BUILD YOUR OWN PRIVATE CLOUD USING UBUNTU 10.04 EUCALYPTUS ENTERPRISE CLOUD COMPUTING PLATFORM

This document will guide you thru step by step on how to install and configure Eucalyptus Enterprise Cloud using Ubuntu 10.04 Server installation media. The source context of this document is been collected from the internet during my research. Thus different sections of this document holds copyright to the original author from which this document is based on.

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Build your Own Private Cloud using Ubuntu 10.04 Eucalyptus Enterprise Cloud Computing Platform

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1.0 Introduction

In this Hands-on Labs session, we're going to use the Linux Ubuntu 10.04 LTS (Lucid Lynx) release. Ubuntu 10.04, Lucid Lynx, is the platform of choice for anybody who intends to build and deploy large-scale infrastructure, whether you're trying to build the next Facebook, or the next Google, or the next eBay. If you want to start on [Amazon's cloud-platform] EC2 and migrate to your own managed private cloud, Ubuntu 10.04 is going to be the platform for you. Lucid Lynx will be the third long-term support (LTS) release by Ubuntu. LTS releases arrive bi-annually and are supported for three years on desktops and five years for servers.

Ubuntu 10.04 LTS Server Edition: Lean, fast and powerful – Ubuntu Server delivers services reliably, predictably and economically - and easily integrates with your existing infrastructure.

Ubuntu is an operating system built by a worldwide team of expert developers. It contains all the applications you need: a web browser, office suite, media apps, instant messaging and much more. Ubuntu is an open-source alternative to Windows and Office.

Ubuntu Enterprise Cloud (UEC): The UEC allows you to build your own private cloud. The Ubuntu Cloud Planet is a window into the world, work and lives of those that work on making Ubuntu the best cloud platform there is. With Ubuntu Enterprise Cloud you can bring the same self-service capability into your data center using the same tools and APIs used on Amazon EC2.

With Ubuntu, you can build the perfect cloud environment for your business whether private, with Ubuntu Enterprise Cloud (UEC), or public, with Ubuntu Server on Amazon EC2. Because UEC uses the same machine images as Amazon EC2, you can create a hybrid cloud or migrate between public and private easily at any time.

Private clouds offer immediacy and elasticity in your own IT infrastructure. Using Ubuntu Enterprise Cloud, you can experience the benefits of cloud computing behind your firewall. Deploy workloads and have them running immediately. Grow or shrink computing capacity to meet the needs of your application.

Solution:

In this Hands-on Lab session, you'll learn how to setup virtual network on VMware (you may also use any other virtual machines like MS VirtualPC, Linux Xen, or VirtualBox from Sun). In this lab session, you'll learn to Build your Own Private Cloud using Ubuntu 10.04 Eucalyptus Enterprise Cloud Computing Platform.

Part 1: Install & Configure Ubuntu 10.04 Enterprise Cloud Server

Step 1: Getting Started & Hardware Pre-requisites

In this Hands-on Labs, it's assumed that your target computer is connected to the internet. After installing

the cluster controller, log into your machine and ensure you perform software updates to bring your systems up-to-date. In the second part, you will install the node controller. For minimum hardware requirements check here.

Step 2: Install Ubuntu 10.04 LTS Enterprise Cloud

1. Hope over to http://www.ubuntu.com/getubuntu/download-server website and download the Linux Ubuntu 10.04 64-bit ISO which at the time of writing this lab manual was "Ubuntu-10.04-server-amd64.iso"
2. Once you have downloaded the Ubuntu ISO specific to your distribution, you have the option burning it into CD or just by using the ISO package to install it from your virtual machine, in our case VMware.
3. Fire-up a new virtual machine and perform the initial configuration and setup to use ISO package.
4. Start the virtual machine, and you should be able to see the first Ubuntu installation screen.
5. From Fig. 1, select the language desired and hit **Enter** key.

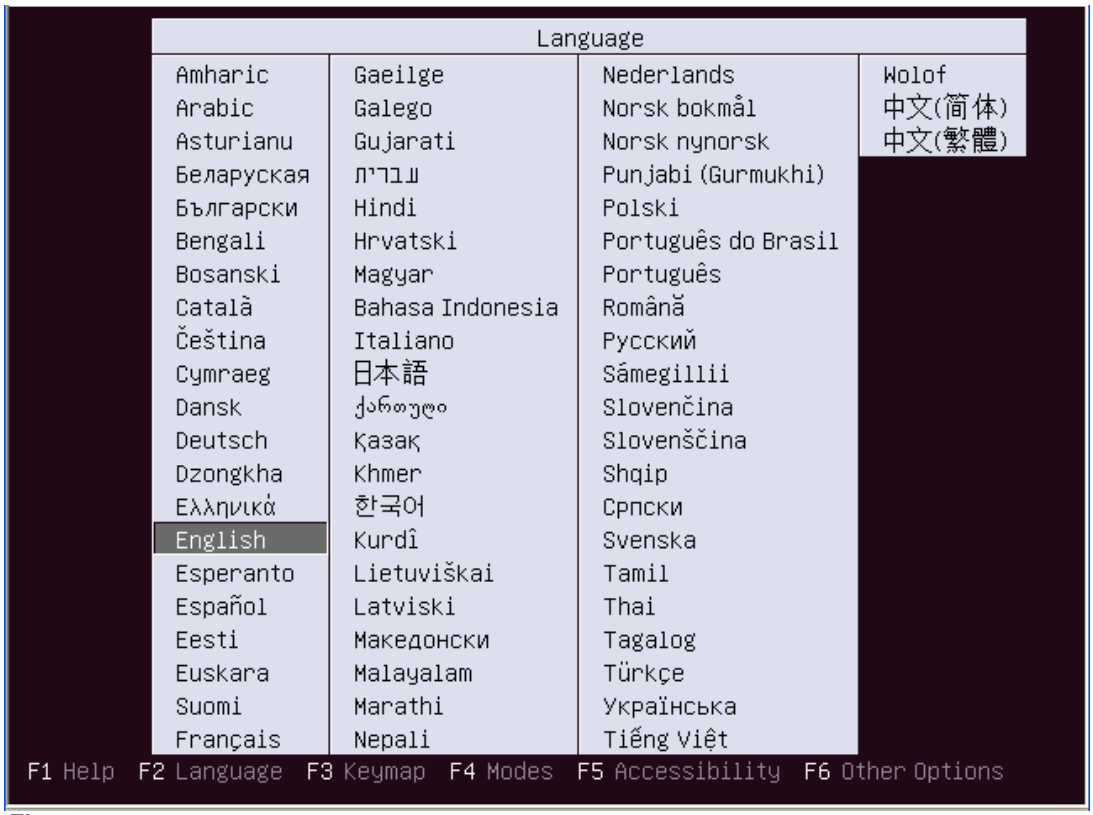

Fig. 1

6. From Fig. 2, select the option desired and then hit the **Enter** key to commence installation. In our case we have selected to **Install Ubuntu Enterprise Cloud** option.

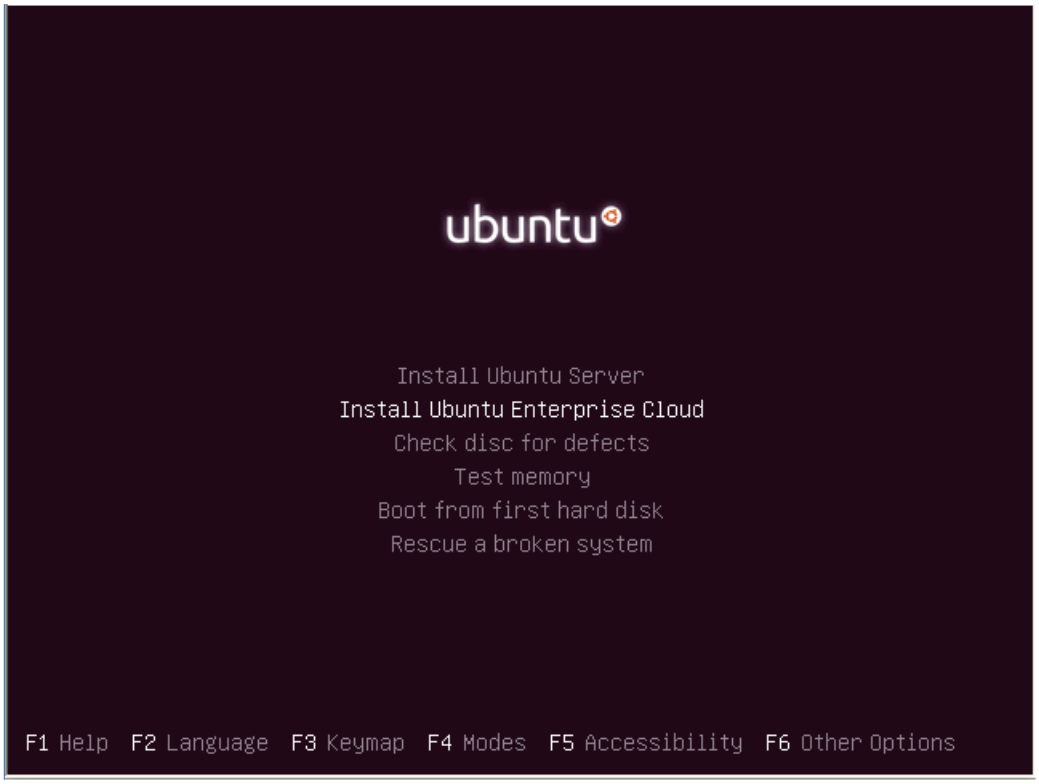

Fig. 2

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7. From Fig. 3, **Choose language** screen, select **English** option, and hit the **Enter** key.

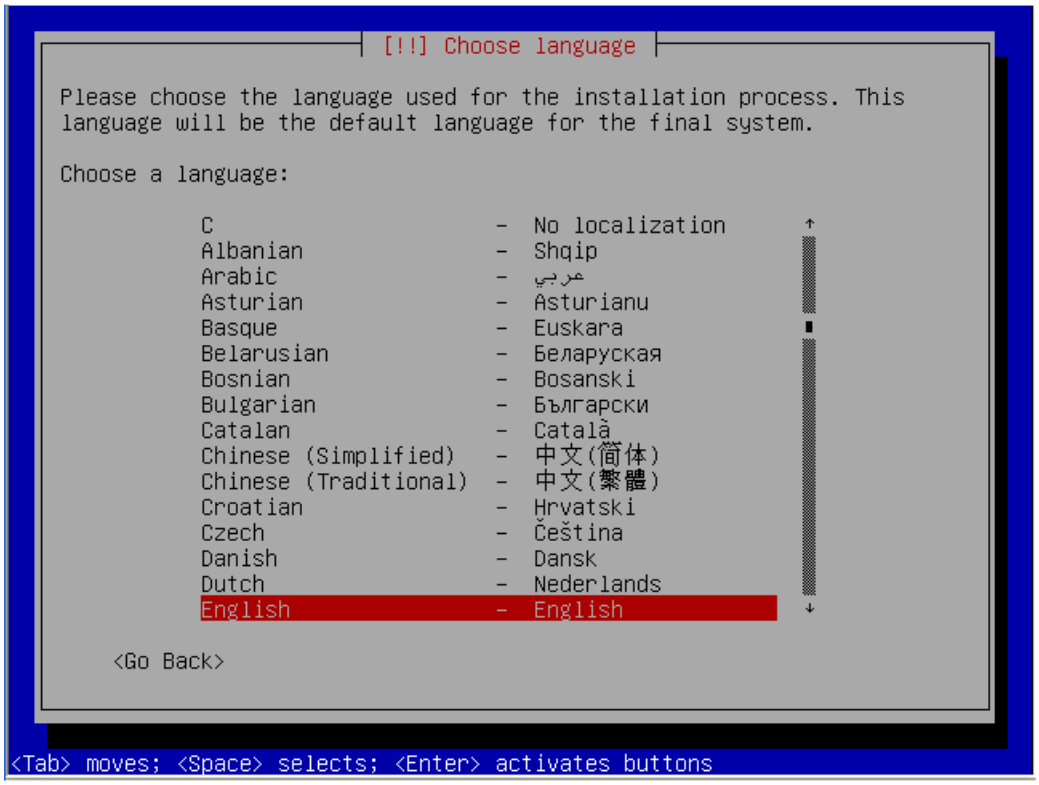

Fig. 3

8. From Fig. 4, **Choose language** screen, Choose a country, select **United States** option, and hit **Enter**

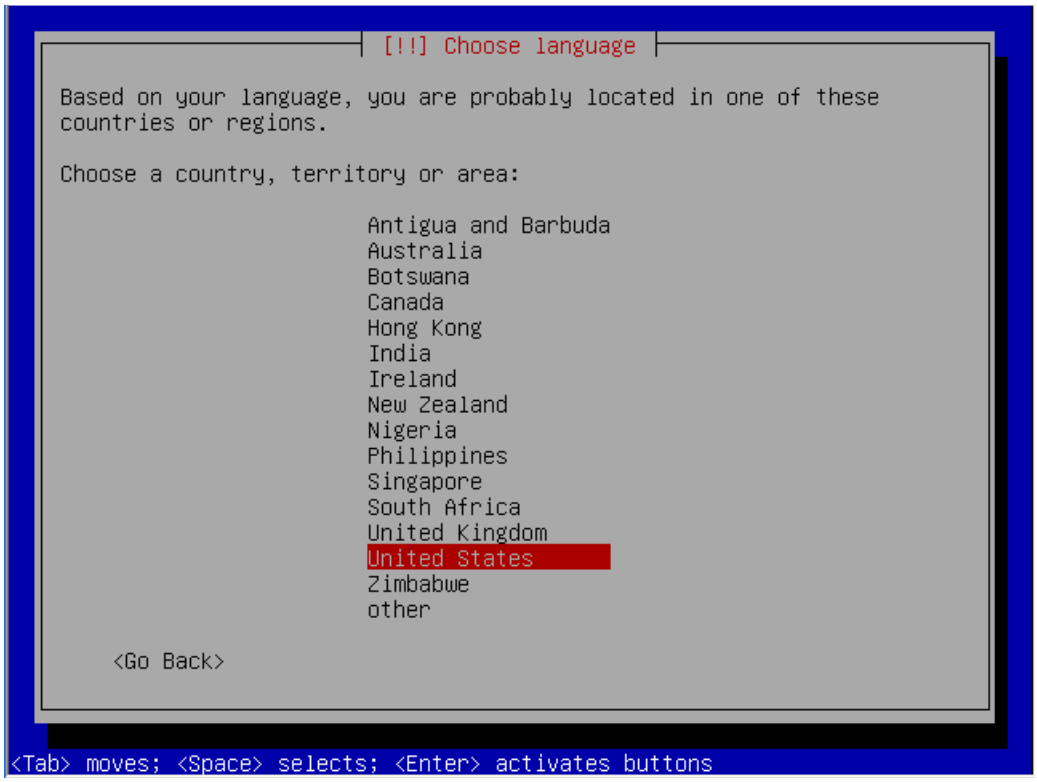

Fig. 4

9. From the **Ubuntu installer main menu** screen, Fig. 5, accept the default selected **<No>** and hit the **Enter** key to continue.

