An Analytical review of different technologies of Cloud Computing

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ABSTRACT

Cloud Computing offers us a means by which we can contact the applications as services, over the Internet. It permits us to create, configure, and customize applications online. Cloud computing is an emerging model of business computing. In this paper, we discover the concept of cloud architecture and compares cloud computing with grid computing. We also address the features and applications of several popular cloud computing platforms. This paper address to pinpoint the challenges and issues of cloud computing. Index Terms cloud computing, architecture, challenges, cloud platforms, research issues.

1. INTRODUCTION

Cloud computing is a type of Internet centric computing that provides shared computer processing resources and data to computers and other devices on demand. It is a model for enabling ubiquitous, on-demand contact to a common pool of configurable computing resources (e.g., computer networks, servers, storage, applications and services), which can be rapidly provisioned and released with nominal management work. Cloud computing and storage solutions provide users and enterprises with various capabilities to store and process their data in third-party data centers that may be placed far from the user–ranging in distance from across a city to across the world. Cloud computing relies on sharing of resources to achieve coherence and economy of scale, similar to a utility (like the electricity grid) over an electricity.

Network. The term Cloud refers to a Network or Internet. In other words, we can say that Cloud is something, which is present at remote location. Cloud can provide services over network, i.e., on public networks or on private networks, i.e., WAN, LAN or VPN. Applications such as e-mail, web conferencing, customer relationship management (CRM), all run in cloud.

Cloud Computing refers to manipulating, configuring, and accessing the applications online. It offers online data storage, infrastructure and application. We need not to install a piece of software on our local PC and this is how the cloud computing overcomes platform

dependency issues. Hence, the Cloud Computing is making our business application mobile and collaborative.

2 .BASIC CONCEPTS

There are certain services and models working behind the scene making the cloud computing feasible and accessible to end users. Following are the working models for cloud computing:

- Deployment Models

- Service Models

2.1 Development Models

Deployment models define the type of access to the cloud, i.e., how the cloud is located? Cloud can have any of the four types of access: Public, Private, Hybrid and Community.

The **Public Cloud** allows systems and services to be easily accessible to the general public. Public cloud may be less secure because of its openness, e.g., e-mail.

Private cloud

The **Private Cloud** allows systems and services to be accessible within an organization. It offers increased security because of its private nature.

Community cloud

Public Cloud

The **Community Cloud** allows systems and services to be accessible by group of organizations.

Hybrid cloud

The **Hybrid Cloud** is mixture of public and private cloud. However, the critical activities are performed using private cloud while the non-critical activities are performed using public cloud.

2.2 SERVICE MODELS

Service Models are the reference models on which the Cloud Computing is based. These can be categorized into three basic service models as listed below:

1. Infrastructure as a Service (IaaS)

2. Platform as a Service (PaaS)

3. Software as a Service (SaaS)

There are many other service models all of which can take the form like XaaS, i.e., anything as a Service. This can be Network as a Service, Business as a Service, Identity as a Service, Database as a Service or Strategy **as a Service.** The **Infrastructure as a Service (IaaS)** is the most basic level of service. Each of the service models make use of the underlying service model, i.e., each inherits the security and management mechanism from the underlying model.

INFRASTRUCTURE AS A SERVICE (IAAS)

IaaS provides access to fundamental resources such as physical machines, virtual machines, virtual storage, etc.

PLATFORM AS A SERVICE (PAAS)

PaaS provides the runtime environment for applications, development & deployment tools, etc.

SOFTWARE AS A SERVICE (SAAS)

SaaS model allows to use software applications as a service to end users.
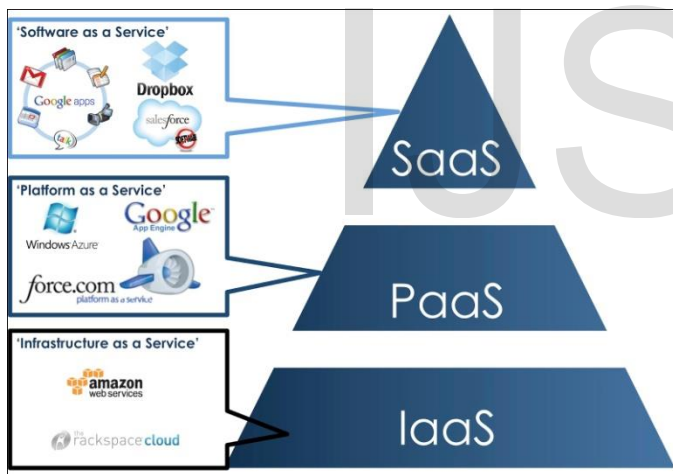
III. POPULAR CLOUD COMPUTING PLATFORMS

