International Journal of Advance Research in Science and Engineering
Vol. No.6, Issue No. 03 , March 2017
www.ijarse.com
IJARSE
ISSN (O) 2319 - 8354
ISSN (P) 2319 - 8346

A STUDY OF CLOUD MODELS & COMPARISON BETWEEN DIFFERENT CLOUD PLATFORMS

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ABSTRACT

The Cloud Computing is an emerging paradigm which believes in providing various services (both hardware and software) as a service to the user. It provides everything as a service. Various benefits are associated with cloud environment such as reliability, scalability, security etc. Cloud computing is a next generation computing truly based on service provisioning based on virtualization. It is fast growing technology. This paper illustrates various service models and cloud platform provided for the user's requirement.

Keywords: Cloud Computing, Reliability, Scalability, Security, Virtualization.

I. INTRODUCTION

Cloud computing is the delivery of computing services both hardware (servers, storage, networking) and software (applications, databases, analytics) over the Internet. Cloud computing is based on a group of many new and old concepts of various areas like distributed computing, grid computing and virtualization. It has grown so much in the last few years. Simply we can say, cloud computing is the computing that is based on internet. Earlier, users download the application or software on a physical system, but with cloud computing, users can access the same kind of application or software through the net.

NIST definition of cloud computing, "Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

This paper is basically divided into four sections:
Section 1 gives a brief introduction about Cloud Computing.
Section 2 explains various service models deployed on cloud.
Section3 illustrates various platforms of cloud.
Section 4 compares and discuss about difference between various platforms of cloud.
Section 5 concludes the summary

IJARSE
ISSN (O) 2319 - 8354
ISSN (P) 2319 - 8346

II. CLOUD COMPUTING- INTRODUCTION

The Cloud Computing has emerged as a latest domain in terms of technology as well as research interests. Cloud computing is also known as fifth utility (along with water, electricity, gas and telephone) which is available as per the demand of the user. Cloud Computing is based on pay as per the use model. In this, a cloud computing model provides online computing service on demand as required by the user. Cloud computing is a fifth generation computing truly based on service provisioning based on virtualization. The cloud computing model believes in providing various benefits like fast deployment, pay-for-use, lower costs, scalability, rapid provisioning, rapid elasticity, ubiquitous network access, greater resiliency. It also provides hypervisor protection against network attacks, disaster recovery in minimal cost and various solutions to data storage, on-demand security controls, and real time detection of system tampering and rapid re-constitution of services.

III. SERVICE MODELS

Broadly, the cloud architecture can be divided into three layers based on their functioning. These layers are: **SaaS** (Software as a Service), **PaaS** (Platform as a Service) and **IaaS** (Infrastructure as service) as shown in figure 1.

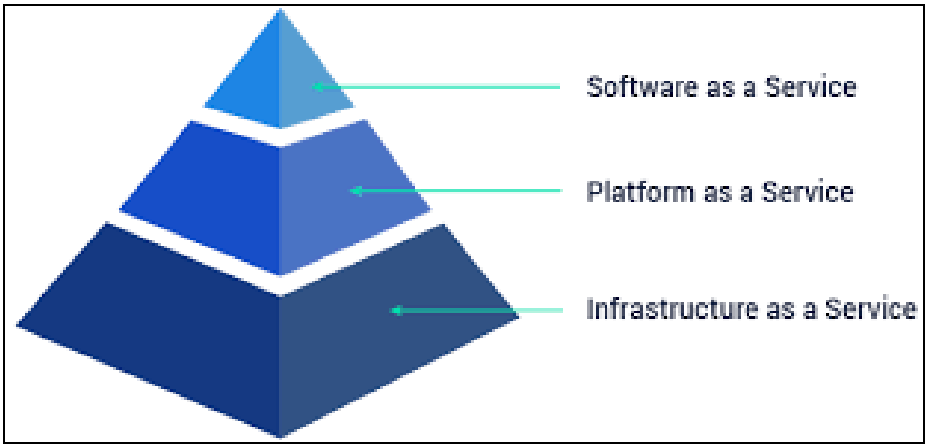

Figure 1: Service Models

3.1 Infrastructure as a Service (IaaS)

Here, the user will be provided with virtual machines having storage blocks and other fundamental computing resources. Instead of purchasing servers, space for data centers etc cloud completely outsource those facilities. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, and deployed applications; and possibly limited control of select networking components. Some of the IaaS providers are Amazon web services by EC2 (Elastic Cloud 2) which can fulfill user's requirements very easily.

