

**NETWORKING AND SYSTEM ADMINISTRATION  
LAB RECORD**

**Submitted by  
JISHA CHACKO  
S2 RMCA  
A BATCH  
ROLLNO:44**

## **prepare a detailed note on computer hardware and various operating systems**

**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. By contrast, software is the set of instructions that can be stored and run by hardware. Hardware is so-termed because it is "hard" or rigid with respect to changes, whereas software is "soft" because it is easy to change. 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.

### **Types of computer systems**

#### **Personal computer**

Basic hardware components of a personal computer, including a monitor, a motherboard, a CPU, a RAM, two expansion cards, a power supply, an optical disc drive, a hard disk drive, a keyboard and a mouse

Inside a custom-built computer: power supply at the bottom has its own cooling fan

The personal computer is one of the most common types of computer due to its versatility and relatively low price. Desktop personal computers have a monitor, a keyboard, a mouse, and a computer case. The computer case holds the motherboard, fixed or removable disk drives for data storage, the power supply, and may contain other peripheral devices such as modems or network interfaces. Some models of desktop computers integrated the monitor and keyboard into the same case as the processor and power supply. Separating the elements allows the user to arrange the components in a pleasing, comfortable array, at the cost of managing power and data cables between them.

## Case

### Main article: Computer case

The computer case encloses most of the components of the system. It provides mechanical support and protection for internal elements such as the motherboard, disk drives, and power supplies, and controls and directs the flow of cooling air over internal components. The case is also part of the system to control electromagnetic interference radiated by the computer and protects internal parts from electrostatic discharge. Large tower cases provide space for multiple disk drives or other peripherals and usually stand on the floor, while desktop cases provide less expansion room. All-in-one style designs include a video display built into the same case. Portable and laptop computers require cases that provide impact protection for the unit. Hobbyists may decorate the cases with colored lights, paint, or other features, in an activity called case modding.

## Power supply

### Main article: Power supply unit

A power supply unit (PSU) converts alternating current (AC) electric power to low-voltage direct current (DC) power for the computer. Laptops can run on built-in rechargeable battery. The PSU typically uses a switched-mode power supply (SMPS), with power MOSFETs (power metal–oxide–semiconductor field-effect transistors) used in the converters and regulator circuits of the SMPS.

## Motherboard

### Computer motherboard

### Main article: Motherboard

The motherboard is the main component of a computer. It is a board with integrated circuitry that connects the other parts of the computer including the CPU, the RAM, the disk drives (CD, DVD, hard disk, or any others) as well as

any peripherals connected via the ports or the expansion slots. The integrated circuit (IC) chips in a computer typically contain billions of tiny metal–oxide–semiconductor field-effect transistors (MOSFETs).

Components directly attached to or to part of the motherboard include:

The CPU (central processing unit), which performs most of the calculations which enable a computer to function, and is referred to as the brain of the computer. It takes program instructions from random-access memory (RAM), interprets and processes them and then sends back results so that the relevant components can carry out the instructions. The CPU is a microprocessor, which is fabricated on a metal–oxide–semiconductor (MOS) integrated circuit (IC) chip. It is usually cooled by a heat sink and fan, or water-cooling system. Most newer CPU includes an on-die graphics processing unit (GPU).

The chipset, which includes the north bridge, mediates communication between the CPU and the other components of the system, including main memory; as well as south bridge, which is connected to the north bridge, and supports auxiliary interfaces and buses; and, finally, a Super I/O chip, connected through the south bridge, which supports the slowest and most legacy components like serial ports, hardware monitoring and fan control.

Random-access memory (RAM), which stores the code and data that are being actively accessed by the CPU. For example, when a web browser is opened on the computer it takes up memory; this is stored in the RAM until the web browser is closed. It is typically a type of dynamic RAM (DRAM), such as synchronous DRAM (SDRAM), where MOS memory chips store data on memory cells consisting of MOSFETs and MOS capacitors.

The BIOS (Basic Input Output System) includes boot firmware and power management firmware. Newer motherboards use Unified Extensible Firmware Interface (UEFI) instead of BIOS.

Buses that connect the CPU to various internal components and to expand cards for graphics and sound.

The CMOS (complementary MOS) battery, which powers the CMOS memory for date and time in the BIOS chip. This battery is generally a watch battery.

The video card (also known as the graphics card), which processes computer graphics. More powerful graphics cards are better suited to handle strenuous tasks, such as playing intensive video games or running computer graphics software. A video card contains a graphics processing unit (GPU) and video memory (typically a type of SDRAM), both fabricated on MOS integrated circuit (MOS IC) chips.

## Expansion cards

### Main article: Expansion card

An expansion card in computing is a printed circuit board that can be inserted into an expansion slot of a computer motherboard or backplane to add functionality to a computer system via the expansion bus. Expansion cards can be used to obtain or expand on features not offered by the motherboard.

## Storage devices

### Main article: Computer data storage

A storage device is any computing hardware and digital media that is used for storing, porting and extracting data files and objects. It can hold and store information both temporarily and permanently and can be internal or external to a computer, server or any similar computing device. Data storage is a core function and fundamental component of computers.

## Fixed media

Data is stored by a computer using a variety of media. Hard disk drives (HDDs) are found in virtually all older computers, due to their high capacity and low cost, but solid-state drives (SSDs) are faster and more power efficient, although currently more expensive than hard drives in terms of dollar per gigabyte, so are often found in personal computers built post-2007. SSDs use flash memory, which stores data on MOS memory chips consisting of floating-gate MOSFET memory cells. Some systems may use a disk array controller for greater performance or reliability.

## Removable media

To transfer data between computers, an external flash memory device (such as a memory card or USB flash drive) or optical disc (such as a CD-ROM, DVD-ROM or BD-ROM) may be used. Their usefulness depends on being readable by other systems; the majority of machines have an optical disk drive (ODD), and virtually all have at least one Universal Serial Bus (USB) port.

## Input and output peripherals

### Main article: Peripheral

Input and output devices are typically housed externally to the main computer chassis. The following are either standard or very common to many computer systems.

## Input device

Input devices allow the user to enter information into the system, or control its operation. Most personal computers have a mouse and keyboard, but laptop systems typically use a touchpad instead of a mouse. Other input devices include webcams, microphones, joysticks, and image scanners.

## Output device

Output devices are designed around the senses of human beings. For example, monitors display text that can be read, speakers produce sound that can be heard. Such devices also could include printers or a Braille embosser.

## Mainframe computer

### Main article: Mainframe Computer

A mainframe computer is a much larger computer that typically fills a room and may cost many hundreds or thousands of times as much as a personal computer. They are designed to perform large numbers of calculations for governments and large enterprises.

An IBM System z9 mainframe

Departmental computing

Main article: Minicomputer

In the 1960s and 1970s, more and more departments started to use cheaper and dedicated systems for specific purposes like process control and laboratory automation. A minicomputer, or colloquially mini, is a class of smaller computers that was developed in the mid-1960s and sold for much less than mainframe and mid-size computers from IBM and its direct competitors.

Supercomputer

Main article: Supercomputer

A supercomputer is superficially similar to a mainframe but is instead intended for extremely demanding computational tasks. As of June 2020, the fastest supercomputer on the TOP500 supercomputer list is Fugaku, in Japan, with a LINPACK benchmark score of 415 PFLOPS, superseding the second fastest, Summit, in the United States, by around 294 PFLOPS.

The term supercomputer does not refer to a specific technology. Rather it indicates the fastest computations available at any given time. In mid-2011, the fastest supercomputers boasted speeds exceeding one petaflop, or 1 quadrillion ( $10^{15}$  or 1,000 trillion) floating-point operations per second. Supercomputers are fast but extremely costly, so they are generally used by large organizations to execute computationally demanding tasks involving large data sets.

## **Hardware upgrade**

When using computer hardware, an upgrade means adding new or additional hardware to a computer that improves its performance, increases its capacity, or adds new features. For example, a user could perform a hardware upgrade to replace the hard drive with a faster one or a Solid State Drive (SSD) to get a boost in performance. The user may also install more Random Access Memory (RAM) so the computer can store additional temporary data, or retrieve such data at a faster rate. The user may add a USB 3.0 expansion card to fully use USB 3.0 devices, or could upgrade the Graphics Processing Unit (GPU) for cleaner, more advanced graphics, or more monitors. Performing such hardware upgrades may be necessary for aged computers to meet a new, or updated program's system requirements.

## Sales

Global revenue from computer hardware in 2016 reached 408 billion Euros.

## Recycling

### Main article: Computer recycling

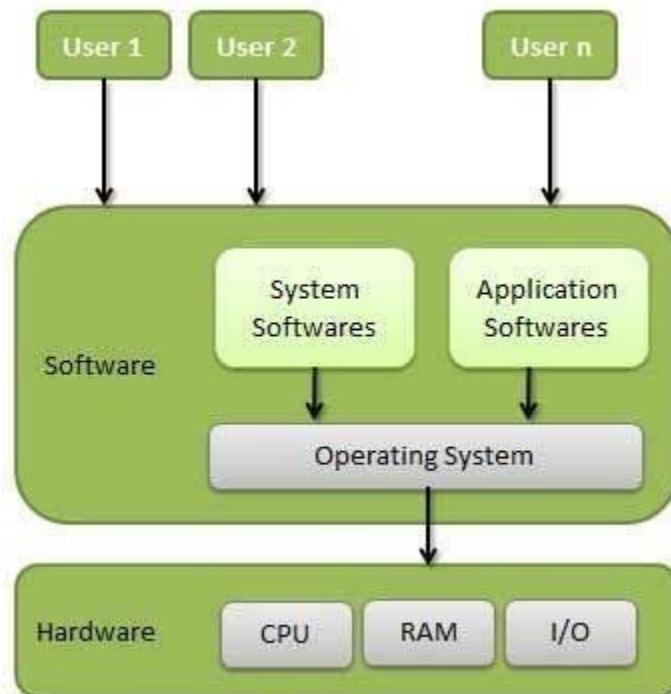
Because computer parts contain hazardous materials, there is a growing movement to recycle old and outdated parts. Computer hardware contain dangerous chemicals such as: lead, mercury, nickel, and cadmium. According to the EPA these e-wastes have a harmful effect on the environment unless they are disposed of properly. Making hardware requires energy, and recycling parts will reduce air pollution, water pollution, as well as greenhouse gas emissions. Disposing unauthorized computer equipment is in fact illegal. Legislation makes it mandatory to recycle computers through the government approved facilities. Recycling a computer can be made easier by taking out certain reusable parts. For example, the RAM, DVD drive, the graphics card, hard drive or SSD, and other similar removable parts can be reused.

## Toxic computer components

The central processing unit contains many toxic materials. It contains lead and chromium in the metal plates. Resistors, semi-conductors, infrared detectors, stabilizers, cables, and wires contain cadmium. The circuit boards in a computer contain mercury, and chromium. When these types of materials, and chemicals are disposed improperly will become hazardous for the environment.

Basic hardware components of a personal computer, including a monitor, a motherboard, a CPU, a RAM, two expansion cards, a power supply, an optical disc drive, a hard disk drive, a keyboard and a mouse

## **operating system**



An **operating system (OS)** is system software that manages computer hardware, software resources, and provides common services for computer programs.

An Operating System (OS) is an interface between a computer user and computer hardware. An operating system is a software which performs all the basic tasks like file management, memory management, process management, handling input and output, and controlling peripheral devices such as disk drives and printers.

## Types of operating systems

### Single-tasking and multi-tasking

A single-tasking system can only run one program at a time, while a multi-tasking operating system allows more than one program to be running in concurrency. This is achieved by time-sharing, where the available processor time is divided between multiple processes. These processes are each interrupted repeatedly in time slices by a task-scheduling subsystem of the operating system. Multi-tasking may be characterized in preemptive and co-operative types. In preemptive multitasking, the operating system slices the CPU time and dedicates a slot to each of the programs. Unix-like operating systems, such as Solaris and Linux—as well as non-Unix-like, such as AmigaOS—support preemptive multitasking. Cooperative multitasking is achieved by relying on each process to provide time to the other processes in a defined manner. 16-bit versions of Microsoft Windows used cooperative multi-tasking; 32-bit versions of both Windows NT and Win9x used preemptive multi-tasking.

## **Single- and multi-user**

Single-user operating systems have no facilities to distinguish users, but may allow multiple programs to run in tandem.[8] A multi-user operating system extends the basic concept of multi-tasking with facilities that identify processes and resources, such as disk space, belonging to multiple users, and the system permits multiple users to interact with the system at the same time. Time-sharing operating systems schedule tasks for efficient use of the system and may also include accounting software for cost allocation of processor time, mass storage, printing, and other resources to multiple users.

## **Distributed**

A distributed operating system manages a group of distinct, networked computers and makes them appear to be a single computer, as all computations are distributed (divided amongst the constituent computers).[9]

## **Templated**

In the distributed and cloud computing context of an OS, templating refers to creating a single virtual machine image as a guest operating system, then saving it as a tool for multiple running virtual machines. The technique is used both in virtualization and cloud computing management, and is common in large server warehouses.

## **Embedded**

Embedded operating systems are designed to be used in embedded computer systems. They are designed to operate on small machines with less autonomy (e.g. PDAs). They are very compact and extremely efficient by design, and are able to operate with a limited amount of resources. Windows CE and Minix 3 are some examples of embedded operating systems.

## **Real-time**

A real-time operating system is an operating system that guarantees to process events or data by a specific moment in time. A real-time operating system may be single- or multi-tasking, but when multitasking, it uses specialized scheduling algorithms so that a deterministic nature of behavior is achieved. Such an event-driven system switches between tasks based on their

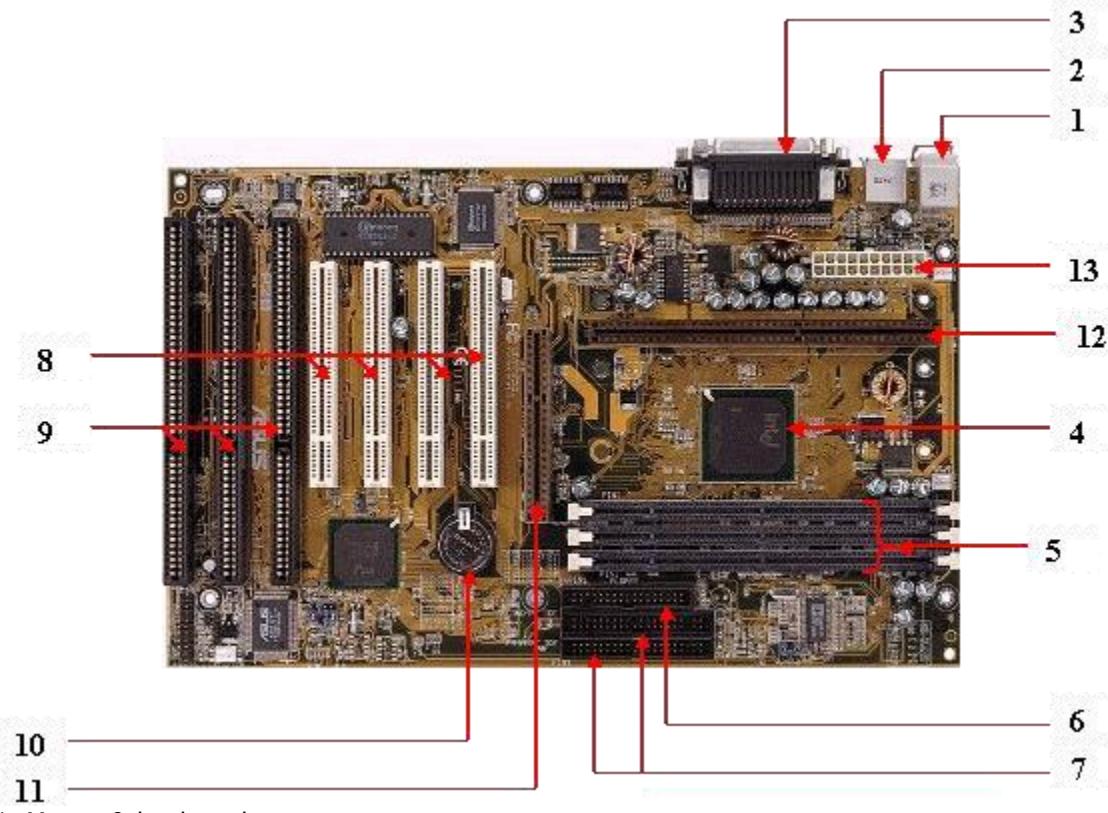
priorities or external events, whereas time-sharing operating systems switch tasks based on clock interrupts.

