

FEDERAL INSTITUTE OF SCIENCE AND TECHNOLOGY

(FISAT)TM

HORMIS NAGAR, MOOKKANNOOR

ANGAMALY-683577



'FOCUS ON EXCELLENCE'

LABORATORY RECORD

Name : NOREEN VALLONTHAIEL

Branch : MCA

Semester : SECOND

Batch : B

Roll No : 25

FEDERAL INSTITUTE OF SCIENCE AND TECHNOLOGY
(FISAT)TM

HORMIS NAGAR, MOOKKANNOOR

ANGAMALY-683577



'FOCUS ON EXCELLENCE'

Name : NORREEN VALLONTHAIEL

Branch : COMPUTER APPLICATION

Semester : SEC0ND Roll No: 25

University Exam.Reg. No:

CERTIFICATE

Certified that this is the Bonafide record of the Practical work done by

Mr/Ms in the

..... Laboratory of the Federal Institute of

Science and Technology during the academic year

Signature of Staff in Charge

Signature of H.O.D

Name :

Name:

Date :

Date of University practical examination

Signature of

Signature of

Internal Examiner

External Examiner

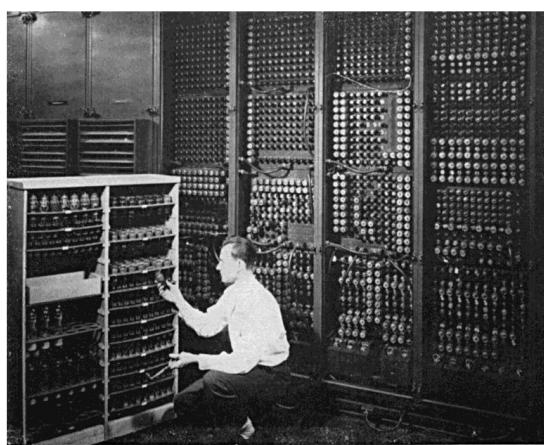
EXPERIMENT -1

1. BASIC INTRODUCTORY CONCEPT OF COMPUTER HARDWARE

1.1 What is Computer?

A computer is a programmable electronic device that accepts raw data as input and processes it with a set of instructions (a program) to produce the result as output. It renders output just after performing mathematical and logical operations and can save the output for future use. It can process numerical as well as non-numerical calculations.

1.2 History of Computers

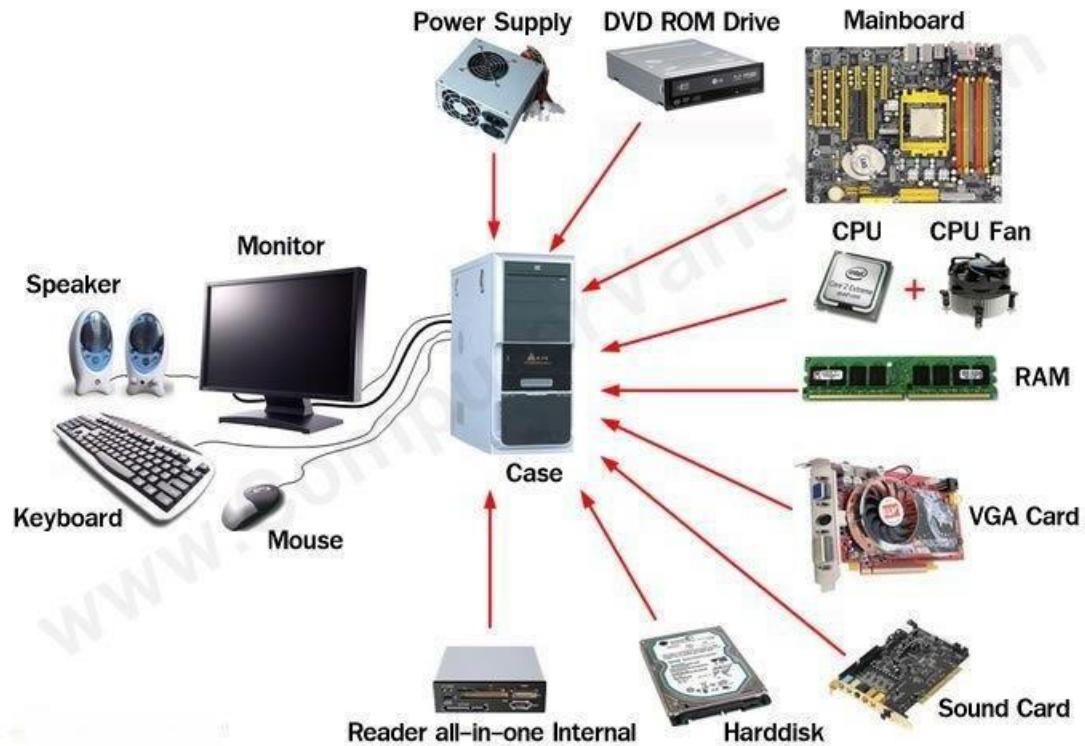


Replacing a bad tube meant checking among ENIAC's 19,000 possibilities.

Since the evolution of humans, devices have been used for calculations for thousands of years. One of the earliest and well-known devices was an abacus. Then in 1822, the father of computers, **Charles Babbage** began developing the first mechanical computer.

1.3 Computer Hardware

Computer hardware includes the physical parts of a computer, such as the case, central processing unit (CPU), monitor, mouse, keyboard, computer data storage, graphics card, sound card, speakers and motherboard. Hardware is typically directed by the software to execute any command or instruction. A combination of hardware and software forms a usable computing system, although other systems exist with only hardware.



1.4 The following are the basic components that will be detailed :-

1.4.1 Motherboard

1.4.2. RAM Modules

1.4.3. Daughter cards

1.4.4. Bus slots

1.4.5. SMPS

1.4.6. Internal Storage Devices

1.4.7. Interfacing Ports

1.4.1 MOTHERBOARD

A motherboard (also called mainboard, main circuit board, system board, baseboard, planar board, logic board or mobo) is the main printed circuit board (PCB) in general-purpose computers and other expandable systems. It holds and allows communication between many of the crucial electronic components of a system, such as the central processing unit (CPU) and memory, and provides connectors for other peripherals. Unlike a backplane, a motherboard usually contains significant sub-systems, such as the central processor, the chipset's input/output and memory controllers, interface connectors, and other components integrated for general use.



Motherboard means specifically a PCB with expansion capabilities. As the name suggests, this board is often referred to as the "mother" of all components attached to it, which often include peripherals, interface cards, and daughter cards: soundcards, video cards, network cards, host bus adapters, TV tuner cards, IEEE 1394 cards; and a variety of other custom components.

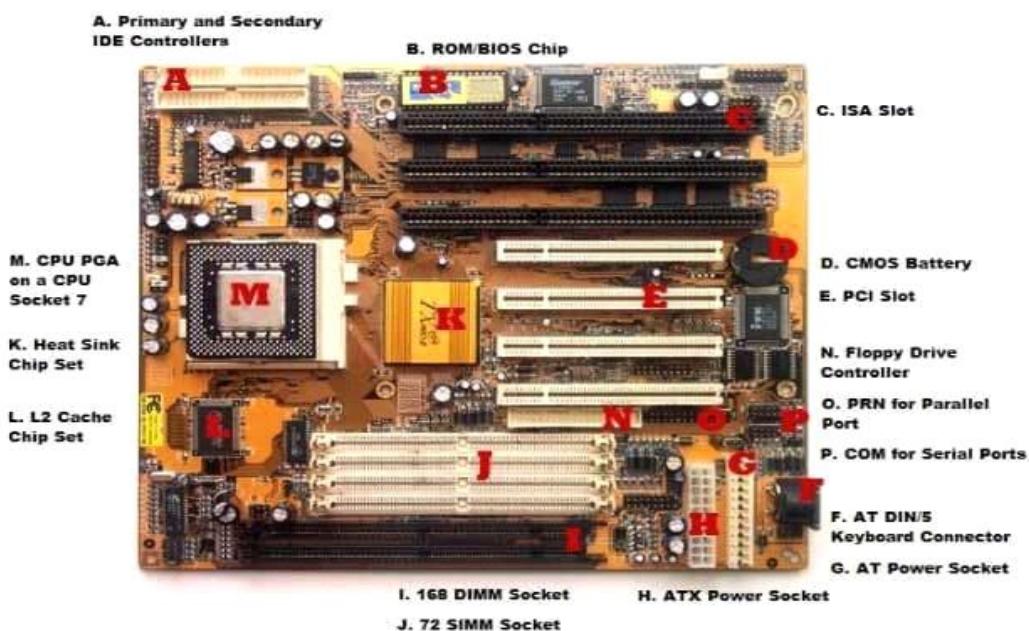
1.4.1.1 FEATURES OF MOTHERBOARD

- Motherboard varies greatly in supporting various types of components.
- Motherboard supports a single type of CPU and few types of memories.
- Video cards, hard disks, sound cards have to be compatible with the motherboard to function properly.
- Motherboards, cases, and power supplies must be compatible to work properly together.

1.4.1.2 TYPES OF MOTHERBOARD

1.4.1.2.1 AT Motherboard

These motherboards have bigger physical dimensions of hundreds of millimetres and hence they are not the right fit for the mini desktop category of computers.



1.4.1.2.2 ATX Motherboards

ATX denotes Advanced technology extended, It was developed by Intel during the 1990s and it was an improved version over an earlier version of AT motherboard. It is smaller in size when compared to AT and it provides interchangeability of the connected components.

1.4.1.2.3 BTX Motherboard

BTX denotes Balanced Technology Extended, intended to manage demands of new technologies in terms of more power requirements hence generation of more heat.

1.4.1.2.4 Pico BTX Motherboard

These boards are smaller in size and hence the word Pico. Two expansion slots are supported in spite of being sharing the top half of BTX. Half-height or riser cards are its unique features and it supports the demands of digital applications.

1.4.1.2.5 Mini ITX Motherboard

It's a miniature version of motherboard. Designed in the early 2000s and its dimension is 17 x 17 cm. Mainly used in small form factor (SFF) computer due to its lower power consumption and faster cooling ability.

1.4.1.3 MAIN COMPONENTS OF MOTHERBOARD

1.4.1.3.1 FLOPPY DISC CONTROLLER

A floppy disk controller (FDC) is an electronic chip controller used as an interface between a computer and a floppy disk drive. Modern computers have this chip embedded in the motherboard, whereas they were a separate component when they were originally introduced.

A floppy disk controller (FDC) is a specially designed chip that controls the reading and writing functionality of a floppy drive. An FDC can support up to four floppy disk drives at a time. The controller is connected to the system bus of the CPU and appears as a set of I/O ports to the computer. It is usually also linked to a serial bus of the direct memory access (DMA) controller. In an x86 computer, the floppy disk controller uses IRQ6, whereas interrupt schemes are used on other systems. Data transmission is often done by FDC while in DMA mode.



Floppy disk controller functions (FDC)

- Translate data bits into FM, MFM, M²FM, or GCR format to be able to record them
- Interpret and execute commands such as seek, read, write, format, etc.
- Error detection with check sums generation and verification, like CRC
- Synchronize data with phase-locked loop(PLL)

1.4.1.3.2 Serial Ports



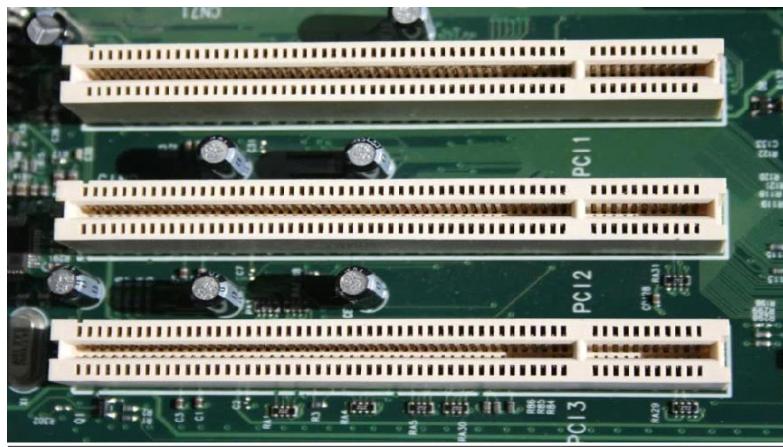
Serial Ports provide an interface to connect serial lines to prepare a serial communication. Serial ports are typically used in modem, mouse, security cameras etc. A Serial port uses DB-9 connector, a 9 pin D-Shaped Connector which connects to the transmission line. A serial port provides a serial communication using one line and thus have no dependency on other wire's speed and its length can be extended as per the need.

1.4.1.3.3 Parallel Ports



Parallel ports provide an interface to connect multiple lines to prepare a parallel communication to send large data at a time. Parallel ports are used in connecting printers, hard-drives, CD-drives etc. All lines speed should be same to avoid error and cross-talk issues. To avoid such issues, the wires are kept small in length. A parallel port uses D-25 connector, a 25 pin D- Shaped connector which connects to the transmission wires.

1.4.1.3.4 The Expansion Buses



An expansion bus is an input/output pathway from the CPU to peripheral devices and it is typically made up of a series of slots on the motherboard. Expansion boards(cards) plug into the bus. PCI is the most common expansion bus in a PC and other hardware platforms. PCI stands for Peripheral Component Interface; PCI slot allows you to insert expansion cards into your computer. Buses carry signals such as data, memory addresses, power, and control signals from component to component. Other types of buses include ISA and EISA. Expansion buses enhance the PCs capabilities by allowing users to add missing features in their computers by slotting adapter cards into expansion slots.

1.4.1.3.5 The Computer Chip-sets



A chipset is a group of small circuits that coordinate the flow of data to and from a PC's key components. These key components include the CPU itself, the main memory, the secondary cache, and any devices situated on the buses. A chip set also controls data flow to and from hard disks and other devices connected to the IDE channels.

A computer has got two main chipsets:

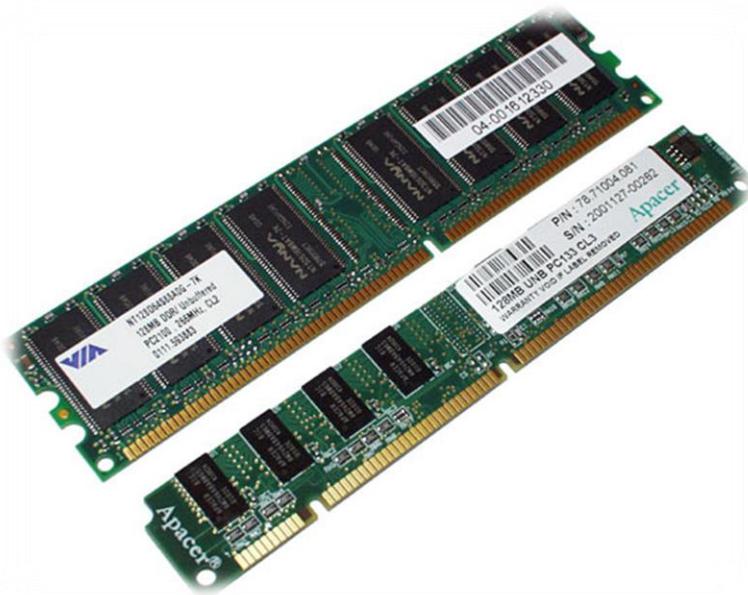
- The North Bridge (also called the memory controller) is in charge of controlling transfers between the processor and the RAM, which is why it is located physically near the processor. It is sometimes called the GMCH, for Graphic and Memory Controller Hub.
- The South Bridge (also called the input/output controller or expansion controller) handles communications between slower peripheral devices. It is also called the ICH (I/O Controller Hub). The term "bridge" is generally used to designate a component which connects two buses.

Chipset manufacturers include SIS, VIA, ALI, and OPTI.

1.4.2. RANDOM ACCESS MEMORY

1.4.2.1. Introduction

RAM, which stands for Random Access Memory, is a hardware device generally located on the motherboard of a computer and acts as an internal memory of the CPU. It allows CPU store data, program, and program results when you switch on the computer. It is the read and write memory of a computer, which means the information can be written to it as well as read from it.



RAM comes in the form of a chip that is individually mounted on the motherboard or in the form of several chips on a small board connected to the motherboard. It is the main memory of a computer. It is faster to write to and read from as compared to other memories such as a hard disk drive (HDD), solid-state drive (SSD), optical drive, etc.

A computer's performance mainly depends on the size or storage capacity of the RAM. If it does not have sufficient RAM (random access memory) to run the OS and software programs, it will result in slower performance. So, the more RAM a computer has, the faster it will work. Information stored in RAM is accessed randomly, not in a sequence as on a CD or hard drive. So, its access time is much faster.

1.4.2.2. CHARACTERISTICS OF RAM

1.4.2.2.1. SDRAM AND DDR

Memory modules are labelled with either SDRAM (Synchronous Dynamic Random-Access Memory) or DDR (Double Data Rate). DDR RAM, as the "double data rate" name suggests, offers much faster speeds than SDRAM. Each generation of DDR, such as DDR2 and DDR3, offers performance improvements over the one preceding it.

1.4.2.2.2. SPEED

The two numbers often quoted first on memory module specifications -- for example, "DDRxxx/PCxxxx" -- indicate the maximum clock speed and maximum transfer rate the device can operate at -- and the higher the better. The stated clock speed is actually double the real figure, so a stick of RAM labelled DDR3-1333 PC3200 offers a clock speed of 666 MHz and a transfer rate of 3,200 MB/s.

1.4.2.2.3 PINS

Essentially, the number of pins a memory module has indicates the number of connections it has to the motherboard -- and thus which motherboards it's compatible with. More pins mean more data can be transferred at once, for faster operation overall, though performance is based on a variety of different factors, including CPU speed and the motherboard configuration.

1.4.2.2.4 VOLTS

The voltage rating associated with a memory module -- for example, 2.5 V -- indicates how much power it draws from the motherboard in order to operate properly. RAM sticks that can work at lower voltages use up less power and give off less heat, and are therefore more suitable for smaller systems such as laptops.

1.4.2.2.5 CAS LATENCY

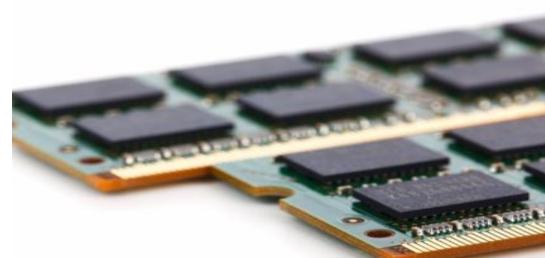
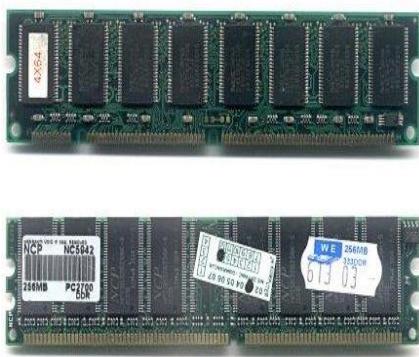
CAS (Column Address Strobe) Latency, sometimes abbreviated to just "CL," indicates the time it takes for a memory module to return data to the CPU. A lower CAS Latency indicates RAM that performs faster.

1.4.2.2.6 TIMING

Memory modules feature other timings besides CAS Latency, usually listed as a series of numbers after the other specifications. In order after CAS Latency, they are RAS (Row Address Strobe) to CAS delay, RAS Precharge, Active to Precharge delay and, optionally, command rate. These timings are only really of interest to advanced technical users, as the impact they have on performance is very small.

1.4.2.2.7 REDUNDANCY

The redundancy built into a memory module indicates its ability to recover from errors and to alert the operating system to a problem, rather than just allowing it to crash and lose your data. More expensive and critical server memory uses Error Checking and Correcting Redundancy, or ECC, in order to detect and correct errors wherever possible.

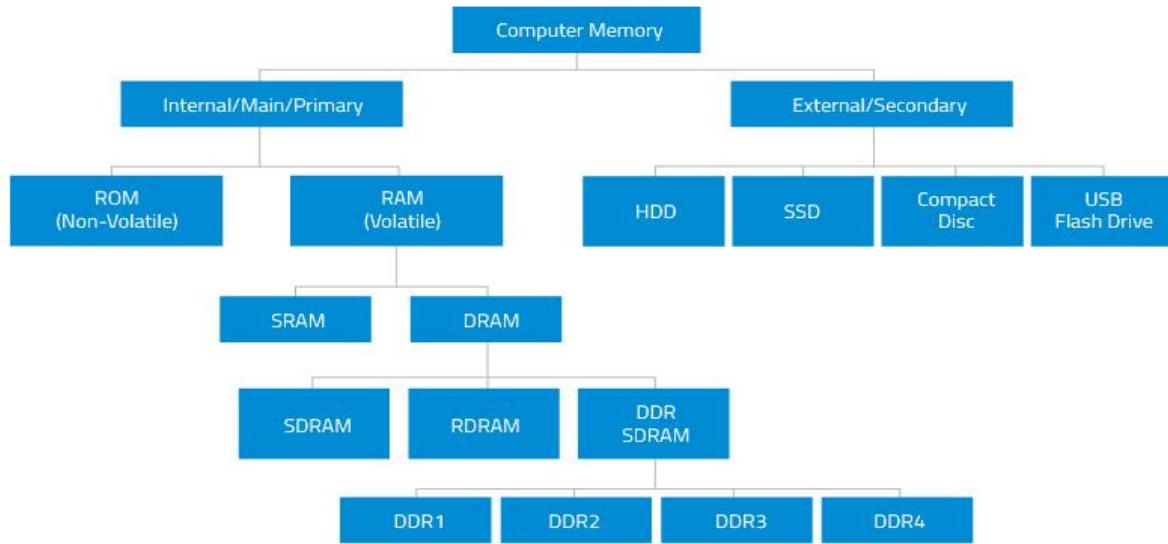


1.4.2.3. Different Types of RAM

RAM(Random Access Memory) is a part of computer's Main Memory which is directly accessible by CPU. RAM is used to Read and Write data into it which is accessed by CPU randomly. RAM is volatile in nature, it means if the power goes off, the stored information is lost. RAM is used to store the data that is currently processed by the CPU. Most of the programs and data that are modifiable are stored in RAM.

Integrated RAM chips are available in two form:

1. SRAM(Static RAM)
2. DRAM(Dynamic RAM)



1.4.2.3.1 SRAM

The SRAM memories consist of circuits capable of retaining the stored information as long as the power is applied. That means this type of memory requires constant power. SRAM memories are used to build Cache Memory.

1.4.2.3.2 DRAM

DRAM stores the binary information in the form of electric charges that applied to capacitors. The stored information on the capacitors tend to lose over a period of time and thus the capacitors must be periodically recharged to retain their usage. The main memory is generally made up of DRAM chips.

1.4.2.4. Functions

1.4.2.4.1. Reading Files

Hard drives can store vast numbers of files, but compared to other computer components, drives run very slowly. Accessing hard drive files -- especially when those files are scattered across the drive due to fragmentation -- requires the drive to move its mechanical read/write head back and forth and to wait for the spinning platters to spin into the correct position. Even though drives spin at thousands of rotations per minute, this process causes a noticeable delay when reading files. To lessen the slowdown, computers store files in RAM after the files are first read from the drive. RAM has no moving parts, so the files can load very quickly during subsequent uses.

1.4.2.4.2 Temporary Storage

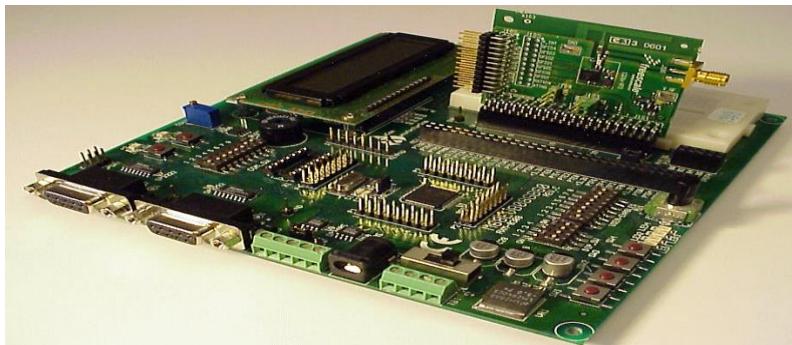
In addition to storing files read from the hard drive, RAM also stores data that programs are actively using but that doesn't need to be saved permanently. By keeping this data in RAM, programs can work with it quickly, improving speed and responsiveness.

1.4.2.4.3 RAM Size

If RAM works so much faster than the hard drive, why not load all of the computer's data into RAM? One major reason: computers have far less RAM than drive space. As of publication, hard drive sizes range from a few hundred gigabytes in laptops to 10TB in high-end enterprise systems. Most home computers have between 1 and 4TB of drive space.

1.4.3. DAUGHTER CARD

Referred to as a piggyback board and **daughter card**, a daughterboard is an expansion board that connects directly to the motherboard and gives added functionality.



Motherboard with daughter card

To disable a daughter board, the user must physically remove it from the motherboard. Daughter boards do not provide new functions to the circuit like an expansion but they extend the circuitry of the circuit in which they are plugged into.

1.4.3.1 Functionalities of daughter board:

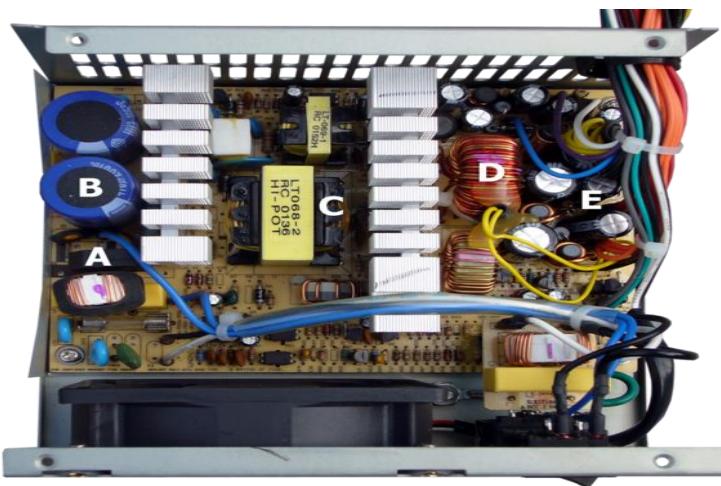
- It is known as the piggyback board, riser card, daughtercard etcetera.
- A daughter board is smaller than a motherboard and may have some slots like the motherboard.
- A daughter board is a printed circuit board which is connected to the motherboard or expansion card.
- Unlike expansion card, daughter boards are directly connected to the motherboard by soldering.
- Daughter boards do not provide new functions to the circuit like an expansion but they extend the circuitry of the circuit in which they are plugged into.
- Daughter boards are released by the vendors as an update of motherboard or expansion card.
-

1.4.3.2 List of daughter cards

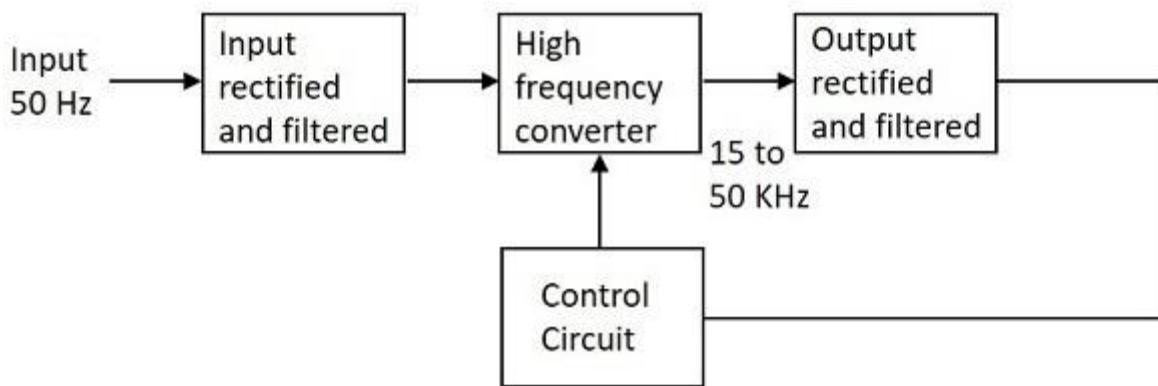
- Video Card: This is also referred to as the graphics adapter, display adapter or video adapter.
- Sound Card: To handle sound, to insert a microphone or connect a speaker this sound card is used.
- Network Interface Card: This is also referred as NIC. The computer can be connected to a network only with the use of this network interface card.
- Ethernet Card: Ethernet card is used to connect computers to computers. A cable is used to connect the Ethernet cards in each computer to make a network.