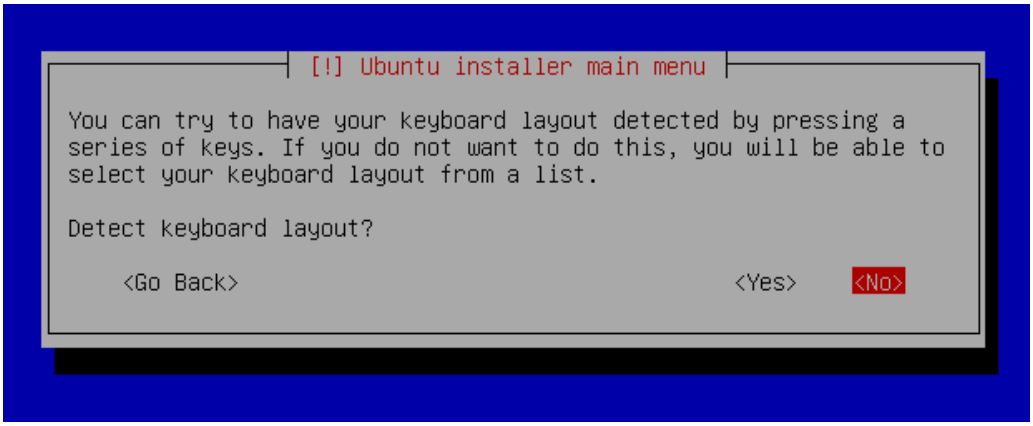

Fig. 5

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10. From the **Ubuntu installer main menu** screen, Fig. 6, `Origin of keyboard`, select **USA** and hit the **Enter** key to continue.

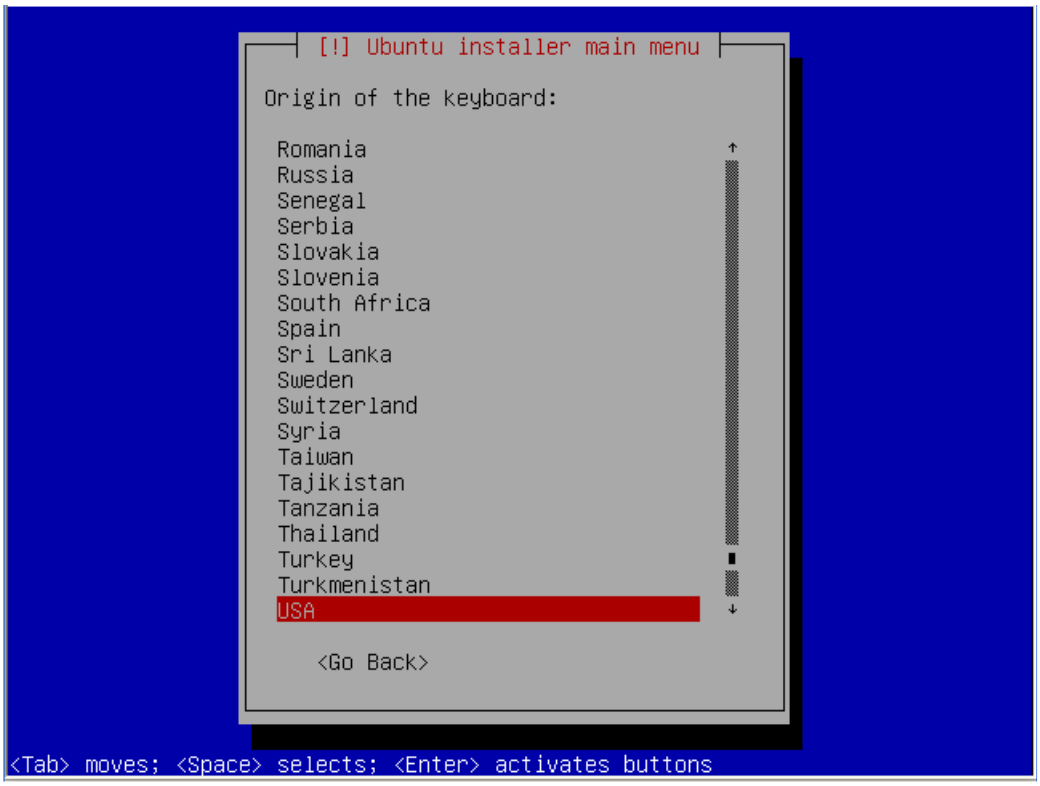

Fig. 6

11. From the **Ubuntu installer main menu** screen, Fig. 7, `Keyboard layout`, select **USA** and hit the **Enter** key to continue.

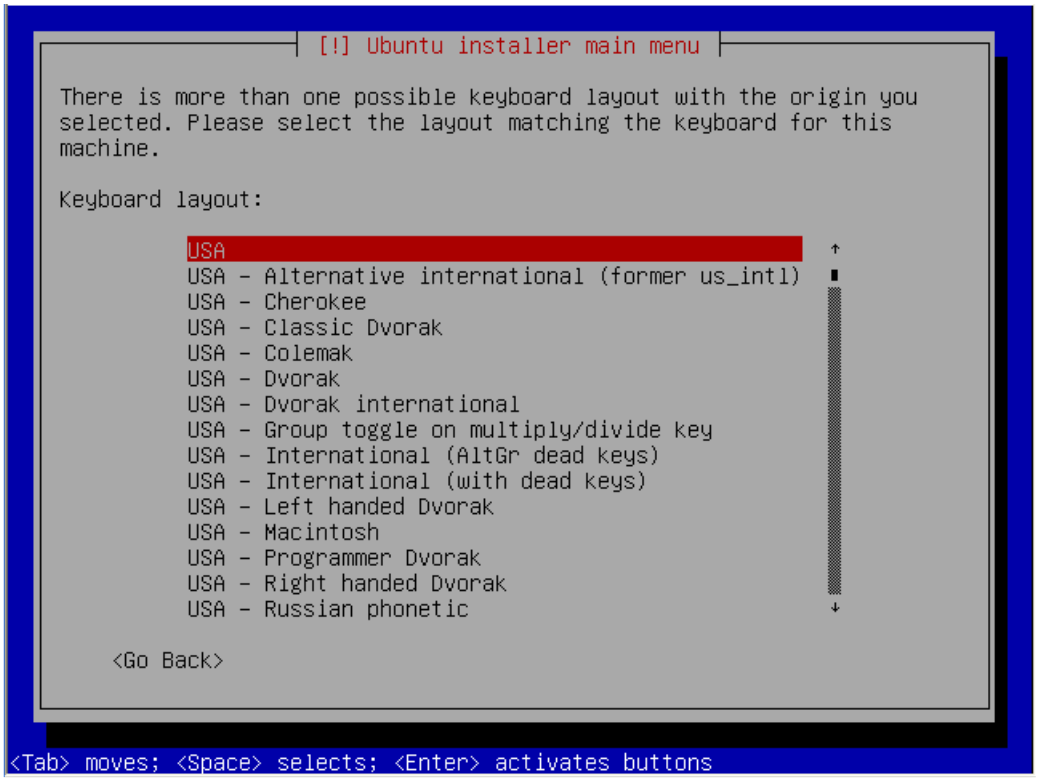

Fig. 7

12. From Fig. 8, the **Detecting hardware to find CD-ROM drives** screen, wait for the system complete the process.

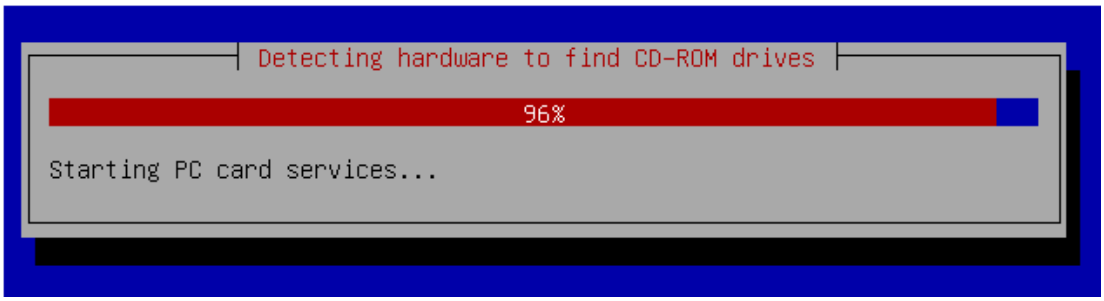

Fig. 8: System Detecting hardware to find CD-ROM drives

13. From Fig. 9, the **Loading additional components** screen, wait for the system complete the process.

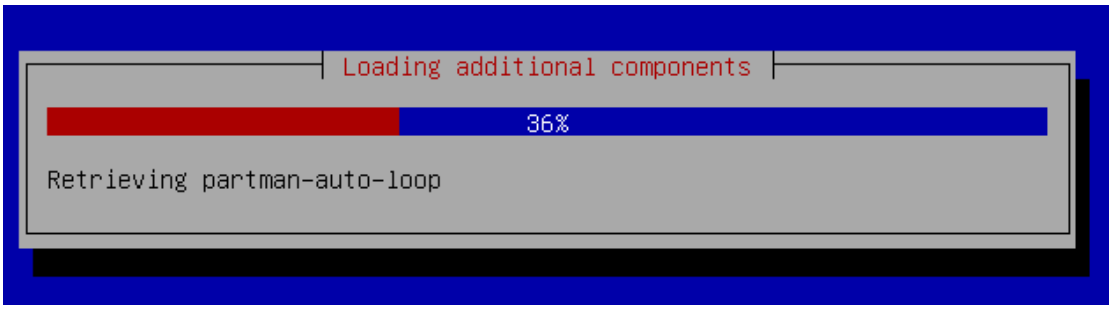

Fig. 9: System Loading additional components

14. From Fig. 10, the **Configure the network** screen, enter desired the Hostname: "cloudoscarcloud.com", change as desired, and hit the **Tab** key to select <Continue> and hit the **Enter** key to continue.

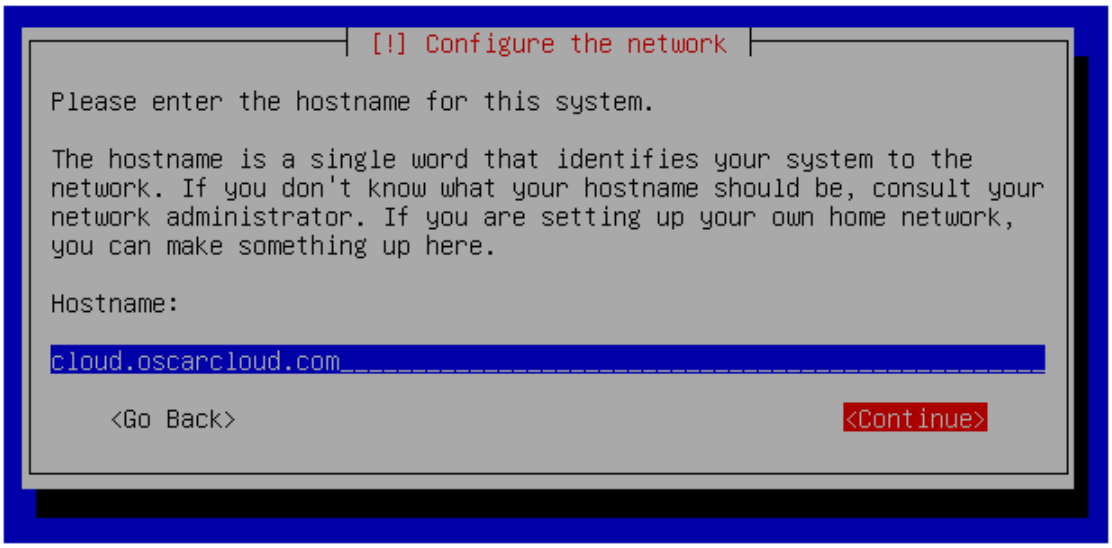

Fig. 10

15. From Fig. 11, the **Select cloud installation mode** screen, leave the cloud control address blank, hit the **Tab** key to select <Continue> and hit the **Enter** key to continue.

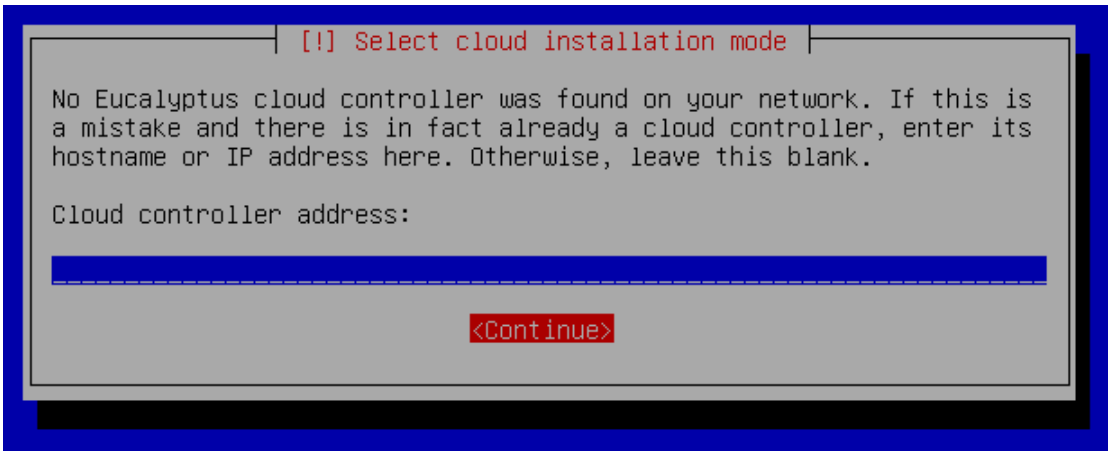

Fig. 11

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16. From Fig. 12, the **Select cloud installation mode** screen, accept the selected default option, hit the **Tab** key to select <Continue> and hit the **Enter** key to continue.

Fig. 12

17. From Fig. 13, the **setting up the clock** screen, wait for the system to complete the process.

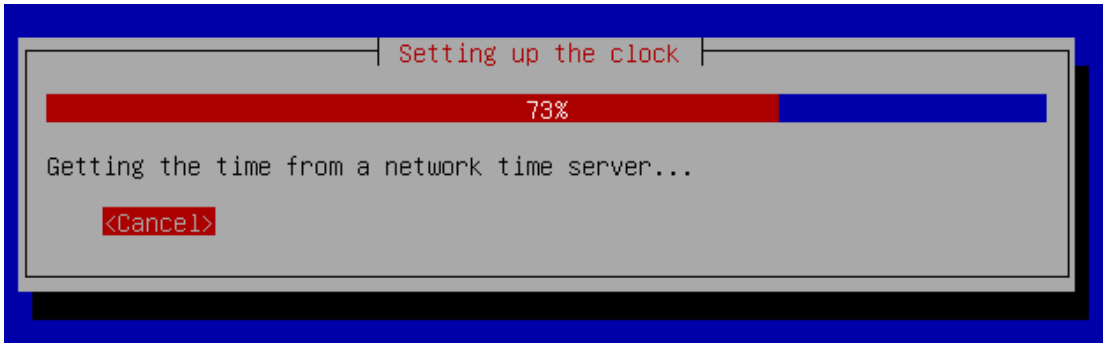

Fig. 13

18. From Fig. 14, the **Configure the clock** screen, accept the default selection for the time zone, or change as desired, and then hit the **Enter** key to continue.

