FEDERAL INSTITUTE OF SCIENCE AND TECHNOLOGY (FISAT)™

HORMIS NAGAR, MOOKKANNOOR

ANGAMALY-683577

'FOCUS ON EXCELLENCE'

NETWORKING & SYSTEM ADMINISTRATION

.....

LABORATORY RECORD

Name : MIRANTA JOHNY

Branch : MASTER OF COMPUTER APPLICATION

Semester : 2 Batch : SEMESTER -B Roll No : 19

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University Exam.Reg. No : ……

CERTIFICATE

Certified that this is the Bonafide record of the Practical work done by Ms ***MIRANTA JOHNY*** *in the* ***NETWORKING & SYSTEM ADMINISTRATION*** *Laboratory of the Federal Institute of Science and Technology during the academic year 2020-21.*

Signature of Staff in Charge
Name :
Date :

Signature of H.O.D
Name:

Date of University practical examination ……

Signature of
Internal Examiner

Signature of
External Examiner

CONTENTS

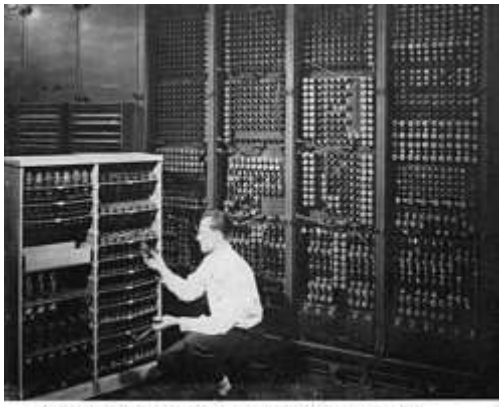
EXPERIMENT -1

BASIC INTRODUCTORY CONCEPT OF COMPUTER HARDWARE

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 producethe 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.

History of Computers

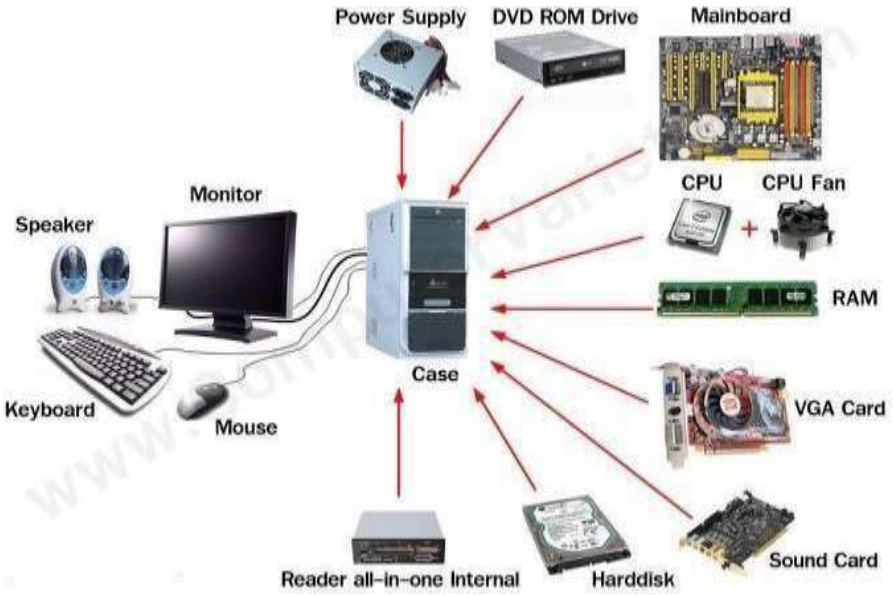


Replacing a bad tube meant checking among ENIAC's 19,000 possibilities.

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.

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.



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

1. Motherboard
2. RAM Modules
3. Daughter cards
4. Bus slots
5. SMPS
6. Internal Storage Devices
7. Interfacing Ports

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.

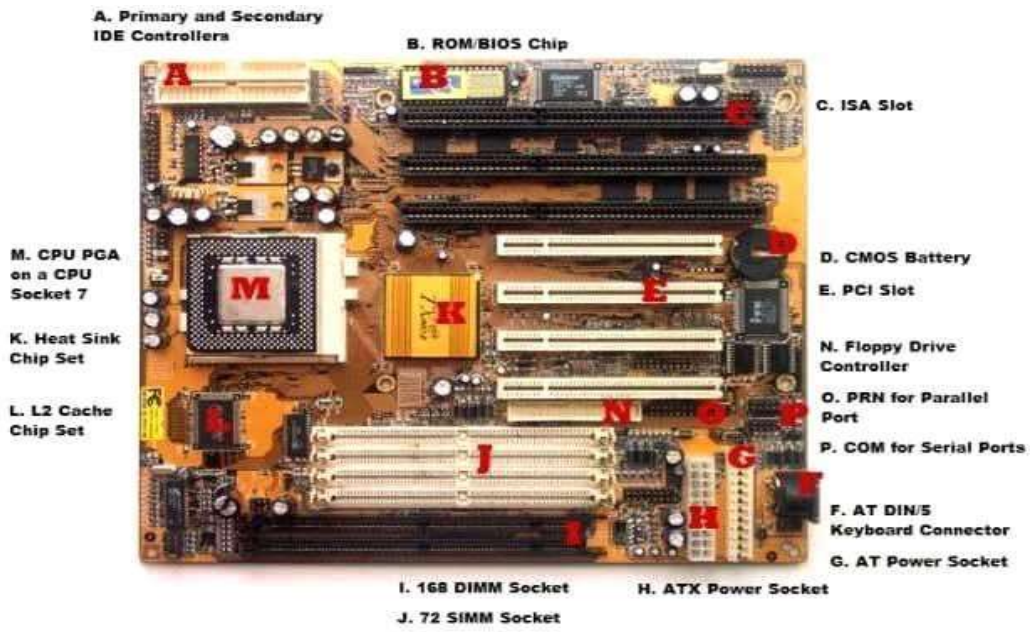
FEATURES OF MOTHERBOARD

- 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.

TYPES OF MOTHERBOARD

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.



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.

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.

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.

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.

MAIN COMPONENTS OF MOTHERBOARD

2.1 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)

2.2 Serial Ports

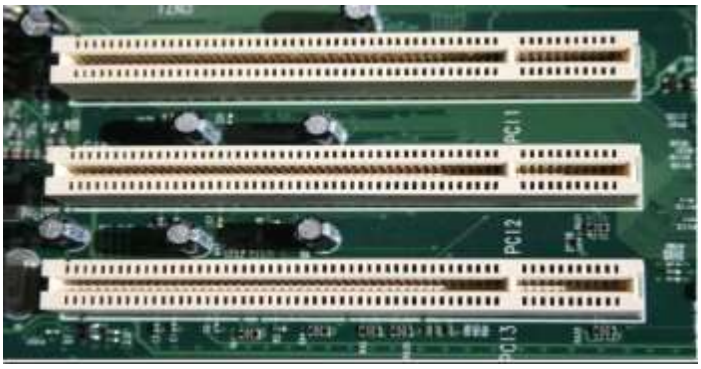
Serial Ports provide an interface to connect serial lines to prepare a serial communication. Serial ports are typically used in modem, mouse, security cameras etc. A Serial port uses DB-9 connector, a 9 pin D-Shaped Connector which connects to the transmission line. A

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.

2.3 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.

2.4 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.

2.5 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.

3. RANDOM ACCESS MEMORY

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.

CHARACTERISTICS OF RAM

3.1 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.

3.2 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.

3.3 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.

3.4 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.

3.5 CAS LATENCY

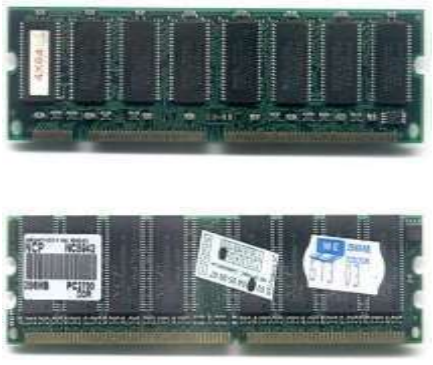
CAS (Column Address Strobe) Latency, sometimes abbreviated to just "CL," indicates the time it takes for a memory module to return data to the CPU. A lower CAS Latency indicates RAM that performs faster.

3.6 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.

3.7 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.



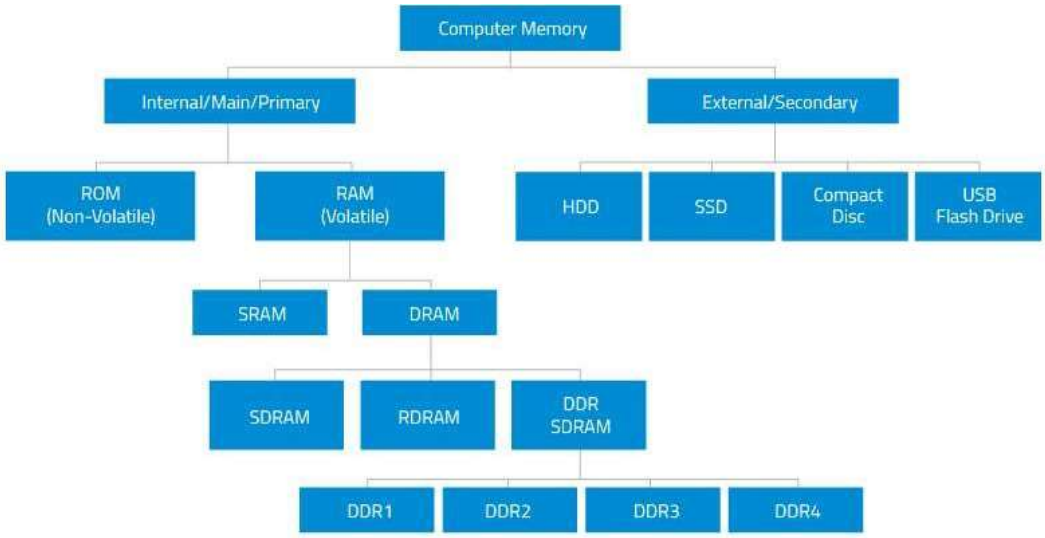
Different Types of RAM

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)



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.

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.

Functions

3.1. 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.

3.2 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.

3.3 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.

4. 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.

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.

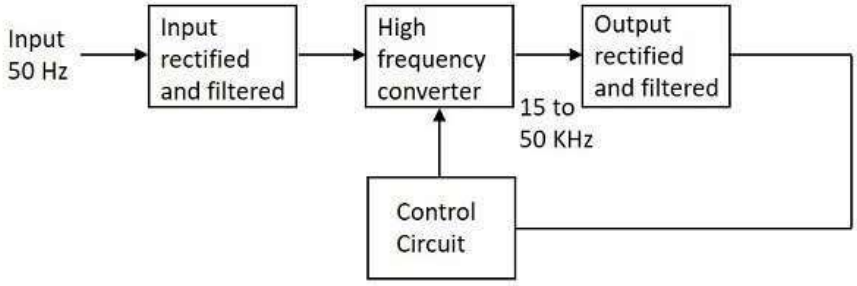
List of daughter cards

- 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.

5. 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

6. 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

Examples of Internal storage devices

- Hard Disk
- SSD
- RAM

6.1 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.

6.2 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.

6.3 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)

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.

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

6.4 SOME OTHER STORAGE DEVICES

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

7 . COMPUTER PORTS

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

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.

Characteristics of Computer Ports

The characteristics of the computer port include the following.

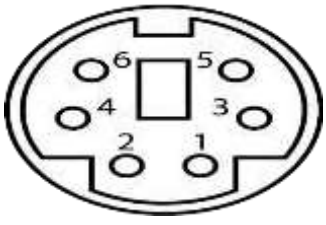
- It is an interface between external devices as well as a computer.
- Ports on the motherboard can be connected using an external device cable by plugging in.
- The external devices which are connected through via ports are the keyboard, mouse, microphone, monitor, speakers, etc.

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

7.1 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



7.2 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,

7.3 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

7.4 ETHERNET: A 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.

7.5 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.

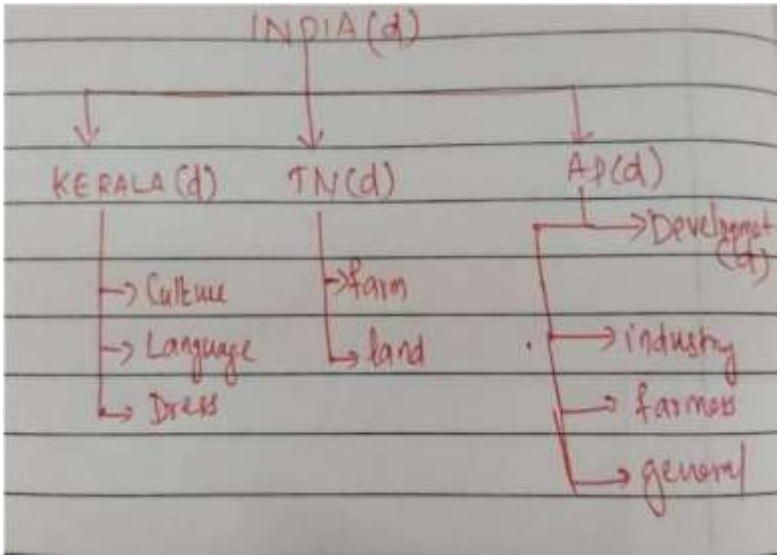
7.6 USB PORT: A **USB port** is a standard cable connection interface for personal computers and consumer electronics devices. USB stands for Universal Serial Bus, USB ports allow USB devices to be connected to each other with and transfer digital data over USB cables

7.7 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..

