered by companies such as Google, Salesforce, Microsoft, Zoho, etc.

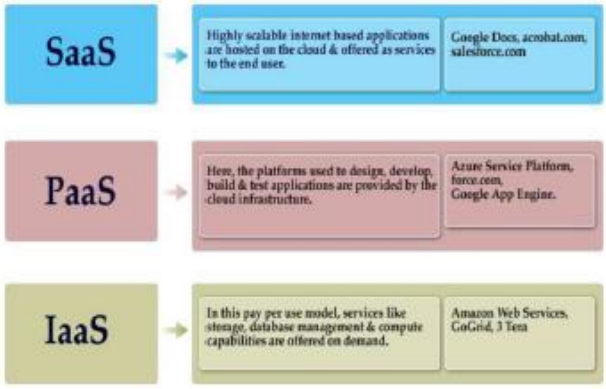

Figure 2: Cloud Computing Models

3.2. Platform as a Service (PAAS):

PAAS is a set of software and development tools hosted on the provider's servers. This layer of software or development environment is encapsulated & offered as a service, upon which other higher levels of service can be built. The customer has the freedom to build his own applications, which run on the provider's infrastructure. This is the idea that someone can provide the hardware plus a certain amount of application software -such as integration into a common set of programming functions or databases as a foundation upon which you can build your application. Google Apps is one of the most famous Platform-as-a-Service providers. To meet manageability and scalability requirements of the applications, PAAS providers offer a predefined combination of OS and application servers, such as LAMP platform (Linux, Apache, MySql and PHP), restricted J2EE, Ruby etc. Google's App Engine, Force.com, etc are some of the popular PAAS examples. [2]

3.3. Infrastructure as a Service (IAAS):

IAAS provides basic storage and computing capabilities as standardized services over the network. It provides virtual servers with unique IP Addresses and blocks of storage on demand. Servers, storage systems, networking equipment, data centre space etc. are pooled and made available to handle workloads. Customers can pay for exactly the amount of service they use, like for electricity or water, this service is also called utility computing. The customer would typically deploy his own software on the infrastructure. Some common examples are Amazon, GoGrid, 3 Tera, etc.

4. FOUR DEPLOYMENT MODELS: - [4, 6]

4.1. Private Cloud: - The cloud infrastructure is operated solely for an organization. It may be managed by the organization or a third party and may exist on premise or off premise. It is easier to align with security, compliance, and regulatory requirements, and provides more enterprise control over deployment and use. In the private cloud, scalable resources and virtual applications provided by the cloud vendor are pooled together and available for cloud users to share and use.

The information and development are control within the group with no the limitations of the system bandwidth, safety measures exposures and legal necessities. Additionally, private cloud services propose the user have power over of the cloud infrastructure, humanizing protection and resiliency. It differs from the public cloud in that all the cloud resources and applications are managed by the organization itself, similar to Intranet functionality.

4.2. Community Cloud: - The cloud infrastructure is shared by several organizations and supports a specific community that has shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be managed by the organizations or a third party and may exist on premise or off premise.

