Date:06-02-2024

EXPERIMENT 1

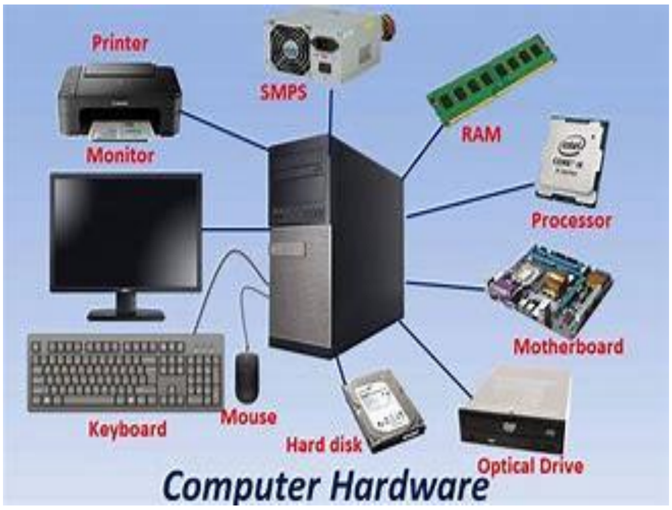
AIM:

Introduction to Computer hardware: Physical identification of major components of a computer system such as mother board, RAM modules, daughter cards, bus slots, SMPS, internal storage devices, interfacing ports. Specifications of desktop and server class computers. Installation of common operating systems for desktop and server use. (Students may be asked to formulate specification for computer to be used as Desktop, Web server).

Introduction to Computer hardware

Computer hardware is a collective term used to describe any of the physical components of an analog or digital computer. The term hardware distinguishes the tangible aspects of a computing device from software, which consists of written, machine-readable instructions or programs that tell physical components what to do and when to execute the instructions.

Computer hardware includes the physical parts of a computer, such as a case, central processing unit(CPU), random access memory (RAM), monitor, mouse, keyboard, computer data storage, graphic cards, sound card, speakers and motherboard which processes the input according to the set of instructions provided to it by the user and gives the desired output.

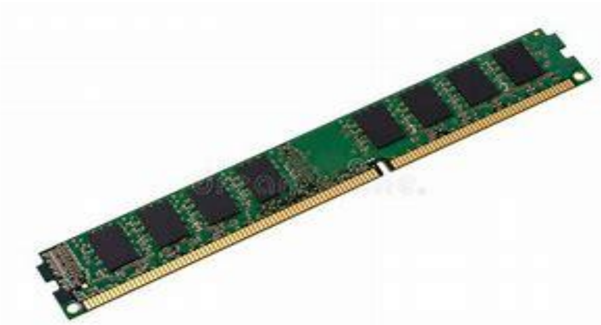


- **Motherboard**

  The motherboard is also referred to as a circuit board for the computer system. It is also called the logic board or the mainboard. In the computer system, the motherboard is the biggest component that controls all the other components of the computer system and bridges a link between all components. Various components such as ROM, CPU, RAM, PCI slots, USB ports, and other components are connected to the motherboard. The controller's devices such as DVD, hard disk, mouse, and keyboard are also connected to the motherboard. The computer system does not start without the motherboard and it acts as the backbone for starting the system.

- **RAM Modules**

  RAM (Random Access Memory) modules in a computer are essential for temporary data storage, allowing the CPU quick access to frequently used information. Different types include DDR4 and DDR5. Match the module type with your motherboard's compatibility. Consider factors like speed (measured in MHz) for optimal performance. Install RAM in pairs or follow the motherboard manual for configuration. Ensure proper seating in DIMM slots and handle modules carefully to avoid static damage. Upgrading RAM can enhance system performance for multitasking and demanding applications.



- **<u>DAUGHTER CARDS</u>**

  Daughtercards, also known as daughterboards or expansion cards, are additional circuit boards that can be plugged into a computer's mainboard or motherboard to enhance its functionality. They often contain specialized components or provide extra features, such as graphics cards, sound cards, or network cards. Daughtercards enable users to customize and upgrade their computers based on specific needs or preferences.

- **<u>BUS SLOTS</u>**

  Bus slots in a computer, commonly known as expansion slots, are physical connectors on the motherboard that allow the installation of expansion cards. These cards, like graphics or network cards, extend the functionality of the system. Common types include PCIe (Peripheral Component Interconnect Express) and PCI (Peripheral Component Interconnect), determining the speed and compatibility of connected devices.

- **SMPS**

  SMPS stands for Switched-Mode Power Supply. It is an electronic power supply that uses a switching regulator to convert electrical power efficiently. It is also known as Switching Mode Power Supply. It is power supply unit (PSU) generally used in computers to convert the voltage into the computer acceptable range. This device has the power handling electronic components that converts electrical power efficiently. Switched Mode Power Supply uses a great power conversion technique to reduce overall power loss.

- **INTERNAL STORAGE DEVICES**

  Internal storage devices are the built-in storage components within electronic devices. They include Hard Disk Drives (HDDs) and Solid-State Drives (SSDs) commonly found in computers, laptops, smartphones, and other gadgets. These devices store the operating system, system files, applications, and user data. The type of internal storage impacts factors like speed, capacity, and durability, influencing the overall performance of the device.

  - **SSD (SOLID STATE DRIVE)**

    SSD is a non-volatile storage device, which stands for Solid State Drive. SSD stores the data on flash memory chips and maintains the data in a permanent state, even when the power is off. Unlike traditional hard disk drives (HDDs) that rely on rotating disks and mechanical components for data storage and retrieval. Sometimes, this storage device is also called as a solid-state disk or solid-state device. Unlike the HDDs (Hard Disk Drives), SSDs do not have any moving parts. That's why they are called solid-state drives. As compared to electromechanical drives, SSDs have lower latency and access quickly. As a result, SSDs offer advantages such as reduced boot times, quicker file transfers, and advanced system overall performance. Activities that used to require numerous minutes on an HDD, which include launching resource-indepth applications or searching for files, can now be carried out within seconds with the speed and efficiency of an SSD.

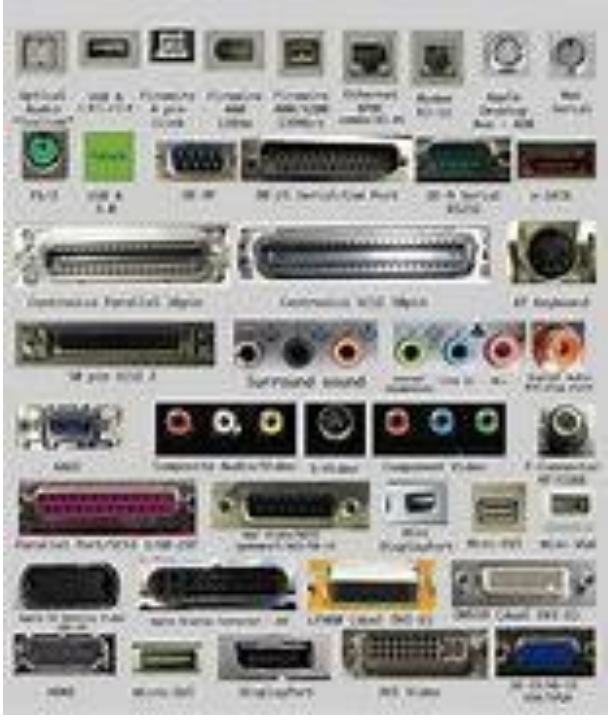
- **HDD (HARD DISK DRIVE)**

  HDD is an electro-mechanical storage device, which is an abbreviation of Hard Disk Drive. It uses magnetic storage for storing and retrieving the digital data. It is a non-volatile storage device. Hard Disk Drive is installed internally in our computer systems, which is connected directly to the disk controllers of the motherboard. Hard Disk Drive is a storage device which stores the operation system (OS), installed software, and the other computer files. HDD means the data is retained when our computer system is shut down. HDD is also called a fixed disk, hard disk, or hard drive.

- **INTERFACING PORTS**

  A port is a physical docking point using which an external device can be connected to the computer. It can also be programmatic docking point through which information flows from a program to the computer or over the Internet. Some common interfacing ports are:

  - USB (Universal Serial Bus)
  - HDMI (High Definition Multimedia Interface)
  - VGA (Video Graphics Array)
  - Ethernet
  - Serial (RS-232)
  - Parallel (Centronics)
  - GPIO (General Purpose Input/Output)
  - SPI (Serial Peripheral Interface)
  - Audio (3.5mm jack, RCA)
  - PS/2 (for keyboards and mic)
  - Thunderbolt
  - SATA (Serial ATA)



- **DESKTOP**

  A desktop computer is a personal computing device designed to fit on top of a typical office desk. It houses the physical hardware that makes a computer run and connects to input devices such as the monitor, keyboard and mouse users interact with. Desktop computers are commonly used in the enterprise, as well as in consumer use cases such as gaming.

  A typically desktop system includes the following components:

  - Monitor: A computer monitor is an output device that displays information in pictorial or textual form.
  - Keyboard: A computer keyboard is an input device used to enter characters and functions into the computer system by pressing buttons, or keys.
  - Mouse: A mouse is a small device that a computer user pushes across a desk surface in order to point to a place on a display screen and to select one or more actions to take from that position.
  - Computer Case: Contains the motherboard, processor, memory and other electronic components.
  - Disk Storage: Usually one or more hard disk drivers, solid-state drivers and optical disc drivers.
  - Speakers: For audio outputs.

- **SERVER OPERATING SYSTEM**

  It is an operating system designed for usage on servers. It is utilized to give services to a large number of clients. It is a very advanced operating system that can serve several clients simultaneously. It is a more advanced operating system with features and capabilities needed in a client-server architecture or comparable enterprise computing environment.

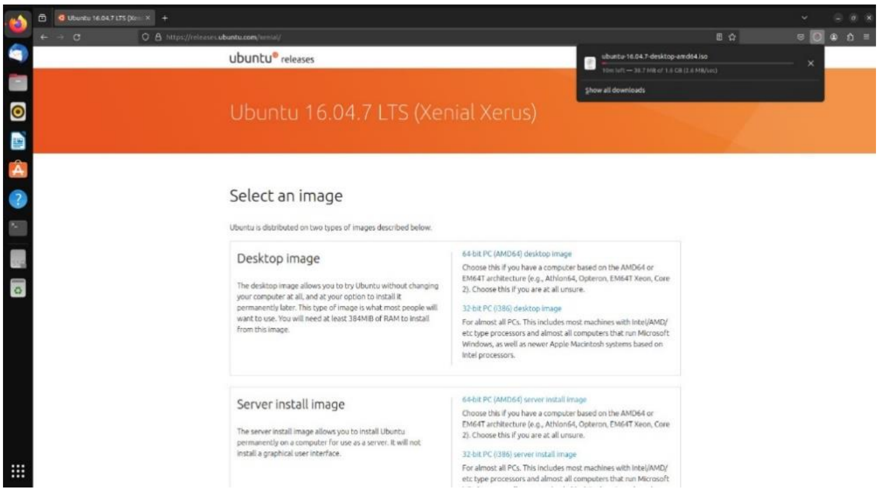
  - DATA SERVER: A data server is a software program/platform used to provide database services like storing, processing and securing data. They are mainly three types:
    - File Server: A file server is a computer responsible for the storage and management of data files so that other computers on the same network can access the files. It enables users to share information over a network without having to physically transfer files.
    - Mail Server: A mail server is a central computer that stores electronic mails for clients over the network. It is much like the post office that obtains emails sent to the users and stores them until it is not requested by the user. It uses standard email protocols, like simple mail transfer protocol (SMTP) to send and receive an email.
    - Web Server: A web server offers web pages or other contents to the web browser by loading the information from a disc and transfer files by using a network to the user's web browser. It's used by a computer or a collection of computers to provide content to several users over the internet. This exchange was done with the help of HTTP communicating between the browser and server.

➢ INSTALLING UBUNTU ON VIRTUAL BOX

Virtual box by Oracle is a powerful virtualization software that allows users to run multiple operating system on one physical computer. VirtualBox is an open-source software for virtualizing the x86 computing architecture. It acts as a hypervisor creating a VM (Virtual machine) where the user can run another OS (operating system).

The system where the VirtualBox runs is called the “host” OS. The operating system running in the VM is called the “guest” OS. VirtualBox supports windows, Linux and Mac OS as it’s host OS.

Before we begin with installation process, we need to download ISO for Ubuntu.



Ubuntu 16.04.7 LTS (Xen
https://releases.ubuntu.com/xenial/
ubuntu-16.04.7-desktop-amd64.iso
Show all downloads
ubuntu releases

Ubuntu 16.04.7 LTS (Xenial Xerus)

Select an image

Ubuntu is distributed on two types of images described below.

Desktop image

The desktop image allows you to try Ubuntu without changing your computer at all, and at your option to install it permanently later. This type of image is what most people will want to use. You will need at least 384MIB of RAM to install from this image.

64-bit PC (AMD64) desktop image

Choose this if you have a computer based on the AMD64 or EM64T architecture (e.g., Athlon64, Opteron, EM64T Xeon, Core 2). Choose this if you are at all unsure.

32-bit PC (i386) desktop image

For almost all PCs. This includes most machines with Intel/AMD/etc type processors and almost all computers that run Microsoft Windows, as well as newer Apple Macintosh systems based on Intel processors.

Server install image

The server install image allows you to install Ubuntu permanently on a computer for use as a server. It will not install a graphical user interface.

64-bit PC (AMD64) server install image

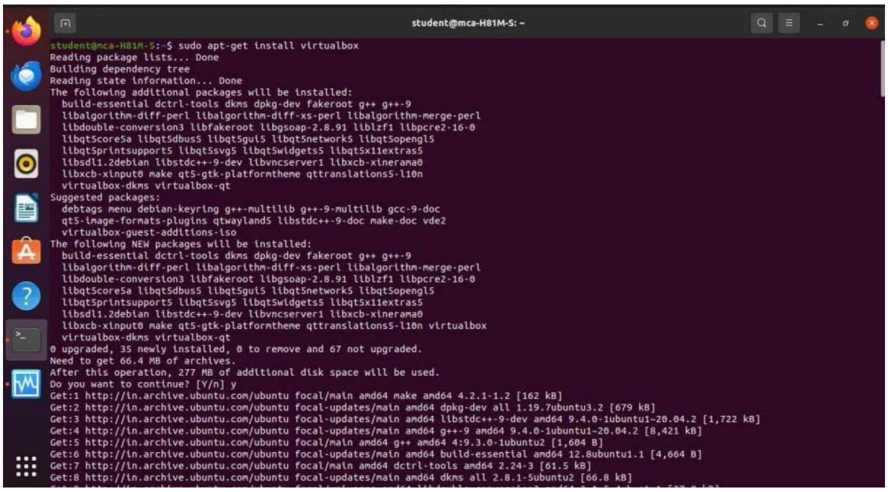
Choose this if you have a computer based on the AMD64 or EM64T architecture (e.g., Athlon64, Opteron, EM64T Xeon, Core 2). Choose this if you are at all unsure.