7.8 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

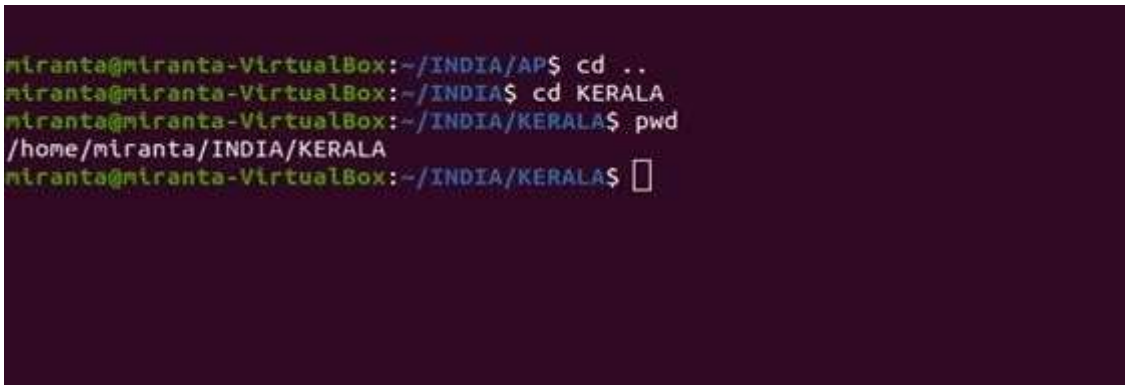
LINUX COMMANDS



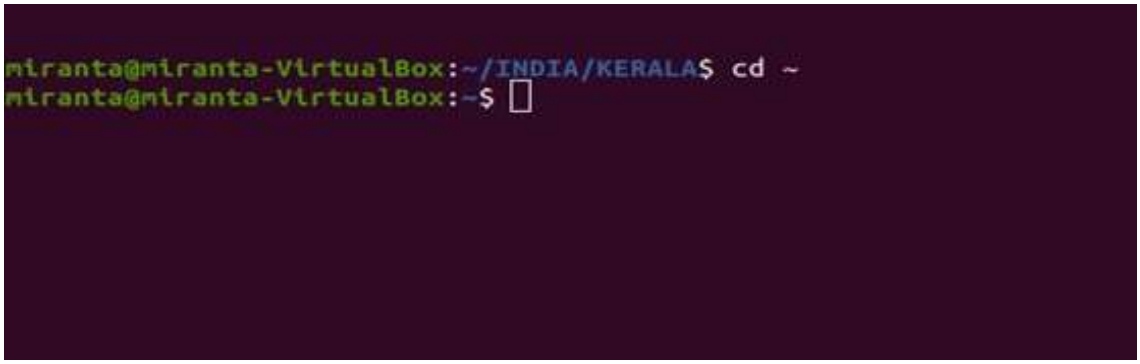
Q1. Create the directories and files as given in the above directory structure. Directories are mentioned as (d). Files should be filled with necessary text dat

```
miranta@miranta-VirtualBox:~$ mkdir INDIA
miranta@miranta-VirtualBox:~$ cd INDIA
miranta@miranta-VirtualBox:~/INDIA$ mkdir KERALA
miranta@miranta-VirtualBox:~/INDIA$ mkdir TN
miranta@miranta-VirtualBox:~/INDIA$ mkdir AP
miranta@miranta-VirtualBox:~/INDIA$ ls
AP  KERALA  TN
miranta@miranta-VirtualBox:~/INDIA$ cd KERALA
miranta@miranta-VirtualBox:~/INDIA/KERALA$ cat > Culture
miranta@miranta-VirtualBox:~/INDIA/KERALA$ cat > Language
miranta@miranta-VirtualBox:~/INDIA/KERALA$ cat > Dress
miranta@miranta-VirtualBox:~/INDIA/KERALA$ ls
Culture  Dress  Language
miranta@miranta-VirtualBox:~/INDIA/KERALA$ cd ..
miranta@miranta-VirtualBox:~/INDIA$ cd TN
miranta@miranta-VirtualBox:~/INDIA/TN$ cat > Farm
miranta@miranta-VirtualBox:~/INDIA/TN$ cat > Land
miranta@miranta-VirtualBox:~/INDIA/TN$ ls
Farm  Land
miranta@miranta-VirtualBox:~/INDIA/TN$ cd ..
miranta@miranta-VirtualBox:~/INDIA$ cd AP
miranta@miranta-VirtualBox:~/INDIA/AP$ mkdir Development
miranta@miranta-VirtualBox:~/INDIA/AP$ cat > Industry
miranta@miranta-VirtualBox:~/INDIA/AP$ cat > Farmers
miranta@miranta-VirtualBox:~/INDIA/AP$ cat > General
miranta@miranta-VirtualBox:~/INDIA/AP$ ls
Development  Farmers  General  Industry
miranta@miranta-VirtualBox:~/INDIA/AP$
```

Q2. List our present working directory



Q3. Move to the root directory.



Q4. Copy the file 'Culture'to the folder AP

Q5. Display the content of the file 'general'

```
miranta@miranta-VirtualBox:~/INDIA/AP$ cat General
India, officially the Republic of India is a country in South Asia. It is the second-most populous count
ry, the seventh-largest country by land area, and the most populous democracy in the world. Bounded by t
he Indian Ocean on the south, the Arabian Sea on the southwest, and the Bay of  Bengal on the southeast,
 it shares land borders with Pakistan to the west; china,Nepal and Bhutan to the North; and Bangladesh a
nd Myanmar to the east. In the Indian Ocean, India is in the vicinity of Sri Lanka and the Maldives; Its
 Andaman and Nicobar Islands share a maritime border with Thailand, Myanmar and Indonesia.

miranta@miranta-VirtualBox:~/INDIA/AP$
```

Q6. Move the file 'language'to the directory AP/Development

```
miranta@miranta-VirtualBox:~/INDIA/KERALA$ mv Language /home/miranta/INDIA/AP/Development
miranta@miranta-VirtualBox:~/INDIA/KERALA$ ls
Culture  Dress
miranta@miranta-VirtualBox:~/INDIA/KERALA$ cd ..
miranta@miranta-VirtualBox:~/INDIA$ cd AP
miranta@miranta-VirtualBox:~/INDIA/AP$ cd Development
miranta@miranta-VirtualBox:~/INDIA/AP/Development$ ls
Language
miranta@miranta-VirtualBox:~/INDIA/AP/Development$
```

Q7. List all the files in the folder AP

```
miranta@miranta-VirtualBox:~$ cd INDIA/AP
miranta@miranta-VirtualBox:~/INDIA/AP$ ls
Culture  Development  Farmers  General  Industry
miranta@miranta-VirtualBox:~/INDIA/AP$
```

```
miranta@miranta-VirtualBox:~/INDIA/AP$ ls -al
total 16
drwxrwxr-x 3 miranta miranta 4096 Aug 31 20:04 .
drwxrwxr-x 5 miranta miranta 4096 Aug 31 16:26 ..
-rw-rw-r-- 1 miranta miranta    0 Aug 31 19:53 Culture
drwxrwxr-x 2 miranta miranta 4096 Aug 31 20:20 Development
-rw-rw-r-- 1 miranta miranta    0 Aug 31 16:31 Farmers
-rw-rw-r-- 1 miranta miranta  612 Aug 31 20:04 General
-rw-rw-r-- 1 miranta miranta    0 Aug 31 16:30 Industry
miranta@miranta-VirtualBox:~/INDIA/AP$
```

Q8. List first 10 lines of the file 'Dress'

```
miranta@miranta-VirtualBox:~/INDIA/KERALA$ head -10 Dress
The traditional wear of the state is called 'Mundu'
which is worn on the lower portion of the body, from
the waist to the foot.
It is white and is worn by both men and women.
It resembles a long skirt or a dhoti. The upper garment
varies with gender and age.
This dress is worn in Kerala, Tamil Nadu region and Maldive islands.
Muslim women on the other hand sometimes prefer
the black or blue purdah, while
traditional Christian women wear a two-piece blouse and a pleated "Mundu".
miranta@miranta-VirtualBox:~/INDIA/KERALA$
```

Q9. List the last 10 lines of the file 'Dress

```
miranta@miranta-VirtualBox:~/INDIA/KERALA$ tail -10 Dress
when you visit Kerala,
you'll see men and women
wearing completely white attires.
It depicts purity and elegance.
Their warm nature, amicable behaviour and
simplicity in living welcomes all from around the world.
The traditional attire for women is called 'Mundum-Neriyathum'.
This consists of pair of similar Mundus.
One of them is worn around the hip
on the lower portion of the body,reaching the ankles.
miranta@miranta-VirtualBox:~/INDIA/KERALA$
```

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

```
miranta@miranta-VirtualBox:~/INDIA/KERALA$ cd ..
miranta@miranta-VirtualBox:~/INDIA$ cd AP
miranta@miranta-VirtualBox:~/INDIA/AP$ ls -l
total 8
-rw-rw-r-- 1 miranta miranta    0 Aug 31 19:53 Culture
drwxrwxr-x 2 miranta miranta 4096 Aug 31 20:20 Development
-rw-rw-r-- 1 miranta miranta    0 Aug 31 16:31 Farmers
-rw-rw-r-- 1 miranta miranta  612 Aug 31 20:04 General
-rw-rw-r-- 1 miranta miranta    0 Aug 31 16:30 Industry
miranta@miranta-VirtualBox:~/INDIA/AP$
```

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

```
miranta@miranta-VirtualBox:~/INDIA/AP$ ls -d F*
Farmers
miranta@miranta-VirtualBox:~/INDIA/AP$
```

Q12. List the files page by page

```
miranta@miranta-VirtualBox:~/INDIA/AP$ cd ..
miranta@miranta-VirtualBox:~/INDIA$ cd KERALA
miranta@miranta-VirtualBox:~/INDIA/KERALA$ ls -l | more
total 4
-rw-rw-r-- 1 miranta miranta   0 Aug 31 16:27 Culture
-rw-rw-r-- 1 miranta miranta 891 Aug 31 20:56 Dress
miranta@miranta-VirtualBox:~/INDIA/KERALA$
```

Q13. Remove the file ‘general

```
miranta@miranta-VirtualBox:~/INDIA/KERALA$ cd ..
miranta@miranta-VirtualBox:~/INDIA$ cd AP
miranta@miranta-VirtualBox:~/INDIA/AP$ rm General
miranta@miranta-VirtualBox:~/INDIA/AP$ ls
Culture  Development  Farmers  Industry
miranta@miranta-VirtualBox:~/INDIA/AP$
```

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

```
miranta@miranta-VirtualBox:~/INDIA/AP$ chmod g-wx Culture
miranta@miranta-VirtualBox:~/INDIA/AP$ ls -l
total 4
-rw-r--r-- 1 miranta miranta    0 Aug 31 19:53 Culture
drwxrwxr-x 2 miranta miranta 4096 Aug 31 20:20 Development
-rw-rw-r-- 1 miranta miranta    0 Aug 31 16:31 Farmers
-rw-rw-r-- 1 miranta miranta    0 Aug 31 16:30 Industry
miranta@miranta-VirtualBox:~/INDIA/AP$
```

Q15. List the lines of the file which contains a string 'saree'

```
miranta@miranta-VirtualBox:~/INDIA/KERALA$ grep 'Saree' Culture
Saree or sari is a beautiful Indian garment.
Saree is an unstitched drape that may vary from 5 to 9 meters long
Sarees are usually worn as an essential outfit
Sarees are also listed as a formal wear and obviously can be carried around as
miranta@miranta-VirtualBox:~/INDIA/KERALA$
```

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  se-
       quence 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, al-
       ways 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
 Manual page wc(1) line 1 (press h for help or q to quit)
```

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

```
miranta@miranta-VirtualBox:~/INDIA/KERALA$ ls
Culture  Dress
miranta@miranta-VirtualBox:~/INDIA/KERALA$ wc -mlw Culture Dress
  10  123  635 Culture
  20  154  891 Dress
  30  277 1526 total
miranta@miranta-VirtualBox:~/INDIA/KERALA$
```

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

```
miranta@miranta-VirtualBox:~$ ls -l >> filelist.txt
miranta@miranta-VirtualBox:~$ cat filelist.txt
total 76
-rwxrwxr-x 1 miranta miranta   98 Aug 31 15:07 1
-rwxrwxr-x 1 miranta miranta  117 Aug 31 15:45 break
-rwxrwxr-x 1 miranta miranta   66 Aug 31 15:36 c
-rwxrwxr-x 1 miranta miranta  217 Aug 31 15:54 case
-rwxrwxr-x 1 miranta miranta  248 Aug 31 16:01 case1
-rwxrwxr-x 1 miranta miranta  295 Aug 31 16:10 date
drwxr-xr-x 2 miranta miranta 4096 Aug 31 13:14 Desktop
-rwxrwxr-x 1 miranta miranta   99 Aug 31 15:10 digit
-rwxrwxr-x 1 miranta miranta  124 Aug 31 15:12 digit1
drwxr-xr-x 2 miranta miranta 4096 Aug 31 13:14 Documents
drwxr-xr-x 2 miranta miranta 4096 Aug 31 13:14 Downloads
-rw-rw-r-- 1 miranta miranta    0 Aug 31 22:23 filelist.txt
drwxrwxr-x 5 miranta miranta 4096 Aug 31 16:26 INDIA
drwxr-xr-x 2 miranta miranta 4096 Aug 31 13:14 Music
drwxr-xr-x 2 miranta miranta 4096 Aug 31 22:20 Pictures
-rwxrwxr-x 1 miranta miranta   65 Aug 31 15:30 prgrm2
drwxr-xr-x 2 miranta miranta 4096 Aug 31 13:14 Public
drwxr-xr-x 2 miranta miranta 4096 Aug 31 13:14 Templates
drwxr-xr-x 2 miranta miranta 4096 Aug 31 13:14 Videos
-rwxrwxr-x 1 miranta miranta   62 Aug 31 15:41 while
miranta@miranta-VirtualBox:~$
```

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

```
miranta@miranta-VirtualBox:~$ ps -aux
USER         PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root           1  0.0  0.4 167656 10480 ?        Ss   16:14   0:01 /sbin/init splash
root           2  0.0  0.0      0     0 ?        S    16:14   0:00 [kthreadd]
root           3  0.0  0.0      0     0 ?        I<   16:14   0:00 [rcu_gp]
root           4  0.0  0.0      0     0 ?        I<   16:14   0:00 [rcu_par_gp]
root           6  0.0  0.0      0     0 ?        I<   16:14   0:00 [kworker/0:0H-kblockd]
root           9  0.0  0.0      0     0 ?        I<   16:14   0:00 [mm_percpu_wq]
root          10  0.0  0.0      0     0 ?        S    16:14   0:00 [ksoftirqd/0]
root          11  0.0  0.0      0     0 ?        I    16:14   0:03 [rcu_sched]
root          12  0.0  0.0      0     0 ?        S    16:14   0:00 [migration/0]
root          13  0.0  0.0      0     0 ?        S    16:14   0:00 [idle_inject/0]
root          14  0.0  0.0      0     0 ?        S    16:14   0:00 [cpuhp/0]
root          15  0.0  0.0      0     0 ?        S    16:14   0:00 [kdevtmpfs]
root          16  0.0  0.0      0     0 ?        I<   16:14   0:00 [netns]
root          17  0.0  0.0      0     0 ?        S    16:14   0:00 [rcu_tasks_kthre]
root          18  0.0  0.0      0     0 ?        S    16:14   0:00 [rcu_tasks_rude_]
root          19  0.0  0.0      0     0 ?        S    16:14   0:00 [rcu_tasks_trace]
root          20  0.0  0.0      0     0 ?        S    16:14   0:00 [kauditd]
root          21  0.0  0.0      0     0 ?        S    16:14   0:00 [khungtaskd]
root          22  0.0  0.0      0     0 ?        S    16:14   0:00 [oom_reaper]
root          23  0.0  0.0      0     0 ?        I<   16:14   0:00 [writeback]
root          24  0.0  0.0      0     0 ?        S    16:14   0:00 [kcompactd0]
root          25  0.0  0.0      0     0 ?        SN   16:14   0:00 [ksmd]
root          26  0.0  0.0      0     0 ?        SN   16:14   0:00 [khugepaged]
root          72  0.0  0.0      0     0 ?        I<   16:14   0:00 [kintegrityd]
root          73  0.0  0.0      0     0 ?        I<   16:14   0:00 [kblockd]
root          74  0.0  0.0      0     0 ?        I<   16:14   0:00 [blkcg_punt_bio]
root          75  0.0  0.0      0     0 ?        I<   16:14   0:00 [tpm_dev_wq]
root          76  0.0  0.0      0     0 ?        I<   16:14   0:00 [ata_sff]
root          77  0.0  0.0      0     0 ?        I<   16:14   0:00 [md]
root          78  0.0  0.0      0     0 ?        I<   16:14   0:00 [edac-poller]
root          79  0.0  0.0      0     0 ?        I<   16:14   0:00 [devfreq_wq]
root          80  0.0  0.0      0     0 ?        S    16:14   0:00 [watchdogd]
root          82  0.0  0.0      0     0 ?        I<   16:14   0:00 [pm_wq]
root          84  0.0  0.0      0     0 ?        S    16:14   0:00 [kswapd0]
```

Q20. List the disk partitions in your harddisk.