3.1. AMAZON WEB SERVICES: AWS continued its lead with constant innovation and enhancements to the platform. The success of AWS re:Invent event was an indication of how Amazon is becoming a dominant player of the industry. AWS now has over 30 services spanning from basic compute to real-time data ingestion. Amazon Web Services (AWS) is a suite of cloud computing services offered by Amazon. AWS offers scalable and flexible IaaS, PaaS, storage, networking, and management platforms. It is supported by a global, 12-region infrastructure.

3.2. GOOGLE CLOUD PLATFORM: Google Cloud Platform is a computing platform that provides developers with products to build

structures, including simple websites and complex web applications. Google Cloud Platforms offers hosting, computing, cloud storage, Big Data, and API services.

3.3. EUCALYPTUS: Eucalyptus Eucalyptus (Elastic Utility Computing Architecture for Linking Your Programs to Useful Systems) mainly was used to build open-source private cloud platform. Eucalyptus is an elastic computing structure that can be used to connect the users' programs to the useful systems, it is an open-source infrastructure using clusters or workstation implementation of elastic, utility, cloud computing and a popular computing standard based on a service level protocol that permit users lease network for computing capability. Currently, Eucalyptus is compatible with EC2 from Amazon, and may support more other kinds of clients with minimum modification and extension.

3.4. IBM CLOUD: The IBM Cloud includes IaaS, SaaS, and PaaS offerings on public, private and hybrid cloud platforms. Softlayer partnered with the IBM Cloud offers a comprehensive cloud ecosystem, offering management, virtualization, storage, and computing platforms.

3.5. REDHAT: Red Hat provides cloud offerings on their open-source software platforms and is easily integrated with other major cloud services. Red Hat has offerings for infrastructure creation and deployment, cloud management, and platform development.

3.6. ORACLE CLOUD: The Oracle cloud offers a variety of cloud computing and networking tools. The Oracle Cloud IaaS offers a set of core infrastructure capabilities,

such as elastic compute and storage for enterprise clients.

3.7. VMWARE: VMware vCloud offers users a platform to run, manage, and secure applications. This is partnered with an ecosystem of cloud service providers. vCloud Air is VMware's flagship infrastructure public cloud platform.

3.8. RACKSPACE: Rackspace has two primary lines of business; **Cloud Servers** and **Dedicated Servers**. Rackspace helps design, build, and operate workloads across both environments depending on the individual needs of the customer.

3.9. ABICLOUD: AbiCloudAbicloud is a cloud computing platform, It can be used to build, integrate and manage public as well as private cloud in the homogeneous environments. Using Abicloud, user can easily and automatically deploy and manage the server, storage system, network, virtual devices and applications and so on. The main difference between Abicloud and other cloud computing

platforms is its powerful web-based management function and its core encapsulation manner.

IV. APPLICATIONS

There are a few applications of cloud computing as follows:

(1) Cloud computing provides dependable and secure data storage center.

(2) Cloud computing can realize data sharing between different equipments.

(3) The cloud provides nearly infinite possibility for users to use the internet.

(4) Cloud computing does not need high quality equipment for the user and it is easy to use.

V. CHATACTERISTICS

ON DEMAND SELF-SERVICE
Cloud Computing allows the users to use web services and resources on demand. One can logon to a website at any time and use them.

BROAD NETWORK ACCESS
Since Cloud Computing is completely web based, it can be accessed from anywhere and at any time.

RESOURCE POOLING
Cloud Computing allows multiple tenants to share a pool of resources. One can share single physical instance of hardware, database and basic infrastructure.

RAPID ELASTICITY
It is very easy to scale up or down the resources at any time. Resources used by the customers or currently assigned to customers are automatically monitored and resources. It make it possible

MEASURED SERVICE
**Service Models & Deployment Models** are described in above section.

VI. BENEFITS
Cloud Computing has numerous advantages. Some of them are listed below:

- One can access applications as utilities, over the Internet.