32-bit PC (i386) server install image

For almost all PCs. This includes most machines with Intel/AMD/etc type processors and almost all computers that run Microsoft

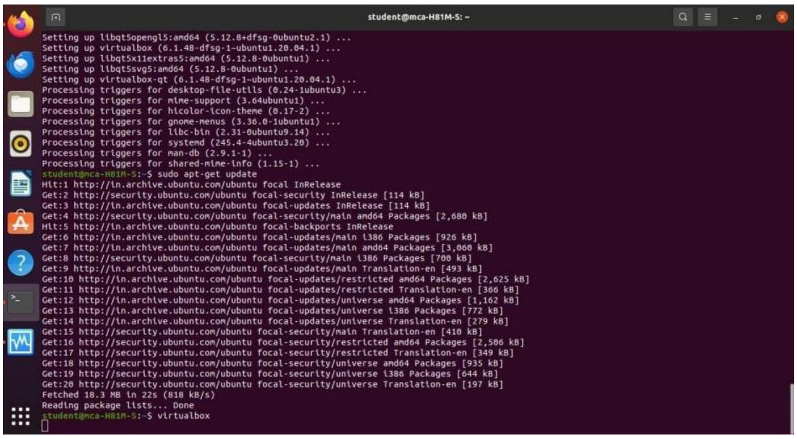
VirtualBox installation:

- sudo apt -get install virtualbox



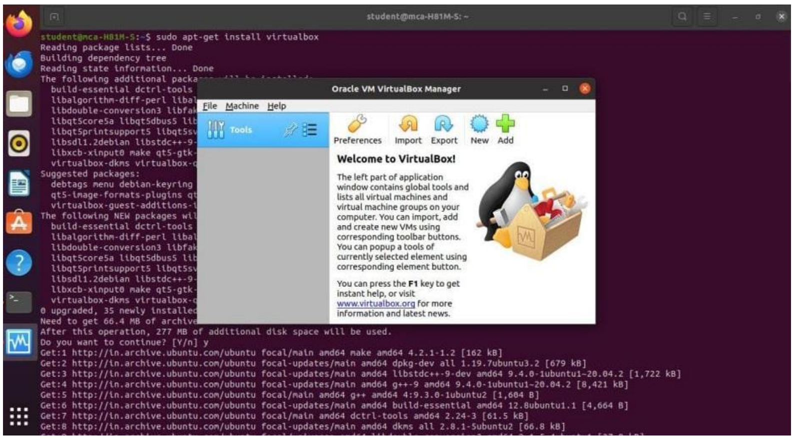
```
student@mca-H81M-S:~$ sudo apt-get install virtualbox
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  build-essential dctrl-tools dkms dpkg-dev fakeroot g++ g++-9
  libalgorithm-diff-perl libalgorithm-diff-xs-perl libalgorithm-merge-perl
  libdouble-conversion3 libfakeroot libgsoap-2.8.91 liblzf1 libpcre2-16-0
  libqt5core5a libqt5dbus5 libqt5gui5 libqt5network5 libqt5opengl5
  libqt5printsupport5 libqt5svg5 libqt5widgets5 libqt5x11extras5
  libsdl1.2debian libstdc++-9-dev libvncserver1 libxcb-xinerama0
  libxcb-xinput0 make qt5-gtk-platformtheme qttranslations5-l10n
  virtualbox-dkms virtualbox-qt
Suggested packages:
  debtags menu debian-keyring g++-multilib g++-9-multilib gcc-9-doc
  qt5-image-formats-plugins qtwayland5 libstdc++-9-doc make-doc vde2
  virtualbox-guest-additions-iso
The following NEW packages will be installed:
  build-essential dctrl-tools dkms dpkg-dev fakeroot g++ g++-9
  libalgorithm-diff-perl libalgorithm-diff-xs-perl libalgorithm-merge-perl
  libdouble-conversion3 libfakeroot libgsoap-2.8.91 liblzf1 libpcre2-16-0
  libqt5core5a libqt5dbus5 libqt5gui5 libqt5network5 libqt5opengl5
  libqt5printsupport5 libqt5svg5 libqt5widgets5 libqt5x11extras5
  libsdl1.2debian libstdc++-9-dev libvncserver1 libxcb-xinerama0
  libxcb-xinput0 make qt5-gtk-platformtheme qttranslations5-l10n virtualbox
  virtualbox-dkms virtualbox-qt
0 upgraded, 35 newly installed, 0 to remove and 67 not upgraded.
Need to get 66.4 MB of archives.
After this operation, 277 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu focal/main amd64 make amd64 4.2.1-1.2 [162 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 dpkg-dev all 1.19.7ubuntu3.2 [679 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 libstdc++-9-dev amd64 9.4.0-1ubuntu1~20.04.2 [1,722 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 g++-9 amd64 9.4.0-1ubuntu1~20.04.2 [8,421 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu focal/main amd64 g++ amd64 4:9.3.0-1ubuntu2 [1,604 B]
Get:6 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 build-essential amd64 12.8ubuntu1.1 [4,664 B]
Get:7 http://in.archive.ubuntu.com/ubuntu focal/main amd64 dctrl-tools amd64 2.24-3 [61.5 kB]
Get:8 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 dkms all 2.8.1-5ubuntu2 [66.8 kB]
```

- sudo apt -get update



```
Setting up libqt5opengl5:amd64 (5.12.8+dfsg-0ubuntu2.1) ...
Setting up virtualbox (6.1.48-dfsg-1-ubuntu1.20.04.1) ...
Setting up libqt5x11extras5:amd64 (5.12.8-0ubuntu1) ...
Setting up libqt5svg5:amd64 (5.12.8-0ubuntu1) ...
Setting up virtualbox-qt (6.1.48-dfsg-1-ubuntu1.20.04.1) ...
Processing triggers for desktop-file-utils (0.24-1ubuntu3) ...
Processing triggers for mime-support (3.64ubuntu1) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for gnome-menus (3.36.0-1ubuntu1) ...
Processing triggers for libc-bin (2.31-0ubuntu9.14) ...
Processing triggers for systemd (245.4-4ubuntu3.20) ...
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for shared-mime-info (1.15-1) ...
student@mca-H81M-S:~$ sudo apt-get update
Hit:1 http://in.archive.ubuntu.com/ubuntu focal InRelease
Get:2 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:4 http://security.ubuntu.com/ubuntu focal-security/main amd64 Packages [2,680 kB]
Hit:5 http://in.archive.ubuntu.com/ubuntu focal-backports InRelease
Get:6 http://in.archive.ubuntu.com/ubuntu focal-updates/main i386 Packages [926 kB]
Get:7 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [3,060 kB]
Get:8 http://security.ubuntu.com/ubuntu focal-security/main i386 Packages [700 kB]
Get:9 http://in.archive.ubuntu.com/ubuntu focal-updates/main Translation-en [493 kB]
Get:10 http://in.archive.ubuntu.com/ubuntu focal-updates/restricted amd64 Packages [2,625 kB]
Get:11 http://in.archive.ubuntu.com/ubuntu focal-updates/restricted Translation-en [366 kB]
Get:12 http://in.archive.ubuntu.com/ubuntu focal-updates/universe amd64 Packages [1,162 kB]
Get:13 http://in.archive.ubuntu.com/ubuntu focal-updates/universe i386 Packages [772 kB]
Get:14 http://in.archive.ubuntu.com/ubuntu focal-updates/universe Translation-en [279 kB]
Get:15 http://security.ubuntu.com/ubuntu focal-security/main Translation-en [410 kB]
Get:16 http://security.ubuntu.com/ubuntu focal-security/restricted amd64 Packages [2,506 kB]
Get:17 http://security.ubuntu.com/ubuntu focal-security/restricted Translation-en [349 kB]
Get:18 http://security.ubuntu.com/ubuntu focal-security/universe amd64 Packages [935 kB]
Get:19 http://security.ubuntu.com/ubuntu focal-security/universe i386 Packages [644 kB]
Get:20 http://security.ubuntu.com/ubuntu focal-security/universe Translation-en [197 kB]
Fetched 18.3 MB in 22s (818 kB/s)
Reading package lists... Done
student@mca-H81M-S:~$ virtualbox
```

- virtualbox

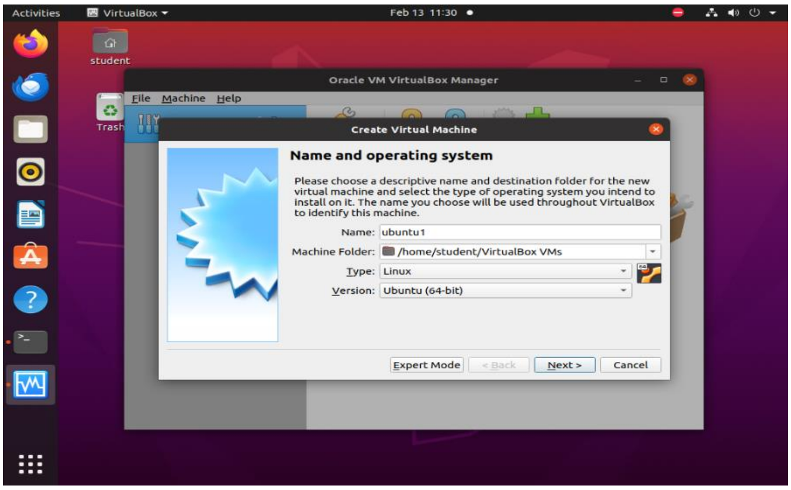


```
student@mca-H81M-S:~$ sudo apt-get install virtualbox
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packa
  build-essential dctrl-tools
  libalgorithm-diff-perl libal
  libdouble-conversion3 libfak
  libqt5core5a libqt5dbus5 lib
  libqt5printsupport5 libqt5sv
  libsdl1.2debian libstdc++-9-
  libxcb-xinput0 make qt5-gtk-
  virtualbox-dkms virtualbox-q
Suggested packages:
  debtags menu debian-keyring
  qt5-image-formats-plugins qt
  virtualbox-guest-additions-i
The following NEW packages wil
  build-essential dctrl-tools
  libalgorithm-diff-perl libal
  libdouble-conversion3 libfak
  libqt5core5a libqt5dbus5 lib
  libqt5printsupport5 libqt5sv
  libsdl1.2debian libstdc++-9-
  libxcb-xinput0 make qt5-gtk-
  virtualbox-dkms virtualbox-q
0 upgraded, 35 newly installed
Need to get 66.4 MB of archive
After this operation, 277 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu focal/main amd64 make amd64 4.2.1-1.2 [162 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 dpkg-dev all 1.19.7ubuntu3.2 [679 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 libstdc++-9-dev amd64 9.4.0-1ubuntu1~20.04.2 [1,722 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 g++-9 amd64 9.4.0-1ubuntu1~20.04.2 [8,421 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu focal/main amd64 g++ amd64 4:9.3.0-1ubuntu2 [1,604 B]
Get:6 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 build-essential amd64 12.8ubuntu1.1 [4,664 B]
Get:7 http://in.archive.ubuntu.com/ubuntu focal/main amd64 dctrl-tools amd64 2.24-3 [61.5 kB]
Get:8 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 dkms all 2.8.1-5ubuntu2 [66.8 kB]
```

Welcome to VirtualBox!

The left part of application window contains global tools and lists all virtual machines and virtual machine groups on your computer. You can import, add and create new VMs using corresponding toolbar buttons. You can popup a tools of currently selected element using corresponding element button.

You can press the **F1** key to get instant help, or visit www.virtualbox.org for more information and latest news.



Create Virtual Machine

Name and operating system

Please choose a descriptive name and destination folder for the new virtual machine and select the type of operating system you intend to install on it. The name you choose will be used throughout VirtualBox to identify this machine.

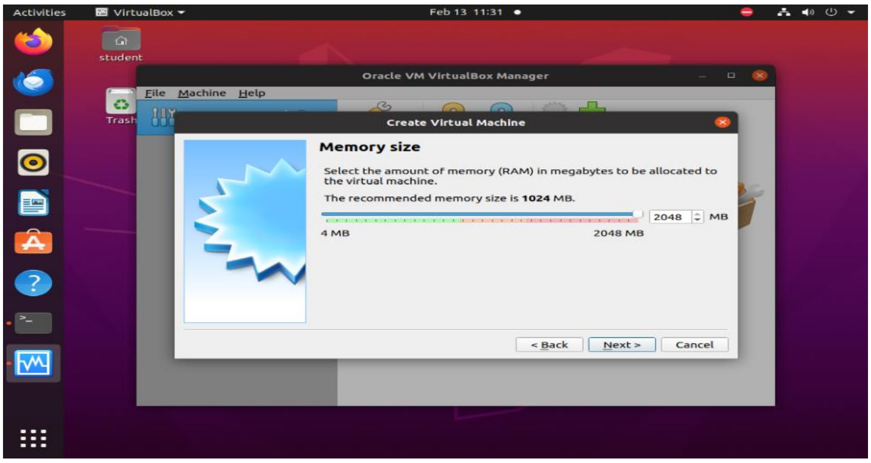
Name: ubuntu1

Machine Folder: /home/student/VirtualBox VMs

Type: Linux

Version: Ubuntu (64-bit)

Click Next



Memory size

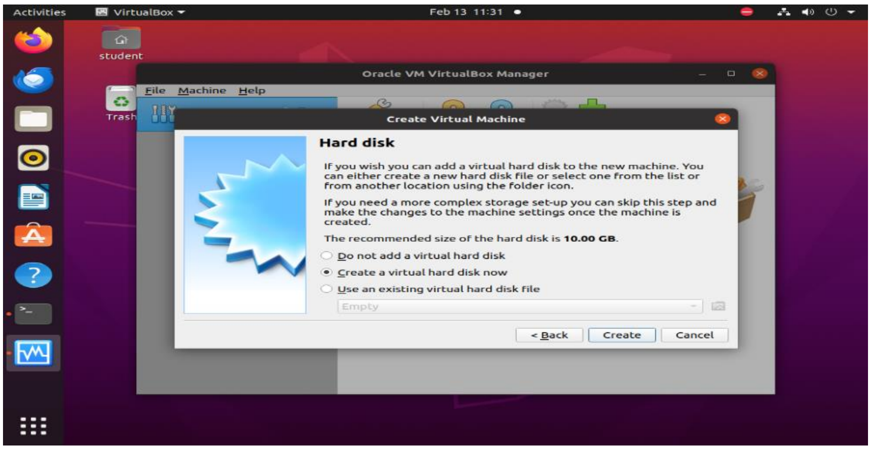
Select the amount of memory (RAM) in megabytes to be allocated to the virtual machine.

The recommended memory size is **1024** MB.

2048 MB

4 MB 2048 MB

Click Next



Hard disk

If you wish you can add a virtual hard disk to the new machine. You can either create a new hard disk file or select one from the list or from another location using the folder icon.

If you need a more complex storage set-up you can skip this step and make the changes to the machine settings once the machine is created.

The recommended size of the hard disk is **10.00 GB**.

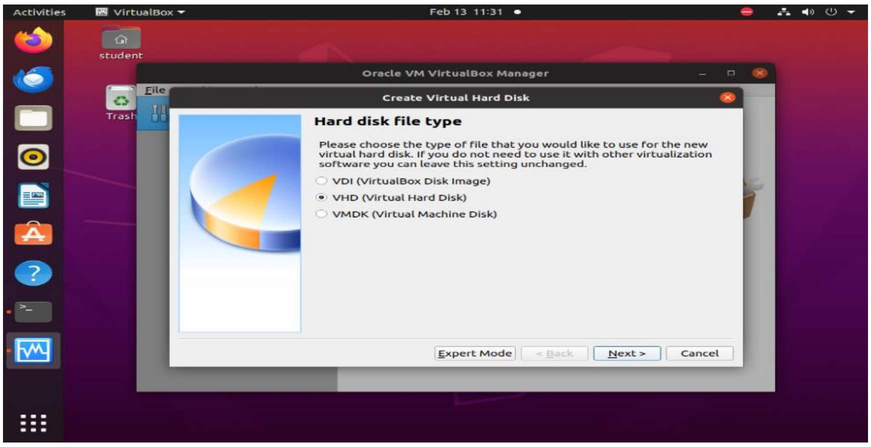
○ Do not add a virtual hard disk

● Create a virtual hard disk now

○ Use an existing virtual hard disk file

Empty

Click Create



Hard disk file type

Please choose the type of file that you would like to use for the new virtual hard disk. If you do not need to use it with other virtualization software you can leave this setting unchanged.