1.4.4. SWITCHED- MODE POWER SUPPLY

Switched-mode power supply Introduction A switched-mode power supply (switching-mode power supply, switch-mode power supply, switched power supply, SMPS, or switcher) is an electronic power supply that incorporates a switching regulator to convert electrical power efficiently. Its function is to convert a level of voltage to the voltage or current required by the client through different forms of architecture.



WORKING



The working of SMPS is simply understood by knowing that the transistor used in LPS is used to control the voltage drop while the transistor in SMPS is used as a controlled switch. The AC input supply signal 50 Hz is given directly to the rectifier and filter circuit combination without using any transformer. A fast switching device such as a Power transistor is employed in this section, which switches ON and OFF according to the variations and this output is given to the primary of the transformer. This is a regulated output voltage which is then given to the control circuit, which is a feedback circuit

1.4.5. INTERNAL STORAGE DEVICES

A storage device is any type of computing hardware that is used for storing, porting or extracting data files and objects. Storage devices can hold and store information both temporarily and permanently. They may be internal or external to a computer.

Some storage devices are classed as 'internal' which means they are inside the computer case. At the most basic level, internal storage is needed to hold the operating system so that the computer is able to access the input and output devices. It will also be used to store the applications software that you use and more than likely, the original copies of your data files.

Internal storage allows the data and applications to be loaded very rapidly into memory, ready for use. The data can be accessed much faster than data which is stored on an external storage device. This is because internal storage devices are connected directly to the motherboard and its data bus whereas external devices are connected through a hardware interface such as USB, which means they are considerably slower to access.

The main disadvantage of internal storage is that when the hard disk fails (and it will), all the data and applications may be lost. This can be avoided to some extent by using more than one hard disk within the machine. Each hard disk has a copy of all the data, so if one fails the other can carry on. This is called a RAID array. An alternative is to use external drives for backup

1.4.5.1. Examples of Internal storage devices

- Hard Disk
- SSD
- RAM

1.4.5.1.1. HARD DISK

A **hard disk drive** (sometimes abbreviated as a **hard drive**, **HD**, or **HDD**) is a non-volatile data storage device. It is usually installed internally in a computer, attached directly to the disk controller of the computer's motherboard. It contains one or more platters, housed inside of an air-sealed casing. Data is written to the platters using a magnetic head, which moves rapidly over them as they spin.

Internal hard disks reside in a drive bay, connected to the motherboard using an ATA, SCSI, or SATA cable. They are powered by a connection to the computer's PSU (power supply unit).

Hard disk, Magnetic storage medium for a microcomputer. Hard disks are flat, circular plates made of aluminum or glass and coated with a magnetic material. Hard disks for personal computers can store up to several gigabytes (billions of bytes) of information. Data are stored on their surfaces in concentric tracks. A small electromagnet, called a magnetic head, writes a binary digit (1 or 0) by magnetizing tiny spots on the spinning disk in different directions and reads digits by detecting the magnetization direction of the spots. A computer's hard drive is a device consisting of several hard disks, read/write heads, a drive motor to spin the disks, and a small amount of circuitry, all sealed in a metal case to protect the disks from dust. In addition to referring to the disks themselves, the term hard disk is also used to refer to the whole hard drive.

Computers rely on hard disk drives (HDDs) to store data permanently. They are storage devices used to save and retrieve digital information that will be required for future reference.

Hard drives are non-volatile, meaning that they retain data even when they do not have power. The information stored remains safe and intact unless the hard drive is destroyed or interfered with. The information is stored or retrieved in a random-access manner as opposed to sequential access. This implies that blocks of data can be accessed at any time they are required without going through other data blocks.



1.4.5.1.2. SOLID STATE DRIVE

A solid-state drive (SSD) is a solid-state storage device that uses integrated circuit assemblies to store data persistently, typically using flash memory, and functioning as secondary storage in the hierarchy of computer storage. It is also sometimes called a **solid-state device** or a **solid-state disk**, even though SSDs lack the physical spinning disks and movable read–write heads used in hard disk drives (HDDs) and floppy disks.

Compared with electromechanical drives, SSDs are typically more resistant to physical shock, run silently, and have quicker access time and lower latency. SSDs store data in semiconductor cells. SSDs have a limited number of writes, and slow as they reach storage capacity.



1.4.5.1.3. RAM

RAM (Random Access Memory) is the internal memory of the CPU for storing data, program, and program result. It is a read/write memory which stores data until the machine is working. As soon as the machine is switched off, data is erased.

RAM is volatile, i.e. data stored in it is lost when we switch off the computer or if there is a power failure. RAM is small, both in terms of its physical size and in the amount of data it can hold.



RAM is of two types –

- Static RAM (SRAM)
- Dynamic RAM (DRAM)

1.4.5.2. Static RAM (SRAM)

The word **static** indicates that the memory retains its contents as long as power is being supplied. However, data is lost when the power gets down due to volatile nature. SRAM chips use a matrix of 6-transistors and no capacitors. Transistors do not require power to prevent leakage, so SRAM need not be refreshed on a regular basis.

1.4.5.3. Dynamic RAM (DRAM)

DRAM, unlike SRAM, must be continually **refreshed** in order to maintain the data. This is done by placing the memory on a refresh circuit that rewrites the data several hundred times per second. DRAM is used for most system memory as it is cheap and small.

1.4.5.4 SOME OTHER STORAGE DEVICES

- Magnetic Storage Device
- Optical Storage Device
- Flash Memory Device
- Online and Cloud
- Paper Storage



1.4.6. COMPUTER PORTS

1.4.6.1 WHAT IS MEANT BY A PORT?

A port in a computer network is a communication endpoint whereas, in an operating system, it is a logical construct, recognizes precise method otherwise a network service type. These endpoints recognize the combination of every protocol and its address through 16-bit unsigned numbers, called the port number. The protocols that use port numbers are the TCP (Transmission Control Protocol) and UDP (User Datagram Protocol). The port number in every computer networking uses an IP address of the type of protocol & the host

1.4.6.2 What is Port in Computer/Computer Port?

A computer port or a communication port is a connection point used as an interface between the computer & the peripherals like keyboard, mouse, printer, display unit, monitor, flash drive and speaker. The computer port transmits the data from any peripheral to the computer. In general, the communication ports are available in two type like Serial Ports as well as Parallel Ports.



1.4.6.3 Characteristics of Computer Ports

The characteristics of the computer port include the following.

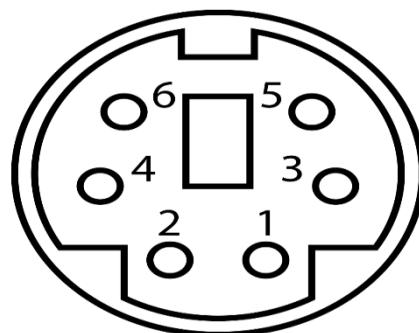
- It is an interface between external devices as well as a computer.
- Ports on the motherboard can be connected using an external device cable by plugging in.
- The external devices which are connected through via ports are the keyboard, mouse, microphone, monitor, speakers, etc.

1.4.6.4 Types of Computer Ports

There are different types of ports available in a computer network. Some of them are:

- PS/02
- Serial Port
- Parallel Port
- Ethernet
- VGA Port
- USB Port
- DVI Port
- HDMI Port
- Display Port

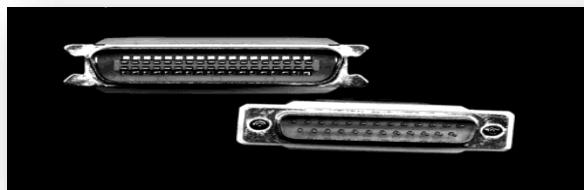
1.4.6.4.1 PS/2 PORTS: PS/2 is a type of port used by older computers for connecting input devices such as keyboards and mice. The port was introduced with IBM's Personal System/2 computer in 1987 (which was abbreviated "PS/2"). The PS/2 port has six pins and is roughly circular in shape



1.4.6.4.2 SERIAL PORT: A serial port is an interface that allows a PC to transmit or receive data one bit at a time. It is one of the oldest types of interfaces commonly used to connect printers and external modems to a PC. Compared to a parallel port, the data transfer rate of a serial port is slower. Normally, a serial port is a male port, while a parallel port is a female port. The serial port standard is RS-232. This standard is used for transmitting serial communication between devices,



1.4.6.4.3 PARALLEL PORT: Parallel port is a type of interface found on computers (personal and otherwise) for connecting peripherals. Parallel ports send multiple bits of data at once (parallel communication), as opposed to serial communication, in which bits are sent one at a time. Parallel port is an interface between computer and peripheral devices like printers with parallel communication



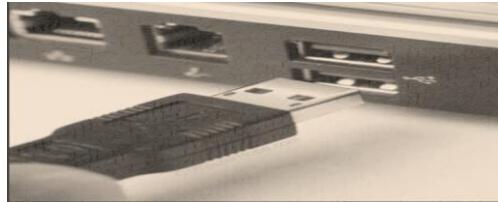
1.4.6.4.4 ETHERNET: An Ethernet port is a jack or socket on a computer that allows the use of an Ethernet connector. These ports are essential in allowing the creation of local area networks (LANs). An Ethernet port is usually found on networking devices, including computers, routers, video game consoles, modems, and televisions. Ethernet is a communication system that allows multiple local devices to share information and work together.



1.4.6.4.5 VGA PORT: Abbreviated VGA, Video Graphics Array is a standard type of connection for video devices such as monitors and projectors. Generally, VGA refers to the types of cables, ports, and connectors used to connect monitors to video cards.



1.4.6.4.6 USB PORT: A **USB port** is a standard cable connection interface for personal computers and consumer electronics devices. USB stands for Universal Serial Bus, USB ports allow USB devices to be connected to each other with and transfer digital data over USB cables



1.4.6.4.7 HDMI PORT: Full form of HDMI is **High-Definition Multimedia Interface**.

HDMI is a proprietary audio/video interface for transmitting uncompressed video data and compressed or uncompressed digital audio data from an HDMI-compliant source device, such as a display controller, to a compatible computer monitor, video projector, digital television, or digital audio device..

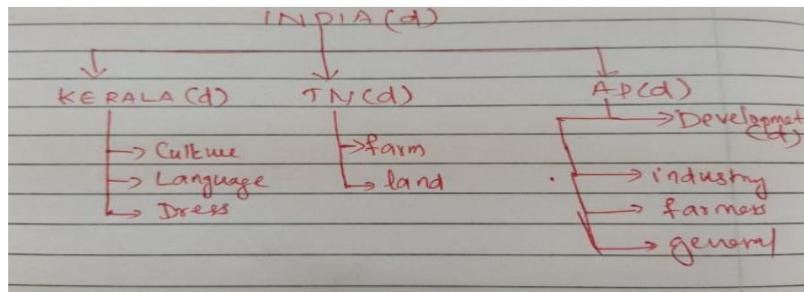


1.4.6.4.8 DISPLAY PORT: DisplayPort is a digital display interface developed by a consortium of PC and chip manufacturers and standardized by the Video Electronics Standards Association. Display Port is a digital display interface with optional multiple channel audio and other forms of data. Display Port is developed with an aim of replacing VGA and DVI ports as the main interface between a computer and monitor.



EXPERIMENT -2

2.1. Linux commands



Q1. Create the directories and files as given in the above directory structure. Directories are mentioned as (d). Files should be filled with necessary text data.

```

noreen@NoreenNVirtualBox:~$ mkdir INDIA
noreen@NoreenNVirtualBox:~$ cd INDIA
noreen@NoreenNVirtualBox:~/INDIA$ mkdir kerala
noreen@NoreenNVirtualBox:~/INDIA$ mkdir TN
noreen@NoreenNVirtualBox:~/INDIA$ mkdir AP
noreen@NoreenNVirtualBox:~/INDIA$ cd kerala
noreen@NoreenNVirtualBox:~/INDIA/kerala$ cat >culture.txt
This is about culture in Kerala
noreen@NoreenNVirtualBox:~/INDIA/kerala$ cat >dress.txt
saree
skirt
pant
shirt
jubba
lungi
noreen@NoreenNVirtualBox:~/INDIA/kerala$ cat >lang.txt
language of Kerala is malayalam
noreen@NoreenNVirtualBox:~/INDIA/kerala$ ls
culture.txt dress.txt lang.txt
noreen@NoreenNVirtualBox:~/INDIA/kerala$ cd ..
noreen@NoreenNVirtualBox:~/INDIA$ cd TN
noreen@NoreenNVirtualBox:~/INDIA/TN$ cat >farm.txt
In TN, major plantation crops are cashew,bamboo,rubber
noreen@NoreenNVirtualBox:~/INDIA/TN$ cat >land.txt
TN is a state in south India. It's capital and largest city is chennai
noreen@NoreenNVirtualBox:~/INDIA/TN$ cd ..
noreen@NoreenNVirtualBox:~/INDIA$ cd AP
noreen@NoreenNVirtualBox:~/INDIA/AP$ mkdir development
noreen@NoreenNVirtualBox:~/INDIA/AP$ cat >industry.txt
automobiles and auto components industry, IT industry, farming are the main industries in AP
noreen@NoreenNVirtualBox:~/INDIA/AP$ cat > industry.txt
automobiles and auto components industry, IT industry, farming are the main industries in AP
noreen@NoreenNVirtualBox:~/INDIA/AP$ cat > general.txt
AP is a state in south-eastern coastal region of India. it is 7 largest state covering and the 10th most populous state in India
noreen@NoreenNVirtualBox:~/INDIA/AP$ cat > farmers.txt
AP's total population approximately 62% and families are dependent on agriculture.
noreen@NoreenNVirtualBox:~/INDIA/AP$ 
  
```

Q2. List your present working directory.

```

noreen@NoreenNVirtualBox:~/INDIA/AP$ ls
development farmers.txt general.txt industry industry.txt
  
```

Q3. Move to the root directory.

```

noreen@NoreenNVirtualBox:~/INDIA/AP$ cd ..
noreen@NoreenNVirtualBox:~/INDIA$ cd ..
  
```

Q4. Copy the file ‘Culture’ to the folder AP.

```

noreen@NoreenNVirtualBox:~$ cd INDIA
noreen@NoreenNVirtualBox:~/INDIA$ cp -r kerala/culture.txt AP
noreen@NoreenNVirtualBox:~/INDIA$ cd AP
noreen@NoreenNVirtualBox:~/INDIA/AP$ ls
culture.txt development farmers.txt general.txt industry industry.txt
noreen@NoreenNVirtualBox:~/INDIA/AP$ 
  
```

Q5. Display the content of the file ‘general’.

```
noreen@NoreenNVirtualBox:~/INDIA/AP$ cat general.txt
AP is a state in south-eastern coastal region of India. it is 7 largest state covering and the 10th most populous state in India
[noreen@NoreenNVirtua... /INDIA/AP]$ cd
```

Q6. Move the file ‘language’ to the directory AP/Development.

```
noreen@NoreenNVirtualBox:~/INDIA/AP$ cd ..
noreen@NoreenNVirtualBox:~/INDIA$ mv kerala/language.txt AP/development
mv: cannot stat 'kerala/language.txt': No such file or directory
noreen@NoreenNVirtualBox:~/INDIA$ mv kerala/lang.txt AP/development
noreen@NoreenNVirtualBox:~/INDIA$ cd AP
noreen@NoreenNVirtualBox:~/INDIA/AP$ cd development
noreen@NoreenNVirtualBox:~/INDIA/AP/development$ ls
lang.txt
[noreen@NoreenNVirtua... /INDIA/AP/development]$ cd .. /INDIA/kerala
```

Q7. List all the files in the folder AP.

```
noreen@NoreenNVirtualBox:~/INDIA$ cd ..
noreen@NoreenNVirtualBox:~$ cd INDIA/AP
noreen@NoreenNVirtualBox:~/INDIA/AP$ ls
culture.txt development farmers.txt general.txt industry industry.txt
[noreen@NoreenNVirtua... /INDIA/AP]$
```

Q8. List first 10 lines of the file ‘Dress’.

```
Kali Mundu
noreen@NoreenNVirtualBox:~/INDIA/kerala$ head -n 10 dress.txt
saree
skirt
pant
shirt
jubba
lungi
kurta
churidar
set saree
half saree
[noreen@NoreenNVirtua... /INDIA/kerala]$
```

Q9. List the last 10 lines of the file ‘Dress’.

```
Kali Mundu
noreen@NoreenNVirtualBox:~/INDIA/kerala$ tail -n 10 dress.txt
pant
shirt
jubba
lungi
kurta
churidar
set saree
half saree
frock
kalli mundu
[noreen@NoreenNVirtua... /INDIA/kerala]$
```

Q10. List all the files in AP in long listing format

```
noreen@NoreenNVirtualBox:~/INDIA/kerala$ cd ..
noreen@NoreenNVirtua... /INDIA$ cd AP
noreen@NoreenNVirtualBox:~/INDIA/AP$ ls -al
total 32
drwxrwxr-x 3 noreen noreen 4096 Oct  2 10:23 .
drwxrwxr-x 5 noreen noreen 4096 Oct  2 09:32 ..
-rw-rw-r-- 1 noreen noreen   32 Oct  2 10:23 culture.txt
drwxrwxr-x 2 noreen noreen 4096 Oct  2 10:33 development
-rw-rw-r-- 1 noreen noreen   83 Oct  2 10:00 farmers.txt
-rw-rw-r-- 1 noreen noreen  129 Oct  2 09:58 general.txt
-rw-rw-r-- 1 noreen noreen   93 Oct  2 09:53 industry
-rw-rw-r-- 1 noreen noreen   93 Oct  2 09:55 industry.txt
[noreen@NoreenNVirtua... /INDIA/AP]$
```

Q11. List the files in AP which begin with the character ‘f’.

```
noreen@NoreenNVirtualBox:~/INDIA/kerala$ cd ..
noreen@NoreenNVirtualBox:~/INDIA$ cd AP
noreen@NoreenNVirtualBox:~/INDIA/AP$ ls
culture.txt development farmers.txt general.txt industry industry.txt
noreen@NoreenNVirtualBox:~/INDIA/AP$ ls -d f*
farmers.txt
```

Q12. List the files page by page.

```
noreen@NoreenNVirtualBox:~/INDIA/AP$ ls -la|more
total 32
drwxrwxr-x 3 noreen noreen 4096 Oct  2 10:23 .
drwxrwxr-x 5 noreen noreen 4096 Oct  2 09:32 ..
-rw-rw-r-- 1 noreen noreen 32 Oct  2 10:23 culture.txt
drwxrwxr-x 2 noreen noreen 4096 Oct  2 10:33 development
-rw-rw-r-- 1 noreen noreen 83 Oct  2 10:00 farmers.txt
-rw-rw-r-- 1 noreen noreen 129 Oct  2 09:58 general.txt
-rw-rw-r-- 1 noreen noreen 93 Oct  2 09:53 industry
-rw-rw-r-- 1 noreen noreen 93 Oct  2 09:55 industry.txt
```

Q13. Remove the file ‘general’.

```
noreen@NoreenNVirtualBox:~/INDIA/AP$ ls
culture.txt development farmers.txt general.txt industry industry.txt
noreen@NoreenNVirtualBox:~/INDIA/AP$ rm -i general.txt
rm: remove regular file 'general.txt'? y
noreen@NoreenNVirtualBox:~/INDIA/AP$ ls
culture.txt development farmers.txt industry industry.txt
```

Q14. Change the permission of the file ‘Culture’ as only read permission to all.

```
noreen@NoreenNVirtualBox:~/INDIA/AP$ cd ..
noreen@NoreenNVirtualBox:~/INDIA$ cd kerala
noreen@NoreenNVirtualBox:~/INDIA/kerala$ ls
culture.txt dress.txt
noreen@NoreenNVirtualBox:~/INDIA/kerala$ ls -l culture.txt
-rw-rw-r-- 1 noreen noreen 32 Oct  2 09:33 culture.txt
noreen@NoreenNVirtualBox:~/INDIA/kerala$ chmod g-wx culture.txt
noreen@NoreenNVirtualBox:~/INDIA/kerala$ ls -l culture.txt
-rw-r--r-- 1 noreen noreen 32 Oct  2 09:33 culture.txt
```

Q15. List the lines of the file which contains a string ‘Saree’.

```
noreen@NoreenNVirtualBox:~/INDIA/kerala$ grep 'saree' dress.txt
saree
set saree
half saree
noreen@NoreenNVirtualBox:~/INDIA/kerala$ ls
```

Q16. Use man command to get the syntax of wc command.

```
WC(1)                               User Commands                               WC(1)

NAME
    wc - print newline, word, and byte counts for each file

SYNOPSIS
    wc [OPTION]... [FILE]...
    wc [OPTION]... --files0-from=F

DESCRIPTION
    Print newline, word, and byte counts for each FILE, and a total line if more than one FILE is specified. A word is a non-zero-length sequence of characters delimited by white space.

    With no FILE, or when FILE is -, read standard input.

    The options below may be used to select which counts are printed, always in the following order: newline, word, character, byte, maximum line length.

    -c, --bytes
        print the byte counts

    -m, --chars
        print the character counts

    -l, --lines
        print the newline counts

    --files0-from=F
        read input from the files specified by NUL-terminated names in file F; If F is - then read names from standard input

    -L, --max-line-length
        print the maximum display width

    -w, --words
        print the word counts

    --help display this help and exit

    --version
        output version information and exit

AUTHOR
    Written by Paul Rubin and David MacKenzie.

REPORTING BUGS
    GNU coreutils online help: <https://www.gnu.org/software/coreutils/>
    Report wc translation bugs to <https://translationproject.org/team/>

COPYRIGHT
    Copyright © 2018 Free Software Foundation, Inc. License GPLv3+: GNU GPL version 3 or later <https://gnu.org/licenses/gpl.html>.
    This is free software: you are free to change and redistribute it. There is NO WARRANTY, to the extent permitted by law.

SEE ALSO
    Full documentation at: <https://www.gnu.org/software/coreutils/wc>
    or available locally via: info '(coreutils) wc invocation'

GNU coreutils 8.30
Manual page wc(1) line 1/55 (END) (press h for help or q to quit)
September 2019
                                            WC(1)
```

Q17. Count the number of characters, words, lines in the directory listing.

```
noreen@NoreenNVirtualBox:~/INDIA/kerala$ wc dress.txt
12 15 89 dress.txt
```

Q18. Put a listing of the files in your directory into a file called filelist.

```
noreen@NoreenNVirtualBox:~$ ls -l >>filelist.txt
noreen@NoreenNVirtualBox:~$ cat filelist.txt
total 224
-rwxrwxr-x 1 noreen noreen 205 Sep 21 20:06 arith
-rwxrwxr-x 1 noreen noreen 432 Sep 25 22:54 arithm
-rwxrwxr-x 1 noreen noreen 163 Sep 14 16:01 arithop
-rw-rw-r-- 1 noreen noreen 39 Sep 30 22:49 a.txt
-rwxrwxr-x 1 noreen noreen 90 Aug 31 15:50 brk
-rwxrwxr-x 1 noreen noreen 61 Aug 31 15:37 c
-rwxrwxr-x 1 noreen noreen 510 Sep 7 15:10 cal
-rwxrwxr-x 1 noreen noreen 198 Sep 30 23:04 calc
-rwxrwxr-x 1 noreen noreen 198 Sep 30 23:05 calcu
-rwxrwxr-x 1 noreen noreen 198 Sep 30 23:05 calculator
-rwxrwxr-x 1 noreen noreen 198 Aug 31 16:09 days
drwxr-xr-x 2 noreen noreen 4096 Aug 16 09:55 desktop
drwxr-xr-x 2 noreen noreen 4096 May 23 20:23 Desktop
-rwxrwxr-x 1 noreen noreen 288 Sep 7 16:02 details
-rwxrwxr-x 1 noreen noreen 103 Sep 25 14:09 dir
drwxr-xr-x 2 noreen noreen 4096 May 23 20:23 Documents
drwxr-xr-x 2 noreen noreen 4096 May 23 20:23 Downloads
-rw-rw-r-- 1 noreen noreen 75 May 25 16:04 een.txt
-rwxrwxr-x 1 noreen noreen 33 Sep 30 22:56 filelist.sh
-rwxrwxr-x 1 noreen noreen 33 Sep 30 22:56 filelist.txt
-rw-rw-r-- 1 noreen noreen 6 Oct 2 11:27 filelist.txt
-rw-rw-r-- 1 noreen noreen 0 Aug 17 15:45 first
-rwxrwxr-x 1 noreen noreen 54 Aug 31 15:33 for
-rwxrwxr-x 1 noreen noreen 151 Aug 31 15:58 fruit
-rwxrwxr-x 1 noreen noreen 12 Aug 17 15:49 hello
-rwxrwxr-x 1 noreen noreen 19 Sep 14 15:46 hello.sh
-rwxrwxr-x 1 noreen noreen 19 Sep 30 20:30 hi
drwxrwxr-x 5 noreen noreen 4096 Aug 30 22:23 India
drwxrwxr-x 5 noreen noreen 4096 Oct 2 09:32 INDIA
-rwxrwxr-x 1 noreen noreen 215 Sep 21 23:05 large
drwxrwxr-x 5 noreen noreen 4096 Aug 16 10:56 library
-rwxrwxr-x 1 noreen noreen 298 Sep 25 23:32 log
-rwxrwxr-x 1 noreen noreen 61 Sep 30 20:51 loop
-rwxrwxr-x 1 noreen noreen 80 Sep 7 16:14 loopsum
-rwxrwxr-x 1 noreen noreen 48 Aug 17 16:02 man
-rwxrwxr-x 1 noreen noreen 98 Oct 1 00:06 may
-rw-rw-r-- 1 noreen noreen 0 Aug 16 09:52 me.txt
drwxr-xr-x 2 noreen noreen 4096 May 23 20:23 Music
drwxrwxr-x 2 noreen noreen 4096 Aug 16 11:02 new
-rw-rw-r-- 1 noreen noreen 0 Aug 16 10:26 newfile
-rw-rw-r-- 1 noreen noreen 49 May 25 15:46 nor1.txt
drwxrwxr-x 8 noreen noreen 4096 Aug 16 11:05 noreen
-rw-rw-r-- 1 noreen noreen 111 May 25 15:00 noreen.txt
-rwxrwxr-x 1 noreen noreen 25 Aug 16 11:30 nort
```

```

-rw-rw-r-- 1 noreen noreen 111 May 25 15:00 noreen.txt
-rwxrwxr-x 1 noreen noreen 25 Aug 16 11:36 noril
-rwxrwxr-x 1 noreen noreen 96 Aug 17 16:15 num
-rwxrwxr-x 1 noreen noreen 283 Sep 21 22:29 oper
drwxr-xr-x 2 noreen noreen 4096 May 23 20:23 Pictures
-rw-rw-r-- 1 noreen noreen 0 Sep 25 14:24 ppl
drwxr-xr-x 2 noreen noreen 4096 May 23 20:23 Public
-rw-rw-r-- 1 noreen noreen 20 Sep 7 16:18 s
drwxr-xr-x 3 noreen noreen 4096 Jun 15 15:22 snap
-rwxrwxr-x 1 noreen noreen 277 Sep 25 23:57 string
-rwxrwxr-x 1 noreen noreen 277 Sep 26 00:11 strings
-rwxrwxr-x 1 noreen noreen 98 Sep 30 21:44 studentdetail
-rwxrwxr-x 1 noreen noreen 133 Sep 7 16:08 sumloop
-rwxrwxr-x 1 noreen noreen 134 Sep 7 16:11 summloop
drwxr-xr-x 2 noreen noreen 4096 May 23 20:23 Templates
-rwxrwxr-x 1 noreen noreen 80 Aug 31 15:11 two
drwxr-xr-x 2 noreen noreen 4096 May 23 20:23 Videos
-rwxrwxr-x 1 noreen noreen 67 Sep 30 20:54 while
noreen@NoreenNVirtualBox:~$ 