## **Library**

A library operating system is one in which the services that a typical operating system provides, such as networking, are provided in the form of libraries and composed with the application and configuration code to construct a unikernel: a specialized, single address space, machine image that can be deployed to cloud or embedded environments.

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## 1. Computer Motherboard Components



1. Mouse & keyboard

2. USB

3. Parallel port

4. CPU Chip

5. RAM slots

6. Floppy controller

7. IDE controller

8. PCI slot

9. ISA slot

10. CMOS Battery

11. AGP slot

12. CPU slot

13. Power supply plug in

## What is a Motherboard?

The motherboard is a thin **printed circuit board** (PCB) which links all different components inside your computer. So, we can say the motherboard acts as a hub in a network. People call motherboard with a different name like mainboard, logic board, baseboard, system board, mobo, etc.

**1. Mouse & keyboard:** Keyboard Connectors are two types basically. All PCs have a Key board port connected directly to the motherboard. The oldest, but still quite common type, is a special DIN, and most PCs until recently retained this style connector. The AT-style keyboard connector is quickly disappearing, being replaced by the smaller mini DIN PS/2-style keyboard connector.

You can use an AT-style keyboard with a PS/2-style socket (or the other way around) by using a converter. Although the AT connector is unique in PCs, the PS/2-style mini-DIN is also used in more modern PCs for the mouse. Fortunately , most PCs that use the mini-DIN for both the keyboard and mouse clearly mark each mini-DIN socket as to its correct use. Some keyboards have a USB connection, but these are fairly rare compared to the PS/2 connection keyboards.

**2. USB (Universal serial bus):** USB is the General-purpose connection for PC. You can find USB versions of many different devices, such as mice, keyboards, scanners, cameras, and even printers. a USB connector's distinctive rectangular shape makes it easily recognizable.

USB has a number of features that makes it particularly popular on PCs. First, USB devices are hot swappable. You can insert or remove them without restarting your system .

**3. Parallel port:** Most printers use a special connector called a parallel port. Parallel port carry data on more than one wire, as opposed to the serial port, which uses only one wire. Parallel ports use a 25-pin female DB connector. Parallel ports are directly supported by the motherboard through a direct connection or through a dangle.

**4. CPU Chip :** The *central processing unit*, also called the *microprocessor* performs all the calculations that take place inside a pc. CPUs come in Variety of shapes and sizes. Modern CPUs generate a lot of heat and thus require a cooling fan or heat sink. The cooling device (such as a cooling fan) is removable, although some CPU manufacturers sell the CPU with a fan permanently attached.

**5. RAM slots:** Random-Access Memory (RAM) stores programs and data currently being used by the CPU. RAM is measured in units called bytes. RAM has been packaged in many different ways. The most current package is called a 168-pin DIMM (Dual Inline Memory module).

**6. Floppy controller:** The floppy drive connects to the computer via a 34-pin *ribbon cable*, which in turn connects to the motherboard. A *floppy controller* is one that is used to control the floppy drive.

**7. IDE controller:** Industry standards define two common types of hard drives: EIDE and SCSI. Majority of the PCs use EIDE drives. SCSI drives show up in high end PCs such as network servers or graphical workstations. The EIDE drive connects to the hard drive via a 2-

inch-wide, 40-pin ribbon cable, which in turn connects to the motherboard. *IDE controller* is responsible for controlling the hard drive.

**8. PCI slot:** Intel introduced the *Peripheral component interconnect* bus protocol. The PCI bus is used to connect I/O devices (such as NIC or RAID controllers) to the main logic of the computer. PCI bus has replaced the ISA bus.

**9. ISA slot:** (Industry Standard Architecture) It is the standard architecture of the Expansion bus. Motherboard may contain some slots to connect ISA compatible cards.

**10. CMOS Battery:** To provide CMOS with the power when the computer is turned off all motherboards comes with a battery. These batteries mount on the motherboard in one of three ways: the obsolete external battery, the most common onboard battery, and built-in battery.

**11. AGP slot:** If you have a modern motherboard, you will almost certainly notice a single connector that looks like a PCI slot, but is slightly shorter and usually brown. You also probably have a video card inserted into this slot. This is an Advanced Graphics Port (AGP) slot.

**12. CPU slot:** To install the CPU, just slide it straight down into the slot. Special notches in the slot make it impossible to install them incorrectly. So remember if it does not go easily, it is probably not correct. Be sure to plug in the CPU fan's power.

**13. Power supply plug in:** The Power supply, as its name implies, provides the necessary electrical power to make the pc operate. the power supply takes standard 110-V AC power and converts into 12-Volt, 5-Volt, and 3.3-Volt DC power.

## 2. Ram



Alternatively referred to as main memory, primary memory, or system memory, RAM (random-access memory) is a hardware device that allows information to be stored and retrieved on a computer. RAM is usually associated with DRAM, which is a type of memory module. Because data is accessed randomly instead of sequentially like it is on a CD or hard drive, access times are much faster. However, unlike ROM, RAM is a volatile memory and requires power to keep the data accessible. If the computer is turned off, all data contained in RAM is lost.

### Types of RAM



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Over the evolution of the computer, there have been different variations of RAM. Some of the more common examples are DIMM, RIMM, SIMM, SO-DIMM, and SOO-RIMM. Below is an example image of a 512 MB DIMM computer memory module, a piece of RAM found in older desktop computers. This memory module would be installed into one of the memory slots on a motherboard.

### **Computer DIMM or dual-inline memory module**

#### **Additional RAM information**

As the computer boots, parts of the operating system and drivers are loaded into memory, which allows the CPU to process instructions faster and speed up the boot process. After the operating system is loaded, programs you open like the browser you're using to view this page are also loaded into memory. If too many programs are open, the computer swaps the data in the memory between the RAM and the hard disk drive.

A computer's performance is largely attributed to the amount of memory contained within it. If a computer does not have the recommended memory to run the operating system and its programs, it results in slower performance. The more memory a computer has, the more information and software it can load and process quickly.

How does a computer work?

What's the largest stick of RAM?

Currently, the largest single stick of RAM is 128 GB.

## History of RAM

The first form of RAM came about in 1947 with the use of the Williams tube. It utilized a CRT (cathode ray tube); the data was stored on the face as electrically charged spots.

The second widely used form of RAM was magnetic-core memory, invented in 1947. Frederick Viehe is credited with much of the work, having filed for several patents relating to the design. Magnetic-core memory works through the use of tiny metal rings and wires connecting to each ring. One bit of data could be stored per ring and accessed at any time.

However, RAM, as we know it today, as solid-state memory, was first invented in 1968 by Robert Dennard. Known specifically as dynamic random-access memory, or DRAM, transistors were used to store bits of data.

What is internal memory and how is it different from external memory?

Computer memory is generally classified as either internal or external memory.

Internal memory, also called "main or primary memory" refers to memory that stores small amounts of data that can be accessed quickly while the computer is running.

External memory, also called "secondary memory" refers to a storage device that can retain or store data persistently. They could be embedded or removable storage devices. Examples include hard disk or solid state drives, USB flash drives, and compact discs.

What are the types of internal memory?

There are basically two kinds of internal memory: ROM and RAM.

ROM stands for read-only memory. It is non-volatile, which means it can retain data even without power. It is used mainly to start or boot up a computer.

Once the operating system is loaded, the computer uses RAM, which stands for random-access memory, which temporarily stores data while the central processing unit (CPU) is executing other tasks. With more RAM on the computer, the less the CPU has to read data from the external or secondary memory (storage device), allowing the computer to run faster. RAM is

fast but it is volatile, which means it will not retain data if there is no power. It is therefore important to save data to the storage device before the system is turned off.

What are the types of RAM?

There are two main types of RAM: Dynamic RAM (DRAM) and Static RAM (SRAM).

DRAM (pronounced DEE-RAM), is widely used as a computer's main memory. Each DRAM memory cell is made up of a transistor and a capacitor within an integrated circuit, and a data bit is stored in the capacitor. Since transistors always leak a small amount, the capacitors will slowly discharge, causing information stored in it to drain; hence, DRAM has to be refreshed (given a new electronic charge) every few milliseconds to retain data.

SRAM (pronounced ES-RAM) is made up of four to six transistors. It keeps data in the memory as long as power is supplied to the system unlike DRAM, which has to be refreshed periodically. As such, SRAM is faster but also more expensive, making DRAM the more prevalent memory in computer systems.

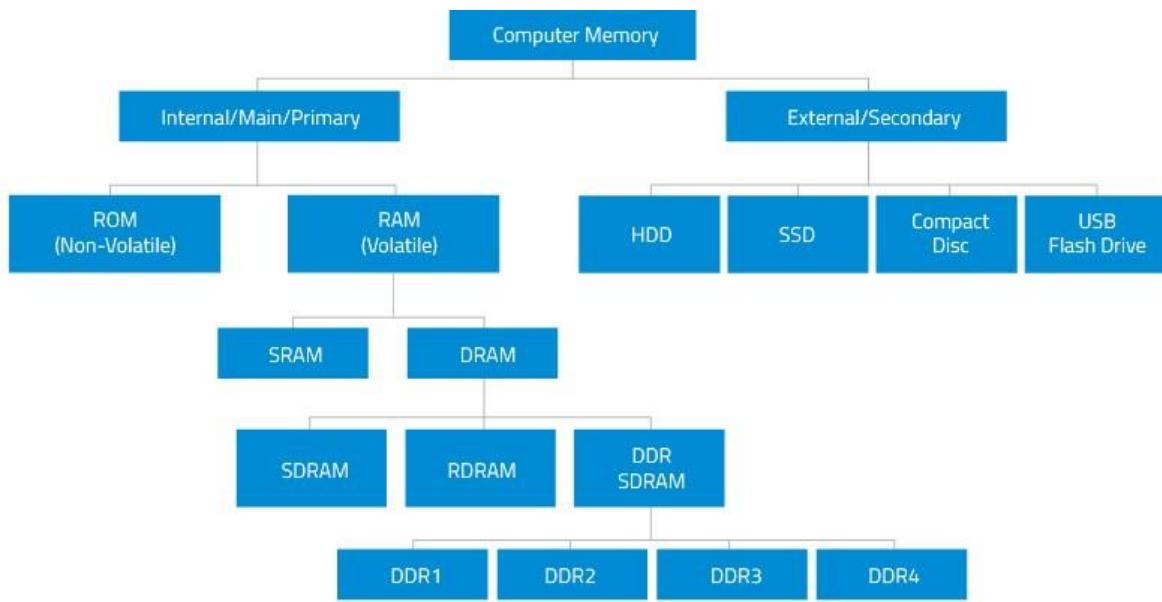
What are the common types of DRAM?

Synchronous DRAM (SDRAM) "synchronizes" the memory speed with CPU clock speed so that the memory controller knows the exact clock cycle when the requested data will be ready. This allows the CPU to perform more instructions at a given time. Typical SDRAM transfers data at speeds up to 133 MHz.

Rambus DRAM (RDRAM) takes its name after the company that made it, Rambus. It was popular in the early 2000s and was mainly used for video game devices and graphics cards, with transfer speeds up to 1 GHz.

Double Data Rate SDRAM (DDR SDRAM) is a type of synchronous memory that nearly doubles the bandwidth of a single data rate (SDR) SDRAM running at the same clock frequency by employing a method called "double pumping," which allows transfer of data on both the rising and falling edges of the clock signal without any increase in clock frequency.

DDR1 SDRAM has been succeeded by DDR2, DDR3, and most recently, DDR4 SDRAM. Although operating on the same principles, the modules are not backward-compatible. Each generation delivers higher transfer rates and faster performance. The latest DDR4 modules, for example, feature fast transfer rates at 2133/2400/2666 and even 3200 MT/s.



### **What are the types of DRAM packages?**

#### **Single In-Line Memory Module (SIMM)**

SIMM modules were widely used from the late 1980s to 1990s, and are now obsolete. They typically had 32-bit data bus and were available in two physical types—30- and 72-pin.

#### **Dual In-Line Memory Module (DIMM)**

Current memory modules come in DIMMs. "Dual in-line" refers to pins on both sides of the modules. A DIMM originally had a 168-pin connector supporting 64-bit data bus, which is twice the data width of SIMMs. The wider bus means that more data can pass through a DIMM, translating to faster overall performance. Latest DIMMs based on fourth-generation double data rate (DDR4) SDRAM have 288-pin connectors for increased data throughput.

#### **What are the common types of DIMM?**

There are several DIMM architectures. Different platforms can accommodate different memory types so it is best to check which modules are supported on the motherboard. Here are the most common standard DIMMs, with a typical length of 133.35 mm and height of 30 mm.

#### **3.daughterboard (or daughter board, daughter card, or daughtercard)**

A daughterboard (or daughter board , daughter card , or daughtercard ) is a circuit board that plugs into and extends the circuitry of another circuit board. The other circuit board may be the computer's main board (its motherboard) or it may be another board or card that is already in the computer, often a sound card. The term is commonly used by manufacturers of wavetable daughterboards that attach to existing sound cards.

A mezzanine card is a kind of daughterboard that is installed in the same plane as but on a second level above the motherboard.

A printed circuit board that plugs into another circuit board (usually the motherboard). A daughtercard is similar to an expansion board, but it accesses the motherboard components (memory and CPU) directly instead of sending data through the slower expansion bus.

A daughtercard is also called a daughterboard.

#### **4. BUS SLOT**

Alternatively known as a bus slot or expansion port, an expansion slot is a connection or port inside a computer on the motherboard or riser card. It provides an installation point for a hardware expansion card to be connected. For example, if you wanted to install a new video card in the computer, you'd purchase a video expansion card and install that card into the compatible expansion slot.

##### **Computer expansion slots**

AGP - Video card.

AMR - Modem, sound card.

CNR - Modem, network card, sound card.

EISA-SCSI, network card, video card.

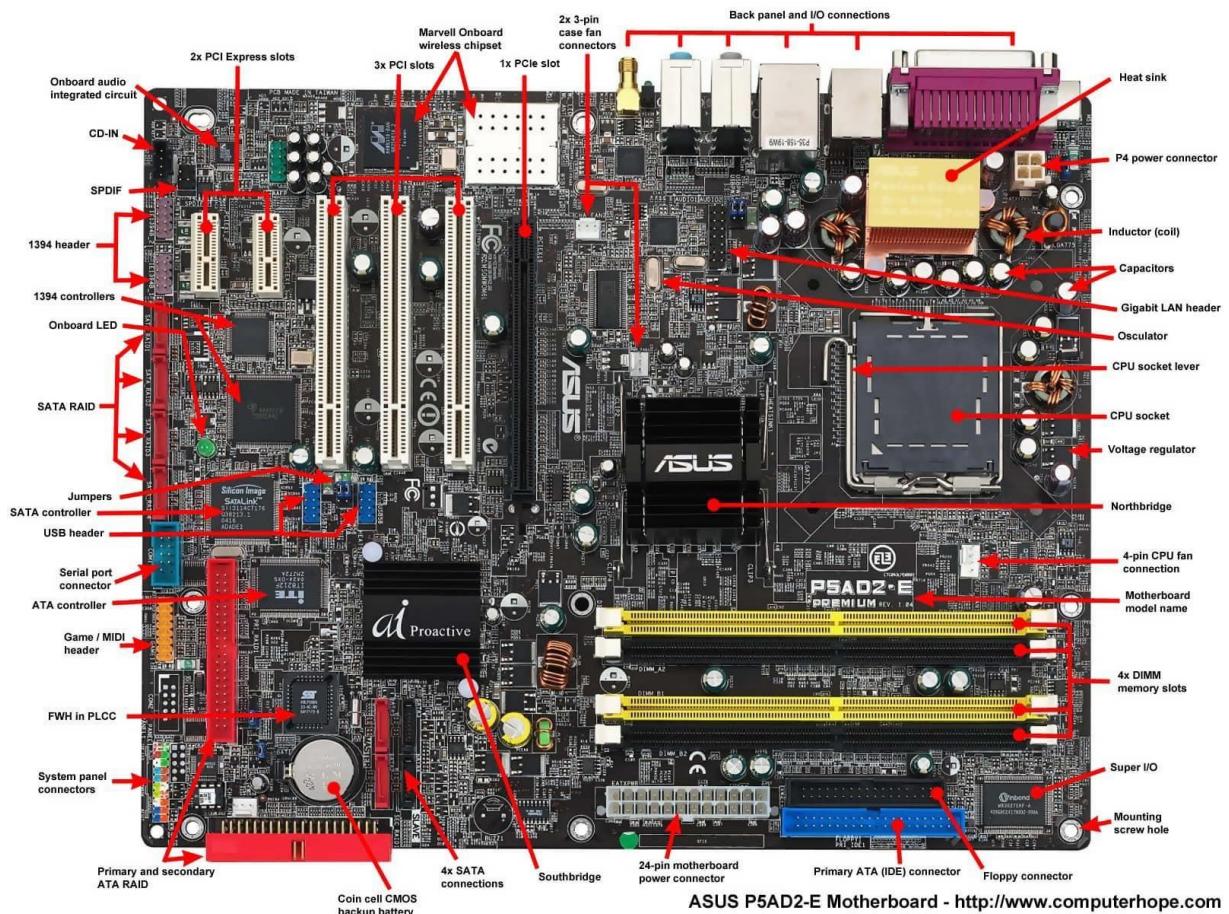
ISA - Network card, sound card, video card.

