

SYSTEM AND NETWORK PROJECT-PART2- Linux server

Student: Alex ACQUIER ID#:G00293624

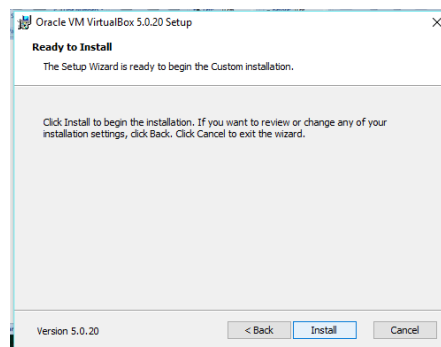
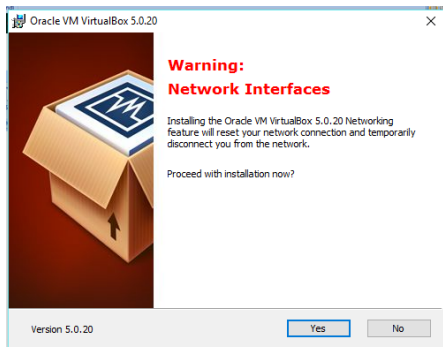
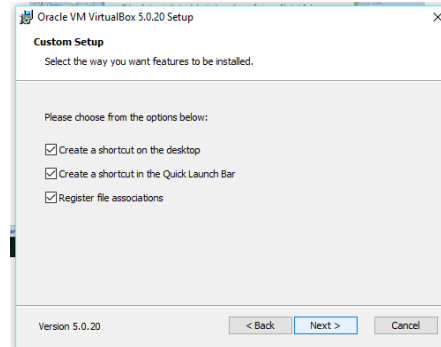
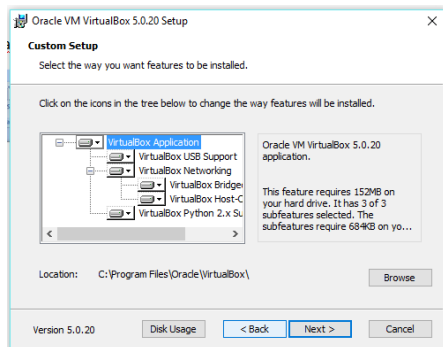
Lecturer: Michael DUIGNAN

Installing Oracle VirtualBox

Start to download Oracle VirtualBox from:

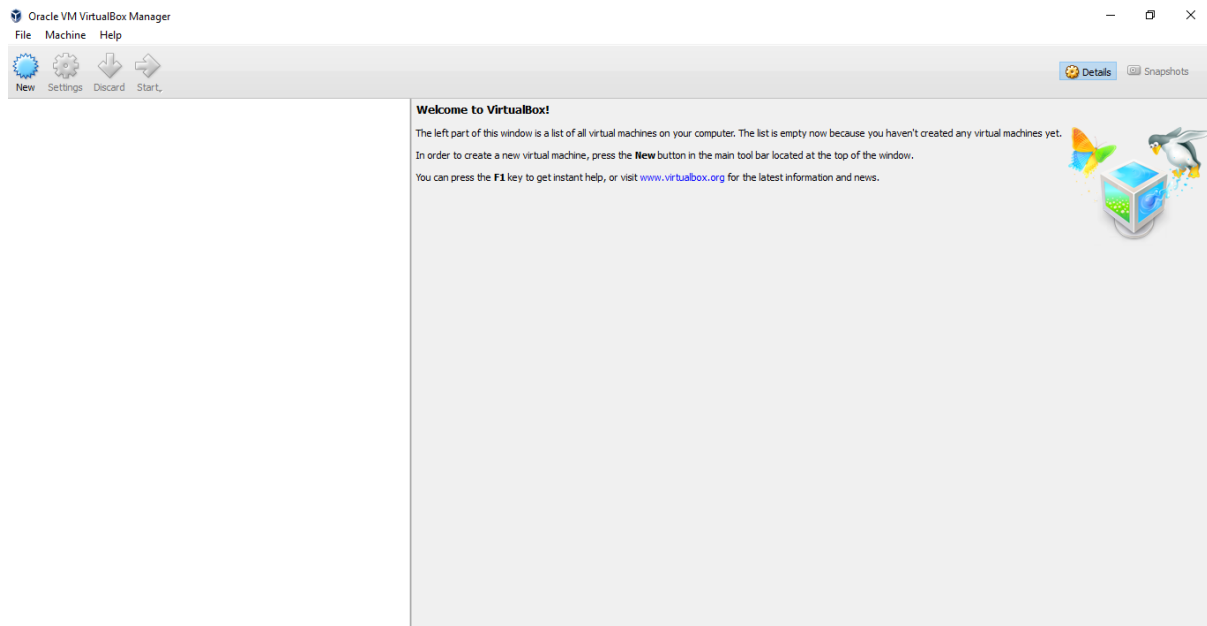
http://download.cnet.com/VirtualBox/3000-2094_4-10922624.html