```
miranta@miranta-VirtualBox:~$ lsblk
NAME   MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
loop0    7:0    0 55.5M  1 loop /snap/core18/1988
loop1    7:1    0  219M  1 loop /snap/gnome-3-34-1804/66
loop2    7:2    0 64.8M  1 loop /snap/gtk-common-themes/1514
loop3    7:3    0   51M  1 loop /snap/snap-store/518
loop4    7:4    0 31.1M  1 loop /snap/snapd/11036
sda      8:0    0   10G  0 disk
├─sda1   8:1    0  512M  0 part /boot/efi
├─sda2   8:2    0    1K  0 part
└─sda5   8:5    0  9.5G  0 part /
sr0     11:0    1 1024M  0 rom
miranta@miranta-VirtualBox:~$
```

21.Redirect the output of the program to a file called "error".

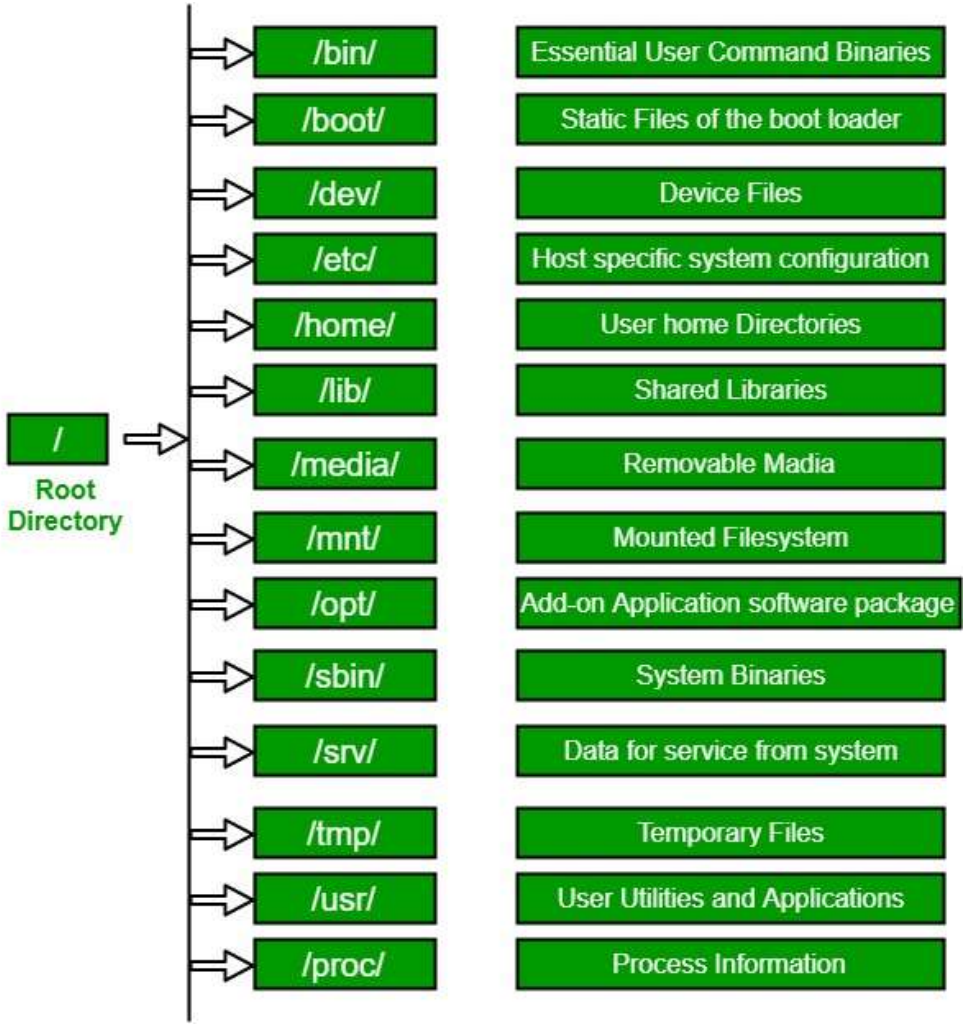
```
miranta@miranta-VirtualBox:~$ top >> error.txt

[1]+  Stopped                 top >> error.txt
miranta@miranta-VirtualBox:~$ cat error.txt
top - 22:30:13 up  6:15,  1 user,  load average: 0.39, 0.39, 0.22
Tasks: 181 total,   1 running, 180 sleeping,   0 stopped,   0 zombie
%Cpu(s):  6.7 us,  1.5 sy,  0.7 ni, 91.1 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
MiB Mem :   2428.4 total,     68.1 free,   1760.8 used,    599.5 buff/cache
MiB Swap:    448.5 total,    350.1 free,     98.4 used.    421.3 avail Mem

    PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
   5578 miranta   20   0 3474784 435956 131364 S   7.6  17.5  11:42.14 firefox
   5714 miranta   20   0 3035272 459964 147472 S   1.4  18.5   2:09.61 Web Content
    304 root     -51   0       0      0      0 S   0.7   0.0   0:03.31 irq/18-vmwgfx
    737 miranta   20   0  680120 183552  80860 S   0.7   7.4   4:26.55 Xorg
   1057 miranta   20   0 3821424 398696 115412 S   0.7  16.0   9:53.21 gnome-shell
   1502 miranta   20   0  722080  50236  35364 S   0.7   2.0   0:00.80 gnome-calendar
   1594 miranta   20   0  506032  34888  25232 S   0.7   1.4   0:01.31 update-notifier
   4198 miranta   20   0 1015084  73884  43704 S   0.7   3.0   0:17.58 nautilus
   6983 miranta   20   0  825588  52204  38740 S   0.7   2.1   0:06.64 gnome-terminal-
   7586 miranta   39  19  765812  34956  24448 S   0.7   1.4   0:00.14 tracker-extract
      1 root      20   0  167656  10480   8176 S   0.0   0.4   0:01.83 systemd
      2 root      20   0       0      0      0 S   0.0   0.0   0:00.00 kthreadd
      3 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 rcu_gp
      4 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 rcu_par_gp
      6 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 kworker/0:0H-kblockd
      9 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 mm_percpu_wq
     10 root      20   0       0      0      0 S   0.0   0.0   0:00.61 ksoftirqd/0
     11 root      20   0       0      0      0 I   0.0   0.0   0:03.32 rcu_sched
     12 root      rt   0       0      0      0 S   0.0   0.0   0:00.24 migration/0
     13 root     -51   0       0      0      0 S   0.0   0.0   0:00.00 idle_inject/0
     14 root      20   0       0      0      0 S   0.0   0.0   0:00.00 cpuhp/0
     15 root      20   0       0      0      0 S   0.0   0.0   0:00.00 kdevtmpfs
```

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:~$ tree -L 1 /
/
├── bin -> usr/bin
├── boot
├── cdrom
├── dev
├── etc
├── home
├── lib -> usr/lib
├── lib32 -> usr/lib32
├── lib64 -> usr/lib64
├── libx32 -> usr/libx32
├── lost+found
├── media
├── mnt
├── opt
├── proc
├── root
├── run
├── sbin -> usr/sbin
├── snap
├── srv
├── swapfile
├── sys
├── tmp
├── usr
└── var

24 directories, 1 file
hp@hp-HP-Laptop-15s-du0xxx:~$
```

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

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, vmlinux, 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.

EXERCISE 4

SHELL SCRIPT

1. Write a Shell program to display a given message

```
echo "Enter a message :"
read m
echo "The given message is : $m"
```

OUTPUT

2. Write a shell script to evaluate arithmetic operations.

```
echo "Enter two integer number :"
read a
read b
c=`expr $a + $b`
echo "Sum = $c"
c=`expr $a - $b`
echo "Difference = $c"
c=`expr $a / $b`
echo "Division = $c"
c=`expr $a \* $b`
echo "Multiplication = $c"
c=`expr $a % $b`
echo "Remainder = $c"
```

OUTPUT

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

```
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

4.Write a shell script to compare two string.

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

OUTPUT

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

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

OUTPUT

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

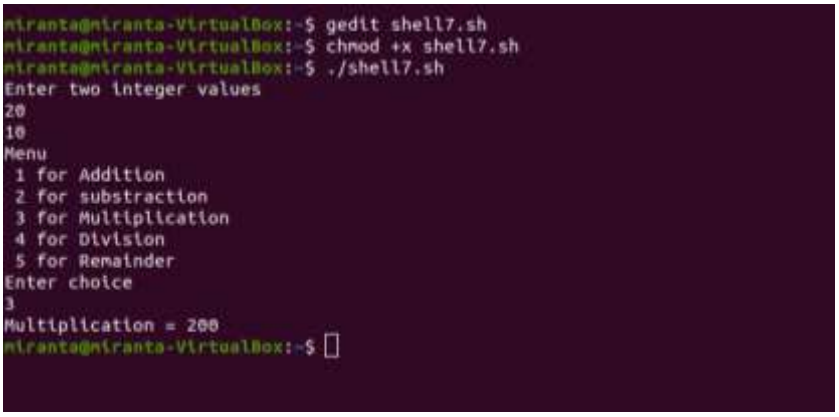
```
echo "Enter the name of file"
read filename
if [ -f $filename ]
then
echo "File $filename exists"
else
touch $filename
echo "File $filename created"
fi
```

OUTPUT

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

```
echo "Enter two integer values"
read a
read b
echo -e "Menu \n 1 for Addition \n 2 for substraction \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)" ;;
*)echo "Invalid Choice :Try Again !"
esac
```

OUTPUT



8. Write a shell script to do:

a. display list of directory contents

b. Name of current directory

c. Who is logged on

d. Long listing of directory contents according to choose of user.

```
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

```
miranta@miranta-VirtualBox:~$ gedit shell8.sh
miranta@miranta-VirtualBox:~$ chmod +x shell8.sh
miranta@miranta-VirtualBox:~$ ./shell8.sh
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
Desktop    Downloads  lab2  miranta  Pictures   shell2.sh  shell5.sh  shell8.sh  Videos
dir        l1         lab3  Music    Public     shell3.sh  shell6.sh  sum
Documents  lab1       mir   n        shell1.sh  shell4.sh  shell7.sh  Templates
miranta@miranta-VirtualBox:~$ ./shell8.sh
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/miranta
miranta@miranta-VirtualBox:~$
```

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

```
echo "Name of the Student : $1"
echo "Roll Number of the Student : $2"
echo "Mark of the Student : $3"
```

OUTPUT

```
miranta@miranta-VirtualBox:~$ gedit shell9.sh
miranta@miranta-VirtualBox:~$ chmod +x shell9.sh
miranta@miranta-VirtualBox:~$ ./shell9.sh Miranta 19 95
Name of the Student : Miranta
Roll Number of the Student : 19
Mark of the Student : 95
miranta@miranta-VirtualBox:~$
```

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

```
a=12
echo $a
echo "$a"
echo '$a'
```

OUTPUT

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

```
if [[ -e /var/log/sylog ]]
then
cat/var/log/sylog | grep "^May"
else
echo "File not found"
fi
```

OUTPUT

12. Implement arithmetic calculator using Functions

```
add()
{
        i=$1
        j=$2
        ((k=i+j))
        echo Sum is $k
}
sub()
{
        i=$1
        j=$2
        ((k=i-j))
        echo Difference is $k
}
mul()
{
        i=$1
        j=$2
        ((k=i*j))
        echo Product 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

13. To find the sum of n natural numbers.

a. Using for loop

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

OUTPUT

```
miranta@miranta-VirtualBox:~$ gedit shell13a.sh
miranta@miranta-VirtualBox:~$ chmod +x shell13a.sh
miranta@miranta-VirtualBox:~$ ./shell13a.sh
45
miranta@miranta-VirtualBox:~$
```

b. Using While loop

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

OUTPUT

```
miranta@miranta-VirtualBox:~$ gedit shell13b.sh
miranta@miranta-VirtualBox:~$ chmod +x shell13b.sh
miranta@miranta-VirtualBox:~$ ./shell13b.sh
45
miranta@miranta-VirtualBox:~$
```

EXERCISE 5

LAMP SERVER

LAMP INSTALLATION

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 Metada
ta [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-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 libgspell-1-1 libgutenprint-common
  libgutenprint9 libiptc0 libirs161 libisc-export1104 libisc1104 libisc1105
  libisccc161 libisccfg163 liblldb9 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]
```

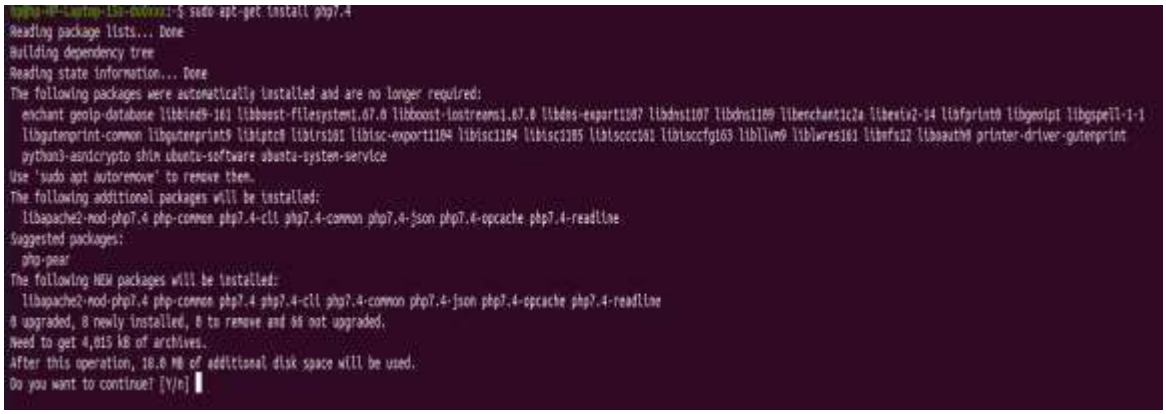
Press **y** (yes) and hit **ENTER** to permit the installation.

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,
To install PHP, run the following command:

$ sudo apt-get install php7.4



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:

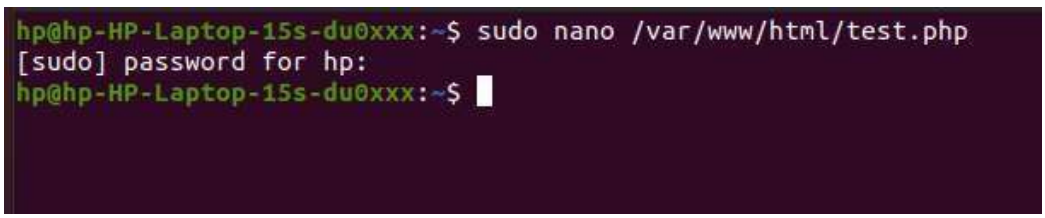
$ sudo /etc/init.d/apache2 restart

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



This command opens the **bank file**.