3.2 Software as a Service (SaaS)

IJARSE
ISSN (O) 2319 - 8354
ISSN (P) 2319 - 8346

In this service, software is requested by the user as per his requirements; in return, a single instance of the software runs in user's machine. This software will remain on user's system as long as required by the user. At the end, user will have to pay only for those services as used by him. The most software used a service example if of Salesforce.com. In this, a user in provided with the functionality of 'customize with code' as he does not have to take overheads of coding. Other examples are Google docs, Google mail and so forth.

3.3 **PLATFORM AS A SERVICE (PaaS)**

In this kind of service, users are provided with API environments. By using these environments, user can develop their own applications and can directly deploy them on the cloud. Application developers need not to worry about the complexity of buying and managing the underlying cost of hardware and software. One of the famous examples of PaaS is Google App Engine provided by Google Applications. Other example of PaaS is VMware which provides virtual platform to the application developers.

IV. CLOUD PLATFORMS

It has been evident from studies that cloud is growing with a pace. Many countries and their governments are investing monetary values on various Cloud providing techniques. Following are the various cloud platform provider available in the market nowadays:

4.1 Abicloud Platform

This platform manages the cloud in homogeneous manner. Also, its innovation can be used to building, managing as well as integration in a homogenous environment a private and public cloud virtualized infrastructure. It provides a feature called a web based management function which allows the user to use a service just by dragging and dropping a virtual machine. In this, user need not to worry about remembering commands as it does not work on command line interface. Flexible infrastructure is the facility which is provided by Abicloud platform as a user once demanded can be increased further at any point of time. As Abicloud is Java based, it is much easier to reinstall anywhere required. This type of cloud can be implemented in private as well as on hybrid clouds.

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ISSN (O) 2319 - 8354
ISSN (P) 2319 - 8346

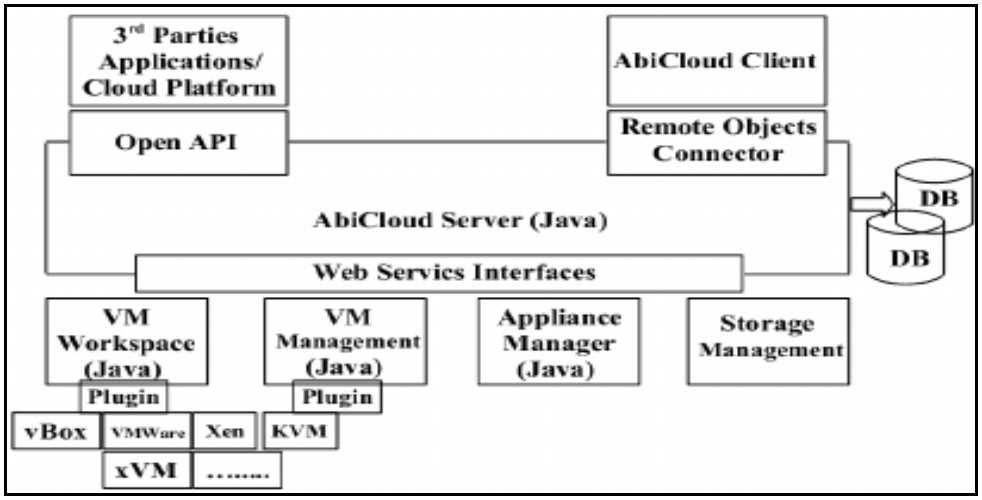

Figure 2: AbiCloud Architecture

4. 2 Eucalptus Cloud Platform

Eucalyptus is a short form for "Elastic Utility Computing Architecture for linking your programs to useful systems". It is Linux-based open source computing environment framework based on private cloud. It also provides virtual network that isolates network traffic of various users. It has transformed and is currently run by Eucalyptus Company.

