Research Inventy: International Journal Of Engineering And Science
Vol.3, Issue 10 (October 2013), PP 51-54
Issn(e): 2278-4721, Issn(p):2319-6483, Www.Researchinventy.Com

Comparative Study on Open Source Software for Cloud Computing Platform: Eucalyptus, Openstack and Opennebula

Sonali Yadav
Assistant Professor
Integral University, Lucknow-226021

ABSTRACT: *Cloud computing is a Service Oriented Architecture which reduced information technology overhead for the end-user and provide great flexibility, reduced total cost of ownership, on-demand services and many other things [1]. Hence it delivered all IT related capability as services rather than product .Services on cloud are divided into three broad categories: Software as a Service, Infrastructure as a Service & Platform as a Service. Same as services cloud is also classified as Private Cloud, Public Cloud & Hybrid Cloud. Private cloud is increasingly become popular between every private organization either large or small wants .To deploy public or private cloud there are many open source software available some are Eucalyptus, Nimbus, OpenStack, Open Nebula Cloud stack and Amazon Web Services .This paper, I provide a study of the main open source software such as Eucalyptus, OpenStack and OpenNebula for cloud implementation. It is believe that the comparison presented in this paper would benefit developers in selecting best open source Software.*

KEYWORDS: *Cloud Computing, Cloud Services, Eucalyptus, Open Stack and Open Nebula.*

I INTRODUCTION

In recent year cloud computing become a most popular word in the world of Information Technology. It is a new term but it encloses advantages of many other technologies which are pre-exists in the IT world such as virtualization ,grid Computing ,Utility Computing etc which make cloud computing successful. Key attributes behind cloud computing are: Dynamic, abstraction, resource sharing and virtually infinite scalability. CLOUD is abbreviated as Computing Location independent Online Utility that is available on-Demand. Cloud Computing allow users to access that are resides on local , remote or other internet connected devices. Thus it deliver all IT related capabilities as services rather than product. .Cloud Computing divide services in the following three catogaries :Software As a Service (SaaS): It deliver to user 'software' as a service over the Internet, eliminating the need to install and run the application on there own computers and simplifying maintenance and support. Platform As A Service (PaaS): It deliver to user a computing platform and/or solution stack as a service. It facilitates deployment of applications without the cost and complexity of buying and managing the underlying hardware and software layers. Infrastructure As A Service (IaaS):It delivers to user computer infrastructure, typically a platform virtualization environment, as a service. Rather than purchasing servers, software, data center space or network equipment, clients instead buy those resources as a fully outsourced service.It is an evolution of virtual private server offerings.It also categorized cloud into three category: Private Cloud — The cloud infrastructure has been deployed, and is maintained and operated for a specific organization. Public Cloud — The cloud infrastructure is available to the public on a commercial basis by a cloud service provider. 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[2].The main goal of this paper is to present a comparison among the three main Open source software for cloud implementation that are: Eucalyptus,OpenStack and Open Nebula.

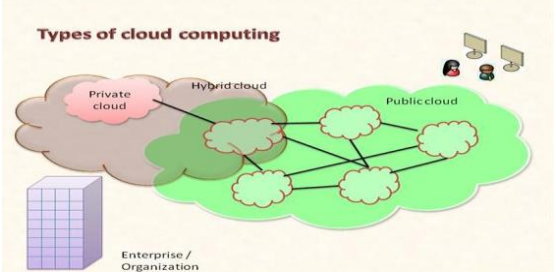

Figure-1[3]