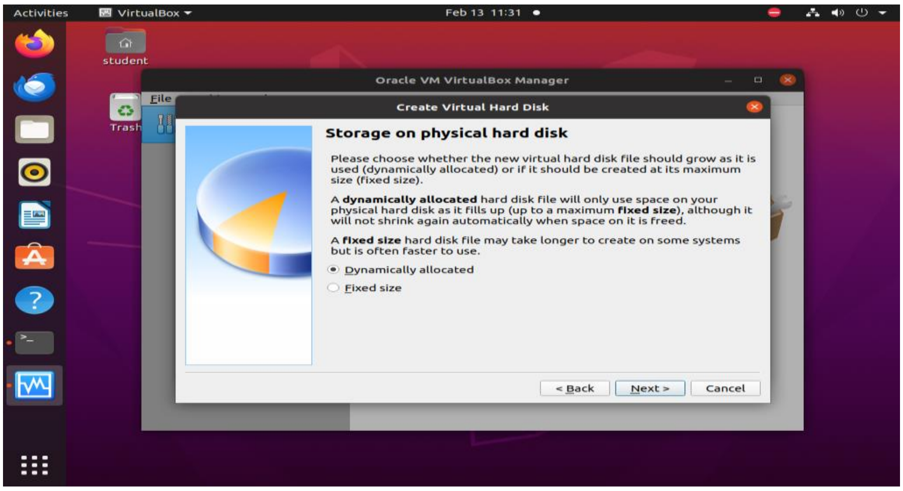
○ VDI (VirtualBox Disk Image)

● VHD (Virtual Hard Disk)

○ VMDK (Virtual Machine Disk)

Select the Virtual Hard Disk (VHD)

Click Next



Storage on physical hard disk

Please choose whether the new virtual hard disk file should grow as it is used (dynamically allocated) or if it should be created at its maximum size (fixed size).

A **dynamically allocated** hard disk file will only use space on your physical hard disk as it fills up (up to a maximum **fixed size**), although it will not shrink again automatically when space on it is freed.

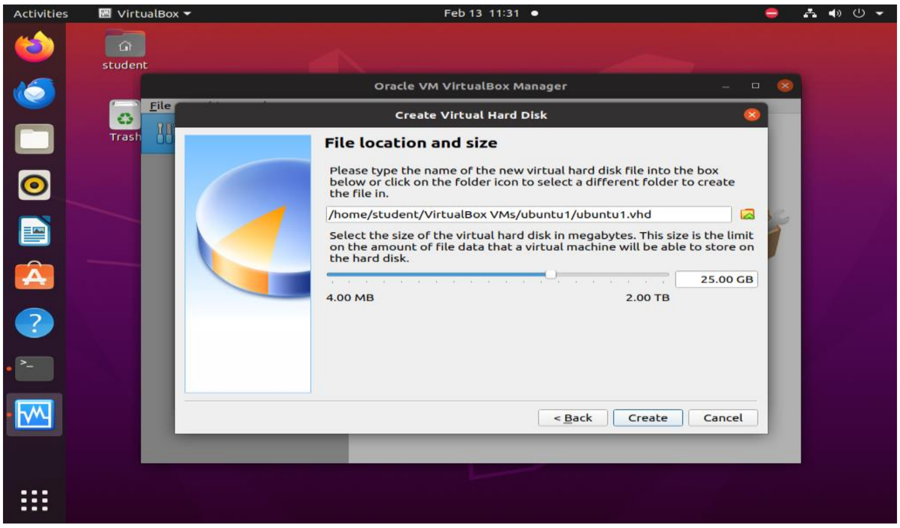
A **fixed size** hard disk file may take longer to create on some systems but is often faster to use.

● Dynamically allocated

○ Fixed size

Select the Dynamically allocated memory

Click Next



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.

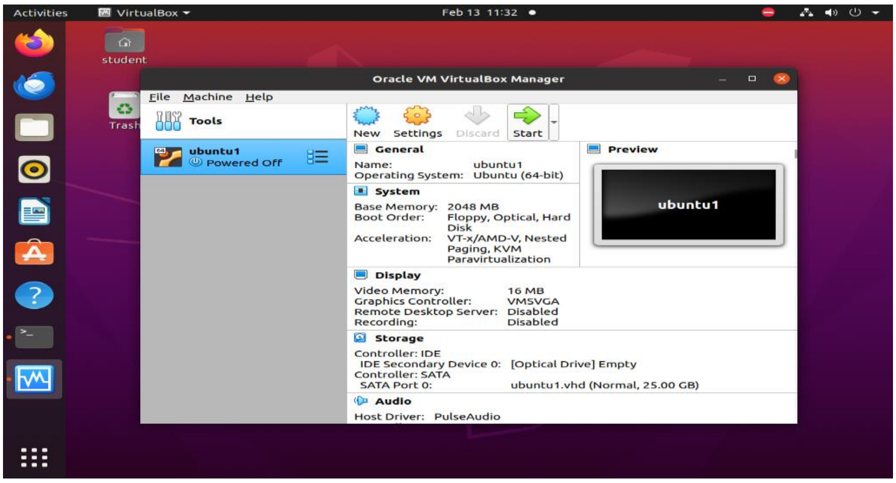
/home/student/VirtualBox VMs/ubuntu1/ubuntu1.vhd

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.

25.00 GB

4.00 MB 2.00 TB

Click create



ubuntu1
Powered Off

General
Name: ubuntu1
Operating System: Ubuntu (64-bit)

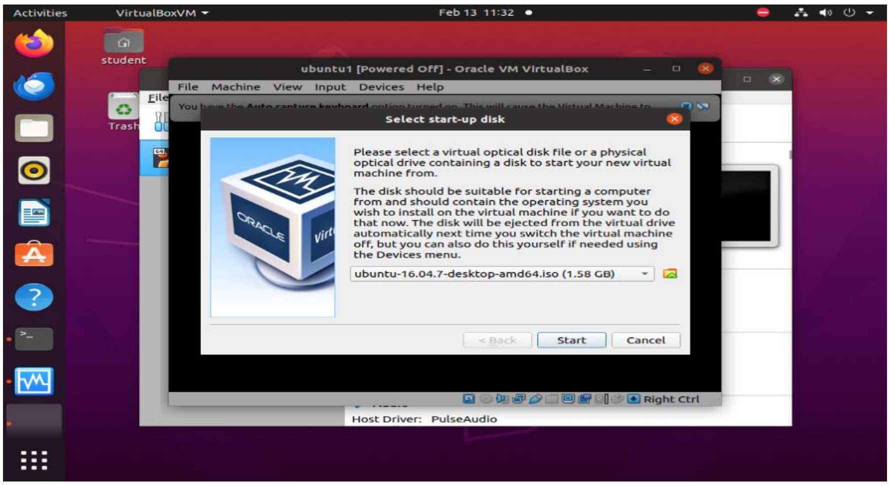
System
Base Memory: 2048 MB
Boot Order: Floppy, Optical, Hard Disk
Acceleration: VT-x/AMD-V, Nested Paging, KVM Paravirtualization

Display
Video Memory: 16 MB
Graphics Controller: VMSVGA
Remote Desktop Server: Disabled
Recording: Disabled

Storage
Controller: IDE
IDE Secondary Device 0: [Optical Drive] Empty
Controller: SATA
SATA Port 0: ubuntu1.vhd (Normal, 25.00 GB)

Audio
Host Driver: PulseAudio

Click Start


Activities
VirtualBoxVM
Feb 13 11:32
student
Trash
ubuntu1 [Powered Off] - Oracle VM VirtualBox
File Machine View Input Devices Help
Select start-up disk

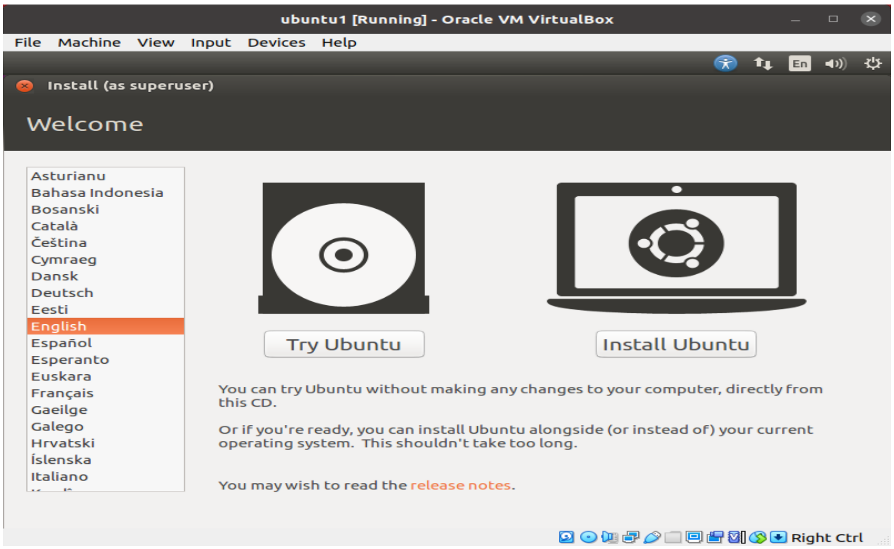
Please select a virtual optical disk file or a physical optical drive containing a disk to start your new virtual machine from.

The disk should be suitable for starting a computer from and should contain the operating system you wish to install on the virtual machine if you want to do that now. The disk will be ejected from the virtual drive automatically next time you switch the virtual machine off, but you can also do this yourself if needed using the Devices menu.

ubuntu-16.04.7-desktop-amd64.iso (1.58 GB)

Select the downloaded ubuntu iso file from the drive

Click Start

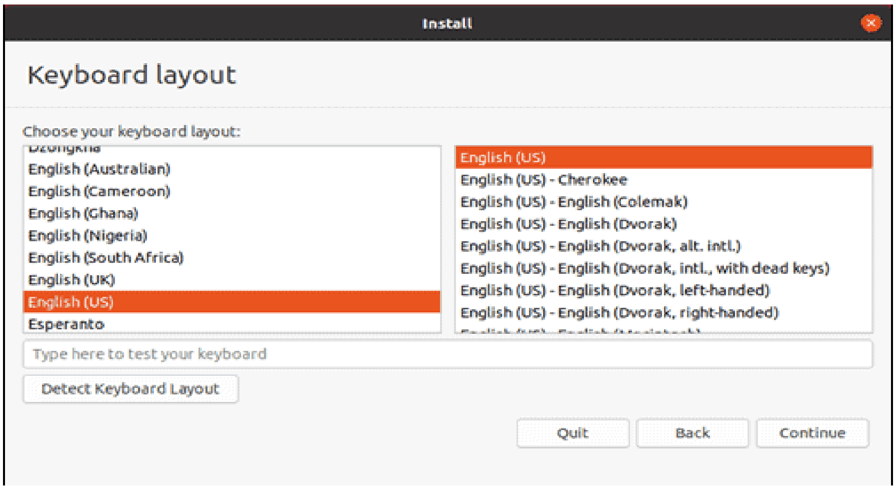


You can try Ubuntu without making any changes to your computer, directly from this CD.

Or if you're ready, you can install Ubuntu alongside (or instead of) your current operating system. This shouldn't take too long.

You may wish to read the release notes.

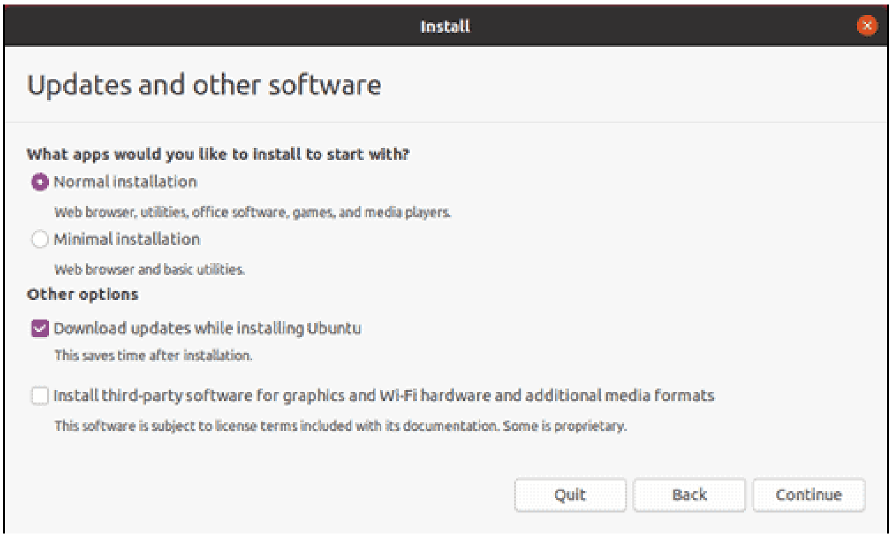
Click Install Ubuntu



Choose your keyboard layout:

Dzongkha
English (Australian)
English (Cameroon)
English (Ghana)
English (Nigeria)
English (South Africa)
English (UK)
English (US)
Esperanto
English (US)
English (US) - Cherokee
English (US) - English (Colemak)
English (US) - English (Dvorak)
English (US) - English (Dvorak, alt. intl.)
English (US) - English (Dvorak, intl., with dead keys)
English (US) - English (Dvorak, left-handed)
English (US) - English (Dvorak, right-handed)
Type here to test your keyboard
Detect Keyboard Layout
Quit
Back
Continue

Select keyboard layout and continue



Updates and other software

What apps would you like to install to start with?

● Normal installation

Web browser, utilities, office software, games, and media players.

○ Minimal installation

Web browser and basic utilities.

Other options

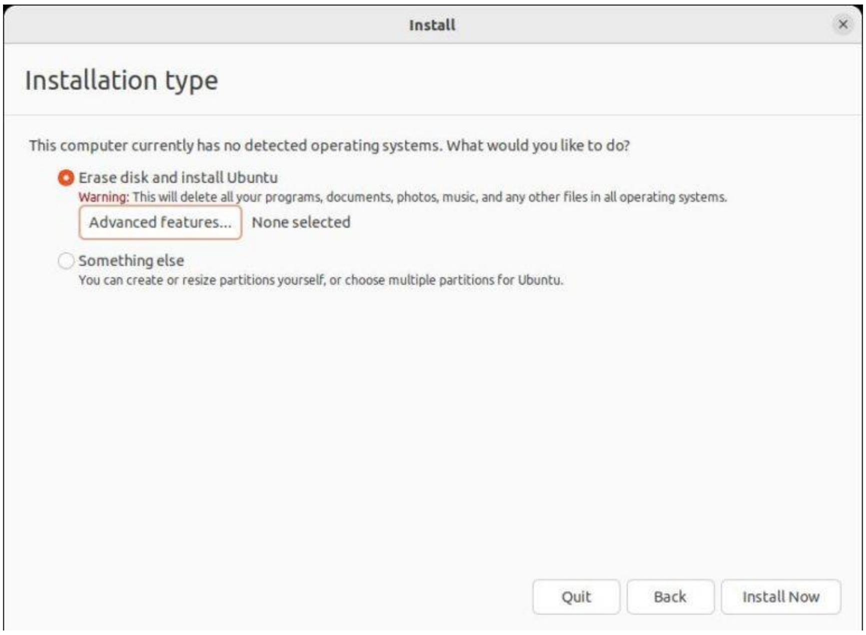
☑ Download updates while installing Ubuntu

This saves time after installation.

☐ Install third-party software for graphics and Wi-Fi hardware and additional media formats

This software is subject to license terms included with its documentation. Some is proprietary.

Continue



Installation type

This computer currently has no detected operating systems. What would you like to do?