PCI - Network card, SCSI, sound card, video card.

PCI Express - Video card, modem, sound card, network card.

VESA - Video card.

Many of the expansion card slots above are obsolete. You're most likely only going to encounter AGP, PCI, and PCI Express when working with computers today. The picture below is an example of what expansion slots may look like on a motherboard. In this picture, there are three different types of expansion slots: PCI Express, PCI, and AGP.



## 5.SMPS: Switched-Mode Power Supply/ Switching Mode Power Supply

SMPS stands for Switched-Mode Power Supply. It is an electronic power supply that uses a switching regulator to convert electrical power efficiently. It is also known as Switching Mode Power Supply. It is power supply unit (PSU) generally used in computers to convert the voltage into the computer acceptable range.

This device has the power handling electronic components that converts electrical power efficiently. Switched Mode Power Supply uses a great power conversion technique to reduce overall power loss.



The SMPS device uses switching regulators that switches the load current on and off to regulate and stabilize the output voltage. The average of the voltage between the off and on produces the appropriate power for a device. Unlike the linear power supply, the pass transistor of SMPS switches between low dissipation, full-on and full-off mode, and spends very less time in the high-dissipation transitions, which minimizes wasted energy.

## **6. INTERNAL STORAGE**

### **What does "internal storage" mean?**

Answer: Internal storage can mean several different things, but most often refers to a computer's internal hard drive. This is the primary storage device used to store a user's files and applications. If a computer has multiple internal hard drives, they are all considered part of the computer's internal storage.

Another popular type of internal storage is flash memory. It serves the same purpose as a hard drive, but stores data electronically rather than magnetically. Flash memory is the most common type of internal storage used by portable electronic devices, such as mobile phones and portable music players. Some computers now use flash drives rather than hard drives as well.

Internal storage can be contrasted with external storage, which includes devices such as external hard drives, network drives, and removable media, such as CDs and DVDs.

### **Primary storage**

#### **Main article: Computer memory**

Primary storage (also known as main memory, internal memory or prime memory), often referred to simply as memory, is the only one directly accessible to the CPU. The CPU continuously reads instructions stored there and executes them as required. Any data actively operated on is also stored there in uniform manner.

Historically, early computers used delay lines, Williams tubes, or rotating magnetic drums as primary storage. By 1954, those unreliable methods were mostly replaced by magnetic core memory. Core memory remained dominant until the 1970s, when advances in integrated circuit technology allowed semiconductor memory to become economically competitive.

This led to modern random-access memory (RAM). It is small-sized, light, but quite expensive at the same time. (The particular types of RAM used for primary storage are also volatile, i.e. they lose the information when not powered).

As shown in the diagram, traditionally there are two more sub-layers of the primary storage, besides main large-capacity RAM:

Processor registers are located inside the processor. Each register typically holds a word of data (often 32 or 64 bits). CPU instructions instruct the arithmetic logic unit to perform various calculations or other operations on this data (or with the help of it). Registers are the fastest of all forms of computer data storage.

Processor cache is an intermediate stage between ultra-fast registers and much slower main memory. It was introduced solely to improve the performance of computers. Most actively used information in the main memory is just duplicated in the cache memory, which is faster, but of much lesser capacity. On the other hand, main memory is much slower, but has a much greater storage capacity than processor registers. Multi-level hierarchical cache setup is also commonly used—primary cache being smallest, fastest and located inside the processor; secondary cache being somewhat larger and slower.

Main memory is directly or indirectly connected to the central processing unit via a memory bus. It is actually two buses (not on the diagram): an address bus and a data bus. The CPU firstly sends a number through an address bus, a number called memory address, that indicates the desired location of data. Then it reads or writes the data in the memory cells using the data bus. Additionally, a memory management unit (MMU) is a small device between CPU and RAM recalculating the actual memory address, for example to provide an abstraction of virtual memory or other tasks.

As the RAM types used for primary storage are volatile (uninitialized at start up), a computer containing only such storage would not have a source to read instructions from, in order to start the computer. Hence, non-volatile primary storage containing a small startup program (BIOS) is used to bootstrap the computer, that is, to read a larger program from non-volatile secondary storage to RAM and start to execute it. A non-volatile technology used for this purpose is called ROM, for read-only memory (the terminology may be somewhat confusing as most ROM types are also capable of random access).

Many types of "ROM" are not literally read only, as updates to them are possible; however it is slow and memory must be erased in large portions before it can be re-written. Some embedded systems run programs directly from ROM (or similar), because such programs are rarely changed. Standard computers do not store non-rudimentary programs in ROM, and rather, use large capacities of secondary storage, which is non-volatile as well, and not as costly.

Recently, primary storage and secondary storage in some uses refer to what was historically called, respectively, secondary storage and tertiary storage.

## **Secondary storage**

A hard disk drive with protective cover removed

Secondary storage (also known as external memory or auxiliary storage) differs from primary storage in that it is not directly accessible by the CPU. The computer usually uses its input/output channels to access secondary storage and transfer the desired data to primary storage. Secondary storage is non-volatile (retaining data when its power is shut off). Modern computer systems typically have two orders of magnitude more secondary storage than primary storage because secondary storage is less expensive.

In modern computers, hard disk drives (HDDs) or solid-state drives (SSDs) are usually used as secondary storage. The access time per byte for HDDs or SSDs is typically measured in milliseconds (one thousandth seconds), while the access time per byte for primary storage is measured in nanoseconds (one billionth seconds). Thus, secondary storage is significantly slower than primary storage. Rotating optical storage devices, such as CD and DVD drives, have even longer access times. Other examples of secondary storage technologies include USB flash drives, floppy disks, magnetic tape, paper tape, punched cards, and RAM disks.

Once the disk read/write head on HDDs reaches the proper placement and the data, subsequent data on the track are very fast to access. To reduce the seek time and rotational latency, data are transferred to and from disks in large contiguous blocks. Sequential or block access on disks is orders of magnitude faster than random access, and many sophisticated paradigms have been developed to design efficient algorithms based upon sequential and block access. Another way to reduce the I/O bottleneck is to use multiple disks in parallel in order to increase the bandwidth between primary and secondary memory.

Secondary storage is often formatted according to a file system format, which provides the abstraction necessary to organize data into files and directories, while also providing metadata describing the owner of a certain file, the access time, the access permissions, and other information.

Most computer operating systems use the concept of virtual memory, allowing utilization of more primary storage capacity than is physically available in the system. As the primary memory fills up, the system moves the least-used chunks (pages) to a swap file or page file on secondary storage,

retrieving them later when needed. If a lot of pages are moved to slower secondary storage, the system performance is degraded.

### **Tertiary storage**

See also: Nearline storage and Cloud storage

A large tape library, with tape cartridges placed on shelves in the front, and a robotic arm moving in the back. Visible height of the library is about 180 cm.

Tertiary storage or tertiary memory[5] is a level below secondary storage. Typically, it involves a robotic mechanism which will mount (insert) and dismount removable mass storage media into a storage device according to the system's demands; such data are often copied to secondary storage before use. It is primarily used for archiving rarely accessed information since it is much slower than secondary storage (e.g. 5–60 seconds vs. 1–10 milliseconds). This is primarily useful for extraordinarily large data stores, accessed without human operators. Typical examples include tape libraries and optical jukeboxes.

When a computer needs to read information from the tertiary storage, it will first consult a catalog database to determine which tape or disc contains the information. Next, the computer will instruct a robotic arm to fetch the medium and place it in a drive. When the computer has finished reading the information, the robotic arm will return the medium to its place in the library.

Tertiary storage is also known as nearline storage because it is "near to online". The formal distinction between online, nearline, and offline storage is:[6]

Online storage is immediately available for I/O.

Nearline storage is not immediately available, but can be made online quickly without human intervention.

Offline storage is not immediately available, and requires some human intervention to become online.

For example, always-on spinning hard disk drives are online storage, while spinning drives that spin down automatically, such as in massive arrays of idle disks (MAID), are nearline storage. Removable media such as tape cartridges that can be automatically loaded, as in tape libraries, are nearline storage, while tape cartridges that must be manually loaded are offline storage.

### **Off-line storage**

Off-line storage is a computer data storage on a medium or a device that is not under the control of a processing unit. The medium is recorded, usually in a secondary or tertiary storage device, and then physically removed or disconnected. It must be inserted or connected by a human operator before a computer can access it again. Unlike tertiary storage, it cannot be accessed without human interaction.

Off-line storage is used to transfer information, since the detached medium can easily be physically transported. Additionally, it's useful for cases of disaster, where, for example, a fire destroys the original data, a medium in a remote location will be unaffected, enabling disaster recovery. Off-line storage increases general information security, since it is physically inaccessible from a computer, and data confidentiality or integrity cannot be affected by computer-based attack techniques. Also, if the information stored for archival purposes is rarely accessed, off-line storage is less expensive than tertiary storage.

## 7, INTERFACE PORT

In computer hardware, a port serves as an interface between the computer and other computers or peripheral devices. In computer terms, a port generally refers to the part of a computing device available for connection to peripherals such as input and output devices. Computer ports have many uses, to connect a monitor, webcam, speakers, or other peripheral devices. On the physical layer, a computer port is a specialized outlet on a piece of equipment to which a plug or cable connects. Electronically, the several conductors where the port and cable contacts connect, provide a method to transfer signals between devices.

Bent pins are easier to replace on a cable than on a connector attached to a computer, so it was common to use connectors for the fixed side of an interface.

Computer ports in common use cover a wide variety of shapes such as round (PS/2, etc.), rectangular (FireWire, etc.), square (Telephone plug), trapezoidal (D-Sub — the old printer port was a DB-25), etc. There is some standardization to physical properties and function. For instance, most computers have a keyboard port (currently a Universal Serial Bus USB-like outlet referred to as USB Port), into which the keyboard is connected.

Physically identical connectors may be used for widely different standards, especially on older personal computer systems, or systems not generally designed according to the current Microsoft Windows compatibility guides. For example, a 9-pin D-subminiature connector on the original IBM PC could have been used for monochrome video, color analog video (in two incompatible standards), a joystick interface, or for a MIDI musical instrument digital control interface. The original IBM PC also had two identical 5 pin DIN connectors, one used for the keyboard, the second for a cassette recorder interface; the two were not interchangeable. The

smaller mini-DIN connector has been variously used for the keyboard and two different kinds of mouse; older Macintosh family computers used the mini-DIN for a serial port or for a keyboard connector with different standards than the IBM-descended systems.

#### Electrical signal transfer

Electronically, hardware ports can almost always be divided into two groups based on the signal transfer:

#### Analog ports

Digital ports:

Parallel ports send multiple bits at the same time over several sets of wires.

Serial ports send and receive one bit at a time via a single wire pair (Ground and +/-).

After ports are connected, they typically require handshaking, where transfer type, transfer rate, and other necessary information is shared before data is sent.

Hot-swappable ports can be connected while equipment is running. Almost all ports on personal computers are hot-swappable.

Plug-and-play ports are designed so that the connected devices automatically start handshaking as soon as the hot-swapping is done. USB ports and FireWire ports are plug-and-play.

Auto-detect or auto-detection ports are usually plug-and-play, but they offer another type of convenience. An auto-detect port may automatically determine what kind of device has been attached, but it also determines what purpose the port itself should have. For example, some sound cards allow plugging in several different types of audio speakers; then a dialogue box pops up on the computer screen asking whether the speaker is left, right, front, or rear for surround sound installations. The user's response determines the purpose of the port, which is physically a 1/8" tip-ring-sleeve mini jack. Some auto-detect ports can even switch between input and output based on context.

# BASIC LINUX COMMANDS

## 1.PWD

It is used to find out the path of current working directory

```
To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo_root" for details.
```

```
jisha@jisha-VirtualBox:~$ pwd  
/home/jisha  
jisha@jisha-VirtualBox:~$ █
```

## 2.history

When you have been using linux for a certain period of time,you will quickly notice that you can hundreds of commands every day.as such running history command is particularly useful if you want to review the commands you have

Entered before

```
jisha@jisha-VirtualBox:~$ history  
1  ls  
2  pwd  
3  history  
jisha@jisha-VirtualBox:~$ █
```

## 3.man

Man searches for information of a file commands or directories and then displays its own screen

```
LS(1)                                         User Commands

NAME
    ls - list directory contents

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

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

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

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

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

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

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

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

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

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

    -c      list entries by columns

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

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

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

    -f      do not sort, enable -au, disable -ls --color
```

## 4.cd

Change directory.it allow user to change between file directories

```
jisha@jisha-VirtualBox:~$ cd .
jisha@jisha-VirtualBox:~$ cd /
jisha@jisha-VirtualBox:/$ █
```

## 5.ls

ls used to display the contents of the directory

```
jisha@jisha-VirtualBox:~$ ls
bin boot cdrom dev etc home lib lib32 lib64 lost+found media mnt opt proc root run sbin snap srv swapfile sys tmp usr var
jisha@jisha-VirtualBox:/$ █
```

## 6.mkdir

This command allow user to make a new directory

```
jisha@jisha-VirtualBox:~$ mkdir minnu
jisha@jisha-VirtualBox:~$ cd minnu
jisha@jisha-VirtualBox:~/minnu$ █
```

## 7.rmdir

Remove directory

```
jisha@jisha-VirtualBox:/$ rmdir minnu█
```

## 8.touch

Touch command allows you to create a blank new file through the linux command line

```
jisha@jisha-VirtualBox:~$ touch -a class  
jisha@jisha-VirtualBox:~$
```

9.rm

Remove or delete file from directory

```
jisha@jisha-VirtualBox:~$ rm class1.txt  
jisha@jisha-VirtualBox:~$
```

10.cat

Cat is used to create a file

echo

**echo is used to print the text**

```
jisha@jisha-VirtualBox:~$ echo hai hello >> hai.txt  
jisha@jisha-VirtualBox:~$ cat hai .txt  
cat: hai: No such file or directory  
cat: .txt: No such file or directory  
jisha@jisha-VirtualBox:~$ echo hello.txt  
hello.txt  
jisha@jisha-VirtualBox:~$ echo hai hello>>hello.txt  
jisha@jisha-VirtualBox:~$ cat hello.txt  
hai hello  
jisha@jisha-VirtualBox:~$
```

head

it is used to view the topest texts

```
jisha@jisha-VirtualBox:~$ head -n 3 /etc/passwd  
root:x:0:0:root:/root:/bin/bash  
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin  
bin:x:2:2:bin:/bin:/usr/sbin/nologin  
jisha@jisha-VirtualBox:~$
```

**tail**

**it is used to view the bottom of texts**

```
jisha@jisha-VirtualBox:~$ tail /etc/passwd
nm-openvpn:x:118:124:NetworkManager OpenVPN,,,:/var/lib/openvpn/chroot:/usr/sbin/nologin
hplip:x:119:7:HPLIP system user,,,:/run/hplip:/bin/false
whoopsie:x:120:125::/nonexistent:/bin/false
colord:x:121:126:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
geoclue:x:122:127::/var/lib/geoclue:/usr/sbin/nologin
pulse:x:123:128:PulseAudio daemon,,,:/var/run/pulse:/usr/sbin/nologin
gnome-initial-setup:x:124:65534::/run/gnome-initial-setup/:/bin/false
gdm:x:125:130:Gnome Display Manager:/var/lib/gdm3:/bin/false
jisha:x:1000:1000:Jisha Chacko,,,:/home/jisha:/bin/bash
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
jisha@jisha-VirtualBox:~$ █
```