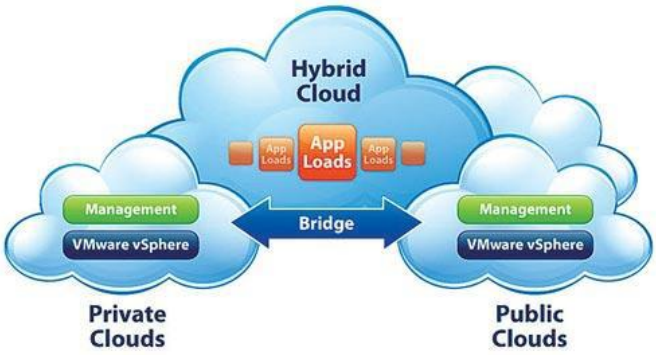

Figure 3: Deployment Models

4.3. Public Cloud: - The cloud infrastructure is made available to the general public or a large industry group and is owned by an organization selling cloud services. A public cloud is a model which allows users access to the cloud via interfaces using mainstream web browsers. It's typically based on a pay-per-use model, similar to a prepaid electricity metering system which is flexible enough to cater for spikes in demand for cloud optimization. In plain words, public cloud casework or services are described as being accessible to cloud users from a third party account provider by means of the Internet. The appellation 'public' does not consistently indicate free, even admitting it can be charge less or adequately be use with less cost. This also doesn't mean that the cloud users' personal info and data is exposed to the public. This model provides an expandable, rate efficient means to set up cloud services. [6] Public clouds are less secure than the other cloud models because it places an additional burden of ensuring all applications and data accessed on the public cloud are not subjected to malicious attacks. Therefore trust and privacy concerns are rife when dealing with Public clouds with the Cloud SLA at its core.

4.4. Hybrid Cloud:- The cloud infrastructure is a composition of two or more clouds (private, community, or public) that remain unique entities but are bound together by standardized or proprietary technology that enables data and application portability (e.g., cloud bursting for load-balancing between

clouds). A hybrid cloud environment consisting of multiple internal and/or external providers. It can also describe configurations combining virtual and physical, collocated assets.

5. CHARACTERISTICS:-[3]

Cloud computing has a variety of characteristics, with the main ones being:

5.1. Shared Infrastructure — Uses a virtualized software model, enabling the sharing of physical services, storage, and networking capabilities.

5.2. 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.

5.3. 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. Deployments of services in the cloud include everything from using business applications to the latest application on the newest smart phones.

5.4. 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.

6. BENEFITS OF CLOUD COMPUTING:-

As cloud computing begins to take hold, several major benefits have become evident:

1) **Costs**: - The cloud promises to reduce the cost of acquiring, delivering, and maintaining computing power, a benefit of particular importance in times of fiscal uncertainty. By enabling agencies to purchase only the computing services needed, instead of investing in complex and expensive IT infrastructures, agencies can drive down the costs of developing, testing, and maintaining new and existing systems.

2) **Access**: - The cloud promises universal access to high-powered computing and storage resources for anyone with a network access device. By providing such capabilities, cloud computing helps to facilitate telework initiatives, as well as bolster an agency's continuity of operations demands.

3) **Scalability and Capacity**: - The cloud is an always-on computing resource that enables users to tailor consumption to their specific needs. Infinitely scalable, cloud computing allows IT infrastructures to be expanded efficiently and expediently without the necessity of making major capital investments. Capacity can be added as resources are needed and completed in a very short period of time.

4) **Resource Maximization: -** Cloud computing eases the burden on IT resources already stretched thin, particularly important for agencies facing shortages of qualified IT professionals.

5) **Collaboration: -** The cloud presents an environment where users can develop software-based services that enhances collaboration and fosters greater information sharing, not only within the agency, but also among other government and private entities.

6) **Customization: -** Cloud computing offers a platform of tremendous potential for creating and amending applications to address a diversity of tasks and challenges. Its inherent agility means that specific processes can be easily altered to meet shifting agency needs, since those processes are typically changeable by making a configuration change, and not by driving redevelopment from the back-end systems (Heyward and Rayport, 2009)

7. CLOUD COMPUTING CHALLENGES [6]

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.

1. **Security and Privacy** —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.

2. **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.

3. 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.

4. **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.

8. CONCLUSION:-

Cloud Computing is essentially on-demand access to a shared pool of computing resources. It helps consumers to reduce costs, reduce management responsibilities and increase business agility and the competitive edge. For this reason, it is becoming a popular paradigm and increasingly more companies are shifting toward IT Cloud Computing solutions. Cloud computing users avoid capital expenditure on hardware, software, and services when they pay a provider only for what they use. Consumption is usually billed on a utility (resources consumed, like electricity) or subscription (time-based, like a newspaper) basis with little cost. Other benefits of this approach are low barriers to entry, shared infrastructure and

costs, low management overhead, and immediate access to a broad range of applications. Cloud computing offers real alternatives to IT department for improved flexibility and cost. Markets are developing for the delivery of software applications, platforms, and infrastructure as a service to IT departments over the "cloud"

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