Unzip and install Oracle VirtualBox and successively answer next, yes, install and finish:

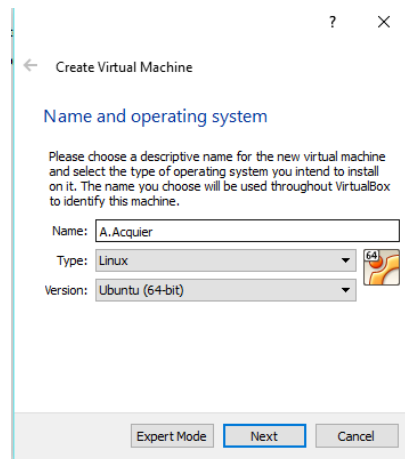


Creation and setting up of a Virtual Machine:

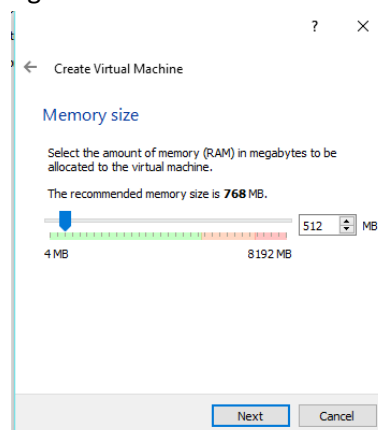
Open Oracle VirtualBox as shown below:



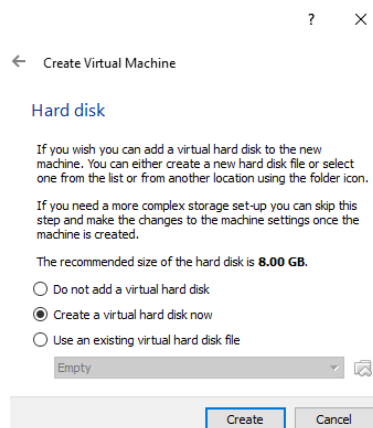
Click New in the top left corner, enter the name of the virtual machine, the type and the version of the operating system, then click Next:



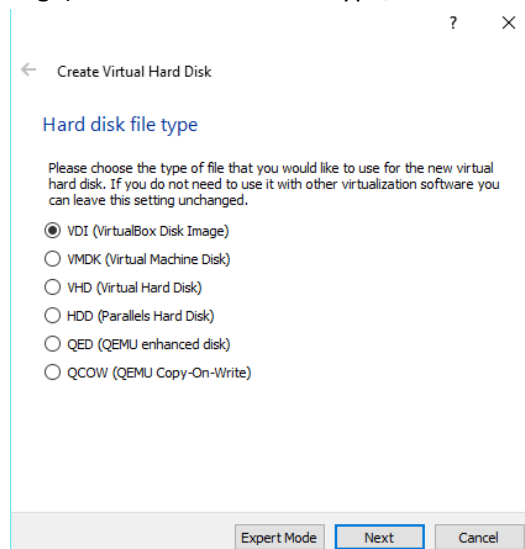
Set up the size of the RAM by moving the cursor and click Next:



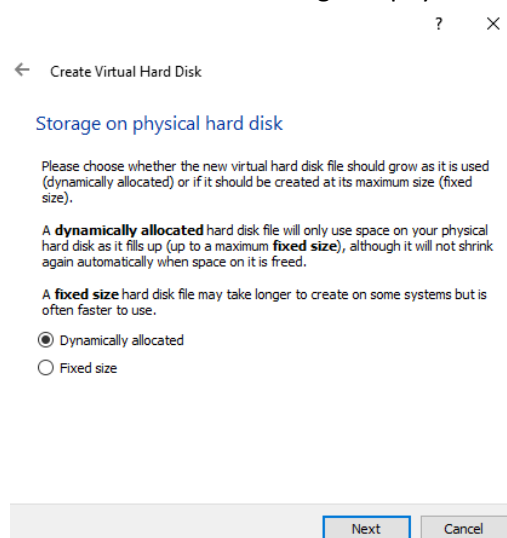
Create a virtual hard disk by selecting the appropriate checkbox, then click create:



Select VDI (VirtualBox Disk Image) as the hard drive file type, then click next:



Select the dynamically allocated checkbox for the storage on physical hard disk, then click next:



Select the name of your virtual machine and its size of the virtual hard drive (8GB in this case)and click create:

?

×

←

Create Virtual Hard Disk

File location and size

Please type the name of the new virtual hard disk file into the box below or click on the folder icon to select a different folder to create the file in.

