Birla Institute of Technology & Science, Pilani, Hyderabad Campus

Second Semester 2020-2021

Computer Programming [CS F111]

Lab 2: 1) Setting up Linux subsystem in Windows.

2) Working with an online Linux emulator.

3) Learn Basic Linux Commands.

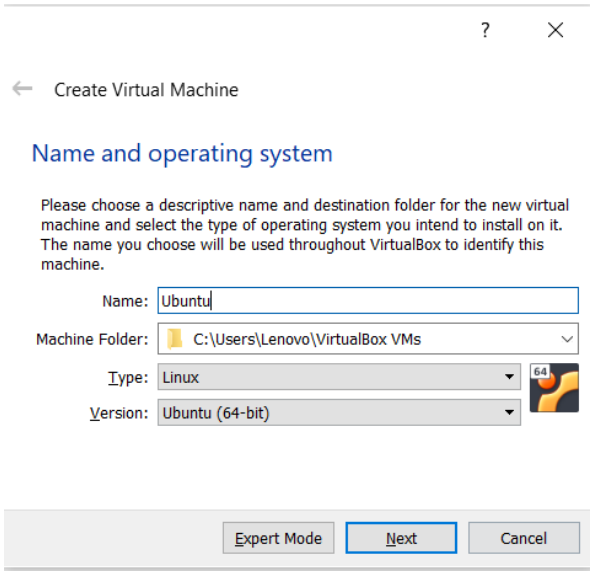
4) View the hardware details using the command line.

5) Introduction to the Vim editor.

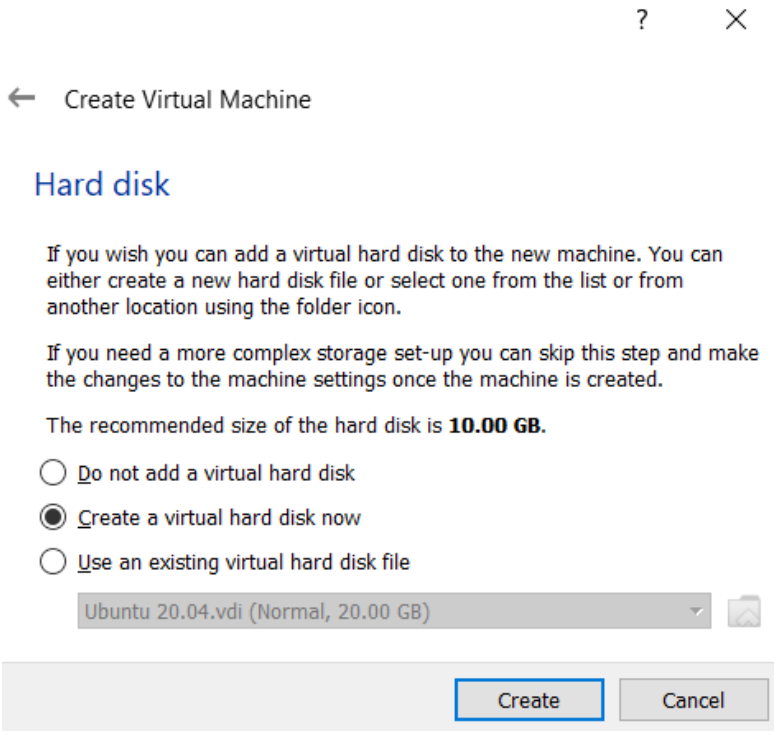
1) Setting up Linux in your Machine using VirtualBox

In this lab, we will learn how to install Linux using VirtualBox.

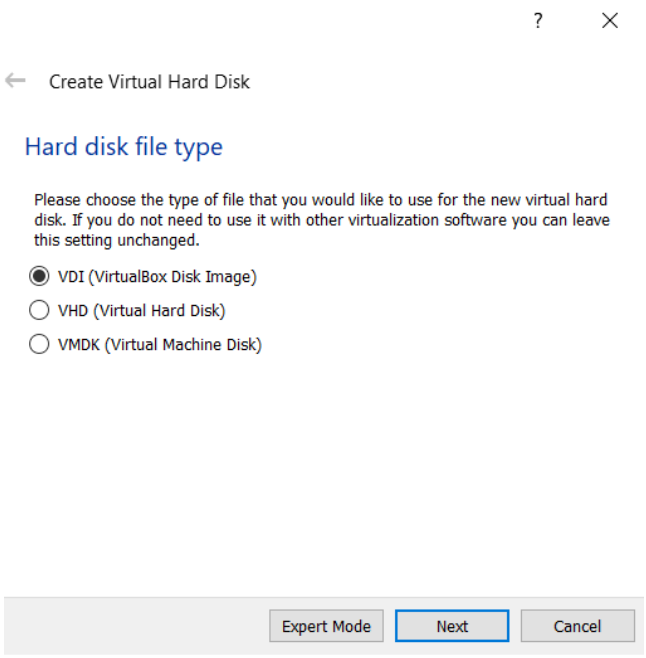
1. Download Virtualbox from the official website. Download the latest version of the virtual Machine for your respective OS type. Install the same by running the .exe file
2. Now, we need to load LINUX iso onto the Virtualbox application. Download the latest version of Ubuntu iso file(currently 20.04 LTS).
3. Open Virtualbox, and click on the New symbol. Give the name as ‘Ubuntu’ to the virtual machine. Virtualbox automatically fills in the Type and Version. Click Next