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

<?php

Echo " test php ";

?>

3. Press **CTRL + X** to save and close the file. Press **y** and **ENTER** to confirm.

4. Then check the code are run currectly 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

```
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 libexiv2-14 libfprint0 libgeoip1 libgspell-1-1
  libgutenprint-common libgutenprint9 libiptc0 libirs161 libisc-export1104
  libisc1104 libisc1105 libisccc161 libisccfg163 libllvm9 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

1. 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)

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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

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

1. Then its ask what type of server, we have Apache2 is set by default that's what we want then press ok
2. Then a configuration prompt are open . here we're going to just choose yes and then it ask the input password for phpmyadmin
3. Then check it currect . go to the localhost/phpmyadmin. Here we can not found it so
4. 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 ctl+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

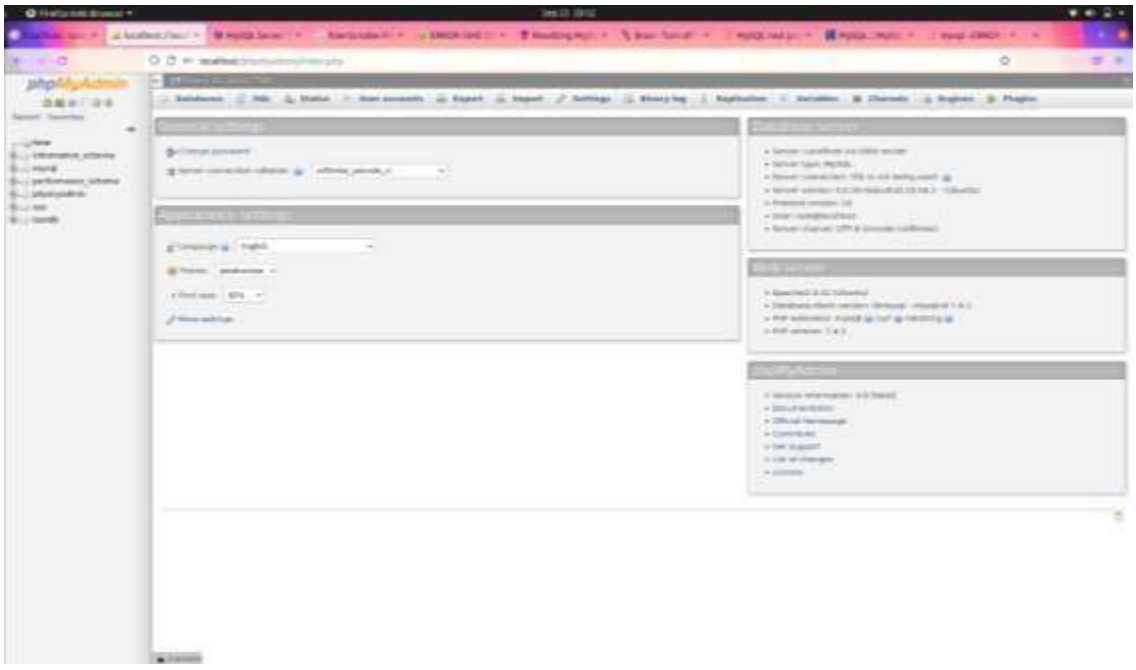
1. Enter the command:

   $ sudo nano/etc/apache2/apache2.conf

2. Type the following command to the nano editor

   Include /etc/phpmyadmin/apache.conf

3. Then enter ctl+x to save
4. Then again restart the apache



EXERCISE 6

LARAVEL SERVER

Laravel installation On Ubuntu with Apache

Step 1 – Install Apache Web Server

Let's open up a Terminal and do first thing first update your package list using Sudo apt update command.

$ sudo apt update

After updating your package list install apache webserver

$ sudo apt install apache2

$ systemctl status apache2

```
ebin@ebin-VirtualBox:~$ sudo apt install apache2
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  linux-headers-5.11.0-25-generic linux-hwe-5.11-headers-5.11.0-25 linux-image-5.11.0-25-generic linux-modules-5.11.0
  linux-modules-extra-5.11.0-25-generic
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  apache2-bin apache2-data apache2-utils
Suggested packages:
  apache2-doc apache2-suexec-pristine | apache2-suexec-custom
The following packages will be upgraded:
  apache2 apache2-bin apache2-data apache2-utils
4 to upgrade, 0 to newly install, 0 to remove and 78 not to upgrade.
Need to get 1,518 kB of archives.
After this operation, 4,096 B of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 apache2 amd64 2.4.41-4ubuntu3.5 [95.5 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 apache2-bin amd64 2.4.41-4ubuntu3.5 [1,180 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 apache2-data all 2.4.41-4ubuntu3.5 [159 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 apache2-utils amd64 2.4.41-4ubuntu3.5 [84.2 kB]
Fetched 1,518 kB in 1s (1,216 kB/s)
```

Now, check the status of apache server whether it is running or not.

If the Apache server not running then use the following command to start apache serve and add to boot startup.

$ systemctl start apache2

$ systemctl enable apache2

```
ebin@ebin-VirtualBox:~$ systemctl status apache2
● apache2.service - The Apache HTTP Server
     Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor preset: enabled)
     Active: active (running) since Tue 2021-09-28 13:53:55 IST; 6min ago
       Docs: https://httpd.apache.org/docs/2.4/
   Main PID: 2749 (apache2)
      Tasks: 7 (limit: 4650)
     Memory: 14.8M
     CGroup: /system.slice/apache2.service
             ├─2749 /usr/sbin/apache2 -k start
             ├─2750 /usr/sbin/apache2 -k start
             ├─2753 /usr/sbin/apache2 -k start
             ├─2754 /usr/sbin/apache2 -k start
             ├─2755 /usr/sbin/apache2 -k start
             ├─2756 /usr/sbin/apache2 -k start
             └─2757 /usr/sbin/apache2 -k start

Sep 28 13:53:55 ebin-VirtualBox systemd[1]: Starting The Apache HTTP Server...
Sep 28 13:53:55 ebin-VirtualBox apachectl[2747]: AH00558: apache2: Could not reliably determine the server's fully
Sep 28 13:53:55 ebin-VirtualBox systemd[1]: Started The Apache HTTP Server.
lines 1-19/19 (END)
```

Open browser, goto localhost and check if default apache server page is available or not

Step 2 – Install and Configure PHP 7.4

To install Laravel 8.x, at least you must have PHP >= 7.3 on your system. And by default, the official Ubuntu 20.04 repository provides PHP 7.4 packages. Install PHP 7.4 packages using the apt command below.

$ sudo apt install libapache2-mod-php php php-common php-xml php-gd php-opcache php-mbstring php-tokenizer php-json php-bcmath php-zip unzip

```
ebin@ebin-VirtualBox:~$ sudo apt install libapache2-mod-php php php-common php-xml php-gd php-opcache php-mbstring php-tokenizer php-js
on php-bcmath php-zip unzip
[sudo] password for ebin:
Reading package lists... Done
Building dependency tree
Reading state information... Done
Package php-opcache is a virtual package provided by:
  php8.1-opcache 8.1.0~rc2-1+ubuntu20.04.1+deb.sury.org+1
  php8.0-opcache 8.0.11-1+ubuntu20.04.1+deb.sury.org+1
  php7.4-opcache 7.4.24-1+ubuntu20.04.1+deb.sury.org+1
  php7.3-opcache 7.3.31-1+ubuntu20.04.1+deb.sury.org+1
  php7.2-opcache 7.2.34-24+ubuntu20.04.1+deb.sury.org+1
  php7.1-opcache 7.1.33-41+ubuntu20.04.1+deb.sury.org+1
  php7.0-opcache 7.0.33-54+ubuntu20.04.1+deb.sury.org+1
  php5.6-opcache 5.6.40-54+ubuntu20.04.1+deb.sury.org+1
You should explicitly select one to install.
```

```
ebin@ebin-VirtualBox:~$ php7.4-dev php7.4-zip php7.4-mbstring php7.4-mysql php7.4-xml curl -y
php7.4-dev: command not found
ebin@ebin-VirtualBox:~$ sudo apt install php7.4 libapache2-mod-php7.4 php7.4-curl php-pear php7.4-gd php7.4-dev php7.4-zip php7.4-mbstr
ing php7.4-mysql php7.4-xml curl -y
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  linux-headers-5.11.0-25-generic linux-hwe-5.11-headers-5.11.0-25 linux-image-5.11.0-25-generic linux-modules-5.11.0-25-generic
  linux-modules-extra-5.11.0-25-generic
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  autoconf automake autopoint autotools-dev debhelper dh-autoreconf dh-strip-nondeterminism dwz gettext intltool-debian
  libarchive-cpio-perl libarchive-zip-perl libcroco3 libdebhelper-perl libfile-stripnondeterminism-perl libltdl-dev
  libmail-sendmail-perl libpcre2-16-0 libpcre2-32-0 libpcre2-8-0 libpcre2-dev libpcre2-posix2 libsigsegv2 libssl-dev
  libsub-override-perl libsys-hostname-long-perl libtool m4 php7.4-cli php7.4-common php7.4-json php7.4-opcache php7.4-readline
  pkg-php-tools po-debconf shtool
Suggested packages:
  autoconf-archive gnu-standards autoconf-doc dh-make gettext-doc libasprintf-dev libgettextpo-dev libtool-doc libssl-doc gfortran
  | fortran95-compiler gcj-jdk m4-doc dh-php libmail-box-perl
The following NEW packages will be installed
  autoconf automake autopoint autotools-dev curl debhelper dh-autoreconf dh-strip-nondeterminism dwz gettext intltool-debian
  libapache2-mod-php7.4 libarchive-cpio-perl libarchive-zip-perl libcroco3 libdebhelper-perl libfile-stripnondeterminism-perl
  libltdl-dev libmail-sendmail-perl libpcre2-16-0 libpcre2-dev libpcre2-posix2 libsigsegv2 libssl-dev libsub-override-perl
  libsys-hostname-long-perl libtool m4 php-pear php7.4 php7.4-cli php7.4-common php7.4-curl php7.4-dev php7.4-gd php7.4-json
  php7.4-mbstring php7.4-mysql php7.4-opcache php7.4-readline php7.4-xml php7.4-zip pkg-php-tools po-debconf shtool
The following packages will be upgraded:
  libpcre2-32-0 libpcre2-8-0
2 to upgrade, 45 to newly install, 0 to remove and 76 not to upgrade.
Need to get 13.0 MB of archives.
After this operation, 54.0 MB of additional disk space will be used.
Get:1 http://in.archive.ubuntu.com/ubuntu focal/main amd64 libsigsegv2 amd64 2.12-2 [13.9 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu focal/main amd64 m4 amd64 1.4.18-4 [199 kB]
Get:3 http://ppa.launchpad.net/ondrej/php/ubuntu focal/main amd64 libpcre2-8-0 amd64 10.36-2+ubuntu20.04.1+deb.sury.org+2 [201 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu focal/main amd64 autoconf all 2.69-11.1 [321 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu focal/main amd64 autotools-dev all 20180224.1 [39.6 kB]
Get:6 http://in.archive.ubuntu.com/ubuntu focal/main amd64 automake all 1:1.16.1-4ubuntu6 [522 kB]
Get:7 http://in.archive.ubuntu.com/ubuntu focal/main amd64 autopoint all 0.19.8.1-10build1 [412 kB]
Get:8 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 curl amd64 7.68.0-1ubuntu2.7 [161 kB]
```

Now go ahead and make tweak changes in PHP ini file and set cgi.fix_pathinfo set to be 0. If this number is kept as a 1, the php interpreter will do its best to process the file that is as near to the requested file as possible. This is a possible security risk. If this number is set to 0, conversely, the interpreter will only process the exact file path—a much safer alternative.

$ cd /etc/php/7.4/apache2

$ sudo nano php.ini

Press ctrl+w and search for the word "cgi.fix" the uncomment the line and set it to 0.

...
cgi.fix_pathinfo=0
...

```
ebin@ebin-VirtualBox:~$ cd /etc/php
ebin@ebin-VirtualBox:/etc/php$ ls
7.4  8.0
ebin@ebin-VirtualBox:/etc/php$ cd 7.4/
ebin@ebin-VirtualBox:/etc/php/7.4$ ls
apache2  cli  mods-available
ebin@ebin-VirtualBox:/etc/php/7.4$ cd apache2/
ebin@ebin-VirtualBox:/etc/php/7.4/apache2$ ls
conf.d  php.ini
ebin@ebin-VirtualBox:/etc/php/7.4/apache2$ sudo nano php.ini
ebin@ebin-VirtualBox:/etc/php/7.4/apache2$ sudo nano php.ini
ebin@ebin-VirtualBox:/etc/php/7.4/apache2$
```

```
; **You CAN safely turn this off for IIS, in fact, you MUST.**
; Thunderbird Mail et/cgi.force-redirect
;cgi.force_redirect = 1

; if cgi.nph is enabled it will force cgi to always sent Status: 200 with
; 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 Netscape
; (iPlanet) web servers, you MAY need to set an environment variable name that PHP
; will look for to know it is OK to continue execution.  Setting this variable MAY
; 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.  PHP's
; previous behaviour was to set PATH_TRANSLATED to SCRIPT_FILENAME, and to not grok
; what PATH_INFO is.  For more information on PATH_INFO, see the cgi specs.  Setting
; this to 1 will cause PHP CGI to fix its paths to conform to the spec.  A setting
; of zero causes PHP to behave as before.  Default is 1.  You should fix your scripts
; 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 outside
; of the web tree and people will not be able to circumvent .htaccess security.
;cgi.discard_path=1

; FastCGI under IIS supports the ability to impersonate
; security tokens of the calling client.  This allows IIS to define the
; security context that the request runs under.  mod_fastcgi under Apache

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

Press Ctrl + x then y to Save and Exit.

Now Restart The apache service.

$ systemctl restart apache2

Step 3 – Install Composer PHP Packages Management

Install the composer package manager go ahead and download and install Composer. and move the composer .phar file to usr/local/bin/composer directory.

$ sudo apt install curl

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

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

```
ebin@ebin-VirtualBox:~$ sudo apt install curl
Reading package lists... Done
Building dependency tree
Reading state information... Done
curl is already the newest version (7.68.0-1ubuntu2.7).
The following packages were automatically installed and are no longer required:
  linux-headers-5.11.0-25-generic linux-hwe-5.11-headers-5.11.0-25 linux-image-5.11.0-25-generic linux-modules-5.11.0-25-ge
  linux-modules-extra-5.11.0-25-generic
Use 'sudo apt autoremove' to remove them.
0 to upgrade, 0 to newly install, 0 to remove and 76 not to upgrade.
ebin@ebin-VirtualBox:~$ curl -sS https://getcomposer.org/installer | php
All settings correct for using Composer
Downloading...

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

ebin@ebin-VirtualBox:~$ sudo mv composer.phar /usr/local/bin/composer
ebin@ebin-VirtualBox:~$
```

```
ebin@ebin-VirtualBox:~$ composer --version
Composer version 2.1.8 2021-09-15 13:55:14
ebin@ebin-VirtualBox:~$
```

Step 4 – 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.

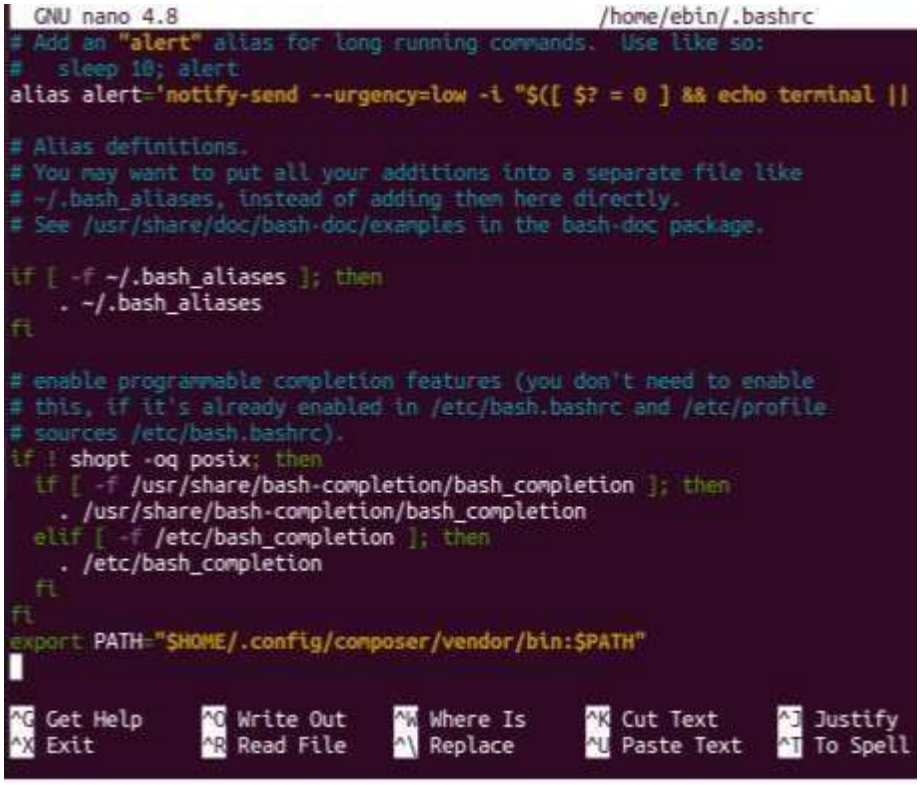
```
ebin@ebin-VirtualBox:~$ composer global require laravel/installer
Changed current directory to /home/ebin/.config/composer
Using version ^4.2 for laravel/installer
./composer.json has been created
Running composer update laravel/installer
Loading composer repositories with package information
Updating 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)
Writing lock file
Installing dependencies from lock file (including require-dev)
Package operations: 13 installs, 0 updates, 0 removals
  - Downloading symfony/polyfill-php80 (v1.23.1)
  - Downloading symfony/process (v5.3.7)
```

As you had seen above image, all packages have been installed on the '~/.config/composer' directory. Next, we need to add the 'bin' directory to the PATH environment through the ~/.bashrc configuration. So Now Edit the ~/.bashrc configuration using nano command.