**read** :read the contents of a line into a variable

```
jisha@jisha-VirtualBox:~$ read v1 v2 v3
hai hello how
jisha@jisha-VirtualBox:~$ echo "[${v1}] [${v2}] [${v3}]"
[hai] [hello] [how]
jisha@jisha-VirtualBox:~$
```

**more**

displays content of the file.Only difference is that in case of larger files cat command output will scroll off your screen while more command displays output one screenful at a time.

```
jisha@jisha-VirtualBox:~$ more /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
ircx:x:39:39:ircd:/var/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:100:102:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin
systemd-resolve:x:101:103:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin
systemd-timesync:x:102:104:systemd Time Synchronization,,,:/run/systemd:/usr/sbin/nologin
messagebus:x:103:106:/nonexistent:/usr/sbin/nologin
syslog:x:104:110:/home/syslog:/usr/sbin/nologin
_apt:x:105:65534:/nonexistent:/usr/sbin/nologin
tss:x:106:111:TPM software stack,,,:/var/lib/tpm:/bin/false
uidd:x:107:114:/run/uidd:/usr/sbin/nologin
tcpdump:x:108:115:/nonexistent:/usr/sbin/nologin
avahi-autoipd:x:109:116:Avahi autoip daemon,,,:/var/lib/avahi-autoipd:/usr/sbin/nologin
usbmux:x:110:46:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologin
rtkit:x:111:117:RealtimeKit,,,:/proc:/usr/sbin/nologin
dnsmasq:x:112:65534:dnsmasq,,,:/var/lib/nisc:/usr/sbin/nologin
cups-pk-helper:x:113:120:user for cups-pk-helper service,,,:/home/cups-pk-helper:/usr/sbin/nologin
```

**less**

Automatically adjust with the width and height of terminal window

```
root:x:0:0:root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/var/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:100:102:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin
systemd-resolve:x:101:103:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin
systemd-timesync:x:102:104:systemd Time Synchronization,,,:/run/systemd:/usr/sbin/nologin
messagebus:x:103:106:/nonexistent:/usr/sbin/nologin
syslog:x:104:110:/home/syslog:/usr/sbin/nologin
_apt:x:105:65534::/nonexistent:/usr/sbin/nologin
tss:x:106:111:TPM software stack,,,:/var/lib/tpm:/bin/false
uuidd:x:107:114::/run/uuidd:/usr/sbin/nologin
tcpdump:x:108:115::/nonexistent:/usr/sbin/nologin
avahi-autoipd:x:109:116:Avahi autoip daemon,,,:/var/lib/avahi-autoipd:/usr/sbin/nologin
usbmux:x:110:46:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologin
rtkit:x:111:117:RealtimeKit,,,:/proc:/usr/sbin/nologin
dnsmasq:x:112:65534:dnsmasq,,,:/var/lib/misc:/usr/sbin/nologin
cups-pk-helper:x:113:120:user for cups-pk-helper service,,,:/home/cups-pk-helper:/usr/sbin/nologin
speech-dispatcher:x:114:29:Speech Dispatcher,,,:/run/speech-dispatcher:/bin/false
avahi:x:115:121:Avahi mDNS daemon,,,:/var/run/avahi-daemon:/usr/sbin/nologin
kernooops:x:116:65534:Kernel Oops Tracking Daemon,,,:/usr/sbin/nologin
saned:x:117:123::/var/lib/saned:/usr/sbin/nologin
nm-openvpn:x:118:124:NetworkManager OpenVPN,,,:/var/lib/openvpn/chroot:/usr/sbin/nologin
hplip:x:119:7:HPLIP system user,,,:/run/hplip:/bin/false
whoopsie:x:120:125::/nonexistent:/bin/false
colord:x:121:126:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
geoclue:x:122:127::/var/lib/geoclue:/usr/sbin/nologin
pulse:x:123:128:PulseAudio daemon,,,:/var/run/pulse:/usr/sbin/nologin
gnome-initial-setup:x:124:65534::/run/gnome-initial-setup/:/bin/false
gdm:x:125:130:Gnome Display Manager:/var/lib/gdm3:/bin/false
jisha:x:1000:1000:Jisha Chacko,,,:/home/jisha:/bin/bash
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
/etc/passwd (END)
```

## cut

used for cutting out the section from each lines of files and writing the standard output.

```
jisha@jisha-VirtualBox:~$ cut -b 1,2 hi.txt
am
ap
m
m
pi
do
jisha@jisha-VirtualBox:~$
```

**paste**

it is used to join files horizontally by outputting lines consisting of lines from each file specified, separated by tab as delimiter, to the standard output.

```
jisha@jisha-VirtualBox:~$ cat>>h.txt
ji
s
h
jisha@jisha-VirtualBox:~$ cat h.txt
ji
s
h
jisha@jisha-VirtualBox:~$ paste hai.txt h.txt
hai hello      ji
      s
      h
      a
jisha@jisha-VirtualBox:~$
```

**uname**

will print detailed information about your linux system like machine name, operating system, kernel etc..

```
jisha@jisha-VirtualBox:~$ uname
Linux
jisha@jisha-VirtualBox:~$
```

**cp**

it is used to copy files from the current directory to a different directory

```
jisha@jisha-VirtualBox:~$ cp -r hai.txt h.txt
jisha@jisha-VirtualBox:~$
```

**mv**

**it is used to move files and rename files**

```
jisha@jisha-VirtualBox:~$ cp -r h.txt h1.txt  
jisha@jisha-VirtualBox:~$ mv h1.txt h.txt  
jisha@jisha-VirtualBox:~$ ls  
ammu.txt appu appu.txt dai.txt Desktop de.txt Documents Downloads hello.txt h.txt minnu Music number.txt Pictures Public Templates Videos  
jisha@jisha-VirtualBox:~$ █
```

**locate**

**it is used to find a file**

```
jisha@jisha-VirtualBox:~$ locate -i where  
  
Command 'locate' not found, but can be installed with:  
  
sudo apt install mlocate  
  
jisha@jisha-VirtualBox:~$ █
```

**find**

**it is used to search for files or directories**

```
jisha@jisha-VirtualBox:~$ find h.txt  
h.txt  
jisha@jisha-VirtualBox:~$ █
```

**grep**

**it is used to Search through all the text in a given file**

```
jisha@jisha-VirtualBox:~$ ls  
ammu.txt appu appu.txt dai.txt Desktop de.txt Documents Downloads  
jisha@jisha-VirtualBox:~$ grep 'ji'h.txt  
jisha@jisha-VirtualBox:~$ grep boo/etc/passwd  
jisha@jisha-VirtualBox:~$ grep /etc/passwd/minnu  
jisha@jisha-VirtualBox:~$ █
```

**df**

it is used to get report on the system's disk space usage shows in percentage and kbs.

```
jisha@jisha-VirtualBox:~$ df -m
Filesystem      1M-blocks  Used Available Use% Mounted on
udev              574      0     574   0% /dev
tmpfs             121      2     120   2% /run
/dev/sda5       9509  5644    3363  63% /
tmpfs              603      0     603   0% /dev/shm
tmpfs                 5      1      5   1% /run/lock
tmpfs              603      0     603   0% /sys/fs/cgroup
/dev/loop1            65      65      0 100% /snap/gtk-common-themes/1514
/dev/loop0            52      52      0 100% /snap/snap-store/518
/dev/loop3            56      56      0 100% /snap/core18/1988
/dev/loop4            32      32      0 100% /snap/snapd/11036
/dev/loop2           219     219      0 100% /snap/gnome-3-34-1804/66
/dev/sda1            511      1     511   1% /boot/efi
tmpfs              121      1     121   1% /run/user/1000
jisha@jisha-VirtualBox:~$
```

## du

it is used to check how many space a file or directory takes.

```
984K  ./cache/mesa_shader_cache
360K  ./cache/gstreamer-1.0
8.8M  ./cache
4.0K  ./Public
4.0K  ./Music
4.0K  ./Desktop
4.0K  ./config/gnome-session/saved-session
8.0K  ./config/gnome-session
8.0K  ./config/gtk-3.0
4.0K  ./config/nautilus
4.0K  ./config/goa-1.0
12K   ./config/dconf
84K   ./config/pulse
8.0K  ./config/ibus/bus
12K   ./config/ibus
16K   ./config/evolution/sources
20K   ./config/evolution
4.0K  ./config/update-notifier
176K  ./config
4.0K  ./Videos
4.0K  ./ssh
4.0K  ./Documents
4.0K  ./gnupg/private-keys-v1.d
16K   ./gnupg
4.0K  ./Downloads
4.0K  ./local/share/ibus-table
4.0K  ./local/share/flatpak/db
8.0K  ./local/share/flatpak
12K   ./local/share/keyrings
4.0K  ./local/share/sounds
12K   ./local/share/rhythmbox
4.0K  ./local/share/gnome-settings-daemon
4.0K  ./local/share/nautilus/scripts
8.0K  ./local/share/nautilus
60K   ./local/share/xorg
4.0K  ./local/share/evolution/calendar/trash
8.0K  ./local/share/evolution/calendar/system
16K   ./local/share/evolution/calendar
4.0K  ./local/share/evolution/addressbook/trash
4.0K  ./local/share/evolution/addressbook/system/photos
92K   ./local/share/evolution/addressbook/system
100K  ./local/share/evolution/addressbook
4.0K  ./local/share/evolution/mail/trash
8.0K  ./local/share/evolution/mail
4.0K  ./local/share/evolution/tasks/trash
8.0K  ./local/share/evolution/tasks/system
16K   ./local/share/evolution/tasks
```

**useradd**

**It is used to create new user**

```
jisha@jisha-VirtualBox:~$ useradd anju
useradd: Permission denied.
useradd: cannot lock /etc/passwd; try again later.
```

**userdel**

**it is used to remove user or delete user account**

```
jisha@jisha-VirtualBox:~$ userdel anju
```

**sudo**

**it enables you to perform tasks that require administrative or root permissions.**

```
jisha@jisha-VirtualBox:~$ sudo
usage: sudo -h | -K | -k | -V
usage: sudo -v [-AknS] [-g group] [-h host] [-p prompt] [-u user]
usage: sudo -l [-AknS] [-g group] [-h host] [-p prompt] [-U user] [-u user] [command]
usage: sudo [-AbEHknPS] [-r role] [-t type] [-C num] [-g group] [-h host] [-p prompt] [-T timeout] [-u user] [VAR=value] [-l|-s] [<command>]
usage: sudo -e [-AknS] [-r role] [-t type] [-C num] [-g group] [-h host] [-p prompt] [-T timeout] [-u user] file ...
jisha@jisha-VirtualBox:~$
```

**passwd**

- it is used to change passwords for user account.**

```
usage: sudo -c [-AknS] [-r role] [-t type] [-C num] [-g
jisha@jisha-VirtualBox:~$ passwd
Changing password for jisha.
Current password: [REDACTED]
```

1. a. Create six files with name of the form songX.mp3

b. Create six files with name of the form snapX.mp3

c. Create six files with name of the form filmX.mp3

```
jisha@jisha-VirtualBox:~$ touch song1.mp3 song2.mp3 song3.mp3 song4.mp3 song5.mp3 song6.mp3
jisha@jisha-VirtualBox:~$ touch snap1.mp3 snap2.mp3 snap3.mp3 snap4.mp3 snap5.mp3 snap6.mp3
jisha@jisha-VirtualBox:~$ touch fillm1.mp3 fillm2.mp3 fillm3.mp3 fillm4.mp3 fillm5.mp3 fillm6.mp3
allfolder appu appu.txt BOOKS Desktop Downloads fillm3.mp3 fillm6.mp3 hello h.txt number.txt snap1.mp3 snap4.mp3 song1.mp3 song4.mp3 Templates
amnu.txt archieve.tar class.txt de.txt fillm1.mp3 fillm4.mp3 ha hello.txt minnu Pictures snap2.mp3 snap5.mp3 song2.mp3 song5.mp3 Videos
appu dal.txt Documents fillm2.mp3 fillm5.mp3 ha.pub hi.txt Music Public snap3.mp3 snap6.mp3 song3.mp3 song6.mp3
jisha@jisha-VirtualBox:~$
```

2. From your home directory, move the song files into your music subdirectory, the snapshot files into your pictures subdirectory, and the movie files into videos subdirectory.

```
jisha@jisha-VirtualBox:~$ mv song1.mp3 song2.mp3 song3.mp3 song4.mp3 song5.mp3 song6.mp3 ./Music/
jisha@jisha-VirtualBox:~$ ls
allfolder appu appu.txt BOOKS dal.txt de.txt Downloads fillm3.mp3 fillm6.mp3 hello h.txt number.txt snap1.mp3 snap4.mp3 song1.mp3 song4.mp3 Templates
amnu.txt archieve.tar class.txt de.txt fillm1.mp3 fillm4.mp3 ha hello.txt minnu Pictures snap2.mp3 snap5.mp3 song2.mp3 song5.mp3 Videos
appu dal.txt Documents fillm2.mp3 fillm5.mp3 ha.pub hi.txt Music Public snap3.mp3 snap6.mp3 song3.mp3 song6.mp3
jisha@jisha-VirtualBox:~$ ls -R Music
Music:
song1.mp3 song2.mp3 song3.mp3 song4.mp3 song5.mp3 song6.mp3
jisha@jisha-VirtualBox:~$ mv snap1.mp3 snap2.mp3 snap3.mp3 snap4.mp3 snap5.mp3 snap6.mp3 ./pictures/
mv: target '/pictures/' is not a directory
jisha@jisha-VirtualBox:~$ mv snap1.mp3 snap2.mp3 snap3.mp3 snap4.mp3 snap5.mp3 snap6.mp3 ./Pictures/
jisha@jisha-VirtualBox:~$ ls -R Pictures
Pictures:
'Screenshot from 2021-06-13 10-31-33.png' 'Screenshot from 2021-06-13 10-34-39.png' 'Screenshot from 2021-06-13 10-35-58.png' 'Screenshot from 2021-06-13 11-13-41.png' snap3.mp3 snap6.mp3
'Screenshot from 2021-06-13 10-33-57.png' 'Screenshot from 2021-06-13 10-34-43.png' 'Screenshot from 2021-06-13 10-36-28.png' snap1.mp3 snap4.mp3
'Screenshot from 2021-06-13 10-34-14.png' 'Screenshot from 2021-06-13 10-34-42.png' 'Screenshot from 2021-06-13 11-11-28.png' snap2.mp3 snap5.mp3
jisha@jisha-VirtualBox:~$ mv fillm1.mp3 fillm2.mp3 fillm3.mp3 fillm4.mp3 fillm5.mp3 fillm6.mp3 ./Videos/
jisha@jisha-VirtualBox:~$ ls -R Videos
Videos:
fillm1.mp3 fillm2.mp3 fillm3.mp3 fillm4.mp3 fillm5.mp3 fillm6.mp3
jisha@jisha-VirtualBox:~$
```

3. In your home directory, create three subdirectories for organizing your files. Call these directories friends, family, and work. Create all three with one command.

```
jisha@jisha-VirtualBox:~$ mkdir friends family work
jisha@jisha-VirtualBox:~$ ls
allfolder appu archieve.tar BOOKS dal.txt de.txt Downloads friends ha.pub hello.txt h.txt Music Pictures Templates work
amnu.txt appu.txt dal.txt class.txt Desktop Documents family ha hello hi.txt minnu number.txt Public Videos
jisha@jisha-VirtualBox:~$
```