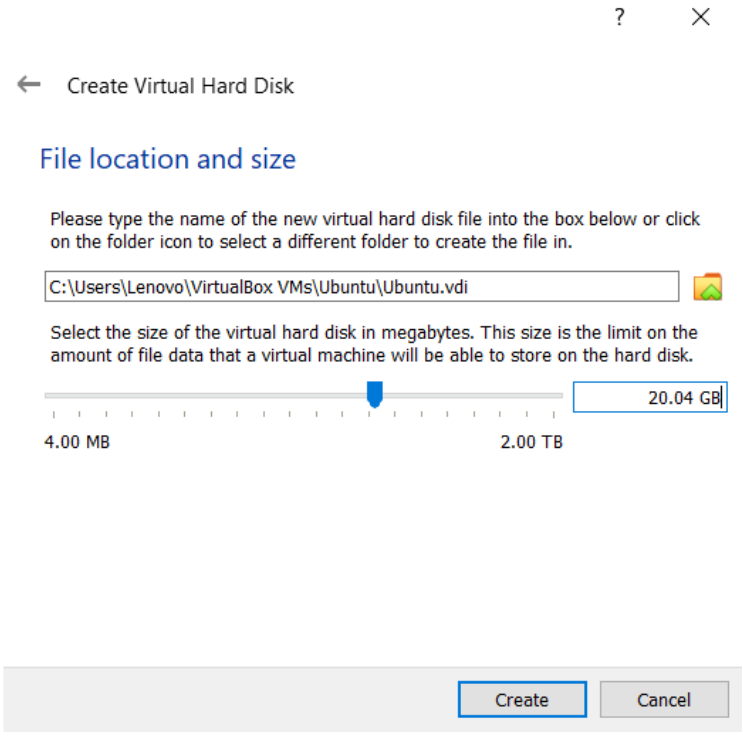
4. Allocate RAM to the virtual OS. Try to give atleast 2-3 GB for smooth performance.
5. For the next step, Create a virtual disk that serves as the hard disk of the virtual Linux system. Click on Create.



