Review on Different IaaS Clouds

John Paul Martin[1], Yedhu Sastri[2], Aneesh Babu S[3], Hareesh M.J.[4], Sijo Cherian[5]

Student, Rajagiri School of Engineering & Technology, Kochi, India[1,2,3,4]

Assistant Professor, Rajagiri School of Engineering & Technology, Kochi, India[5]

Abstract: The most leading business buzz is cloud computing. Cloud computing is nothing but accepting the resources and services through internet which are provided by the cloud providers .Cloud platform can handle large volumes of data as well as spikes with ease.The confrontational growth of the cloud infrastructure as a service framework presented a challenge before the users to choose the best framework suiting their requirements. Comparison of various features of frameworks in real time environment is a tedious task. In this paper, a comparative study is done on the different frameworks used in cloud where infrastructure is provided as a service.

Keywords: Cloud, Cloud Stack, Open Nebula, Open Stack, Nimbus, Framework.

I. INTRODUCTION

Cloud computing can be outlined as dynamically expandable shared resources accessed over a network. The prime feature of cloud computing is that a user needs to pay for what he uses. The shared resources are storage, computing, services etc. Based on the supported style of resources provided, cloud design can be divided in to three kinds of delivery models: IaaS, SaaS, PaaS [1] [2]. The main goal of IaaS computing model is to deliver high performance computing power that satisfies the requests from the user. Virtualization is a technique that could be used to improve computing power.
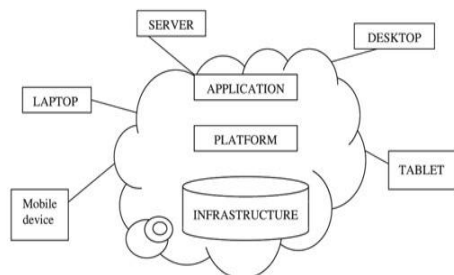
High availability, flexibility, network and image management, security, elasticity, robustness, SSH Key management, Volume and Snapshot management, IP address Management etc are some of the features of Eucalyptus.

The latest version of Eucalyptus 3.4 provides the following additional features such as Hybrid Cloud Management, Enhanced API compatibility, Image creation and management and additional cloud operations. The figure 2 represents eucalyptus cloud architecture.
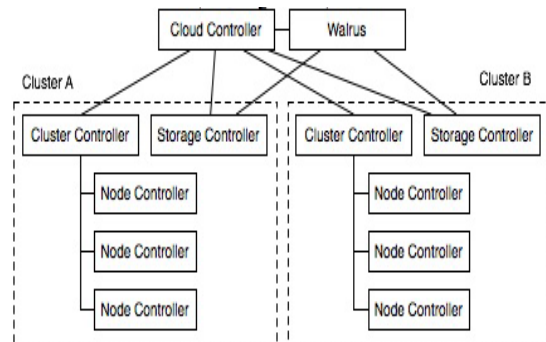

Fig.1. Cloud delivery model

Fig.2. Eucalyptus Cloud Architecture [3]

II. DIFFERENT IAAS FRAMEWORKS

A. Eucalyptus

Eucalyptus [3] [4]is an open source cloud computing software for creating private and public cloud which are compatible with Amazon web service. Eucalyptus is coded in Java and C. Eucalyptus consists of six components.

- Cloud Controller:- It provides an interface to the user. Cloud controller handles incoming requests and also acts as an administrative interface for management of cloud.
- Walrus Storage:- Used for the permanent storage of all virtual machines in the cloud.
- Cluster Controller:-Acts as a front end for cluster within the cloud and also manages execution of the virtual machines
- Storage Controller:-Manages snapshots of virtual machines within its cluster.
- Vmware Broker: Provides an interface to the Vmware and runs on the cluster controller.
- NodeController:-Used to host virtual machine instances.

B. Nimbus

Nimbus [5] is used to create infrastructure as a service cloud from a computer cluster. The nimbus toolkit consists of Workspace service, Workspace resource manager, Workspace pilot, Workspace control tools, Iaas Gateway, Context broker, Workspace client, cloud client, Nimbus Storage service. These tools are self -contained and light weighted thus they can be randomly selected and can be arranged in any of the configurations. The two products of Nimbus are Nimbus platform and Nimbus Infrastructure [6].

- Nimbus Infrastructure:- It consists of a set of tools that supports batch schedulers, best effort allocation and proxy credentials. Nimbus infrastructure mainly focusing for the interest of the scientific community.
- Nimbus Platform:- Nimbus platform consists of a set of tools working on multi cloud environment. It allows managing and deploying cloud resources.

Nimbus allows clients to create and use virtual machines with a cloud provider and thus provides flexibility. This flexibility helps to make use of nimbus cloud in data intensive researches.