4. Copy song files to the friends folder and snap files to family folder.

```
jisha@jisha-VirtualBox:~$ cp Pictures/snap6.mp3 friends
jisha@jisha-VirtualBox:~$ cp Pictures/snap5.mp3 friends
jisha@jisha-VirtualBox:~$ cp Pictures/snap4.mp3 friends
jisha@jisha-VirtualBox:~$ cp Pictures/snap3.mp3 friends
jisha@jisha-VirtualBox:~$ cp Pictures/snap2.mp3 friends
jisha@jisha-VirtualBox:~$ cp Pictures/snap1.mp3 friends
jisha@jisha-VirtualBox:~$ ls friends
snap1.mp3 snap2.mp3 snap3.mp3 snap4.mp3 snap5.mp3 snap6.mp3
jisha@jisha-VirtualBox:~$
```

```
jisha@jisha-VirtualBox:~$ cp Music/song1.mp3 friends
jisha@jisha-VirtualBox:~$ cp Music/song2.mp3 friends
jisha@jisha-VirtualBox:~$ cp Music/song3.mp3 friends
jisha@jisha-VirtualBox:~$ cp Music/song4.mp3 friends
jisha@jisha-VirtualBox:~$ cp Music/song5.mp3 friends
jisha@jisha-VirtualBox:~$ cp Music/song6.mp3 friends
jisha@jisha-VirtualBox:~$ ls
allfolder appu archieve.tar BOOKS dal.txt de.txt Downloads friends ha.pub hello.txt h.txt Music Pictures Templates work
amnu.txt appu.txt dal.txt class.txt Desktop Documents family ha hello hi.txt minnu number.txt Public Videos
jisha@jisha-VirtualBox:~$ cp Pictures/snap1.mp3 friends
jisha@jisha-VirtualBox:~$ cp Pictures/snap2.mp3 friends
jisha@jisha-VirtualBox:~$ cp Pictures/snap3.mp3 friends
jisha@jisha-VirtualBox:~$ cp Pictures/snap4.mp3 friends
jisha@jisha-VirtualBox:~$ cp Pictures/snap5.mp3 friends
jsha@jisha-VirtualBox:~$ cp Pictures/snap6.mp3 friends
jsha@jisha-VirtualBox:~$ ls friends
snap1.mp3 snap2.mp3 snap3.mp3 snap4.mp3 snap5.mp3 snap6.mp3 song1.mp3 song2.mp3 song3.mp3 song4.mp3 song5.mp3 song6.mp3
jsha@jisha-VirtualBox:~$
```

5. Attempt to delete both family and friends projects with a single rmdir command.

```
jisha@jisha-VirtualBox:~$ rm -r family friends
jisha@jisha-VirtualBox:~$ ls
allfolder appu    archive.tar  BOOKS    dai.txt  de.txt   Downloads ha.pub hello.txt h.txt  Music   Pictures  Templates  work
ammu.txt  appu.txt books  class.txt Desktop  Documents ha    hello  hi.txt  minnu number.txt Public  Videos
jisha@jisha-VirtualBox:~$
```

6. Use another command that will succeed in deleting both the family and friends folder.

```
jisha@jisha-VirtualBox:~$ rmdir family friends
rmdir: failed to remove 'family': No such file or directory
■ rmdir: failed to remove 'friends': No such file or directory
■ jisha@jisha-VirtualBox:~$
```

7. Redirect a long listing of all home directory files, including hidden, into a file named allfiles.txt. Confirm that the file contains the listing.

```
jisha@jisha-VirtualBox:~$ ls -al > allfiles.txt
jisha@jisha-VirtualBox:~$ ls
allfiles.txt ammu.txt  appu.txt  books  class.txt  Desktop  Documents  ha    hello  hi.txt  minnu  number.txt  Public  Videos
allfolder appu    archive.tar  BOOKS    dai.txt  de.txt   Downloads ha.pub hello.txt h.txt  Music   Pictures  Templates  work
jisha@jisha-VirtualBox:~$
```

```
jisha@jisha-VirtualBox:~$ cat allfiles.txt
total 152
drwxr-xr-x 21 jisha jisha 4096 Aug 17 16:03 .
drwxr-xr-x  3 root  root 4096 Jun 12 16:53 ..
-rw-rw-r--  1 jisha jisha    0 Aug 17 16:03 allfiles.txt
drwxrwxr-x  3 jisha jisha 4096 Aug  6 15:24 allfolder
-rw-rw-r--  1 jisha jisha    4 Jun 15 15:30 ammu.txt
-rw-rw-r--  1 jisha jisha    0 Jun 15 15:55 appu
-rw-rw-r--  1 jisha jisha   12 Jun 15 15:34 appu.txt
-rw-rw-r--  1 jisha jisha 10240 Aug  8 12:28 archive.tar
-rw-----  1 jisha jisha 4595 Aug 14 12:45 .bash_history
-rw-r--r--  1 jisha jisha 220 Jun 12 16:53 .bash_logout
-rw-r--r--  1 jisha jisha 3771 Jun 12 16:53 .bashrc
drwxr-xrwx  2 jisha jisha 4096 Aug  3 15:38 books
drwxrwxr-x  2 jisha jisha 4096 Aug  3 15:41 BOOKS
drwx----- 15 jisha jisha 4096 Aug 14 11:13 .cache
-rw-rw-r--  1 jisha jisha    54 Aug  6 14:45 class.txt
drwx----- 12 jisha jisha 4096 Aug  3 15:51 .config
-rw-rw-r--  1 jisha jisha    0 Jun 15 15:54 dai.txt
drwxr-xr-x  2 jisha jisha 4096 Jun 12 17:07 Desktop
-rw-rw-r--  1 jisha jisha    0 Jun 15 15:54 de.txt
drwxr-xr-x  2 jisha jisha 4096 Jun 12 17:07 Documents
drwxr-xr-x  2 jisha jisha 4096 Jun 12 17:07 Downloads
drwx-----  3 jisha jisha 4096 Aug 17 14:21 .gnupg
-rw-----  1 jisha jisha 2655 Aug  8 12:31 ha
-rw-r--r--  1 jisha jisha  576 Aug  8 12:31 ha.pub
drwxrwxr-x  2 jisha jisha 4096 Aug  8 12:16 hello
-rw-rw-r--  1 jisha jisha   10 Jun 20 09:30 hello.txt
-rwxrw-r--  1 jisha jisha   34 Jun 20 09:45 hi.txt
-rw-rw-r--  1 jisha jisha   10 Jun 20 09:28 h.txt
drwx-----  3 jisha jisha 4096 Jun 12 17:07 .local
drwxrwxr-x  2 jisha jisha 4096 Jun 13 11:40 minnu
drwxr-xr-x  2 jisha jisha 4096 Aug 17 15:08 Music
-rw-rw-r--  1 jisha jisha   21 Jun 15 15:46 number.txt
drwxr-xr-x  2 jisha jisha 4096 Aug 17 15:11 Pictures
-rw-r--r--  1 jisha jisha  807 Jun 12 16:53 .profile
drwxr-xr-x  2 jisha jisha 4096 Jun 12 17:07 Public
drwx-----  2 jisha jisha 4096 Jun 12 17:09 .ssh
-rw-r--r--  1 jisha jisha    0 Aug  3 15:01 .sudo_as_admin_successful
drwxr-xr-x  2 jisha jisha 4096 Jun 12 17:07 Templates
drwxr-xr-x  2 jisha jisha 4096 Aug 17 15:13 Videos
drwxrwxr-x  2 jisha jisha 4096 Aug 17 15:21 work
jisha@jisha-VirtualBox:~$
```

8. In the command window, display today's date with day of the week, month, date and year

```
jisha@jisha-VirtualBox:~$ date
Tuesday 17 August 2021 04:06:25 PM IST
jisha@jisha-VirtualBox:~$
```

## 9. Add the user Juliet

```
jisha@jisha-VirtualBox:~$ sudo useradd juliet
[sudo] password for jisha:
jisha@jisha-VirtualBox:~$ cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:ircd:/var/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:100:100:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin
systemd-resolve:x:101:103:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin
systemd-timesync:x:102:104:systemd Time Synchronization,,,:/run/systemd:/usr/sbin/nologin
messagebus:x:103:106:/:/nonexistent:/usr/sbin/nologin
syslog:x:104:110:/:/home/syslog:/usr/sbin/nologin
_apt:x:105:65534:/:/nonexistent:/usr/sbin/nologin
tss:x:106:111:TPM software stack,,,:/var/lib/tpm:/bin/false
uiddd:x:107:114:/:/run/uiddd:/usr/sbin/nologin
tcpdump:x:108:115:/:/nonexistent:/usr/sbin/nologin
avahi-autopid:x:109:116:avahi autopid daemon,,,:/var/lib/avahi-autopid:/usr/sbin/nologin
usbmux:x:110:46:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologin
rtkit:x:111:117:RealtimeKit,,,:/proc:/usr/sbin/nologin
dovecot:x:112:65534:dovecot,,,:/var/lib/dovecot:/usr/sbin/nologin
```

## 10. Confirm that Juliet has been added by examining the /etc/passwd file

```
jisha@jisha-VirtualBox:~$ cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin

systemd-coredump:x:999:999:systemd Core Dumper:/:/u
anna:x:3001:1001:/:/home/anna:/bin/sh
ammu:x:2002:3002:/:/home/ammu:/bin/sh
juliet:x:3002:3003:/:/home/juliet:/bin/sh
jisha@jisha-VirtualBox:~$ █
```

## 11. Use the passwd command to initialize Juliet's password

```
jisha@jisha-VirtualBox:~$ sudo passwd juliet
New password:
Retype new password:
█
█  passwd: password updated successfully
█
jisha@jisha-VirtualBox:~$
```

## 12. Create a supplementary group called Shakespeare with a group id of 30000

```
jisha@jisha-VirtualBox:~$ sudo groupadd -g 3000 shakespeare
jisha@jisha-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,jisha
tty:x:5:syslog
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
man:x:12:
proxy:x:13:
kmem:x:15:
dialout:x:20:
fax:x:21:
voice:x:22:
cdrom:x:24:jisha
floppy:x:25:
tape:x:26:
sudo:x:27:jisha
audio:x:29:pulse
dip:x:30:jisha
www-data:x:33:
backup:x:34:
operator:x:37:
list:x:38:
jisha:x:3000:
```

```
pulse-access:x:129:
gdm:x:130:
lxde:x:131:jisha
jisha:x:1000:
sambashare:x:132:jisha
systemd-coredump:x:999:
anna:x:1001:
mca:x:1002:anna
trees:x:1003:
plants:x:1004:
ammu:x:3002:
CN:x:1005:
juliet:x:3003:
shakespeare:x:3000:
jisha@jisha-VirtualBox:~$
```

13. Create a supplementary group called artists

```
jisha@jisha-VirtualBox:~$ sudo groupadd artists
jisha@jisha-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,jisha
tty:x:5:syslog
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
man:x:12:
proxy:x:13:
kmem:x:15:
dialout:x:20:
fax:x:21:
voice:x:22:
cdrom:x:24:jisha
floppy:x:25:
tape:x:26:
sudo:x:27:jisha
audio:x:29:pulse
dip:x:30:jisha
www-data:x:33:
backup:x:34:
operator:x:37:
list:x:38:
irc:x:39:
src:x:40:
gnats:x:41:
shadow:x:42:
utmp:x:43:
video:x:44:
sasl:x:45:
plugdev:x:46:jisha
staff:x:50:
games:x:60:
users:x:100:
nogroup:x:65534:
```

```
whoopsie:x:125:
colord:x:126:
geoclue:x:127:
pulse:x:128:
pulse-access:x:129:
gdm:x:130:
lxde:x:131:jisha
jisha:x:1000:
sambashare:x:132:jisha
systemd-coredump:x:999:
anna:x:1001:
mca:x:1002:anna
trees:x:1003:
plants:x:1004:
ammu:x:3002:
CN:x:1005:
juliet:x:3003:
shakespheare:x:3000:
artists:x:3004:
jisha@jisha-VirtualBox:~$
```

14. Confirm that Shakespeare and artists have been added by examining the /etc/group file.

```
nm-openvpn:x:124:  
whoopsie:x:125:  
colord:x:126:  
geoclue:x:127:  
pulse:x:128:  
pulse-access:x:129:  
gdm:x:130:  
lxd:x:131:jisha  
jisha:x:1000:  
sambashare:x:132:jisha  
systemd-coredump:x:999:  
anna:x:1001:  
mca:x:1002:anna  
trees:x:1003:  
plants:x:1004:  
ammu:x:3002:  
CN:x:1005:  
juliet:x:3003:  
shakespheare:x:3000:  
artists:x:3004:  
jisha@jisha-VirtualBox:~$
```

```
netdev:x:119:  
lpadmin:x:120:jisha  
avahi:x:121:  
scanner:x:122:saned  
saned:x:123:  
nm-openvpn:x:124:  
whoopsie:x:125:  
colord:x:126:  
geoclue:x:127:  
pulse:x:128:  
pulse-access:x:129:  
gdm:x:130:  
lxd:x:131:jisha  
jisha:x:1000:  
sambashare:x:132:jisha  
systemd-coredump:x:999:  
anna:x:1001:  
mca:x:1002:anna  
trees:x:1003:  
plants:x:1004:  
ammu:x:3002:  
CN:x:1005:  
juliet:x:3003:  
shakespheare:x:3000:  
artists:x:3004:  
jisha@jisha-VirtualBox:~$
```

15. Add the Juliet user to the Shakespeare group as a supplementary group.

```
jisha@jisha-VirtualBox:~$ sudo usermod -G shakespeare juliet
jisha@jisha-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,jisha
tty:x:5:syslog
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
man:x:12:
proxy:x:13:
kmem:x:15:
dialout:x:20:
fax:x:21:
voice:x:22:
cdrom:x:24:jisha
floppy:x:25:
tape:x:26:
sudo:x:27:jisha
audio:x:29:pulse
dip:x:30:jisha
```

```
gdm:x:130:
lxd:x:131:jisha
jisha:x:1000:
sambashare:x:132:jisha
systemd-coredump:x:999:
anna:x:1001:
mca:x:1002:anna
trees:x:1003:
plants:x:1004:
ammu:x:3002:
CN:x:1005:
juliet:x:3003:
shakespeare:x:3000:juliet
artists:x:3004:
jisha@jisha-VirtualBox:~$
```

16. Confirm that Juliet has been added using the id command.

```
jisha@jisha-VirtualBox:~$ id -u juliet
3002
jisha@jisha-VirtualBox:~$ id -g juliet
3003
jisha@jisha-VirtualBox:~$
```

17. Add Romeo and Hamlet to the Shakespeare group.

```
jisha@jisha-VirtualBox:~$ sudo usermod -G shakespeare Romeo
jisha@jisha-VirtualBox:~$ sudo usermod -G shakespeare Juliet
usermod: user 'Juliet' does not exist
jisha@jisha-VirtualBox:~$ sudo usermod -G shakespeare Hamlet
jisha@jisha-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,jisha
tty:x:5:syslog
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
```

```
juliet:x:3003:
shakespeare:x:3000:juliet,Romeo,Hamlet
artists:x:3004:
Romeo:x:3005:
Hamlet:x:3006:
jisha@jisha-VirtualBox:~$
```

Add Reba,

18.Dolly and Elvis to the artists group

```
jisha@jisha-VirtualBox:~$ sudo useradd Reba
jisha@jisha-VirtualBox:~$ sudo useradd Dolly
jisha@jisha-VirtualBox:~$ sudo useradd Elvis
jisha@jisha-VirtualBox:~$ sudo usermod -G artists Reba
jisha@jisha-VirtualBox:~$ sudo usermod -G artists Dolly
jisha@jisha-VirtualBox:~$ sudo usermod -G artists Elvis
jisha@jisha-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,jisha
tty:x:5:syslog
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
man:x:12:
proxy:x:13:
kmem:x:15:
dialout:x:20:
fax:x:21:
voice:x:22:
cdrom:x:24:jisha
floppy:x:25:
tape:x:26:
sudo:x:27:jisha
audio:x:29:pulse
dip:x:30:jisha
www-data:x:33:
```

```
color0:x:126:  
geoclue:x:127:  
pulse:x:128:  
pulse-access:x:129:  
gdm:x:130:  
lxd:x:131:jisha  
jisha:x:1000:  
sambashare:x:132:jisha  
systemd-coredump:x:999:  
anna:x:1001:  
mca:x:1002:anna  
trees:x:1003:  
plants:x:1004:  
ammu:x:3002:  
CN:x:1005:  
juliet:x:3003:  
shakespheare:x:3000:juliet,Romeo,Hamlet  
artists:x:3004:Reba,Dolly,Elvis  
Romeo:x:3005:  
Hamlet:x:3006:  
Reba:x:3007:  
Dolly:x:3008:  
Elvis:x:3009:  
jisha@jisha-VirtualBox:~$
```