```

Q19. List the status of all process running in your system.

```

noreen@NoreenNVirtualBox:~$ ps
  PID TTY      TIME CMD
 8578 pts/0    00:00:00 bash
 9217 pts/0    00:00:00 ps
noreen@NoreenNVirtualBox:~$ ps -aux
USER      PID %CPU %MEM   VSZ   RSS TTY      STAT START   TIME COMMAND
root      1  0.0  0.8 185486 12456 ?
root      2  0.0  0.0     0   0 ?          Ss Oct01  0:11 /sbin/init splash
root      3  0.0  0.0     0   0 ?          Ss Oct01  0:00 [kthreadd]
root      4  0.0  0.0     0   0 ?          I< Oct01  0:00 [rcu_gp]
root      6  0.0  0.0     0   0 ?          I< Oct01  0:00 [rcu_par_gp]
root      9  0.0  0.0     0   0 ?          I< Oct01  0:00 [kworker/u0:0:events_highpri]
root     10  0.0  0.0     0   0 ?          Ss Oct01  0:00 [rcu_tasks_rude]
root     11  0.0  0.0     0   0 ?          Ss Oct01  0:00 [rcu_tasks_trace]
root     12  0.0  0.0     0   0 ?          Ss Oct01  0:00 [ksoftirqd/0]
root     13  0.0  0.0     0   0 ?          I   Oct01  0:03 [rcu_sched]
root     14  0.0  0.0     0   0 ?          Ss Oct01  0:00 [migration/0]
root     15  0.0  0.0     0   0 ?          Ss Oct01  0:00 [idle_inject/0]
root     16  0.0  0.0     0   0 ?          Ss Oct01  0:00 [cpuhp/0]
root     17  0.0  0.0     0   0 ?          Ss Oct01  0:00 [kdevtmpfs]
root     18  0.0  0.0     0   0 ?          I< Oct01  0:00 [netns]
root     19  0.0  0.0     0   0 ?          I< Oct01  0:00 [inet_frag_wq]
root     20  0.0  0.0     0   0 ?          Ss Oct01  0:00 [kaudit]
root     21  0.0  0.0     0   0 ?          Ss Oct01  0:00 [khungtaskd]
root     22  0.0  0.0     0   0 ?          Ss Oct01  0:00 [oom_reaper]
root     23  0.0  0.0     0   0 ?          I< Oct01  0:00 [writeback]
root     24  0.0  0.0     0   0 ?          Ss Oct01  0:04 [kcompactd0]
root     25  0.0  0.0     0   0 ?          SN Oct01  0:00 [ksnd]
root     26  0.0  0.0     0   0 ?          SN Oct01  0:00 [kudapeaged]
root     72  0.0  0.0     0   0 ?          I< Oct01  0:00 [kmemcgtrytd]
root     73  0.0  0.0     0   0 ?          I< Oct01  0:00 [kblockkd]
root     74  0.0  0.0     0   0 ?          I< Oct01  0:00 [blkcg_punt_bio]
root     75  0.0  0.0     0   0 ?          I< Oct01  0:00 [tpm_dev_wq]
root     76  0.0  0.0     0   0 ?          I< Oct01  0:00 [ata_sff]
root     77  0.0  0.0     0   0 ?          I< Oct01  0:00 [md]
root     78  0.0  0.0     0   0 ?          I< Oct01  0:00 [edac-polller]
root     79  0.0  0.0     0   0 ?          I< Oct01  0:00 [devfreq_wq]
root     80  0.0  0.0     0   0 ?          Ss Oct01  0:00 [watchdog]
root     82  0.0  0.0     0   0 ?          I< Oct01  0:03 [kworker/u0:1h-kblockd]
root     84  0.0  0.0     0   0 ?          Ss Oct01  0:00 [kswapd0]
root     85  0.0  0.0     0   0 ?          Ss Oct01  0:00 [cryptfs-kthrea]
root     87  0.0  0.0     0   0 ?          I< Oct01  0:00 [kthrotld]
root     88  0.0  0.0     0   0 ?          I< Oct01  0:00 [acpi_thermal_pm]
root     89  0.0  0.0     0   0 ?          Ss Oct01  0:00 [scsi_eh_0]
root     90  0.0  0.0     0   0 ?          I< Oct01  0:00 [scsi_tmf_0]
root     91  0.0  0.0     0   0 ?          Ss Oct01  0:00 [scsi_eh_1]
root     92  0.0  0.0     0   0 ?          I< Oct01  0:00 [scsi_tmf_1]
root     94  0.0  0.0     0   0 ?          I< Oct01  0:00 [vfio-irqfd-clea]

```

```

noreen   1235  0.0  0.7 580936 11184 ?
      S1  Oct01  0:00 /usr/libexec/gnome-shell-calendar-server
noreen   1243  0.0  1.0 685604 15432 ?
      Ssl Oct01  0:00 /usr/libexec/evolution-source-registry
noreen   1251  0.0  0.3 156200  5356 ?
      S1  Oct01  0:00 /usr/libexec/dconf-service
noreen   1260  0.0  1.0 716228 16128 ?
      Ssl Oct01  0:00 /usr/libexec/evolution-calendar-factory
noreen   1276  0.0  1.2 681804 18312 ?
      Ssl Oct01  0:00 /usr/libexec/evolution-addressbook-factory
noreen   1287  0.0  1.2 2607164 19428 ?
      S1  Oct01  0:00 /usr/bin/gjs /usr/share/gnome-shell/org.gnome.Shell.Notifications
noreen   1300  0.0  0.5 325292  7668 ?
      S1  Oct01  0:00 /usr/libexec/gvfsd-trash --spawn器 :1.4 /org/gtk/gvfs/exec_spaw/0
noreen   1316  0.0  0.4 318276  6328 ?
      Ssl Oct01  0:00 /usr/libexec/gsd-audio-settings
noreen   1317  0.0  1.5 576740 27884 ?
      Ssl Oct01  0:01 /usr/libexec/gsd-color
noreen   1319  0.0  0.8 382240 12956 ?
      Ssl Oct01  0:00 /usr/libexec/gsd-datetime
noreen   1320  0.0  0.4 320340 7436 ?
      Ssl Oct01  0:05 /usr/libexec/gsd-housekeeping
noreen   1325  0.0  1.8 354532 27312 ?
      Ssl Oct01  0:00 /usr/libexec/gsd-keyboard
noreen   1328  0.0  1.9 969932 29336 ?
      Ssl Oct01  0:00 /usr/libexec/gsd-media-keys
noreen   1329  0.0  2.0 621956 30408 ?
      Ssl Oct01  0:01 /usr/libexec/gsd-power
noreen   1330  0.0  0.7 256868 10756 ?
      Ssl Oct01  0:00 /usr/libexec/gsd-print-notifications
noreen   1331  0.0  0.3 465732  5776 ?
      S1  Oct01  0:00 /usr/libexec/gsd-rfkill
noreen   1332  0.0  0.3 244140  5772 ?
      Ssl Oct01  0:00 /usr/libexec/gsd-screensaver-proxy
noreen   1335  0.0  0.6 473400  9528 ?
      Ssl Oct01  0:00 /usr/libexec/gsd-sharing
noreen   1337  0.0  0.1 814000  8140 ?
      S1  Oct01  0:00 /usr/libexec/gsd-smartcard
noreen   1343  0.0  0.5 327972  8720 ?
      Ssl Oct01  0:00 /usr/libexec/gsd-sound
noreen   1354  0.0  0.4 467308  7124 ?
      Ssl Oct01  0:00 /usr/libexec/gsd-sub-protection
noreen   1356  0.0  1.7 353996 26708 ?
      Ssl Oct01  0:00 /usr/libexec/gsd-wacom
noreen   1358  0.0  0.4 322600  7236 ?
      Ssl Oct01  0:00 /usr/libexec/gsd-wwan
noreen   1360  0.0  1.5 351516 27532 ?
      Ssl Oct01  0:00 /usr/libexec/gsd-xsettings
noreen   1371  0.0  2.0 719956 39466 ?
      S1  Oct01  0:01 /usr/libexec/evolution-data-server/evolution-alarm-notify
noreen   1389  0.0  0.3 231800  5348 ?
      S1  Oct01  0:00 /usr/libexec/gsd-disk-utility-notify
noreen   1397  0.0  0.4 171328  6688 ?
      S1  Oct01  0:00 /usr/libexec/ibus-engine-simple
noreen   1435  0.0  0.9 3508820 14969 ?
      S1  Oct01  0:00 /usr/libexec/gsd-printer
colord   1447  0.0  0.9 254868 13516 ?
      Ssl Oct01  0:00 /usr/libexec/colord
root    1638  0.0  0.0     0   0 ?          S< Oct01  0:00 [loop13]
root    1656  0.0  1.1 644824 17924 ?
      Ssl Oct01  0:31 /usr/lib/snappy/snappyd
noreen   1743  0.0  0.4 170880  6448 ?
      Ssl Oct01  0:00 /usr/libexec/gvfsd-metadata
noreen   1793  0.0  2.3 546180 34708 ?
      S1  Oct01  0:03 update-notifier
root    1893  0.0  0.0     0   0 ?          S< Oct01  0:00 [loop12]
root    2188  0.0  0.0     0   0 ?          S< Oct01  0:00 [loop14]
noreen   2219  0.0  2.8 828040 42948 ?
      Ssl Oct01  0:56 /usr/libexec/gnome-terminal-server
noreen   2233  0.0  0.3 19248 4784 pts/1 S+  Oct01  0:00 bash
noreen   7584  0.0  0.2 18348 3864 pts/1 T  07:48  0:00 nano 5.sh
noreen   7718  0.0  0.0 108600  592 pts/1 T  08:09  0:00 cat
noreen   8578  0.0  0.3 19364 4832 pts/0 Ss  09:13  0:00 bash
root    8762  0.0  0.0     0   0 ?          S< 09:50  0:00 [loop8]
root    8995  0.0  0.0     0   0 ?          I  11:00  0:00 [kworker/u2:0-events_power_efficient]
root    9042  0.0  0.0     0   0 ?          I  11:04  0:02 [kworker/u0:1-events]
root    9150  0.0  0.0     0   0 ?          I  11:27  0:00 [kworker/u0:0-cgroup_destroy]
root    9160  0.0  0.0     0   0 ?          I  11:37  0:00 [kworker/u2:2-events_power_efficient]
root    9175  0.0  0.0     0   0 ?          I  11:58  0:00 [kworker/u2:1-events_unbound]
root    9180  0.1  0.5 234056  7704 ?
      Ssl 12:05  0:00 /usr/libexec/fprintd

```

Q20. List the disk partitions in your hard disk.

```
noreen@NoreenNVirtualBox:~$ lsblk
NAME   MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
loop0    7:0   0  512M  0 loop /snap/core/11806
loop1    7:1   0 55.5M  1 loop /snap/core18/2874
loop3    7:3   0 55.4M  1 loop /snap/core18/3228
loop4    7:4   0 219M  1 loop /snap/gnome-3-34-1884/72
loop5    7:5   0 32.3M  1 loop /snap/snapd/12881
loop6    7:6   0 65.3M  1 loop /snap/gtk-common-themes/1515
loop7    7:7   0 219M  1 loop /snap/gnome-3-34-1884/66
loop8    7:8   0 99.3M  1 loop /snap/core/11743
loop9    7:9   0 51M  1 loop /snap/snap-store/518
loop10   7:10  0  4.2M  1 loop /snap/tree/18
loop11   7:11  0 51M  1 loop /snap/snap-store/547
loop12   7:12  0  4K  1 loop /snap/paru/1
loop13   7:13  0 32.3M  1 loop /snap/snapd/13170
loop14   7:14  0 65.2M  1 loop /snap/gtk-common-themes/1519
sda      8:0   0 10G  0 disk 
└─sda1   8:1   0 512M  0 part /boot/efi
└─sda2   8:2   0 9.5G  0 part /
└─sda5   8:5   0 9.5G  0 part /
sr0     11:0  1 58.2M  0 rom  /media/noreen/VBox_GAs_6.1.22
```

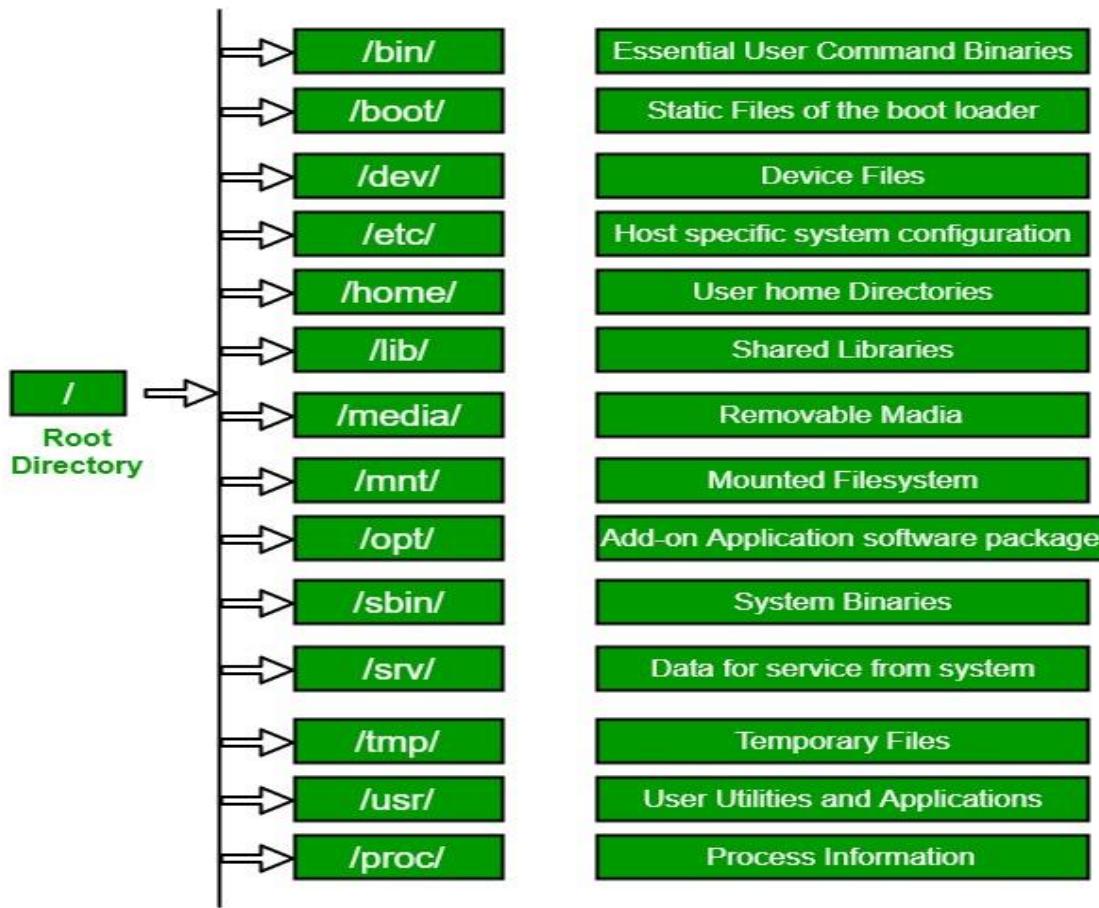
Q21. Redirect the output of the top program to a file called ‘errors’

```
noreen@NoreenNVirtualBox:~$ top >error.txt
noreen@NoreenNVirtualBox:~$ cat error.txt
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
1172	noreen	20	0	3783956	352256	87104	S	3.6	23.5	8:09.87	gnome-shell
9234	noreen	39	19	764660	35872	24152	S	1.8	2.4	0:00.21	tracker-extract
899	noreen	20	0	575348	76580	37272	S	1.2	5.1	2:02.51	Xorg
9225	noreen	20	0	20516	3872	3328	R	1.2	0.3	0:00.09	top
9227	noreen	20	0	443484	27448	15604	S	1.2	1.8	0:00.28	tracker-store
82	root	0	-20	0	0	0	I	0.6	0.0	0:03.30	kworker/0:1H-kblockd
1094	noreen	20	0	163996	2004	1768	S	0.6	0.1	4:24.69	VBoxClient
1793	noreen	20	0	546180	34708	24144	S	0.6	2.3	0:03.56	update-notifier
1	root	20	0	185480	12456	7804	S	0.0	0.8	0:11.51	systemd
2	root	20	0	0	0	0	S	0.0	0.0	0:00.02	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
6	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/0:0H-events_highpri
9	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	mp_percpu_wq
10	root	20	0	0	0	0	S	0.0	0.0	0:00.00	rcu_tasks_rude_
11	root	20	0	0	0	0	S	0.0	0.0	0:00.00	rcu_tasks_trace
12	root	20	0	0	0	0	S	0.0	0.0	0:00.82	ksoftirqd/0
13	root	20	0	0	0	0	I	0.0	0.0	0:03.58	rcu_sched
14	root	rt	0	0	0	0	S	0.0	0.0	0:00.84	migration/0
15	root	-51	0	0	0	0	S	0.0	0.0	0:00.00	idle_inject/0
16	root	20	0	0	0	0	S	0.0	0.0	0:00.00	cpuhp/0
17	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kdevtmpfs
18	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	netns
19	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	inet_frag_wq
20	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kauditd
21	root	20	0	0	0	0	S	0.0	0.0	0:00.05	khungtaskd
22	root	20	0	0	0	0	S	0.0	0.0	0:00.00	oom_reaper
23	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	writeback
24	root	20	0	0	0	0	S	0.0	0.0	0:04.36	kcompactd0
25	root	25	5	0	0	0	S	0.0	0.0	0:00.00	ksmd
26	root	39	19	0	0	0	S	0.0	0.0	0:00.05	khugepaged
72	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kinintegrityd
73	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kblockd
74	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	blkcg_punt_bio
75	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	tpm_dev_wq
76	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	ata_sff
77	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	md
78	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	edac-poller
79	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	devfreq_wq
80	root	-51	0	0	0	0	S	0.0	0.0	0:00.00	watchdogd
84	root	20	0	0	0	0	S	0.0	0.0	0:00.93	kswapd0

Experiment 3

3.1. Linux File System Hierarchy Structure:



The Linux File System Hierarchy defines the directory structure and directory contents in Unix-like operating systems. It is maintained by the Linux Foundation.

- The all files and directories appear under the root directory /, even if they are stored on different physical or virtual devices.
- Most of these directories exist in all UNIX operating systems and are generally used in much the same way; however, the descriptions here are those used specifically for the FHS and are not considered authoritative for platforms other than Linux.
- Most Linux distributions follow the Filesystem Hierarchy Standard and declare it their own policy to maintain FHS compliance.
- Some distributions generally follow the standard but deviate from it in some areas. The FHS is a "trailing standard", and so documents common practices at a point in time.

3.2. The tree intallation process:

- Install tree using the following command:

```
$ sudo apt install tree
```

```
hp@hp-HP-Laptop-15s-du0xxx:~$ sudo apt install tree
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  acl apg colord-data enchant geopip-database gnome-control-center-faces gnome-online-accounts gsfonts hplib-data libbind9-161 libboost-filesystem0
  libcolorhug2 libdns-export1107 libdns1107 libdns1109 libenchant1c2a libexiv2-14 libfprint0 libgeoip1 libgsound0 libgspell-1-1 libgssdp-1.2-0
  libgutenprint-common libgutenprint9 libltee1284-3 libimagequant0 libiptc0 libirs161 libisc-export1104 libisc1104 libisc1105 libisccc161 libisccc162
  librygel-core-2.6-2 librygel-db-2.6-2 librygel-renderer-2.6-2 librygel-server-2.6-2 libsane-common libsnmp-base libwebpmux3 mobile-broadband-
  printer-driver-gutenprint printer-driver-postscript-hp python3-asn1crypto python3-macaroonbakery python3-olefile python3-pil python3-protobuf
  python3-reportlab-accel python3-rfc3339 python3-tz rygel shim ubuntu-software ubuntu-system-service
Use 'sudo apt autoremove' to remove them.
The following NEW packages will be installed:
  tree
0 upgraded, 1 newly installed, 0 to remove and 81 not upgraded.
Need to get 43.0 kB of archives.
After this operation, 115 kB of additional disk space will be used.
Get:1 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 tree amd64 1.8.0-1 [43.0 kB]
Fetched 43.0 kB in 10s (4,119 B/s)
Selecting previously unselected package tree.
(Reading database ... 192362 files and directories currently installed.)
Preparing to unpack .../tree_1.8.0-1_amd64.deb ...
Unpacking tree (1.8.0-1) ...
Setting up tree (1.8.0-1) ...
Processing triggers for man-db (2.9.1-1) ...
hp@hp-HP-Laptop-15s-du0xxx:~$
```

```
noreen@NoreenNVirtualBox:~$ tree -L 1/
.
├── arith
├── arithm
├── arithop
├── a.txt
├── brk
├── c
├── cal
├── calc
├── calcu
├── calculator
├── days
├── desktop
├── desktop
├── details
├── dir
├── Documents
├── Downloads
├── een.txt
├── error.txt
├── fil
├── fili.sh
├── filei.sh
├── filelist.txt
├── first
├── f
├── fruit
├── hello
├── hello.sh
├── ht
├── India
├── INDIA
├── large
├── library
├── log
├── loop
├── loopsum
├── man
├── man
├── me.txt
├── Music
├── new
├── newfile
├── nor1.txt
├── noreen
├── noreen.txt
└── nori
```

```
een.txt
error.txt
fil
filli.sh
file1.sh
filelist.txt
first
for
fruit
hello
hello.sh
ht
India
INDIA
large
library
log
loop
loopsum
man
may
me.txt
Music
new
newfile
nori.txt
noreen
noreen.txt
nori
NUM
oper
Pictures
ppl
Public
s
snap
string
strings
studentdetail
sumLoop
summLoop
Templates
two
Videos
while

15 directories, 47 files
noreen@NoreenVirtualBox:~$
```

- Explore various directories and files using the command cd, ls etc in linux and provide its screenshots