6. Choose VDI and then Next.

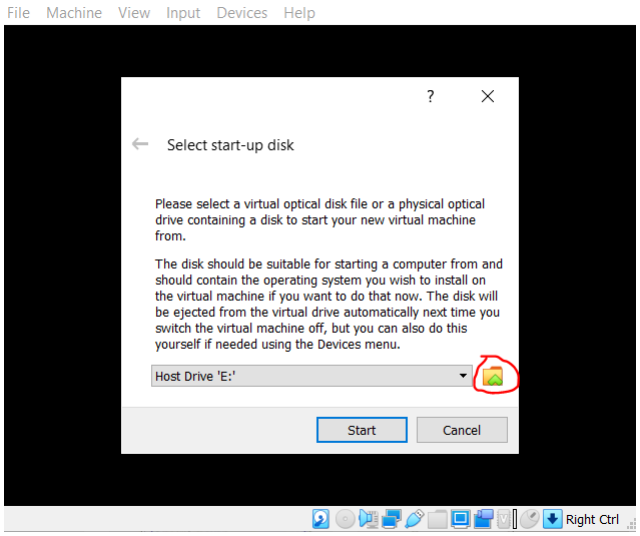


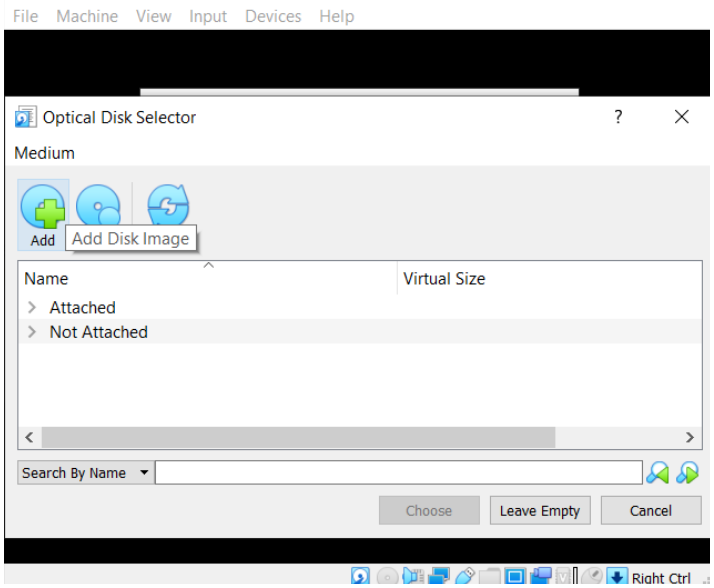
7. You can choose either the “Dynamically allocated” or the “Fixed size” option for creating the virtual hard disk.
8. Provide at least 10 GB of hard disk space. Click on create



9. Now, we need to boot the ISO and install Linux as a virtual operating system. Select the newly created VM and click Start to boot the machine.

10. The machine asks for a Start-up disk. If VirtualBox doesn't detect the Linux ISO, browse to its location by clicking the folder icon and adding it.