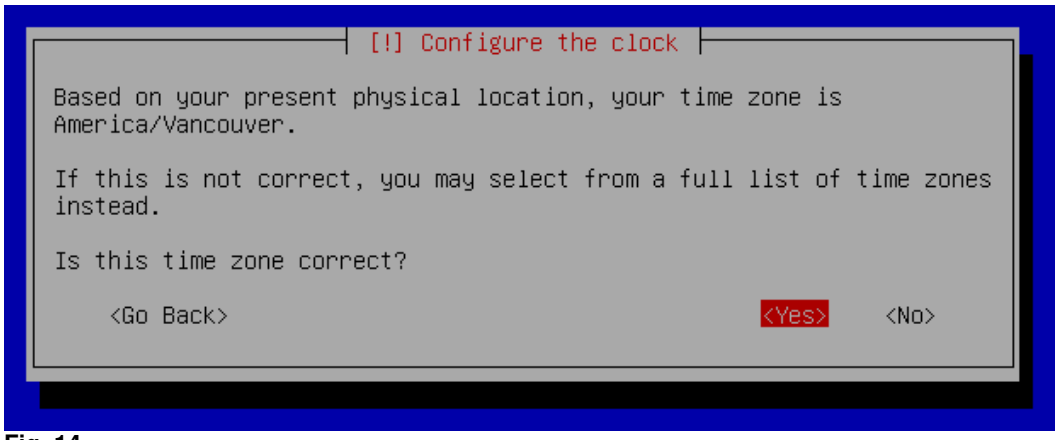

Fig. 14

19. From Fig. 15, the **Starting up the partitioner** screen, wait for the system to complete the process.

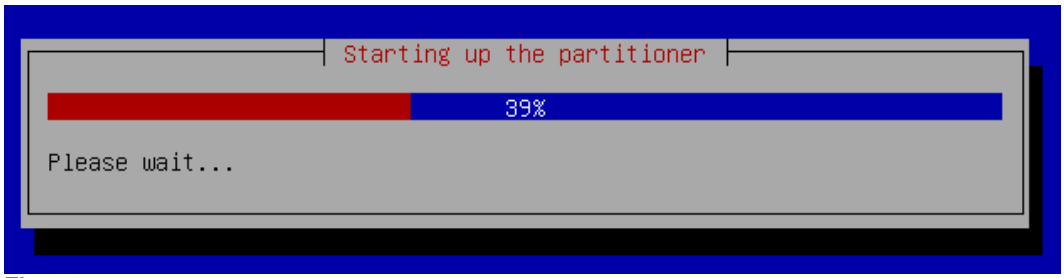

Fig. 15

20. From Fig. 16, the **Partition disks** screen, accept the default selection, or change as desired, and then hit the **Enter** key to continue.

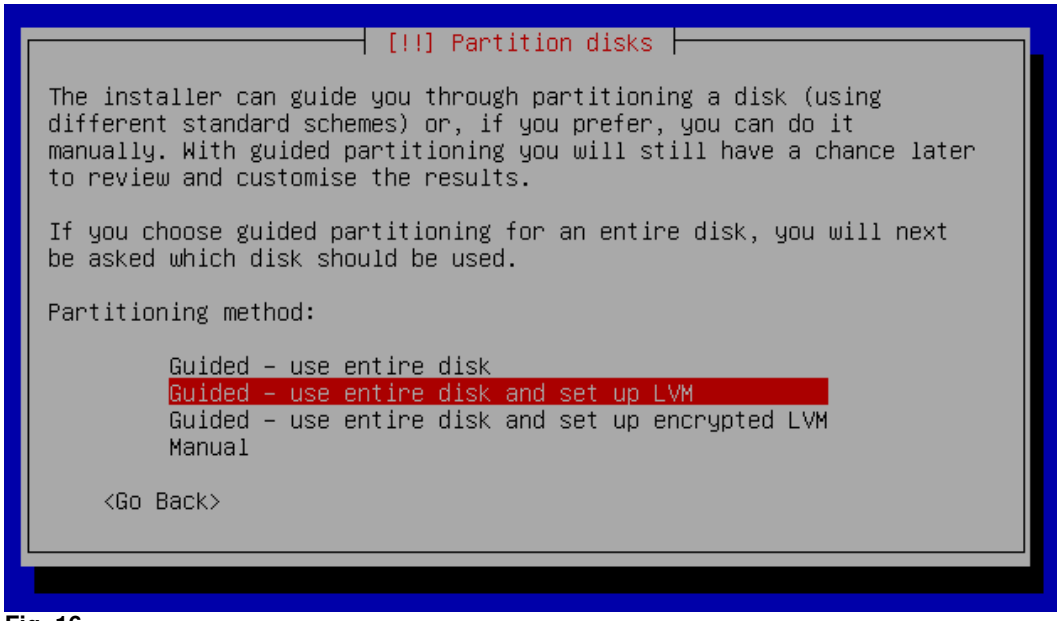

Fig. 16

21. From Fig. 17, the **Partition disks** screen, accept the default selection, or change as desired, and then hit the **Enter** key to continue.

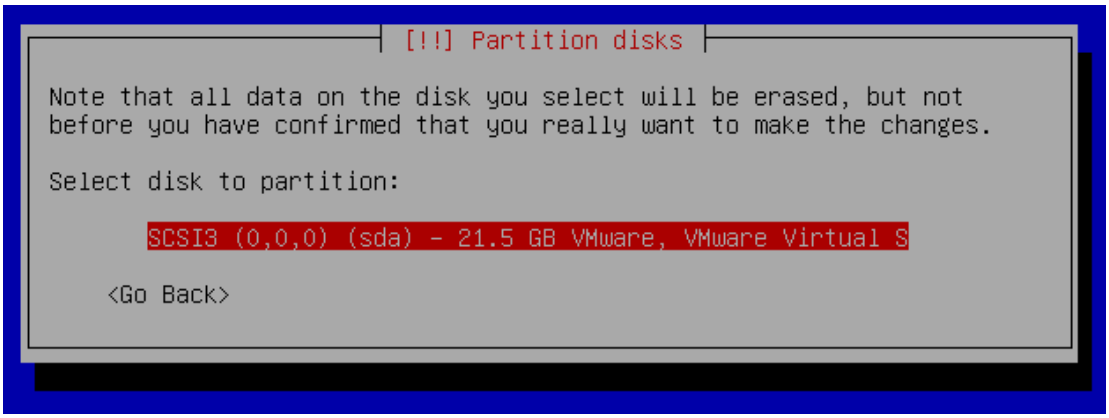

Fig. 17

22. From Fig. 18, the **Partition disks** screen, select <Yes>, or change as desired, and then hit the **Enter** key to continue.

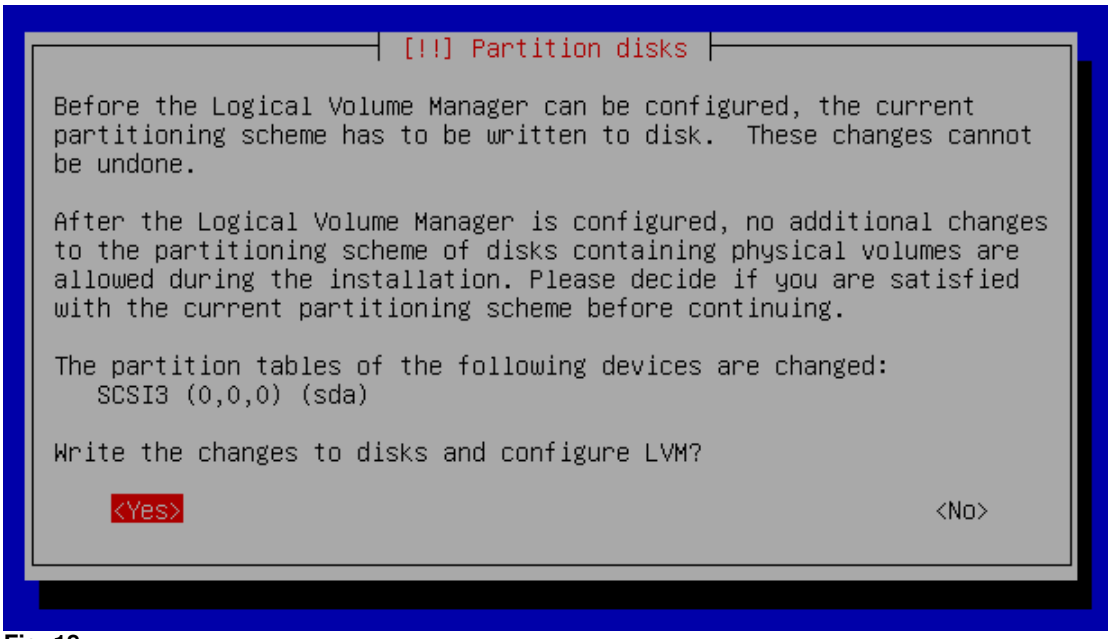

Fig. 18

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23. From Fig. 19, the **Partition disks** screen, accept the default selection of 21.2GB, or change as desired, and then hit the **Tab** key to select <Continue> and hit the **Enter** key to continue.

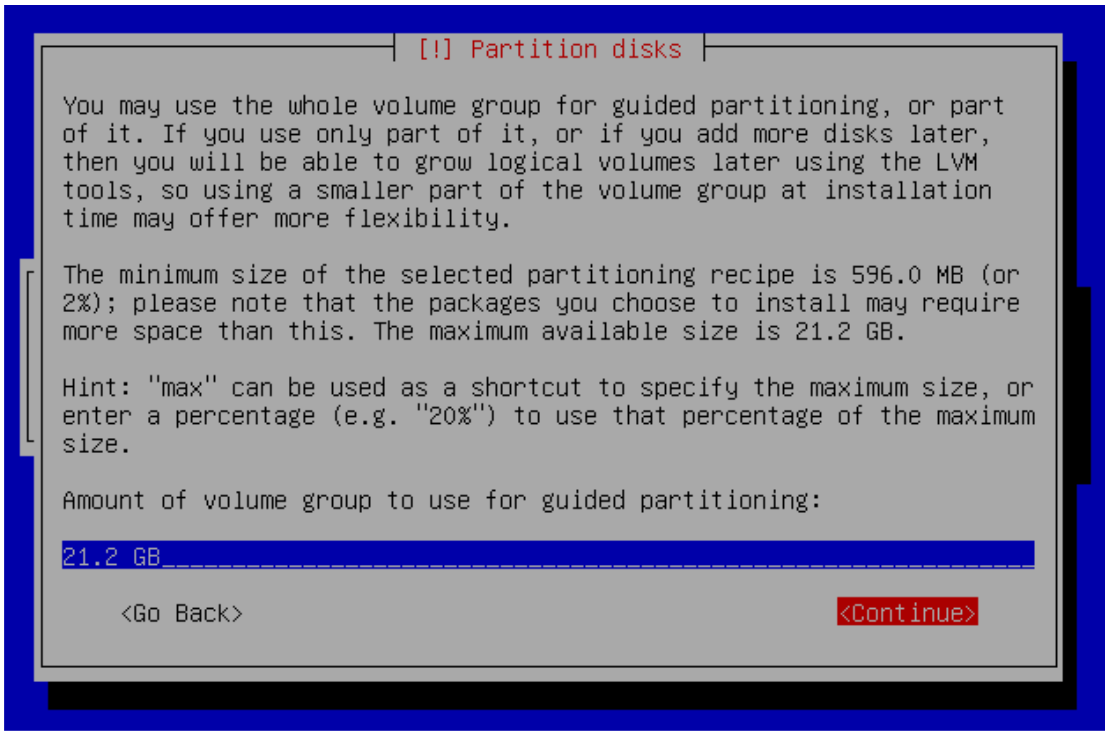

Fig. 19

24. From Fig. 20, the **Partition disks** screen, read the warning and then select <Yes>, or change as desired, and then hit the **Enter** key to continue.

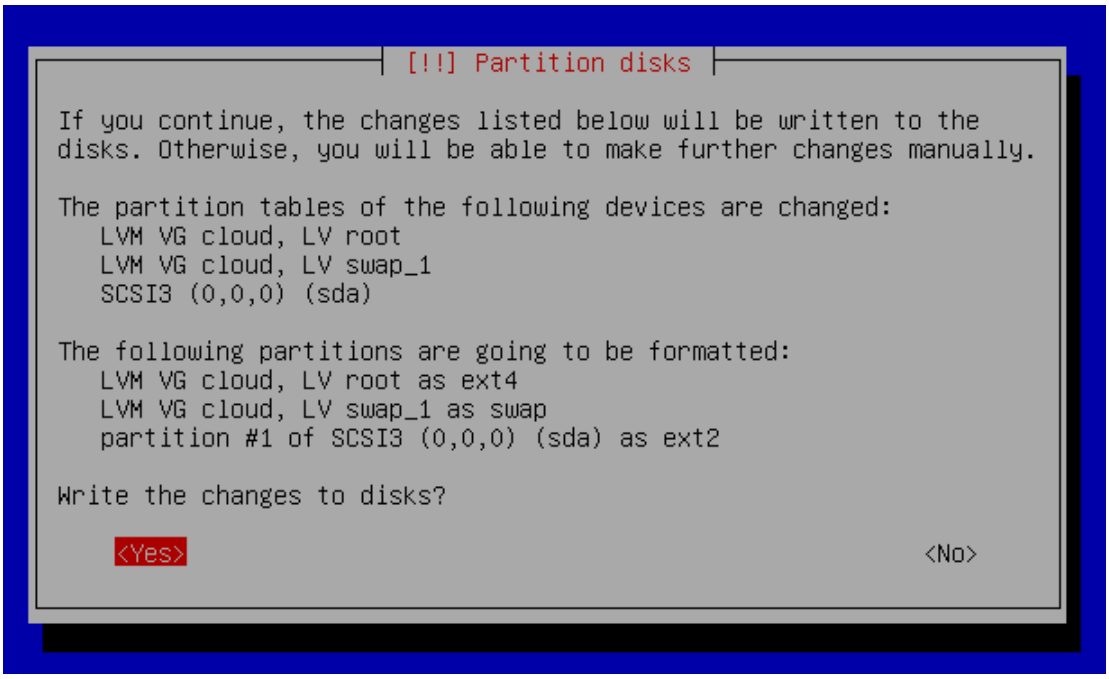

Fig. 20

25. From Fig. 21, the **Partition disks** screen, wait for the system to complete the process.

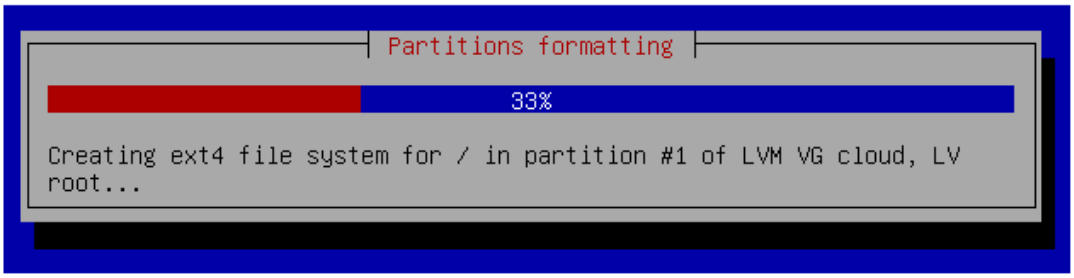

Fig. 21

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26. From Fig. 22, the **Installing the base system** screen, wait for the system to complete the process.

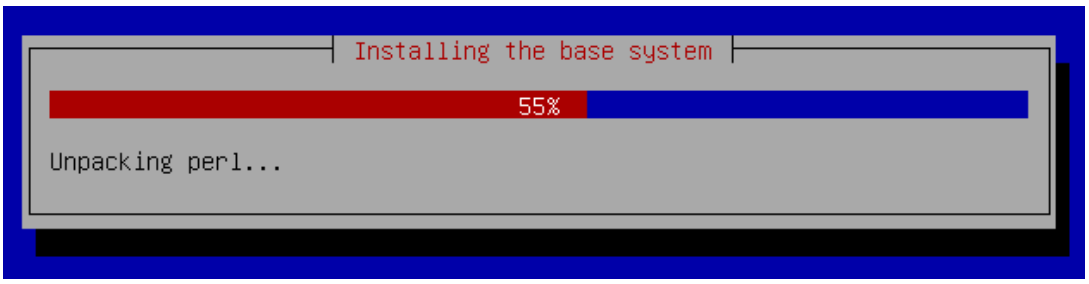

Fig. 22

27. From Fig. 23, the **Setup users and passwords** screen, enter the full name of the user: "Cloud Admin", or change as desired, and then select <Continue> and hit the **Enter** key to continue.