● Erase disk and install Ubuntu

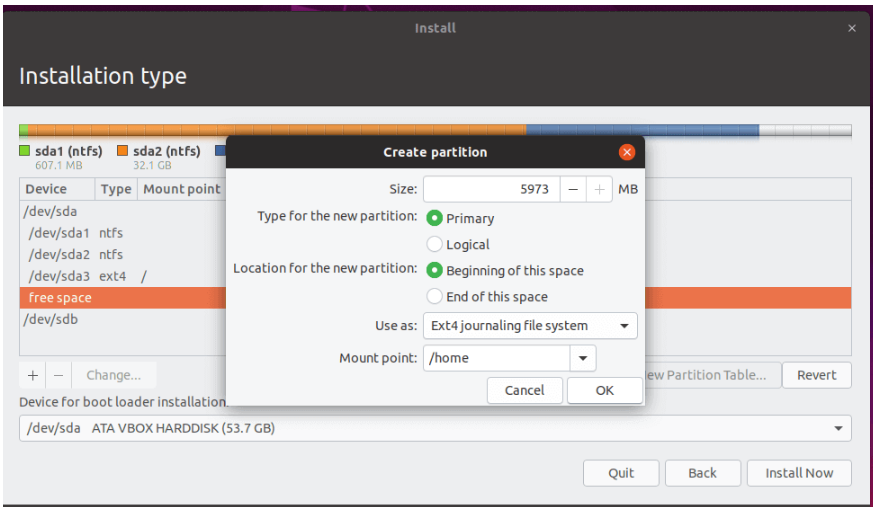
Warning: This will delete all your programs, documents, photos, music, and any other files in all operating systems.

Advanced features... None selected

○ Something else

You can create or resize partitions yourself, or choose multiple partitions for Ubuntu.

Install Now



Install

Installation type

🟩 sda1 (ntfs) 607.1 MB 🟧 sda2 (ntfs) 32.1 GB

Device	Type	Mount point
/dev/sda		
/dev/sda1	ntfs	
/dev/sda2	ntfs	
/dev/sda3	ext4	/
free space		
/dev/sdb		

Create partition

Size: 5973 MB

Type for the new partition: ● Primary ○ Logical

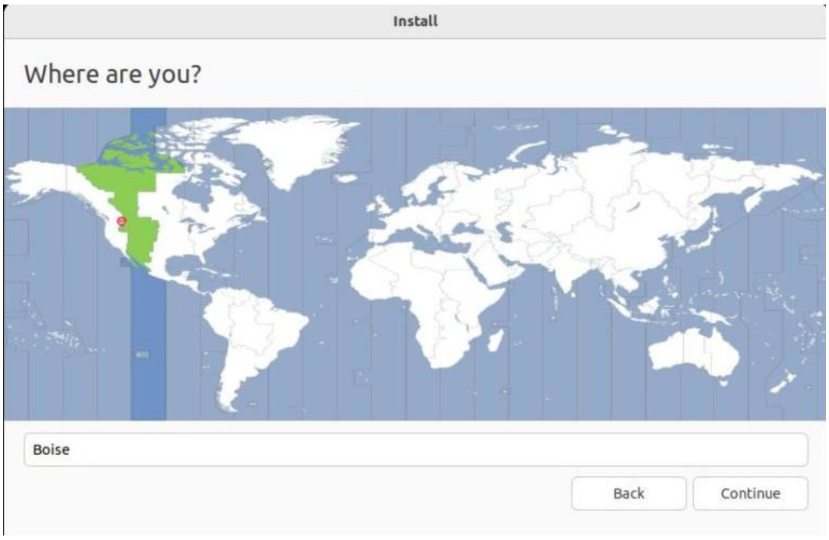
Location for the new partition: ● Beginning of this space ○ End of this space

Use as: Ext4 journaling file system

Mount point: /home

Device for boot loader installation:

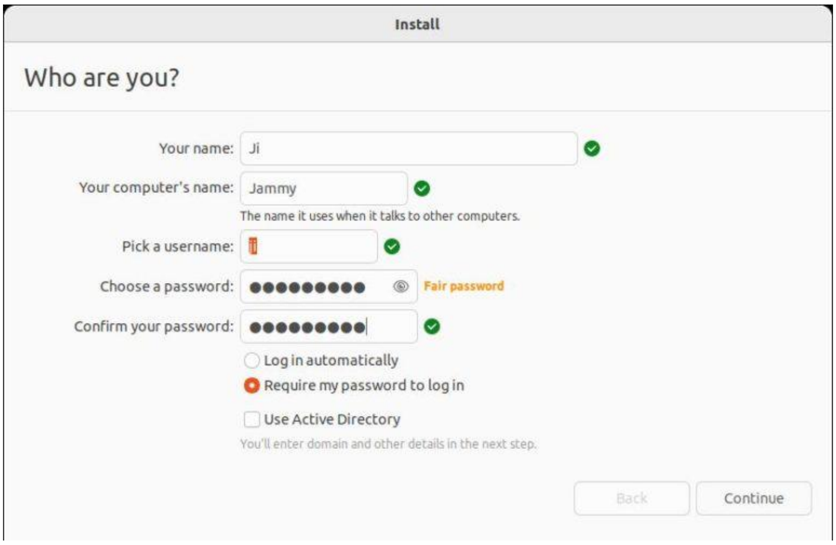
/dev/sda ATA VBOX HARDDISK (53.7 GB)



Install

Where are you?

Boise



Install

Who are you?

Your name: Ji ✓

Your computer's name: Jammy ✓

The name it uses when it talks to other computers.

Pick a username: ji ✓

Choose a password: ●●●●●●●●● Fair password

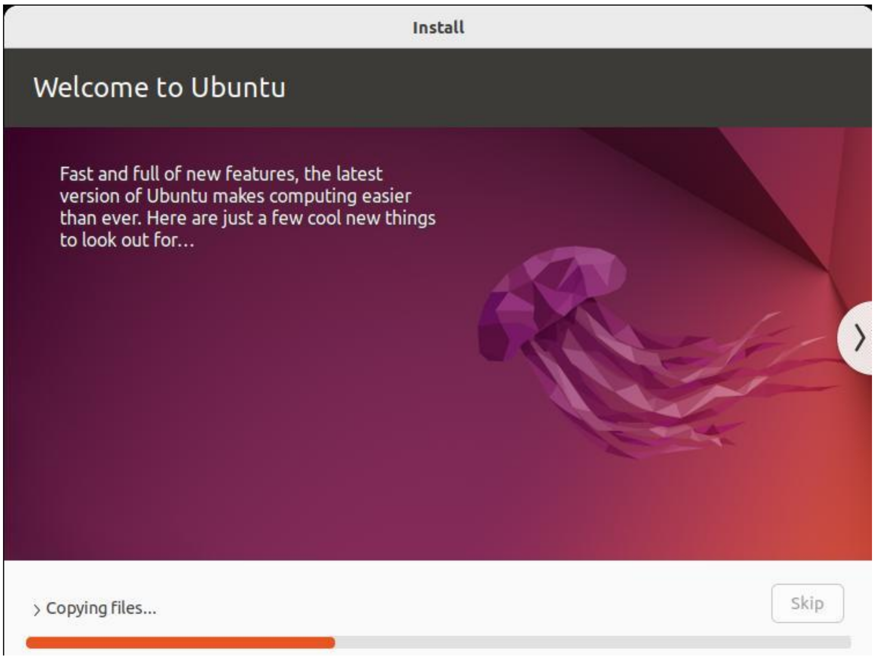
Confirm your password: ●●●●●●●●● ✓

○ Log in automatically

● Require my password to log in

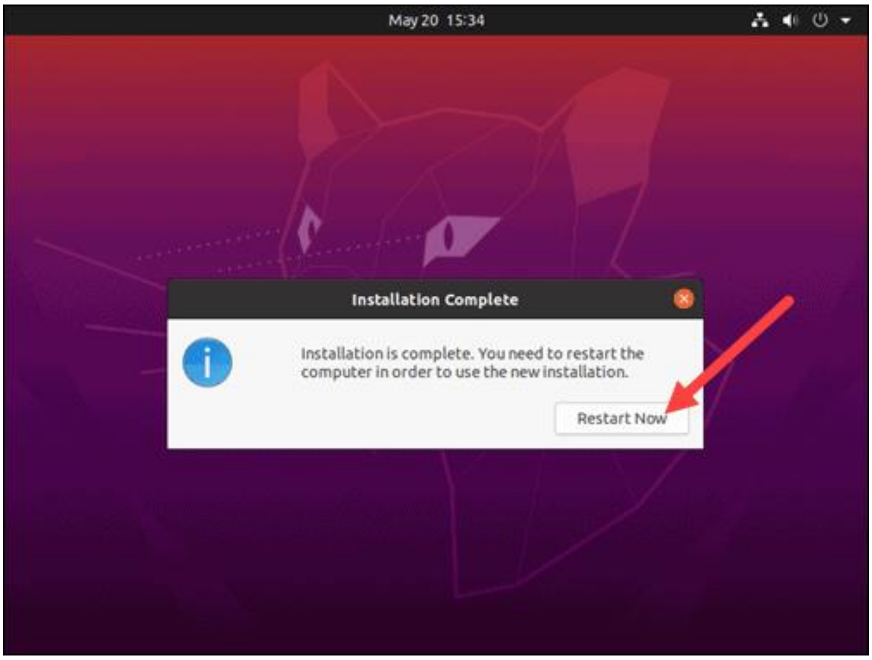
□ Use Active Directory

You'll enter domain and other details in the next step.



Fast and full of new features, the latest version of Ubuntu makes computing easier than ever. Here are just a few cool new things to look out for...

Copying files...



Installation is complete. You need to restart the computer in order to use the new installation.

EXPERIMENT 2

AIM:

Study of a terminal based text editor such as Vim or Emacs. (By the end of the course, students are expected to acquire following skills in using the editor: cursor operations, manipulate text, search for patterns, global search and replace)

Basic Linux commands, familiarity with following commands/operations expected

1 man
2 ls, echo, read
3 more, less, cat
4 cd, mkdir, pwd, find
5 mv, cp, rm, tar
6 wc, cut, paste
7 head, tail, grep, expr
8 chmod, chown
9 Redirections & Piping
10 useradd, usermod, userdel, passwd
11 df,top, ps
12 ssh, scp, ssh-keygen, ssh-copy-id

Text Editor

Text editors are software programs used for creating and editing plain text files. They're essential tools for programmers, writers, and anyone who works with text-based documents.

Unix text editors are:

- VIM
- EMACS
- NANO
- PICO

VIM

Vim is an acronym for Vi IMproved. It is a free and open-source cross-platform text editor. It was first released by Bram Moolenaar in 1991 for UNIX variants.

Vim is based on the original Vi editor, which was created by Bill Joy in 1976.

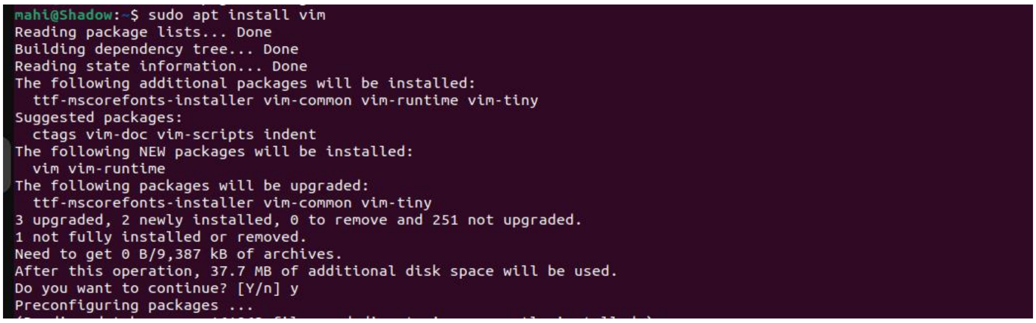
Vim Modes:

There are 4 most important modes in Vim:

- Command Mode
- Command-Line Mode
- Insert Mode
- Visual Mode

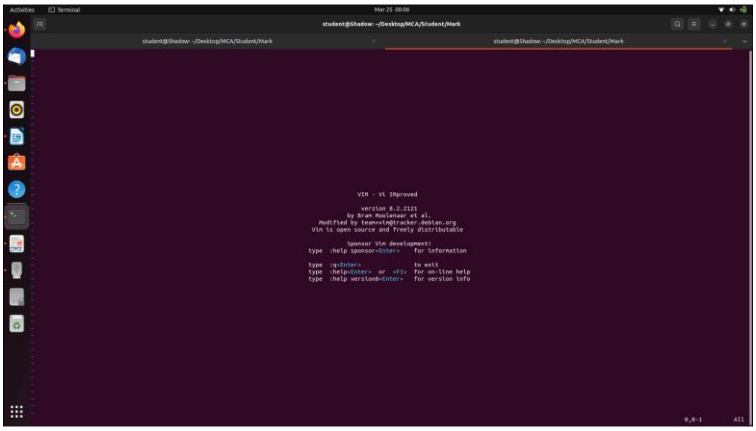
Vim Installation:

- sudo apt-get update
- sudo apt-get install vim



```
mahi@Shadow:~$ sudo apt install vim
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  ttf-mscorefonts-installer vim-common vim-runtime vim-tiny
Suggested packages:
  ctags vim-doc vim-scripts indent
The following NEW packages will be installed:
  vim vim-runtime
The following packages will be upgraded:
  ttf-mscorefonts-installer vim-common vim-tiny
3 upgraded, 2 newly installed, 0 to remove and 251 not upgraded.
1 not fully installed or removed.
Need to get 0 B/9,387 kB of archives.
After this operation, 37.7 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Preconfiguring packages ...
```

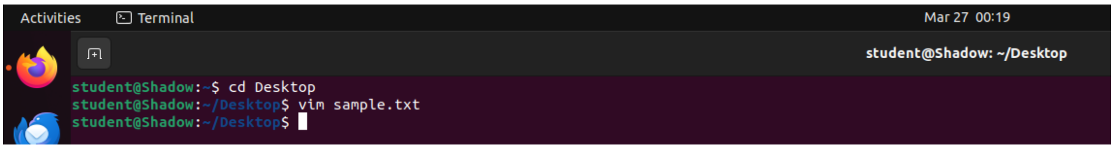
- vim



```
                     VIM - Vi IMproved

                      version 8.2.2121
                  by Bram Moolenaar et al.
         Modified by team+vim@tracker.debian.org
       Vim is open source and freely distributable

                 Sponsor Vim development!
type  :help sponsor<Enter>    for information

type  :q<Enter>               to exit
type  :help<Enter>  or  <F1>  for on-line help
type  :help version8<Enter>   for version info
```

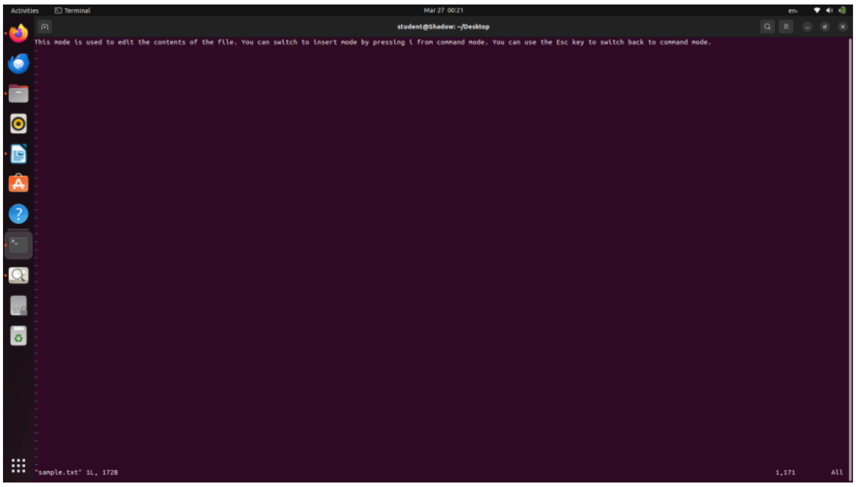
Activities
Terminal
Mar 25 00:06
student@Shadow: ~/Desktop/MCA/Student/Mark
student@Shadow: ~/Desktop/MCA/Student/Mark
student@Shadow: ~/Desktop/MCA/Student/Mark
0,0-1
All

To invoke the vim editor, execute the vim command with the file name:



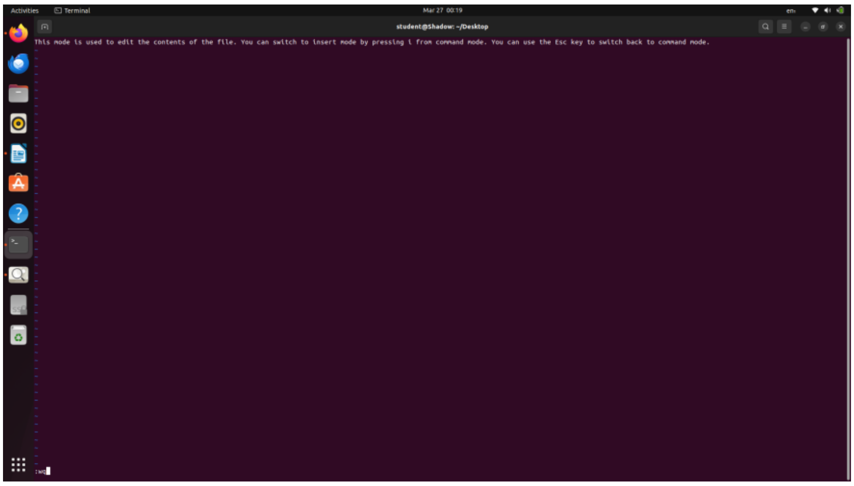
```
student@Shadow:~$ cd Desktop
student@Shadow:~/Desktop$ vim sample.txt
student@Shadow:~/Desktop$ 
```

- **Command Mode:** This is the default mode (also called Normal mode) in Vim. Whenever Vim starts, you'll be in this mode. You can switch to any mode from this mode.



