Activity 3 : Linux

Group No : 25

Group Member :

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4. Name Surname

Part 0 : Preparation

0.1 Install a secure shell client program

You'll need a **secure shell (ssh)** remote client program to access your Linux system, which we have prepared for you, one system per group.

For Mac OS and Linux users, you probably have **ssh** installed, usually by default, so open your "terminal" and type "ssh" and hit enter to see if the command is already installed, if not, try to google the way out !

For Windows users, though it is possible to install a vanilla **ssh** on your system, but for the purpose of this activity it is a bit overkill and would take too much time to complete. We suggest using **putty** which can be downloaded from here http://www.putty.org/

0.2 Retrieve your credential and access your system

We provided each group with a Linux machine on the cloud. The ip address of your group's machine as well as the"root" username/password (root credential) is available in myCourseVille.

- * DO THIS * Use this credential to remote access into the system (using **ssh** or **putty**).

* ANSWER THIS * After a successful login, read the information on the screen. What is **the name of Linux distribution and its version** you are using right now ?

```
Ubuntu 21.10 (GNU/Linux 5.13.0-25-generic x86_64)
```

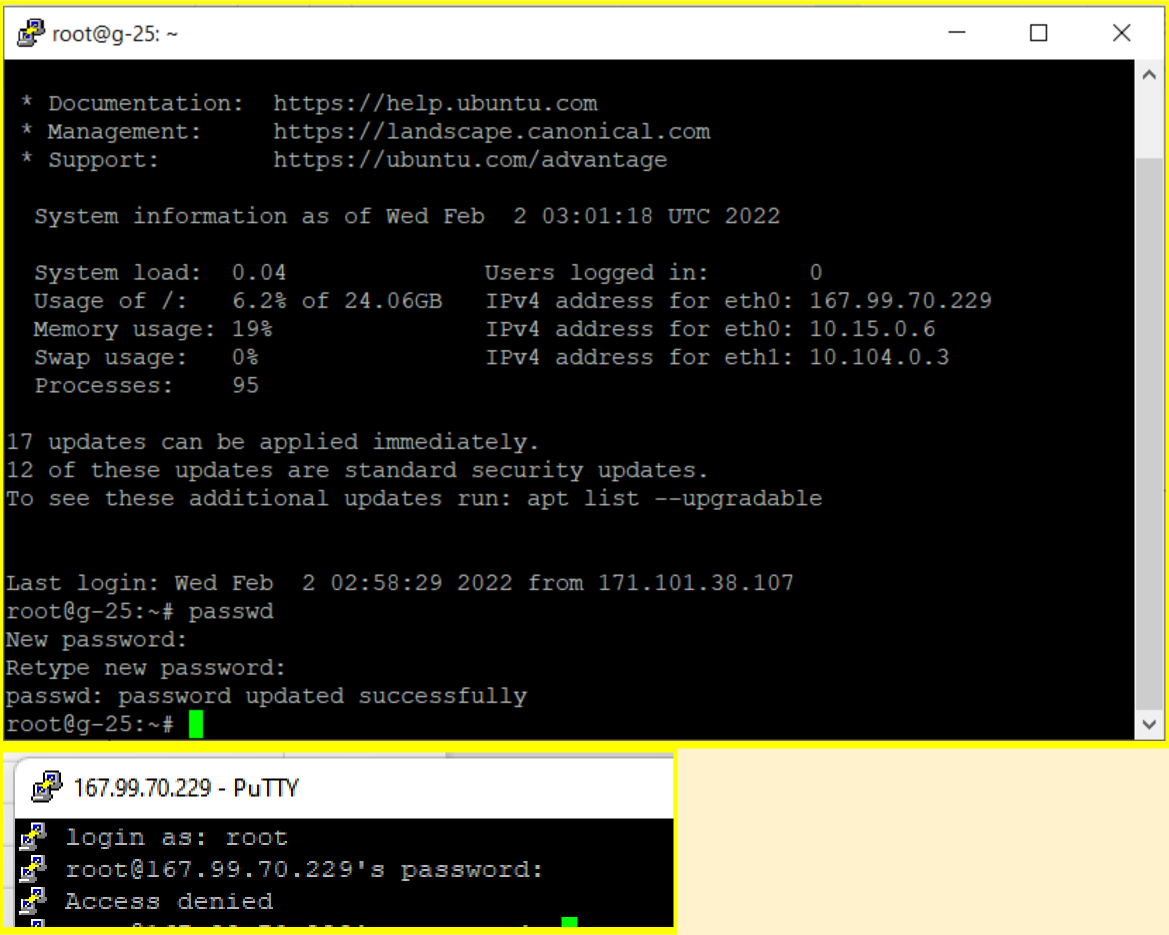
0.3 Change the root password

As a general practice in administering a Linux server, right after the first login, you should change the root password.

- * DO THIS * Use `passwd` to change the root password.

Caution: You should know that the root password cannot be recovered by any means. If you lose your root password, you lose your linux system. Please contact TA for creating a new system, but for each time we create a new system for you, you will lose 0.25 point as a penalty.

* ANSWER THIS * Capture your screen to show that the original root password no longer works.



```
 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

  System information as of Wed Feb  2 03:01:18 UTC 2022

  System load:  0.04              Users logged in:       0
  Usage of /:   6.2% of 24.06GB   IPv4 address for eth0: 167.99.70.229
  Memory usage: 19%               IPv4 address for eth0: 10.15.0.6
  Swap usage:   0%                IPv4 address for eth1: 10.104.0.3
  Processes:    95

17 updates can be applied immediately.
12 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable


Last login: Wed Feb  2 02:58:29 2022 from 171.101.38.107
root@g-25:~# passwd
New password:
Retype new password:
passwd: password updated successfully
root@g-25:~#
```

```
login as: root
root@167.99.70.229's password:
Access denied
```

Part 1 : Linux command line

Hopefully, you have successfully logged in with the “root” account of your system, which is hosted in Singapore. You see that using **ssh** you do not need to be close to your system, you can “remote” from afar.

Now, you should see a black window with a **green** cursor inside by which you can type some commands and make this Linux system do things.

1.1 Basic Linux commands

Here are some commands you can try, so do try and see the results for yourself.

Command	Description
ls **options:** ls -l ls -a ls -al	List files in the current directory. Usually, when you just logged in your current directory is your “home directory”. **-l** stands for “long” this command will list files in a longer format. **-a** stands for “all” this command will list all files including hidden ones. **-al** shows how you can combine options together, this is the same as **-a -l**.
pwd	Print the path of the current directory.
cd [PATH]	Change current directory to [PATH] **e.g.** cd Documents, change the current directory to Documents **try:** - cd .. - cd / - cd /root - cd ~ (change to home directory)
clear	Clear the display of the terminal
man [COMMAND]	View the manual of the [COMMAND] to learn how to use it **e.g.** man ls
echo [STRING]	Print [STRING] as the program output. **e.g.** echo “Hello World!”

cp [SOURCE] [TARGET] **options:** cp -r [SRCDIR] [TARGETDIR]	Copy a given [SOURCE] file to [TARGET] file.
mv [SOURCE] [DESTINATION]	Move a file [SOURCE] to [TARGET], can also be used to rename a file.
rm [FILE] **options:** rm -rf [FILE | DIRECTORY]	Remove a file [FILE]. **caution:** rm -rf / or rm -rf /* will remove everything from the computer (refrain yourself from using it) which are different from rm -rf * that removes everything only within the current directory.
mkdir [NAME] **options:** mkdir -p [PATH]	Make directory (folder) [NAME] **try:** mkdir ~/newdir
rmdir [NAME]	Remove directory [NAME] (the directory to be removed should be empty)
cat [FILE]	Print the content in [FILE] as an output, keep in mind that [FILE] should contain only texts.

1.2 I/O redirection

In Linux systems, any program has 3 basic I/Os:

1. **standard input**, you can think of it as a keyboard.
2. **standard output**, you can think of it as a display monitor.
3. **standard error**, normally it shares the same output channel as **standard output**, but technically you can separate them.

In a nutshell, I/O redirection lets you "connect" standard input and/or output and/or error to some other sources and targets. For example, you want your program to get input not from a keyboard but from a text file, and instead of outputting to a display but to a file.