19.Verify the supplemental group memberships by examining the /etc/gr

```
netdev:x:119:  
lpadmin:x:120:jisha  
avahi:x:121:  
scanner:x:122:saned  
saned:x:123:  
nm-openvpn:x:124:  
whoopsie:x:125:  
colord:x:126:  
geoclue:x:127:  
pulse:x:128:  
pulse-access:x:129:  
gdm:x:130:  
lxd:x:131:jisha  
jisha:x:1000:  
sambashare:x:132:jisha  
systemd-coredump:x:999:  
anna:x:1001:  
mca:x:1002:anna  
trees:x:1003:  
plants:x:1004:  
ammu:x:3002:  
CN:x:1005:  
juliet:x:3003:  
shakespheare:x:3000:juliet,Romeo,Hamlet  
artists:x:3004:Reba,Dolly,Elvis  
Romeo:x:3005:  
Hamlet:x:3006:  
Reba:x:3007:  
Dolly:x:3008:  
Elvis:x:3009:  
jisha@jisha-VirtualBox:~$
```

20. Attempt to remove user Dolly.

```
jisha@jisha-VirtualBox:~$ sudo userdel Dolly
jisha@jisha-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,jisha
tty:x:5:syslog
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
man:x:12:
proxy:x:13:
kmem:x:15:
dialout:x:20:
fax:x:21:
voice:x:22:
cdrom:x:24:jisha
floppy:x:25:
tape:x:26:
sudo:x:27:jisha
audio:x:29:pulse
dip:x:30:jisha
```

## 1. usermod

- usermod command is used to change the properties of a user in Linux through the command line

```
jisha@jisha-VirtualBox:~$ sudo useradd ammu
jisha@jisha-VirtualBox:~$ sudo passwd
New password:
Retype new password:
passwd: password updated successfully
jisha@jisha-VirtualBox:~$ sudo usermod -u 2002 ammu
jisha@jisha-VirtualBox:~$ cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:proxy:/bin:/usr/sbin/nologin
```

## 2. groupadd

- groupadd command creates a new group account using the values specified on the command line and the default values from the system.

```
jisha@jisha-VirtualBox:~$ sudo groupadd CN
jisha@jisha-VirtualBox:~$ groups
jisha adm cdrom sudo dip plugdev lpadmin lxd sambashare
jisha@jisha-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,jisha
tty:x:5:syslog
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
.....12:
```

## 3. groups –

print the groups a user is in

## 4..groupdel

- groupdel command modifies the system account files, deleting all entries that refer to group. The named group must exist

```
jisha@jisha-VirtualBox:~$ sudo groupdel CN
jisha@jisha-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,jisha
tty:x:5:syslog
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
man:x:12:
proxy:x:13:
kmem:x:15:
dialout:x:20:
fax:x:21:
voice:x:22:
cdrom:x:24:jisha
floppy:x:25:
tape:x:26:
sudo:x:27:jisha
audio:x:29:pulse
dip:x:30:jisha
www-data:x:33:

```

## 5. groupmod

- The groupmod command modifies the definition of the specified group by modifying the appropriate entry in the group database.

```
jisha@jisha-VirtualBox:~$ sudo groupmod -n flowers
jisha@jisha-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,jisha
tty:x:5:syslog
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
man:x:12:
proxy:x:13:
kmem:x:15:
dialout:x:20:
fax:x:21:
voice:x:22:
cdrom:x:24:jisha
floppy:x:25:
tape:x:26:
sudo:x:27:jisha

```

## 6. chmod

- To change directory permissions of file/ Directory in Linux.

```
jisha@jisha-VirtualBox:~$ chmod u+x nl.txt
jisha@jisha-VirtualBox:~$
```

## 7. chown

- The chown command allows you to change the user and/or group ownership of a given file, directory.

```
jisha@jisha-VirtualBox:~$ chown jisha hi.txt
jisha@jisha-VirtualBox:~$ ls -l hi.txt
-rw-rw-r-- 1 jisha jisha 34 Jun 20 09:45 hi.txt
jisha@jisha-VirtualBox:~$
```

## 8.id

- id command in Linux is used to find out user and group names and numeric ID's (UID or group ID) of the current user.

```
jisha@jisha-VirtualBox:~$ id
uid=1000(jisha) gid=1000(jisha) groups=1000(jisha),4(adm),24(cdrom),27(sudo),30(dip),46(plugdev),120(lpadmin),131(lxd),132(sambashare)
jisha@jisha-VirtualBox:~$
```

## 9.ps

- The ps command, short for Process Status, is a command line utility that is used to display or view information related to the processes running in a Linux system.

```
jisha@jisha-VirtualBox:~$ ps -u
USER PID %CPU %MEM VSZ RSS TTY STAT START TIME COMMAND
jisha 1108 0.0 0.4 172652 6628 tty2 Ssl+ 11:31 0:00 /usr/lib/gdm3/gdm-x-session --run-script env GNOME_SESSION_MODE=ubuntu /usr/bin/gnome-session --systemd --session=ubuntu
jisha 1115 0.5 7.0 565248 87304 tty2 SL+ 11:31 0:16 /usr/lib/xorg/Xorg vt2 -displayfd 3 -auth /run/user/1000/gdm/Xauthority -background none -noretention -keeptty -verbose 3
jisha 2039 0.4 0.1 199360 14800 pts/0 S+ 11:31 0:00 /usr/libexec/gnome-session-binary --systemd --session=ubuntu
jisha 6377 0.0 0.3 6298 516 pts/0 S+ 11:32 0:00 grep p
jisha 15774 1.0 0.2 20132 3248 pts/0 R+ 12:21 0:00 ps -u
```

## 10.top

- top command is used to show the Linux processes. It provides a dynamic real-time view of the running system

```
jisha@jisha-VirtualBox:~$ top
top - 12:22:12 up 51 min, 1 user, load average: 0.00, 0.03, 0.04
Tasks: 160 total, 1 running, 159 sleeping, 0 stopped, 0 zombie
%Cpu(s): 2.7 us, 0.3 sy, 0.0 ni, 96.9 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
MiB Mem : 1204.4 total, 79.9 free, 630.8 used, 493.7 buff/cache
MiB Swap: 448.5 total, 442.7 free, 5.8 used. 407.6 avail Mem
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
2629	jisha	20	0	3719400	333104	132092	S	2.3	27.0	0:34.16	gnome-shell
1115	jisha	20	0	565248	87304	53816	S	0.7	7.1	0:17.16	Xorg
6204	jisha	20	0	823660	50464	37528	S	0.3	4.1	0:08.58	gnome-terminal-
15775	jisha	20	0	20512	3916	3344	R	0.3	0.3	0:00.04	top
1	root	20	0	102000	11232	8472	S	0.0	0.9	0:02.04	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/0:0-hkblockd
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	0:00.17	ksoftirqd/0
11	root	20	0	0	0	0	I	0.0	0.0	0:00.86	rcu_sched
12	root	rt	0	0	0	0	S	0.0	0.0	0:00.03	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
16	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	netns
17	root	20	0	0	0	0	S	0.0	0.0	0:00.00	rcu_tasks_kthre
18	root	20	0	0	0	0	S	0.0	0.0	0:00.00	rcu_tasks_rude_
19	root	20	0	0	0	0	S	0.0	0.0	0:00.00	rcu_tasks_trace
20	root	20	0	0	0	0	S	0.0	0.0	0:00.00	ksuspend

## 11.wc

wc stands for word count.

- Used for counting purpose.
- It is used to find out number of lines,

word count, byte and characters count in the files specified in the file arguments.

```
153 root      0 -20      0      0      0
jisha@jisha-VirtualBox:~$ wc -c hi.txt
34 hi.txt
jisha@jisha-VirtualBox:~$
```

#### 12. tar

- The Linux ‘tar’ stands for tape archive, is used to create Archive and extract the Archive files
- Linux tar command to create compressed or uncompressed Archive files

```
jisha@jisha-VirtualBox:~$ tar cf archive.tar hi.txt class.txt
jisha@jisha-VirtualBox:~$ ls archive.tar
archive.tar
jisha@jisha-VirtualBox:~$
```

#### 13. expr

- The expr command evaluates a given expression and displays its corresponding output. It is used for:
- Basic operations like addition, subtraction, multiplication, division, and modulus on integers.
- Evaluating regular expressions, string operations like substring, length of strings etc.

```
jisha@jisha-VirtualBox:~$ expr 10 + 2
12
jisha@jisha-VirtualBox:~$
```

#### 14. Redirections & Piping 7

- A pipe is a form of redirection to send the output of one command/program/process to another command/program/process for further processing.
- Pipe is used to combine two or more commands, the output of one command acts as input to another command, and this command’s output may act as input to the next command and so on.

```
jisha@jisha-VirtualBox:~$ ls -l | wc -l
25
jisha@jisha-VirtualBox:~$
```

#### 15. ssh-keygen

Ssh-keygen command to generate a public/private authentication.

```
jisha@jisha-VirtualBox:~$ ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/home/jisha/.ssh/id_rsa): ha
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in ha
Your public key has been saved in ha.pub
The key fingerprint is:
SHA256:mr12evASR9/0S2JIIYDPvlJvZ+h8b4ARWsweRbfqwM jisha@jisha-VirtualBox
The key's randomart image is:
+---[RSA 3072]---+
|   . o oo .   |
|   . . * . .   |
|   o = + ..   |
|   + +.o  o   |
|   . S.+..+ .   |
|   *o.0000...   |
|   + +=.+0.0 .   |
|   . .+==+0. .   |
|   ..=E+ o.   |
+---[SHA256]---+
jisha@jisha-VirtualBox:~$
```

## 1. usermod

- usermod command is used to change the properties of a user in Linux through the command line

```
jisha@jisha-VirtualBox:~$ sudo useradd ammu
jisha@jisha-VirtualBox:~$ sudo passwd
New password:
Retype new password:
passwd: password updated successfully
jisha@jisha-VirtualBox:~$ sudo usermod -u 2002 ammu
jisha@jisha-VirtualBox:~$ cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:proxy:/bin:/usr/sbin/nologin
```

## 2. groupadd

- groupadd command creates a new group account using the values specified on the command line and the default values from the system.

```
jisha@jisha-VirtualBox:~$ sudo groupadd CN
jisha@jisha-VirtualBox:~$ groups
jisha adm cdrom sudo dip plugdev lpadmin lxd sambashare
jisha@jisha-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,jisha
tty:x:5:syslog
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
.....12:
```

## 3. groups –

print the groups a user is in

## 4..groupdel

- groupdel command modifies the system account files, deleting all entries that refer to group. The named group must exist

```
jisha@jisha-VirtualBox:~$ sudo groupdel CN
jisha@jisha-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,jisha
tty:x:5:syslog
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
man:x:12:
proxy:x:13:
kmem:x:15:
dialout:x:20:
fax:x:21:
voice:x:22:
cdrom:x:24:jisha
floppy:x:25:
tape:x:26:
sudo:x:27:jisha
audio:x:29:pulse
dip:x:30:jisha
www-data:x:33:

```

## 5. groupmod

- The groupmod command modifies the definition of the specified group by modifying the appropriate entry in the group database.

```
jisha@jisha-VirtualBox:~$ sudo groupmod -n flowers
jisha@jisha-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,jisha
tty:x:5:syslog
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
man:x:12:
proxy:x:13:
kmem:x:15:
dialout:x:20:
fax:x:21:
voice:x:22:
cdrom:x:24:jisha
floppy:x:25:
tape:x:26:
sudo:x:27:jisha

```

## 6. chmod

- To change directory permissions of file/ Directory in Linux.

```
jisha@jisha-VirtualBox:~$ chmod u+x nl.txt
jisha@jisha-VirtualBox:~$
```

## 7. chown

- The chown command allows you to change the user and/or group ownership of a given file, directory.

```
jisha@jisha-VirtualBox:~$ chown jisha hi.txt
jisha@jisha-VirtualBox:~$ ls -l hi.txt
-rwXr--r-- 1 jisha jisha 34 Jun 20 09:45 hi.txt
jisha@jisha-VirtualBox:~$
```

## 8.id

- id command in Linux is used to find out user and group names and numeric ID's (UID or group ID) of the current user.

```
jisha@jisha-VirtualBox:~$ id
uid=1000(jisha) gid=1000(jisha) groups=1000(jisha),4(adm),24(cdrom),27(sudo),30(dip),46(plugdev),120(lpadmin),131(lxd),132(sambashare)
jisha@jisha-VirtualBox:~$
```

## 9.ps

- The ps command, short for Process Status, is a command line utility that is used to display or view information related to the processes running in a Linux system.

```
jisha@jisha-VirtualBox:~$ ps -u
USER PID CPU %MEM %CPU TIME COMMAND
jisha 1000 0.0 0.0 172852 6028 tty2
jisha 1115 0.5 1.0 565248 87304 tty2
jisha 2031 0.0 1.2 199504 14896 tty2
jisha 6377 0.0 0.3 19240 4516 pts/0
jisha 15774 1.0 0.2 20132 3248 pts/0
jisha@jisha-VirtualBox:~$
```

## 10.top

- top command is used to show the Linux processes. It provides a dynamic real-time view of the running system

1. Try out top command with each user

```
jisha@jisha-VirtualBox:~$ top
top - 12:22:12 up 51 min, 1 user, load average: 0.00, 0.03, 0.04
Tasks: 160 total, 1 running, 159 sleeping, 0 stopped, 0 zombie
%Cpu(s): 2.7 us, 0.3 sy, 0.0 ni, 96.9 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
MiB Mem : 1204.4 total, 79.9 free, 630.8 used, 493.7 buff/cache
MiB Swap : 448.5 total, 442.7 free, 5.8 used. 407.6 avail Mem
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
2629	jisha	20	0	3719400	333104	132092	S	2.3	27.0	0:34.16	gnome-shell
1115	jisha	20	0	565248	87304	53816	S	0.7	7.1	0:17.16	Xorg
6204	jisha	20	0	823660	50464	37528	S	0.3	4.1	0:08.58	gnome-terminal-
<b>15775</b>	<b>jisha</b>	<b>20</b>	<b>0</b>	<b>20512</b>	<b>3916</b>	<b>3344</b>	<b>R</b>	<b>0.3</b>	<b>0.3</b>	<b>0:00.04</b>	<b>top</b>
1	root	20	0	102000	11232	8472	S	0.0	0.9	0:02.04	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	0:00.17	ksoftirqd/0
11	root	20	0	0	0	0	I	0.0	0.0	0:00.86	rcu_sched
12	root	rt	0	0	0	0	S	0.0	0.0	0:00.03	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
16	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	netns
17	root	20	0	0	0	0	S	0.0	0.0	0:00.00	rcu_tasks_kthre
18	root	20	0	0	0	0	S	0.0	0.0	0:00.00	rcu_tasks_rude_
19	root	20	0	0	0	0	S	0.0	0.0	0:00.00	rcu_tasks_trace
20	root	0	0	0	0	0	S	0.0	0.0	0:00.00	rcu_tasks_dsdma

```
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : fe80::846:bcff:fe2e:3ce7%17
                           192.168.43.1
```

Ethernet adapter Bluetooth Network Connection:

```
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . .
```

C:\Users\micromedia02>NetStat

Active Connections

  [1] Command Prompt

  C:\Users\micromedia02>ipconfig/all

Windows IP Configuration

```
  Host Name . . . . . : LAPTOP-HIRSTONI
  Primary Dns Suffix . . . . .
  Node Type . . . . . : Hybrid
  IP Routing Enabled. . . . . : No
  WINS Proxy Enabled. . . . . : No
```

Ethernet adapter Ethernet:

```
  Media State . . . . . : Media disconnected
  Connection-specific DNS Suffix . . .
  Description . . . . . : Realtek PCIe GbE Family Controller
  Physical Address . . . . . : 80-E8-2C-8D-21-99
  DHCP Enabled. . . . . : Yes
  Autoconfiguration Enabled . . . . . : Yes
```