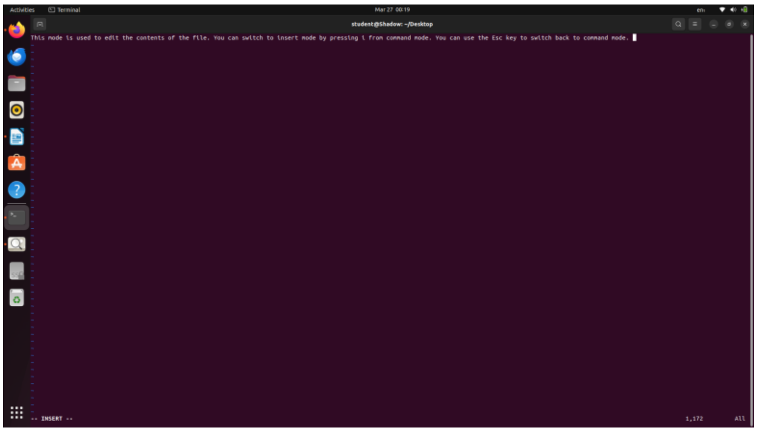
```
This mode is used to edit the contents of the file. You can switch to insert mode by pressing i from command mode. You can use the Esc key to switch back to command mode.
"sample.txt" 1L, 172B                                                                          1,171         All
```

- **Command-Line Mode:** You can use this mode to play around with some commands. But the commands in this mode are prefixed with a colon (:). You can switch to this mode by pressing : (colon) in command mode.



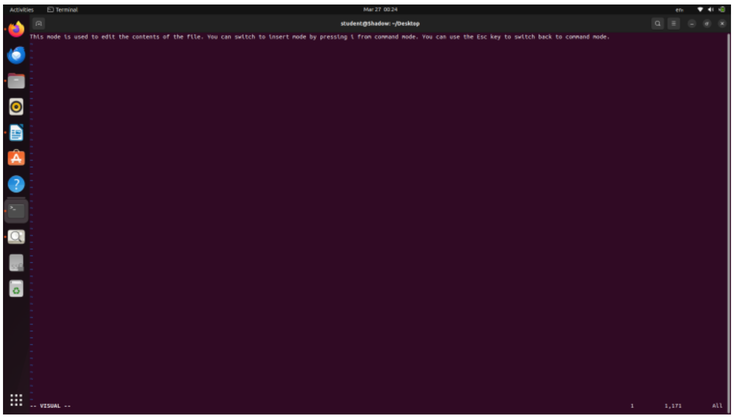
```
This mode is used to edit the contents of the file. You can switch to insert mode by pressing i from command mode. You can use the Esc key to switch back to command mode.
:wq
```

- **Insert Mode:** This mode is used to edit the contents of the file. You can switch to insert mode by pressing i from command mode. You can use the Esc key to switch back to command mode.



```
This mode is used to edit the contents of the file. You can switch to insert mode by pressing i from command mode. You can use the Esc key to switch back to command mode.
-- INSERT --                                                                                   1,172          All
```

- **Visual Mode:** You use this mode to visually select some text and run commands over that section of code. You can switch to this mode by pressing v from the command mode.



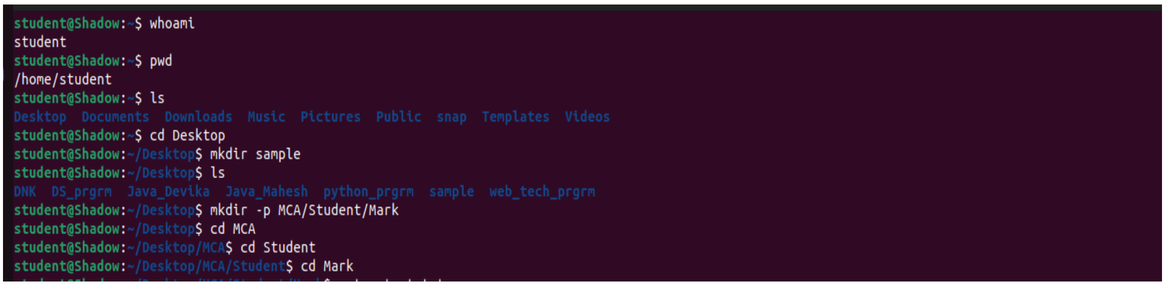
```
This mode is used to edit the contents of the file. You can switch to insert mode by pressing i from command mode. You can use the Esc key to switch back to command mode.
-- VISUAL --                                                                          1          1,171          All
```

Basic Linux Commands

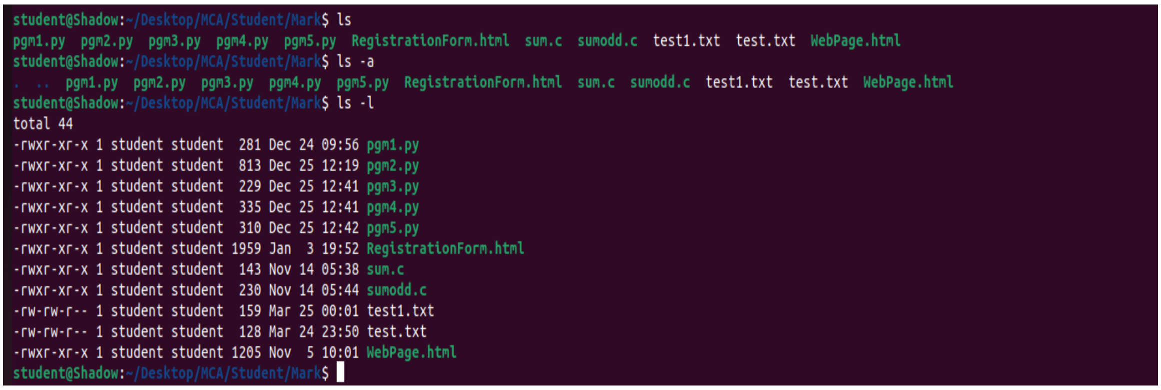
- **whoami** : Display the user.
- **pwd** : Present working directory
- **mkdir** : Create a new directory (folder).
- **cd** : It is used to navigate through the linux files and directories.
- **ls** : List the directory(folder) system.

  ls -a: Will show the hidden file.

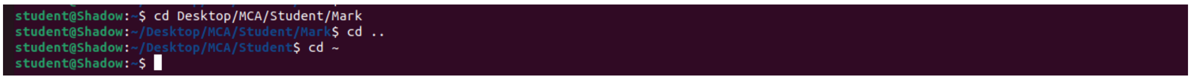
  ls -l: Will list the file and directory with detailed information like the permission size,owner…etc.



```
student@Shadow:~$ whoami
student
student@Shadow:~$ pwd
/home/student
student@Shadow:~$ ls
Desktop  Documents  Downloads  Music  Pictures  Public  snap  Templates  Videos
student@Shadow:~$ cd Desktop
student@Shadow:~/Desktop$ mkdir sample
student@Shadow:~/Desktop$ ls
DNK  DS_prgrm  Java_Devika  Java_Mahesh  python_prgrm  sample  web_tech_prgrm
student@Shadow:~/Desktop$ mkdir -p MCA/Student/Mark
student@Shadow:~/Desktop$ cd MCA
student@Shadow:~/Desktop/MCA$ cd Student
student@Shadow:~/Desktop/MCA/Student$ cd Mark
```

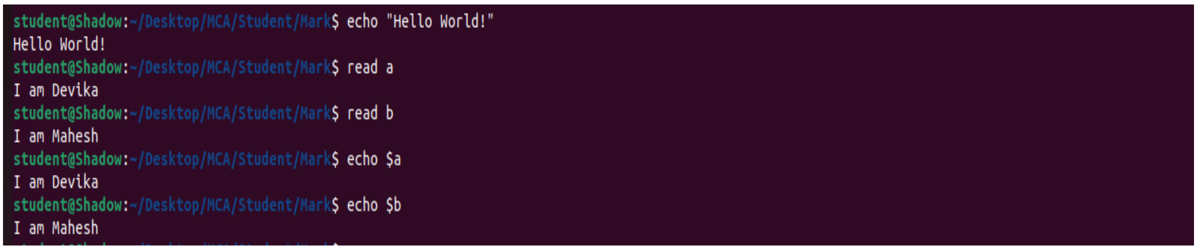


```
student@Shadow:~/Desktop/MCA/Student/Mark$ ls
pgm1.py  pgm2.py  pgm3.py  pgm4.py  pgm5.py  RegistrationForm.html  sum.c  sumodd.c  test1.txt  test.txt  WebPage.html
student@Shadow:~/Desktop/MCA/Student/Mark$ ls -a
.  ..  pgm1.py  pgm2.py  pgm3.py  pgm4.py  pgm5.py  RegistrationForm.html  sum.c  sumodd.c  test1.txt  test.txt  WebPage.html
student@Shadow:~/Desktop/MCA/Student/Mark$ ls -l
total 44
-rwxr-xr-x 1 student student  281 Dec 24 09:56 pgm1.py
-rwxr-xr-x 1 student student  813 Dec 25 12:19 pgm2.py
-rwxr-xr-x 1 student student  229 Dec 25 12:41 pgm3.py
-rwxr-xr-x 1 student student  335 Dec 25 12:41 pgm4.py
-rwxr-xr-x 1 student student  310 Dec 25 12:42 pgm5.py
-rwxr-xr-x 1 student student 1959 Jan  3 19:52 RegistrationForm.html
-rwxr-xr-x 1 student student  143 Nov 14 05:38 sum.c
-rwxr-xr-x 1 student student  230 Nov 14 05:44 sumodd.c
-rw-rw-r-- 1 student student  159 Mar 25 00:01 test1.txt
-rw-rw-r-- 1 student student  128 Mar 24 23:50 test.txt
-rwxr-xr-x 1 student student 1205 Nov  5 10:01 WebPage.html
student@Shadow:~/Desktop/MCA/Student/Mark$ 
```



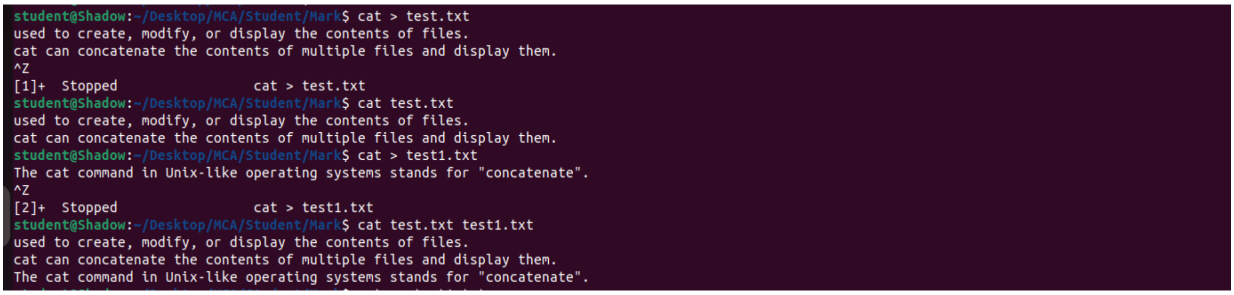
```
student@Shadow:~$ cd Desktop/MCA/Student/Mark
student@Shadow:~/Desktop/MCA/Student/Mark$ cd ..
student@Shadow:~/Desktop/MCA/Student$ cd ~
student@Shadow:~$ 
```

- **echo**: echo "Hello, World!" - Prints "Hello, World!" to the command line.
- **read** : Reads a line from standard input into the variable.

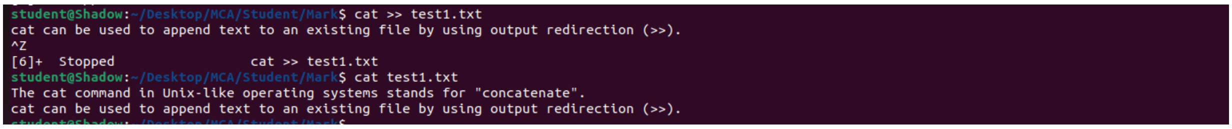


```
student@Shadow:~/Desktop/MCA/Student/Mark$ echo "Hello World!"
Hello World!
student@Shadow:~/Desktop/MCA/Student/Mark$ read a
I am Devika
student@Shadow:~/Desktop/MCA/Student/Mark$ read b
I am Mahesh
student@Shadow:~/Desktop/MCA/Student/Mark$ echo $a
I am Devika
student@Shadow:~/Desktop/MCA/Student/Mark$ echo $b
I am Mahesh
```

- **more**: Displays text files one page at a time, waiting for user input to continue to the next page.
- **less**: Similar to more, but with additional features such as backward scrolling and searching within the displayed text.
- **cat** : The cat command in Unix-like operating systems stands for "concatenate".cat can concatenate the contents of multiple files and display them. Its also used to create, modify, or display the contents of files.



