

A Novel Method of Implementation of Private Cloud using Eucalyptus

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ABSTRACT

Cloud computing provides on-choice software as well as hardware services with pay per use charges. Any service available on Cloud can be accessed through the Internet anywhere across the world. To deploy and run these services need to have a Cloud platform. As a first step towards Cloud we are trying find the novel method of Cloud implementation so we can develop and deploy Cloud applications. This paper describes the implementation of Cloud using Eucalyptus, open-source software.

Keywords

Eucalyptus, Private Cloud

1. INTRODUCTION

Cloud computing is not a new technology, but still lot of research are going in this domain to improve it. It is becoming more popular. Many of the enterprises have begun to adopt it. The actual thought of cloud computing has developed from the era of time-sharing computation which was started in 1960s, through distributed computing and grow of networks, to the Internet and then online services found these days. The services like email, on-line transactions, data storage etc are the part of Cloud, are with us from long time. The Cloud Security Alliance (2009) declares that the "cloud describes the use of a collection of services, applications, information, and infrastructure comprised of pools of compute, network, information, and storage resources. These components can be rapidly orchestrated, provisioned, implemented and decommissioned, or scaled up and down" [7]

Cloud computing is defined in various ways by various communities and people. Few of them are:

"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." - U.S. National Institute of Standards and Technology (NIST) [1]

"A pool of abstracted, highly scalable, and managed compute infrastructure capable of hosting end-customer applications and billed by consumption" - Forrester Research, Inc. [2]

"A style of computing where massively scalable IT-enabled capabilities are delivered as a service to external customers using Internet technologies." - Gartner, Inc. [1]

"A Cloud is a type of parallel and distributed system consisting of a collection of interconnected and virtualized computers that are dynamically provisioned and presented as

one or more unified computing resources based on service-level agreements established through negotiation between the service provider and consumers" - R. Buyya, C.S Yeo, and S.Venugopal [3]

In this work, we present implementation of Eucalyptus and the modular system components, also provide results from experiments that measure performance and scalability of a Eucalyptus. Eucalyptus is an open-source cloud-computing framework comes under GPL that helps in creating and managing a private as well as public cloud. It offers an EC2-compatible cloud computing platform which supports the client tools written for Amazon Web Services (AWS) as well. Eucalyptus has several components which work together with one another all the way through well-defined interfaces. Like Eucalyptus there various frameworks available for Cloud implementation e.g. OpenNebula, Xen, KVM, VMware ESX etc [7]

2. METHODOLOGY

We have taken two servers, one as a Cloud Controller and the other as a Cloud Node.

The Cloud Controller allows user to create both public as well as private Cloud. Public cloud can be customized with powerful portal features, while private cloud can work as an extension of LAN.

We are keeping Cloud instances on node controller for getting more space to add more instances. We have used default network configuration of "Managed-NoVLAN" which gives IP at run time for VMs and which helps us to control doorway traffic by creating IPTables profiles known as security groups.

Also need one Client machine to interact with Cloud setup, for bundling and registering new Eucalyptus Machine Image (EMI).

3. DESIGN AND IMPLEMENTATION

3.1 Installing Cloud Controller

Cloud Controller installation begins from the CD of Ubuntu 10.04 Server. Select "Install Ubuntu Enterprise Cloud" (UEC) from below shown menu:



Figure 1: Setup CD menu

Accept the default Cloud installation mode of Cloud controller, Walrus Storage Service, Cluster Controller, and Storage Controller.

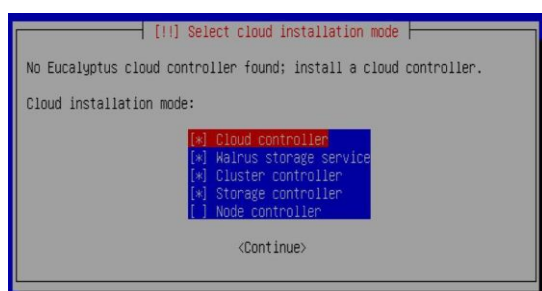


Figure 2: CC setup

Then need to select Network Interface for communication with nodes and partitioning of disk is required for, here we have selected default partitioning and configure Linux Volume Manager (LVM). After partition, base system will be installed and ask username and password for sudo privileged account. Now install Eucalyptus-cc where we provide a pool of IP addresses that will be assigned to VMs. The same addresses make possible to access cloud instances outside the cloud. We have following hardware for (CC and NC) [6]

- Dell Rack Server R715
- Two 1.8 GHz AMD Processor (8 cores per processor)
- Maximum Internal Storage- 300 GB
- RAM 8 GB

Next we install the Grand Unified Boot loader, GRUB which is the last step of Cloud Controller installation.