In eucalyptus architecture, there are five high-level components, each component has its own Web-service interface that comprise a Eucalyptus installation i.e. node controller, cluster controller, storage controller, a cloud controller and Walrus (put/get storage).

Node Controller: Handling of queries is done by node controller which runs on each and every node in computing environment. It also controls the life cycle of instances. The node cluster interacts with operating system.

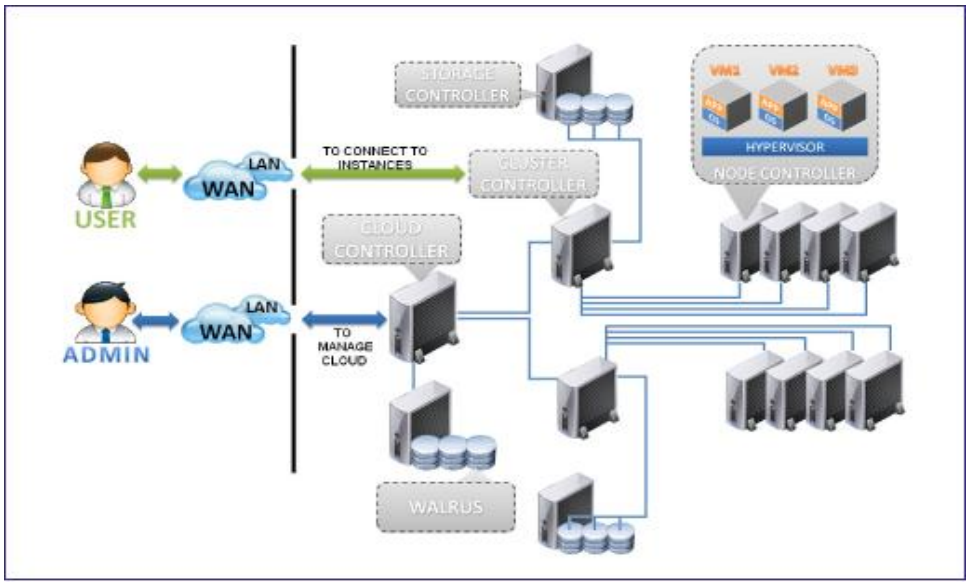

Figure 3: EUCALPTUS Architecture

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ISSN (O) 2319 - 8354
ISSN (P) 2319 - 8346

Cluster Controller: It executes on a cluster front-end machine generally. It controls all the nodes that are interconnected form a virtual cluster, collects the information from VM and schedule its extension.

Storage controller: It implements block-accessed network storage. Images are stored with the help of storage controller so that they can be access in future.

Cloud controller: It is the entry-point into the cloud for administrators, developers, project managers, and end-users. It is the real manager of the cloud as it is responsible for all the queries done on cloud. It also monitors the availability of resources of the cloud infrastructure.

Walrus (put/get storage): It allow users to store persistent material, organized as eventually-consistent buckets and objects. It also allow the users to create, delete, list buckets, put, get, and delete objects, and set access control policies.

4.3 Open Nebula Cloud Platform

This platform can be used on private, public as well as hybrid cloud. It follows the framework of open source cloud service. The biggest advantage of using Open Nebula platform is that it can dynamically extend the infrastructure of any user i.e. the data centers or clusters can be set to make them their infrastructure property flexible. Storage, network and virtual techniques can easily by synchronize. It basically includes three technologies i.e. virtualization, storage and network. Open Nebula offers various advantages such as adjustable platform meeting the dynamic requirements of the users, centralized management of virtually and physically distributed infrastructure, efficient energy consumption, cost reduction and so on. It also manages the heterogeneity and complexity of distributed large infrastructure.