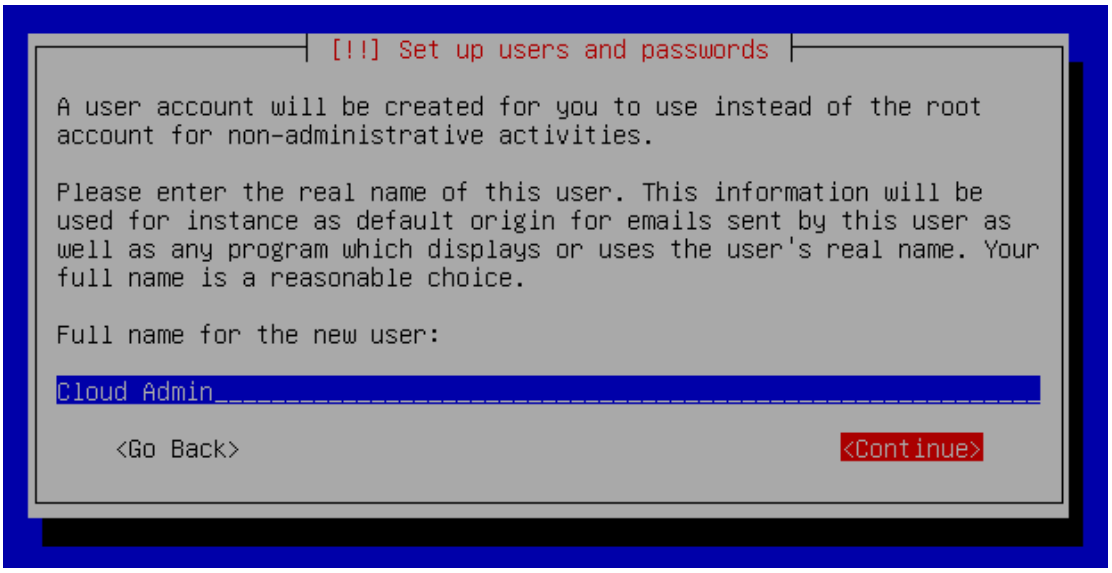

Fig. 23

28. From Fig. 24, the **Setup users and passwords** screen, enter the username of the user: "cadmin", or change as desired, and then select <Continue> and hit the **Enter** key to continue.

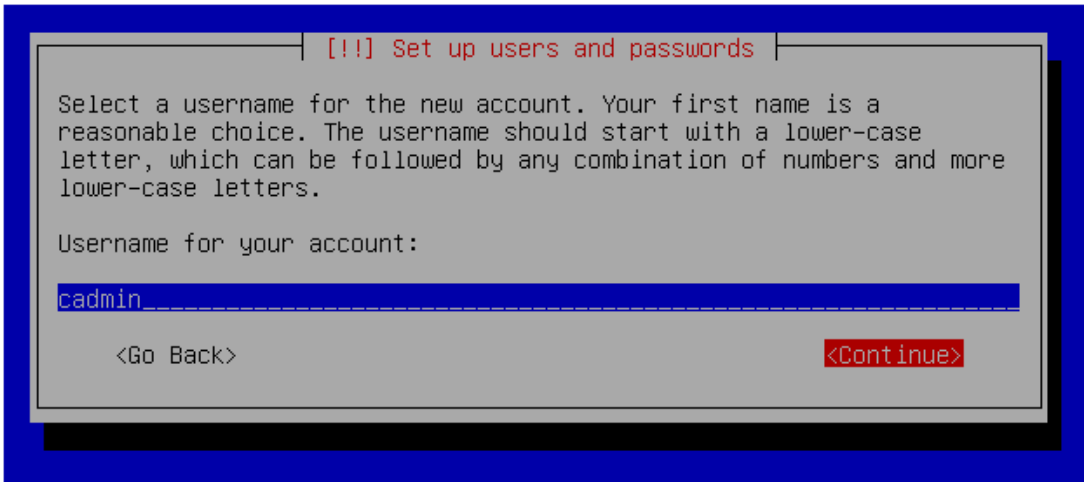

Fig. 24

29. From Fig. 25a, the **Setup users and passwords** screen; enter the password of the user "cadmin", and then select <Continue> and hit the **Enter** key to continue.

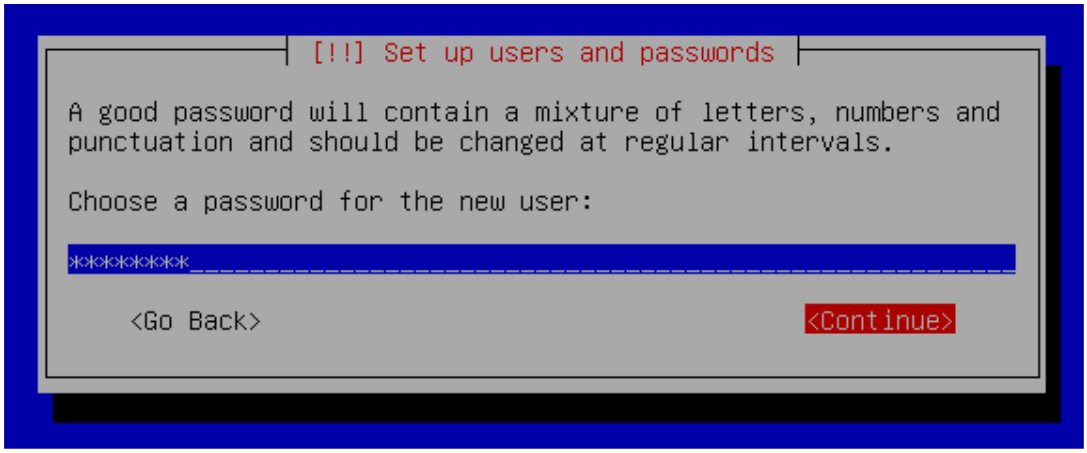

Fig. 25a Note: Reenter the password when prompted.

30. From Fig. 25b, the **Setup users and passwords** screen; accepted the selection <No> not to encrypt your home directory, or change as desired, and then hit the **Enter** key to continue.

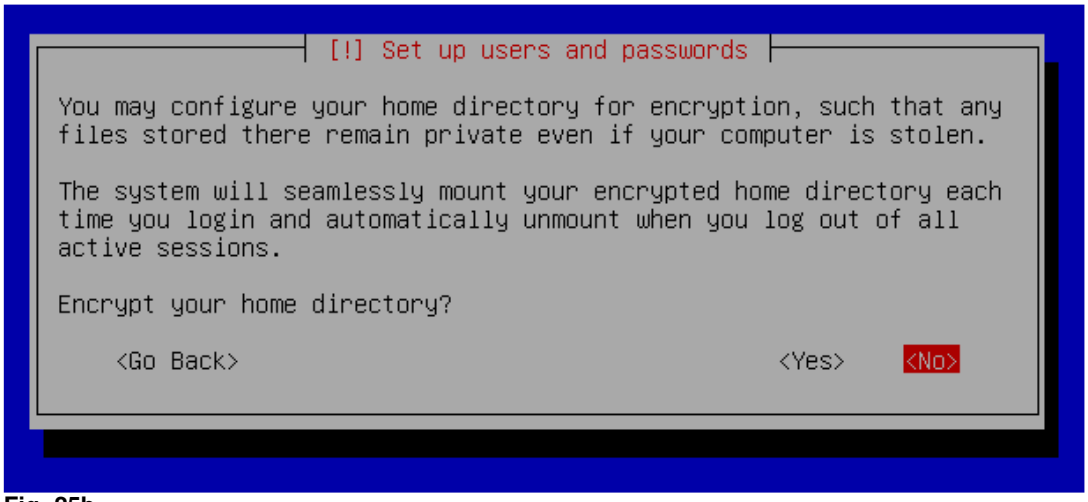

Fig. 25b

31. From Fig. 26, the **Configuring apt** screen, wait for the system to complete the process.

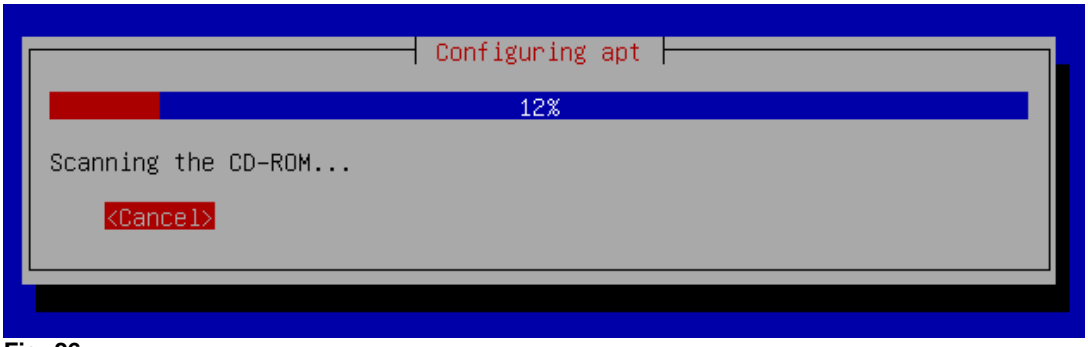

Fig. 26

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32. From Fig. 27, the **Configuring the package manager** screen; leave HTTP proxy blank, hit the **Tab** key to select <Continue> and hit the **Enter** key to continue.

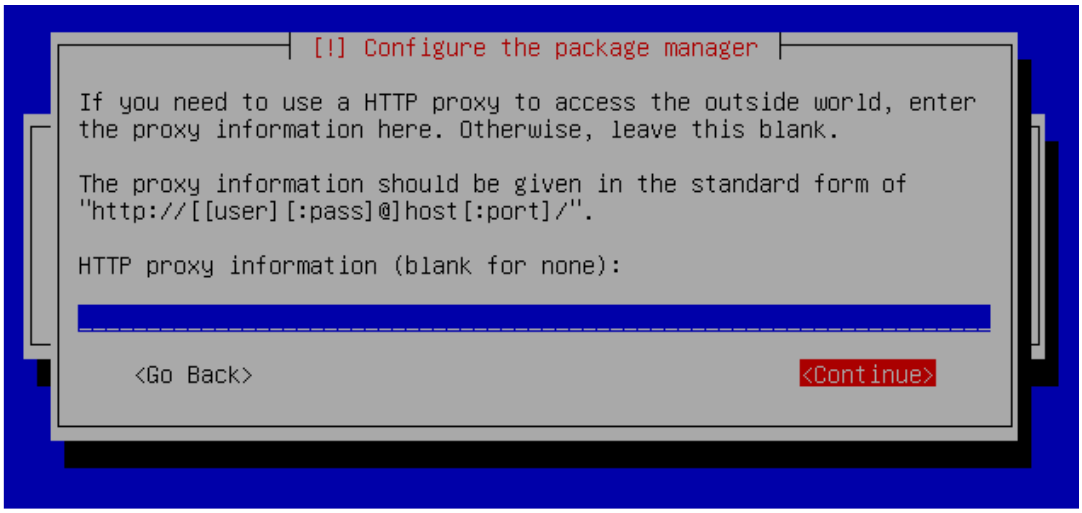

Fig. 27

33. From Fig. 28, the **Configuring apt** screen, the system will continue with configuring apt, wait for the system to complete the process.

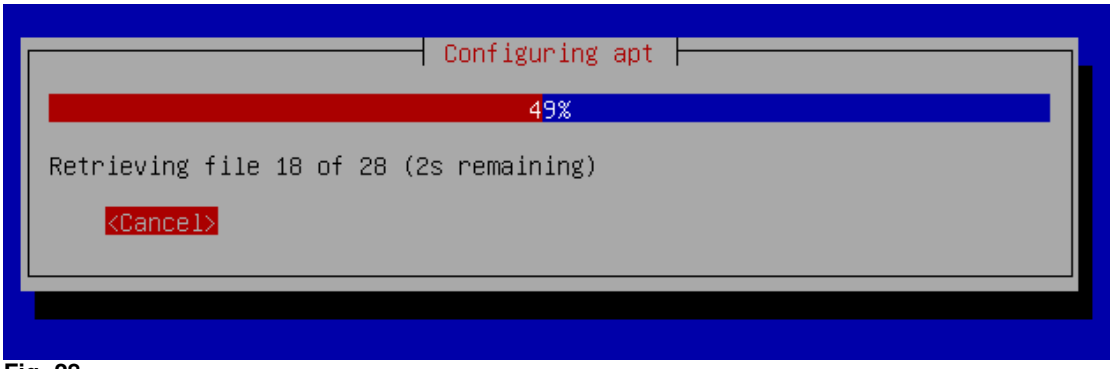

Fig. 28

34. From Fig. 29, the **Select and install software** screen, select the desired update option, and hit the **Enter** key to continue.

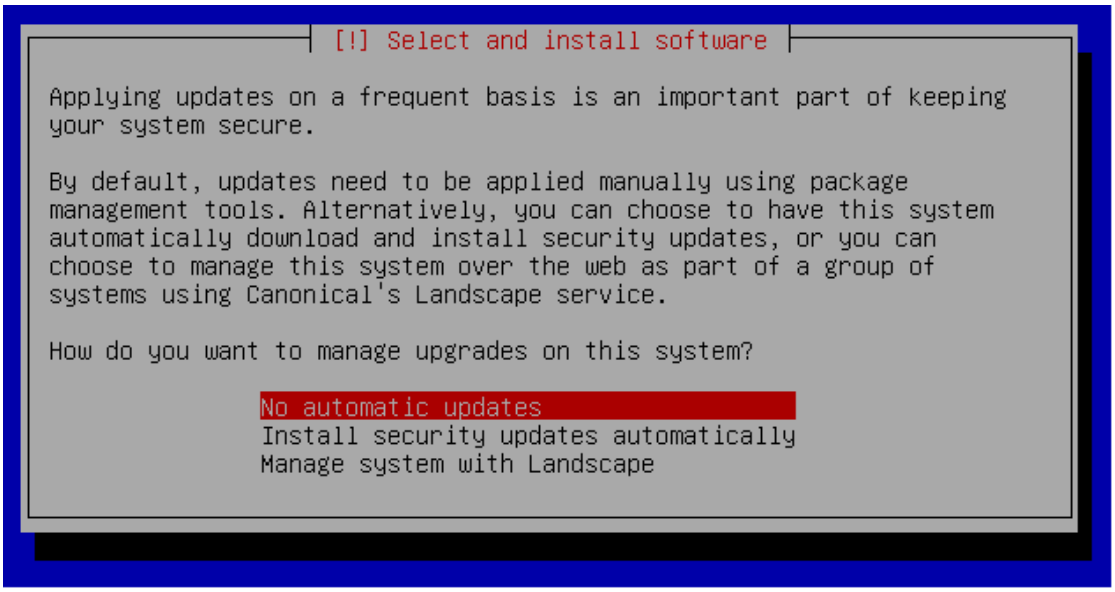

Fig. 29

35. From Fig. 30, the **Select and install software** screen, wait for the system to complete the process.

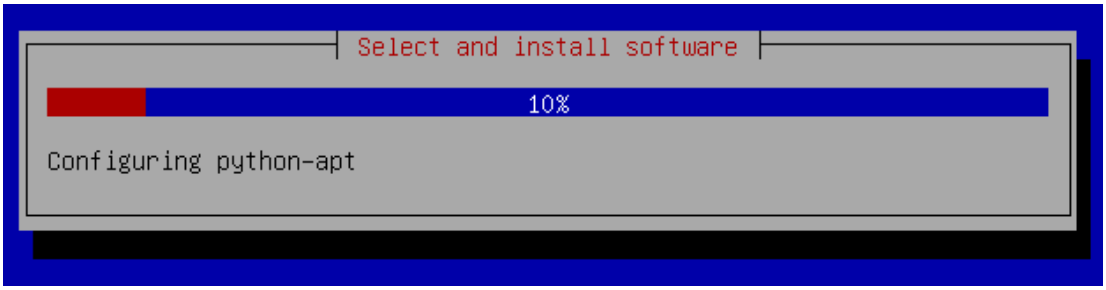

Fig. 30

36. From Fig. 31, the **Postfix Configuration** screen; under `System mail name`: `"cloud.oscarcloud.com"`, or change as desired, and then hit the **Tab** key to select <Continue> and hit the **Enter** key to continue.