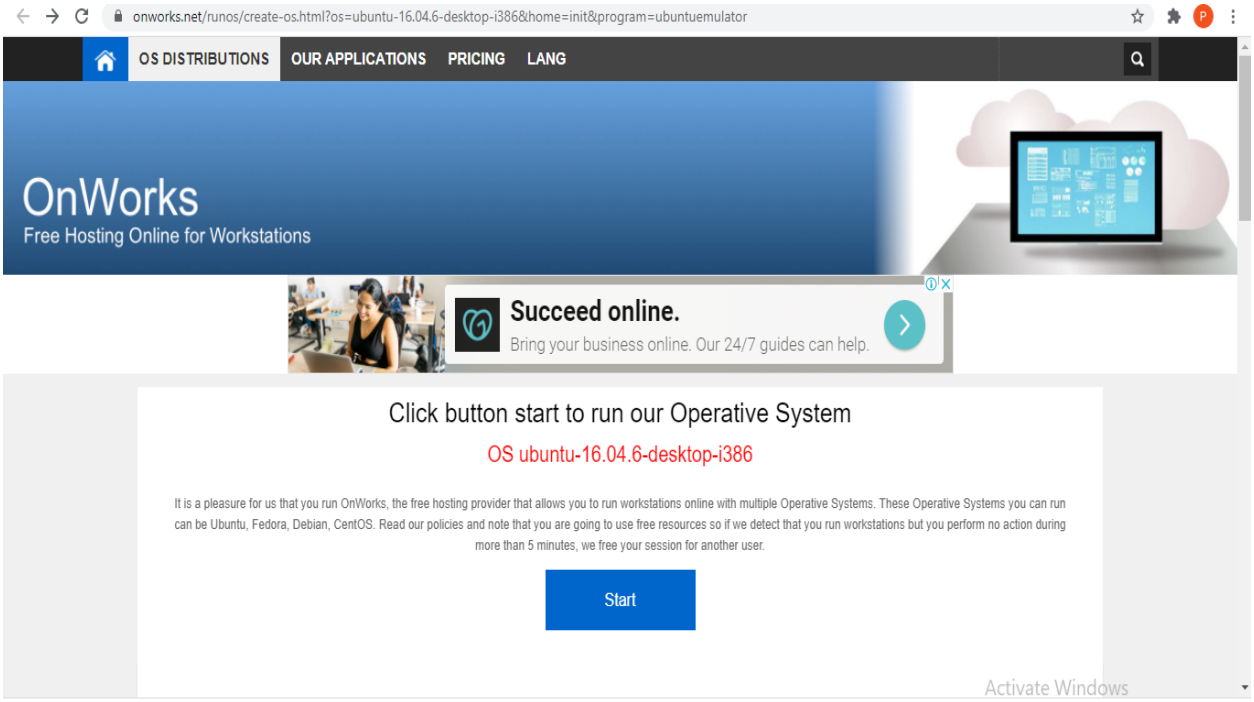




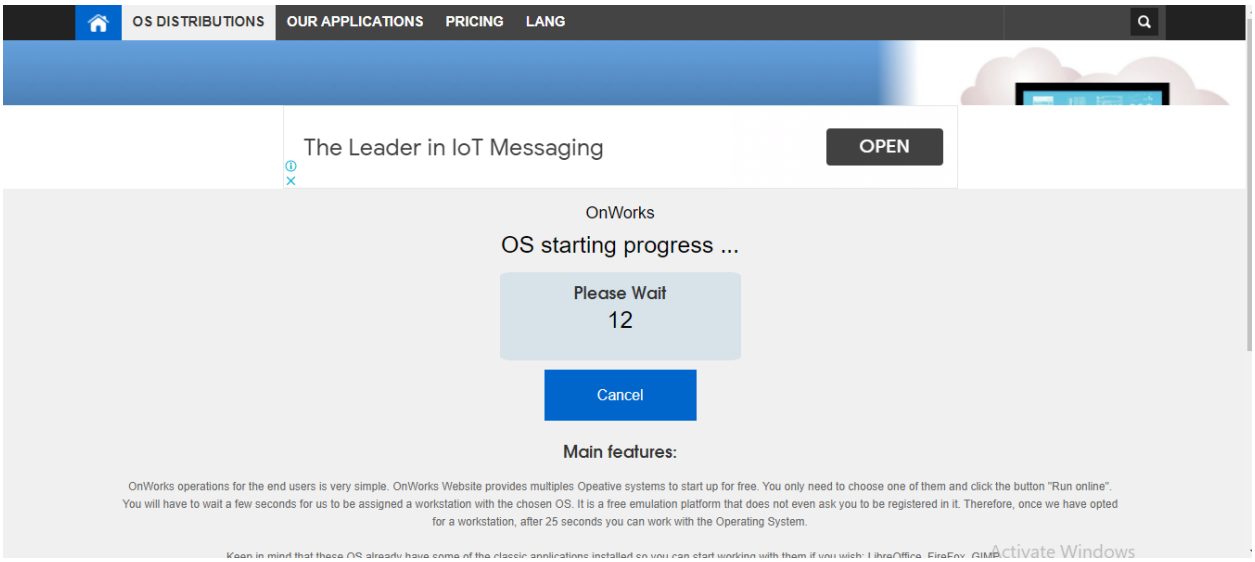
11. Let Linux load. Soon you'll be prompted to install Linux. Click on it.
12. Check the options you want to keep or simply skip to Continue.
13. Now, Select 'Erase disk and install Ubuntu'. It **won't delete** anything on your Operating system and click Continue.
14. Next, fill in the details according to your location and preferred keyboard layout.
15. Set a password that you remember (Linux needs authentication to run certain commands).
16. You are all set. It takes 5-10 minutes to complete the installation. Restart once it's done.

2) Working with online Linux emulator

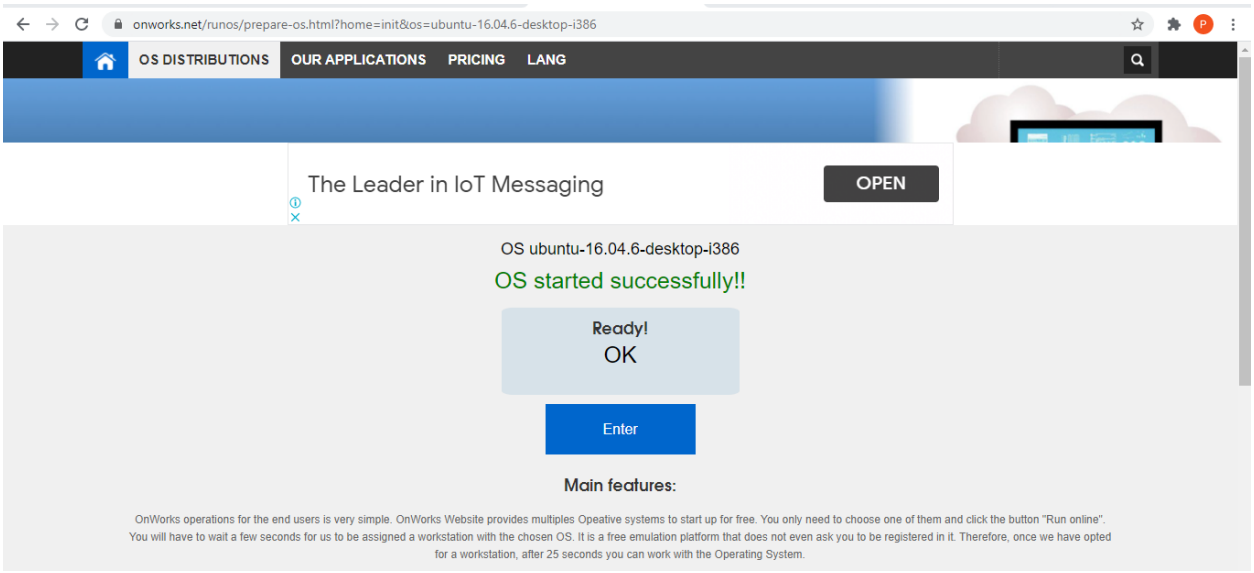
1. Go to below link https://www.onworks.net/programs/ubuntu-emulator-online