C. OpenNebula

OpenNebula [7] is an open source tool kit used for creating private, public and hybrid infrastructure as a cloud from a heterogeneous distributed environment. OpenNebula is also used for the management of virtual data centers. It has a core used for maintaining virtual machines, web service and language specific bindings. OpenNebula uses a shared file system, typically NFS for all disk images and files for running OpenNebula functions. For creating a virtual machine, user has to provide a configuration file which specifies the required configuration of the virtual machine in to a virtual machine manager's command line. The NFS doesn't use any of the encryption techniques and thus it may be vulnerable to sniffing attacks. Thus an authorization mechanism can be used based on passwords, ssh, rsa key, X509 certificates or LDAP.
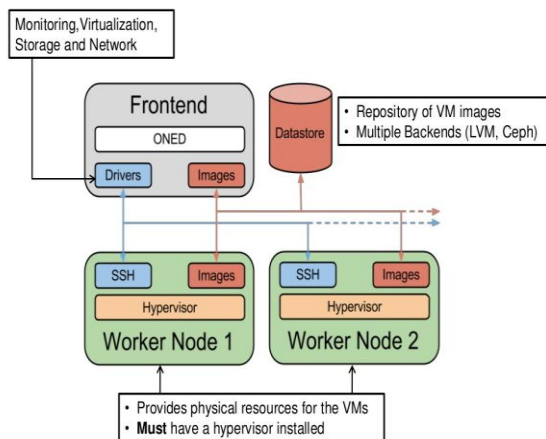

Fig.3. Typical OpenNebula Enviornment [14]

D. OpenStack

OpenStack [8]9 is an Open-Source operating system for building private and public clouds. They can be used to manage large networks of virtual machines. The three main components of OpenStack consists of Open-Stack Compute(Nova),OpenStack Object Storage(swift) and OpenStack Image Service (Glance).

- OpenStackCompute:- Manages large networks of virtual machines. The modular structure, broad hyper visor and volume support allows third party integration. The android and iOS application support allows mobile management. The main features of OpenStackCompute are multi-tenancy, massive scalability, EC2 support, Multiple Network models, Block storage support and an ajax based web control panel. OpenStackCompute supports different type of hypervisors such as Xen, KVM,Hyper-V, VMWare, Linux containers.
- OpenStackObjectStore:- Clusters of standardized servers are used to store petabytes of accessible data.

Large amount of static data can be stored for long term and can also be retrieved and updated. Storage uses a distributed architecture which avoids single point of failures and provides scalability and reliability. Clusters scale horizontally by adding new nodes. It is responsible for the data replication and integrity.

- OpenStackGlance:- Manages huge number of server images. Provides discovery, registration, delivery services for virtual disk images.
- OpenStack provides:
- Control & Flexibility: Modular design structure thus can easily integrate with third party technologies
- Scalability
- Open Industry Standard: a number of companies and industries are participating in OpenStack.
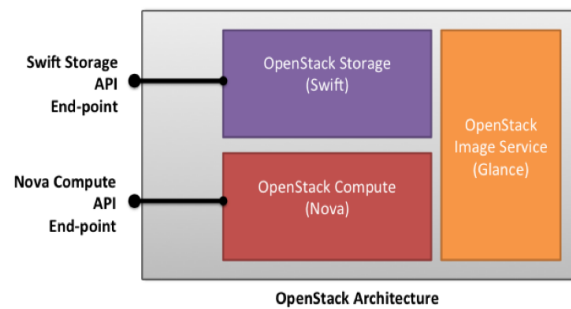- Openness & Compatibility.
- Flexible Technology.

Fig.4. Open Stack Architecture

E. Cloud Stack

Apache Cloud Stack [10] is a top-level project of the Apache Software Foundation. Cloud Stack is an Open source tool used to manage large networks of virtual machines as a infrastructure as a cloud computing platform. Cloud Stack is used for providing public cloud and creating private and hybrid clouds. CloudStack supports most of the hypervisors such as VMWare, KVM, XenServer and Xen cloud platform. Users can manage cloud with web interface, command line tools and an API. It manages instances running on the hypervisors as well as well as snapshots and ISO images. It also takes into account network and storage resources.

CloudStack support:

- Multiple Hypervisor Support : It supports multiple hypervisors and single cloud deployment may contain more than one hypervisor implementations.
- Infrastructure Management
- Automatic Configuration Management.
- Graphical User Interface.
- High Availability.