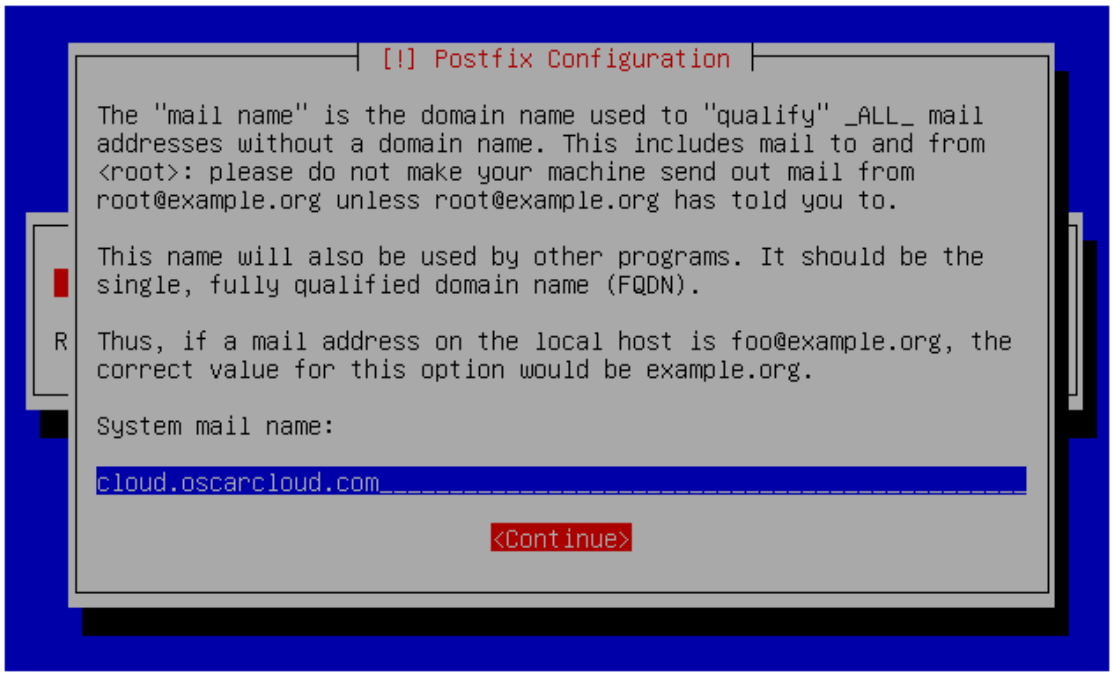

Fig. 31

37. From Fig. 32, the **Configuration eucalyptus-cc** screen; accept the default `Eucalyptus cluster name`: `"cluster1"`, change as desired, and then hit the **Enter** key to continue.

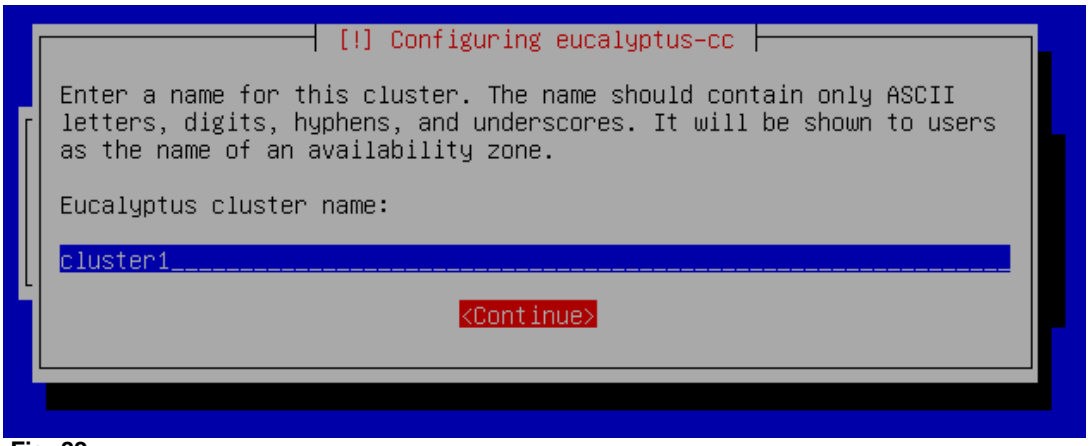

Fig. 32

38. From Fig. 33, the **Configuration eucalyptus-cc** screen; leave the IP address range, enter: "192.168.83.30-192.168.83.50", or change as desired, and then hit the **Tab** key to select <Continue> and hit the **Enter** key to continue.

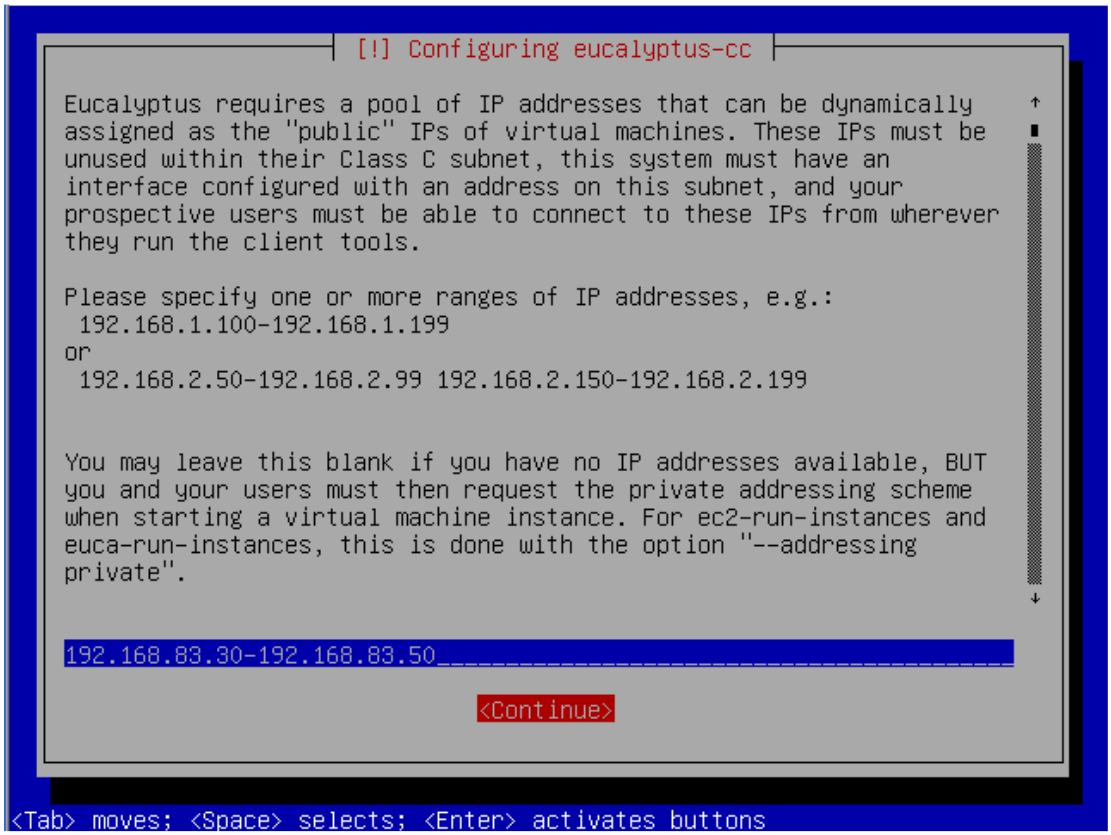

Fig. 33

39. From Fig. 34, the **Select and install software** screen, the system will continue with the installation process, wait for the system to complete the process.

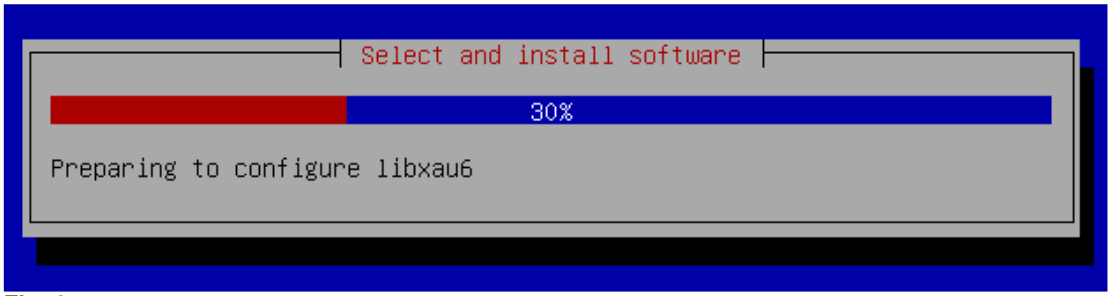

Fig. 34

40. From Fig. 35, the **Installing GRUB boot loader** screen, wait for the system to complete the process.

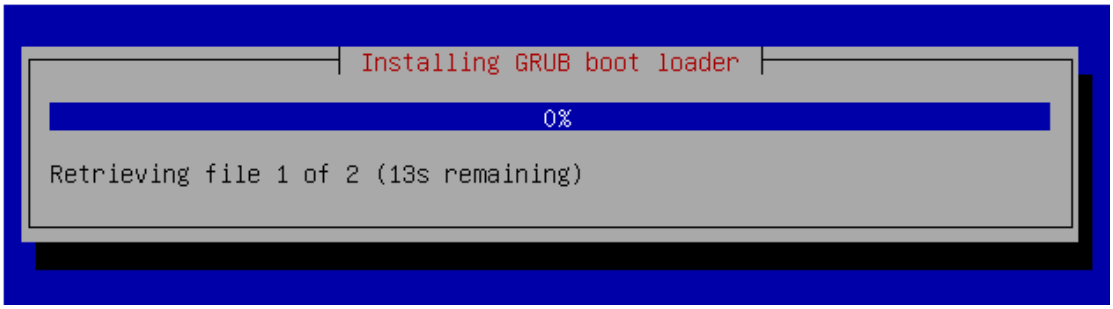

Fig. 35

41. From Fig. 36, the **Installing GRUB boot loader** screen, accept the default selection to install GRUB boot loader, or change as desired, and hit the **Enter** key to continue.

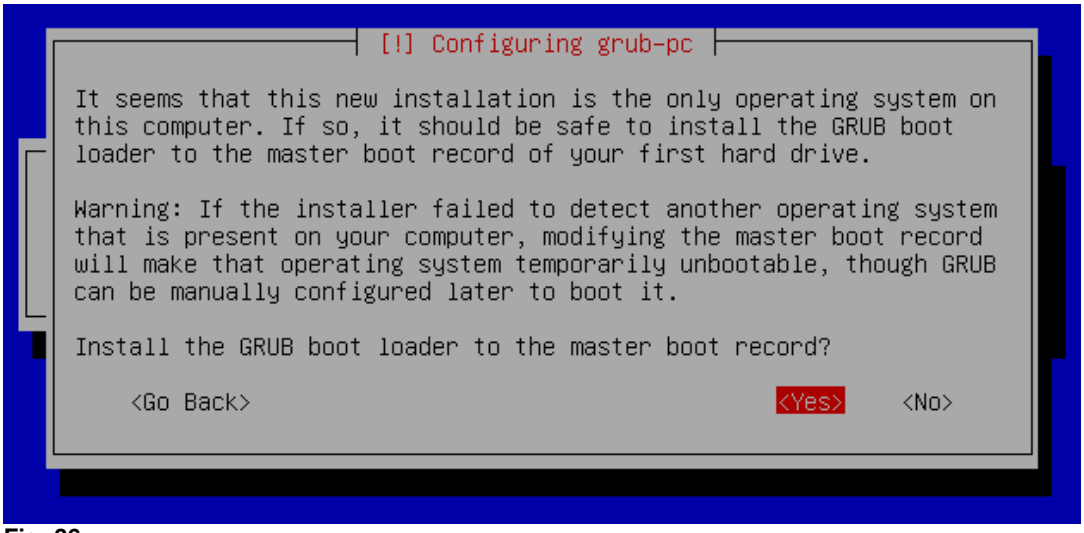

Fig. 36

42. From Fig. 37, the **Finishing the installation** screen, wait for the system to complete the process.

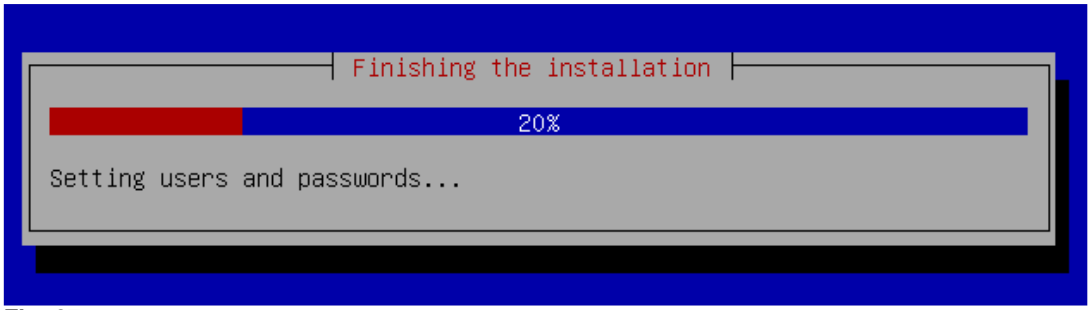

Fig. 37

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43. From Fig. 38, the **Finish installation** screen; `Installation complete`. Remove the installation CD, and hit the **Enter** key to restart the system.