$ nano ~/.bashrc

And add the following line at the end of the file.

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



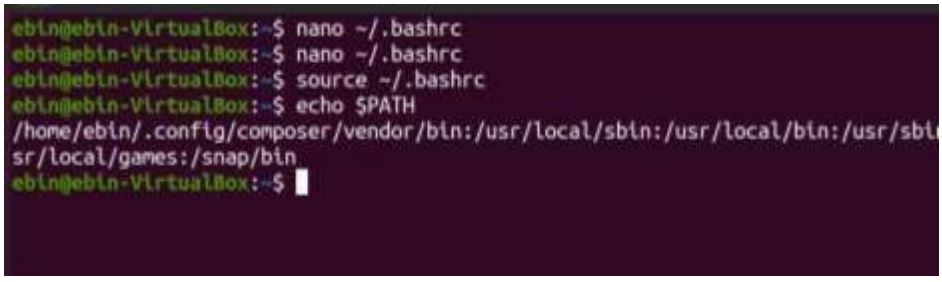
Press Ctrl + x then y to Save and Exit.

Now reload your bashrc configuration using the source command.

$ source ~/.bashrc

Now echo $PATH. It will return your "Bin" directory path for the Composer package.

$ echo $PATH



The 'bin' directory for the composer packages has been added to the $PATH environment variable. And as a result, you can use the command 'laravel' to start and create a new project. Now go ahead and type Laravel new then your project name to start a new Laravel project.

$ laravel new myapp1

This will take a while to download all dependencies required by Laravel.

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 5 – Finally Configure Apache for Laravel and test it

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

$ sudo chgrp -R www-data /home/ebin/myapp1

-R flag is recursive, Recursive means all subdirectory and files under your project directory become changed to the "www-data" group.

Also, you need to change access permission 775 of the storage directory under your project. So, go ahead and use the following command.

$ sudo chmod -R 775 /home/ebin/myapp1/storage

```
ebin@ebin-VirtualBox:~$ cd home
bash: cd: home: No such file or directory
ebin@ebin-VirtualBox:~$ pwd
/home/ebin
ebin@ebin-VirtualBox:~$ /home/ebin/myapp1
bash: /home/ebin/myapp1: Is a directory
ebin@ebin-VirtualBox:~$ cd /home/ebin/myapp1
ebin@ebin-VirtualBox:~/myapp1$ cd ..
ebin@ebin-VirtualBox:~$ sudo chgrp -R www-data /home/ebin/myapp1
[sudo] password for ebin:
ebin@ebin-VirtualBox:~$ sudo chmod -R 775 /home/ebin/myapp1/storage
ebin@ebin-VirtualBox:~$
```

Now 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 myapp1.com

    ServerAdmin admin@myapp1.com
    DocumentRoot /home/ebin/myapp1/public

    <Directory /home/ebin/myapp1>
        Options Indexes MultiViews
        AllowOverride None
        Require all granted
    </Directory>

    ErrorLog  ${APACHE_LOG_DIR}/error.log

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

```
ebin@ebin-VirtualBox:~$ cd /etc/apache2/sites-available/
ebin@ebin-VirtualBox:/etc/apache2/sites-available$ sudo nano myapp1.com.conf
ebin@ebin-VirtualBox:/etc/apache2/sites-available$
```