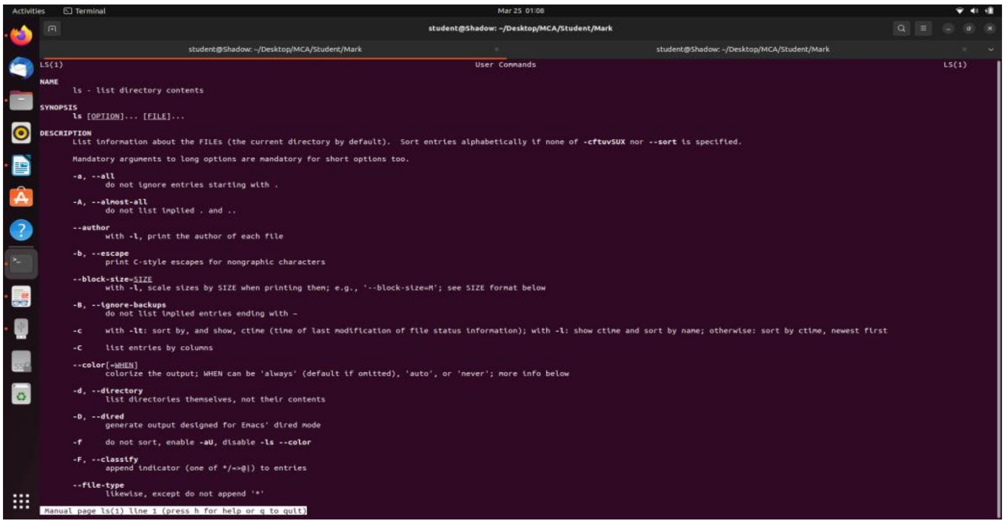
```
student@Shadow:~/Desktop/MCA/Student/Mark$ cat > test.txt
used to create, modify, or display the contents of files.
cat can concatenate the contents of multiple files and display them.
^Z
[1]+  Stopped                 cat > test.txt
student@Shadow:~/Desktop/MCA/Student/Mark$ cat test.txt
used to create, modify, or display the contents of files.
cat can concatenate the contents of multiple files and display them.
student@Shadow:~/Desktop/MCA/Student/Mark$ cat > test1.txt
The cat command in Unix-like operating systems stands for "concatenate".
^Z
[2]+  Stopped                 cat > test1.txt
student@Shadow:~/Desktop/MCA/Student/Mark$ cat test.txt test1.txt
used to create, modify, or display the contents of files.
cat can concatenate the contents of multiple files and display them.
The cat command in Unix-like operating systems stands for "concatenate".
```



```
student@Shadow:~/Desktop/MCA/Student/Mark$ cat >> test1.txt
cat can be used to append text to an existing file by using output redirection (>>).
^Z
[6]+  Stopped                 cat >> test1.txt
student@Shadow:~/Desktop/MCA/Student/Mark$ cat test1.txt
The cat command in Unix-like operating systems stands for "concatenate".
cat can be used to append text to an existing file by using output redirection (>>).
```

- **man** : Used to display the manual pages for other commands.

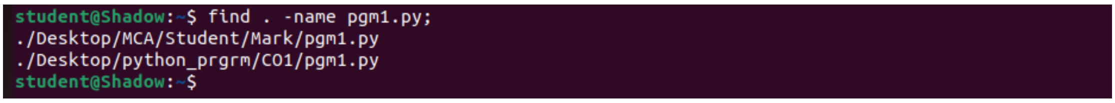
  Eg; man ls



Activities
Terminal
Mar 25 01:08
student@Shadow: ~/Desktop/MCA/Student/Mark
student@Shadow: ~/Desktop/MCA/Student/Mark
student@Shadow: ~/Desktop/MCA/Student/Mark

```
LS(1)                                   User Commands                                   LS(1)

NAME
       ls - list directory contents

SYNOPSIS
       ls [OPTION]... [FILE]...

DESCRIPTION
       List information about the FILEs (the current directory by default).  Sort entries alphabetically if none of -cftuvSUX nor --sort is specified.

       Mandatory arguments to long options are mandatory for short options too.

       -a, --all
              do not ignore entries starting with .

       -A, --almost-all
              do not list implied . and ..

       --author
              with -l, print the author of each file

       -b, --escape
              print C-style escapes for nongraphic characters

       --block-size=SIZE
              with -l, scale sizes by SIZE when printing them; e.g., '--block-size=M'; see SIZE format below

       -B, --ignore-backups
              do not list implied entries ending with ~

       -c     with -lt: sort by, and show, ctime (time of last modification of file status information); with -l: show ctime and sort by name; otherwise: sort by ctime, newest first

       -C     list entries by columns

       --color[=WHEN]
              colorize the output; WHEN can be 'always' (default if omitted), 'auto', or 'never'; more info below

       -d, --directory
              list directories themselves, not their contents

       -D, --dired
              generate output designed for Emacs' dired mode

       -f     do not sort, enable -aU, disable -ls --color

       -F, --classify
              append indicator (one of */=>@|) to entries

       --file-type
              likewise, except do not append '*'

 Manual page ls(1) line 1 (press h for help or q to quit)
```

- **find** : Searches for files and directories in a directory hierarchy.



```
student@Shadow:~$ find . -name pgm1.py;
./Desktop/MCA/Student/Mark/pgm1.py
./Desktop/python_prgrm/CO1/pgm1.py
student@Shadow:~$
```

- **mv**: Moves a file or directory from one location to another.

  For example, mv file1.txt /path/to/new/location/ moves file1.txt to /path/to/new/location/.

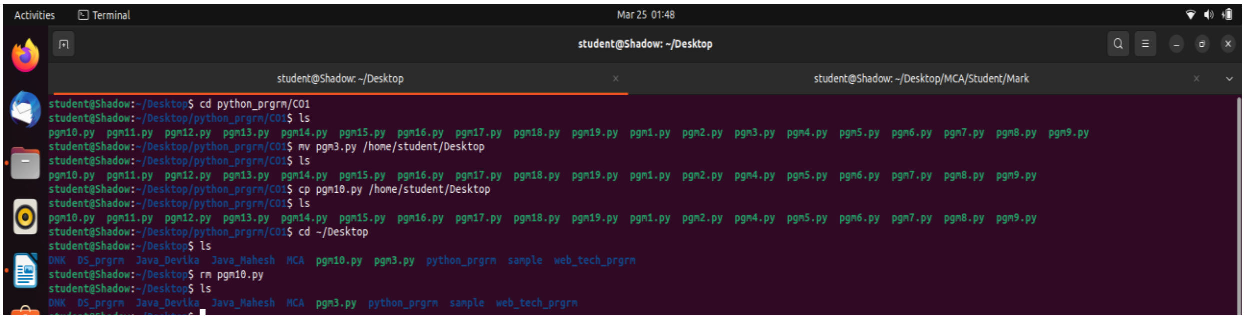
- **cp**: Copies a file or directory from one location to another.

  For example, cp file1.txt file2.txt copies file1.txt to file2.txt.

- **rm**: Deletes (removes) a file or directory.

  For example, rm file.txt deletes file.txt.

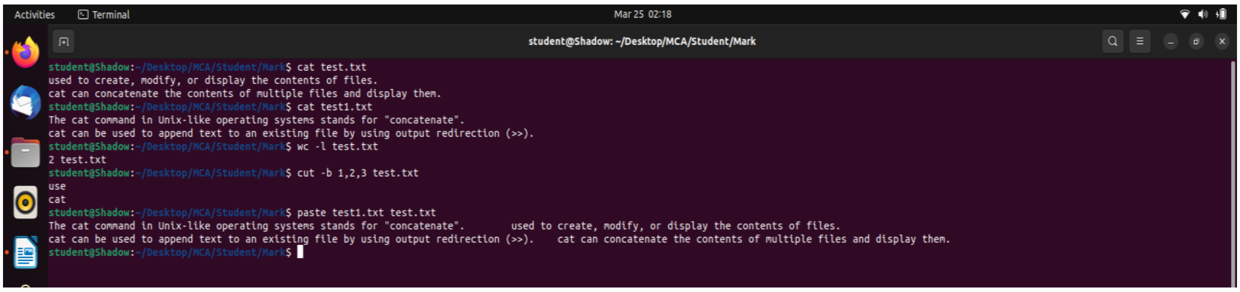
- **tar**: Creates an archive of files and directories.



Activities
Terminal
Mar 25 01:48
student@Shadow: ~/Desktop
student@Shadow: ~/Desktop
student@Shadow: ~/Desktop/MCA/Student/Mark

```
student@Shadow:~/Desktop$ cd python_prgrm/CO1
student@Shadow:~/Desktop/python_prgrm/CO1$ ls
pgm10.py  pgm11.py  pgm12.py  pgm13.py  pgm14.py  pgm15.py  pgm16.py  pgm17.py  pgm18.py  pgm19.py  pgm1.py  pgm2.py  pgm3.py  pgm4.py  pgm5.py  pgm6.py  pgm7.py  pgm8.py  pgm9.py
student@Shadow:~/Desktop/python_prgrm/CO1$ mv pgm3.py /home/student/Desktop
student@Shadow:~/Desktop/python_prgrm/CO1$ ls
pgm10.py  pgm11.py  pgm12.py  pgm13.py  pgm14.py  pgm15.py  pgm16.py  pgm17.py  pgm18.py  pgm19.py  pgm1.py  pgm2.py  pgm4.py  pgm5.py  pgm6.py  pgm7.py  pgm8.py  pgm9.py
student@Shadow:~/Desktop/python_prgrm/CO1$ cp pgm10.py /home/student/Desktop
student@Shadow:~/Desktop/python_prgrm/CO1$ ls
pgm10.py  pgm11.py  pgm12.py  pgm13.py  pgm14.py  pgm15.py  pgm16.py  pgm17.py  pgm18.py  pgm19.py  pgm1.py  pgm2.py  pgm4.py  pgm5.py  pgm6.py  pgm7.py  pgm8.py  pgm9.py
student@Shadow:~/Desktop/python_prgrm/CO1$ cd ~/Desktop
student@Shadow:~/Desktop$ ls
DNK  DS_prgrm  Java_Devika  Java_Mahesh  MCA  pgm10.py  pgm3.py  python_prgrm  sample  web_tech_prgrm
student@Shadow:~/Desktop$ rm pgm10.py
student@Shadow:~/Desktop$ ls
DNK  DS_prgrm  Java_Devika  Java_Mahesh  MCA  pgm3.py  python_prgrm  sample  web_tech_prgrm
```

- **wc**: wc -l file.txt - Counts the number of lines in file.txt.
- **cut**: Extracts specific fields from lines in a file based on a delimiter.
- **paste**: Merges lines from multiple files.



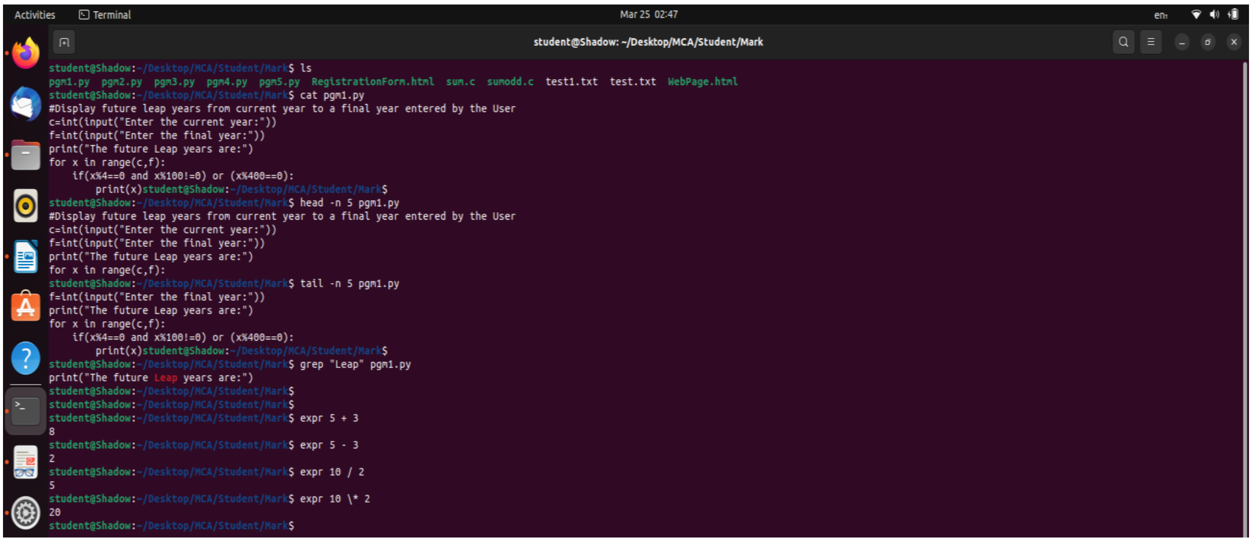
```
student@Shadow:~/Desktop/MCA/Student/Mark$ cat test.txt
used to create, modify, or display the contents of files.
cat can concatenate the contents of multiple files and display them.
student@Shadow:~/Desktop/MCA/Student/Mark$ cat test1.txt
The cat command in Unix-like operating systems stands for "concatenate".
cat can be used to append text to an existing file by using output redirection (>>).
student@Shadow:~/Desktop/MCA/Student/Mark$ wc -l test.txt
2 test.txt
student@Shadow:~/Desktop/MCA/Student/Mark$ cut -b 1,2,3 test.txt
use
cat
student@Shadow:~/Desktop/MCA/Student/Mark$ paste test1.txt test.txt
The cat command in Unix-like operating systems stands for "concatenate".        used to create, modify, or display the contents of files.
cat can be used to append text to an existing file by using output redirection (>>).    cat can concatenate the contents of multiple files and display them.
student@Shadow:~/Desktop/MCA/Student/Mark$
```

- **head**: head -n 5 file.txt - Displays the first 5 lines of file.txt.
- **tail**: tail -n 5 file.txt - Displays the last 5 lines of file.txt.
- **grep**: Grep command is used to search through all the text in a given file.

  Eg: grep "pattern" file.txt - Searches for lines containing "pattern" in file.txt.

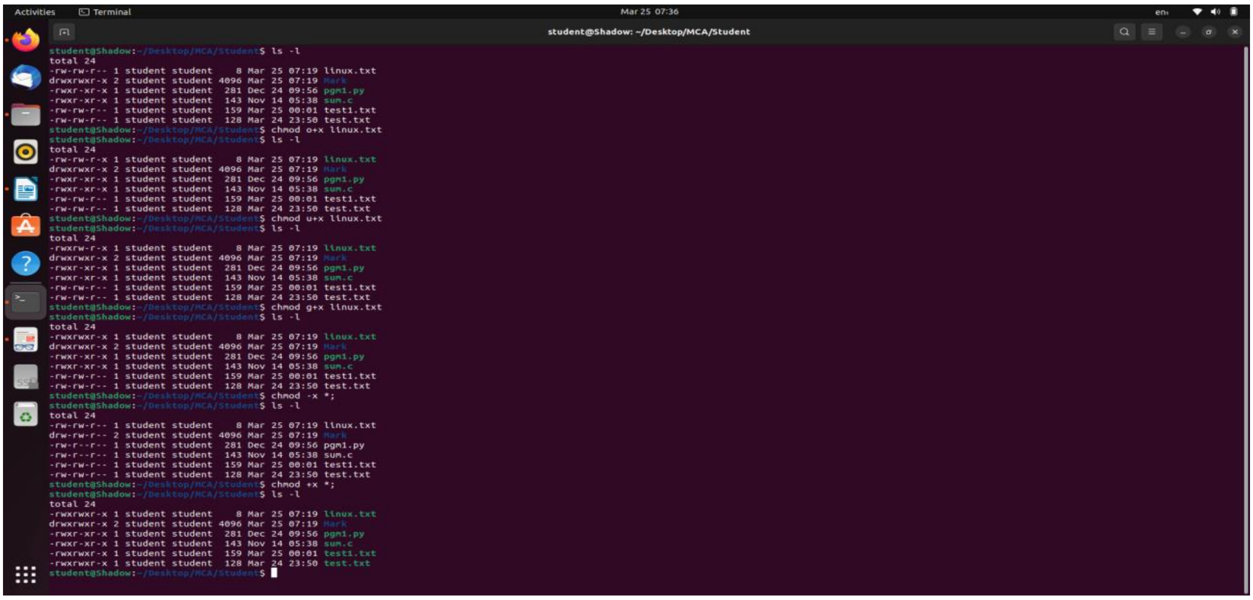
- **expr**: It was used to evaluate a given expression and display its corresponding output.