Ethernet adapter VirtualBox Host-Only Network:

```
  Connection-specific DNS Suffix . .
  Description . . . . . : VirtualBox Host-Only Ethernet Adapter
  Physical Address . . . . . : 0A-00-27-00-00-00
  DHCP Enabled. . . . . : No
  Autoconfiguration Enabled . . . . . : Yes
  Link-local IPv6 Address . . . . . : fe80::916d:54ef:c3d6:57b3%13(Preferred)
```

ifconfig

```
jisha@jisha-VirtualBox:~$ sudo ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
        inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
        inet6 fe80::f7c3:6a7a:9d6b:876a prefixlen 64 scopeid 0x20<link>
              ether 08:00:27:3b:54:e4 txqueuelen 1000 (Ethernet)
                    RX packets 206 bytes 211656 (211.6 KB)
                    RX errors 0 dropped 0 overruns 0 frame 0
                    TX packets 214 bytes 20590 (20.5 KB)
                    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
        inet 127.0.0.1 netmask 255.0.0.0
        inet6 ::1 prefixlen 128 scopeid 0x10<host>
              loop txqueuelen 1000 (Local Loopback)
                    RX packets 679 bytes 51978 (51.9 KB)
                    RX errors 0 dropped 0 overruns 0 frame 0
                    TX packets 679 bytes 51978 (51.9 KB)
                    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

jisha@jisha-VirtualBox:~$
```

```
jisha@jisha-VirtualBox:~$ ifconfig -a
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
        inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
        inet6 fe80::f7c3:6a7a:9d6b:876a prefixlen 64 scopeid 0x20<link>
          ether 08:00:27:3b:54:e4 txqueuelen 1000 (Ethernet)
            RX packets 44 bytes 5759 (5.7 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 112 bytes 12865 (12.8 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
        inet 127.0.0.1 netmask 255.0.0.0
        inet6 ::1 prefixlen 128 scopeid 0x10<host>
          loop txqueuelen 1000 (Local Loopback)
            RX packets 152 bytes 13406 (13.4 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 152 bytes 13406 (13.4 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

jisha@jisha-VirtualBox:~$ ifconfig -s
Iface      MTU     RX-OK RX-ERR RX-DRP RX-OVR     TX-OK TX-ERR TX-DRP TX-OVR Flg
enp0s3     1500      44      0      0 0       112      0      0      0 BMRU
lo       65536     152      0      0 0       152      0      0      0 LRU
jisha@jisha-VirtualBox:~$ ifconfig -v
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
        inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
        inet6 fe80::f7c3:6a7a:9d6b:876a prefixlen 64 scopeid 0x20<link>
          ether 08:00:27:3b:54:e4 txqueuelen 1000 (Ethernet)
            RX packets 44 bytes 5759 (5.7 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 112 bytes 12865 (12.8 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

```
jisha@jisha-VirtualBox:~$ ifconfig --help
Usage:
ifconfig [-a] [-v] [-s] <interface> [[<AF>] <address>]
[add <address>/<prefixlen>]
[del <address>/<prefixlen>]
[[[-]broadcast [<address>]] [[[-]pointopoint [<address>]]]
[netmask <address>] [dstaddr <address>] [tunnel <address>]
[outfill <NN>] [keepalive <NN>]
[hw <HW> <address>] [mtu <NN>]
[[[-]trailers] [[[-]arp] [[[-]allmulti]
[multicast] [[[-]promisc]
[mem_start <NN>] [io_addr <NN>] [irq <NN>] [media <type>]
[txqueuelen <NN>]
[[[-]dynamic]
[up|down] ...

<HW>=Hardware Type.
List of possible hardware types:
loop (Local Loopback) slip (Serial Line IP) cslip (VJ Serial Line IP)
slip6 (6-bit Serial Line IP) cslip6 (VJ 6-bit Serial Line IP) adaptive (Adaptive
ash (Ash) ether (Ethernet) ax25 (AMPR AX.25)
netrom (AMPR NET/ROM) rose (AMPR ROSE) tunnel (IPIP Tunnel)
ppp (Point-to-Point Protocol) hdlc ((Cisco)-HDLC) lapb (LAPB)
arcnet (ARCnet) dlci (Frame Relay DLCI) frad (Frame Relay Access Device)
sit (IPv6-in-IPv4) fddi (Fiber Distributed Data Interface) hippi (HIPPI)
irda (IrLAP) ec (Econet) x25 (generic X.25)
eui64 (Generic EUI-64)
<AF>=Address family. Default: inet
List of possible address families:
 unix (UNIX Domain) inet (TCP/IP) ipx (IPX/SPX)
 ipng (IPng) ip6 (IP Version 6)
```

Netstat

```
C:\ Command Prompt
Connection-specific DNS Suffix . :
C:\Users\micromedia02>NetStat
Active Connections

Proto Local Address          Foreign Address        State
TCP   192.168.43.220:49505  137:https             TIME_WAIT
TCP   192.168.43.220:49552  20.197.71.89:https    ESTABLISHED
TCP   192.168.43.220:49663  ec2-52-202-128:45:https  TIME_WAIT
TCP   192.168.43.220:49899  ec2-52-45-61-27:https  TIME_WAIT
TCP   192.168.43.220:50239  76:https              TIME_WAIT
TCP   192.168.43.220:50328  40.119.205.193:https   TIME_WAIT
TCP   192.168.43.220:50444  ec2-52-202-128:45:https  TIME_WAIT
TCP   192.168.43.220:50504  a97add881b0f0fc2a4:https  TIME_WAIT
TCP   192.168.43.220:51178  ec2-52-221-144-69:https   TIME_WAIT
TCP   192.168.43.220:51271  90:https              TIME_WAIT
TCP   192.168.43.220:52050  ec2-52-45-61-27:https  TIME_WAIT
TCP   192.168.43.220:52175  ec2-52-45-61-27:https  TIME_WAIT
TCP   192.168.43.220:52272  20.198.0.3:https       ESTABLISHED
TCP   192.168.43.220:52730  17.18.237.29:https    ESTABLISHED
TCP   192.168.43.220:52731  13.107.6.254:https     ESTABLISHED
TCP   192.168.43.220:52966  ec2-34-235-197-155:https  TIME_WAIT
TCP   192.168.43.220:53179  maa05s19-in-f6:https    TIME_WAIT
TCP   192.168.43.220:54843  111:https              TIME_WAIT
TCP   192.168.43.220:55949  ec2-52-45-61-27:https  TIME_WAIT
TCP   192.168.43.220:56201  121:https              TIME_WAIT
TCP   192.168.43.220:56495  server-13-225-295-71:https  TIME_WAIT
TCP   192.168.43.220:56496  server-13-225-295-71:https  TIME_WAIT
TCP   192.168.43.220:57288  11.104.167.235:https    TIME_WAIT
TCP   192.168.43.220:57289  20.198.162.76:https     ESTABLISHED
TCP   192.168.43.220:58785  ec2-3-222-213-29:https  TIME_WAIT
TCP   192.168.43.220:58953  maa05s21-in-f4:https    TIME_WAIT
TCP   192.168.43.220:59313  ec2-34-235-197-155:https  TIME_WAIT
TCP   192.168.43.220:60049  ec2-52-45-61-27:https  TIME_WAIT
TCP   192.168.43.220:60111  maa03s43-in-f2:https    TIME_WAIT
TCP   192.168.43.220:60251  ec2-3-215-64-185:https  TIME_WAIT
TCP   192.168.43.220:60601  ec2-3-222-213-29:https  TIME_WAIT
TCP   192.168.43.220:60609  ec2-52-45-61-27:https  TIME_WAIT
TCP   192.168.43.220:61126  maa03s43-in-f2:https    TIME_WAIT
TCP   192.168.43.220:61570  ec2-3-215-64-185:https  TIME_WAIT
TCP   192.168.43.220:61658  ec2-34-235-197-155:https  TIME_WAIT
TCP   192.168.43.220:62024  121:https              TIME_WAIT
TCP   192.168.43.220:62880  ec2-3-222-213-29:https  TIME_WAIT
TCP   192.168.43.220:62881  20.44.10.123:https     ESTABLISHED
TCP   192.168.43.220:62883  ec2-52-45-61-27:https  TIME_WAIT
TCP   192.168.43.220:63358  ec2-3-222-213-29:https  ESTABLISHED
TCP   192.168.43.220:63654  40.79.107.35:https     ESTABLISHED
```

C:\Users\micromedia02>netstat -n

#### Active Connections

Proto	Local Address	Foreign Address	State
TCP	192.168.43.220:51178	20.197.71.89:443	ESTABLISHED
TCP	192.168.43.220:62193	20.198.162.78:443	ESTABLISHED
TCP	[2409:4073:204:4e78:e53d:e792:1e6c:ce5d]:59696	[2606:2800:147:120f:30c:1ba0:fc6:265a]:443	ESTABLISHED
TCP	[2409:4073:204:4e78:e53d:e792:1e6c:ce5d]:59698	[2606:2800:147:120f:30c:1ba0:fc6:265a]:443	ESTABLISHED

C:\Users\micromedia02>netstat -n 5

#### Active Connections

Proto	Local Address	Foreign Address	State
TCP	192.168.43.220:51178	20.197.71.89:443	ESTABLISHED
TCP	192.168.43.220:62193	20.198.162.78:443	ESTABLISHED
TCP	[2409:4073:204:4e78:e53d:e792:1e6c:ce5d]:59696	[2606:2800:147:120f:30c:1ba0:fc6:265a]:443	ESTABLISHED
TCP	[2409:4073:204:4e78:e53d:e792:1e6c:ce5d]:59698	[2606:2800:147:120f:30c:1ba0:fc6:265a]:443	ESTABLISHED

#### Active Connections

Proto	Local Address	Foreign Address	State
TCP	192.168.43.220:51178	20.197.71.89:443	ESTABLISHED
TCP	192.168.43.220:62193	20.198.162.78:443	ESTABLISHED
TCP	[2409:4073:204:4e78:e53d:e792:1e6c:ce5d]:59696	[2606:2800:147:120f:30c:1ba0:fc6:265a]:443	ESTABLISHED
TCP	[2409:4073:204:4e78:e53d:e792:1e6c:ce5d]:59698	[2606:2800:147:120f:30c:1ba0:fc6:265a]:443	ESTABLISHED

#### Active Connections

Proto	Local Address	Foreign Address	State
TCP	192.168.43.220:51178	20.197.71.89:443	ESTABLISHED
TCP	192.168.43.220:62193	20.198.162.78:443	ESTABLISHED

```
C:\Users\micromedia02>netstat -a

Active Connections

Proto Local Address          Foreign Address        State
TCP   0.0.0.0:135           LAPTOP-HIR5TON1:0    LISTENING
TCP   0.0.0.0:445           LAPTOP-HIR5TON1:0    LISTENING
TCP   0.0.0.0:5040          LAPTOP-HIR5TON1:0    LISTENING
TCP   0.0.0.0:49664          LAPTOP-HIR5TON1:0    LISTENING
TCP   0.0.0.0:49665          LAPTOP-HIR5TON1:0    LISTENING
TCP   0.0.0.0:49666          LAPTOP-HIR5TON1:0    LISTENING
TCP   0.0.0.0:49667          LAPTOP-HIR5TON1:0    LISTENING
TCP   0.0.0.0:49669          LAPTOP-HIR5TON1:0    LISTENING
TCP   127.0.0.1:5939         LAPTOP-HIR5TON1:0    LISTENING
TCP   127.0.0.1:27017         LAPTOP-HIR5TON1:0    LISTENING
TCP   127.0.0.1:37014         LAPTOP-HIR5TON1:0    LISTENING
TCP   127.0.0.1:37114         LAPTOP-HIR5TON1:0    LISTENING
TCP   192.168.43.220:139      LAPTOP-HIR5TON1:0    LISTENING
TCP   192.168.43.220:51178     20.197.71.89:https ESTABLISHED
TCP   192.168.43.220:62193     20.198.162.78:https ESTABLISHED
TCP   192.168.56.1:139         LAPTOP-HIR5TON1:0    LISTENING
TCP   [::]:135                LAPTOP-HIR5TON1:0    LISTENING
TCP   [::]:445                LAPTOP-HIR5TON1:0    LISTENING
TCP   [::]:49664              LAPTOP-HIR5TON1:0    LISTENING
TCP   [::]:49665              LAPTOP-HIR5TON1:0    LISTENING
TCP   [::]:49666              LAPTOP-HIR5TON1:0    LISTENING
TCP   [::]:49667              LAPTOP-HIR5TON1:0    LISTENING
TCP   [::]:49669              LAPTOP-HIR5TON1:0    LISTENING
TCP   [::]:49668              LAPTOP-HIR5TON1:0    LISTENING
TCP   [2409:4073:204:4e78:e53d:e792:1e6c:ce5d]:59696 [2606:2800:147:120f:30c:1ba0:fc6:265a]:ht
TCP   [2409:4073:204:4e78:e53d:e792:1e6c:ce5d]:59698 [2606:2800:147:120f:30c:1ba0:fc6:265a]:ht
UDP   0.0.0.0:3702            *.*
UDP   0.0.0.0:3702            *.*
UDP   0.0.0.0:5050            *.*
```

### Netstat in linux

```
jisha@jisha-VirtualBox:~$ sudo netstat
[sudo] password for jisha:
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address          Foreign Address        State
udp      0      0 jisha-VirtualBox:bootpc _gateway:bootps      ESTABLISHED

Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags       Type      State          I-Node Path
unix    2      [ ]        DGRAM    CONNECTED     25065 /run/user/1000/systemd/notify
unix    2      [ ]        DGRAM    CONNECTED     15163 /run/systemd/journal/syslog
unix   16      [ ]        DGRAM    CONNECTED     15173 /run/systemd/journal/dev-log
unix    8      [ ]        DGRAM    CONNECTED     15177 /run/systemd/journal/socket
unix    3      [ ]        DGRAM    CONNECTED     15149 /run/systemd/notify
unix    3      [ ]        STREAM   CONNECTED    31986 /run/systemd/journal/stdout
unix    3      [ ]        STREAM   CONNECTED    28502 /run/user/1000/bus
unix    3      [ ]        STREAM   CONNECTED    30760
unix    3      [ ]        STREAM   CONNECTED    32000
unix    3      [ ]        STREAM   CONNECTED    29165
unix    3      [ ]        STREAM   CONNECTED    25890 /run/systemd/journal/stdout
unix    3      [ ]        STREAM   CONNECTED    31917
unix    3      [ ]        STREAM   CONNECTED    25837
unix    3      [ ]        STREAM   CONNECTED    30547
unix    3      [ ]        STREAM   CONNECTED    29168 /run/dbus/system_bus_socket
unix    3      [ ]        STREAM   CONNECTED    28905 /run/systemd/journal/stdout
unix    3      [ ]        STREAM   CONNECTED    31987 /run/systemd/journal/stdout
unix    2      [ ]        DGRAM    CONNECTED    25832
unix    3      [ ]        STREAM   CONNECTED    30736 /run/dbus/system_bus_socket
unix    3      [ ]        STREAM   CONNECTED    31697 /run/user/1000/bus
unix    3      [ ]        STREAM   CONNECTED    28904 /run/systemd/journal/stdout
unix    3      [ ]        STREAM   CONNECTED    18638
unix    2      [ ]        STREAM   CONNECTED    31919 /run/systemd/journal/stdout
```

```
jisha@jisha-VirtualBox:~$ netstat -a
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp      0      0 localhost:mysql          0.0.0.0:*
tcp      0      0 localhost:domain        0.0.0.0:*
tcp      0      0 localhost:ipp           0.0.0.0:*
tcp6     0      0 [::]:http              [::]:*                LISTEN
tcp6     0      0 ip6-localhost:ipp       [::]:*                LISTEN
udp      0      0 0.0.0.0:631            0.0.0.0:*
udp      0      0 localhost:domain        0.0.0.0:*
udp      0      0 jisha-VirtualBox:bootpc _gateway:bootps      ESTABLISHED
udp      0      0 0.0.0.0:mdns           0.0.0.0:*
udp      0      0 0.0.0.0:50518          0.0.0.0:*
udp6     0      0 [::]:56526             [::]:*                LISTEN
udp6     0      0 [::]:mdns              [::]:*                LISTEN
raw6    0      0 [::]:ipv6-icmp         [::]:*                7
Active UNIX domain sockets (servers and established)
Proto RefCnt Flags     Type      State     I-Node   Path
unix    2      [ ACC ]   STREAM    LISTENING  27744   @/tmp/.ICE-unix/1104
unix    2      [ ACC ]   SEQPACKET LISTENING  15174   /run/udev/control
unix    2      [ ACC ]   STREAM    LISTENING  15147   /run/systemd/private
unix    2      [ ]        DGRAM     LISTENING  24942   /run/user/1000/systemd/notify
unix    2      [ ACC ]   STREAM    LISTENING  15149   /run/systemd/userdb/io.systemd.DynamicUser
unix    2      [ ACC ]   STREAM    LISTENING  24945   /run/user/1000/systemd/private
unix    2      [ ACC ]   STREAM    LISTENING  24971   /run/user/1000/bus
unix    2      [ ]        DGRAM     LISTENING  15158   /run/systemd/journal/syslog
unix    2      [ ACC ]   STREAM    LISTENING  15160   /run/systemd/fsck.progress
unix    2      [ ACC ]   STREAM    LISTENING  24972   /run/user/1000/gnupg/S.dirmngr
```