II OPEN SOURCE CLOUD PLATFORM

A. Eucalyptus

EUCALYPTUS stand for Elastic Utility Computing Architecture for Linking Your Program To Useful System. It is an open Source software that was developed by University of California-Santa Barbara for Cloud Computing to implement Infrastructure as a Service.In early 2008, it become the first open source software which is compatible with Amazon Web Service API for deploying On-premise private cloud .Amazon Web Service (AWS) is one of the major players for providing Infrastructure As A Service.They have two popular services Elastic Compute Cloud (EC2) and Simple Storage Service (S3). Eucalyptus provide an EC2 -compatible cloud Computing Platform and S3-compatible Cloud Storage thus its services are available through EC2/S3 compatible APIs [4].Eucalyptus can leverage(drag) a heterogeneous collection of virtualization technologies within a single cloud, to incorporate resources that have already been virtualized without modifying their configuration.Eucalyptus has five high-level components: **Cloud Controller (CLC)** -it is the entry point into the private cloud for end user,project managers developers and administrator. It also help in manage virtualized resources. Walrus : It implements bucket-based storage, which is available inside and outside the cloud system. **Cluster Controller (CC)**:It executes on a machine that has network connectivity to the machines that are running on Node Controller and Cloud Controller .It manages the Virtual Machine (VMs) Network. All Node Controllers associated with a single CC must be in the same subnet.; Walrus is the storage system,which allow user to store data, organized as bucket and object, it is also used to create, delete, and list buckets.**Storage Controller (SC)** provides block-level network storage including support for Amazon Elastic Block Storage(EBS) semantics; and **Node Controller (NC)** is installed in each compute node to control Virtual Machine activities, including the execution, inspection, and termination of VM instances.

B. OpenStack

In July 2010 , OpenStack was announced and the initial contributes of it are NASA and Rackspace.It is the fastest growing free open source software. . Rackspace contributed their "Cloud Files" platform (code) to power the Object Storage part of the OpenStack, while NASA contributed their "Nebula" platform (code) to power the Compute part[5]. OpenStack is a collection of open source software project that developers and cloud computing technologist can use to setup and run their cloud compute and storage infrastructure.Its services are available through Amazon EC2/S3 compatible APIs and hence the client tools written for AWS can also be used with OpenStack.It consist of three core software project:OpenStack Compute Infrastructure also called Nova;OpenStack Object Storage Infrastructure also called Swift and OpenStack Image Service Infrastructure also called Glance. Nova is the main part of Infrastructure as a service and it also is the computing Fabric controller for the OpenStack cloud .Enterprises/Organization can use Nova to host and manage their cloud computing systems.Nova manages all the activities that are needed to support life cycle of instances within the open stack.Swift offers a distributed,consistent virtual object containers in which lots of data can be store and from which data can be retrieve It is capable of storing large number of object distributed across nodes.Glance is a lookup and retrieval system for virtual machine images.

C. OpenNebula

OpenNebula was first established as a research project back in 2005 by Ignacio M. Liorente and Ruben S. Montero.Since its first public release of software in March 2008**.** It can be primarily used as a virtualization tool to manage virtualized infrastructure in the data center or cluster , which is usually referred as private cloud. It supports hybrid cloud to combine local infrastructure with public cloud-based infrastructure, enabling highly scalable hosting environments. It also support Public cloud by providing cloud interfaces to expose its functionality for virtual machine,storage and network management.Its virtual infrastructure interface disclose user and administrator functionality for virtualization, networking,image and physical resource configuration,management etc. OpenNebula cloud infrastructure provide users with an elastic platform for fast delivery and scalability of services to meet dynamic demand of service end-users.All the services are hosted in Virtual Machines (VM) and then submitted ,monitored and controlled in the cloud by using the virtual interfaces such as Command Line interface,XML-RPC API, Libvirt virtualization API etc[6]

III COMPARATIVE STUDY

The comparison between Eucalyptus, OpenStack and OpenNebula is based on the study of the architecture of respective open source platform.Each Open source software provide Infrastructure as a Service to delivers virtualization environment, as a service to user computer.

A. Origin and Community Support

Eucalyptus: Eucalyptus was the result of research project of the university of California ,Santa Barbara, Department of computer science. It has a powerful community that contributes to platform development and assists in finding and fixing.

OpenStack: OpenStack started in summer 2010 when RackSpace and NASA jointed its initial project "Cloud Files" and "Nebula" respectively. OpenStack is lead by an foundation (integrated by 850 companies and 4500 individual members) and has a broad range of support from major tech industry players,ranging from HP, Dell , IBM, RackSpace , NASA , Cisco, NEC, AT&T ,Bull , EMC,Brocade and dozens of other companies.Its community integrated by around 7000 person over 87 countries.

OpenNebula: OpenNebula was funded initially by European infrastructure grants,and is now doing rather well in developments both inside Europe and overseas.Some large company such as Research In Motion,Telefonia and China Mobile also contribute to OpenNebula.In March 2010, the main authors of OpenNebula founded C12G Labs to provide the C12G value-added professional service that many enterprise IT shops require for internal adoption and to allow the OpenNebula project to not br tied exclusively to public financing,contributing to its long-term sustainability.