  Eg: expr 5 + 3 - Evaluates the expression 5 + 3



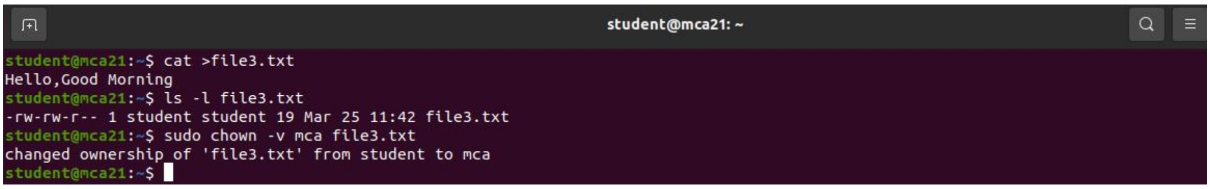
```
student@Shadow:~/Desktop/MCA/Student/Mark$ ls
pgm1.py  pgm2.py  pgm3.py  pgm4.py  pgm5.py  RegistrationForm.html  sum.c  sumodd.c  test1.txt  test.txt  WebPage.html
student@Shadow:~/Desktop/MCA/Student/Mark$ cat pgm1.py
#Display future leap years from current year to a final year entered by the User
c=int(input("Enter the current year:"))
f=int(input("Enter the final year:"))
print("The future Leap years are:")
for x in range(c,f):
    if(x%4==0 and x%100!=0) or (x%400==0):
        print(x)student@Shadow:~/Desktop/MCA/Student/Mark$
student@Shadow:~/Desktop/MCA/Student/Mark$ head -n 5 pgm1.py
#Display future leap years from current year to a final year entered by the User
c=int(input("Enter the current year:"))
f=int(input("Enter the final year:"))
print("The future Leap years are:")
for x in range(c,f):
student@Shadow:~/Desktop/MCA/Student/Mark$ tail -n 5 pgm1.py
f=int(input("Enter the final year:"))
print("The future Leap years are:")
for x in range(c,f):
    if(x%4==0 and x%100!=0) or (x%400==0):
        print(x)student@Shadow:~/Desktop/MCA/Student/Mark$
student@Shadow:~/Desktop/MCA/Student/Mark$ grep "Leap" pgm1.py
print("The future Leap years are:")
student@Shadow:~/Desktop/MCA/Student/Mark$
student@Shadow:~/Desktop/MCA/Student/Mark$
student@Shadow:~/Desktop/MCA/Student/Mark$ expr 5 + 3
8
student@Shadow:~/Desktop/MCA/Student/Mark$ expr 5 - 3
2
student@Shadow:~/Desktop/MCA/Student/Mark$ expr 10 / 2
5
student@Shadow:~/Desktop/MCA/Student/Mark$ expr 10 \* 2
20
student@Shadow:~/Desktop/MCA/Student/Mark$
```

- **chmod**: It is used to change the access permissions of files and directories.



```
student@Shadow:~/Desktop/MCA/Student$ ls -l
total 24
-rw-rw-r-- 1 student student    8 Mar 25 07:19 linux.txt
drwxrwxr-x 2 student student 4096 Mar 25 07:19 Mark
-rwxr-xr-x 1 student student  281 Dec 24 09:56 pgm1.py
-rwxr-xr-x 1 student student  143 Nov 14 05:38 sum.c
-rw-rw-r-- 1 student student  159 Mar 25 00:01 test1.txt
-rw-rw-r-- 1 student student  128 Mar 24 23:50 test.txt
student@Shadow:~/Desktop/MCA/Student$ chmod o+x linux.txt
student@Shadow:~/Desktop/MCA/Student$ ls -l
total 24
-rw-rw-r-x 1 student student    8 Mar 25 07:19 linux.txt
drwxrwxr-x 2 student student 4096 Mar 25 07:19 Mark
-rwxr-xr-x 1 student student  281 Dec 24 09:56 pgm1.py
-rwxr-xr-x 1 student student  143 Nov 14 05:38 sum.c
-rw-rw-r-- 1 student student  159 Mar 25 00:01 test1.txt
-rw-rw-r-- 1 student student  128 Mar 24 23:50 test.txt
student@Shadow:~/Desktop/MCA/Student$ chmod u+x linux.txt
student@Shadow:~/Desktop/MCA/Student$ ls -l
total 24
-rwxrw-r-x 1 student student    8 Mar 25 07:19 linux.txt
drwxrwxr-x 2 student student 4096 Mar 25 07:19 Mark
-rwxr-xr-x 1 student student  281 Dec 24 09:56 pgm1.py
-rwxr-xr-x 1 student student  143 Nov 14 05:38 sum.c
-rw-rw-r-- 1 student student  159 Mar 25 00:01 test1.txt
-rw-rw-r-- 1 student student  128 Mar 24 23:50 test.txt
student@Shadow:~/Desktop/MCA/Student$ chmod g+x linux.txt
student@Shadow:~/Desktop/MCA/Student$ ls -l
total 24
-rwxrwxr-x 1 student student    8 Mar 25 07:19 linux.txt
drwxrwxr-x 2 student student 4096 Mar 25 07:19 Mark
-rwxr-xr-x 1 student student  281 Dec 24 09:56 pgm1.py
-rwxr-xr-x 1 student student  143 Nov 14 05:38 sum.c
-rw-rw-r-- 1 student student  159 Mar 25 00:01 test1.txt
-rw-rw-r-- 1 student student  128 Mar 24 23:50 test.txt
student@Shadow:~/Desktop/MCA/Student$ chmod -x *;
student@Shadow:~/Desktop/MCA/Student$ ls -l
total 24
-rw-rw-r-- 1 student student    8 Mar 25 07:19 linux.txt
drw-rw-r-- 2 student student 4096 Mar 25 07:19 Mark
-rw-r--r-- 1 student student  281 Dec 24 09:56 pgm1.py
-rw-r--r-- 1 student student  143 Nov 14 05:38 sum.c
-rw-rw-r-- 1 student student  159 Mar 25 00:01 test1.txt
-rw-rw-r-- 1 student student  128 Mar 24 23:50 test.txt
student@Shadow:~/Desktop/MCA/Student$ chmod +x *;
student@Shadow:~/Desktop/MCA/Student$ ls -l
total 24
-rwxrwxr-x 1 student student    8 Mar 25 07:19 linux.txt
drwxrwxr-x 2 student student 4096 Mar 25 07:19 Mark
-rwxr-xr-x 1 student student  281 Dec 24 09:56 pgm1.py
-rwxr-xr-x 1 student student  143 Nov 14 05:38 sum.c
-rwxrwxr-x 1 student student  159 Mar 25 00:01 test1.txt
-rwxrwxr-x 1 student student  128 Mar 24 23:50 test.txt
student@Shadow:~/Desktop/MCA/Student$ 
```

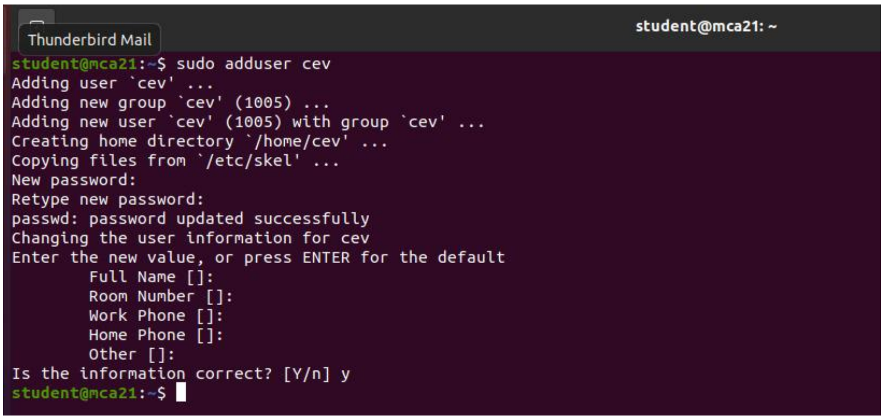
- **chown**: It is used to change the files ownership, directory,or symbolic link for a user or group.



```
student@mca21:~$ cat >file3.txt
Hello,Good Morning
student@mca21:~$ ls -l file3.txt
-rw-rw-r-- 1 student student 19 Mar 25 11:42 file3.txt
student@mca21:~$ sudo chown -v mca file3.txt
changed ownership of 'file3.txt' from student to mca
student@mca21:~$ 
```

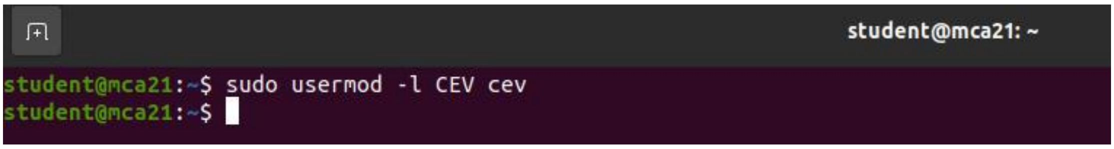
- **redirection and piping**: Pipe is used to combine two or more commends and in this the output of one command and act as input to the another command, and this command output may cut as input to the next command. Redirection in linux command refers to the ability of the linux operating system that allows as to change the standard input and standard output when executing a command on the terminal.

- **useradd**: It is used to for adding /creating user accounts in linux and other unix-like operating systems.



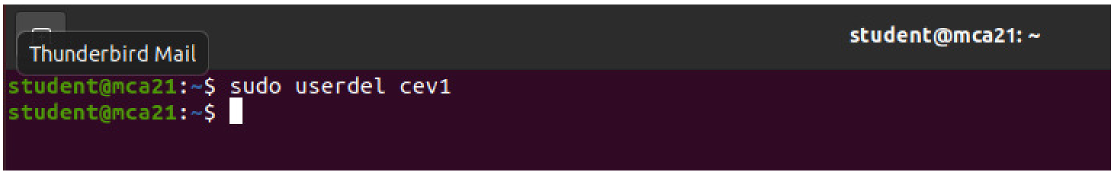
```
student@mca21:~$ sudo adduser cev
Adding user `cev' ...
Adding new group `cev' (1005) ...
Adding new user `cev' (1005) with group `cev' ...
Creating home directory `/home/cev' ...
Copying files from `/etc/skel' ...
New password:
Retype new password:
passwd: password updated successfully
Changing the user information for cev
Enter the new value, or press ENTER for the default
        Full Name []:
        Room Number []:
        Work Phone []:
        Home Phone []:
        Other []:
Is the information correct? [Y/n] y
student@mca21:~$ 
```

- **usermod**: It is used to modify existing user account details, such as username,password,home directory location,default shell,and more.



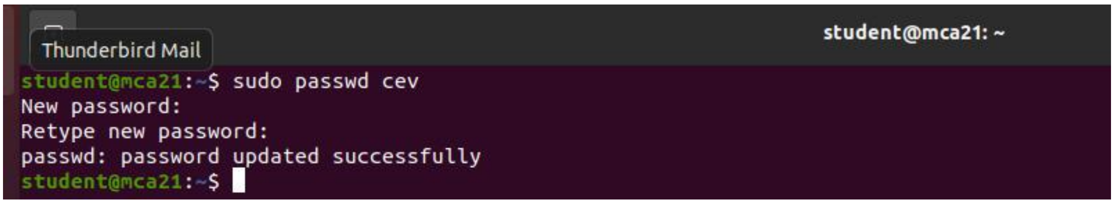
```
student@mca21:~$ sudo usermod -l CEV cev
student@mca21:~$ 
```

- **userdel**: It is used to delete a user account and related files.



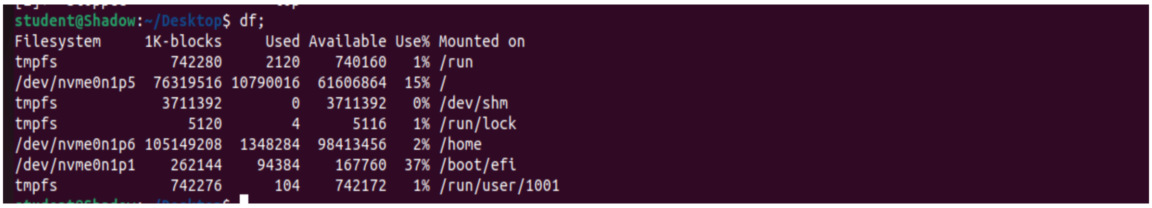
```
student@mca21:~$ sudo userdel cev1
student@mca21:~$ 
```

- **passwd**: Passwd command used to change password for user accounts.



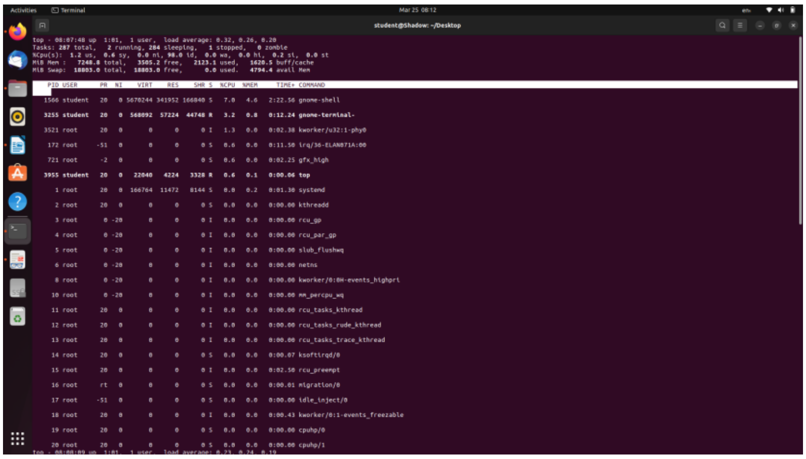
```
student@mca21:~$ sudo passwd cev
New password:
Retype new password:
passwd: password updated successfully
student@mca21:~$ 
```

- **df**: It is used to display the disk space used in the file system.

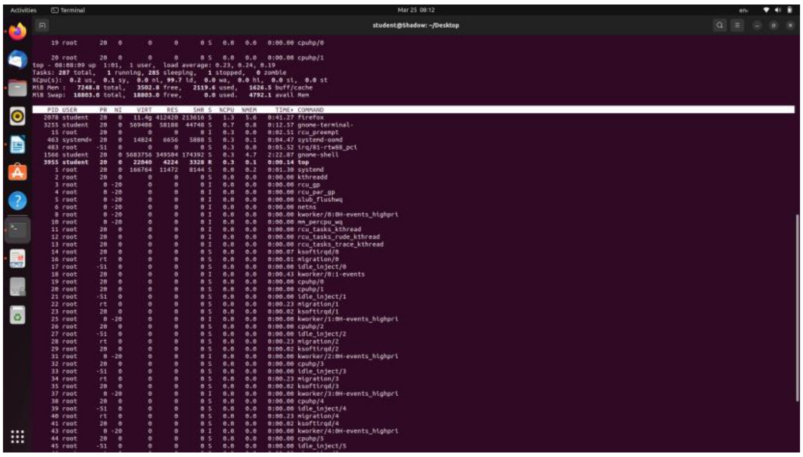


```
student@Shadow:~/Desktop$ df;
Filesystem      1K-blocks     Used Available Use% Mounted on
tmpfs              742280     2120    740160   1% /run
/dev/nvme0n1p5   76319516 10790016  61606864  15% /
tmpfs             3711392        0   3711392   0% /dev/shm
tmpfs                5120        4      5116   1% /run/lock
/dev/nvme0n1p6  105149208  1348284  98413456   2% /home
/dev/nvme0n1p1     262144    94384    167760  37% /boot/efi
tmpfs              742276      104    742172   1% /run/user/1001
```

- **top**: It shows the real-time view of running process in linux and displays and kernel managed tasks.