A.Acquier

Select the size of the virtual hard disk in megabytes. This size is the limit on the amount of file data that a virtual machine will be able to store on the hard disk.

4,00 MB

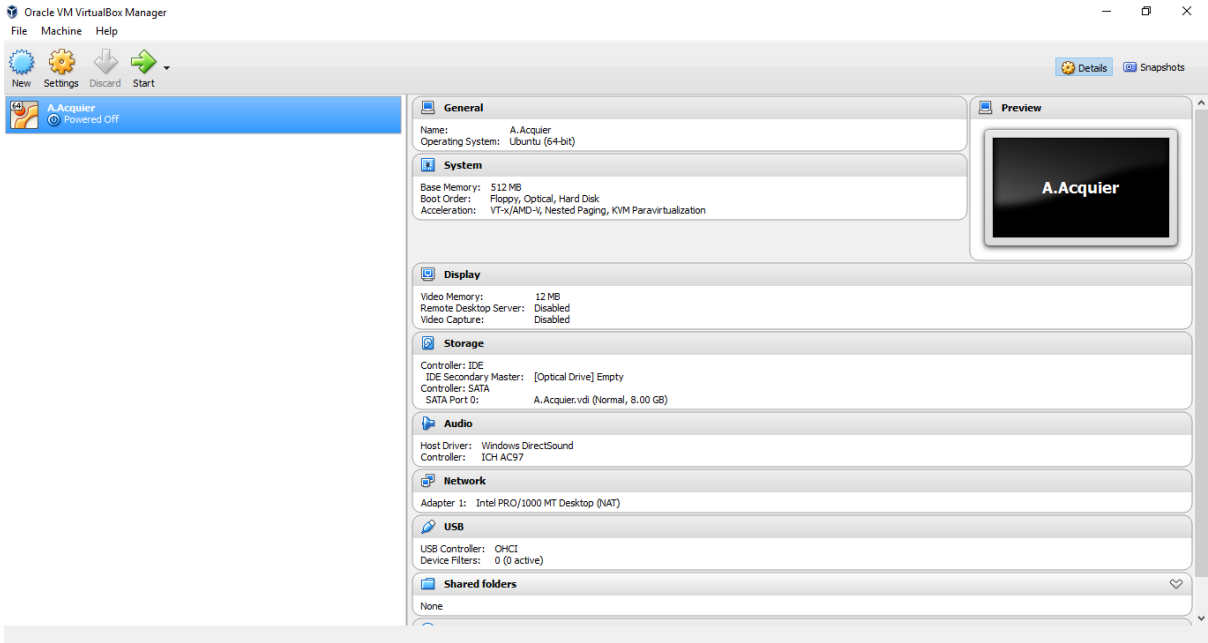
2,00 TB

8.00 GB

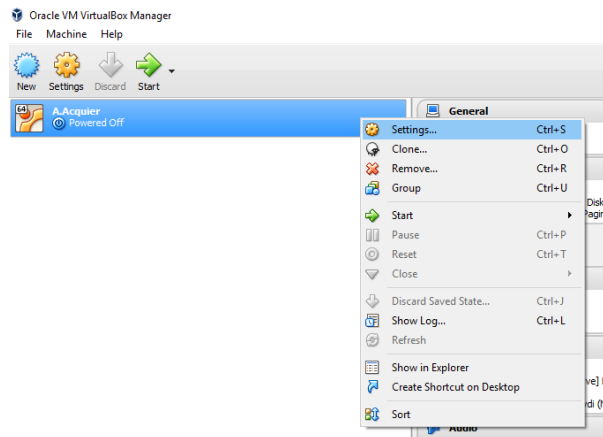
Create

Cancel

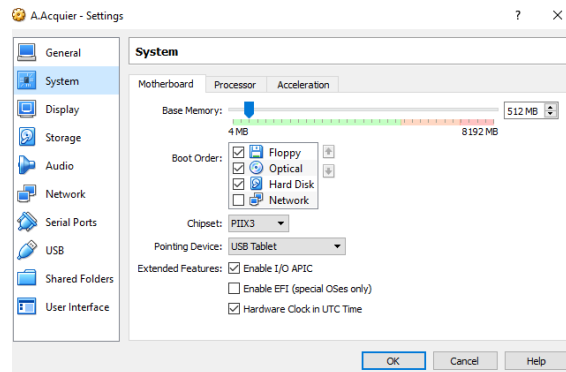
VirtualBox creates a disk image as shown below:



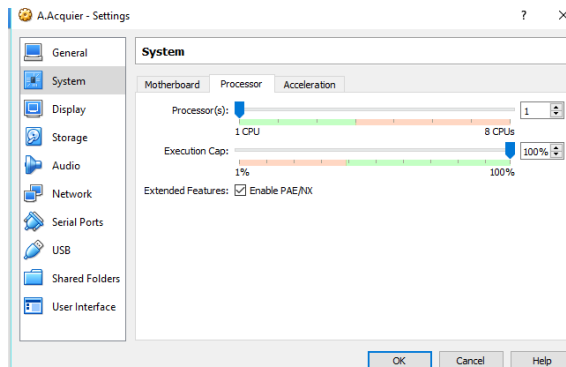
Right click on the virtual machine then select Settings:



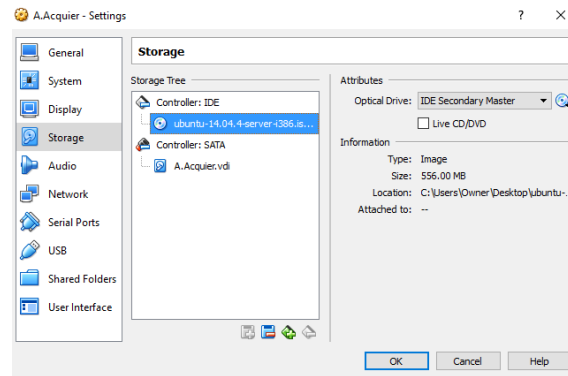
Select System and go to Motherboard, make sure that **Hardware Clock in UTC Time** checkbox is selected:



Next, click the Processor tab and be sure to check the **Enable PAE/NX** box:

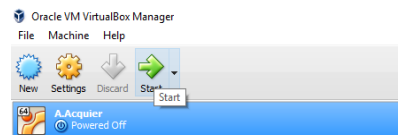


Select the Storage category, and add the DVD ISO as the **IDE Secondary Master** drive:



Server Installation

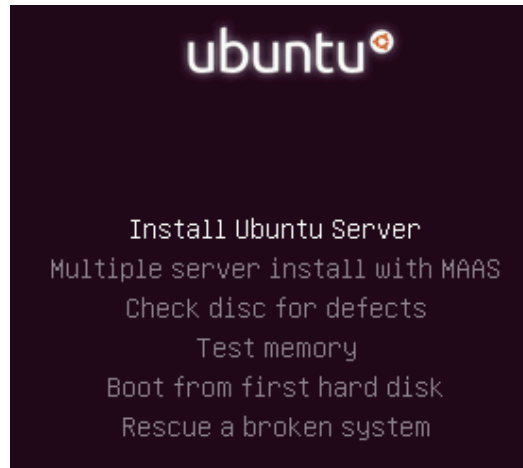
Click Start to begin installing Linux to your Virtual Machine:



Select your language and press enter:

Language			
Amharic	Français	Македонски	Tamil
Arabic	Gaeilge	Malayalam	తెలుగు
Asturianu	Galego	Marathi	Thai
Беларуская	Gujarati	Burmese	Tagalog
Български	עברית	Nepali	Türkçe
Bengali	Hindi	Nederlands	Uyghur
Tibetan	Hrvatski	Norsk bokmål	Українська
Bosanski	Magyar	Norsk nynorsk	Tiếng Việt
Català	Bahasa Indonesia	Punjabi (Gurmukhi)	中文(简体)
Čeština	Íslenska	Polski	中文(繁體)
Dansk	Italiano	Português do Brasil	
Deutsch	日本語	Português	
Dzongkha	ಕನ್ನಡ	Română	
Ελληνικά	Қазақ	Русский	
English	Khmer	Sámegillii	
Esperanto	ಕನ್ನಡ	සිංහල	
Español	한국어	Slovenčina	
Eesti	Kurdî	Slovenščina	
Euskara	Lao	Shqip	
فارسی	Lietuviškai	Српски	
Suomi	Latviski	Svenska	

Select **Install Ubuntu Server** and install it by pressing Enter:



Once again select a language and press Enter:



Select a country and press enter:

[!] Select your location

The selected location will be used to set your time zone and also for example to help select the system locale. Normally this should be the country where you live.

This is a shortlist of locations based on the language you selected. Choose "other" if your location is not listed.

Country, territory or area:

Antigua and Barbuda

Australia

Botswana

Canada

Hong Kong

India

Ireland

New Zealand

Nigeria

Philippines

Singapore

South Africa

United Kingdom

United States

Zambia

Zimbabwe

other

<Go Back>

Choose (or not) to configure your keyboard (option picked No):

[!] Configure the keyboard

You can try to have your keyboard layout detected by pressing a series of keys. If you do not want to do this, you will be able to select your keyboard layout from a list.

Detect keyboard layout?

<Go Back>

<Yes>

<No>

Then select the country of origin of the keyboard:

[!] Configure the keyboard

The layout of keyboards varies per country, with some countries having multiple common layouts. Please select the country of origin for the keyboard of this computer.