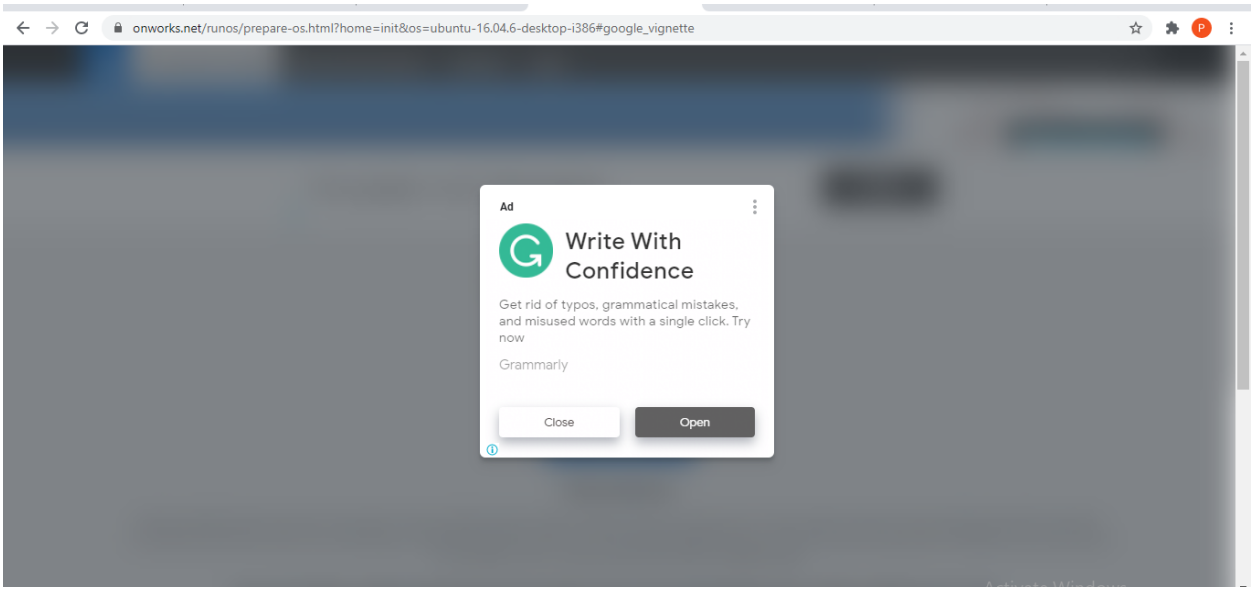
2. Click on the Start button



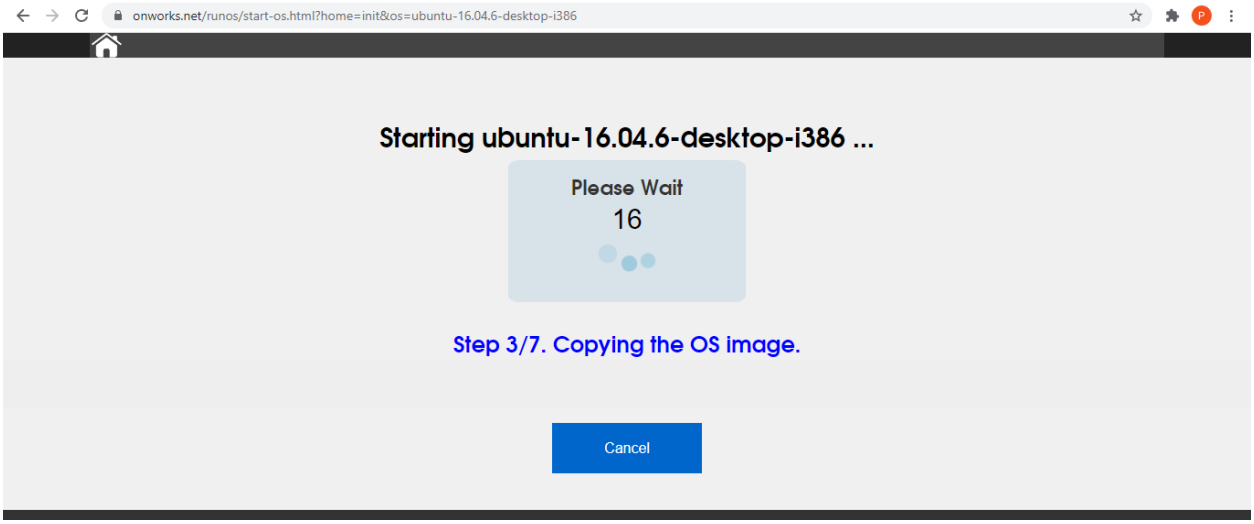
3. After waiting time you will get the following screen