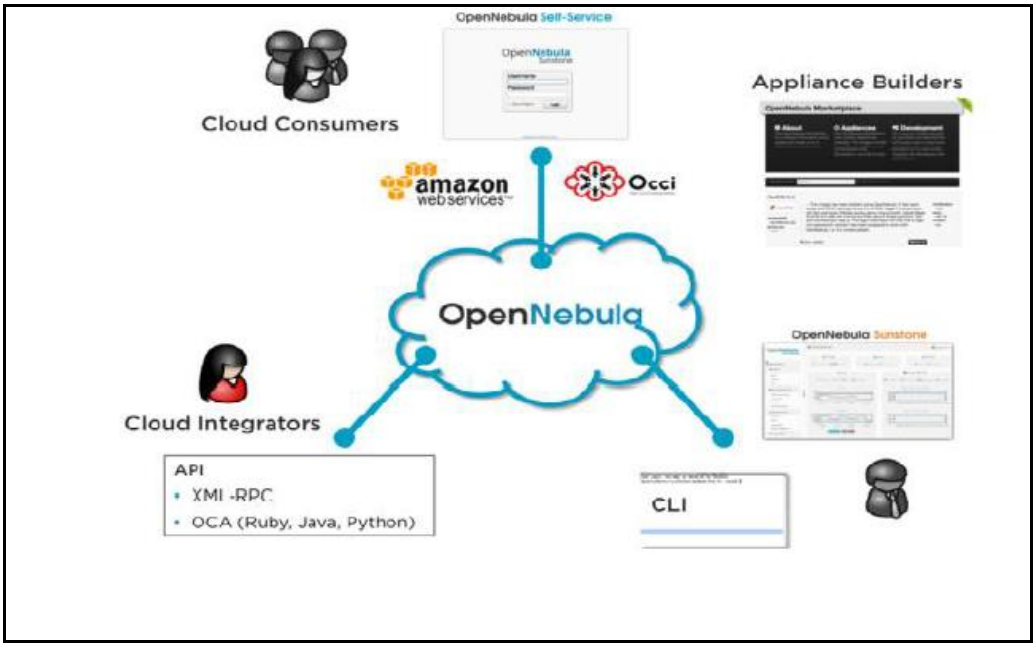

Figure 4: OPEN NEBULA Architecture

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ISSN (O) 2319 - 8354
ISSN (P) 2319 - 8346

4.4 Nimbus Cloud Platform

In this, clusters are converted into IaaS (Infrastructure as a Service). It permits the users for leasing remote resources and building environment for computing. While deploying an application, Nimbus offers a "cloudkit" which provides a manager and a repository of images. VWS (Virtual Workspace Services) is provided with it which does the allocation of remote resources. Like eucalyptus, Nimbus platform also comprises of four components namely: Workspace service, Workspace control, Workspace resource management and Workspace pilot. Here, workspace service is web based which provides GSI authorization and authentication. Workspace control helps in controlling VM instances, reconstructing images and assigning IP and MAC addresses to the virtual machines. The workspace resource management also manages the virtual machines over the network. At last, workspace pilot handles the administration and the network signals. Nimbus cloud seems more complicated than many cloud platforms as command line interface is used for command and results are that makes nimbus more complex.