Country of origin for the keyboard:

English (Nigeria)

English (South Africa)

English (UK)

English (US)

Esperanto

Estonian

Faroese

Filipino

Finnish

French

French (Canada)

French (Democratic Republic of the Congo)

French (Guinea)

Georgian

German

German (Austria)

Greek

Hebrew

Hungarian

Icelandic

Indian

Iraqi

Irish

<Go Back>

Select the type of keyboard:

[[!]] Configure the keyboard

Please select the layout matching the keyboard for this machine.

Keyboard layout:

English (UK)

English (UK) - English (UK, Colemak)

English (UK) - English (UK, Dvorak with UK punctuation)

English (UK) - English (UK, Dvorak)

English (UK) - English (UK, Macintosh international)

English (UK) - English (UK, Macintosh)

English (UK) - English (UK, extended WinKeys)

English (UK) - English (UK, international with dead keys)

<Go Back>

Let the program load until you reach the configure network window, then pick a hostname and select continue:

[[!]] Configure the network

Please enter the hostname for this system.

The hostname is a single word that identifies your system to the network. If you don't know what your hostname should be, consult your network administrator. If you are setting up your own home network, you can make something up here.

Hostname:

Alex

<Go Back> <Continue>

Enter your username to create an account, a new window may show up after this one to ask you to add a number to your username, do as you see fit:

[[!]] Set up users and passwords

A user account will be created for you to use instead of the root account for non-administrative activities.

Please enter the real name of this user. This information will be used for instance as default origin for emails sent by this user as well as any program which displays or uses the user's real name. Your full name is a reasonable choice.

Full name for the new user:

alex

<Go Back> <Continue>

Enter your password and continue:

[[!]] Set up users and passwords

A good password will contain a mixture of letters, numbers and punctuation and should be changed at regular intervals.

Choose a password for the new user:

<Go Back> <Continue>

Confirm your password and continue:

[[!]] Set up users and passwords

Please enter the same user password again to verify you have typed it correctly.
Re-enter password to verify:

•••••

<Go Back>

<Continue>

The program may ask you to user a stronger password as shown below, do as you see fit:

[[!]] Set up users and passwords

You entered a password that consists of less than eight characters, which is considered too weak. You should choose a stronger password.
Use weak password?

<Go Back>

<Yes>

<No>

You may choose to encrypt your directory (do as you see fit):

[[!]] Set up users and passwords

You may configure your home directory for encryption, such that any files stored there remain private even if your computer is stolen.
The system will seamlessly mount your encrypted home directory each time you login and automatically unmount when you log out of all active sessions.
Encrypt your home directory?

<Go Back>

<Yes>

<No>

Confirm your time zone:

[[!]] Configure the clock

Based on your present physical location, your time zone is Europe/Dublin.
If this is not correct, you may select from a full list of time zones instead.
Is this time zone correct?

<Go Back>

<Yes>

<No>

Choose which way you want to partition the disk(s):

[[!]] Partition disks

The installer can guide you through partitioning a disk (using different standard schemes) or, if you prefer, you can do it manually. With guided partitioning you will still have a chance later to review and customise the results.

If you choose guided partitioning for an entire disk, you will next be asked which disk should be used.

Partitioning method:

- Guided - use entire disk
- Guided - use entire disk and set up LVM
- Guided - use entire disk and set up encrypted LVM
- Manual

<Go Back>

Confirm the disk(s) partition and select the disk(s):

[[!]] Partition disks

Note that all data on the disk you select will be erased, but not before you have confirmed that you really want to make the changes.

Select disk to partition:

- SCSI3 (0,0,0) (sda) - 8.6 GB ATA VBOX HARDDISK

<Go Back>

Confirming partition once again and wait for the system to be installed:

[[!]] Partition disks

If you continue, the changes listed below will be written to the disks. Otherwise, you will be able to make further changes manually.

The partition tables of the following devices are changed:

- SCSI3 (0,0,0) (sda)

The following partitions are going to be formatted:

- partition #1 of SCSI3 (0,0,0) (sda) as ext4
- partition #5 of SCSI3 (0,0,0) (sda) as swap

Write the changes to disks?

<Yes> <No>

Asking if an HTTP proxy is needed (selected: none):

[[!]] Configure the package manager

If you need to use a HTTP proxy to access the outside world, enter the proxy information here. Otherwise, leave this blank.

The proxy information should be given in the standard form of "http://[[user]:[pass]@host[:port]"/".

HTTP proxy information (blank for none):

<Go Back> <Continue>

Asking for the management of the updates (no automatic updates selected):

[[!]] Configuring tasksel

Applying updates on a frequent basis is an important part of keeping your system secure.

By default, updates need to be applied manually using package management tools. Alternatively, you can choose to have this system automatically download and install security updates, or you can choose to manage this system over the web as part of a group of systems using Canonical's Landscape service.