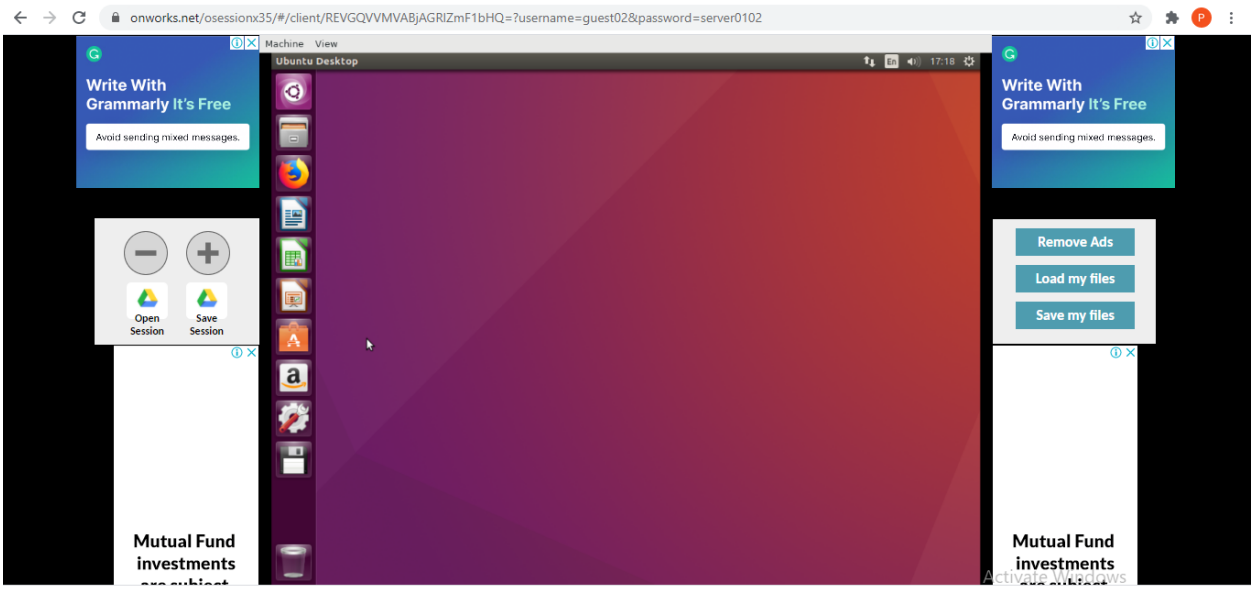
4. Click on the Enter button. Sometimes you may get the following windows just click on the close button.



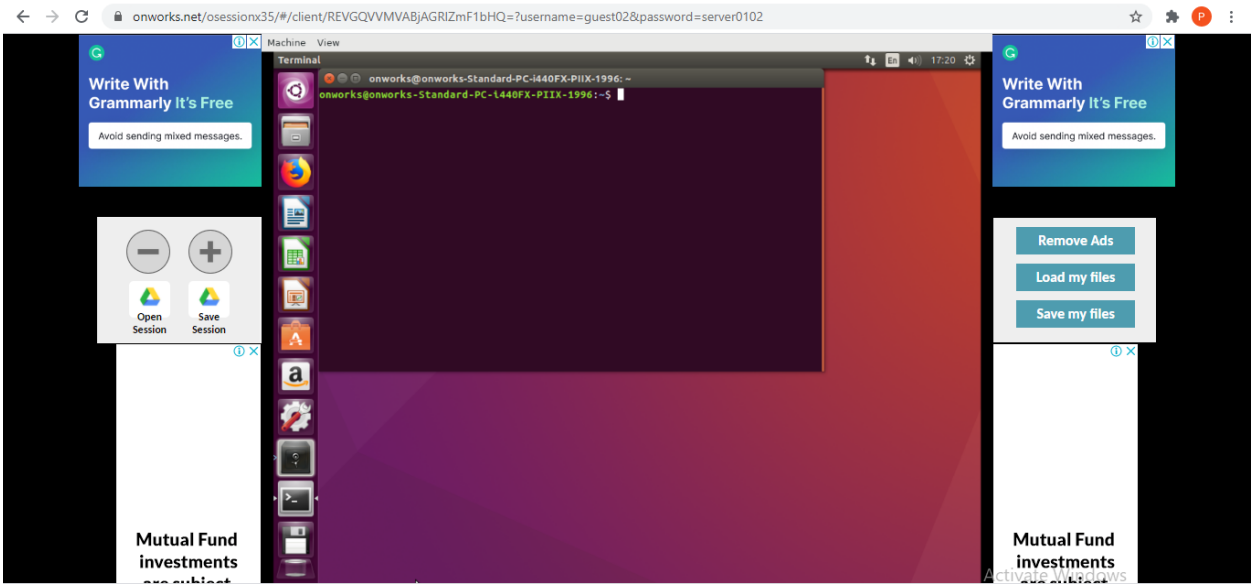
5. Now the os is going to start please wait for a moment.