```
noreen@NoreenNVirtualBox:~$ cd ..
noreen@NoreenNVirtualBox:~$ cd /dev
noreen@NoreenNVirtualBox:~$ /dev$ ls
autofs          cuse      hidraw0   loop0   loop5    net     rtc     snd     tty12  tty21  tty30  tty4   tty49  tty58  ttyprintk  ttyS17  ttyS26  ttyS7   vcs     vcsa3  vcsu6
block          dtsk      hpet       loop1  loop6    null    rtc0    sr0    tty13  tty22  tty31  tty40  tty5   tty59  tty50  tty518  tty527  tty58  vcs1   vcsa4  vfio
bsg           dna_heap  hugepages  loop0   loop7    nvram   stdcr  tty14  tty23  tty32  tty41  tty50  tty6   tty51  tty519  tty528  tty59  vcs2   vcsa5  vga_arbitrer
btrfs-control  drl      hwrng     loop11  loop8    port    stdai  stdin  tty15  tty24  tty33  tty42  tty51  tty60  tty510  tty529  udnabuf  vcs3   vcsa6  vhcl
bus            dvd      i2c-0     loop12  loop9    ppp    sda2   stdout  tty16  tty25  tty34  tty43  tty52  tty61  tty511  tty520  uhid   vcs4   vcsu1  vhost-net
cdrom         encryptfs  inctl    loop13  loop-control  psaux  sda5   tty    tty17  tty26  tty35  tty44  tty53  tty62  tty512  tty521  vinput  vcs5   vcsu1  vhost-vsock
char          fb0      input     loop14  mapper   ptmx   sg0    tty0   tty18  tty27  tty36  tty45  tty54  tty63  tty513  tty522  tty531  urandom  vcs6   vcsu2  zero
console        fd      kmsg     loop3   mcelog   pts    sgl    tty1   tty19  tty28  tty37  tty46  tty55  tty7   tty514  tty523  tty532  userlo  vcs8   vcsu3  zfs
core          full      lightnvm  loop5   mem     random   sli    tty10  tty2   tty29  tty38  tty47  tty56  tty8   tty515  tty524  tty535  vboxguest  vcsa1  vcsu4
core_dma_latency  fuse      log     loop4   queue   rfkill  snapshot  tty11  tty20  tty3   tty39  tty48  tty57  tty9   tty516  tty525  tty56  vboxuser  vcsa2  vcsu5
noreen@NoreenNVirtualBox:~$ /dev$ cd ..
noreen@NoreenNVirtualBox:~$ cd /usr
noreen@NoreenNVirtualBox:~$ /usr$ ls
bin  games  include  lib  lib32  lib64  libexec  libx32  local  sbin  share  src
noreen@NoreenNVirtualBox:~$ /usr$ cd ..
noreen@NoreenNVirtualBox:~$ cd /tmp
noreen@NoreenNVirtualBox:/tmp$ ls
config.err-P7Zup0
ssh-fA1V1ghusWfQ
systemd-private-0bed90c80b949eb9eb5e526d106f01c-.colord.service-NPQ0q
systemd-private-0bed90c80b949eb9eb5e526d106f01c-fwupd.service-bl9QjH
systemd-private-0bed90c80b949eb9eb5e526d106f01c-ModenManager.service-Hqb3ji
systemd-private-0bed90c80b949eb9eb5e526d106f01c-switcheroo-control.service-rI4AuJ
noreen@NoreenNVirtualBox:/tmp$ cd ..
noreen@NoreenNVirtualBox:~$ cd /var
noreen@NoreenNVirtualBox:~$ /var$ ls
backups  cache  cron  lsb  local  lock  log  mail  mounted  opt  run  snap  spool  tmp
noreen@NoreenNVirtualBox:~$ /var$
```

3.3. The detailed explanation of directories in Linux

1. / (Root): Primary hierarchy root and root directory of the entire file system hierarchy.

- Every single file and directory starts from the root directory
- The only root user has the right to write under this directory
- /root is the root user's home directory, which is not the same as /

2. /bin : Essential command binaries that need to be available in single-user mode; for all users, e.g., cat, ls, cp.

- Contains binary executables
- Common linux commands you need to use in single-user modes are located under this directory.
- Commands used by all the users of the system are located here e.g. ps, ls, ping, grep, cp

3. /boot : Boot loader files, e.g., kernels, initrd.

- Kernel initrd, vmlinuz, grub files are located under /boot
- Example: initrd.img-2.6.32-24-generic, vmlinuz-2.6.32-24-generic

4. /dev : Essential device files, e.g., /dev/null.

- These include terminal devices, usb, or any device attached to the system.
- And also know the connected devices.

5. /etc : Host-specific system-wide configuration files.

- Contains configuration files required by all programs.
- This also contains startup and shutdown shell scripts used to start/stop individual programs.
- Example: /etc/resolv.conf, /etc/logrotate.conf.
- The old format is et cetera

6. /home : Users' home directories, containing saved files, personal settings, etc.

- Home directories for all users to store their personal files.

7. /lib : Libraries essential for the binaries in /bin/ and /sbin/.

- Library filenames are either ld* or lib*.so.*
- Eg wifi, printer etc

8. /media : Mount points for removable media such as CD-ROMs (appeared in FHS-2.3).

- Temporary mount directory for removable devices.
- Examples, /media/cdrom for CD-ROM; /media/floppy for floppy drives; /media/cdrecorder for CD writer

9. /mnt : Temporarily mounted filesystems.

- Temporary mount directory where sysadmins can mount filesystems.
-

10. /opt : Optional application software packages.

- Contains add-on applications from individual vendors.
- Add-on applications should be installed under either /opt/ or /opt/ sub-directory.

11. /sbin : Essential system binaries, e.g., fsck, init, route.

- Just like /bin, /sbin also contains binary executables.
- The linux commands located under this directory are used typically by system administrator, for system maintenance purpose.
- Example: iptables, reboot, fdisk, ifconfig, swapon

12. /srv : Site-specific data served by this system, such as data and scripts for web servers, data offered by FTP servers, and repositories for version control systems.

- srv stands for service.
- Contains server specific services related data.
- Example, /srv/cvs contains CVS related data.

13. /tmp : Temporary files. Often not preserved between system reboots, and may be severely size restricted.

- Directory that contains temporary files created by system and users.
- Files under this directory

14. /usr : Secondary hierarchy for read-only user data; contains the majority of (multi-)user utilities and applications.

- Contains binaries, libraries, documentation, and source-code for second level programs.
- /usr/bin contains binary files for user programs. If you can't find a user binary under /bin, look under /usr/bin. For example: at, awk, cc, less, scp
- /usr/sbin contains binary files for system administrators. If you can't find a system binary under /sbin, look under /usr/sbin. For example: atd, cron, sshd, useradd, userdel
- /usr/lib contains libraries for /usr/bin and /usr/sbin
- /usr/local contains users programs that you install from source. For example, when you install apache from source, it goes under /usr/local/apache2
- /usr/src holds the Linux kernel sources, header-files and documentation.

15. /proc : Virtual filesystem providing process and kernel information as files. In Linux, corresponds to a procfs mount. Generally automatically generated and populated by the system, on the fly.

- Contains information about system process.

- This is a pseudo filesystem contains information about running process. For example: /proc/{pid} directory contains information about the process with that particular pid.
- This is a virtual filesystem with text information about system resources. For example: /proc/uptime

16. /var — Variable Data Files

The /var directory is the writable counterpart to the /usr directory, which must be read-only in normal operation. Log files and everything else that would normally be written to /usr during normal operation are written to the /var directory. For example, you'll find log files in /var/log.

17./srv — Service Data

The /srv directory contains “data for services provided by the system.” If you were using the Apache HTTP server to serve a website, you’d likely store your website’s files in a directory inside the /srv directory.

18./run — Application State Files

The /run directory is fairly new, and gives applications a standard place to store transient files they require like sockets and process IDs. These files can’t be stored in /tmp because files in /tmp may be deleted.

EXPERIMENT-04**4.1. Shell Script**

1. Write a Shell program to display a given message

CODE:

```
Cat >hi
Echo "Hello world"
Chmod +x hi
./hi
```

OUTPUT:

```
noreen@NoreenNVirtualBox:~$ cat >hi
echo "Hello World"
noreen@NoreenNVirtualBox:~$ chmod +x hi
noreen@NoreenNVirtualBox:~$ ./hi
Hello World
noreen@NoreenNVirtualBox:~$
```

RESULT:

The output of the program executed successfully.

2. Write a shell script to evaluate arithmetic operations.

CODE:

```
echo "enter two integer number"
read a
read b
c=`expr $a + $b`
echo "sum=$c"
c=`expr $a - $b`
echo "sub=$c"
c=`expr $a / $b`
echo "div=$c"
c=`expr $a \* $b`
echo "multiplication=$c"
c=`expr $a % $b`
```

```
echo "remainder=$c"
```

OUTPUT:

```
noreen@NoreenNVirtualBox:~$ 
noreen@NoreenNVirtualBox:~$ cat >arith
echo "enter 2 integer no:"
read a
read b
c=`expr $a + $b`
echo "sum=$c"
c=`expr $a - $b`
echo "sub=$c"
c=`expr $a / $b`
echo "div=$c"
c=`expr $a \* $b`
echo "multi=$c"
c=`expr $a % $b`
echo "remainder=$c"
noreen@NoreenNVirtualBox:~$ chmod +x arith
noreen@NoreenNVirtualBox:~$ ./arith
enter 2 integer no:
4
3
sum=7
sub=1
div=1
multi=12
remainder=1
noreen@NoreenNVirtualBox:~$
```

RESULT:

The output of the program executed successfully.

3. Write a shell Script to determine largest among three integer number.

CODE:

```
echo "enter three integer number"
read a
read b
read c
if [ $a -ge $b ]
then
if [ $a -ge $c ]
then
echo "$a is largest number"
else
echo "$c is largest number"
fi
elif [ $b -ge $c ]
then
```

```

echo "$b is largest number"
else
echo "$c is largest number"
fi

```

OUTPUT:

```

[noreen@NoreenNVirtualBox:~$ cat >large
echo "enter 3 no:"
read a
read b
read c
if [ $a -ge $b ]
then
if [ $a -ge $c ]
then
echo "$a is largest no:"
else
echo "$c is largest"
fi
elif [ $b -ge $c ]
then
echo "$b is largest"
else
echo "$c is largest"
fi
[noreen@NoreenNVirtualBox:~$ chmod +x large
[noreen@NoreenNVirtualBox:~$ ./large
enter 3 no:
7
5
3
7 is largest no:
[noreen@NoreenNVirtualBox:~$ █

```

RESULT:

The output of the program executed successfully.

4. Write a shell script to print calculator using case.

CODE:

```

echo "enter two integer number"
read a
read b
c=`expr $a + $b`
echo "sum=$c"
c=`expr $a - $b`
echo "sub=$c"
c=`expr $a / $b`
echo "div=$c"
c=`expr $a /* $b`
echo "multiplication=$c"
c=`expr $a % $b`

```

```
echo "remainder=$c"
```

OUTPUT:

```
noreen@NoreenNVirtualBox:~$ cat >calculator
echo "enter 2 no:"
read a
read b
c=`expr $a + $b`
echo "sum=$c"
c=`expr $a - $b`
echo "sub=$c"
c=`expr $a / $b`
echo "div=$c"
c=`expr $a \* $b`
echo "multi=$c"
c=`expr $a % $b`
echo "remainder=$c"
noreen@NoreenNVirtualBox:~$ chmod +x calculator
noreen@NoreenNVirtualBox:~$ ./calculator
enter 2 no:
5
5
sum=10
```

RESULT:

The output of the program executed successfully.

5. Write a shell script to compare two string.

CODE:

```
echo "enter two string"
read a
read b
if [ -z $a ]
then
echo " First String is empty: Null String"
fi
if [ -z $b ]
then
echo " First String is empty: Null String"
fi
if [ $a = $b ]
then
echo "Strings are equal: strings Matched"
else
echo "Strings are not equal: Strings not match"
fi
```

OUTPUT:

```
noreen@NoreenNVirtualBox:~$ cat >strings
echo "enter 2 string"
read a
read b
if [ -z $a ]
then
echo "1st string is empty: Null string"
fi
if [ -z $b ]
then
echo "1st string is empty: Null string"
fi
if [ $a = $b ]
then
echo "Strings are equal: String matched"
else
echo "Strings are not equal: String not matched"
fi
noreen@NoreenNVirtualBox:~$ chmod +x strings
noreen@NoreenNVirtualBox:~$ ./strings
enter 2 string
hi
hi
Strings are equal: String matched
noreen@NoreenNVirtualBox:~$ ./strings
enter 2 string
hello
hi
Strings are not equal: String not matched
noreen@NoreenNVirtualBox:~$
```

RESULT:

The output of the program executed successfully.

6. Write a shell script to read and check the directory exists or not, if not make directory.

CODE:

```
echo "enter name of directory"
read dir
if [ -d $dir ]
then
echo "Directory $dir Exists!"
else
mkdir $dir
fi
```

OUTPUT:

```
noreen@NoreenNVirtualBox:~$ cat >dir
echo "enter a directory"
read dir
if [ -d $dir ]
then
echo "directory $dir exists"
else
mkdir $dir
fi
noreen@NoreenNVirtualBox:~$ chmod +x dir
noreen@NoreenNVirtualBox:~$ ./dir
enter a directory
hi
mkdir: cannot create directory 'hi': File exists
noreen@NoreenNVirtualBox:~$ ./dir
enter a directory
noreen
directory noreen exists
noreen@NoreenNVirtualBox:~$
```

RESULT:

The output of the program executed successfully.

7. Write a shell script to read and check the file exists or not, if not make file.

CODE:

```
echo "enter name of file"
read filename
if [ -f $filename ]
then
echo "File $filename Exists!"
else
touch $filename
fi
```

OUTPUT:

```
noreen@NoreenNVirtualBox:~$ cat >fil
echo "enter a file name"
read filename
if [ -f $filename ]
then
echo "file $filename exists!"
else
touch $filename
fi
noreen@NoreenNVirtualBox:~$ chmod +x fil
noreen@NoreenNVirtualBox:~$ ./fil
enter a file name
dir
file dir exists!
```

RESULT:

The output of the program executed successfully.

8. Write a shell script to implement menu driven program to perform all arithmetic operation using case statement.

CODE:

```
echo "enter two integer values"
read a
read b
echo -e "Menu \n 1 for Addition \n 2 for Subtraction \n 3 for Multiplication \n 4 for
Division \n 5 for Remainder"
echo "enter choice"
read ch
```

```

case $ch in
1) echo "Sum=$(expr $a + $b)";;
2) echo "Substraction=$(expr $a - $b)";;
3) echo "Multiplication=$(expr $a \* $b)";;
4) echo "Division=$(expr $a / $b)";;
5) echo "Remainder=$(expr $a % $b)";;
6) echo "invalid Choice:Try Again!"
esac

```

OUTPUT:

```

noreen@NoreenNVirtualBox:~$ cat >arithm
echo "enter 2 integer values"
read a
read b
echo -e "Menu \n 1 for addition \n 2 for subtraction \n 3 for multiplication \n
4 for division \n 5 for reminder"
echo "enter choice"
read ch
case $ch in
1) echo "sum=$(expr $a + $b)";;
2) echo "subtraction=$(expr $a - $b)";;
3) echo "multiplication=$(expr $a \* $b)";;
4) echo "division=$(expr $a / $b)";;
5) echo "remainder=$(expr $a % $b)";;
6) echo "invalid choice:try again!"
esac
noreen@NoreenNVirtualBox:~$ chmod +x arithm
noreen@NoreenNVirtualBox:~$ ./arithm
enter 2 integer values
5
4
Menu
1 for addition
2 for subtraction
3 for multiplication
4 for division
5 for reminder
enter choice
1
sum=9
noreen@NoreenNVirtualBox:~$ ./arithm

```

RESULT:

The output of the program executed successfully.

9. Write a shell script to do:

- display list of directory contents
- Name of current directory
- Who is logged on
- Long listing of directory contents according to choose of user.

CODE:

```

echo -e "Menu \n 1 for listing directory content \n 2 for print name of current
directory \n 3 for Show who is logged on \n 4 Show directory content using long
listing format "

```

```

echo "enter your choice"
read ch
case $ch in
    1) ls;;
    2) pwd;;
    3) who;;
    4) ls -l;;
*) echo "Invalid Choice: Try Again!!"
esac

```

OUTPUT:

```

echo -e "Menu \n 1 for listing directory content \n 2 for print name of current directory \n 3 for show who is logged on \n4 show directory content using long listing format"
echo "enter your choice"
read ch
case $ch in
    1) ls;;
    2) pwd;;
    3) who;;
    4) ls -l;;
*) echo "invalid choice:try again!"
esac
noreen@NoreenNVirtualBox:~$ chmod +x log
noreen@NoreenNVirtualBox:~$ ./log
Menu
1 for listing directory content
2 for print name of current directory
3 for show who is logged on \4 show directory content using long listing format
enter your choice
1
arith  days      een.txt  hi      man      noreen.txt  s      Videos
arithm desktop   fil     India    me.txt   norl    snap
arithop Desktop  first   large   Music    num     string
brk    details   for     library  new     oper    sumloop
c      dir       fruit   log     newfile  Pictures  sumloop
cal    Documents hello   loop    nori.txt ppl    Templates
calc   Downloads hello.sh loopsum noreen Public  two
noreen@NoreenNVirtualBox:~$ ./log
Menu
1 for listing directory content
2 for print name of current directory
3 for show who is logged on \4 show directory content using long listing format
enter your choice
2
/home/noreen
noreen@NoreenNVirtualBox:~$ ./log
Menu
1 for listing directory content
2 for print name of current directory
3 for show who is logged on \4 show directory content using long listing format
enter your choice
3
noreen :0          2021-09-23 21:00 (:0)
noreen@NoreenNVirtualBox:~$ ./log
Menu
1 for listing directory content
2 for print name of current directory
3 for show who is logged on \4 show directory content using long listing format
enter your choice
5
invalid choice:try again!

```

RESULT:

The output of the program executed successfully.

10. Write a shell script to getting input details like name, roll number and marks and print them. using command line arguments.

CODE:

```

cat > Studentdetail
echo "Name of the student: $1"

```

```
echo "Roll Number of the student: $2"
```

```
echo "Marks of the student: $3"
```

OUTPUT:

```
noreen@NoreenNVirtualBox:~$ cat >studentdetail
echo "Name of the student: $1"
echo "Roll no: of student: $2"
echo "Marks of student: $3"
noreen@NoreenNVirtualBox:~$ chmod +x studentdetail
noreen@NoreenNVirtualBox:~$ ./studentdetail Noreen 25 800
Name of the student: Noreen
Roll no: of student: 25
Marks of student: 800
noreen@NoreenNVirtualBox:~$
```

RESULT:

The output of the program executed successfully.

11. Understand the differences between Echo statement using single quote , double quote and without quotes.

CODE:

```
Cat< file1.sh
```

```
a=12
```

```
echo $a
```

```
echo "$a"
```

```
echo '$a'
```

OUTPUT:

```
noreen@NoreenNVirtualBox:~$ cat >file1.sh
a=12
echo $a
echo "$a"
echo '$a'
noreen@NoreenNVirtualBox:~$ chmod +x file1.sh
noreen@NoreenNVirtualBox:~$ ./file1.sh
12
12
$a
noreen@NoreenNVirtualBox:~$
```

RESULT:

The output of the program executed successfully.

12. To check whether there is any entry in the month of May in the system log.

CODE:

```
if [[ -e /var/log/syslog ]]
```

```
then
```

```
cat /var/log/syslog | grep "May"
```

```

else
echo "File not found"
fi

```

OUTPUT:

```

$ chmod +x sh11.sh
$ ./sh11.sh

```

```

Binary file (standard input) matches

```

RESULT:

The output of the program executed successfully.

13. Implement arithmetic calculator using Functions**CODE:**

```

add()
{
i=$1
j=$2
((k=i+j))
echo Sum is $k
}

sub()
{
i=$1
j=$2
((k=i-j))
echo Sum is $k
}

mul()
{
i=$1
j=$2

```

```
((k=i*j))
echo Sum is $k
}
echo "Enter your option: 1: Add, 2:Subtract, 3: Multiply"
read i
case $i in
1) add 1 2;;
2) sub 1 2;;
3) mul 1 2;;
esac
```

OUTPUT:

```

noreen@NoreenNVirtualBox:~$ cat >calc
add()
{
i=$1
j=$2
((k=i+j))
echo sum is $k
}
sub()
{
i=$1
j=$2
((k=i-j))
echo sub is $k
}
mul()
{
i=$1
j=$2
((k=i*j))
echo multi is $k
}
echo "Enter your choice: 1: Add, 2: Subtraction, 3: Multiply"
read i
case $i in
1) add 1 2;;
2) sub 1 2;;
3) mul 1 2;;
esac
noreen@NoreenNVirtualBox:~$ chmod +x calc
noreen@NoreenNVirtualBox:~$ ./calc
Enter your choice: 1: Add, 2: Subtraction, 3: Multiply
1
sum is 3
noreen@NoreenNVirtualBox:~$
```

RESULT:

The output of the program executed successfully.

14. To find the sum of n natural numbers.

a. Using for loop

CODE:

```
sum=0
for ((i=0;i<10;i++))
do
((sum=sum+i))
done
echo $sum
```

OUTPUT:

```

for ((i=0;i<10;i++))
noreen@NoreenNVirtualBox:~$ cat >loop
sum=0
for ((i=0;i<10;i++))
do
((sum=sum + i))
done
echo $sum
noreen@NoreenNVirtualBox:~$ chmod +x loop
noreen@NoreenNVirtualBox:~$ ./loop
45

```

RESULT:

The output of the program executed successfully.

b. Using While loop

CODE:

```

i=0
sum=0
while ((i<10));do
((sum=sum+i))
((i=i+1))
done
echo $sum

```

OUTPUT:

```

noreen@NoreenNVirtualBox:~$ cat >while
i=0
sum=0
while ((i<10))
do
((sum=sum+i))
((i=i+1))
done
echo $sum
noreen@NoreenNVirtualBox:~$ chmod +x while
noreen@NoreenNVirtualBox:~$ ./while
45

```

RESULT:

The output of the program executed successfully.

EXPERIMENT-05

5.1. Installing LAMP on Ubuntu

Step 1: Update Package Repository Cache

Before you begin:

1. Open the terminal either by using the **CTRL+ALT+T** keyboard shortcut or by searching for the word **terminal** in **Ubuntu**
2. Make sure to update the package repository cache to ensure it installs the latest versions of the software. To do so, type in the following command:

sudo apt-get update

```
hp@hp-HP-Laptop-15s-du0xxx:~$ sudo apt-get update
Get:1 http://in.archive.ubuntu.com/ubuntu focal InRelease [265 kB]
Hit:2 https://screenrec.com/download/ubuntu stable InRelease
Get:3 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Get:4 http://security.ubuntu.com/ubuntu focal-security/main amd64 DEP-11 Metadata [27.6 kB]
Get:5 http://security.ubuntu.com/ubuntu focal-security/universe amd64 DEP-11 Metadata [61.0 kB]
Get:6 http://security.ubuntu.com/ubuntu focal-security/multiverse amd64 DEP-11 Metadata [2,464 B]
Get:1 http://in.archive.ubuntu.com/ubuntu focal InRelease [265 kB]
Get:1 http://in.archive.ubuntu.com/ubuntu focal InRelease [265 kB]
Get:1 http://in.archive.ubuntu.com/ubuntu focal InRelease [265 kB]
Hit:7 http://in.archive.ubuntu.com/ubuntu focal-updates InRelease
Hit:8 http://in.archive.ubuntu.com/ubuntu focal-backports InRelease
Fetched 463 kB in 2min 36s (2,977 B/s)
Reading package lists... Done
hp@hp-HP-Laptop-15s-du0xxx:~$
```

Step 2: Install Apache

1. To install Apache, run the following command in the terminal:

sudo apt-get install apache2

```

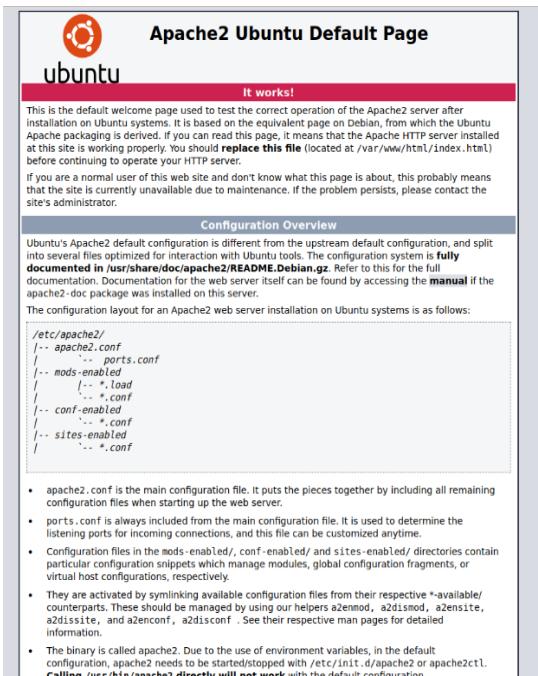
Reading package lists... Done
hp@hp-HP-Laptop-15s-du0xx:~$ sudo apt-get install apache2
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  enchant geoip-database libbind9-161 libboost-filesystem1.67.0
  libboost-iostreams1.67.0 libdns-export1107 libdns1107 libdns1109 libenchant1c2a
  libexiv2-14 libfprint0 libgeoip1 libgspell-1-1 libgutenprint-common
  libgutenprint9 libiptc0 libirs161 libisc-export1104 libisc1104 libisc1105
  libisccc161 libisccfg163 libl1vm9 liblwres161 libnfs12 liboauth0
  printer-driver-gutenprint python3-asn1crypto shim ubuntu-software
  ubuntu-system-service
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  apache2-bin apache2-data apache2-utils libapr1 libaprutil1
  libaprutil1-dbd-sqlite3 libaprutil1-ldap liblua5.2-0
Suggested packages:
  apache2-doc apache2-suexec-pristine | apache2-suexec-custom
The following NEW packages will be installed:
  apache2 apache2-bin apache2-data apache2-utils libapr1 libaprutil1
  libaprutil1-dbd-sqlite3 libaprutil1-ldap liblua5.2-0
0 upgraded, 9 newly installed, 0 to remove and 66 not upgraded.
Need to get 1,819 kB of archives.
After this operation, 7,938 kB of additional disk space will be used.
Do you want to continue? [Y/n] 

```

Press **y** (yes) and hit **ENTER** to permit the installation.

2. To ensure Apache is running, enter the Localhost of your server in the address bar and press **ENTER**.

The test Apache web server page should display as below.



Step 3: Install PHP

1. To install PHP, run the following command:

```
$ sudo apt-get install php7.4
```

```
hp@hp-HP-Laptop-15s-du0xxx:~$ sudo apt-get install php7.4
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  enchant geoip-database libbind9-161 libboost-filesystem1.67.0 libboost-iostreams1.67.0 libdns-export1107 libdns1107 libdns1109 libenchant1c2a libexiv2-14 libfprint0 libgeoip1 libgspell-1-1
  libgutenprint-common libgutenprint9 libiptc0 libirs161 libisc-export104 libisc104 libisc105 libisccc161 libiscfg163 liblvm9 liblwres161 libnfs12 liboauth0 printer-driver-gutenprint
  python3-asn1crypto shim ubuntu-software ubuntu-system-service
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  libapache2-mod-php7.4 php-common php7.4-cli php7.4-common php7.4-json php7.4-opcache php7.4-readline
Suggested packages:
  php-pear
The following NEW packages will be installed:
  libapache2-mod-php7.4 php-common php7.4-cli php7.4-common php7.4-json php7.4-opcache php7.4-readline
0 upgraded, 8 newly installed, 0 to remove and 66 not upgraded.
Need to get 4,015 kB of archives.
After this operation, 18.0 MB of additional disk space will be used.
Do you want to continue? [Y/n] ■
```

Press **y** and **ENTER** to allow the installation.

Step 4: Restart Apache

After the php installation you must restart the Apache service.

Enter the command:

```
$ sudo /etc/init.d/apache2 restart
```

Step 5: Test PHP Processing on Web Server

1. Create a basic **PHP script** and save it to the “web root” directory. This is necessary for Apache to find and serve the file correctly. This directory is located at **/var/www/html/**.

To create a file in that directory, type in the following command:

```
sudo nano /var/www/html/test.php
```

```
hp@hp-HP-Laptop-15s-du0xxx:~$ sudo nano /var/www/html/test.php
[sudo] password for hp:
hp@hp-HP-Laptop-15s-du0xxx:~$ ■
```

This command opens the **bank file**.

2. Inside the file, type in the valid PHP code:

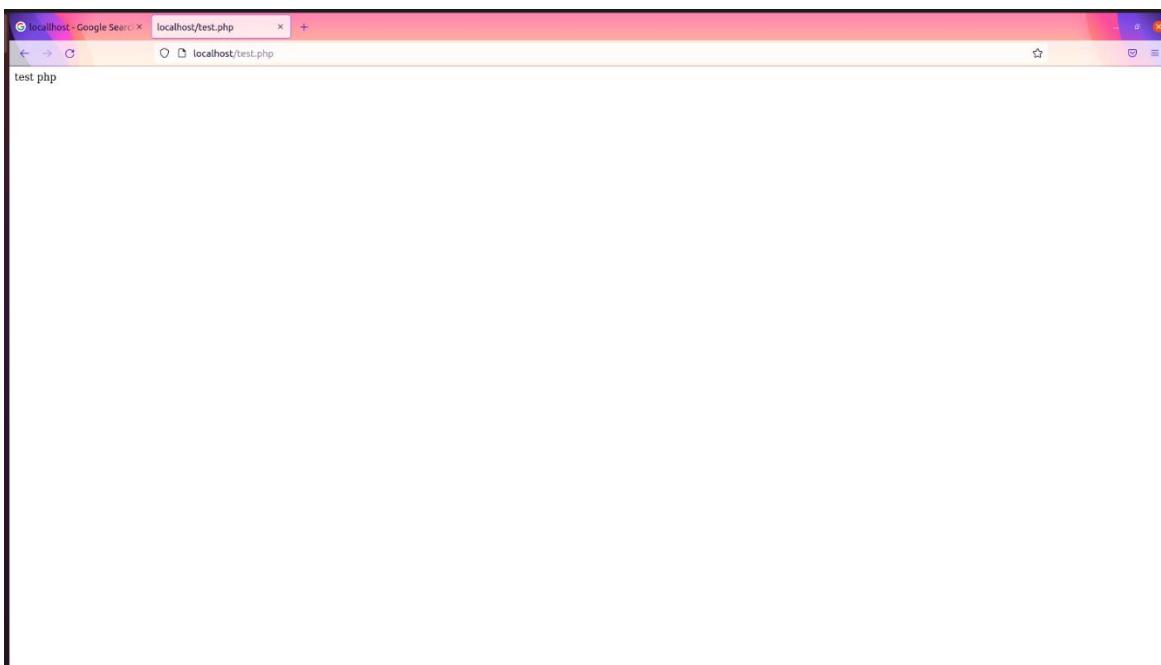
```
<?php
  Echo " test php ";
?>
```