- Manipulate and configure the application online at any time.

- It does not require to install a specific piece of software to access or manipulate cloud application.

- Cloud Computing offers online development and deployment tools, programming runtime environment through **Platform as a Service model**.

- Cloud resources are available over the network in a manner that provides platform independent access to any type of clients.

- Cloud Computing offers **on-demand self-service**. The resources can be used without interaction with cloud service provider.

- Cloud Computing is highly cost effective because it operates at higher efficiencies with greater utilization. It just requires an Internet connection.

- Cloud Computing offers load balancing that makes it more reliable.
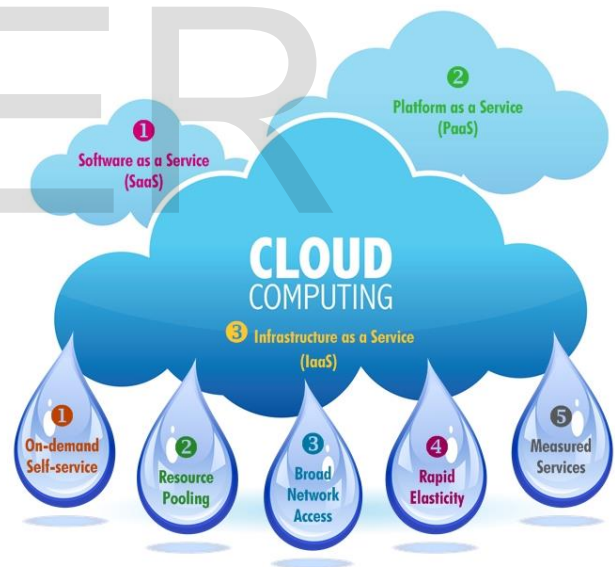
VII. RISKS
Although Cloud Computing is a great innovation in the world of computing, there also exist downsides of cloud computing. Some of them are discussed below:

SECURITY & PRIVACY
It is the biggest concern about cloud computing. Since data management and infrastructure management in cloud is provided by third-party, it is always a risk to handover the sensitive information to such providers. Although the cloud computing vendors ensure more

secure password protected accounts, any sign of security breach would result in loss of clients and businesses.

LOCK-IN

It is very difficult for the customers to switch from one **Cloud Service Provider (CSP)** to another. It results in dependency on a particular CSP for service.

ISOLATION FAILURE

This risk involves the failure of isolation mechanism that separates storage, memory, routing between the different tenants.

MANAGEMENT INTERFACE COMPROMISE

In case of public cloud provider, the customer management interfaces are accessible through the Internet.

INSECURE OR INCOMPLETE DATA DELETION

It is possible that the data requested for deletion may not get deleted. It happens either because extra copies of data are stored but are not available or disk destroyed also stores data from other tenants.

VIII. CLOUD COMPUTING TECHNOLOGIES

There are certain technologies that are working behind the cloud computing platforms making cloud computing flexible, reliable, and usable. These technologies are listed below:

1. Virtualization

2. Service-Oriented Architecture (SOA)

3. Grid Computing

4. Utility Computing

(1) Virtualization

Virtualization is a technique, which allows to share single physical instance of an application or resource among multiple organizations or tenants (customers). It does so by assigning a logical name to a physical resource and providing a pointer to that physical resource when demanded.

(2) Service-Oriented Architecture (SOA)

Service-Oriented Architecture helps to use applications as a service for other applications regardless the type of vendor, product or technology. Therefore, it is possible to exchange of data between applications of different vendors.

(3) Grid Computing

Grid Computing refers to distributed computing in which a group of computers from multiple locations are connected with each other to achieve common objective. These computer resources are heterogeneous and geographically dispersed. Grid Computing breaks

complex task into smaller pieces. These smaller pieces are distributed to CPUs that reside within the grid.

(4) Utility Computing

Utility computing is based on **Pay per Use** model. It offers computational resources on demand as a metered service. Cloud computing, grid computing, and managed IT services are based on the concept of Utility computing

CONCLUSION:

This paper discussed the basics of cloud computing, the various technologies, popular platforms and the characteristics of cloud computing. It also addressed the challenges and other issues and risks related. It also threw some light on the benefits of cloud computing.

Cloud computing is becoming a hugely attractive paradigm, especially for business enterprises and various organizations.

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