6. Once os is loaded its look like below.



7. You can open the applications of ubuntu



8. The password for any user is **123456**

3) Basic LINUX commands

Command	Example	Description
ls	ls ls -al	Lists files in current directory List in long format
cd	cd tempdir cd .. cd ~dhyatt/web-docs	Change directory to tempdir Move back one directory Move into dhyatt's web-docs directory
mkdir	mkdir graphics	Make a directory called graphics
rmdir	rmdir emptydir	Removes empty directory
cp	cp file1 web-docs cp file1 file1.bak	Copy file1 into directory Make backup of file1
rm	rm file1.bak rm *.tmp	Remove or delete file Remove all file ending with .tmp
mv	mv old.html new.html	Move or rename files
more	more index.html	Look at file, one page at a time
lpr	lpr index.html	Send file to printer

man	man ls	Online manual (help) about command
pwd	pwd	Returns an absolute (full) path
cat	cat q1.c cat > q1.c cat file1 >> file2	View a file's content To create a new file Appends the contents of file 1 onto file 2
echo	echo "String" echo > new.c	Prints String onto console Creates an empty new file
ps	ps	Returns the currently running processes
who	who	Print information about users who are currently logged in.
date	date	Display the current date and time
touch	touch newfile.c	Creates a new file
finger*	finger user	Get details of a user
chmod	chmod u-- file	Change the access mode of a file
kill	kill -l kill pid	Display all the available signals Terminate the process
chown	chown master file1.txt	Change the file Owner
history	history	Returns previously executed commands
cal	cal cal 2019	Shows current month calendar on the terminal Shows the whole calendar of the year
logout	logout	Logs out from the current session
shutdown	shutdown	Shuts the system down

*- need to be installed before using

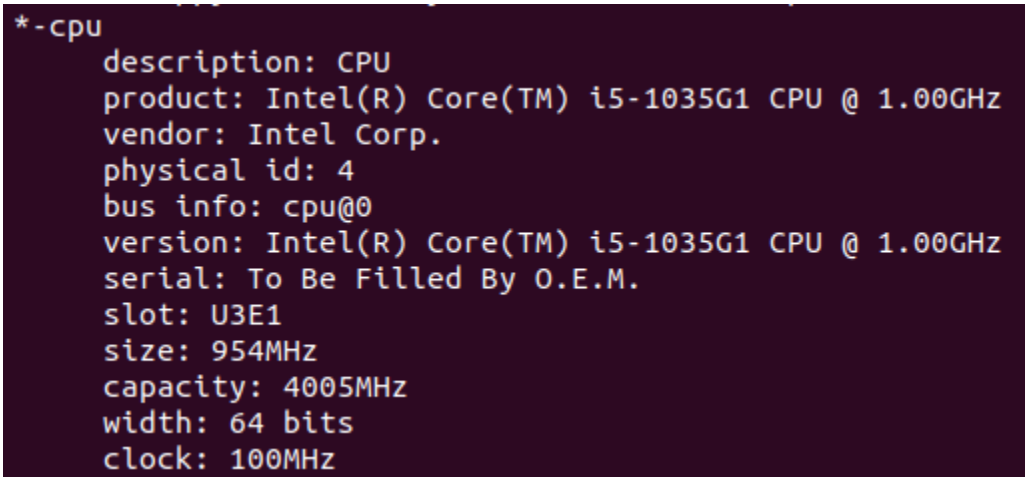
Run `sudo apt install [command]`

4) View the hardware details using the command line.

Execute the command **sudo lshw | less**

Press Enter to scroll through the different hardware components

CPU



CACHE Details

```
*-cache:0
     description: L1 cache
     physical id: 6
     slot: L1 Cache
     size: 128KiB
     capacity: 128KiB
     capabilities: synchronous internal write-back instruction
     configuration: level=1
*-cache:1
     description: L2 cache
     physical id: 7
     slot: L2 Cache
     size: 2MiB
     capacity: 2MiB
     capabilities: synchronous internal write-back unified
     configuration: level=2
*-cache:2
     description: L3 cache
     physical id: 8
     slot: L3 Cache
     size: 6MiB
     capacity: 6MiB
     capabilities: synchronous internal write-back unified
     configuration: level=3
```

Memory

```
*-memory
     description: System Memory
     physical id: 28
     slot: System board or motherboard
     size: 8GiB
   *-bank:0
        description: SODIMM DDR4 Synchronous 2667 MHz (0.4 ns)
        product: M471A1K43DB1-CTD
        vendor: Samsung
        physical id: 0
        serial: 36CF85D6
        slot: Bottom-Slot 1(left)
        size: 8GiB
        width: 64 bits
        clock: 2667MHz (0.4ns)
   *-bank:1
        description: SODIMM DDR Synchronous [empty]
        physical id: 1
        slot: Bottom-Slot 2(right)
```

5) Introduction to the Vim editor.