```
<?php echo "test php"; ?>
```

The terminal window shows the command `<?php echo "test php"; ?>` being run. The output is blank, indicating the code was executed successfully.

3. Press **CTRL + X** to save and close the file. Press **y** and **ENTER** to confirm.
4. Then check the code are run correctly in php.open the browser enter the Ip address (localhost/test.php).

It show the below image



Step 6: Install Mysql server

1. To install Mysql server, run the following command:

\$ sudo apt-get install mysql-server

```

OTHER OPTIONS:
hp@hp-HP-Laptop-15s-du0xxx:~$ sudo apt-get install mysql-server
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  enchant geoip-database libbind9-161 libboost-filesystem1.67.0
  libboost-iostreams1.67.0 libdns-export1107 libdns1107 libdns1109
  libenchant1c2a libxiv2-14 libfprint0 libgeoip1 libgspell-1-1
  libgutenprint-common libgutenprint9 libiptc0 libirs161 libisc-export1104
  libisc1104 libisc1105 libisccc161 libisccfg163 liblvm9 liblwres161 libnfs12
  liboauth0 printer-driver-gutenprint python3-asn1crypto shim ubuntu-software
  ubuntu-system-service
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  libaio1 libcgi-fast-perl libcgi-pm-perl libevent-core-2.1-7
  libevent-pthreads-2.1-7 libfcgi-perl libhtml-template-perl libmecab2
  mecab-ipadic mecab-ipadic-utf8 mecab-utils mysql-client-8.0
  mysql-client-core-8.0 mysql-server-8.0 mysql-server-core-8.0
Suggested packages:

```

2. Then it's asking us for a root password . enter the password . Again we get to repeat it

Step 7: Check the Mysql server

- To check Mysql server, run the following command

```
$ mysql -u root -p
```

- Enter the root password and press enter

```

hp@hp-HP-Laptop-15s-du0xxx:~$ mysql -u root -p
Enter password:
ERROR 1045 (28000): Access denied for user 'root'@'localhost' (using password: YES)
hp@hp-HP-Laptop-15s-du0xxx:~$ mysql -u root -p
Enter password:
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 19
Server version: 8.0.26-0ubuntu0.20.04.2 (Ubuntu)

Copyright (c) 2000, 2021, Oracle and/or its affiliates.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> create database testdb;
Query OK, 1 row affected (0.01 sec)

mysql> show databases;
+-----+
| Database      |
+-----+
| information_schema |
| mysql          |
| performance_schema |
| sys            |
| testdb         |
+-----+
5 rows in set (0.00 sec)

mysql> 
```

2 . Create a database testdb and show it

- Enter the command
 - Create database testdb;
 - Show databases;
- So mysql is working then exit the mysql prompt just enter **exit;**

Step 8: Install PHP Myadmin

1. To install PHP Myadmin, run the following command:

\$ sudo apt-get install phpmyadmin

```
root@hp-hp-Laptop-15s-du0xx:~$ sudo apt-get install phpmyadmin
[sudo] password for hp:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  acl apg colord-data enchant geoip-database gnome-control-center-faces gnome-online-accounts gsfonts hplib-data libbind9-161 libboost filesystem1.67.0 libboost-iostreams1.67.0 libcolorl-gtk1
  libcolorhug2 libdns-export1107 libdns107 libdns1189 libenchant1c2a libexiv2-14 libfprint libgeoip1 libgsound0 libgspell-1-1 libgssdp-1.2.0 libgupnp-1.2.0 libgupnp-av1.0-2 libgupnp-dlna-2.0-3
  libgutenprint-common libgutenprint9 libtee1284-3 libimagequant0 libiptc0 libirs161 libisc-export104 libisc1104 libisc1105 libisccc161 libisccfg163 libllw9 liblres161 libnfs12 liboauth0
  librygel-core-2.6-2 librygel-db-2.6-2 librygel-renderer-2.6-2 librygel-server-2.6-2 libsanee-common libsnmp-base libwebpnu3 mobile-broadband-provider-info network-manager-gnome
  printer-driver-gutenprint printer-driver-postscript-h python3-asn1crypto python3-macaroonbakery python3-olefile python3-pil python3-protobuf python3-pymcaroos python3-reportlab
  python3-reportlab-accel python3-rcf3339 python3-tz rygel shim ubuntu-software ubuntu-system-service
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  dbconfig-common dbconfig-mysql icc-profiles-free javascript-common libjs-jquery libjs-openlayers libjs-sphinxdoc libjs-underscore libonig5 libzip5 php-b22 php-curl php-gd php-google-recaptcha
  php-mbstring php-mysql php-phpmyadmin-notranslator php-phpmyadmin-shapefile php-phpmyadmin-sql-parser php-phpseclib php-psr-cache php-psr-container php-psr-log php-symfony-cache
  php-symfony-cache-contracts php-symfony-expression-language php-symfony-service-contracts php-symfony-var-exporter php-tcpdf php-twig php-twиг-extensions php-xml php-zip php7.4-b22 php7.4-curl
  php7.4-gd php7.4-mbstring php7.4-mysql php7.4-xml php7.4-zip
Suggested packages:
  php-dbase php-libodium php-mcrypt php-gmp php-symfony-service-implementation php-imagick php-twиг-doc php-symfony-translation php-recode php-gd2 php-pragnarx-google2fa php-bacon-qr-code
  php-sayoutl-u2f-php-server
Recommended packages:
  php-mcrypt
The following NEW packages will be installed:
  dbconfig-common dbconfig-mysql icc-profiles-free javascript-common libjs-jquery libjs-openlayers libjs-sphinxdoc libjs-underscore libonig5 libzip5 php-b22 php-curl php-gd php-google-recaptcha
  php-mbstring php-mysql php-phpmyadmin-notranslator php-phpmyadmin-shapefile php-phpmyadmin-sql-parser php-phpseclib php-psr-cache php-psr-container php-psr-log php-symfony-cache
  php-symfony-cache-contracts php-symfony-expression-language php-symfony-service-contracts php-symfony-var-exporter php-tcpdf php-twig php-twиг-extensions php-xml php-zip php7.4-b22 php7.4-curl
  php7.4-gd php7.4-mbstring php7.4-mysql php7.4-xml php7.4-zip phpmyadmin
0 upgraded, 41 newly installed, 0 to remove and 61 not upgraded.
Need to get 16.0 MB of archives.
After this operation, 71.8 MB of additional disk space will be used.
Do you want to continue? [Y/n] 
```

Press **y** and **ENTER** to allow the installation

2. Then its ask what type of server, we have Apache2 is set by default that's what we want then press ok
3. Then a configuration prompt are open . here we're going to just choose yes and then it ask the input password for phpmyadmin
4. Then check it correct . go to the localhost/phpmyadmin. Here we can not found it so We have to actually edit the file php is located in Apache2 folder.
5. Enter the following command to edit the file
\$ sudo nano/etc/php7.4/apache2.php.ini
6. Then we need to uncomment an **extension=mysql.so**. find it the file just remove the Semicolon.
7. Then enter **ctrl+x** to save

Step 9: Restart Apache

After the php installation you must restart the Apache service.

Enter the command:

```
$ sudo /etc/init.d/apache2 restart
```

Step 9.1:Include phpmyadmin in apache configuration

1. Enter the command:

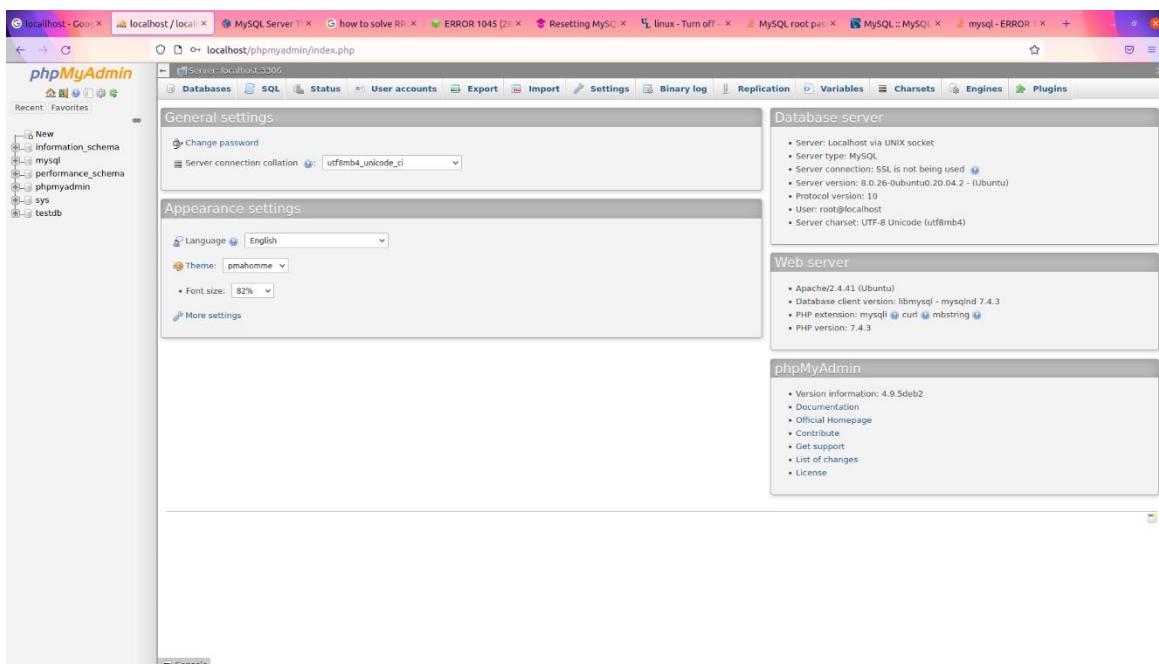
```
$ sudo nano/etc/apache2/apache2.conf
```

2. Type the following command to the nano editor

Include /etc/phpmyadmin/apache.conf

3. Then enter **ctrl+x** to save

4. Then again restart the apache



EXPERIMENT-06**6.1.Laravel installation On Ubuntu with Apache****Step 1: Update Package Repository Cache**

Before you begin:

1. Open the terminal either by using the **CTRL+ALT+T** keyboard shortcut or by searching for the word *terminal* in **Ubuntu**
2. Make sure to update the package repository cache to ensure it installs the latest versions of the software. To do so, type in the following command:

sudo apt-get update

```
hp@hp-HP-Laptop-15s-du0xxx:~$ sudo apt-get update
[sudo] password for hp:
Get:1 http://in.archive.ubuntu.com/ubuntu focal InRelease [265 kB]
Hit:2 https://screenrec.com/download/ubuntu stable InRelease
Hit:3 http://security.ubuntu.com/ubuntu focal-security InRelease
Hit:4 http://in.archive.ubuntu.com/ubuntu focal-updates InRelease
Hit:5 http://in.archive.ubuntu.com/ubuntu focal-backports InRelease
Fetched 265 kB in 1s (225 kB/s)
Reading package lists... Done
hp@hp-HP-Laptop-15s-du0xxx:~$
```

Step 2: Install Apache

1. To install Apache, run the following command in the terminal:

sudo apt-get install apache2

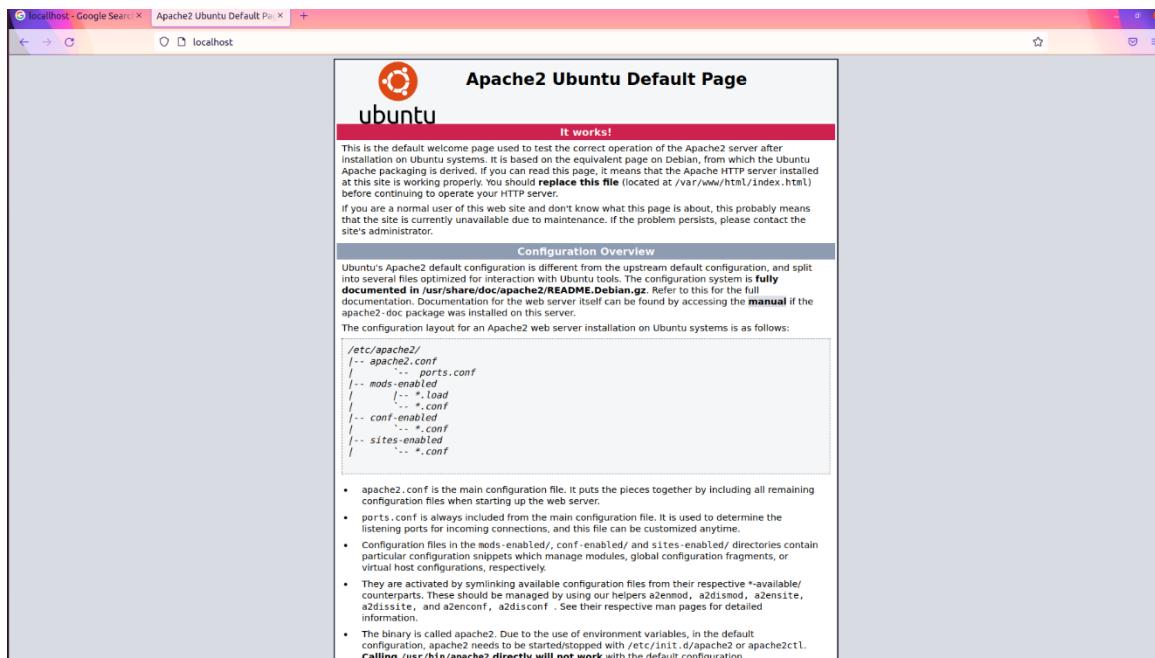
```

Reading package lists... Done
hp@hp-HP-Laptop-15s-du0xxx:~$ sudo apt-get install apache2
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  enchant geoip-database libbind9-161 libboost-filesystem1.67.0
  libboost-iostreams1.67.0 libdns-export1107 libdns1107 libdns1109 libenchant1c2a
  libexiv2-14 libfprint0 libgeoip1 libgsspell-1-1 libgutenprint-common
  libgutenprint9 libiptc0 libirs161 libisc-export1104 libisc1104 libisc1105
  libisccc161 libisccfg163 libl1vm9 liblwres161 libnfs12 liboauth0
  printer-driver-gutenprint python3-asn1crypto shim ubuntu-software
  ubuntu-system-service
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  apache2-bin apache2-data apache2-utils libapr1 libaprutil1
  libaprutil1-dbd-sqlite3 libaprutil1-ldap liblua5.2-0
Suggested packages:
  apache2-doc apache2-suexec-pristine | apache2-suexec-custom
The following NEW packages will be installed:
  apache2 apache2-bin apache2-data apache2-utils libapr1 libaprutil1
  libaprutil1-dbd-sqlite3 libaprutil1-ldap liblua5.2-0
0 upgraded, 9 newly installed, 0 to remove and 66 not upgraded.
Need to get 1,819 kB of archives.
After this operation, 7,938 kB of additional disk space will be used.
Do you want to continue? [Y/n] 

```

2. To ensure Apache is running, enter the Localhost of your server in the address bar and press **ENTER**.

The test Apache web server page should display as below.



Step 3: Install PHP

2. To install PHP, run the following command:

\$ sudo apt-get install php7.4

```
hp@hp-HP-Laptop-15s-du0xxx:~$ sudo apt-get install php7.4
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  enchant geoip-database libbind9-161 libboost-filesystem1.67.0 libboost-iostreams1.67.0 libdns-export1107 libdns1107 libdns1109 libenchant1c2a libixiv2-14 libfprint0 libgeoip1 libgspell-1-1
  libgutenprint-common libgutenprint9 libiptc0 libirs161 libisc-export1104 libisc1104 libisc1105 libisccc161 libisccfg163 libl1v9 liblwres161 libnfs12 liboauth0 printer-driver-gutenprint
  python3-asn1crypto shin ubuntu-software ubuntu-system-service
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  libapache2-mod-php7.4 php-common php7.4-cli php7.4-common php7.4-json php7.4-opcache php7.4-readline
Suggested packages:
  php-pear
The following NEW packages will be installed:
  libapache2-mod-php7.4 php-common php7.4-cli php7.4-common php7.4-json php7.4-opcache php7.4-readline
0 upgraded, 8 newly installed, 0 to remove and 66 not upgraded.
Need to get 4,015 kB of archives.
After this operation, 18.0 MB of additional disk space will be used.
Do you want to continue? [Y/n] ■
```

Press **y** and **ENTER** to allow the installation

3. Then make a change in php init file . set cgi.fix_pathinfo set to be 0.Do it using the following commands.

- Cd /etc/php/ 7.4/apache2/
- Sudo nano php.ini
- It open the php.ini file ,then uncomment the line and it set to be 0

```
Memory: 20.1M
CGroup: /system.slice/apache2.service
         └─919 /usr/sbin/apache2 -k start
          ├─943 /usr/sbin/apache2 -k start
          ├─944 /usr/sbin/apache2 -k start
          ├─945 /usr/sbin/apache2 -k start
          ├─946 /usr/sbin/apache2 -k start
          └─948 /usr/sbin/apache2 -k start

Sep 28 23:49:08 hp@HP-Laptop-15s-du0xxx systemd[1]: Starting The Apache HTTP Se>
Sep 28 23:49:08 hp@HP-Laptop-15s-du0xxx apachectl[865]: AH0055B: apache2: Could>
Sep 28 23:49:08 hp@HP-Laptop-15s-du0xxx systemd[1]: Started The Apache HTTP Ser>
hp@hp-HP-Laptop-15s-du0xxx:~$ cd /etc/php
hp@hp-HP-Laptop-15s-du0xxx:/etc/php$ ls
7.4
hp@hp-HP-Laptop-15s-du0xxx:/etc/php$ cd 7.4/
hp@hp-HP-Laptop-15s-du0xxx:/etc/php/7.4$ ls
apache2 cli mods-available
hp@hp-HP-Laptop-15s-du0xxx:/etc/php/7.4$ cd apache2
hp@hp-HP-Laptop-15s-du0xxx:/etc/php/7.4/apache2$ ls
conf.d php.ini
hp@hp-HP-Laptop-15s-du0xxx:/etc/php/7.4/apache2$ sudo nano php.ini
hp@hp-HP-Laptop-15s-du0xxx:/etc/php/7.4/apache2$ sudo systemctl restart apache2
```

```
GNU nano 4.8                               php.ini                               Modified
; every request. PHP's default behavior is to disable this feature.
;cgi.nph = 1

; if cgi.force_redirect is turned on, and you are not running under Apache or N>
; (iPlanet) web servers, you MAY need to set an environment variable name that >
; will look for to know it is OK to continue execution. Setting this variable >
; cause security issues, KNOW WHAT YOU ARE DOING FIRST.
; http://php.net/cgi.redirect-status-env
;cgi.redirect_status_env =

; cgi.fix_pathinfo provides *real* PATH_INFO/PATH_TRANSLATED support for CGI. >
; previous behaviour was to set PATH_TRANSLATED to SCRIPT_FILENAME, and to not >
; what PATH_INFO is. For more information on PATH_INFO, see the cgi specs. Set>
; this to 1 will cause PHP CGI to fix its paths to conform to the spec. A sett>
; of zero causes PHP to behave as before. Default is 1. You should fix your s>
; to use SCRIPT_FILENAME rather than PATH_TRANSLATED.
; http://php.net/cgi.fix-pathinfo
;cgi.fix_pathinfo=0

; if cgi.discard_path is enabled, the PHP CGI binary can safely be placed outsi>

^G Get Help  ^O Write Out  ^W Where Is  ^K Cut Text  ^J Justify  ^C Cur Pos
^X Exit      ^R Read File  ^\ Replace   ^U Paste Text  ^T To Spell  ^L Go To Line
```

- Then restart the apache server using the following command

\$ systemctl restart apache

4. Install Composer

Composer is a PHP dependency manager that facilitates the download of PHP libraries in our projects. Composer both works great with and makes it much easier to install Laravel.

1. Install composor using the following command

```
$ Curl -sS https://getcomposer.org/installer | php
```

2. In this time your system not insdtaaled the curl file .then install it using the following command

```
$ Sudo apt install curl
```

```
ip@hp-HP-Laptop-15s-du0xxx:/etc/php/7.4/apache2$ sudo nano php.ini
ip@hp-HP-Laptop-15s-du0xxx:/etc/php/7.4/apache2$ systemctl restart apache2
ip@hp-HP-Laptop-15s-du0xxx:/etc/php/7.4/apache2$ curl -sS http://getcomposer.org/installer | php

Command 'curl' not found, but can be installed with:

sudo snap install curl # version 7.78.0, or
sudo apt install curl # version 7.68.0-1ubuntu2.7

See 'snap info curl' for additional versions.

ip@hp-HP-Laptop-15s-du0xxx:/etc/php/7.4/apache2$ sudo apt install curl
Reading package lists...
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  acl app-color-data enchant geopg-database gnome-control-center-faces
  gnome-online-accounts gsfonts hplip-data libbind9-161
  libboost-filesystem1.67.0 libboost-iostreams1.67.0 libcolor-gtk1
  libcolorhug2 libdns-export1107 libdns1107 libdns1109 libenchant1c2a
  libexiv2-14 libprint0 libgeoi1p1 libgsound0 libgsspell-1-1 libgssdp-1.2-0
  libgupnp-1.2-0 libgupnp-av-1.0-2 libgupnp-dlna-2.0-3 libgutenprint-common
  libgutenprint9 libieee1284-3 libimagequanto libiptc0 libirs161
  libisc-export104 libisc1104 libisc1105 libisccc161 libiscfg163 liblvm9
  liblwres161 libnfs12 libautho0 librygel-core-2.6-2 librygel-db-2.6-2
  librygel-renderer-2.6-2 librygel-server-2.6-2 libsane-common libsnmp-base
  libwebpmax3 mobile broadband provider info network-manager-gnome
  printer-driver-gutenprint printer-driver-postscript-hp python3-asn1crypto
  python3-macaroonbakery python3-olefile python3-pil python3-protobuf
  python3-pymacaroons python3-renderpm python3-reportlab
  python3-reportlab-accel python3-rfc3339 python3-tz rygel shim
  ubuntu-software ubuntu-system-service
Use 'sudo apt autoremove' to remove them.
The following NEW packages will be installed:
  curl
0 upgraded, 1 newly installed, 0 to remove and 91 not upgraded.
Need to get 161 kB of archives.
After this operation, 412 kB of additional disk space will be used.
Get:1 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 curl amd64 7.68.0-1ubuntu2.7 [161 kB]
Fetched 161 kB in 11s (14.8 kB/s)
Selecting previously unselected package curl.
(Reading database ... 192305 files and directories currently installed.)
Preparing to unpack .../curl_7.68.0-1ubuntu2.7_amd64.deb ...
Unpacking curl (7.68.0-1ubuntu2.7) ...
Setting up curl (7.68.0-1ubuntu2.7) ...
Processing triggers for man-db (2.9.1-1) ...
ip@hp-HP-Laptop-15s-du0xxx:/etc/php/7.4/apache2$
```

3. Move the file using the following command

```
$
```

```
| Composer (version 2.1.8) successfully installed to: /home/hp/composer.phar
| Use it: php composer.phar

hp@hp-HP-Laptop-15s-du0xxx:$ sudo mv composer.phar /usr/local/bin/composer
hp@hp-HP-Laptop-15s-du0xxx:$ composer --version
Composer version 2.1.8 2021-09-15 13:55:14
hp@hp-HP-Laptop-15s-du0xxx:$ composer global require laravel/installer
Changed current directory to /home/hp/.config/composer
```

```
sudo mv composer.phar
/usr/local/bin/composer
```

Step 5 – Install Laravel 8.x on Ubuntu 20.04

Now install Laravel Framework using composer, just type composer global require Laravel/installer It will take a while to complete download its dependencies

1. Lavaral install with following command

\$ composer global require laravel/installer

```
hp@hp-HP-Laptop-15s-du0xxx:~$ composer global require laravel/installer
Changed current directory to /home/hp/.config/composer
https://repo.packagist.org could not be fully loaded (curl error 28 while downloading https://repo.packagist.org/pa
d from the local cache and may be out of date
Using version ^4.2 for laravel/installer
./composer.json has been updated
Running composer update laravel/installer
Loading composer repositories with package information
Updating dependencies
Lock file operations: 13 installs, 0 updates, 0 removals
- Locking laravel/installer (v4.2.8)
- Locking psr/container (1.1.1)
- Locking symfony/console (v5.3.7)
- Locking symfony/deprecation-contracts (v2.4.0)
- Locking symfony/polyfill-ctype (v1.23.0)
- Locking symfony/polyfill-intl-grapheme (v1.23.1)
- Locking symfony/polyfill-intl-normalizer (v1.23.0)
- Locking symfony/polyfill-mbstring (v1.23.1)
- Locking symfony/polyfill-php73 (v1.23.0)
- Locking symfony/polyfill-php80 (v1.23.1)
- Locking symfony/process (v5.3.7)
- Locking symfony/service-contracts (v2.4.0)
- Locking symfony/string (v5.3.7)
```

Next add bin directory to path environment through the `~/.bashrc` configuration .so edit the `~/.bashrc` configuration using nano command. The command are follow

\$ nano ~/.bashrc

2.It open the file and add the following line at the end of the file.

export PATH="\$HOME/.config/composer/vendor/bin:\$PATH"

```
# Add an "alert" alias for long running commands. Use like so:
# sleep 10; alert
alias alert='notify-send --urgency=low -i "$( [ $? = 0 ] && echo terminal ||

# Alias definitions.
# You may want to put all your additions into a separate file like
# ~/.bash_aliases, instead of adding them here directly.
# See /usr/share/doc/bash-doc/examples in the bash-doc package.

if [ -f ~/.bash_aliases ]; then
    . ~/.bash_aliases
fi

# enable programmable completion features (you don't need to enable
# this, if it's already enabled in /etc/bash.bashrc and /etc/profile
# sources /etc/bash.bashrc).
if ! shopt -oq posix; then
    if [ -f /usr/share/bash-completion/bash_completion ]; then
        . /usr/share/bash-completion/bash_completion
    elif [ -f /etc/bash_completion ]; then
        . /etc/bash_completion
    fi
fi
export PATH="$HOME/.config/composer/vendor/bin:$PATH"
'

^G Get Help      ^O Write Out     ^W Where Is      ^K Cut Text      ^J Justify
^X Exit         ^R Read File     ^\ Replace       ^U Paste Text   ^T To Spell
```

3.Then reload your bashrc configuration using the source command.

```
$ source ~/.bashrc
```

4.Then echo \$PATH. It will return your “Bin” directory path for the Composer package.