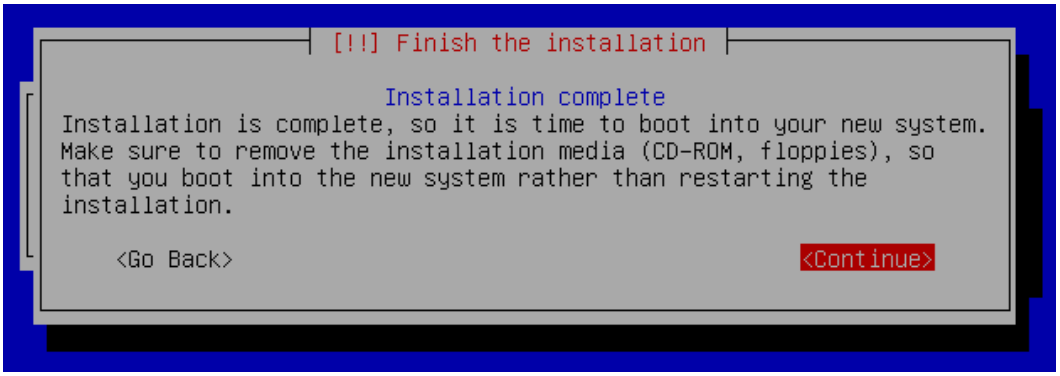

Fig. 38

44. From Fig. 39, you can observer the system startup process.

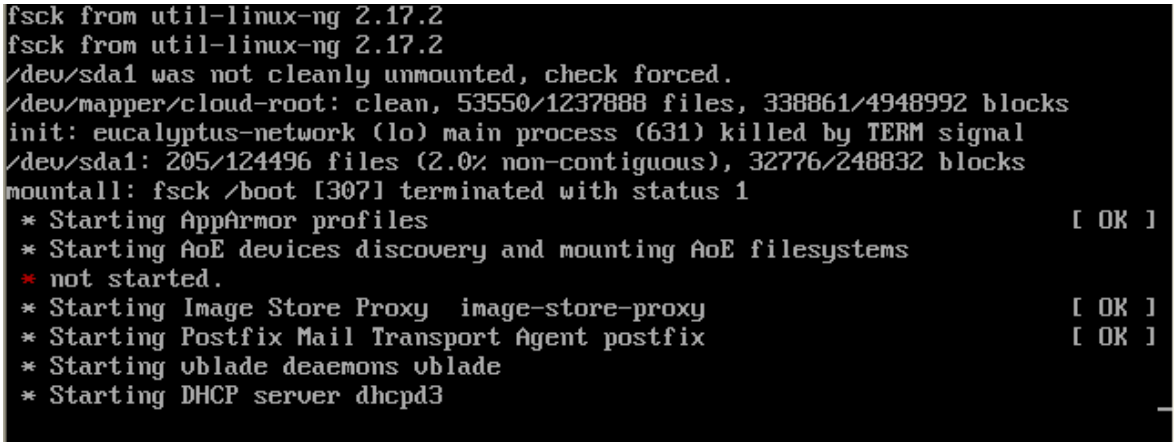

Fig. 39: Ubuntu cloud server startup process.

45. From Fig. 40, enter your username and password, same as the one entered during the installation stage, and hit enter.

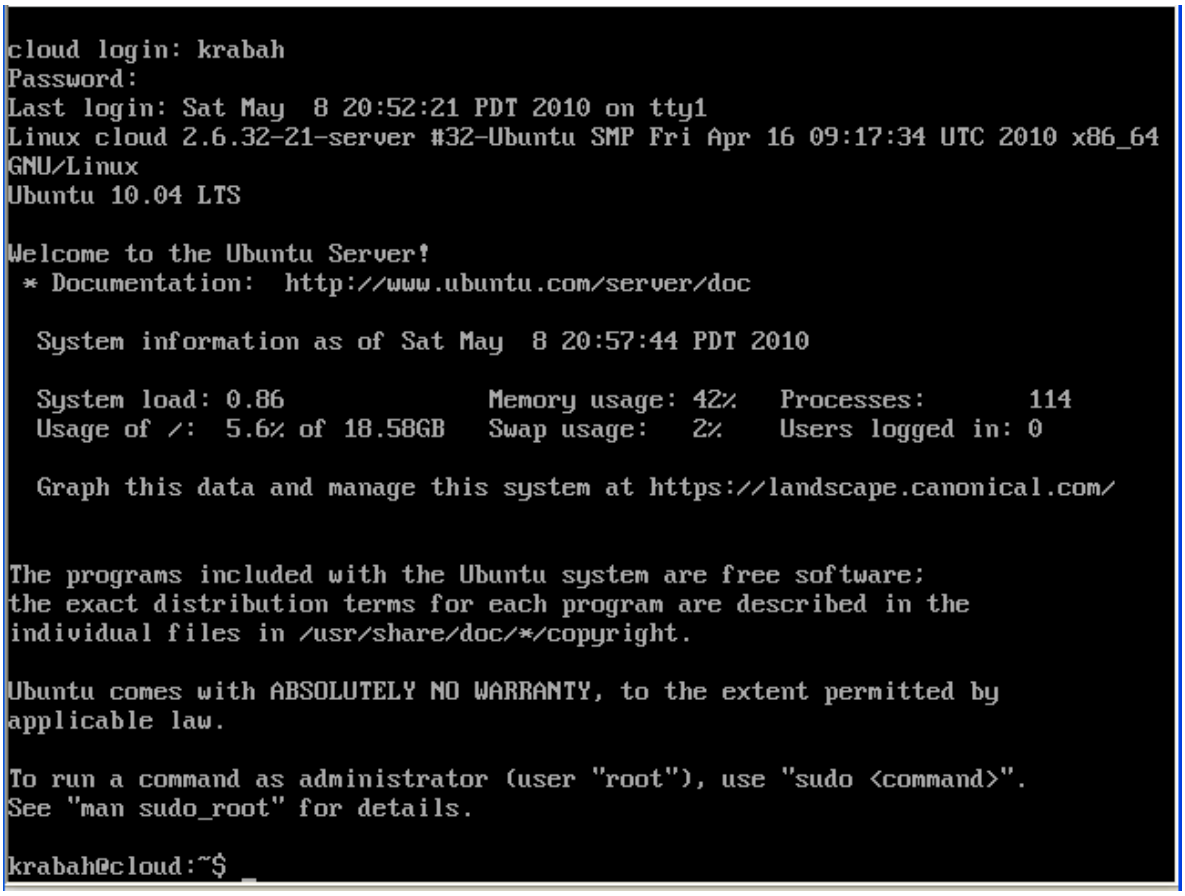

Fig. 40: Ubuntu cloud server with successful login.

46. To check you server IP address, if the `Ifconfig` command, as shown in Fig. 41.

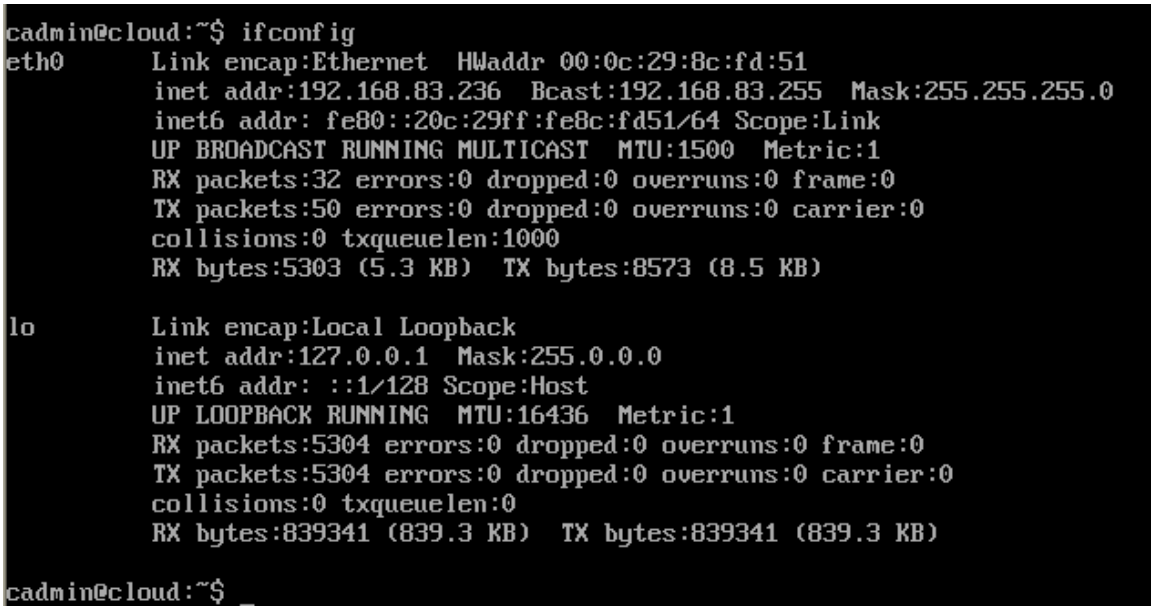

Fig. 41: Checking server IP address

47. We're done with this section.

Step 3: Update Ubuntu 10.04 Operating Systems

It is useful to update your system with the latest components and system patches. The first command below asks Ubuntu to update its database of available packages, and the second command installs the latest packages based on your current configuration. We run the upgrade command twice to ensure that any packages that may have post-upgrade dependencies also have an opportunity to be upgraded.

1. From the command line, enter the following commands, one at a time.

```
$ sudo apt-get update
$ sudo apt-get -u upgrade
```

Note 1: The `sudo` command is used to run privileged operations on the Ubuntu platform. The first time you run the command, it will ask for your password. Subsequently, it will not ask for your password again for a short period of time (typically 15 minutes).

Note 2: `apt-get` is the program Ubuntu uses for managing the system's packages. When used to manipulate the core packages of the operating system, it needs to be run in conjunction with the `sudo` command.

2. We're done with this section
3. You're now ready to begin any other application installation as desired!

Part 2: Ubuntu Linux Node Installation

Node installation under the Ubuntu 10.04 install is as straight forward as the Cloud controller.

1. At the start of the node installation, the option **"Install Ubuntu Enterprise Cloud"** should be selected just like the Cloud controller installation. However, in the **Select Cloud Installation Mode** screen (Fig. 42), select `"Node controller"` as the install method.

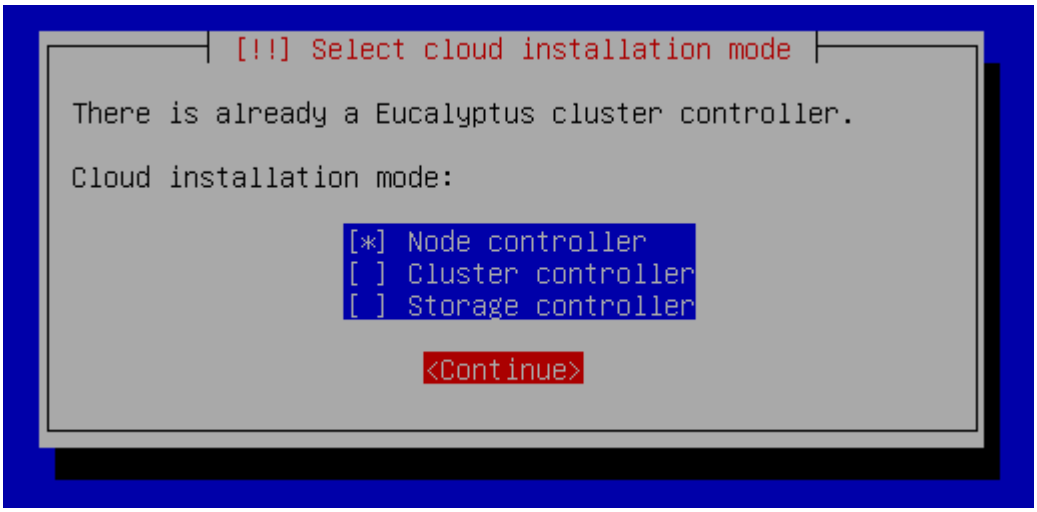

Fig. 42: Cloud installation mode.

Note 1: Node's hostname use: "node01.oscarcloud.com", you may change as desired, see Fig. 43.

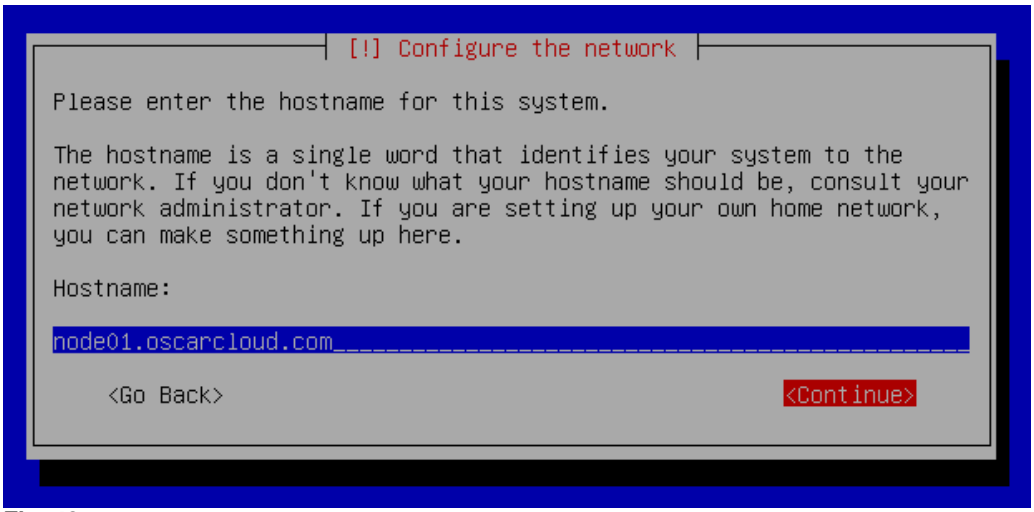

Fig. 43

Note 2: The rest of the installation remains the same as installing the Cluster controller in Part 1.

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2. When done with installation and rebooted the node back, use `Ifconfig` command to check network devices installed on the node controller, as shown in Fig. 44.

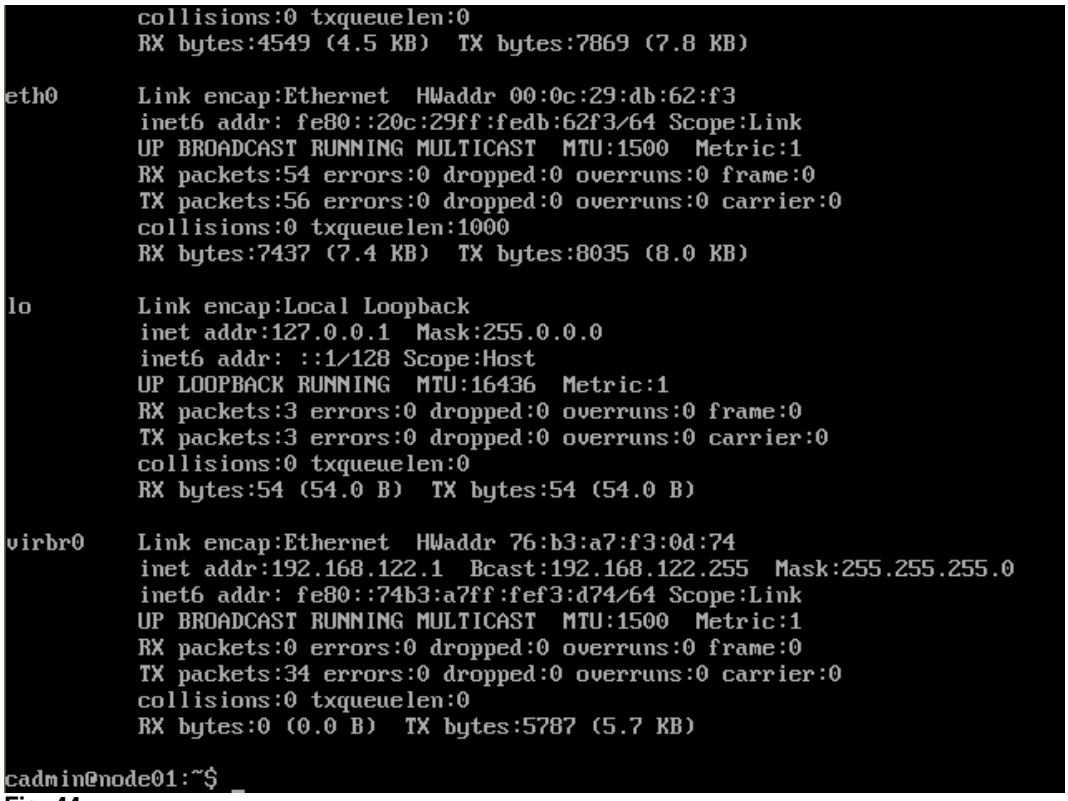

Fig. 44

3. Next, use the `ping` command to test that you can connect to the Cloud controller, as show in Fig. 45.

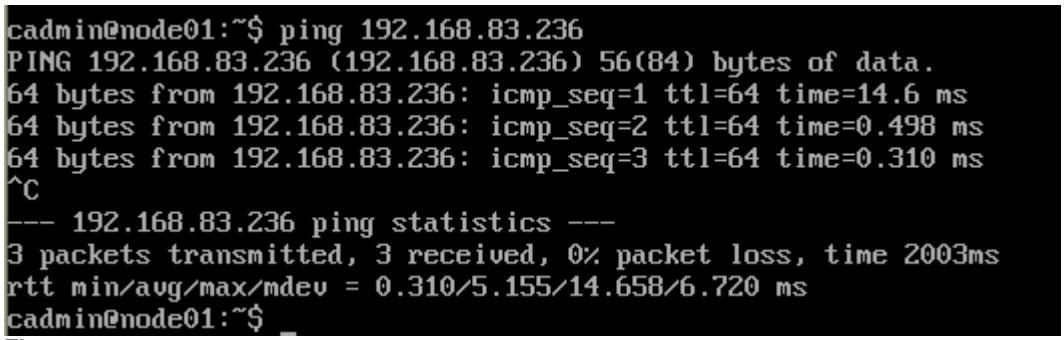

Fig. 45

4. We're done with this section.

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Part 3: Cloud provisioning from Ubuntu

Step 1: Logging into Ubuntu Cloud Admin console

In this section, I will show you how install the node controller. Once the Cluster controller and nodes are installed the cloud is managed via the cluster controller's IP address. The system can be managed via the

Web interface by connecting on port `8443`. For example, assuming the cluster controller's IP address is `192.168.83.236`, the URL `http://192.168.83.236:8443` can be used to manage the cluster.