How do you want to manage upgrades on this system?

No automatic updates

Install security updates automatically

Manage system with Landscape

Asking if more software are needed (answered no):

[[!]] Software selection

At the moment, only the core of the system is installed. To tune the system to your needs, you can choose to install one or more of the following predefined collections of software.

Choose software to install:

[] OpenSSH server

[] DNS server

[] LAMP server

[] Mail server

[] PostgreSQL database

[] Print server

[] Samba file server

[] Tomcat Java server

[] Virtual Machine host

[] Manual package selection

<Continue>

Install the GRUB boot loader:

[[!]] Install the GRUB boot loader on a hard disk

It seems that this new installation is the only operating system on this computer. If so, it should be safe to install the GRUB boot loader to the master boot record of your first hard drive.

Warning: If the installer failed to detect another operating system that is present on your computer, modifying the master boot record will make that operating system temporarily unbootable, though GRUB can be manually configured later to boot it.

Install the GRUB boot loader to the master boot record?

<Go Back>

<Yes>

<No>

when the installation is completed this message should show and the system should boot:

[[!]] Finish the installation

Installation complete

Installation is complete, so it is time to boot into your new system. Make sure to remove the installation media (CD-ROM, floppies), so that you boot into the new system rather than restarting the installation.

<Go Back>

<Continue>

Once rebooted, the system asks for the username and the password, once inputted it should update the sever system as shown below:

```
Ubuntu 14.04.4 LTS Alex tty1
Alex login: alex
Password:
Welcome to Ubuntu 14.04.4 LTS (GNU/Linux 4.2.0-27-generic i686)

* Documentation:  https://help.ubuntu.com/

System information as of Mon May  9 16:17:19 IST 2016

System load:  0.68               Processes:            73
Usage of /:   13.7% of 7.26GB    Users logged in:     0
Memory usage: 8%                IP address for eth0: 10.0.2.15
Swap usage:   0%

Graph this data and manage this system at:
https://landscape.canonical.com/

51 packages can be updated.
38 updates are security updates.

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

alex@Alex:~$
```

Installation of the apache2 server

To install the Apache2 web server the command line **sudo apt-get install apache2** must be used in the user directory as shown below:

```
alex@Alex:~$ sudo apt-get install apache2
```

The program will ask for the password of the current account logged in, input it. After the password, the program will ask if you want to continue given the increase of the size of the hard drive as shown below, answer "yes":

```
The following NEW packages will be installed:
  apache2 apache2-bin apache2-data libapr1 libaprutil1 libaprutil1-dbd-sqlite3
  libaprutil1-ldap ssl-cert
0 upgraded, 8 newly installed, 0 to remove and 49 not upgraded.
Need to get 1,269 kB of archives.
After this operation, 5,057 kB of additional disk space will be used.
Do you want to continue? [Y/n]
```

Final screen after installation:

```
* Starting web server apache2
AH00558: apache2: Could not reliably determine the server's fully qualified domain
name, using 127.0.1.1. Set the 'ServerName' directive globally to suppress this
message
*
Setting up ssl-cert (1.0.33) ...
Processing triggers for libc-bin (2.19-0ubuntu6.7) ...
Processing triggers for ureadahead (0.100.0-16) ...
Processing triggers for ufw (0.34~rc-0ubuntu2) ...
alex@Alex:~$
```

Virtual server specification

Operating System:	Ubuntu 14.0.4 (x64)
Web server:	Apache2
Hostname:	Alex
Hard drive size:	8GB
RAM size:	512 MB
IP Address:	10.0.2.15

Creating account and setting priority

To create the new accounts, the root directory needs to be accessed by using the **cd /** command after the **sudo adduser <name of the account>** command is used to generate the accounts and press enter. Type a password for the new account and press enter, confirm the password and press enter, then enter the full name of the user. All the other fields are optional and do not need to be filled and can be skipped by pressing enter. Finally, the system asks if the information inputted are correct if so press y and enter.

Creating the Sysclass account:

```
alex@Alex:/$ sudo adduser sysclass
Adding user 'sysclass' ...
Adding new group 'sysclass' (1001) ...
Adding new user 'sysclass' (1001) with group 'sysclass' ...
Creating home directory '/home/sysclass' ...
Copying files from '/etc/skel' ...
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
Changing the user information for sysclass
Enter the new value, or press ENTER for the default
  Full Name []: SysClass
  Room Number []: 123
  Work Phone []: 123
  Home Phone []: 123
  Other []: 123
Is the information correct? [Y/n]
```

Creating the Guest account:

```
alex@Alex:/$ sudo adduser guest
Adding user `guest' ...
Adding new group `guest' (1002) ...
Adding new user `guest' (1002) with group `guest' ...
Creating home directory `/home/guest' ...
Copying files from `/etc/skel' ...
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
Changing the user information for guest
Enter the new value, or press ENTER for the default
    Full Name []: Guest
    Room Number []: 123
    Work Phone []: 123
    Home Phone []: 123
    Other []: 123
Is the information correct? [Y/n] y
```