```
$ echo $PATH
```

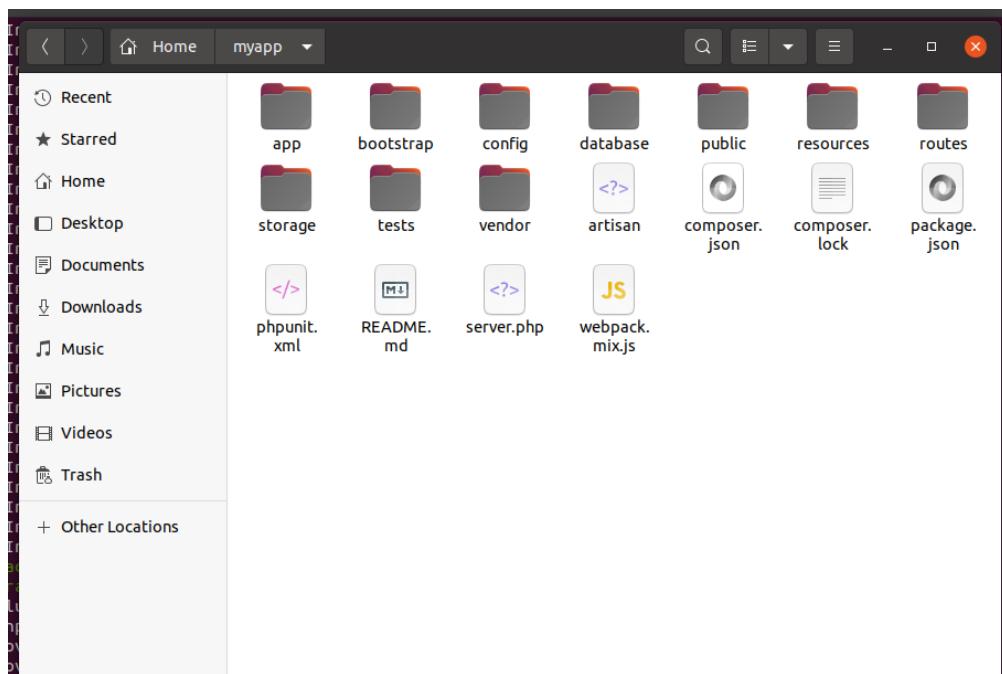
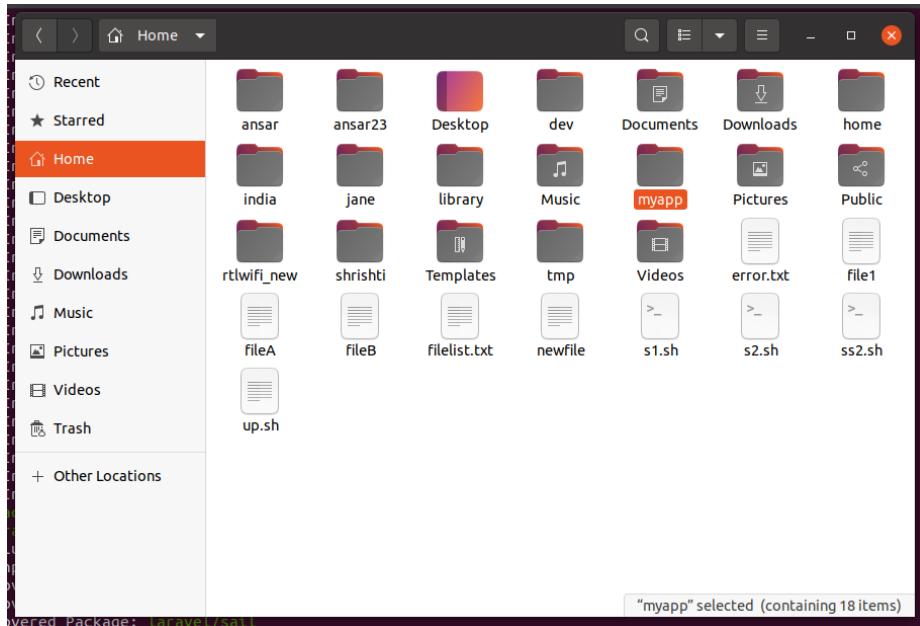
```
hp@hp-HP-Laptop-15s-du0xxx:~$ sudo nano ~/.bashrc
[sudo] password for hp:
hp@hp-HP-Laptop-15s-du0xxx:~$ source ~/.bashrc
hp@hp-HP-Laptop-15s-du0xxx:~$ echo $PATH
/home/hp/.config/composer/vendor/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin
hp@hp-HP-Laptop-15s-du0xxx:~$
```

5.then create a new project in laravel with the following command

```
$ laravel new myapp1
```

```
/home/hp/.composer/vendor/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin
hp@hp-HP-Laptop-15s-du0xxx:~$ laravel new myapp1
[Progress Bar]
Creating a "laravel/laravel" project at "./myapp1"
Installing laravel/laravel (v8.6.2)
- Downloading laravel/laravel (v8.6.2)
- Installing laravel/laravel (v8.6.2): Extracting archive
Created project in /home/hp/myapp1
> @php -r "file_exists('.env') || copy('.env.example', '.env');"
Loading composer repositories with package information
Updating dependencies
Lock file operations: 111 installs, 0 updates, 0 removals
- Locking asm89/stack-cors (v2.0.3)
- Locking brick/math (0.9.3)
- Locking dflydev/dot-access-data (v3.0.1)
- Locking doctrine/inflector (2.0.3)
- Locking doctrine/instantiator (1.4.0)
- Locking doctrine/lexer (1.2.1)
- Locking dragonmantank/cron-expression (v3.1.0)
- Locking egulias/email-validator (2.1.25)
- Locking facade/flare-client-php (1.9.1)
- Locking facade/ignition (2.13.1)
- Locking facade/ignition-contracts (1.0.2)
```

Here you can see the installation of my new project myapp1 finished. You can also see inside my home directory a new directory has been created with my project name.



Step 6– Finally Configure Apache for Laravel and test it

1. First, add your project directory to www-data group use the following command

```
$ sudo chgrp -R www-data /home/hp/myapp
```

- Then you need to change access permission 775 of the storage directory under your project. use the following command.

```
$ sudo chmod -R 775 /home/hp/myapp/storage
```

```
chgrp: cannot access '/home/hp/myapp': No such file or directory
hp@hp-HP-Laptop-15s-du0xxx:~$ sudo chgrp -R www-data /home/hp/myapp
hp@hp-HP-Laptop-15s-du0xxx:~$ sudo chmod -R 775 /home/hp/myapp/storage
hp@hp-HP-Laptop-15s-du0xxx:~$ cd /etc/apache2/sites-available/
hp@hp-HP-Laptop-15s-du0xxx:/etc/apache2/sites-available$ ls
000-default.conf default-ssl.conf
hp@hp-HP-Laptop-15s-du0xxx:/etc/apache2/sites-available$
```

6.Then create an apache vhost configuration go to the following directory and create a vhost config file using nano file editor.

```
$ cd /etc/apache2/sites-available/
$ sudo nano myapp1.com.conf
```

And paste the following line inside the file.

```
<VirtualHost *:80>
    ServerName myapp.com
    ServerAdmin admin@myapp.com
    DocumentRoot /home/hp/myapp/public

    <Directory /home/hp/myapp>
        Options Indexes MultiViews
        AllowOverride None
        Require all granted
    </Directory>

    ErrorLog ${APACHE_LOG_DIR}/error.log
    CustomLog ${APACHE_LOG_DIR}/access.log combined
</VirtualHost>
```

```
chgrp: cannot access '/home/myapp': No such file or directory
hp@hp-HP-Laptop-15s-du0xxx:~$ sudo chgrp -R www-data /home/hp/myapp
hp@hp-HP-Laptop-15s-du0xxx:~$ sudo chmod -R 775 /home/hp/myapp/storage
hp@hp-HP-Laptop-15s-du0xxx:~$ cd /etc/apache2/sites-available/
hp@hp-HP-Laptop-15s-du0xxx:/etc/apache2/sites-available$ ls
000-default.conf default-ssl.conf
hp@hp-HP-Laptop-15s-du0xxx:/etc/apache2/sites-available$ sudo nano myapp.com.conf
hp@hp-HP-Laptop-15s-du0xxx:/etc/apache2/sites-available$ sudo nano myapp.com.conf
hp@hp-HP-Laptop-15s-du0xxx:/etc/apache2/sites-available$ sudo a2enmod rewrite
Enabling module rewrite.
To activate the new configuration, you need to run:
  systemctl restart apache2
hp@hp-HP-Laptop-15s-du0xxx:/etc/apache2/sites-available$ sudo a2ensite myapp.com.conf
sudo: a2ensite myapp.com.conf: command not found
hp@hp-HP-Laptop-15s-du0xxx:/etc/apache2/sites-available$ sudo a2ensite myapp.com.conf
Enabling site myapp.com.
To activate the new configuration, you need to run:
  systemctl reload apache2
```

7. Now enable mod rewrite for apache2 just type

```
$ sudo a2enmod rewrite
```

Then enable your site, just type

```
$ sudo a2ensite myapp1.com.conf
```

Finally, Restart the apache service, type

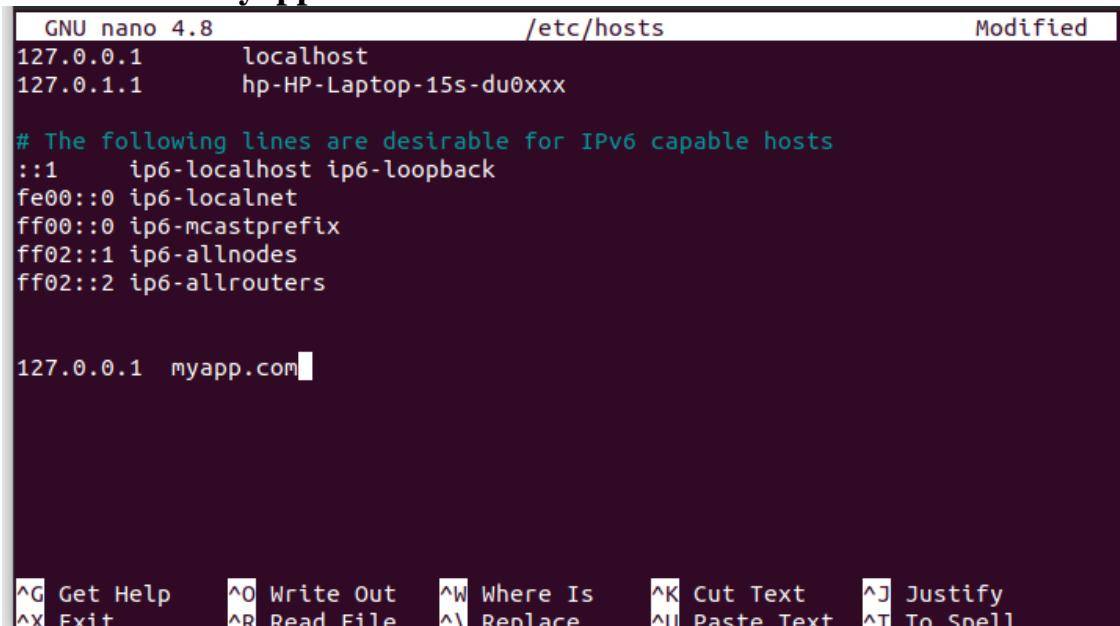
```
$ systemctl restart apache2
```

8. As you are in a local environment you need a local dns resolver for your site. Go ahead and edit /etc/hosts file, add a dns record for your site then save the file.

```
$ sudo nano /etc/hosts
```

Inside the file add the below line

127.0.0.1 myapp.com



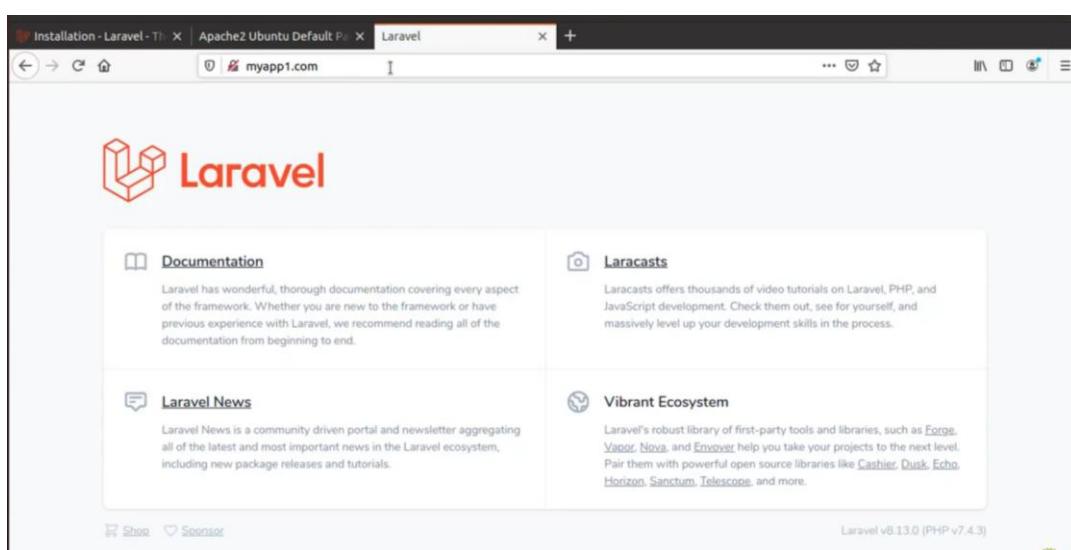
```
GNU nano 4.8                               /etc/hosts                         Modified
127.0.0.1      localhost
127.0.1.1      hp-HP-Laptop-15s-du0xxx

# The following lines are desirable for IPv6 capable hosts
::1      ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters

127.0.0.1  myapp.com

^G Get Help      ^O Write Out    ^W Where Is     ^K Cut Text    ^J Justify
^X Exit          ^R Read File   ^\ Replace      ^U Paste Text  ^T To Spell
```

Now get back to the web browser and open a tab then type your project hostname.



And here it is it's working. Here you can see the Laravel version and PHP version.

EXPERIMENT-07

7.1. Networking commands

7.1.1.PING COMMAND

PING (Packet Internet Groper) command is used to check the network connectivity between host and server/host. This command takes as input the IP address or the URL and sends a data packet to the specified address with the message “PING” and get a response from the server/host this time is recorded which is called latency. Fast ping low latency means faster connection. Ping uses **ICMP(Internet Control Message Protocol)** to send an **ICMP echo message** to the specified host if that host is available then it sends **ICMP reply message**. Ping is generally measured in millisecond every modern operating system has this ping pre-installed.

Syntax: ping [OPTIONS] DESTINATION

```
noreen@NoreenVirtualBox:~$ ping google.com
PING google.com (172.217.160.142) 56(84) bytes of data.
64 bytes from maa03s29-in-f14.1e100.net (172.217.160.142): icmp_seq=1 ttl=115 time=26.6 ms
64 bytes from maa03s29-in-f14.1e100.net (172.217.160.142): icmp_seq=2 ttl=115 time=28.9 ms
64 bytes from maa03s29-in-f14.1e100.net (172.217.160.142): icmp_seq=3 ttl=115 time=29.3 ms
64 bytes from maa03s29-in-f14.1e100.net (172.217.160.142): icmp_seq=4 ttl=115 time=28.5 ms
64 bytes from maa03s29-in-f14.1e100.net (172.217.160.142): icmp_seq=5 ttl=115 time=29.3 ms
64 bytes from maa03s29-in-f14.1e100.net (172.217.160.142): icmp_seq=6 ttl=115 time=435 ms
64 bytes from maa03s29-in-f14.1e100.net (172.217.160.142): icmp_seq=7 ttl=115 time=29.3 ms
64 bytes from maa03s29-in-f14.1e100.net (172.217.160.142): icmp_seq=8 ttl=115 time=28.8 ms
64 bytes from maa03s29-in-f14.1e100.net (172.217.160.142): icmp_seq=9 ttl=115 time=28.9 ms
64 bytes from maa03s29-in-f14.1e100.net (172.217.160.142): icmp_seq=10 ttl=115 time=29.4 ms
64 bytes from maa03s29-in-f14.1e100.net (172.217.160.142): icmp_seq=11 ttl=115 time=28.8 ms
^C
--- google.com ping statistics ---
11 packets transmitted, 11 received, 0% packet loss, time 10017ms
rtt min/avg/max/mdev = 26.642/65.677/434.553/116.650 ms
```

7.1.2.TRACEROUTE COMMAND

Traceroute command in Linux prints the route that a packet takes to reach the host. This command is useful when you want to know about the route and about all the hops that a packet takes. Below image depicts how traceroute command is used to reach the Google (172.217.26.206) host from the local machine and it also prints detail about all the hops that it visits in between.

Syntax: traceroute [options] host_Address [pathlength]

```
hp@hp-HP-Laptop-15s-du0xxx:~$ traceroute google.com
traceroute to google.com (142.250.183.238), 30 hops max, 60 byte packets
 1 _gateway (10.10.10.101)  6.253 ms  6.221 ms  6.188 ms
 2 * * *
 3 130.230.88.202.asianet.co.in (202.88.230.130)  28.619 ms  28.577 ms  30.782
ms
 4 77.252.88.202.asianet.co.in (202.88.252.77)  24.119 ms  30.677 ms  24.078 ms
 5 * * *
 6 108.170.253.97 (108.170.253.97)  28.104 ms  21.323 ms  142.251.55.236 (142.25
1.55.236)  21.177 ms
 7 209.85.253.85 (209.85.253.85)  19.985 ms  108.170.253.122 (108.170.253.122)
19.868 ms  108.170.253.121 (108.170.253.121)  20.976 ms
 8 maa05s23-in-f14.1e100.net (142.250.183.238)  20.919 ms  74.125.242.129 (74.12
5.242.129)  20.905 ms  20.871 ms
```

7.1.3.ROUTE COMMAND

route command in Linux is used when you want to work with the IP/kernel routing table. It is mainly used to set up static routes to specific hosts or networks via an interface. It is used for showing or update the IP/kernel routing table.

Syntax: route

```
Processing triggers for man-db (2.5.1-1, ...  
hp@hp-HP-Laptop-15s-du0xxx:~$ route  
Kernel IP routing table  
Destination      Gateway          Genmask        Flags Metric Ref    Use Iface  
default         _gateway        0.0.0.0        UG    600    0        0 wlo1  
10.0.0.0        0.0.0.0        255.0.0.0      U     600    0        0 wlo1  
link-local      0.0.0.0        255.255.0.0    U     1000   0        0 wlo1  
hp@hp-HP-Laptop-15s-du0xxx:~$
```

7.1.4. NSLOOKUP COMMAND

nslookup (stands for “Name Server Lookup”) is a useful command for getting information from DNS server. It is a network administration tool for querying the Domain Name System (DNS) to obtain domain name or IP address mapping or any other specific DNS record. It is also used to troubleshoot DNS related problems.

Syntax: nslookup [option]

```
noreen@NoreenNVirtualBox:~$ nslookup google.com
Server:  127.0.0.53
Address: 127.0.0.53#53

Non-authoritative answer:
Name:  google.com
Address: 172.217.160.142
Name:  google.com
Address: 2404:6800:4007:814::200e
```

7.1.5. IFCONFIG COMMAND

ifconfig(interface configuration) command is used to configure the kernel-resident network interfaces. It is used at the boot time to set up the interfaces as necessary. After that, it is usually used when needed during debugging or when you need system tuning. Also, this command is used to assign the IP address and netmask to an interface or to enable or disable a given interface.

Syntax: ifconfig [...OPTIONS] [INTERFACE]

```
Processing triggers for man-db (2.9.1-1) ...
noreen@NoreenNVirtualBox:~$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
        inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
        inet6 fe80::6632:f3b6:ba2f:38f3 prefixlen 64 scopeid 0x20<link>
            ether 08:00:27:36:e3:5f txqueuelen 1000 (Ethernet)
            RX packets 48646 bytes 66391425 (66.3 MB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 22524 bytes 1561058 (1.5 MB)
            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 1708 bytes 159074 (159.0 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 1708 bytes 159074 (159.0 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