Now enable mod rewrite for apache2 just type

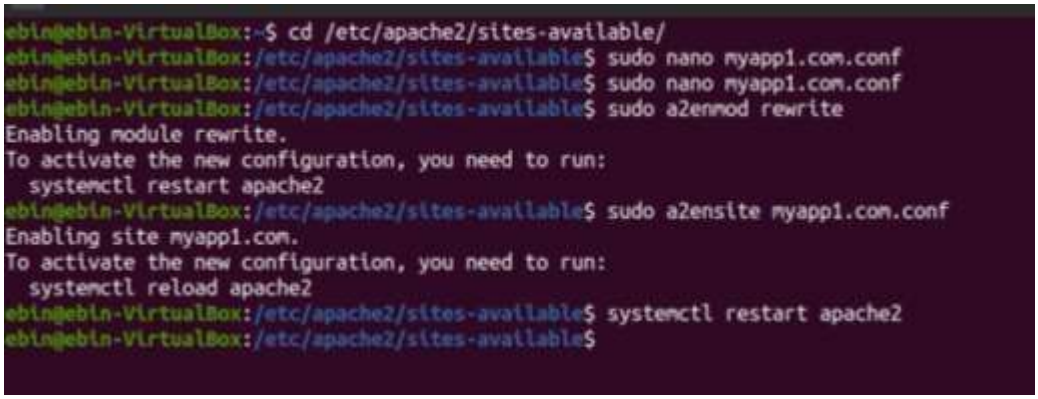
$ sudo a2enmod rewrite

Now enable your site, just type

$ sudo a2ensite myapp1.com.conf

Finally, Restart the apache service, type

$ systemctl restart apache2



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

…

127.0.0.1 myapp1.com

```
ebin@ebin-VirtualBox:~$ sudo nano /etc/hosts
```

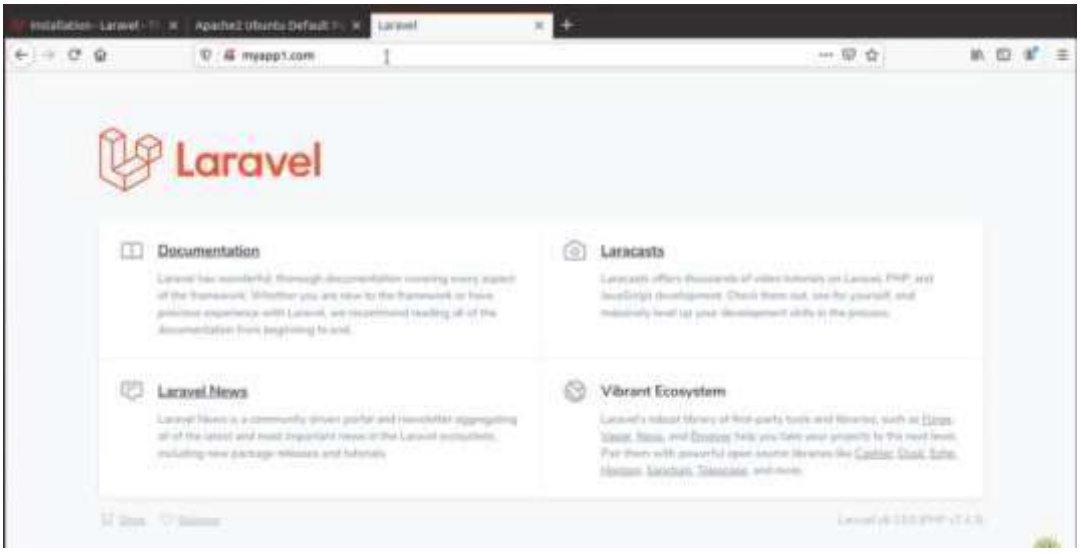
```
  GNU nano 4.8                                  /etc/hosts
127.0.0.1       localhost
127.0.1.1       ebin-VirtualBox

# 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   myapp1.com

                                [ Read 11 lines ]
^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.

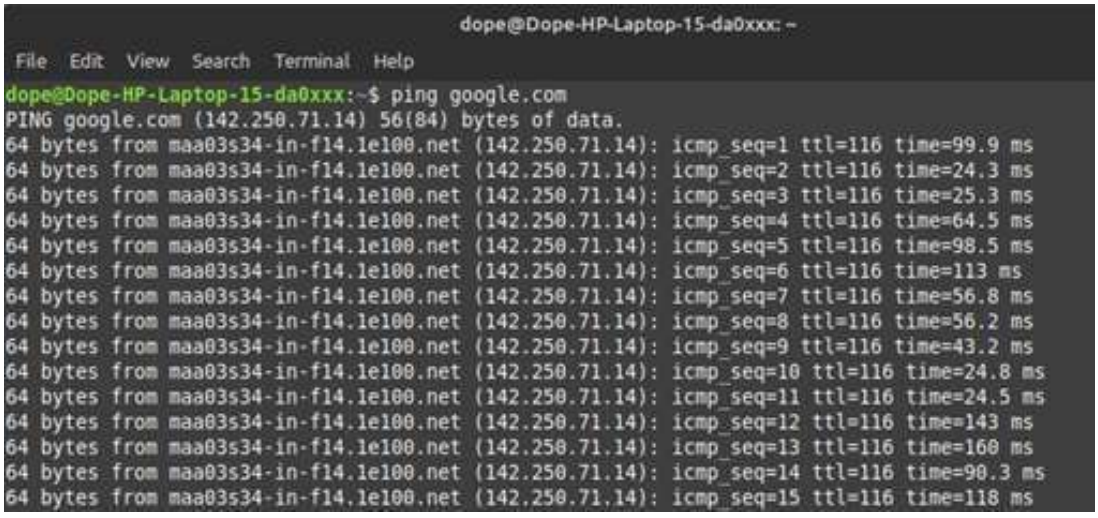
EXPERIMENT-7

NETWORKING COMMANDS

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**. Pingis generally measured in millisecond every modern operating system has this ping pre - installed.

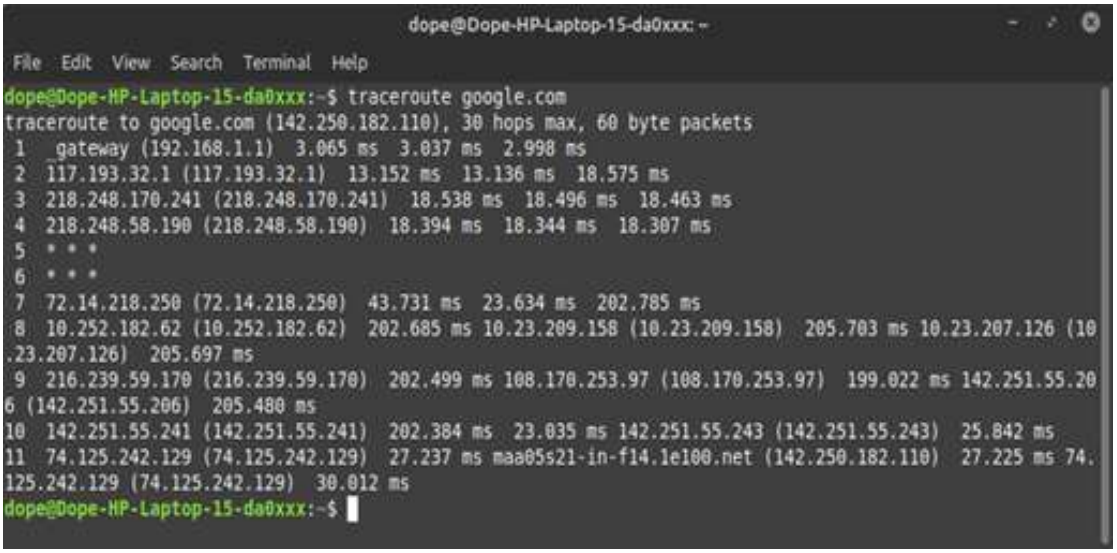
Syntax: ping [OPTIONS] DESTINATION



TRACEROUTE COMMAND

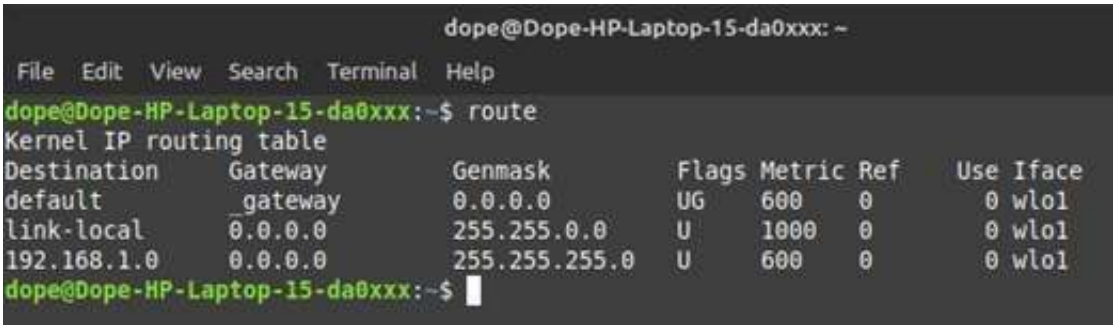
Traceroute command in Linux prints the route that a packet takes to reach the host. This command is useful when you want to know about the route and about all the hops that a packet takes. Below image depicts how traceroute command is used to reach the Google (172.217.26.206) host from the local machine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

Syntax: traceroute [options] host_Address [pathlength]



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.

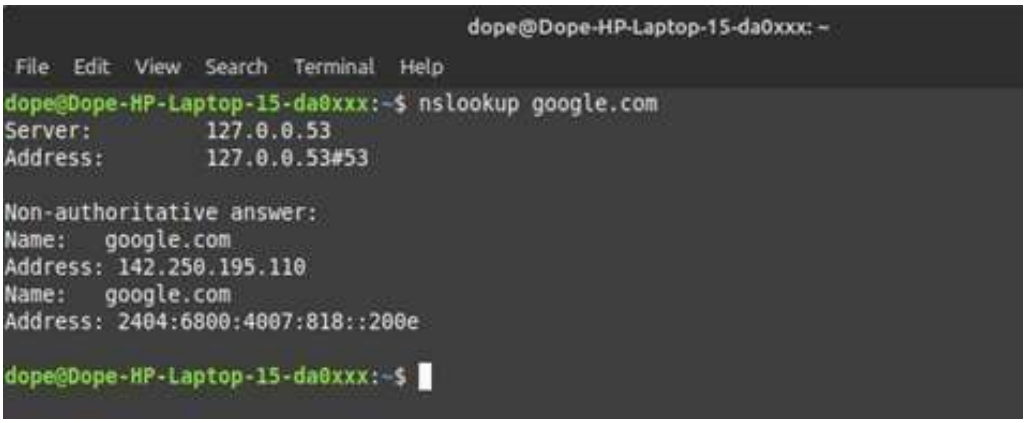


Syntax: route

NSLOOKUP COMMAND

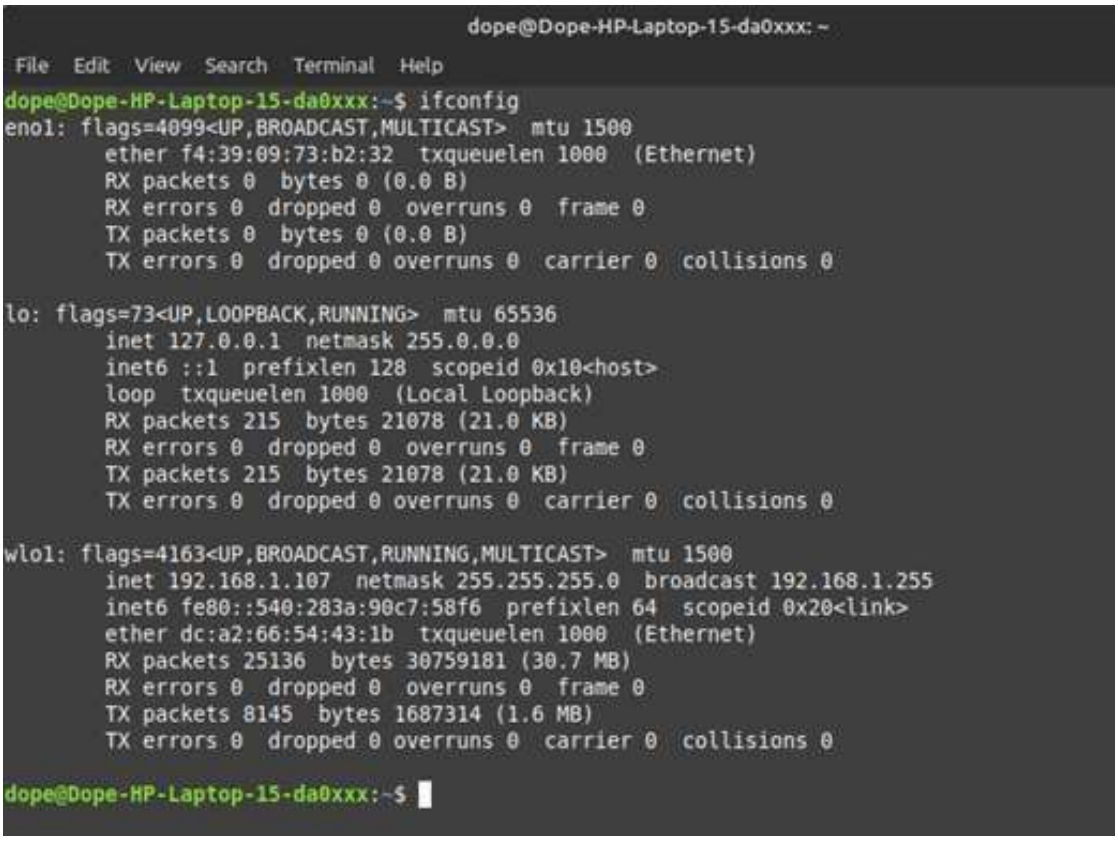
nslookup (stands for "Name Server Lookup") is a useful command for getting information from DNS server. It is a network administration tool for querying the Domain Name System (DNS) to obtain domain name or IP address mapping or any other specific DNS record. It is also used to troubleshoot DNS related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

Syntax: nslookup [option]



IFCONFIG COMMAND

ifconfig(interface configuration) command is used to configure the kernel-resident netwo



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]

EXERCISE 8

WIRESHARK

Wireshark

Wireshark is a network packet analyzer. A networkpacket analyzer presents captured packet data in as much detail as possible. Youcouldthink of a network packet analyzeras a measuringdevice for examining what's happening inside a network cable, just like an electrician uses a voltmeter for examining what's happening inside an electric cable (but at a higher level, of course).

In the past, such tools were either very expensive, proprietary, or both. However, with the advent of Wireshark, that has changed. Wireshark is available for free, is open source, and isone of the best packet analyzers available today. It captures network traffic on the local network and stores that data for offline analysis. **Wireshark** captures network traffic fromEthernet, Bluetooth, Wireless (IEEE. 802.11), Token Ring, Frame Relay connections, and more.