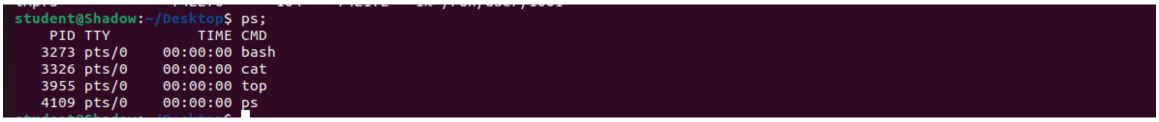


```
top - 08:07:48 up  1:01,  1 user,  load average: 0.32, 0.26, 0.20
Tasks: 287 total,   2 running, 284 sleeping,   1 stopped,   0 zombie
%Cpu(s):  1.2 us,  0.6 sy,  0.0 ni, 98.0 id,  0.0 wa,  0.0 hi,  0.2 si,  0.0 st
MiB Mem :   7248.8 total,   3505.2 free,   2123.1 used,   1620.5 buff/cache
MiB Swap:  18803.0 total,  18803.0 free,      0.0 used.   4794.4 avail Mem

    PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
   1566 student   20   0 5670244 341952 166840 S   7.0   4.6   2:22.56 gnome-shell
   3255 student   20   0  568092  57224  44748 R   3.2   0.8   0:12.24 gnome-terminal-
   3521 root      20   0       0      0      0 I   1.3   0.0   0:02.38 kworker/u32:1-phy0
    172 root     -51   0       0      0      0 S   0.6   0.0   0:11.50 irq/36-ELAN071A:00
    721 root      -2   0       0      0      0 S   0.6   0.0   0:02.25 gfx_high
   3955 student   20   0   22040   4224   3328 R   0.6   0.1   0:00.06 top
      1 root      20   0  166764  11472   8144 S   0.0   0.2   0:01.30 systemd
      2 root      20   0       0      0      0 S   0.0   0.0   0:00.00 kthreadd
      3 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 rcu_gp
      4 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 rcu_par_gp
      5 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 slub_flushwq
      6 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 netns
      8 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 kworker/0:0H-events_highpri
     10 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 mm_percpu_wq
     11 root      20   0       0      0      0 I   0.0   0.0   0:00.00 rcu_tasks_kthread
     12 root      20   0       0      0      0 I   0.0   0.0   0:00.00 rcu_tasks_rude_kthread
     13 root      20   0       0      0      0 I   0.0   0.0   0:00.00 rcu_tasks_trace_kthread
     14 root      20   0       0      0      0 S   0.0   0.0   0:00.07 ksoftirqd/0
     15 root      20   0       0      0      0 I   0.0   0.0   0:02.50 rcu_preempt
     16 root      rt   0       0      0      0 S   0.0   0.0   0:00.01 migration/0
     17 root     -51   0       0      0      0 S   0.0   0.0   0:00.00 idle_inject/0
     18 root      20   0       0      0      0 I   0.0   0.0   0:00.43 kworker/0:1-events_freezable
     19 root      20   0       0      0      0 S   0.0   0.0   0:00.00 cpuhp/0
     20 root      20   0       0      0      0 S   0.0   0.0   0:00.00 cpuhp/1
top - 08:08:09 up  1:01,  1 user,  load average: 0.23, 0.24, 0.19
```



```
     19 root      20   0       0      0      0 S   0.0   0.0   0:00.00 cpuhp/0

     20 root      20   0       0      0      0 S   0.0   0.0   0:00.00 cpuhp/1
top - 08:08:09 up  1:01,  1 user,  load average: 0.23, 0.24, 0.19
Tasks: 287 total,   1 running, 285 sleeping,   1 stopped,   0 zombie
%Cpu(s):  0.2 us,  0.1 sy,  0.0 ni, 99.7 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
MiB Mem :   7248.8 total,   3502.8 free,   2119.6 used,   1626.5 buff/cache
MiB Swap:  18803.0 total,  18803.0 free,      0.0 used.   4792.1 avail Mem

    PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
   2078 student   20   0   11.4g 412420 213616 S   1.3   5.6   0:41.27 firefox
   3255 student   20   0  569408  58188  44748 S   0.7   0.8   0:12.57 gnome-terminal-
     15 root      20   0       0      0      0 I   0.3   0.0   0:02.51 rcu_preempt
    463 systemd+  20   0   14824   6656   5888 S   0.3   0.1   0:04.47 systemd-oomd
    483 root     -51   0       0      0      0 S   0.3   0.0   0:05.52 irq/81-rtw88_pci
   1566 student   20   0 5683756 349504 174392 S   0.3   4.7   2:22.87 gnome-shell
   3955 student   20   0   22040   4224   3328 R   0.3   0.1   0:00.14 top
      1 root      20   0  166764  11472   8144 S   0.0   0.2   0:01.30 systemd
      2 root      20   0       0      0      0 S   0.0   0.0   0:00.00 kthreadd
      3 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 rcu_gp
      4 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 rcu_par_gp
      5 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 slub_flushwq
      6 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 netns
      8 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 kworker/0:0H-events_highpri
     10 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 mm_percpu_wq
     11 root      20   0       0      0      0 I   0.0   0.0   0:00.00 rcu_tasks_kthread
     12 root      20   0       0      0      0 I   0.0   0.0   0:00.00 rcu_tasks_rude_kthread
     13 root      20   0       0      0      0 I   0.0   0.0   0:00.00 rcu_tasks_trace_kthread
     14 root      20   0       0      0      0 S   0.0   0.0   0:00.07 ksoftirqd/0
     16 root      rt   0       0      0      0 S   0.0   0.0   0:00.01 migration/0
     17 root     -51   0       0      0      0 S   0.0   0.0   0:00.00 idle_inject/0
     18 root      20   0       0      0      0 I   0.0   0.0   0:00.43 kworker/0:1-events
     19 root      20   0       0      0      0 S   0.0   0.0   0:00.00 cpuhp/0
     20 root      20   0       0      0      0 S   0.0   0.0   0:00.00 cpuhp/1
     21 root     -51   0       0      0      0 S   0.0   0.0   0:00.00 idle_inject/1
     22 root      rt   0       0      0      0 S   0.0   0.0   0:00.23 migration/1
     23 root      20   0       0      0      0 S   0.0   0.0   0:00.02 ksoftirqd/1
     25 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 kworker/1:0H-events_highpri
     26 root      20   0       0      0      0 S   0.0   0.0   0:00.00 cpuhp/2
     27 root     -51   0       0      0      0 S   0.0   0.0   0:00.00 idle_inject/2
     28 root      rt   0       0      0      0 S   0.0   0.0   0:00.23 migration/2
     29 root      20   0       0      0      0 S   0.0   0.0   0:00.02 ksoftirqd/2
     31 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 kworker/2:0H-events_highpri
     32 root      20   0       0      0      0 S   0.0   0.0   0:00.00 cpuhp/3
     33 root     -51   0       0      0      0 S   0.0   0.0   0:00.00 idle_inject/3
     34 root      rt   0       0      0      0 S   0.0   0.0   0:00.23 migration/3
     35 root      20   0       0      0      0 S   0.0   0.0   0:00.02 ksoftirqd/3
     37 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 kworker/3:0H-events_highpri
     38 root      20   0       0      0      0 S   0.0   0.0   0:00.00 cpuhp/4
     39 root     -51   0       0      0      0 S   0.0   0.0   0:00.00 idle_inject/4
     40 root      rt   0       0      0      0 S   0.0   0.0   0:00.23 migration/4
     41 root      20   0       0      0      0 S   0.0   0.0   0:00.02 ksoftirqd/4
     43 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 kworker/4:0H-events_highpri
     44 root      20   0       0      0      0 S   0.0   0.0   0:00.00 cpuhp/5
     45 root     -51   0       0      0      0 S   0.0   0.0   0:00.00 idle_inject/5
```

- **ps**: It is used to list the currently running processes and their PIDs along with some other information depends on different option.



```
student@Shadow:~/Desktop$ ps;
    PID TTY          TIME CMD
   3273 pts/0    00:00:00 bash
   3326 pts/0    00:00:00 cat
   3955 pts/0    00:00:00 top
   4109 pts/0    00:00:00 ps
```

- **ssh** : It instructs the system to establish an encrypted secure connection with the host machine.

  To check the system containing ssh using the command;

  $ “ssh”

  The installation command on ssh is:

  $ “sudo apt-get install open ssh-server”

  To check the system IP address using the command:

  $ “ifconfig”

  Ping command using to check working:

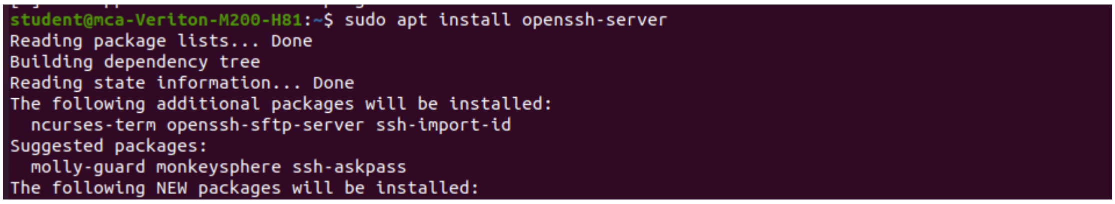
  $ “ping second system IP”

  To login second system using the given command:

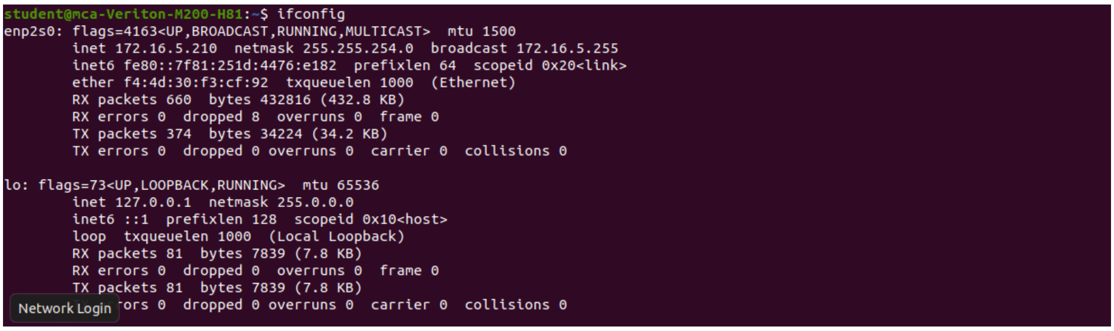
  $ “ssh second system user@second system IP

  $ “cd Desktop”

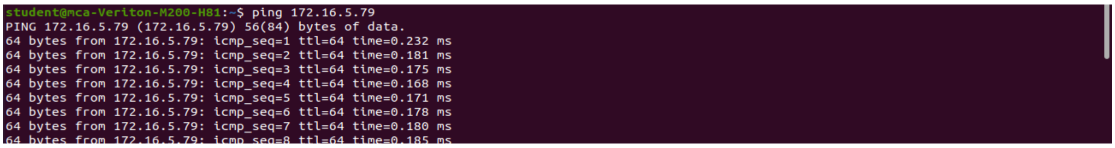
  $ “ls”



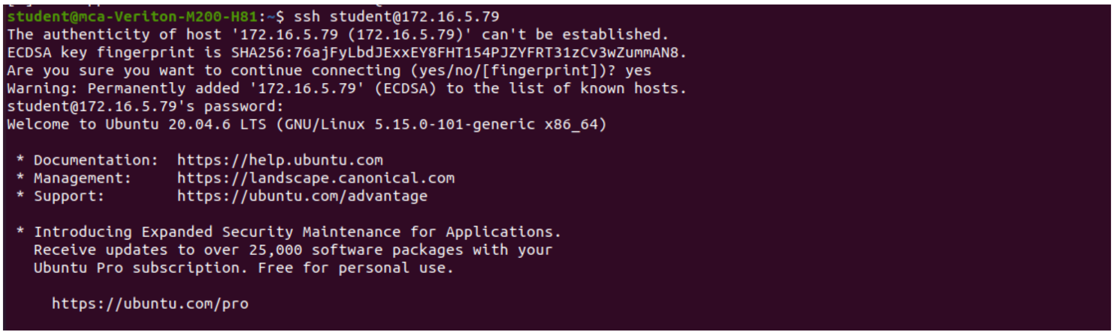
```
student@mca-Veriton-M200-H81:~$ sudo apt install openssh-server
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  ncurses-term openssh-sftp-server ssh-import-id
Suggested packages:
  molly-guard monkeysphere ssh-askpass
The following NEW packages will be installed:
```



```
student@mca-Veriton-M200-H81:~$ ifconfig
enp2s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 172.16.5.210  netmask 255.255.254.0  broadcast 172.16.5.255
        inet6 fe80::7f81:251d:4476:e182  prefixlen 64  scopeid 0x20<link>
        ether f4:4d:30:f3:cf:92  txqueuelen 1000  (Ethernet)
        RX packets 660  bytes 432816 (432.8 KB)
        RX errors 0  dropped 8  overruns 0  frame 0
        TX packets 374  bytes 34224 (34.2 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (Local Loopback)
        RX packets 81  bytes 7839 (7.8 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 81  bytes 7839 (7.8 KB)
          rors 0  dropped 0 overruns 0  carrier 0  collisions 0
```



```
student@mca-Veriton-M200-H81:~$ ping 172.16.5.79
PING 172.16.5.79 (172.16.5.79) 56(84) bytes of data.
64 bytes from 172.16.5.79: icmp_seq=1 ttl=64 time=0.232 ms
64 bytes from 172.16.5.79: icmp_seq=2 ttl=64 time=0.181 ms
64 bytes from 172.16.5.79: icmp_seq=3 ttl=64 time=0.175 ms
64 bytes from 172.16.5.79: icmp_seq=4 ttl=64 time=0.168 ms
64 bytes from 172.16.5.79: icmp_seq=5 ttl=64 time=0.171 ms
64 bytes from 172.16.5.79: icmp_seq=6 ttl=64 time=0.178 ms
64 bytes from 172.16.5.79: icmp_seq=7 ttl=64 time=0.180 ms
64 bytes from 172.16.5.79: icmp_seq=8 ttl=64 time=0.185 ms
```



```
student@mca-Veriton-M200-H81:~$ ssh student@172.16.5.79
The authenticity of host '172.16.5.79 (172.16.5.79)' can't be established.
ECDSA key fingerprint is SHA256:76ajFyLbdJExxEY8FHT154PJZYFRT31zCv3wZummAN8.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '172.16.5.79' (ECDSA) to the list of known hosts.
student@172.16.5.79's password:
Welcome to Ubuntu 20.04.6 LTS (GNU/Linux 5.15.0-101-generic x86_64)

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

 * Introducing Expanded Security Maintenance for Applications.
   Receive updates to over 25,000 software packages with your
   Ubuntu Pro subscription. Free for personal use.

     https://ubuntu.com/pro
```

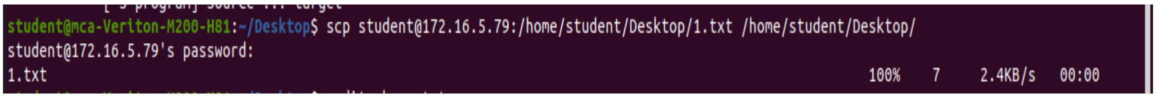
- **scp** : It is used to copy files between servers in a secure way.

  Command:

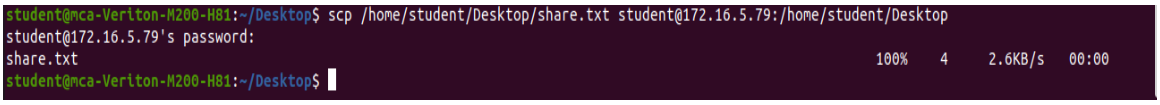
  $ ”scp 2nd system file path 1st system user@1st system IP:2nd system path”

  To logout the connection using:

  $ “logout/cntrl+D”



```
student@mca-Veriton-M200-H81:~/Desktop$ scp student@172.16.5.79:/home/student/Desktop/1.txt /home/student/Desktop/
student@172.16.5.79's password:
1.txt                                                                             100%    7     2.4KB/s   00:00
```



```
student@mca-Veriton-M200-H81:~/Desktop$ scp /home/student/Desktop/share.txt student@172.16.5.79:/home/student/Desktop
student@172.16.5.79's password:
share.txt                                                                         100%    4     2.6KB/s   00:00
student@mca-Veriton-M200-H81:~/Desktop$ █
```

- **ssh-keygen** :It is used to generate,manage,and convert authentication keys for “ssh”.
- **ssh-copy-id** : It uses the “ssh” protocol to connect to the target host and upload the “ssh” user key.