noreen@NoreenNVirtualBox:~$
```

EXPERIMENT-08**8.1 WIRESHARK installation**

Wireshark is a free and open source packet analyser used for network troubleshooting and analysis.

8.1.2. Downloading steps

1. Open a web browser.
2. Navigate to <http://www.wireshark.org>.
3. Select Download Wireshark.
4. Select the Wireshark Windows Installer matching your system type. Save the program in the Downloads folder.
5. Close the web browser.

8.1.3. Installation process

1. Double-click on the file to open it.
2. If you see a User Account Control dialog box, select Yes to allow the program to make changes to this computer.
3. Select Next > to start the Setup Wizard.
4. Review the license agreement. If you agree, select I Agree to continue.
5. Select Next > to accept the default components.
6. Select the shortcuts you would like to have created. Leave the file extensions selected. Select Next > to continue.
7. Select Next > to accept the default install location.
8. Select Install to begin installation.
9. Select Next > to install WinPcap.
10. Select Next > to start the Setup Wizard.
11. Review the license agreement. If you agree, select I Agree to continue.
12. Select Install to begin installation.
13. Select Finish to complete the installation of WinPcap.

14. Select Next > to continue with the installation of Wireshark.

15. Select Finish to complete the installation of Wireshark.

1.8.4. Demonstrate the process to filtering SMTP packets.

1)) Capturing SMTP packets

1. Start a Wireshark capture.

2. Open a command prompt.

3. Type telnet gmail-smtp-in.l.google.com 25 and press Enter. If this does not work, your ISP may be blocking outbound traffic on port 25. You can try telnet smtp.gmail.com 587 instead to generate SMTP traffic and then filter on port 587 in the next activity.

4. Observe the server response.

5. Type helo and press Enter.

6. Observe the server response. Note that at this point you could enter mail, rcpt and data to send an SMTP message, but this only works on servers configured.

to allow clear text relay without authentication.

7. Type quit and press Enter to close the connection.

8. Observe the server response.

9. Close the command prompt.

10. Stop the Wireshark capture.

9. 2))Select destination Traffic

1. Observe the traffic captured in the top Wireshark packet list pane. To view only SMTP traffic, type smtp (lower case) in the Filter box and press Enter.

2. Select the first SMTP packet labelled 220

3. Observe the destination IP address.

4. To view all related traffic for this connection, change the filter to ip.addr == <destination>, where <destination> is the destination address of the SMTP packet.

10. 3))Analysing TCP connection traffic

1. Observe the traffic captured in the top Wireshark packet list pane. The first three packets (TCP SYN, TCP SYN/ACK, TCP ACK) are the TCP three way handshake. Select the first packet.
2. Observe the packet details in the middle Wireshark packet details pane. Notice that it is an Ethernet II / Internet Protocol Version 4 / Transmission Control Protocol frame.
3. Expand Ethernet II to view Ethernet details.
4. Observe the Destination and Source fields. The destination should be your default gateway's MAC address and the source should be your MAC address. You can use ipconfig /all and arp -a to confirm.
5. Expand Internet Protocol Version 4 to view IP details.
6. Observe the Source address. Notice that the source address is your IP address.
7. Observe the Destination address. Notice that the destination address is the IP address of the SMTP server.
8. Expand Transmission Control Protocol to view TCP details.
9. Observe the Source port. Notice that it is a dynamic port selected for this HTTP connection.
10. Observe the Destination port. Notice that it is smtp (25). Note that all of the packets for this connection will have matching MAC addresses, IP addresses, and port numbers.

11.))Analyse SMTP Service Ready Traffic

1. Observe the traffic captured in the top Wireshark packet list pane.
2. Select the fourth packet, which is the first SMTP packet and labeled 220
3. Observe the packet details in the middle Wireshark packet details pane. Notice that it is an Ethernet II / Internet Protocol Version 4 / Transmission Control Protocol / Hypertext Transfer Protocol frame. Also notice that the Ethernet II, Internet Protocol Version 4, and Transmission Control Protocol values are consistent with the TCP connection analysed in Activity 3.
4. Expand Simple Mail Transfer Protocol and Response to view SMTP details.
5. Observe the Response code and Response parameter.
6. Observe the traffic captured in the top Wireshark packet list pane.
7. Select the fifth packet, labelled TCP ACK. This is the client TCP acknowledgement of receiving the Service Ready message.

12. 5))Analyse SMTP HELO Traffic

1. Observe the traffic captured in the top Wireshark packet list pane.
2. Select the following TCP segments and acknowledgements. If you observe the packet details in the bottom Wireshark packet bytes pane carefully, you will see that the segments spell out the helo message. The sequence ends with a Wireshark-combined SMTP client helo message, followed by a server TCP acknowledgement.

13. 6)) Analyse SMTP Completed Traffic