B. Architecture

Eucalyptus architecture consist of five components : Cloud Controller, Walrus , Cluster Controller , Node controller and Storage Controller. OpenStack has a fragmentated, distributed architecture. Currently it consist of three core software projects : OpenStack Compute (Nova) ,OpenStack Object Storage (Swift) and OpenStack Image service (glance). While architecture of OpenNebula a classical cluster -like architecture with a front end and a set of cluster nodes to run the virtual machines.At least one physical network is required for connecting all cluster node with the front end.

C. Relation with Amazon

Eucalyptus ,OpenNebula have embraced amazon Web Service-APIs to compatible with AWS's application programming interfaces. OpenStack , developers built tools to manage their resources using the native OpenStack RESTful APIs. OpenStack also has,at least at the moment ,has AWS EC2 compatibility API, and also support AWS S3 API.

D. Cloud Implementation

Eucalyptus is an open source platform for private cloud.OpenStack is an open source platform for deploying private and public cloud. OpenNebula,while an open source platform for deploying hybrid cloud ,but it also deploy private and public cloud.

E. Programming/Scripting Language

Eucalyptus has five component in which Cluster Controller and Node controller are primarily written in 'C' while Cloud Controller , Storage Controller and VMWare -Broker(not open -source due to license restriction) are written in Java. Euca2ools are written in Python. OpenStack Compute Nova is written in Python and Unix Shell (Bash sh).OpenNebula used many languages but most of its components are written in C++ ,Ruby and JAVA.

F. Hypervisors

Hypervisor is a software abstraction of a physical hardware platform that enables multiple guest operating system to run concurrently on a single physical machine.Eucalyptus is compatible with Xen and KVM hypervisor. To interact with these hypervisor eucalyptus use the Libvirt virtualization API.OpenStack is compatible with many hypervisor such as KVM, Xen, LXC, QEMU, UML, Hyper-V etc ,which make difficult for developer to choose one.OpenNebula , while support Xen, VMWare and KVM.

G. Operating System Support

Eucalyptus support Linux operating system .And images of both Microsoft windows and Linux . OpenStack and OpenNebula support CentOS ,Debian ,Fedora,RHEL open-SUSE, SLES, and Ubuntu.

H. Databases

Eucalyptus component use PostgreSQL to store their metadata and user information.OpenStack Nova support any database supported by SQL-Alchemy but the only databases currently widely used ate SQLite3 , MySQL and PostgreSQL.OpenNebula supports SQLite backend in its previous versions while now it uses MySQL backend.

Image Management

In Eucalyptus images are managed by Euca2ools distributed by eucalyptus team.One can bundle, upload, register, describe, download, unbundle and deregister VM images. OpenStack image service (glance), provides functionality for discovering , registering and retrieving virtual machine images. While OpenNebula use image repository or datastores to allow administrator or users to set images.Datastores are generally backed with SAN/NAS severs.All images and virtual machines management files are stored in /var/lib/one.

J. VM Migration

Eucalyptus do not support VM migration ,While OpenStack and OpenNebula supports VM migration from one resource to another.

K. Miscellaneous

It is observed that the OpenStack has the largest active population in during the past months. And in total, it has the largest population followed by Eucalyptus and Nebula.

IV. CONCLUSION

Open Source Softwares are software with there source code available to the user with or without fee. The Open source cloud platform provide an alternative to end-user for improved salability , potability , flexibility and On-demand services. This paper compares the three most popular and commonly used open source software (Eucalyptus, OpenStack and OpenNebula).The summarization and comparison allow users to choose better services according to there requirement.This paper also hep users to make more unified decision on the open source cloud platform according to their compatibility, scalability, interfaces ,requirement and etc. Although cloud computing is an evolving technology there are many feature which are added. The comparison is based on the current feature and technologies of these open source platform..

REFERENCES:

[1] Cloud Computing – Issues,Research and Implementations Mladen A. VoukDepartment of Computer Science, North Carolina State University, Raleigh, North Carolina, USA
[2] https://www.dialogic.com/~/media/products/docs/whitepapers/12023-cloud-computing-wp.pdf
[3] http://www.indiastudychannel.com/resources/144808-Cloud-Computing-An-Overview-Cloud-Computing.aspx
[4] Eucalyptus Beginner's Guide - UEC Edition
[5] OpenStack Compute Starter Guide diablo (2011-11-11)
[6] Private Cloud Computing with OpenNebula 1.4