CloudStack mainly consists of two parts: Management server and cloud Infrastructure. Management server is a CloudStack software which manages the cloud resources. It controls creation and management of virtual machines and also assigns IP addresses to them. Management server also provides APIs for cloud stack. The management server manages the zones having hosts which contain the virtual machines.
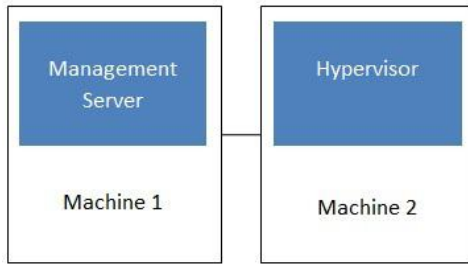
Fig.5. Deployment Architecture [10]

F. IBM Smart Cloud

IBM Smart Cloud [11] is a enterprise class cloud computing technologies for building private, public and hybrid cloud provided by IBM. It is used to create a secure and scalable infrastructure efficiently and effectively. IBM Smart Cloud is not an open source tool. IBM Smart Cloud Enterprise+ is specifically designed for running critical enterprise workloads.IBM smart cloud provides:

- Faster provisioning.
- Greater flexibility.
- Improved service.
- Graphical User Interface.
- High Availability.

It supports multiple hypervisors such as VMware vSphere (ESXi), Microsoft Hyper-V and Linux KVM. It can be used with existing or new infrastructure. Users can request resources through an web based interface.

Cloud Frame-work	Hypervisor Used	Vendors	Storage	Type Of Cloud
Eucalyptus	KVM, Xen & VMware	Amazon Web service	Walrus	Private or Hybrid
Nimbus	Xen or KVM	Amazon EC2	Cumulus	Private, Public, Community
OpenNebula	Xen, KVM, VMware	Amazon EC2	Unix File System	Public or Private cloud
OpenStack	KVM, XenServer, HyperV, LXC	Rackspace Hosting & NASA	Swift Unix File system	Public or Private
Cloud Stack	VMware, KVM, XenServer, Xen Cloud Platform	Apache	VM disk storage, Secondary storage as template snap-shot	Public or Private
IBM Smart-Cloud	VMware, Vsphere, KVM, IBM power VM	IBM		Private, Public & Hybrid

III. COMPARISON

The various features [12] [13] of Infrastructure as a Service cloud platforms are compared in Table 1.

IV. CONCLUSION

Cloud computing provides platform as a service, infrastructure as a service and storage as a service. There exist many frameworks which provides infrastructure as a service. This paper focuses on a comparison between the features of various IaaS Platforms. Thus this study allows the users to select the platform based on the requirements. We also hope that our survey will aid researchers who are working in this domain.

REFERENCES

[1] Saurabh Kumar Garg, Steve Versteeg, RajkumarBuyya,A Framework for Ranking of Ccloud Computing Services, Future Generation Computer Systems, Volume 29, Issue 4, June 201 3, Pages 1012- 1023, ISSN 0167-739X

[2] Mohiuddin Ahmed, Abu Sina Md. RajuChowdhury, Mustaq Ahmed, Md. Mahmudul Hasan Rafee , An Advanced Survey on Cloud Computing and State-of-the-art Research Issues, IJCSI International Journal of Computer Science Issues, Vol. 9, Issue 1, No 1, January 2012ISSN (Online): 1694-0814.

[3] Eucalyptus Web Pages (Open Source). Available: http://open.eucalyptus.com/

[4] Nurmi, D.; Wolski, R.; Grzegorczyk, C.; Obertelli, G.; Soman, S.; Youseff, L.; Zagorodnov, D., "The Eucalyptus Open-Source Cloud-Computing System", Cluster Computing and the Grid, 2009. CCGRID '09. 9th IEEE/ACM International Symposium on , vol., no., pp.124,131, 18-21 May 2009, doi: 10.1109/CCGRID.2009.93

[5] Nimbus Project Web Page. Available: http://www.nimbusproject.org

[6] K. Keahey, I. Foster, T. Freeman, and X. Zhang, "Virtual Workspaces: Achieving Quality of Service and Quality of Life in the Grid," Scientific Programming Journal, vol. 13, pp. 265-276,2005.

[7] Chao-Tung Yang; Kuan-Lung Huang; Jung-Chun Liu; Wei-Sheng Chen; Wen-Hung Hsu, "On Construction of Cloud IaaS Using KVM and Open Nebula for Video Services," Parallel Processing Workshops (ICPPW), 2012 41st International Conference on , vol., no., pp.212,221, 10-13 Sept. 2012 ,doi: 10.1109/ICPPW.2012.32.

[8] OpenStack, Available:http://www.openstack.org/downloads/ openstack/computedatasheet.pdf

[9] Apache CloudStack, Available, http://cloudstack.apache.org/docs/en-US/index.html

[10] IBM SmartCloud Entry for SystemX, Available: http://www-03.ibm.com/systems/x/solutions/cloud/starterkit/index.html

[11] Gregor von Laszewski, Javier Diaz, Fugang Wang, Geoffrey C. Fox Qualitative Comparison of Multiple Cloud Frameworks.

[12] Jisha S. Manjaly, Jisha S. a comparative study on open source cloud computing framework International Journal Of Engineering And Computer Science ISSN:2319-7242 Volume 2, Issue 6 June, 2013 Page No. 2026-2029.

[13] OpenNebulla, Available: http://opennebula.org/documentation