1. To access the Ubuntu Cloud Admin console, fire-up another virtual machine, in our case it's WinXP PC, and then use your favorite browser and enter the URL: `http://192.168.83.236:8443`. You will be prompted for **Security Alert** window as shown in Fig.46. Click **Yes** to accept the security certificate.

Fig. 46

2. The Web login will be shown at this point as shown in Fig. 47. The default username `"admin"` with the password `"admin"` can be used for the initial login.

Fig. 47: Enterprise cloud login.

3. Once you are logged in, **Eucalyptus** will prompt you for the administrator's new password as well as email address and the cluster host IP address, as shown in Fig. 48. Change as desired and then click the **Submit** button to update the changes. (Note: we have changed to Firefox browser)

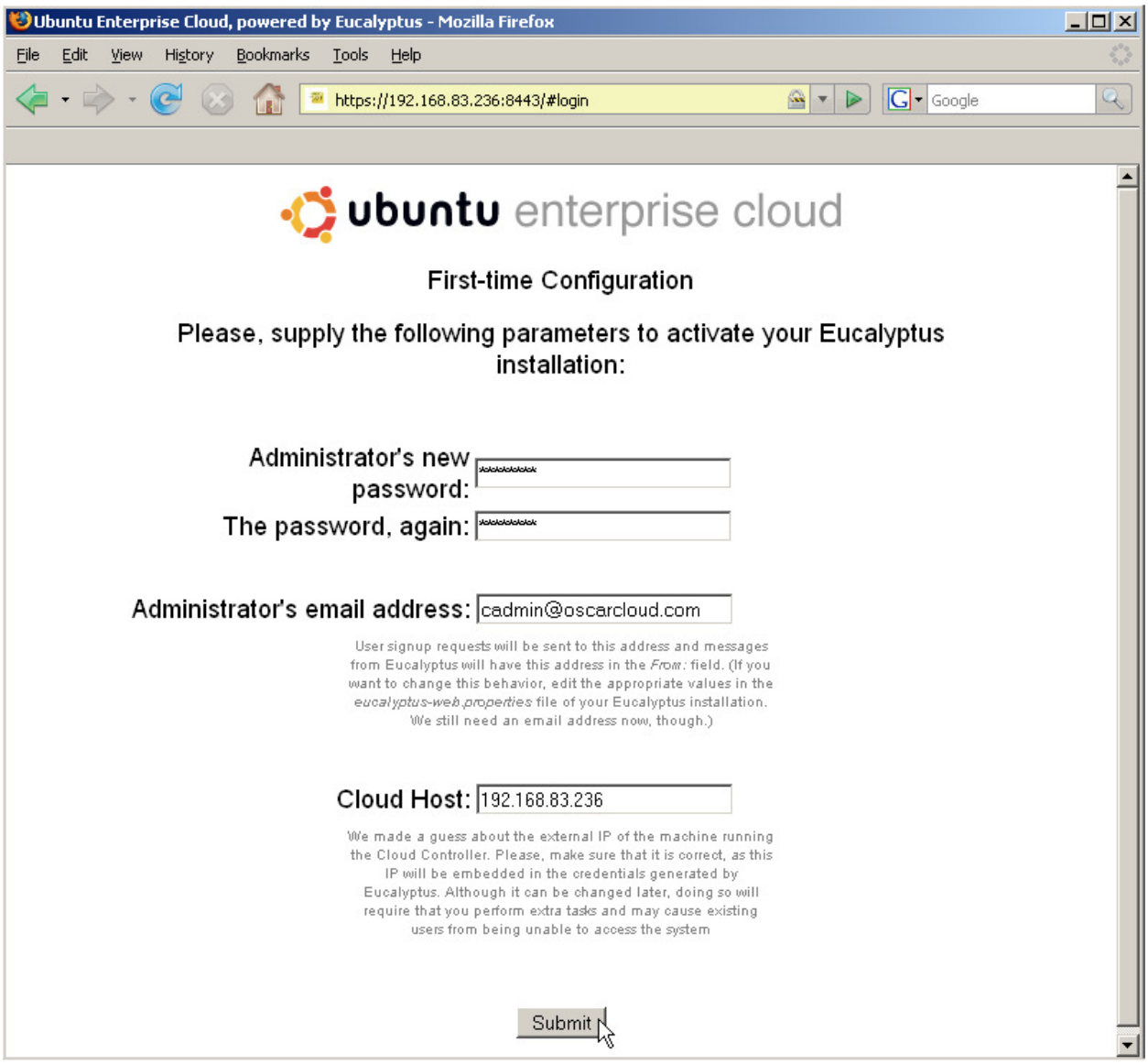

Fig. 48: First time configuration for Ubuntu Enterprise Cloud.

4. When you hit the **Submit** button, from Fig. 48 above, you'll be brought to the screen shown in Fig. 49. Notice at the moment there is only one user, who is the server administrator.

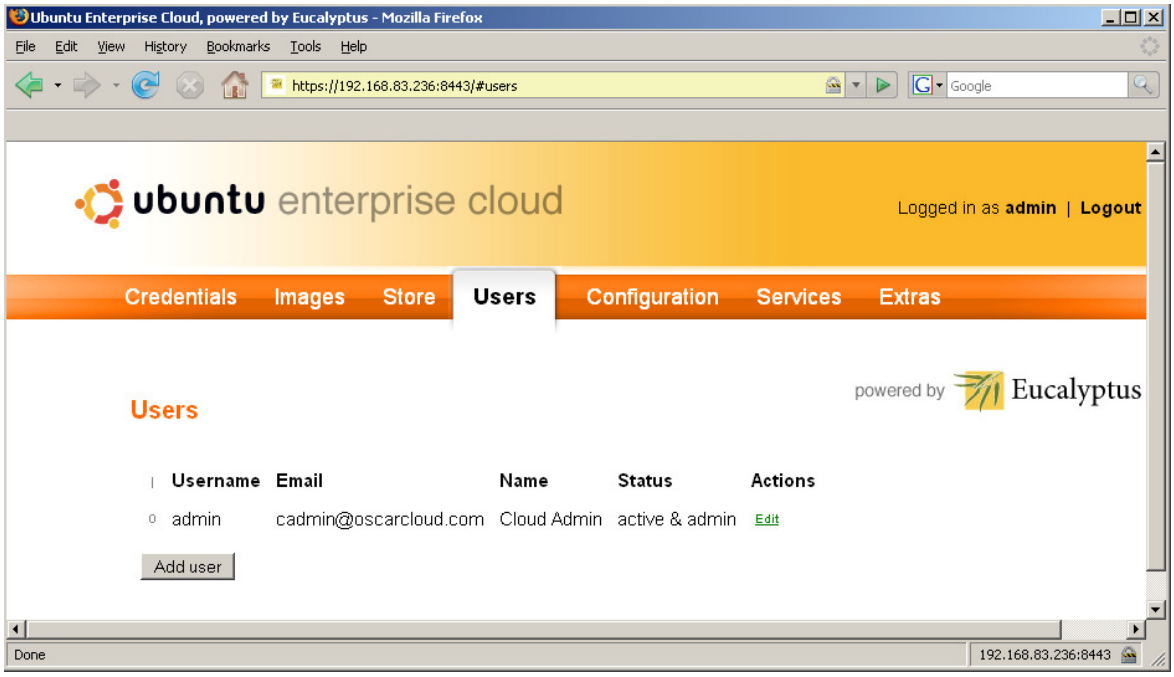

Fig. 49: Ubuntu Enterprise Cloud admin console

5. Before we do anything, we need to register Walrus, this can be found on the **Configuration** tab. Enter under Walrus host: `192.168.83.236`, which is the IP of the cloud controller, then click the **Register Walrus** button.

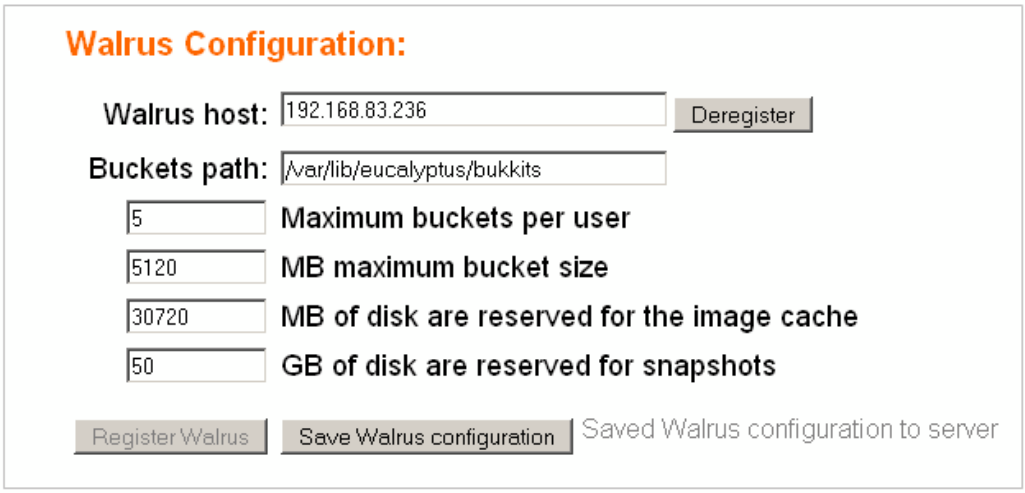

Fig. 50

Note: The integration of UEC goes beyond the installation. The Eucalyptus Web interface supports the concept of a **Store**, and **Extras**. The Store and Extras provide similar function. They are repositories and links to the Internet for operating systems supported within the cloud. The Images tab is initially empty, as shown in Fig. 51.

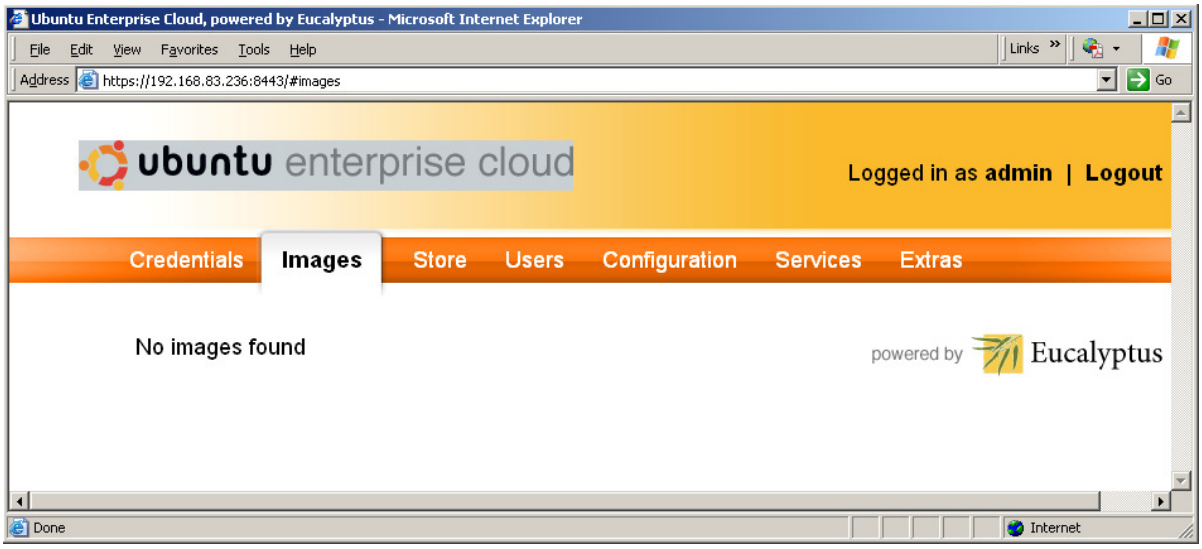

Fig. 51: Ubuntu Enterprise Cloud admin console – Images tab

Step 2: A closer look at Ubuntu enterprise cloud

The Web-based management console is made up of seven tabs: **Credentials**, **Images**, **Store**, **Users**, **Configuration**, **Services**, and **Extras**. The major advantage of the console over the command line is that it gives a large view of the whole environment in one location, as shown in Fig. 51.

- **Credential tab:** The Credentials pane contains two fundamental configuration parameters: the admin account information, and the credentials information. The admin account information is the basic authentication and authorization information needed to access the Web interface; whereas the credential information is the authentication (keys) needed to access cloud infrastructure such as private cloud resources managed by the enterprise or public ones such as Amazon's cloud computing services.
- **Images tab:** - Virtual machines within Eucalyptus are made up of images, and these "base" images are made up of three discrete pieces: a kernel, a ram disk, and an OS image. These images are stored under the Images tab. This images tab integrates tightly with the **Store tab** which provides administrators a set of four Images available for download and quick provisioning, see Fig. 52.
- **Users tab:** - Eucalyptus also supports additional users, which are provisioned under the Users tab.

- **Configuration tab**: - The Configuration tab is the major tab and is used to provision the settings for the cloud, including its IP, DNS, storage, and cluster information. This is really for changing the parameters, as the Ubuntu integrated install process provisions most of these out of the box.
- **Services tab:** -The Services tab is a bit misleading. It is not to start and stop services, but rather a 'help" tab. It provides links to documentation, training, and community Web sites.