Here are some reasons people use Wireshark:

- Network administrators use it to *troubleshoot network problems*
- Network security engineers use it to *examine security problems*
- QA engineers use it to *verify network applications*
- Developers use it to *debug protocol implementations*
- People use it to *learn network protocol* internals

Wireshark can also be helpful in many other situations.

FEATURES

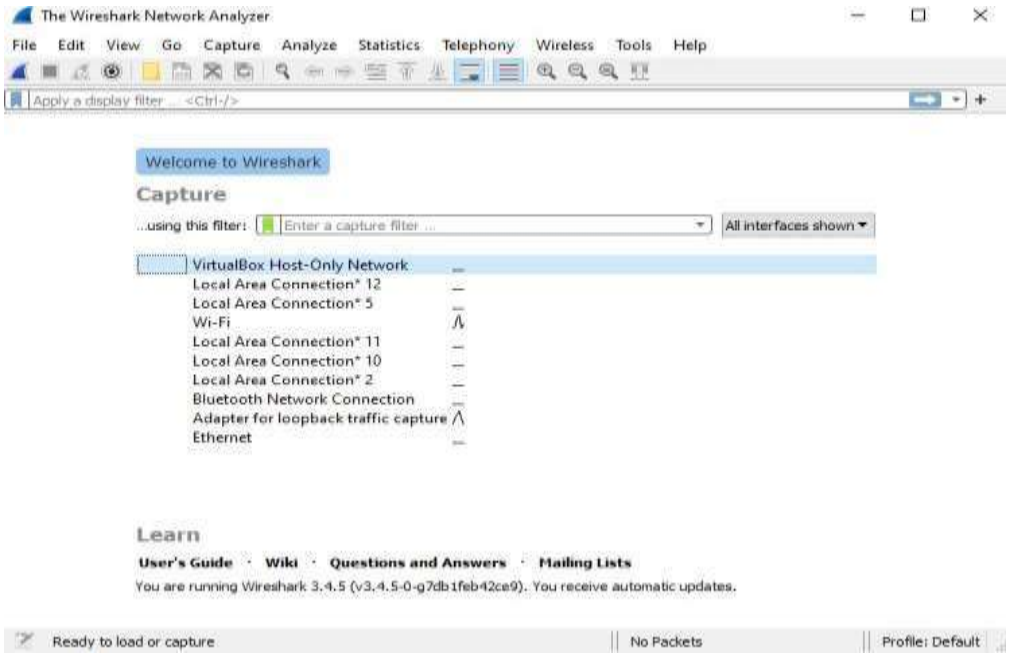
- Data can be captured "from the wire" from a live network connection or read from a fileof already-captured packets.
- Live data can be read from different types of networks, including Ethernet, IEEE802.11, PPP, and loopback.

- Captured network data can be browsed via a GUI, or via the terminal (command line)version of the utility, TShark.
- Captured files can be programmatically edited or converted via command-line switchesto the "editcap" program.
- Data display can be refined using a display filter.
- Plug-ins can be created for dissecting new protocols.
- VoIP calls in the captured traffic can be detected. If encoded in a compatible encoding,the media flow can even be played.
- Raw USB traffic can be captured[1]
- Wireless connections can also be filtered as long as they traverse the monitored Ethernet
- Various settings, timers, and filters can be set to provide the facility of filtering the outputof the captured traffic.

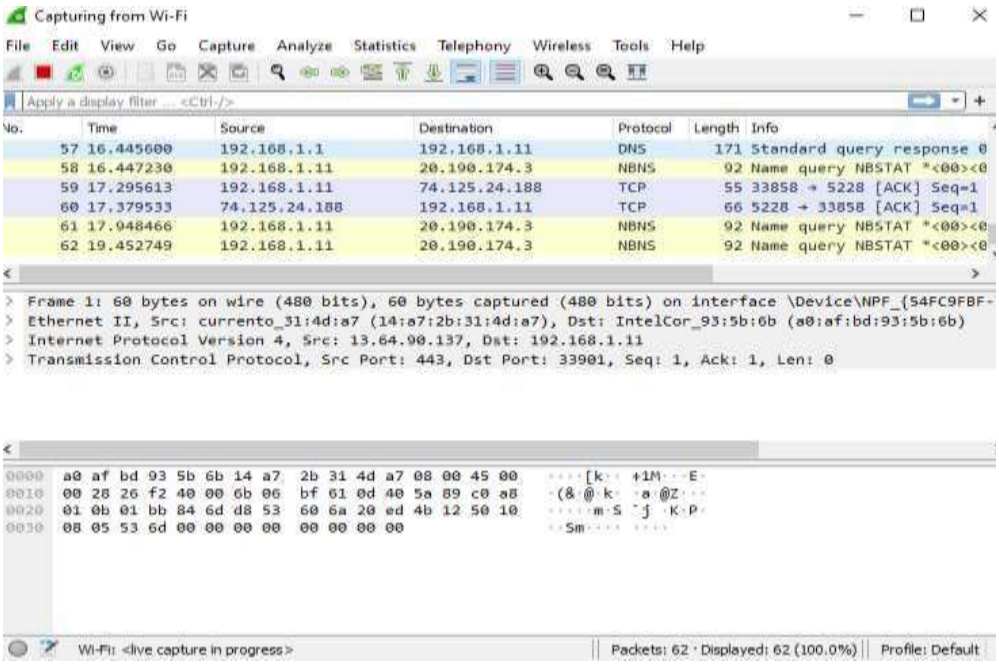
How to use wireshark to capture the packet for analysis?

Analyzing data packet on wireshark

Wireshark shows you three different panes for inspecting packet data. The packet list, the top pane, is the list of all packets that are captured. When you click on a packet, the other two panes change to show you about the details of the packet



The above figshows the first or opening page of wireshark(here you can select any of the option for eg:-wifi



In the above fig you can see it automatically got in to capturing mode. The first window shows all the network traffic that is going through and from our computer. If you want to stopthe capturing you can click on the red button on menu, it will stop capturing packets.

But if you want to filter http packets, you can click on apply a display filter on the topof the page and you can type there http.

Steps are the following:-

1. Start up your web browser.

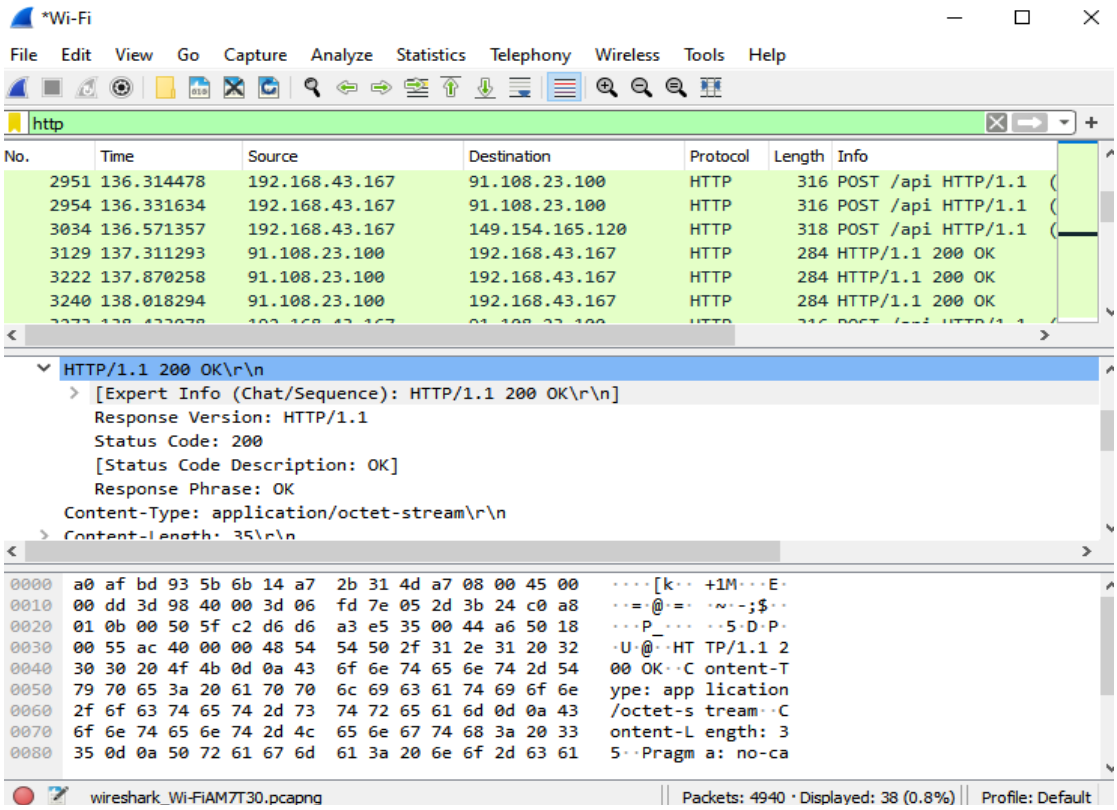
2. Start up the Wireshark packet sniffer (but don't yet begin packet capture).

• Enter "http" (just the letters, not the quotation marks) in the display-filter specification window, so that only captured HTTP messages will be displayed later in the packet-listing window.

3. Wait a bit more than one minute (we'll see why shortly), and then begin Wireshark packet capture.

4. Enter the following to your browser http://javapoint.com Your browser shoulddisplay the webpage.

5. Stop Wireshark packet capture.