Command Pattern	**Description**
[COMMAND] > [OUTPUT FILE]	Redirect the standard output of the [COMMAND] to replace [OUTPUT FILE]
[COMMAND] >> [OUTPUT FILE]	Redirect the standard output of the [COMMAND] to append to [OUTPUT FILE]

[COMMAND] < [INPUT FILE]	Use [INPUT FILE] as a standard input for [COMMAND]
[COMMAND1] | [COMMAND2]	Redirect the standard output of [COMMAND1] to be the standard input of [COMMAND2] In Linux, "|" is also known as "pipe" operation **e.g.** ls | sort will display the content from ls command in lexicographical order. **Caution:** "|" sign is on the "ฃ" key on keyboard.

You can create a file with contents in it using redirection in this way:

```
echo "hello world!" > output.txt
```

* ANSWER THIS * What is the content of **output.txt** now? (hint: read again the command list above)

```
hello world!
```

* ANSWER THIS * What is the content of **output.txt** after `ls --eiei > output.txt`, which should produce an error because there is no option **--eiei** ?

```
ls: unrecognized option '--eiei'
```

If you want to redirect only the standard error to a file (but print output normally to a display):

```
[COMMAND] 2> error.txt
[COMMAND] 2>> error.txt
```

2 is the number for standard error, **1** is the number for standard output.

If you want to redirect everything, both standard input and output, to a file you need to:

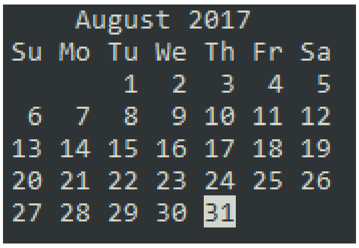
```
[COMMAND] > output.txt 2>&1
```

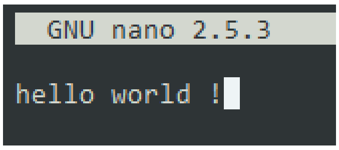
2>&1 specifies that first redirect standard error to standard output, **&1** means standard output (using 2>1 means redirect to a file named “1”).

1.3 Command line applications

Despite using a command line interface, there are many things we can do with applications. By default of our Ubuntu system, these following applications are built-in:

Command	Description

`cal`	Show a calendar.
	
	`     August 2017`
	`Su Mo Tu We Th Fr Sa`
	`       1  2  3  4  5`
	` 6  7  8  9 10 11 12`
	`13 14 15 16 17 18 19`
	`20 21 22 23 24 25 26`
	`27 28 29 30 31`

`nano [FILE]`	Open a text editor “nano” to edit a file [FILE].
	Note: ^ is ctrl.
	
	`  GNU nano 2.5.3`
	`hello world !`

Create a new file using **nano** with your name as its content, save the file in your home directory (~), name it as you desire.

* ANSWER THIS * Explain how do you save the file and quit the program:

1. Use “nano newFile.txt” command to create new file.
2. Type its content as you wish.
3. To exit, press Ctrl + X.
4. nano will ask if you want to save the content or not
    a. Press Y to confirm that you want to save.
5. nano will ask about the file’s name
    a. Press Enter to confirm the file’s name.
    b. After that you will quit the program automatically.

1.4 Installing an application

In Ubuntu, it has a default package manager called “apt-get” which is commonly used to install applications. On installing, it finds an application name from its repositories, and then downloads and installs it. However, once in a while, you should update the repositories to make sure that you have the latest list. Using the following commands:

```
apt-get update
```

Most installation problems can be solved simply by re-executing the above command.

Now, we can install an application using:

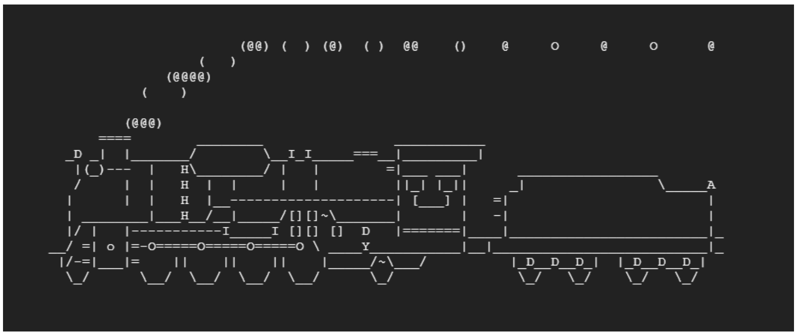
```
apt-get install [APPLICATION]
```

*Note: Not everyone can install an application ! You just happen to be the root user of this system. Later on you will learn to create a normal user which cannot install an application.