Giving permission to the different users using the commands **sudo chown -R sysclass /var/www/html** and **sudo chmod -R 755 /var/www/html**. The first command change the ownership from the alex account to the SysClass account, it can only be run in the account with the actual ownership and after it is inputted the password of the owner will be asked. The second command set the permission through a binary system represented by the 755 (the first 7 give the right to write execute and read the files to the SysClass account, the first 5 give the right to read the files to the other accounts and the second 5 gives a read permission for the other people):

```
alex@Alex:/$ sudo chown -R sysclass /var/www/html
[sudo] password for alex:
alex@Alex:/$ sudo chmod -R 755 /var/www/html
```

Accounts information:

Usernames	Passwords	Permissions
alex	123	Read, write and execute
sysclass	123	Read
guest	123	Read

Email generation code and scheduling

To generate a shell file, enter the command **sudo nano <name of file>.sh** and type enter then give password of the account currently logged in:

```
alex@Alex:/$ sudo nano severSpec.sh
[sudo] password for alex:
```

This screen will appear and you will be able to input the command that you want your file to execute:



To obtain the details concerning the server name, the size of the RAM, the IP address, the server uptime and to generate the automated email containing those information, this code has been written:

```
#get the name of the server
( echo -n -"Hostname:" && hostname

#get the size of RAM
grep MemTotal /proc/meminfo

#get the IP address
echo -n "-IP Address:" && hostname -I

#Server uptime
echo -n "-Uptime:" && uptime) >mySeverSpec.txt

# Send email to systecsubmission@gmail.com
sendEmail -o tls=yes -f alex.acquier@gmail.com -t alex.acquier@gmail.com -u "Sc$
-u "Scheduled Email for system network" -m "Find the linux VM spec in the atta$
e attached document" -a mySeverSpec.txt -s smtp.gmail.com:587 -xu sysclass201$
s2016@gmail.com -xp systems2016
```

The `echo -n` allows the program to append the text file with string part (part in the double quote marks) without to come back at the start of a new line afterward. The `&&` allows the program to interpreted the next keyword as an action to be undertaken instead of a file path. The keyword `hostname` fetches the server name, the keyword `hostname -I` fetches the server IP address and the keyword `uptime` fetches the server uptime. The `grep` keyword allows to fetch the totality of the text line situated in the `proc/meminfo` file path starting by `MemTotal`. All the information needed to be fetch are in parentheses which allows each of the values to be fetch and the string to be created.

The `>mySeverSpec.txt` placed after the parentheses allows the creation of text file to store the information previously stated in this document.

The last line is the one dealing with sending the automated emails, the `sendEmail` keyword references the command line SMTP email client, the `-o tls=yes` tells the Google server (smtp) to use ssl. The `-f` followed by the email address tells from which address it is send from where the `-t` followed by the email address tells from which address it is send to. The `-u "Scheduled Email for system and network"` generate the subject of the email, the `-m "Find the Linux VM spec in the attached document"` generate the body of text of the Email. The `-a mySeverSpec.txt` tells which document to attach to the email and `-s smtp.gmail.com:587` tells which smtp server and which port to use. The `-xu sysclass2016@gmail.com` is the account username for the smtp authentication and the `-xp systems2016` is the password for the smtp authentication.

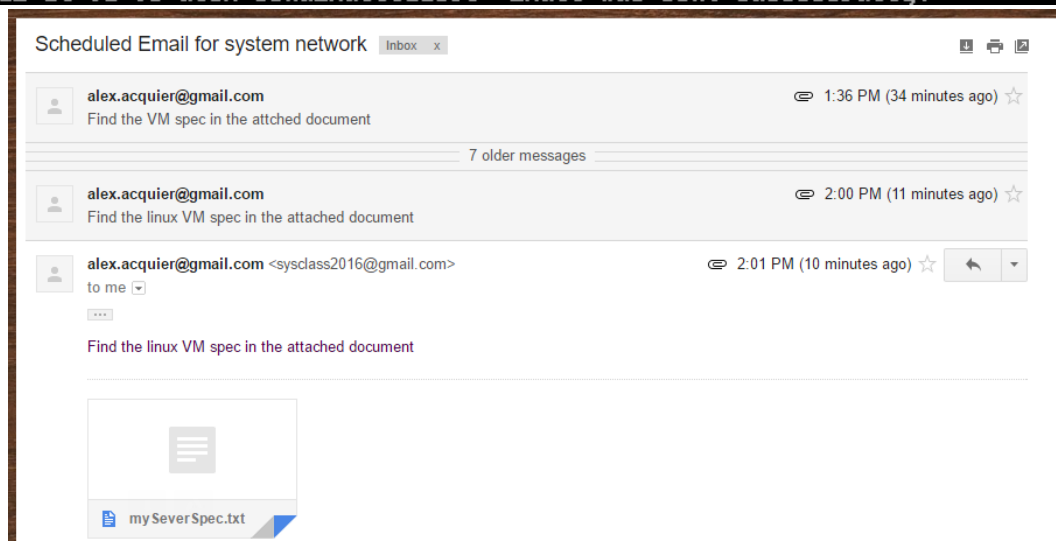
To generate the e-mails, two packages need to be installed by using the two command lines **sudo apt-get install sendmail** and **sudo apt-get install libio-socket-ssl-perl** as shown below. When prompt if you want to continue answer yes.

```
alex@Alex:/$ sudo apt-get install sendmail
```

```
alex@Alex:/$ sudo apt-get install libio-socket-ssl-perl
```