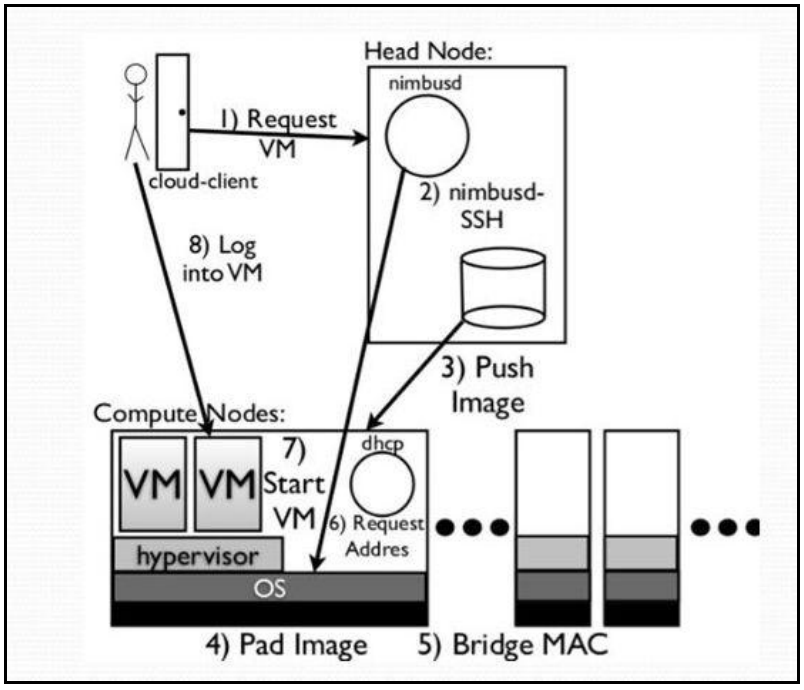

Figure 5: NIMBUS Architecture

4.5 Xen Cloud Platform (XCP)

Xen was launched in 2010 by Xen organization (Xen.org) for IaaS services. But it does not support full architecture of cloud. It works as abstraction layer between hardware and OS. This platform is used by many cloud vendors like Amazon EC2, Nimbus etc. In the architecture of XCP, there are XCP hosts that work behind its working. These are used to host VM on server as well as sharing of resources. There is another host known as Master XCP which has all administrative rights. It also sends the mess ages to other XCP hosts.

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ISSN (O) 2319 - 8354
ISSN (P) 2319 - 8346

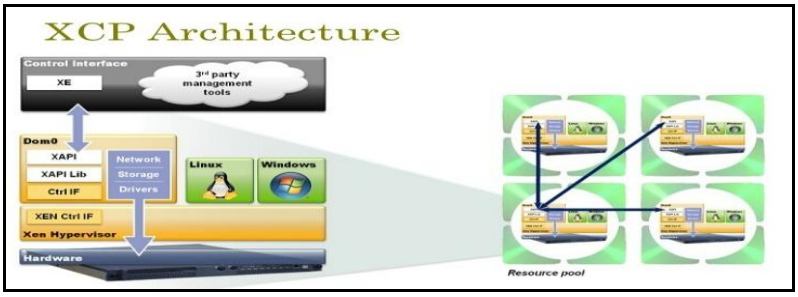

Figure 6: XCP Architecture

V. COMPARISON OF CLOUD PLATFORMS

Presently, a lot of cloud computing platform exist with different implementation, characteristics and varying advantages. In order to have understanding of them, a comparison of four major platforms: Eucalyptus, OpenNebula, Abicloud and Nimbus cloud are presented in table 1 below and some parameters used in the analysis include: Platform type, cloud form, compatibility, deployment, deployment manner, Transplant ability, VM support, Web Interface, structure, Reliability, OS support and development.

TABLE 1: COMPARISON BETWEEN CLOUD PLATFORMS

	Eucalyptus	**OpenNebula**	**Abicloud**	**Nimbus**
Cloud Type	Public	Private / Public	Private / Public	Private
Scalability	Scalable	Dynamic / Scalable	Scalable	Dynamic / Scalable
Cloud Form	IaaS	IaaS	IaaS	IaaS
Deployment	Dynamic Deployment	Dynamic Deployment	Pack and redeploy	Dynamic Deployment
Deployment manner	Command line	Command line	Web interface drag	Command line
Compatibility	Support EC2, S3	Open, multiplatform	Not supported EC2	Support EC2
Transplant ability	Common	Common	Easy	Common
Hypervisors support	VMware, Xen, KVM	Xen, VMware, KVM	Virtual box, Xen, VMware, KVM	Xen, KVM
Structure	Module	Module	Open Platform, encapsulate core	Lightweight components
Reliability	--	Rollback host and VM	--	--
OS Support	Linux	Linux	Linux	Linux
Development language	Java	Java	Ruby, C++, Python	Java, Python

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ISSN (O) 2319 - 8354
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VI. CONCLUSION

This paper has presented the basic introduction to cloud, service models and various platforms of cloud. This paper has also presented the work published by various journals on cloud computing. This paper explicated fundamentals pertaining to the basic requirements of pursing research in the cloud computing. Various platforms are already available in the market and also a lot of research has been in process so that more platforms can be made available in the market. Now, the difference in the platform is becoming an issue in terms of understanding and usage. Based on the analysis, users now have the opportunity to understand the features and be able to make choices of cloud computing platform in respect to cloud modules.

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