1. Observe the traffic captured in the top Wireshark packet list pane.
2. Select the following SMTP packet, labeled 250 ...
3. Observe the packet details in the middle Wireshark packet details pane.
4. Expand Simple Mail Transfer Protocol and Response to view SMTP details.
5. Observe the Response code and Response parameter.

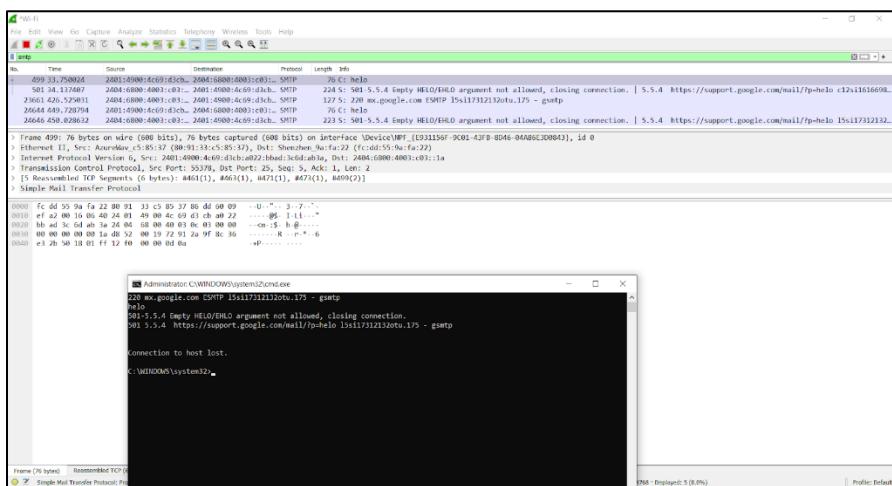
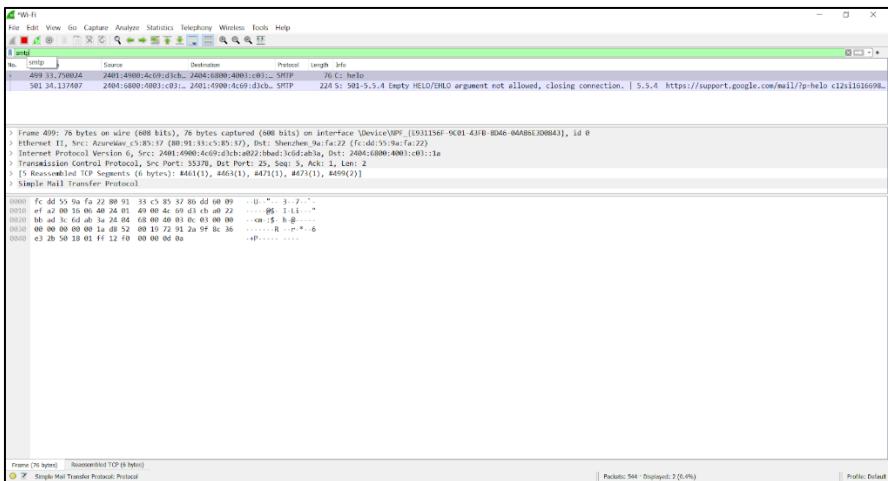
14. 7))Analyse SMTP QUIT Traffic

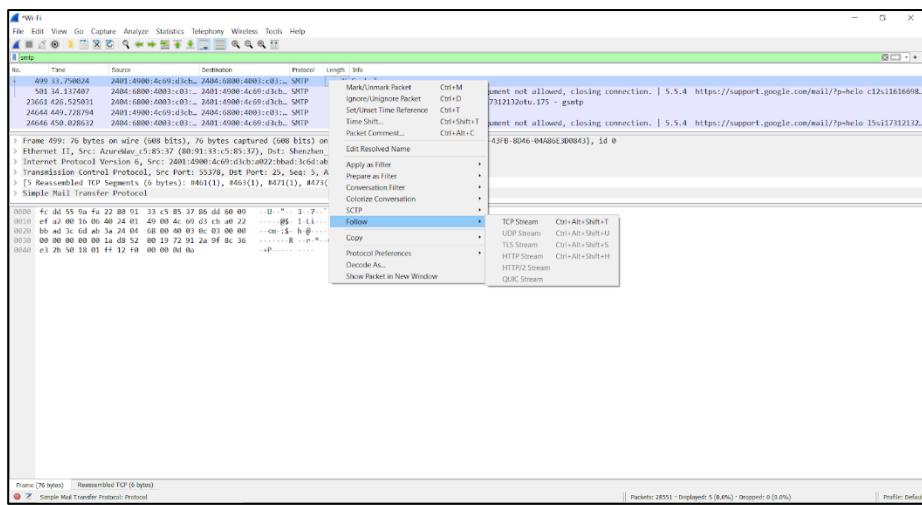
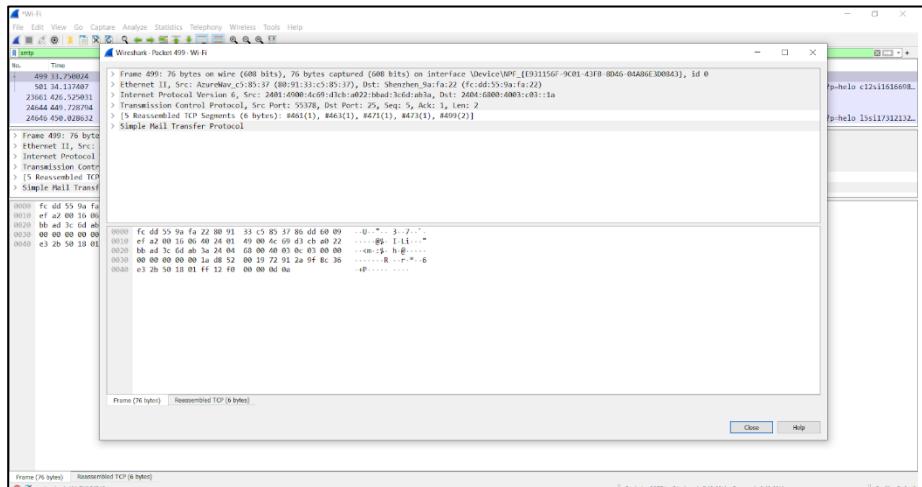
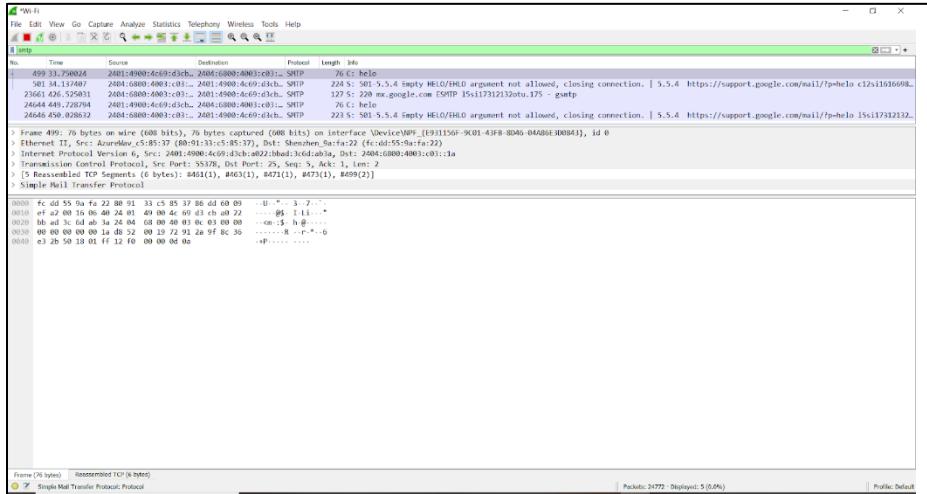
1. Observe the traffic captured in the top Wireshark packet list pane.
2. Select the following TCP segments and acknowledgements. If you observe the packet details in the bottom Wireshark packet bytes pane carefully, you will see that the segments spell out the quit message. The sequence ends with a Wireshark-combined SMTP client quit message, followed by a server TCP acknowledgement.

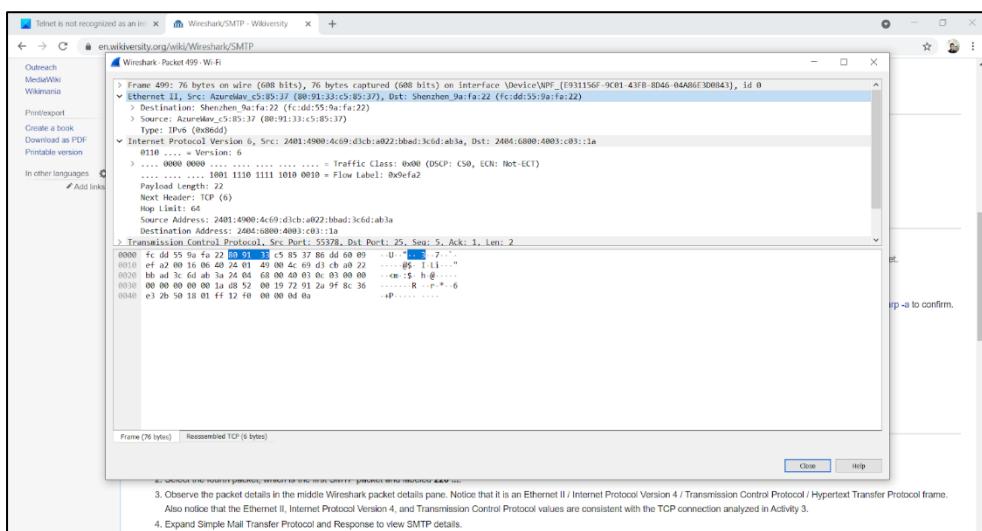
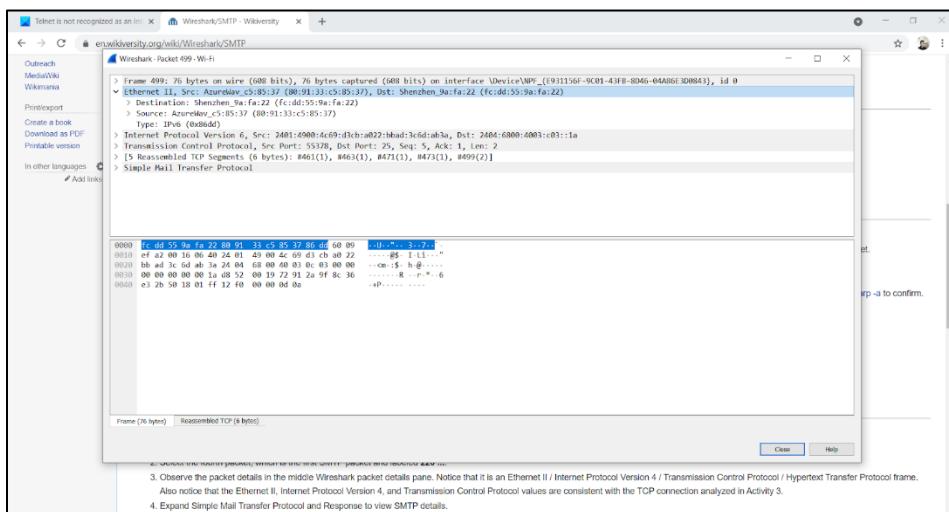
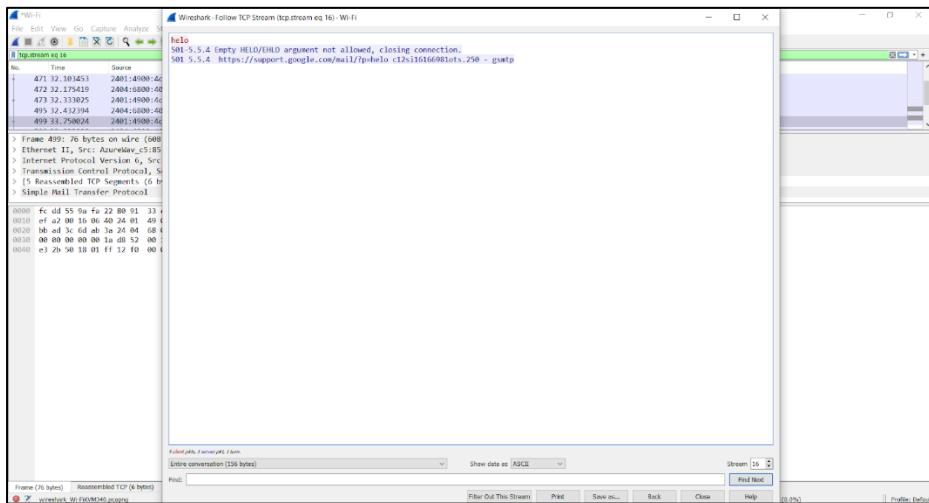
15. 8))Analyse SMTP Closing Traffic

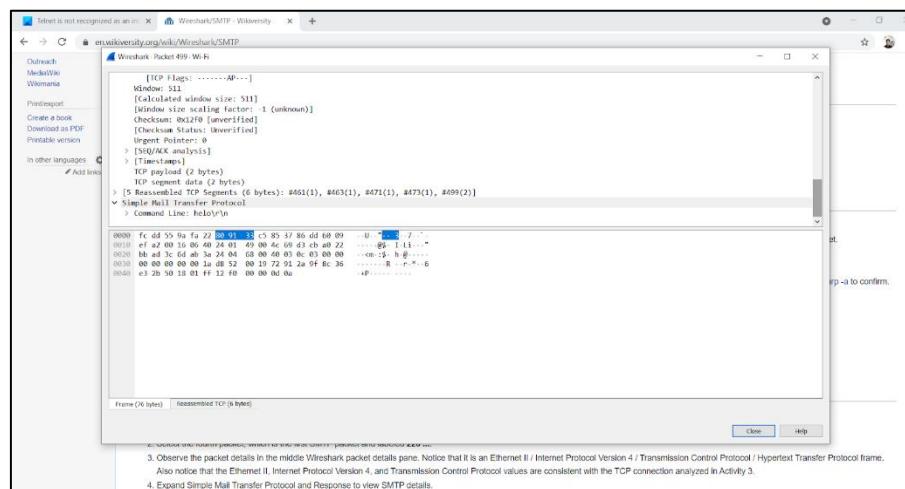
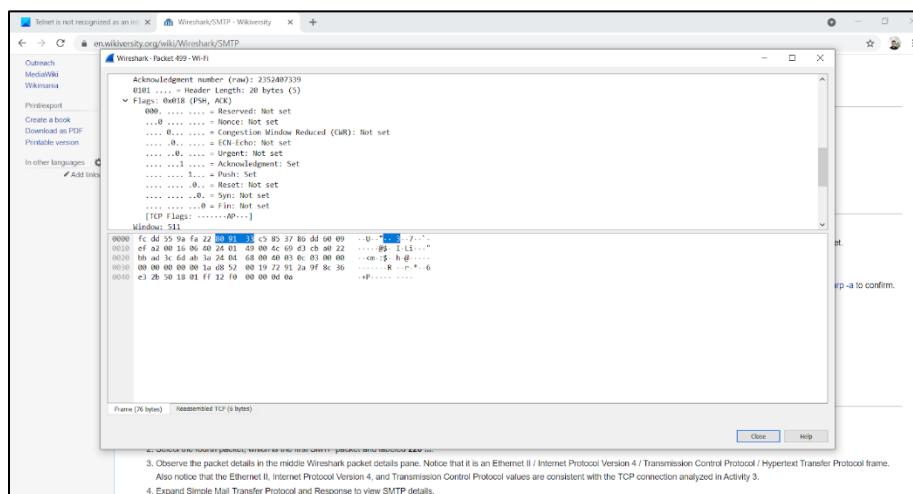
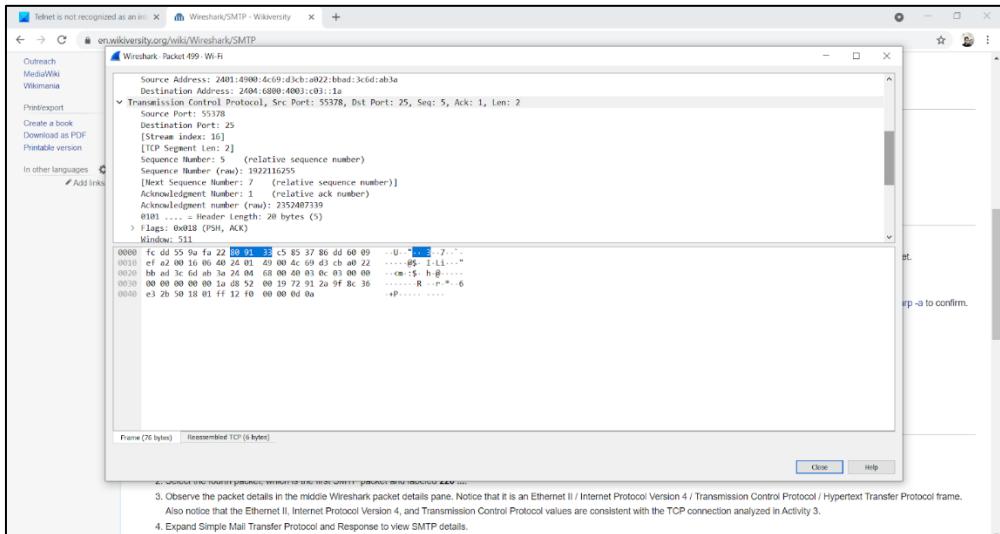
1. Observe the traffic captured in the top Wireshark packet list pane.
2. Select the following SMTP packet, labelled 221 ...
3. Observe the packet details in the middle Wireshark packet details pane.
4. Expand Simple Mail Transfer Protocol and Response to view SMTP details.
5. Observe the Response code and Response parameter.
6. Close Wireshark to complete this activity. Quit without Saving to discard the captured traffic.

8.1.5. SMTP Process









EXPERIMENT-09

9.1. Introduction to Virtual Machine and installation

9.1.2. Creating a Virtual Machine

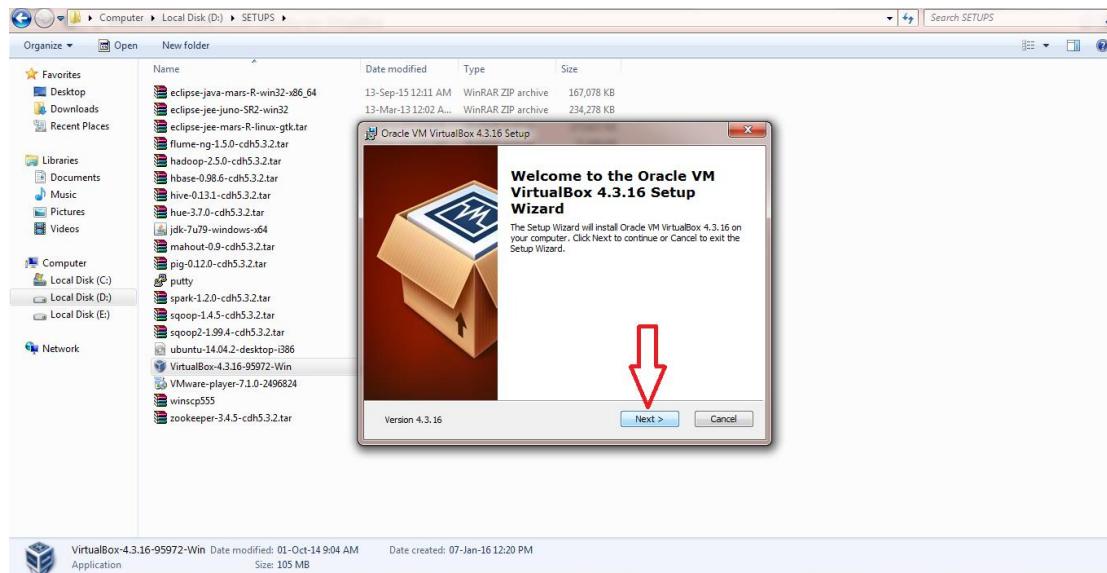
9.1.2.1 Install VirtualBox .

If you don't already have VirtualBox installed on your Windows or Mac computer, you'll need to install it before proceeding.

Following are the steps required to install VirtualBox(Oracle VM VirtualBox):

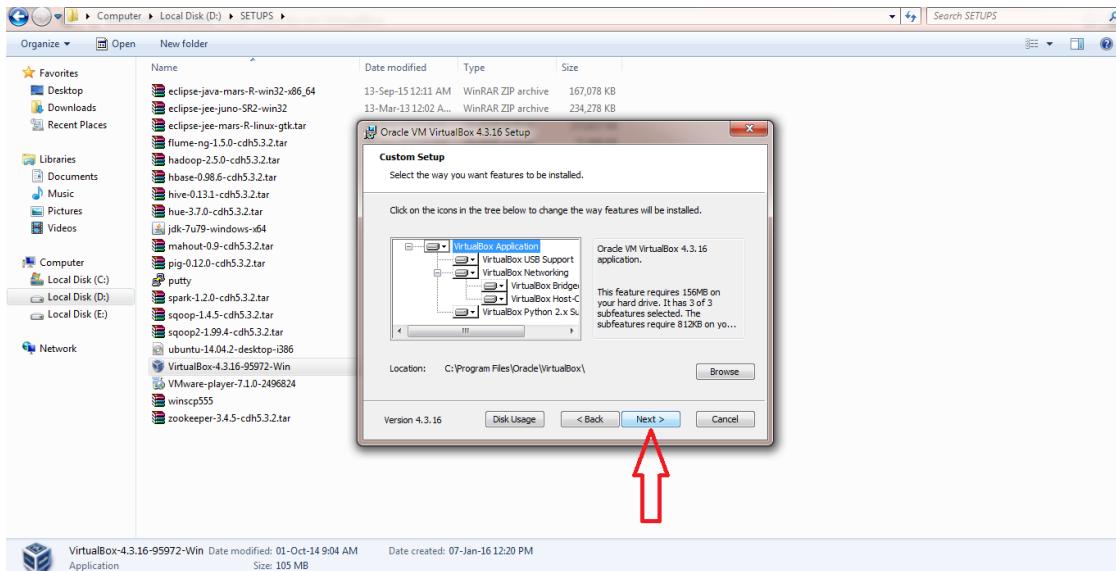
You can download the latest version of VirtualBox from the Virtual Box website: <https://www.virtualbox.org/wiki/Downloads> according to the version of your operating system Windows, Mac or Linux.

- Click Next



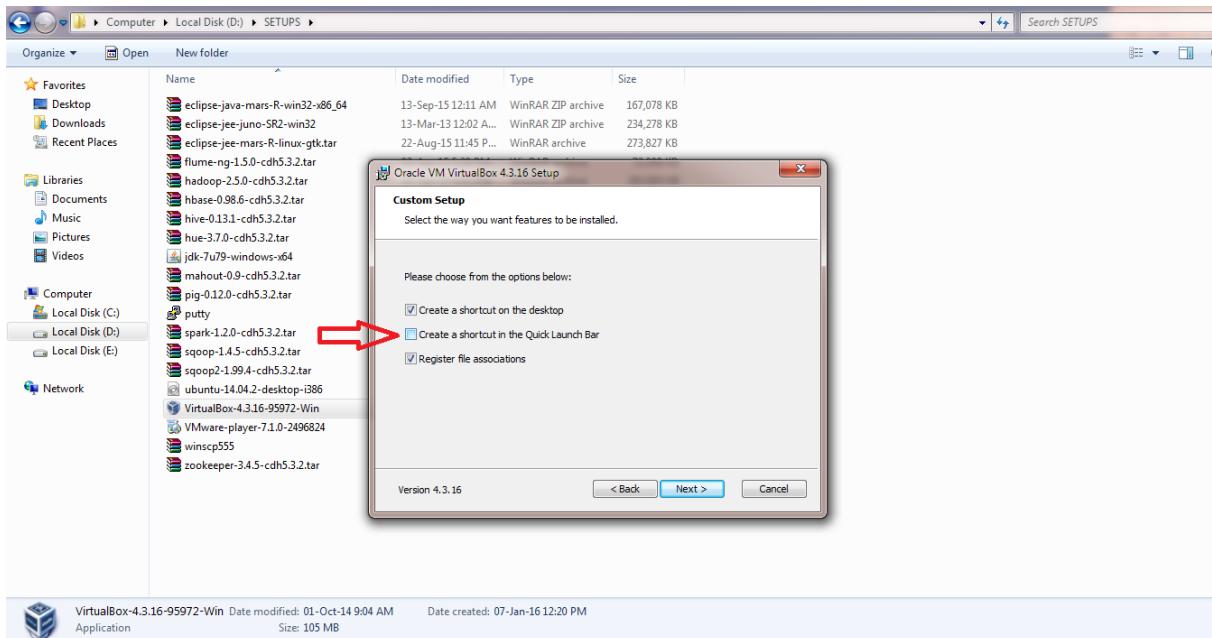
To Install VirtualBox – Setup Wizard

- Click Next



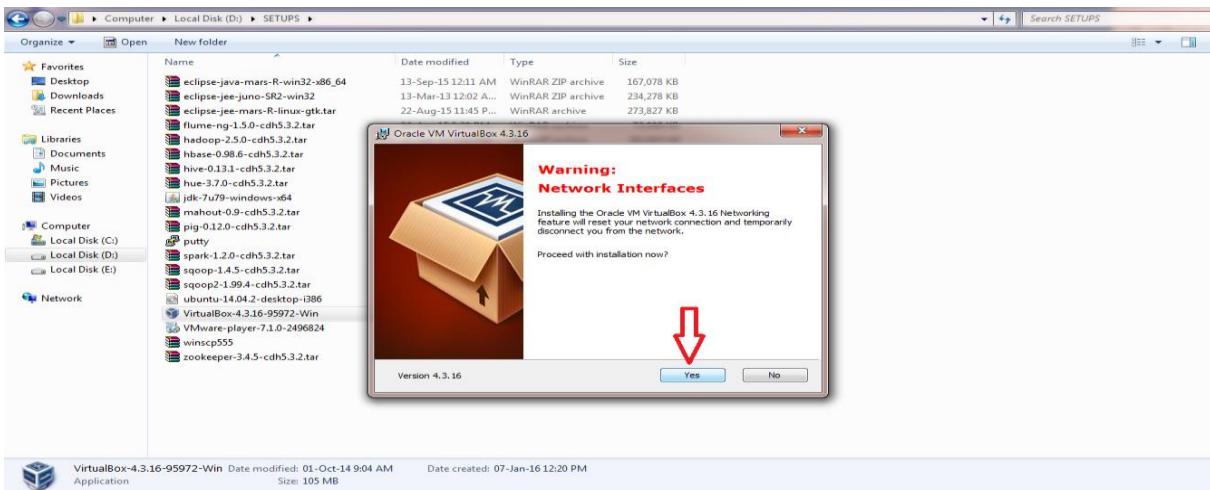
To Install VirtualBox – Custom Setup

- Uncheck “Create a shortcut in the Quick Launch Bar” and click “Next”



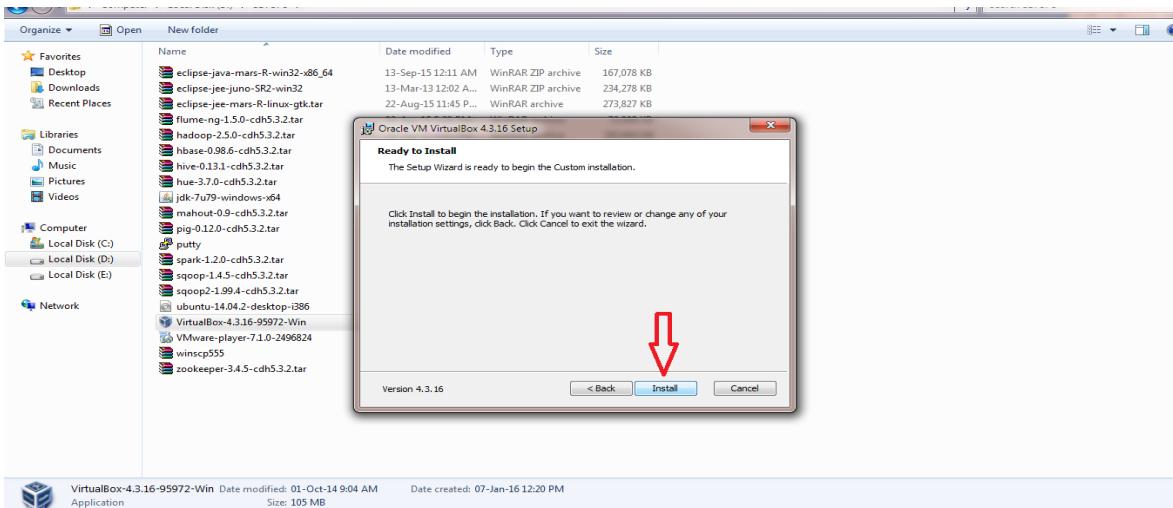
To Install VirtualBox – Features Selection

- Click “Yes”



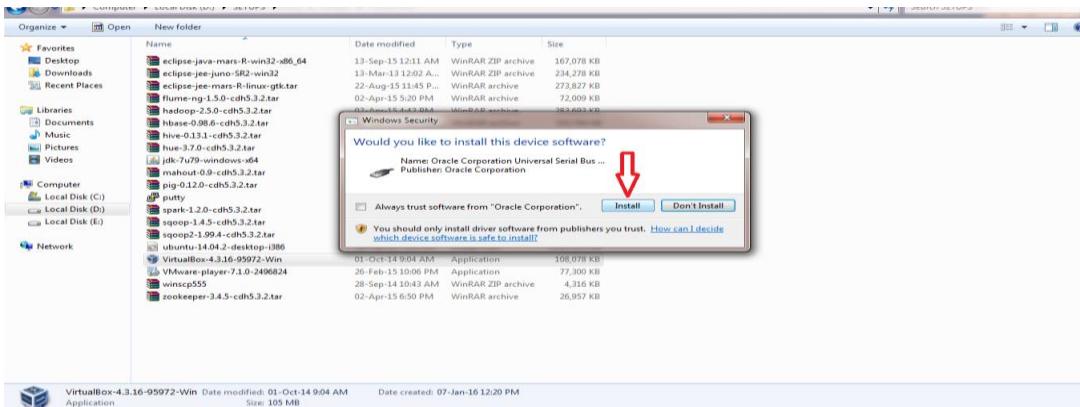
To Install VirtualBox – Network Interfaces Warning

- Click “Install”



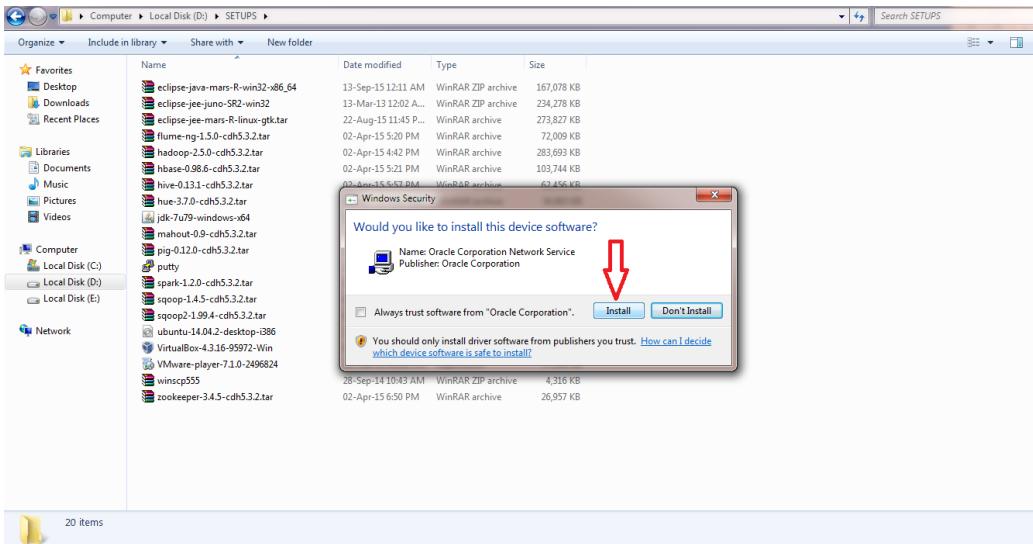
Installation of Oracle VM VirtualBox – Ready to Install

- Click “Install”



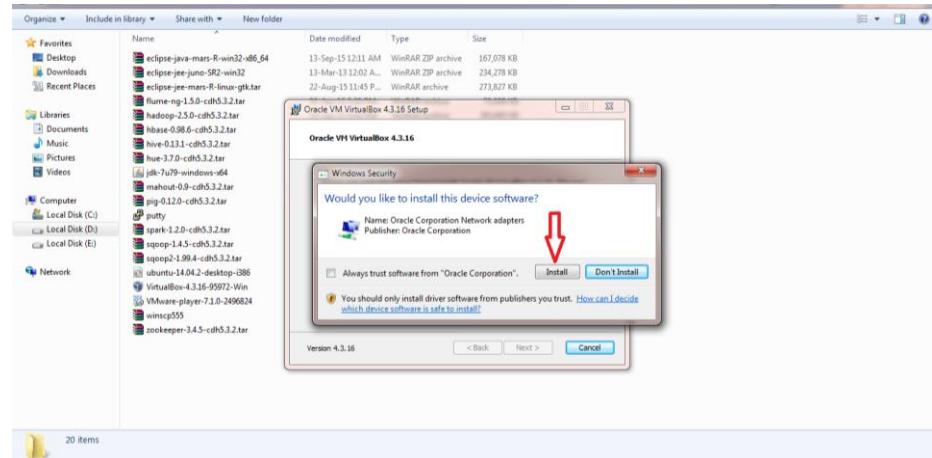
Installation of Oracle VM VirtualBox- Serial Bus Software Installation

- Click “Install”



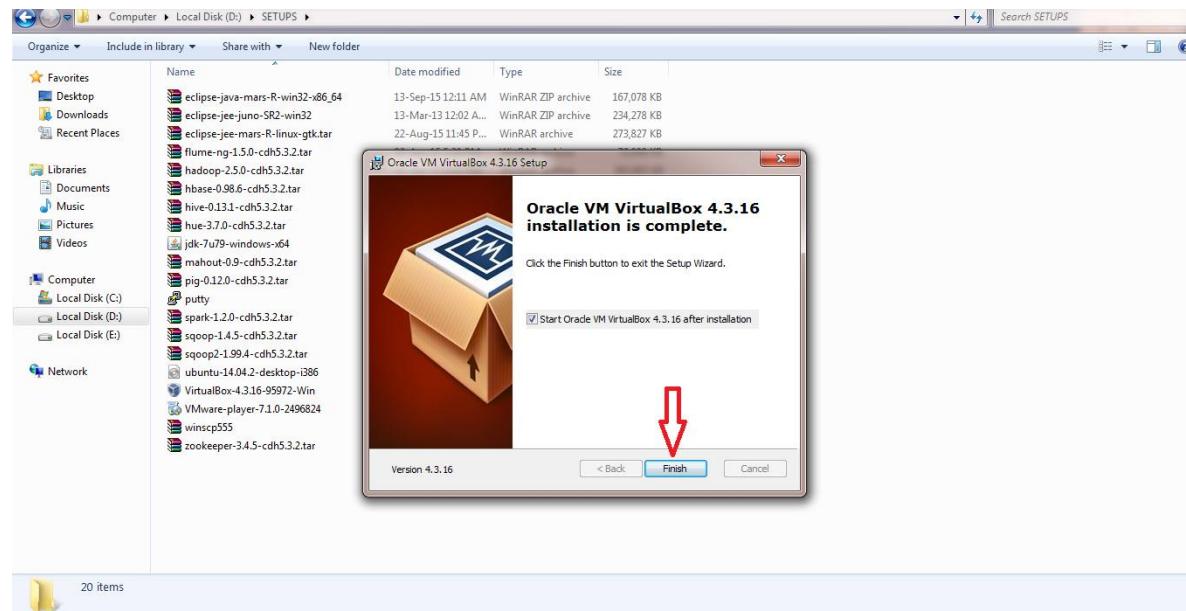
Installation of Oracle VM VirtualBox – Network Service Installation

- Click “Install”



Installation of Oracle VM VirtualBox – Network Adapters Installation

- Click “Finish”



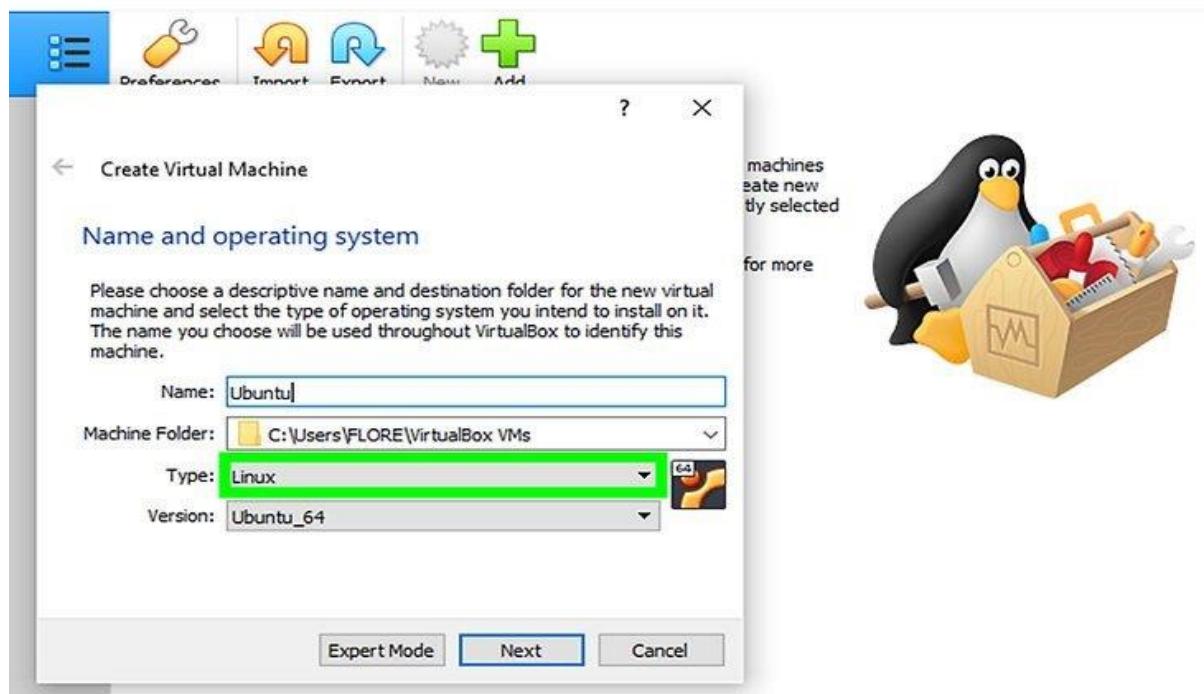
9.1.2.2. Open VirtualBox. Double-click (or click once on a Mac) the VirtualBox app icon.



Click **New.** It's a blue badge in the upper-left corner of the VirtualBox window. Doing so opens a pop-up menu.



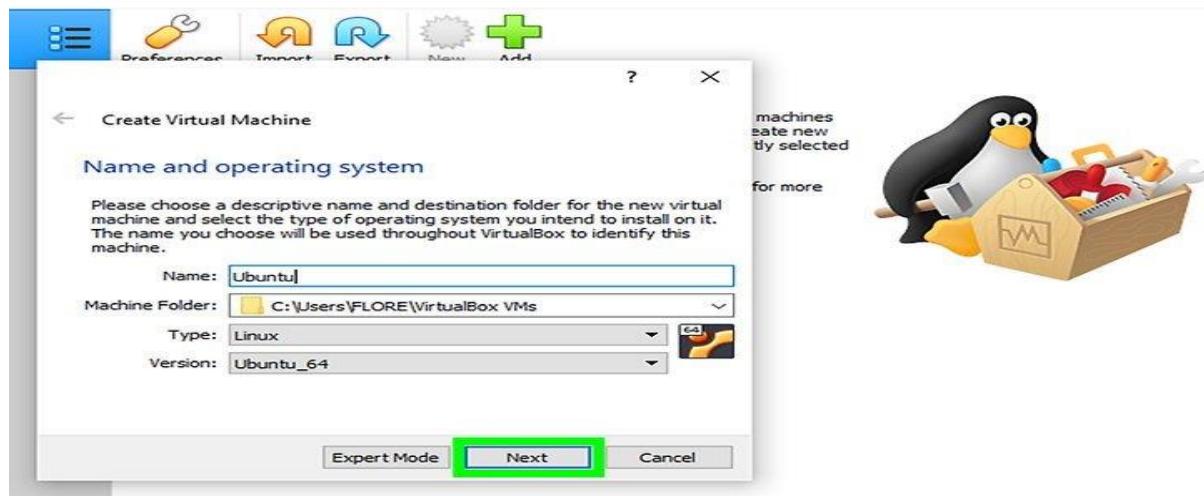
Enter a name for your virtual machine. Type whatever you want to name your virtual machine (e.g., **Ubuntu**) into the "Name" text field that's near the top of the pop-up menu.



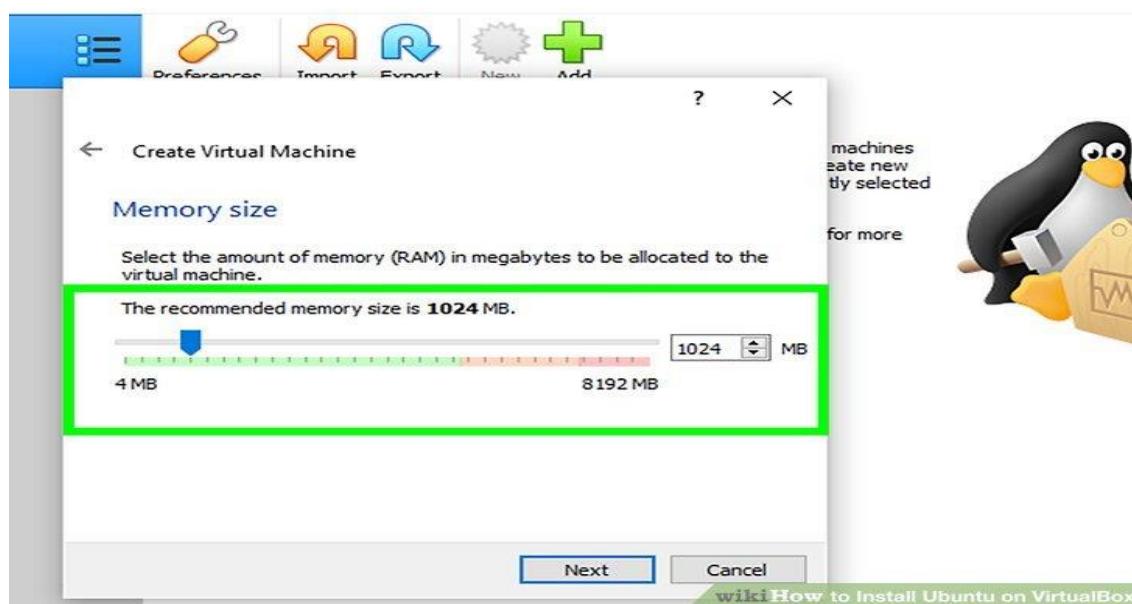
For **Operating System Type**, select the OS that you want to install.



Select the **version** of the operating system.



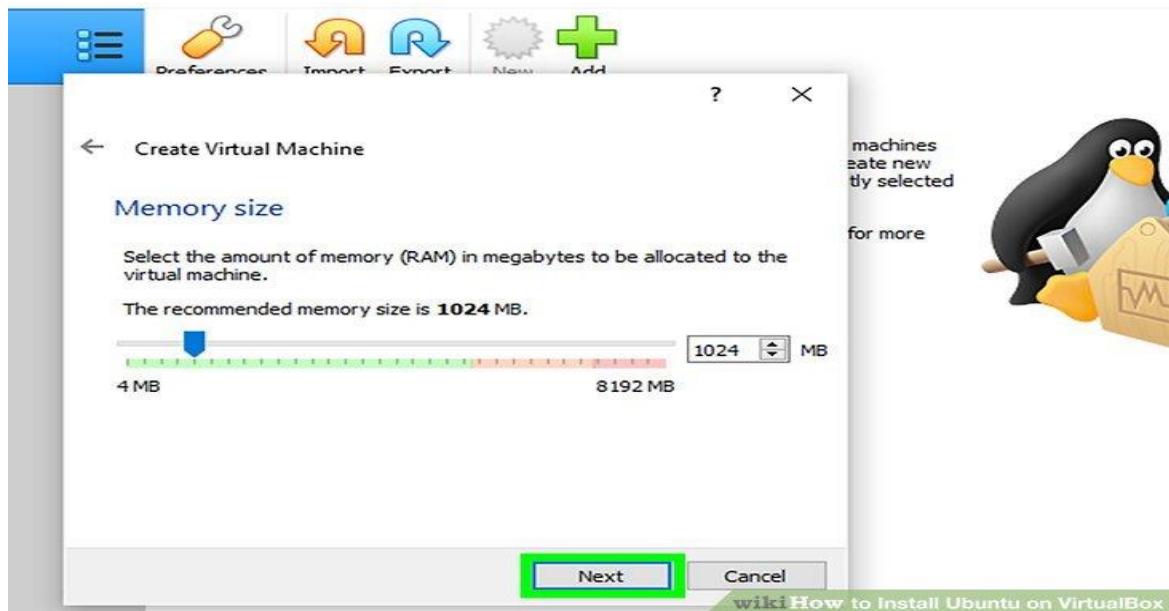
Click Next. It's at the bottom of the menu.



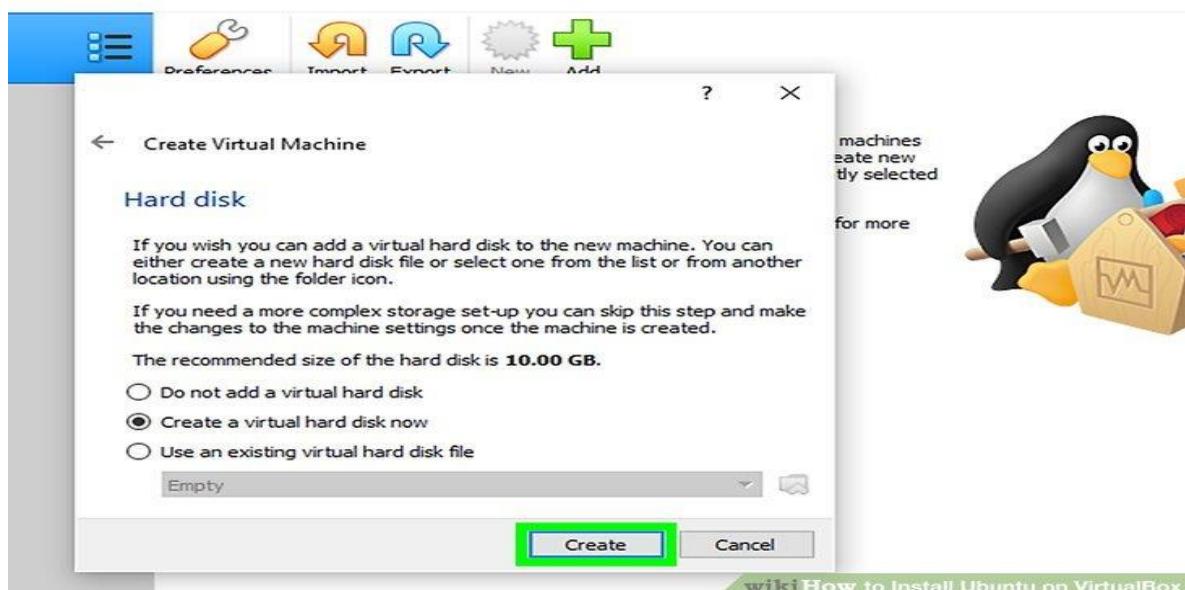
Select an amount of RAM to use. Click and drag the slider left or right to decrease or increase the amount of RAM that VirtualBox will have available for your virtual machine.

The ideal amount of RAM will automatically be selected when you get to this page.

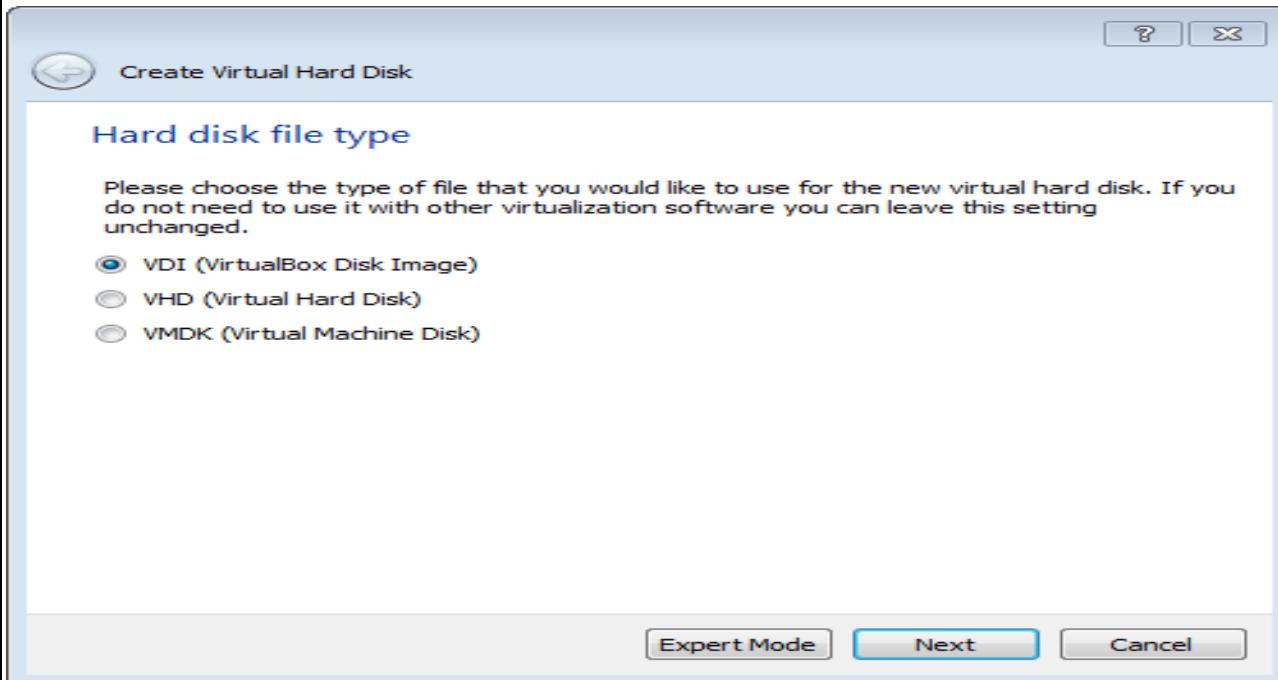
Make sure not to increase the RAM into the red section of the slider; try to keep the slider in the green.



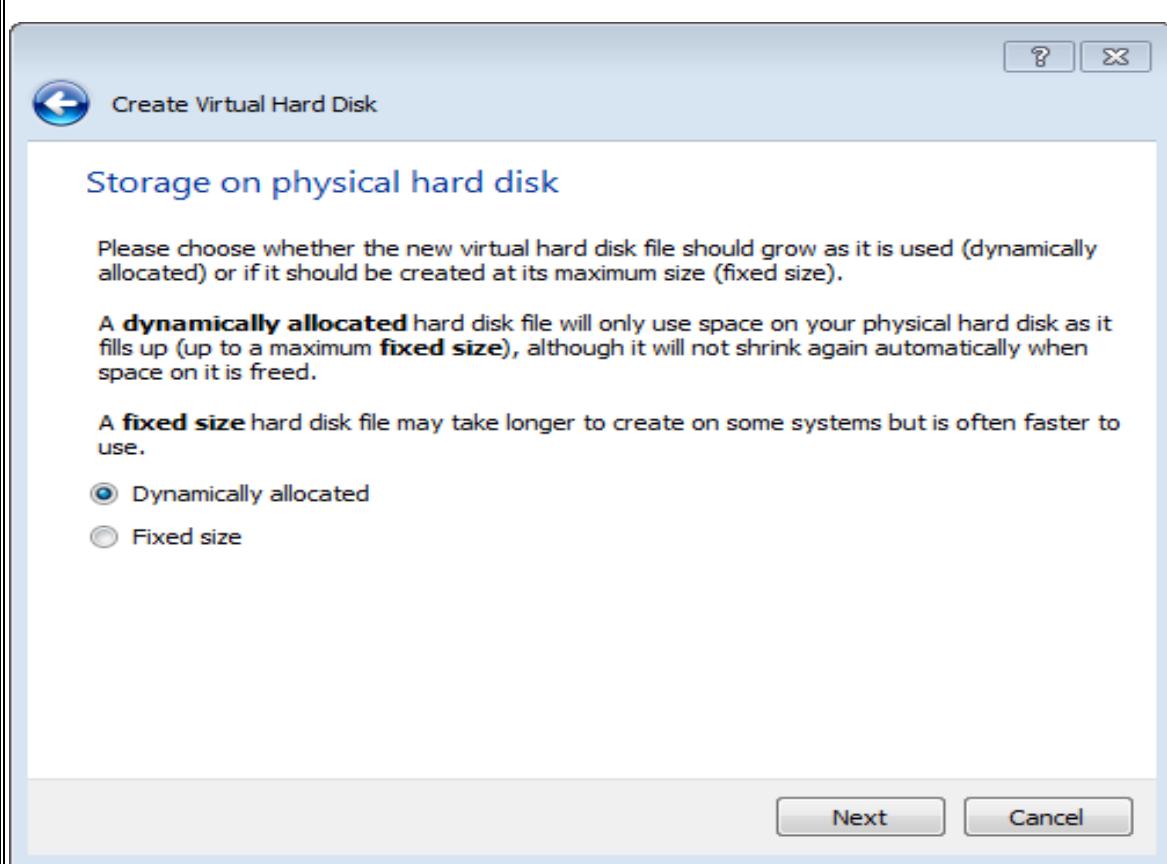
Click Next. It's at the bottom of the menu.



Create your virtual machine's virtual hard drive. The virtual hard drive is a section of your computer's hard drive space which will be used to store your virtual machine's files and programs:

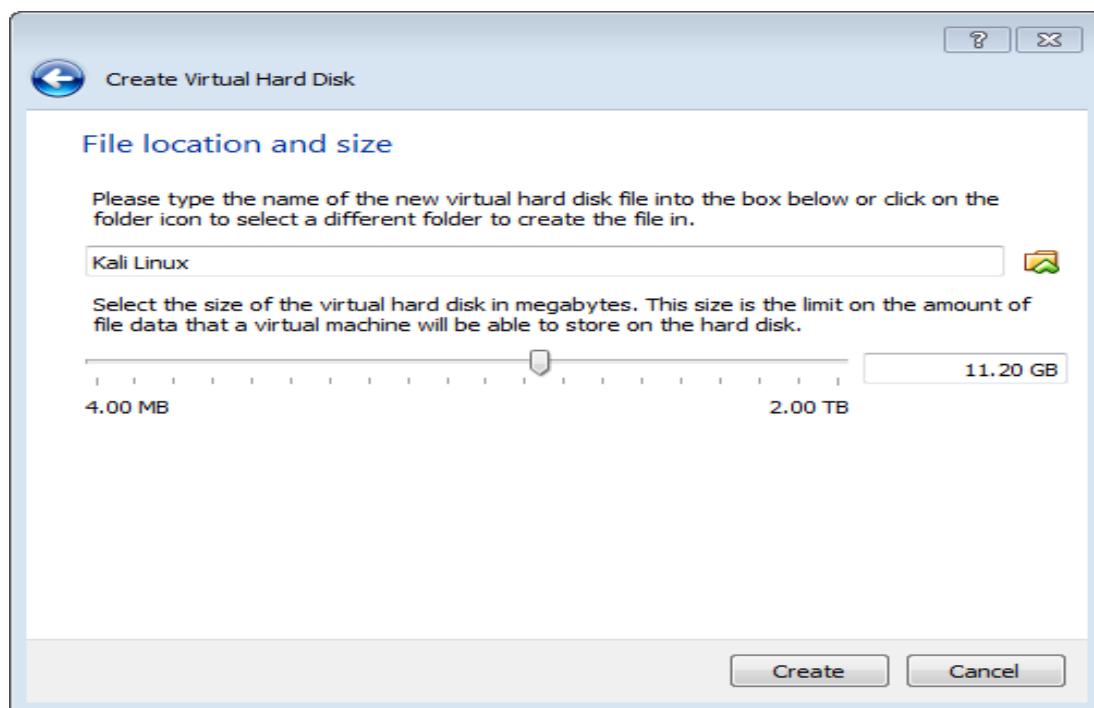


Use “VDI” to create a virtual hard disk



Choose “Dynamically allocated”

Allocate at Minimum 8 GB (recommended 10 or more).



Click **Create**, to create your new virtual machine. The virtual machine is displayed in the list on the left side of the VirtualBox Manager window, with the name that you entered initially.

VMs can run multiple operating system environments on a single physical computer, saving physical space, time and management costs.