The above fig shows capturing http packets. After browsing any web page on your browser, come back to wireshark and start capturing. You can select any of the packets from the list. Now the selected packet details will be specified in the second window. The content is displayed in the third window.

There are columns specifying time, source IP address, destination IP address, the protocol, length of the packet and its indormation.

EXPERIMENT-9

INTRODUCTION TO VIRTUAL MACHINES

Creating a Virtual Machine

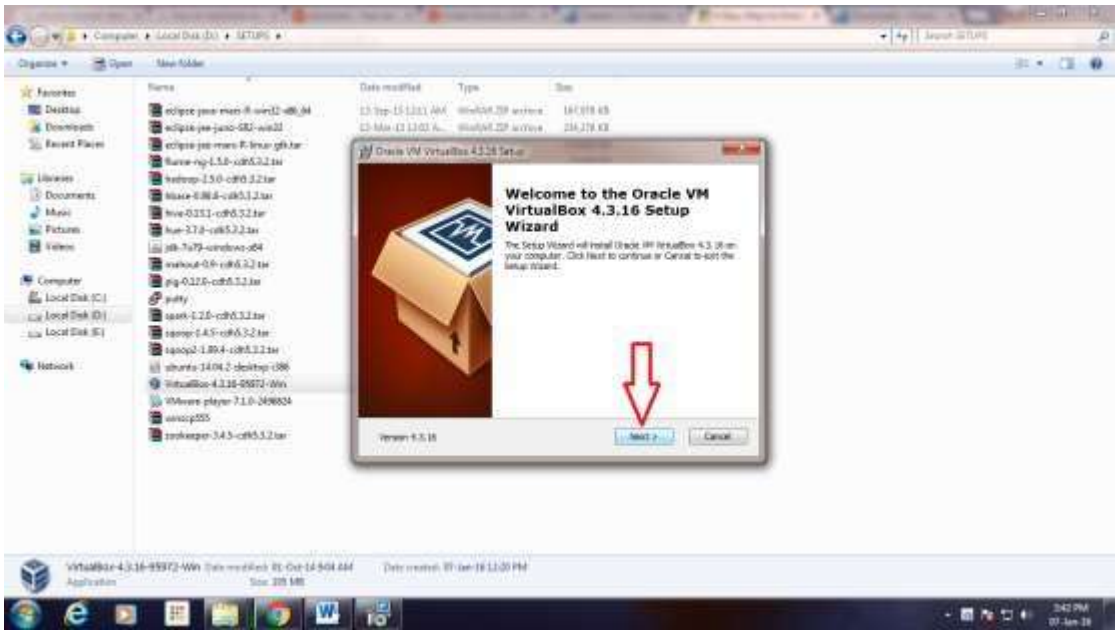
1. Install VirtualBox .

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):

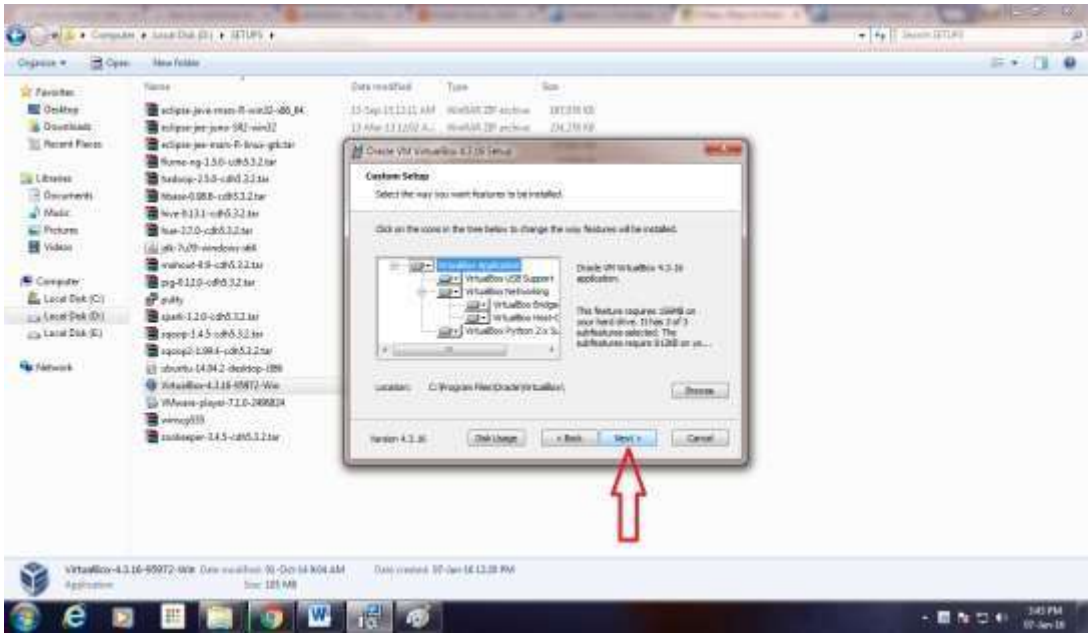
You can download the latest version of VirtualBox from the Virtual Box website: **https://www.virtualbox.org/wiki/Downloads** according to the version of your operating system Windows, Mac or Linux.

1.1. Click Next



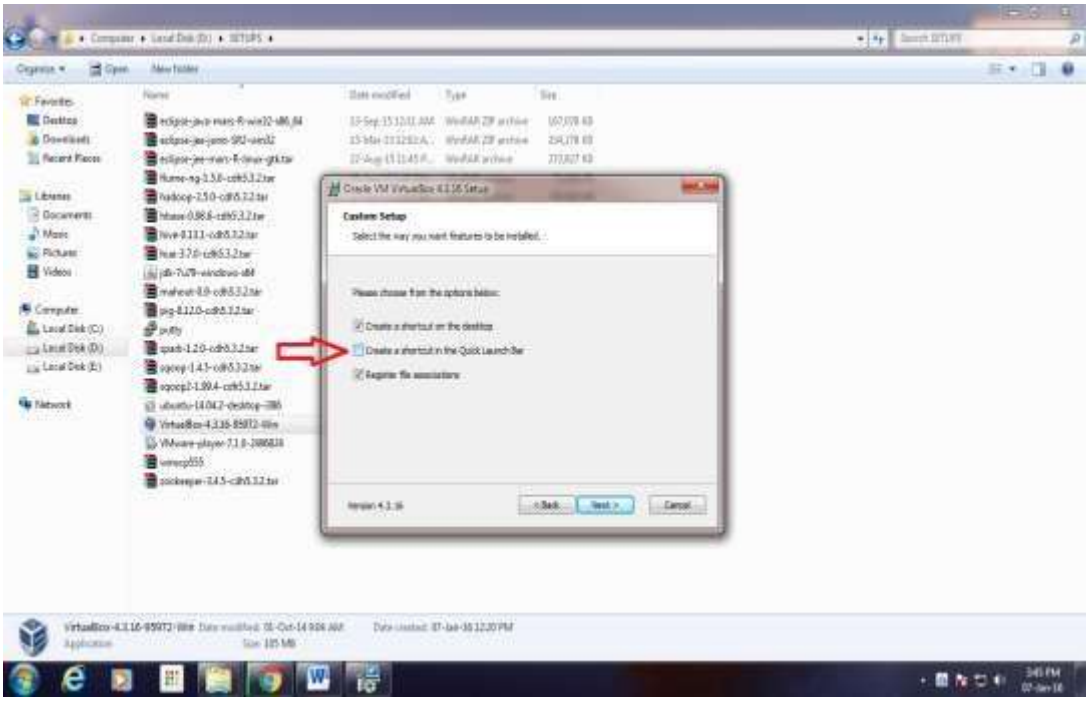
To Install VirtualBox – Setup Wizard

1.2. Click Next



To Install VirtualBox – Custom Setup

1.3. Uncheck "Create a shortcut in the Quick Launch Bar" and click "Next"

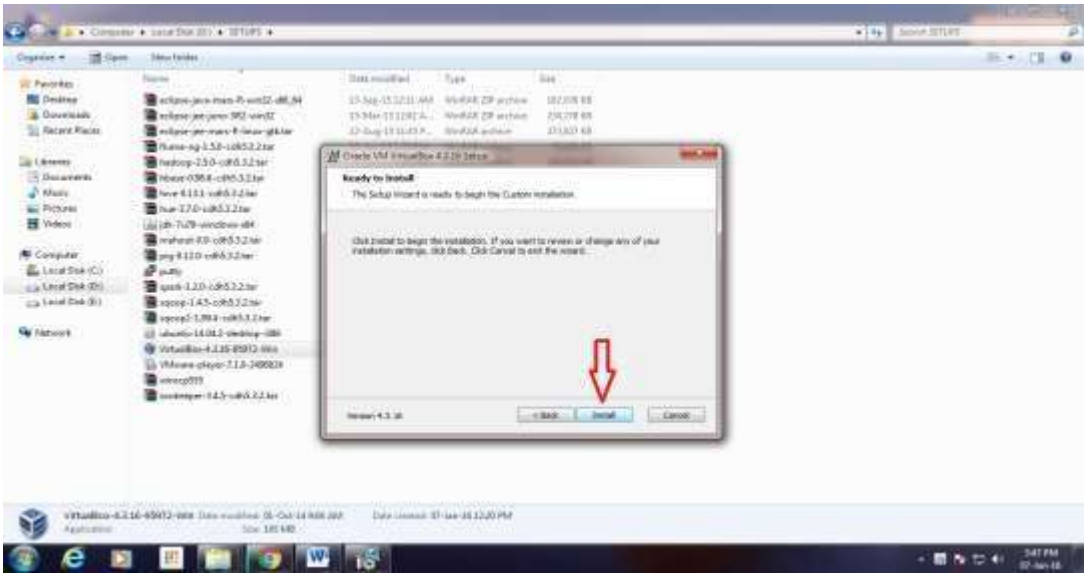


To Install VirtualBox – Features Selection

1.4. Click "Yes"

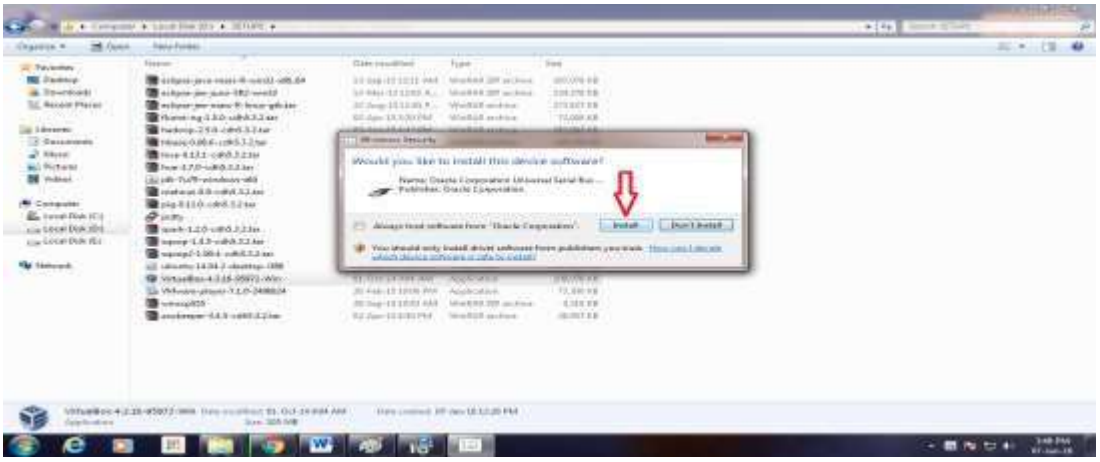
To Install VirtualBox – Network Interfaces Warning

1.5. Click "Install"



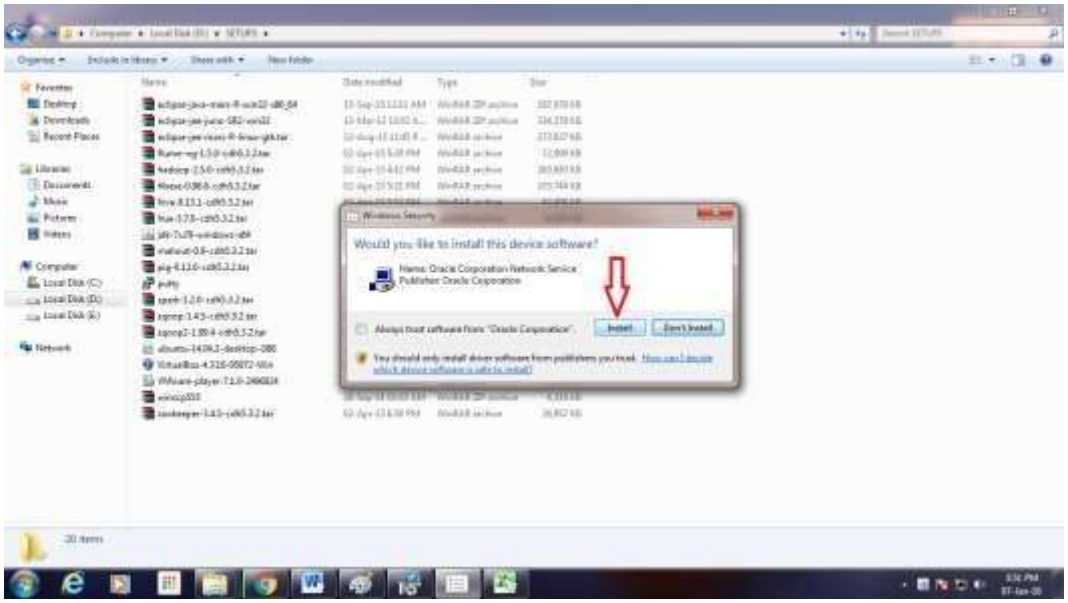
Installation of Oracle VM VirtualBox – Ready to Install

1.6. Click "Install"



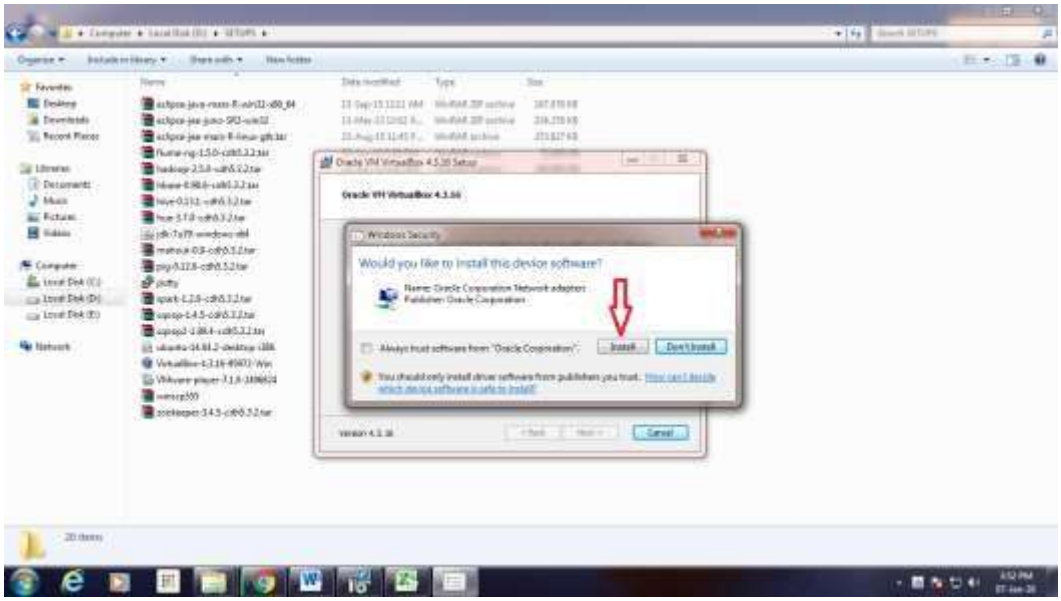
Installation of Oracle VM VirtualBox- Serial Bus Software Installation

1.7. Click "Install"



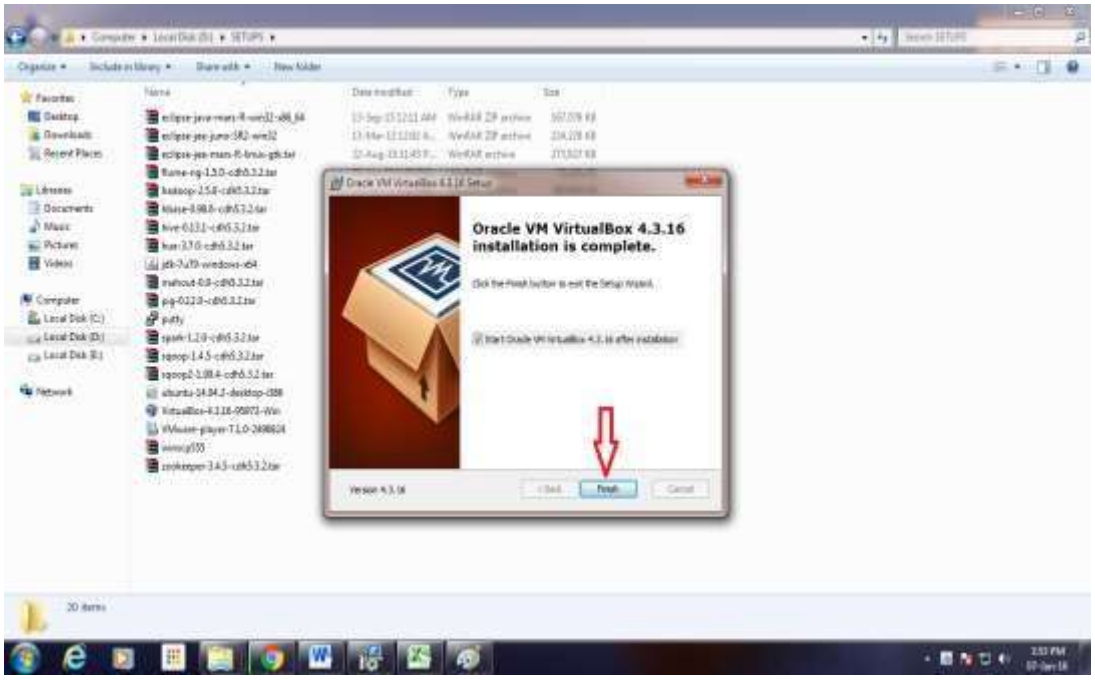
Installation of Oracle VM VirtualBox – Network Service Installation

1.8. Click "Install"



Installation of Oracle VM VirtualBox – Network Adapters Installation

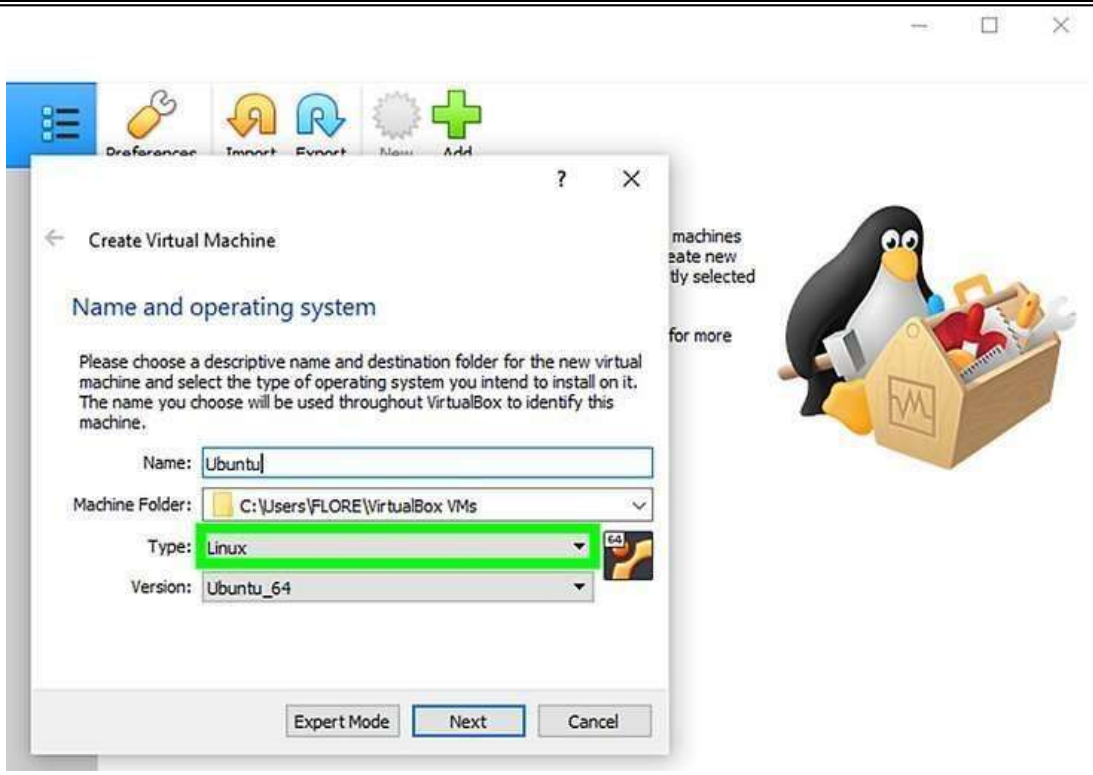
1.9. Click "Finish"



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

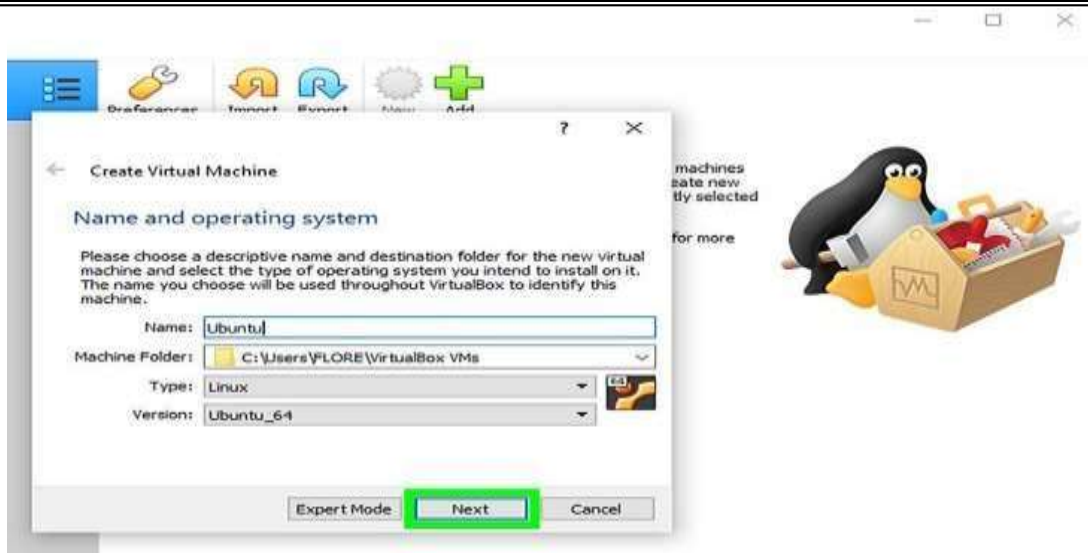
3 **Click New.** It's a blue badge in the upper-left corner of the VirtualBox window. Doing so opens a pop-up menu.

4 **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.

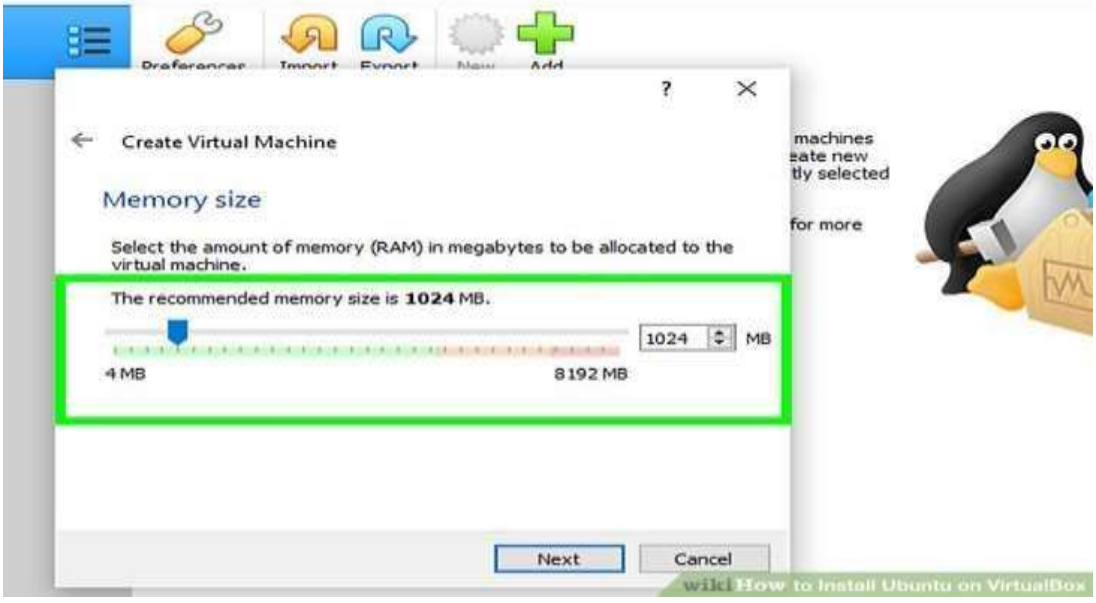


5. For **Operating System Type**, select the OS that you want to install.

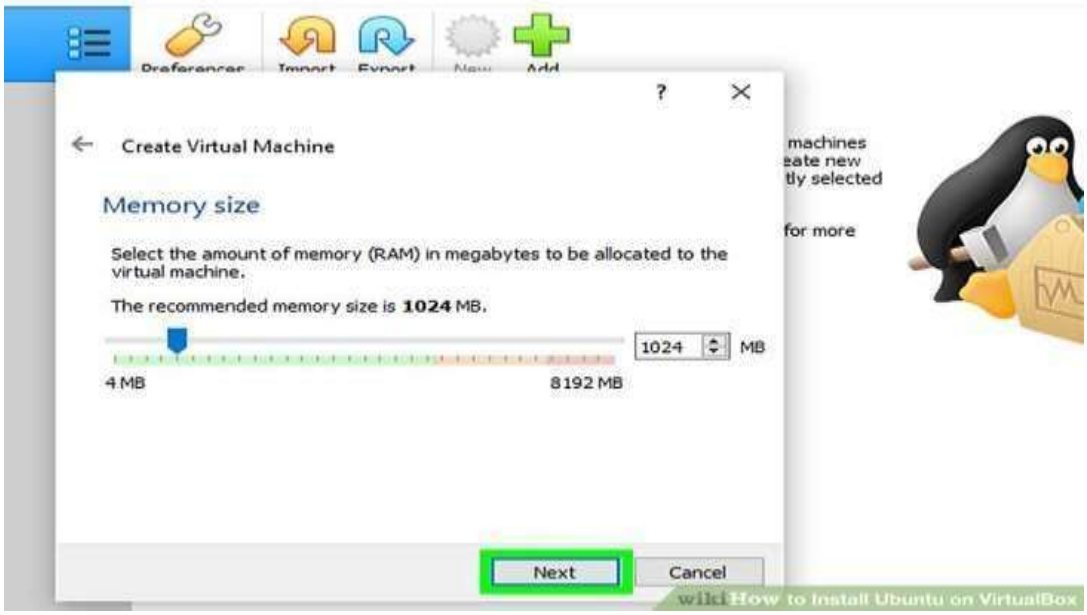
6. Select the **version** of the operating system.



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

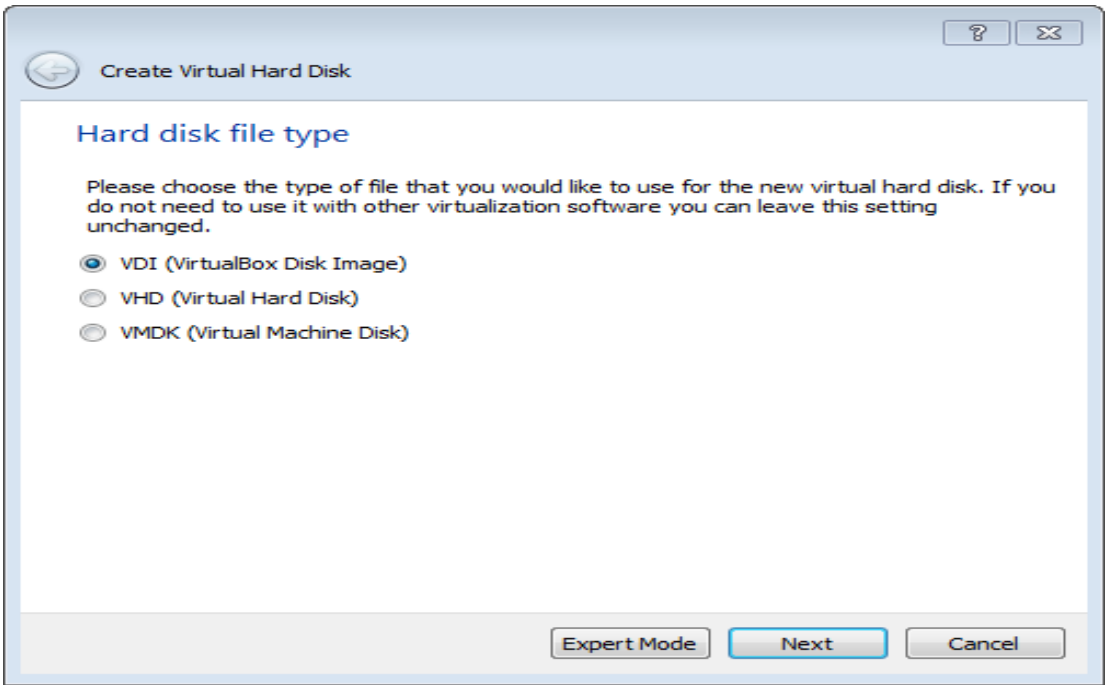


8. **Select an amount of RAM to use.** Click and drag the slider left or right to decrease or increase the amount of RAM that VirtualBox will have available for your virtual machine. The ideal amount of RAM will automatically be selected when you get to this page.
Make sure not to increase the RAM into the red section of the slider; try to keep the slider in the green.

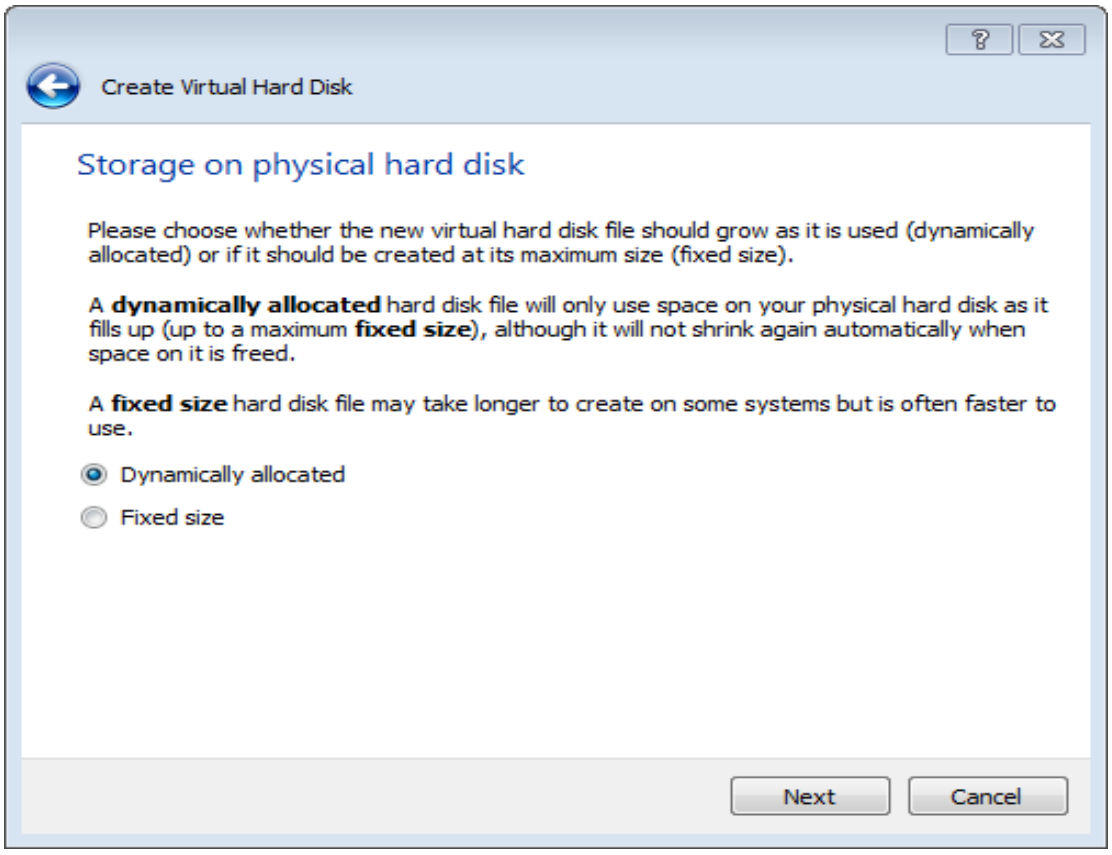


9. **Click Next.** It's at the bottom of the menu.

1O.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:

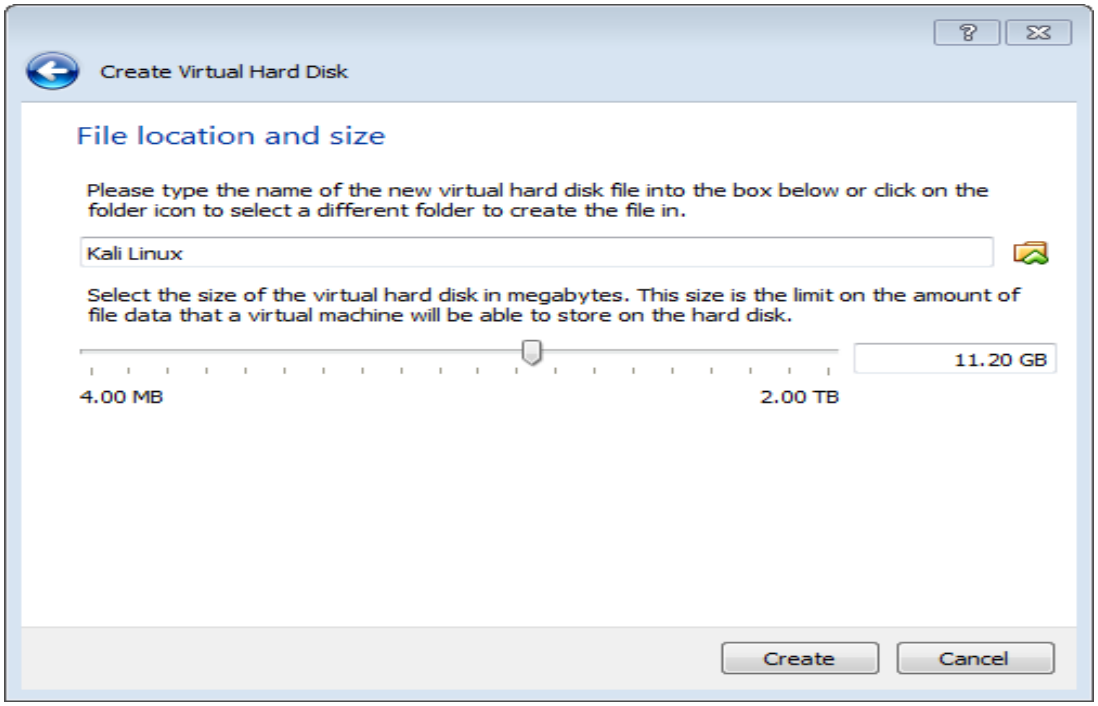


11.Use "VDI" to create a virtual hard disk



12 .Choose "Dynamically allocated"

13. 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 cos