Cloud controller has 2 NICs eth0 is connected to the enterprise network and eth1 is connected to a dedicated switch to be used for connecting various components of UEC.

eth0 IP – 192.168.0.210 and eth1 – 192.168.0.199.

Setup static IP for eth0 and eth1 in etc/network/interfaces

Auto eth0

Address 192.168.0.210

Netmask 255.255.255.0

Network 255.255.255.0

Broadcast 192.168.0.255

Gateway 192.168.0.1

Auto eth1

Address 192.168.0.199

Netmask 255.255.255.0

Broadcast 192.168.0.255

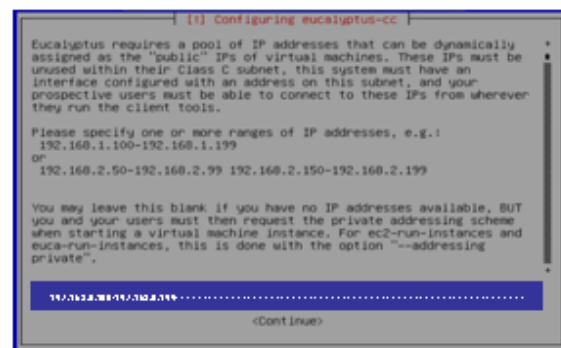


Figure 3: Configuring Eucalyptus-cc

Follow few more steps here to install NTP, save changes in etc/init.d/ntp and restart CC by

\$ start eucalyptus-cc CLEAN=1

3.1.1 Installing Cloud Node

Once again start Cloud node installation from Ubuntu 10.04 Server CD and at the graphical boot menu select "Install Ubuntu Enterprise Cloud".

Give host name here and follow the steps suggested for Cloud Controller. After installation, reboot the node back, and see network devices installed on the node controller using ifconfig command

Cloud Node has also two NICs eth1 is connected to the enterprise network to have internet connectivity during the installation process and eth0 is connected to a dedicated switch mentioned in CC.