The code was tested by running it using the **sudo bash severSpec.sh** command line and it yielded the results shown below:

```
alex@Alex:/$ sudo bash severSpec.sh
May 12 14:01:06 alex sendEmail[1139]: Email was sent successfully!
```



```
-Hostname:Alex
MemTotal:      506128 kB
-IP Address:10.0.2.15
-Uptime: 14:01:05 up 6 min,  1 user,  load average: 0.01, 0.08, 0.05
```

To generate the schedule, the command **sudo crontab -e** should be used and should show as below. The last line is where you set the schedule by inputting different values space separated. The first number represents the minutes, the second represents the hours, the third represents the day of the month, the fourth represents month of the year, the fifth represents the day of the week and finally the last part tells the schedule which command to execute.

```
# Edit this file to introduce tasks to be run by cron.
#
# Each task to run has to be defined through a single line
# indicating with different fields when the task will be run
# and what command to run for the task
#
# To define the time you can provide concrete values for
# minute (m), hour (h), day of month (dom), month (mon),
# and day of week (dow) or use '*' in these fields (for 'any').#
# Notice that tasks will be started based on the cron's system
# daemon's notion of time and timezones.
#
# Output of the crontab jobs (including errors) is sent through
# email to the user the crontab file belongs to (unless redirected).
#
# For example, you can run a backup of all your user accounts
# at 5 a.m every week with:
# 0 5 * * 1 tar -zcf /var/backups/home.tgz /home/
#
# For more information see the manual pages of crontab(5) and cron(8)
#
# m h dom mon dow  command
09 15 12 05 4  /severSpec.sh

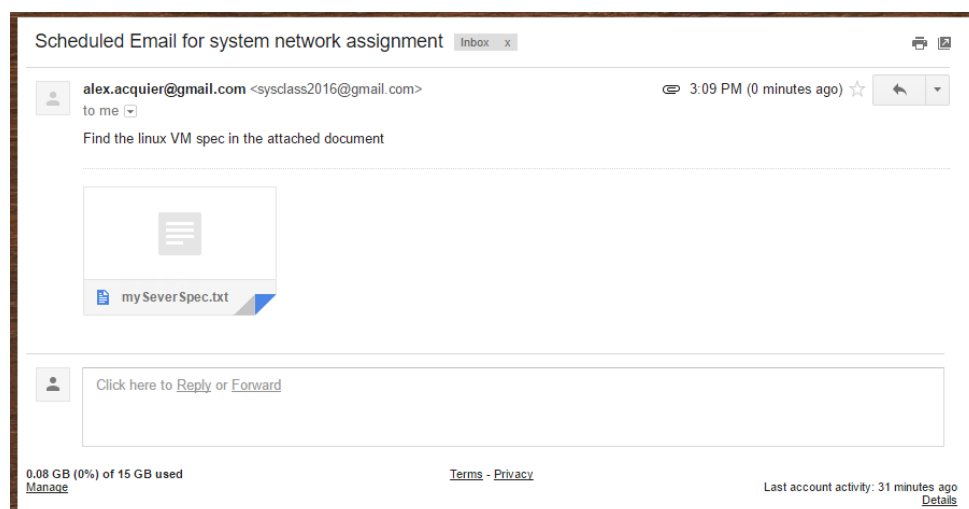
[ Wrote 23 lines ]

crontab: installing new crontab
```

To insure that the scheduled task is executed, the command **sudo chmod +x /<name of the file>.sh** should be run:

```
alex@Alex:/$ sudo chmod +x /severSpec.sh
```

This is the result of the test shown above:



Find below the schedule established for the project:

```
# m h dom mon dow  command
00 08 * * *  /severSpec.sh
```

[Wrote 23 lines]

```
crontab: installing new crontab
alex@Alex:/$ sudo chmod +x /severSpec.sh
```