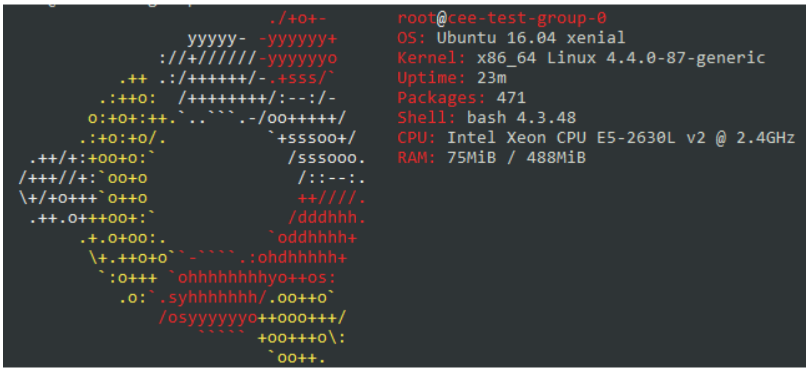
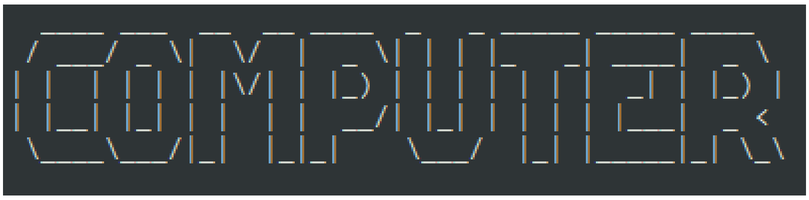
Note: “apt-get” is a package manager for Ubuntu. You should not assume that this command is available on every Linux machine.

* DO THIS * Here are some cool apps, please go ahead install and try:

Application	**Description**

`sl`	`A train animation.`
	`Ex: sl`
	

`screenfetch`	`Display the system information`
	`Ex:` `screenfetch`

<table>
<tr><th></th><th></th></tr>
<tr><td></td><td>
<pre>
                          ./+o+-   root@cee-test-group-0
                  yyyyy- -yyyyyy+   OS: Ubuntu 16.04 xenial
               ://+//////-yyyyyyo   Kernel: x86_64 Linux 4.4.0-87-generic
           .++ .:/++++++/-.+sss/`   Uptime: 23m
         .:++o: /++++++++/:--:/-   Packages: 471
        o:+o+:++.`..```.-/oo+++++/   Shell: bash 4.3.48
       .:+o:+o/.   `+sssoo+/   CPU: Intel Xeon CPU E5-2630L v2 @ 2.4GHz
  .++/+:+oo+o:`   /sssooo.   RAM: 75MiB / 488MiB
 /+++//+:`oo+o   /::--:.
 +/+o+++`o++o   ++////.
  .++.o+++oo+:`   /dddhhh.
       .+.o+oo:.   `oddhhhh+
        +.++o+o``-````.:ohdhhhhh+
         `:o+++ `ohhhhhhhhyo++os:
           .o:`.syhhhhhhh/.oo++o`
               /osyyyyyyo++ooo+++/
                   ````` +oo+++o\:
                          `oo++.
</pre></td></tr>
<tr><td>figlet</td><td>Display a word as a figure<br><b>Ex:</b> figlet “COMPUTER”<br>
<pre>
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</pre></td></tr>
<tr><td>worm</td><td>A game (snake)<br>To install this application, use <code>apt-get install bsdgames</code><br><b>Ex:</b> worm</td></tr>
</table>

In case you have problems “quitting” an application, try using **ctrl + c** first, it works in most cases. Basically, ctrl + c will trigger SIGINT (interrupt signal) which usually causes a process to terminate.