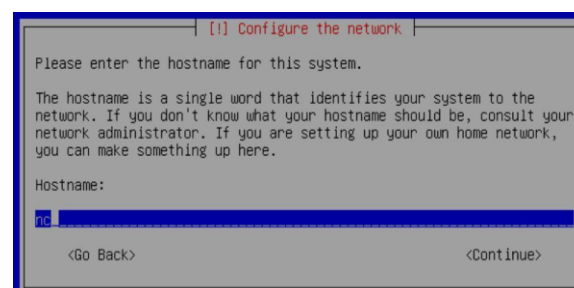


Figure 4: Configure network host

eth0 IP– 192.168.0.211 and eth1 – 192.168.0.199

Setup static IP for eth0 and eth1 in etc/network/interfaces

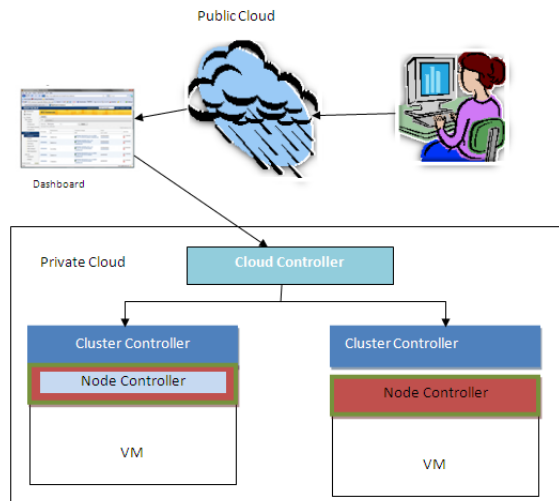


Figure 5: Private Eucalyptus Cloud Architecture

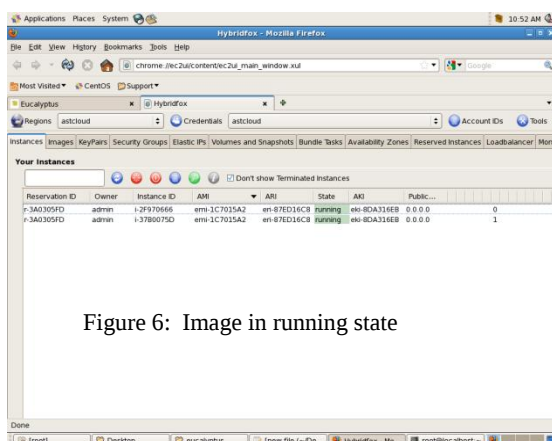


Figure 6: Image in running state

Auto eth0
Address 192.168.0.199
Netmask 255.255.255.0
Broadcast 192.168.0.255

Auto eth1
Address 192.168.0.199
Netmask 255.255.255.0
Network 192.168.0.0
Broadcast 192.168.0.255

Follow few more steps here to install NTP, save changes in etc/init.d/ntp and restart NC by

```
# start eucalyptus-nc
```

1. Install CC's ssh public key to NC

Install the CC Eucalyptus user's public ssh key into the NC Eucalyptus user's authorized_keys file.

On NC set temporary password for Eucalyptus user:

```
# sudo passwd eucalyptus
```

On CC run

```
# sudo -u eucalyptus ssh-copy-id-I  
eucalyptus/.ssh/id-rsa.pub eucalyptus@192.18.0.199
```

Then start public services

- Walrus Controller
- Cluster Controller
- Storage Controller
- Node Controller

Now register the copied data with Eucalyptus for allowing a VM image to run. To do this to add a user/admin to root disk image, a kernel/ramdisk pair to Walrus

The following example uses the test image that we provide.

Unzip it to any directory:

```
# wget  
http://open.eucalyptus.com/sites/all/modules/pubdlcnt/pubdlc  
nt.php?file=http://eucalyptussoftware.com/downloads/releases  
/euca2ools-1.2-centos-i386.tar.gz&nid=3088
```

```
# cd euca-centos-5.3-i386
```

Next, add image to Walrus:

```
# euca-bundle-image -i  
  
# euca-upload-bundle -b -m /tmp/manifest.xml
```

```
# euca-register /manifest.xml  
# euca-upload-bundle -b -m /tmp/manifest.xml
```

```
# euca-register /manifest.xml  
# euca-bundle-image -i --kernel true
```

I. RESULTS AND DISCUSSION

If you see Web Interface (Figure 7) by default it shows No images. Execution of VM in the cloud is only done through image. Generally installation of images can be done either directly from Canonical online cloud image store or build custom image [8], bundle it, upload and register it with the cloud. In the web interface shown in Figure 6, Store tag shows the list of images available from Canonical over the internet

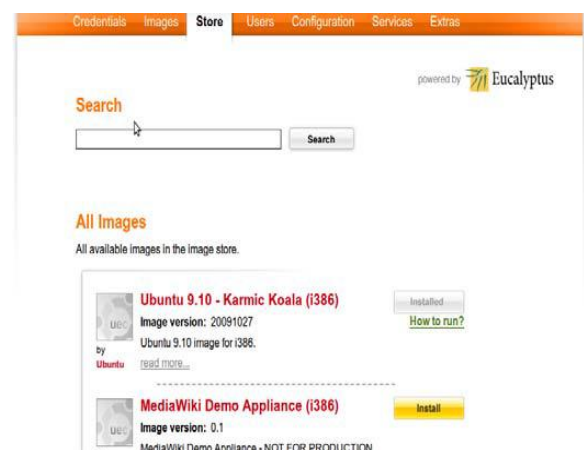


Figure 7: Canonical web interface

Sometimes, while installing images we stuck with instance related issues. When we start instance using ec2tools, instance was restarting. We were not getting useful inform from any log. So we have saved each step and checked error and resolved this issue.

4. CONCLUSION AND FUTURE WORK

To run Cloud applications we need Cloud platform. We have studied many research papers, articles, and made a conclusion of implementing Private Cloud using Eucalyptus. Eucalyptus is an Open Source Software framework and provides most of the features supported by other Cloud platforms. This paper shows how to implement Private cloud using Eucalyptus on UEC. As discussed in the section III, we have followed the steps and achieved the instance of CentOS 5.3 in running state.

In future we are developing Cloud applications using Java and Python. These will be deploying on Cloud and performance will be tested.

5. REFERENCES

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