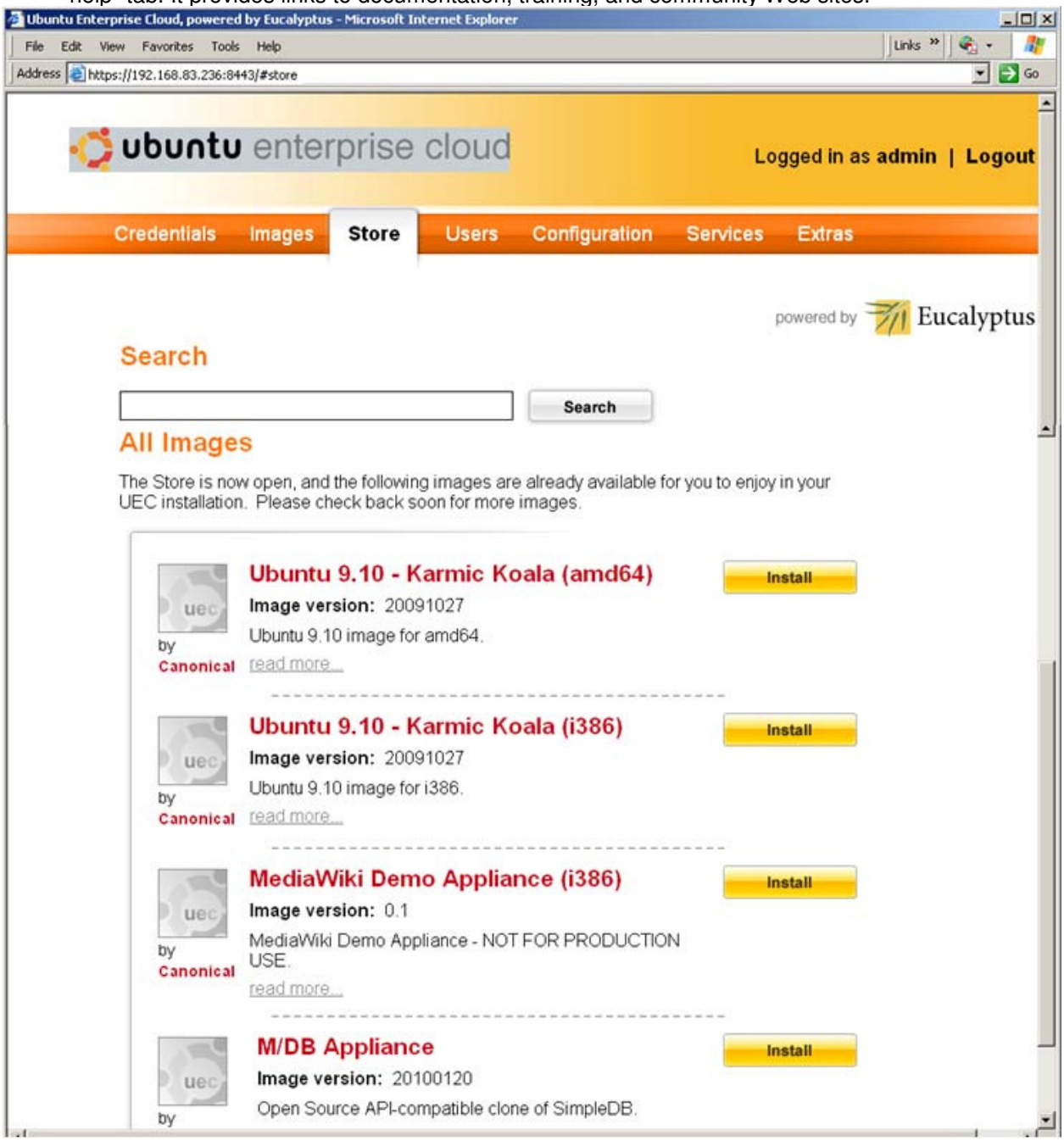

Fig. 52: Store tab in Enterprise Cloud console showing images that are ready for installing.

- **Extras tab:** - Finally, the Extras tab contains other Linux versions as well as older Ubuntu images that will also function with the platform. The Extra tabs, also contains client tools, see Fig. 53.

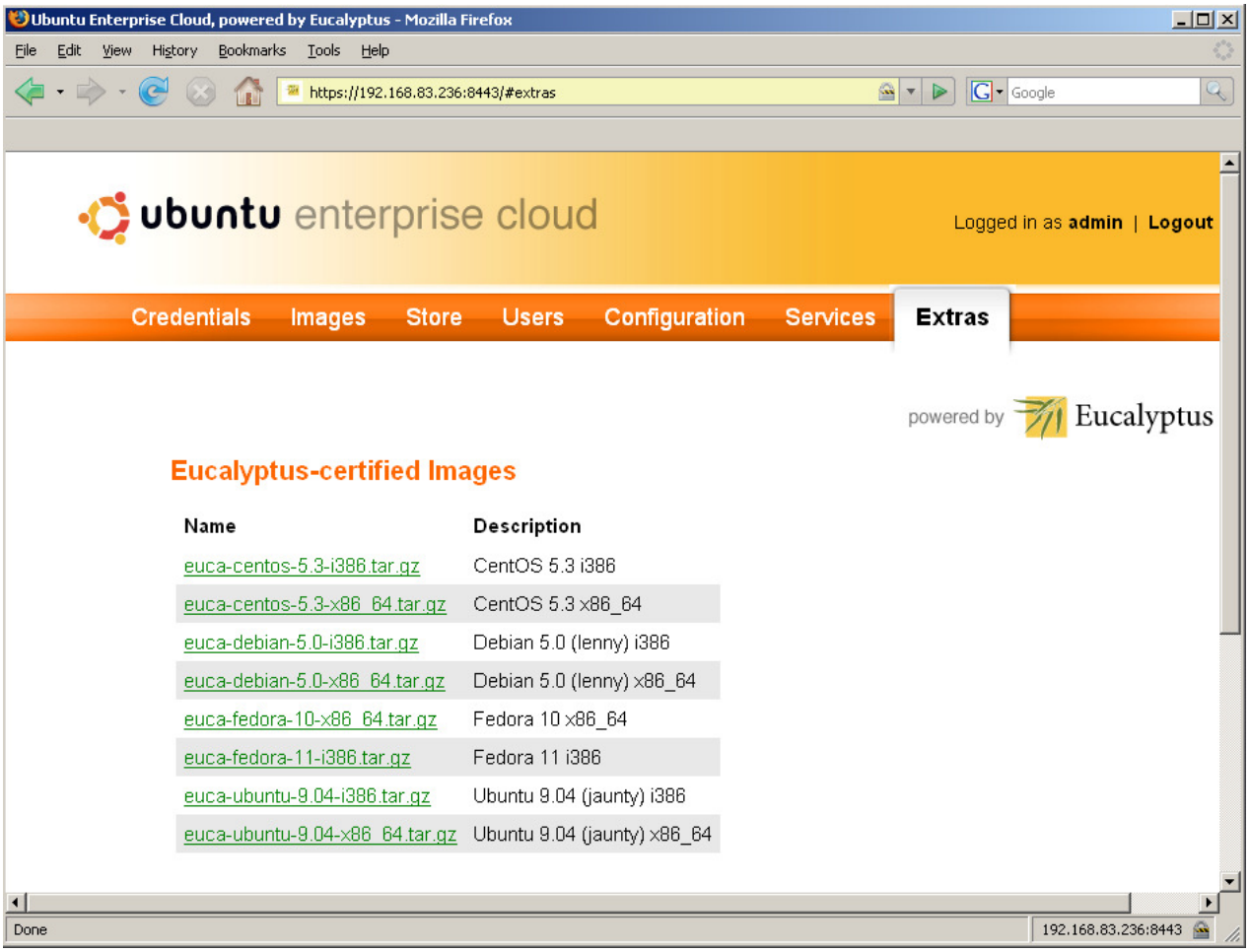

Fig. 53: Extras tab in Enterprise Cloud console showing Eucalyptus-certified Images that are ready for installing.

Note: if you scroll down you'll also see the **Eucalyptus-compatible Tools** which you can also install, see Fig. 54.

Fig. 54

Step 3: Set up your cloud

In this section I'll show you how to download and install tools necessary to help you manage your cloud.

1. Download and install a tool to allow you to start and stop instances, see Fig. 54 located in the Extras tab. You can use either Elastic Fox or `Euca2ools` for free. Euca2ools is open source and comes with Ubuntu Server
2. Click `euca2ools` link from Fig. 54 to install it access the package and the guide on how to install it.

Step 4: Install an image from the store

The following is by far the simplest way to install an image. However, advanced users may be interested in learning how to Bundle their own image.

1. The simplest way to add an image to UEC is to install it from the Image Store on the UEC web interface from the Store tab, see Fig.52 above.

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2. From the available images under All Images heading, locate the desired image and then click on the Install button to install it the desired image, in our case: **Ubuntu 9.10 – Karmic Koala (amd64)**, see Fig. 55.

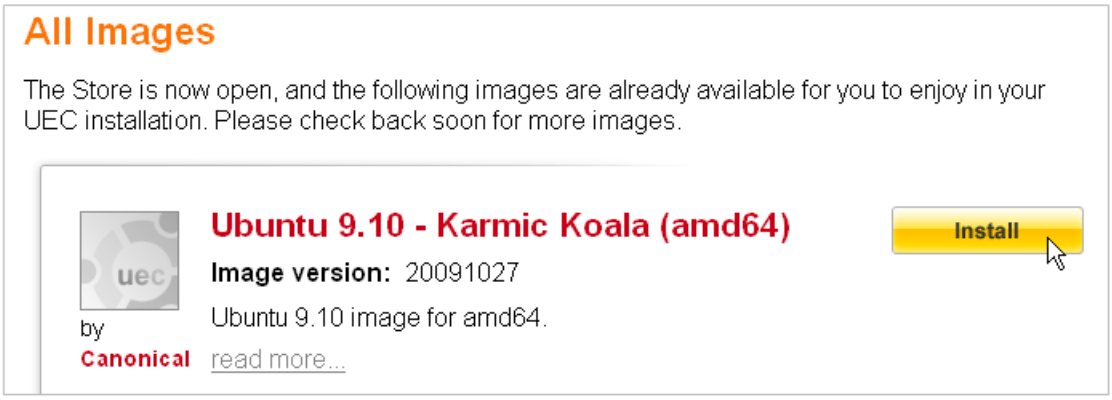

Fig. 55: From the UEC Store tab, click Install button to install **Ubuntu 9.10 –Karmic Koala (amd64)**

Note: It will take several minutes to download & complete installation, so take time-off for some coffee.

3. Once the image has been downloaded and installed, you can click on `"How to run?"` that will be displayed below the image button to view the command to execute to instantiate (start) this image. The image will also appear on the list given on the Image tab, see Fig. 56.

Fig. 56: Click the **"How to run?"** link.

Note: When you click "How to run?", a window will open as shown in Fig. 57. Click the **Close** button when done.

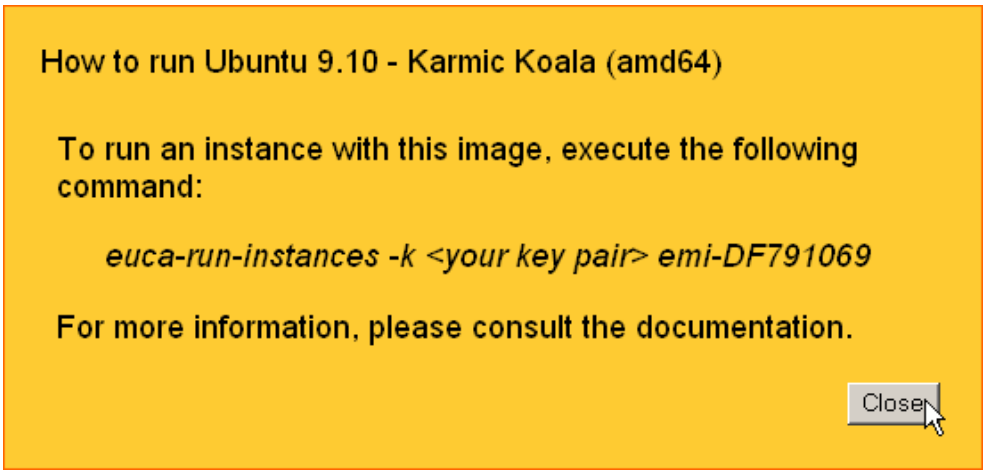

Fig. 57: Information on how to run: **Ubuntu 9.10 –Karmic Koala (amd64)**

4. Now if you click the **Image** tab, should notice that we have some images, as shown in Fig. 58.

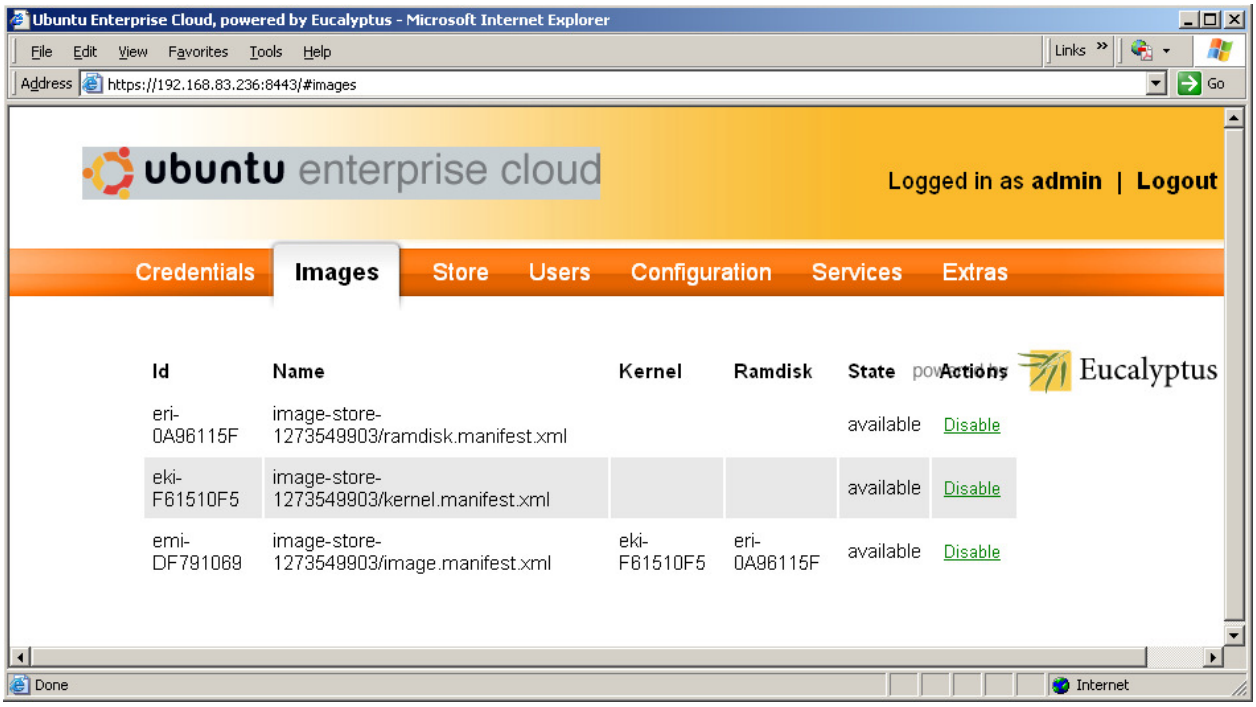

Fig. 58: Image tab, now showing some images.

5. We're done with this section.

6. Take your time to some Google search to help you learn how to extend the knowledge that you have learned in this lab session.

   Note: Shutdown the systems in this order: first the node controller followed by the cloud controller. Use the following command to shutdown: `"sudo shutdown now -h"`.

   To power up the cloud system, fire-up the cloud controller first followed by the node controller.

Step 5; Summary

The Ubuntu integrated install of Eucalyptus and the Web-based enterprise console is a welcome addition to cloud computing. It makes a consistent and quick deployment of the technology much more attainable by many enterprise shops.

References

1. Installing Ubuntu 9_10 and the Eucalyptus enterprise cloud computing platform http://www.canonical.com/projects/landscape/cloud-management
2. Landscape Cloud Management Canonical https://help.ubuntu.com/community/UEC/CDInstall
3. Private cloud Ubuntu - http://www.ubuntu.com/cloud/private-steps

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