* ANSWER THIS * Capture the screens to show which apps you tried.

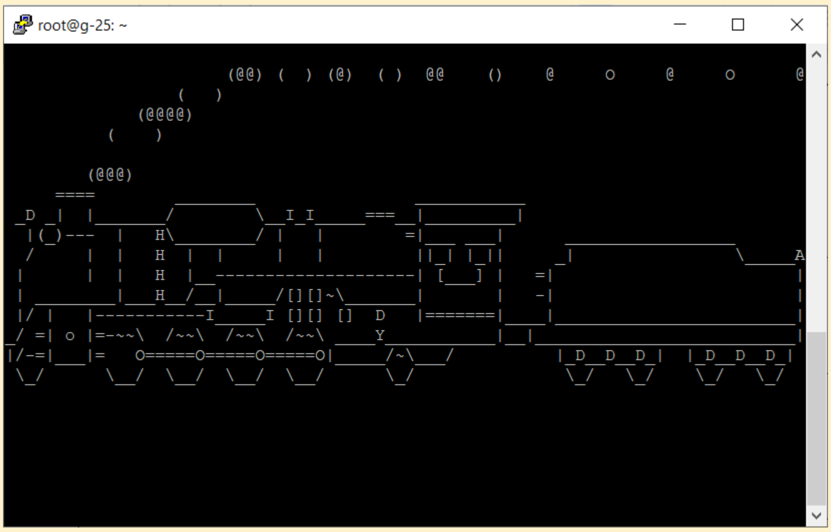

root@g-25: ~

```
                      (@@) (  ) (@)  ( )  @@    ()    @     O     @     O      @
                 (   )
             (@@@@)
          (    )

        (@@@)
     ====        ________                ___________
 _D _|  |_______/        \__I_I_____===__|_________|
  |(_)---  |   H\________/ |   |        =|___ ___|       _________________
  /     |  |   H  |  |     |   |         ||_| |_||      _|                \_____A
 |      |  |   H  |__--------------------| [___] |    =|                        |
 | ________|___H__/__|_____/[][]~\_______|       |    -|                        |
 |/ |   |-----------I_____I [][] []  D   |=======|__ __|________________________|
_/ =| o |=-~~\  /~~\  /~~\  /~~\ ____Y___________|__ |__________________________|
|/-=|___|=   O=====O=====O=====O|_____/~\___/           |_D__D__D_|  |_D__D__D_|
 \_/      \__/  \__/  \__/  \__/      \_/                \_/   \_/    \_/   \_/
```
                   `````

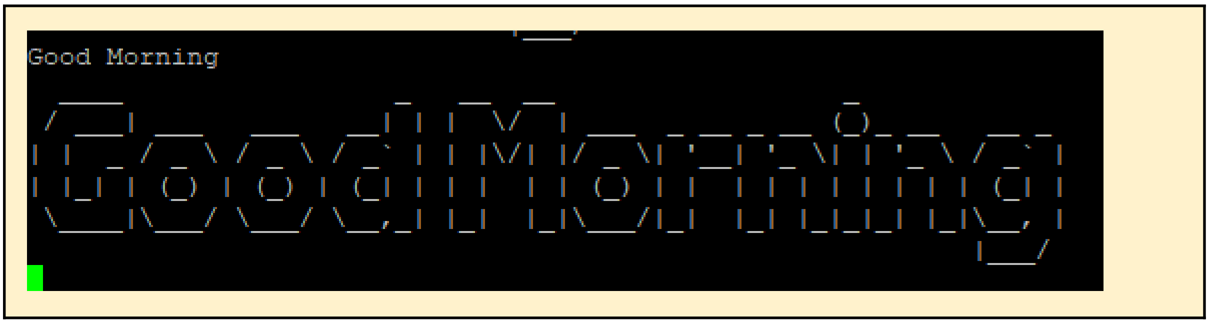

```
                             |___/
Good Morning

  ____                 _ __  __                  _
 / ___| ___   ___   __| |  \/  | ___  _ __ _ __ (_)_ __   __ _
| |  _ / _ \ / _ \ / _` | |\/| |/ _ \| '__| '_ \| | '_ \ / _` |
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```