Introduction to shell

A Unix shell is a **command-line interpreter** or shell that provides a **command line user interface for Unix-like operating systems**. Some of the common shells are the **C** shell, the **Bourne shell** and the **BASH shell**. The BASH shell is the standard in most of the current standard linux distributions. The BASH shell is an extended version of the Bourne shell with additional functionalities.

Introduction to the Vim Editor

The Vim is a versatile and powerful editor designed for the Unix users. If used properly, it does not require the use of a mouse at all. It can be controlled completely using key combinations from the keyboard only. It comes bundled with any Unix/Linux distribution and hence does not require to be installed separately.

The current version of Vim editor has support for several languages, such as, C++, Python, Java etc. that can be incorporated using plugins to facilitate an improved coding environment for a specific language.

Command for opening a file using Vim editor

> **vim <*filename*>.c**

The Vim editor has 3 major modes.

1. The NORMAL mode
2. The INSERT mode
3. The VISUAL mode

NORMAL mode

1. By default, the editor opens in normal mode.
2. You cannot edit in this mode.
3. Navigation through file, searching for a text pattern, replacing a pattern by a text can be done in this mode.
4. Searching for a pattern
    a. press / to start a search.
    b. then type the pattern (\<i\>), then press Enter.
    c. Press **N** to continue searching.
5. To search for the first occurrence of the string ‘foo’ in the current line and replace it with ‘bar’ .
    a. :s/foo/bar/
6. To replace all occurrences of the search pattern in the current line, add the g flag.
    a. :s/foo/bar/g
7. To search and replace the pattern in the entire file, use the percentage character % as a range.
    a. :%s/foo/bar/g

8. If you want to quit press ‘q’ key followed by ENTER

INSERT mode

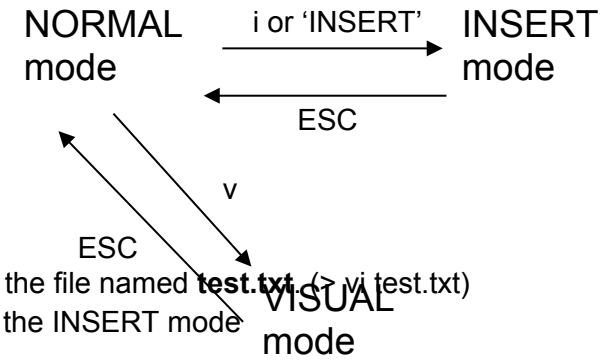
1. This mode can be entered from Normal mode by pressing the ‘I’ or ‘Insert’ key.
2. You may edit a file in this mode.
3. You can switch back to normal mode by pressing the ESC key.
4. After editing, a file can be saved by
    a. switching to the Normal mode by pressing the ESC key.
    b. Type in “:w” and press ENTER.
5. If you want to **quit after saving**
    a. switch to the Normal mode by pressing the ESC key.
    b. Type in “:wq” and press ENTER.
6. If you want to **quit without saving**
    a. switch to the Normal mode by pressing the ESC key.
    b. Type in “:!q” and press ENTER.
7. If you want to search or replace a string
    a. Switch to Normal mode by pressing the ESC key.
    b. Follow the instructions as given in NORMAL mode.

VISUAL mode

The visual mode is primarily meant for copying/cutting a piece of text in vi

To enter the visual mode, you have to press “v” in the normal mode.

1. For copying/cutting a text
    a. In normal mode, navigate to the start of the intended text by arrow keys.
    b. Press ‘v’ to enter the visual mode.
    c. Use the arrow keys to select the part of the text.
    d. Press ‘y’ to copy or ‘d’ to cut the portion of text.
    e. Press ESC to enter the normal mode.
    f. Navigate to the intended position where you wish to paste the text.
    g. Press ‘p’ to paste the text.
    h. Press ‘:q’ followed by ENTER to save.



Task

1. Open the file named **test.txt** (> vi test.txt)
2. Enter the INSERT mode

3. Type in the following piece of text into the file.

   this is my introduction to the vi editor.
   the quick brown fox jumped over the lazy dog.

4. Save the file.
5. Search for the word “**the**” in the file.
6. Replace the word “**the**” by “**The**”.