```
jisha@jisha-VirtualBox:~$ netstat -t
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
jisha@jisha-VirtualBox:~$ netstat -l
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp      0      0 localhost:mysql          0.0.0.0:*
tcp      0      0 localhost:domain        0.0.0.0:*
tcp      0      0 localhost:ipp           0.0.0.0:*
tcp6     0      0 [::]:http              [::]:*                LISTEN
tcp6     0      0 ip6-localhost:ipp       [::]:*                LISTEN
udp      0      0 0.0.0.0:631            0.0.0.0:*
udp      0      0 localhost:domain        0.0.0.0:*
udp      0      0 0.0.0.0:mdns           0.0.0.0:*
udn      0      0 0.0.0.0:50518          0.0.0.0:*
```

```
jtsna@jtsna-VirtualBox:~$ netstat -s
Ip:
    Forwarding: 2
    258 total packets received
    1 with invalid addresses
    0 forwarded
    0 incoming packets discarded
    255 incoming packets delivered
    269 requests sent out
    20 outgoing packets dropped
Icmp:
    40 ICMP messages received
    0 input ICMP message failed
    ICMP input histogram:
        destination unreachable: 40
    40 ICMP messages sent
    0 ICMP messages failed
    ICMP output histogram:
        destination unreachable: 40
IcmpMsg:
    InType3: 40
    OutType3: 40
Tcp:
    7 active connection openings
    0 passive connection openings
    2 failed connection attempts
    1 connection resets received
    0 connections established
```

#### Traceroute

```
address: 192.0.0.1
>
C:\Users\micromedia02>tracert
Usage: tracert [-d] [-h maximum_hops] [-j host-list] [-w timeout]
               [-R] [-S srcaddr] [-4] [-6] target_name

Options:
  -d          Do not resolve addresses to hostnames.
  -h maximum_hops Maximum number of hops to search for target.
  -j host-list  Loose source route along host-list (IPv4-only).
  -w timeout   Wait timeout milliseconds for each reply.
  -R          Trace round-trip path (IPv6-only).
  -S srcaddr   Source address to use (IPv6-only).
  -4          Force using IPv4.
```

```
C:\Users\micromedia02>tracert -R
A target name or address must be specified.

Usage: tracert [-d] [-h maximum_hops] [-j host-list] [-w timeout]
                [-R] [-S srcaddr] [-4] [-6] target_name

Options:
    -d           Do not resolve addresses to hostnames.
    -h maximum_hops   Maximum number of hops to search for target.
    -j host-list     Loose source route along host-list (IPv4-only).
    -w timeout       Wait timeout milliseconds for each reply.
    -R             Trace round-trip path (IPv6-only).
    -S srcaddr      Source address to use (IPv6-only).
    -4             Force using IPv4.
    -6             Force using IPv6.

C:\Users\micromedia02>tracert -S
A value must be supplied for option -S.

C:\Users\micromedia02>tracert -D
-D is not a valid command option.

Usage: tracert [-d] [-h maximum_hops] [-j host-list] [-w timeout]
                [-R] [-S srcaddr] [-4] [-6] target_name

Options:
    -d           Do not resolve addresses to hostnames.
    -h maximum_hops   Maximum number of hops to search for target.
    -j host-list     Loose source route along host-list (IPv4-only).
    -w timeout       Wait timeout milliseconds for each reply.
    -R             Trace round-trip path (IPv6-only).
    -S srcaddr      Source address to use (IPv6-only).
    -4             Force using IPv4.
    -6             Force using IPv6.

C:\Users\micromedia02>
```

```
C:\Users\micromedia02>tracert -j
A target name or address must be specified.

Usage: tracert [-d] [-h maximum_hops] [-j host-list] [-w timeout]
                [-R] [-S srcaddr] [-4] [-6] target_name

Options:
  -d                  Do not resolve addresses to hostnames.
  -h maximum_hops    Maximum number of hops to search for target.
  -j host-list        Loose source route along host-list (IPv4-only).
  -w timeout          Wait timeout milliseconds for each reply.
  -R                  Trace round-trip path (IPv6-only).
  -S srcaddr          Source address to use (IPv6-only).
  -4                  Force using IPv4.
  -6                  Force using IPv6.

C:\Users\micromedia02>tracert -w
A value must be supplied for option -w.

C:\Users\micromedia02>tracert -R
A target name or address must be specified.

Usage: tracert [-d] [-h maximum_hops] [-j host-list] [-w timeout]
                [-R] [-S srcaddr] [-4] [-6] target_name

Options:
  -d                  Do not resolve addresses to hostnames.
  -h maximum_hops    Maximum number of hops to search for target.
  -j host-list        Loose source route along host-list (IPv4-only).
  -w timeout          Wait timeout milliseconds for each reply.
  -R                  Trace round-trip path (IPv6-only).
  -S srcaddr          Source address to use (IPv6-only).
  -4                  Force using IPv4.
  -6                  Force using IPv6.

C:\Users\micromedia02>tracert -S
A value must be supplied for option -S.
```

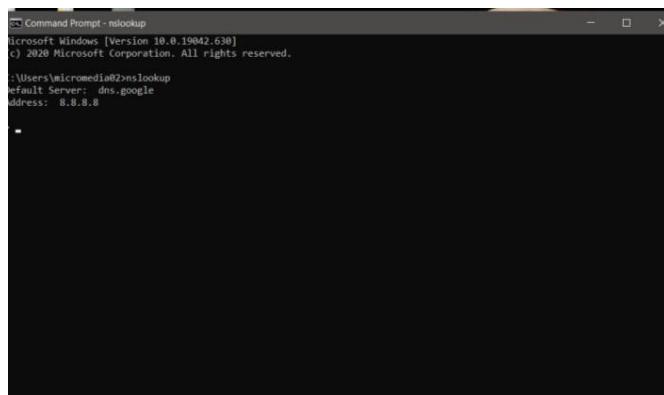
Traceroute in linux

```
jisha@jisha-VirtualBox:~$ traceroute www.google.com
traceroute to www.google.com (142.250.182.4), 30 hops max, 60 byte packets
1 _gateway (10.0.2.2)  1.613 ms  1.635 ms  1.620 ms
2 * * *
3 * * *
4 * * *
5 * * *
6 * * *
7 * * *
8 * * *
9 * * *
10 * * *
11 * * *
12 * * *
13 * * *
14 * * *
15 * * *
16 * * *
17 * * *
18 * * *
19 * * *
20 * * *
21 * * *
22 * * *
23 * * *
24 * * *
25 * * *
26 * * *
27 * * *
28 * * *

jisha@jisha-VirtualBox:~$ traceroute -4 google.com
traceroute to google.com (142.250.196.14), 30 hops max, 60 byte packets
1 _gateway (10.0.2.2)  1.864 ms  1.821 ms  1.799 ms
2 * * *
3 * * *
4 * * *
5 * * *
6 * * *
7 * * *
8 * * *
9 * * *
10 * * *
11 * * *
12 * * *
13 * * *
14 * * *
15 * * *
16 * * *
17 * * *
18 * * *
19 * * *
20 * * *
21 * * *
22 * * *
23 *^C
```

```
jisha@jisha-VirtualBox:~$ traceroute -F google.com
traceroute to google.com (142.250.196.14), 30 hops max, 60 byte packets
 1 _gateway (10.0.2.2)  1.334 ms  1.376 ms  1.328 ms
 2 * * *
 3 * * *
 4 * * *
 5 * * *
 6 * * *
 7 * * *
 8 * * *
 9 * * *
10 * * *
11 * * *
12 * *^C
jisha@jisha-VirtualBox:~$ traceroute -N google.com
Cannot handle '-N' option with arg `google.com' (argc 2)
jisha@jisha-VirtualBox:~$ traceroute -n google.com
traceroute to google.com (142.250.196.14), 30 hops max, 60 byte packets
 1 10.0.2.2  0.583 ms  0.534 ms  0.513 ms
 2 * * *
 3 * * *
 4 * * *
 5 * * *
 6 * * *
 7 * * *
 8 * * *
 9 * * *
10 * * *
11 * * *
12 * * *
jisha@jisha-VirtualBox:~$ traceroute --help
Usage:
  traceroute [ -46dFITnreAUDV ] [ -f first_ttl ] [ -g gate,... ] [ -i device ] [ -m max_ttl ] [ -w_label ] [ -w MAX,HERE,NEAR ] [ -q nqueries ] [ -s src_addr ] [ -z sendwait ] [ --fwmark=num ] h
Options:
  -4                      Use IPv4
  -6                      Use IPv6
  -d  --debug             Enable socket level debugging
  -F  --dont-fragment     Do not fragment packets
  -f first_ttl            --first=first_ttl
                           Start from the first_ttl hop (instead from 1)
  -g gate,...  --gateway=gate,...
```

## Nslookup



```
C:\Users\micromedia02>nslookup google.com
Server: dns.google
Address: 8.8.8.8

Non-authoritative answer:
Name: google.com
Addresses: 2404:6800:4007:829::200e
           172.217.163.174
```

Nslookup in linux

```
jisha@jisha-VirtualBox:~$ nslookup google.com
Server: 127.0.0.53
Address: 127.0.0.53#53

Non-authoritative answer:
Name: google.com
Address: 142.250.196.14
Name: google.com
Address: 2404:6800:4007:823::200e

jisha@jisha-VirtualBox:~$
```

```
jisha@jisha-VirtualBox:~$ nslookup -type=ns google.com
Server: 127.0.0.53
Address: 127.0.0.53#53

Non-authoritative answer:
google.com      nameserver = ns4.google.com.
google.com      nameserver = ns1.google.com.
google.com      nameserver = ns3.google.com.
google.com      nameserver = ns2.google.com.

Authoritative answers can be found from:

jisha@jisha-VirtualBox:~$ nslookup -type=mx google.com
Server: 127.0.0.53
Address: 127.0.0.53#53

Non-authoritative answer:
google.com      mail exchanger = 50 alt4.aspmx.l.google.com.
google.com      mail exchanger = 20 alt1.aspmx.l.google.com.
google.com      mail exchanger = 10 aspmx.l.google.com.
google.com      mail exchanger = 30 alt2.aspmx.l.google.com.
google.com      mail exchanger = 40 alt3.aspmx.l.google.com.

Authoritative answers can be found from:
```

```
jisha@jisha-VirtualBox:~$ nslookup -type=txt google.com
;; Truncated, retrying in TCP mode.
Server: 127.0.0.53
```

## Route

```
C:\ Command Prompt
>
C:\Users\micromedia02>route
Manipulates network routing tables.

ROUTE [-f] [-p] [-4|-6] command [destination]
      [MASK netmask] [gateway] [METRIC metric] [IF interface]

-f      Clears the routing tables of all gateway entries. If this is
       used in conjunction with one of the commands, the tables are
       cleared prior to running the command.

-p      When used with the ADD command, makes a route persistent across
       boots of the system. By default, routes are not preserved
       when the system is restarted. Ignored for all other commands,
       which always affect the appropriate persistent routes.

-4      Force using IPv4.

-6      Force using IPv6.

command  One of these:
         PRINT   Prints a route
         ADD    Adds a route
         DELETE Deletes a route
         CHANGE Modifies an existing route

destination Specifies the host.

MASK      Specifies that the next parameter is the 'netmask' value.
netmask   Specifies a subnet mask value for this route entry.
          If not specified, it defaults to 255.255.255.255.
gateway   Specifies gateway.
interface  the interface number for the specified route.
METRIC    specifies the metric, ie. cost for the destination.

All symbolic names used for destination are looked up in the network database
file NETWORKS. The symbolic names for gateway are looked up in the host name
database file HOSTS.

If the command is PRINT or DELETE, Destination or gateway can be a wildcard,
(wildcard is specified as a star '*'), or the gateway argument may be omitted.

If Dest contains a * or ?, it is treated as a shell pattern, and only
matching destination routes are printed. The '*' matches any string,
and '?' matches any one char. Examples: 157.*.1, 157.?, *224*.

Pattern match is only allowed in PRINT command.

Diagnostic Notes:
  Invalid MASK generates an error, that is when (DEST & MASK) != DEST.
  Example> route ADD 157.0.0.0 MASK 155.0.0.0 157.55.80.1 IF 1
           The route addition failed: The specified mask parameter is invalid. (Destination & Mask) != Destination.
```

```
C:\Users\micromedia02>route -n

Manipulates network routing tables.

ROUTE [-f] [-p] [-4|-6] command [destination]
      [MASK netmask] [gateway] [METRIC metric] [IF interface]

-f      Clears the routing tables of all gateway entries. If this is
       used in conjunction with one of the commands, the tables are
       cleared prior to running the command.

-p      When used with the ADD command, makes a route persistent across
       boots of the system. By default, routes are not preserved
       when the system is restarted. Ignored for all other commands,
       which always affect the appropriate persistent routes.

-4      Force using IPv4.

-6      Force using IPv6.

command  One of these:
         PRINT   Prints a route
         ADD    Adds a route
         DELETE Deletes a route
         CHANGE Modifies an existing route

destination Specifies the host.

MASK      Specifies that the next parameter is the 'netmask' value.
netmask   Specifies a subnet mask value for this route entry.
          If not specified, it defaults to 255.255.255.255.
gateway   Specifies gateway.
interface  the interface number for the specified route.
METRIC    specifies the metric, ie. cost for the destination.

All symbolic names used for destination are looked up in the network database
file NETWORKS. The symbolic names for gateway are looked up in the host name
```

```
C:\Users\micromedia02>route -cn
Manipulates network routing tables.

ROUTE [-f] [-p] [-4|-6] command [destination]
      [MASK netmask] [gateway] [METRIC metric] [IF interface]

-f           Clears the routing tables of all gateway entries. If this is
            used in conjunction with one of the commands, the tables are
            cleared prior to running the command.

-p           When used with the ADD command, makes a route persistent across
            boots of the system. By default, routes are not preserved
            when the system is restarted. Ignored for all other commands,
            which always affect the appropriate persistent routes.

-4           Force using IPv4.

-6           Force using IPv6.

command      One of these:
              PRINT   Prints a route
              ADD     Adds a route
              DELETE Deletes a route
              CHANGE Modifies an existing route

destination   Specifies the host.

MASK         Specifies that the next parameter is the 'netmask' value.

netmask      Specifies a subnet mask value for this route entry.
            If not specified, it defaults to 255.255.255.255.

gateway      Specifies gateway.

interface    the interface number for the specified route.

METRIC       specifies the metric, ie. cost for the destination.
```

All symbolic names used for destination are looked up in the network database file NETWORKS. The symbolic names for gateway are looked up in the host name database file HOSTS.

If the command is PRINT or DELETE. Destination or gateway can be a wildcard, (wildcard is specified as a star '\*'), or the gateway argument may be omitted.

If Dest contains a \* or ?, it is treated as a shell pattern, and only matching destination routes are printed. The '\*' matches any string, and '?' matches any one char. Examples: 157.\*.1, 157.\*, 127.\*, \*224\*.

Pattern match is only allowed in PRINT command.

Diagnostic Notes:

```
Invalid MASK generates an error, that is when (DEST & MASK) != DEST.
Example> route ADD 157.0.0.0 MASK 155.0.0.0 157.55.80.1 IF 1
```



## Route in linux

```
jisha@jisha-VirtualBox:~$ sudo route
Kernel IP routing table
Destination     Gateway         Genmask        Flags Metric Ref  Use Iface
default         _gateway       0.0.0.0        UG    100    0        0 enp0s3
10.0.2.0        0.0.0.0        255.255.255.0  U     100    0        0 enp0s3
link-local      0.0.0.0        255.255.0.0    U     1000   0        0 enp0s3
```

```
jisha@jisha-VirtualBox:~$ route -n
Kernel IP routing table
Destination     Gateway         Genmask        Flags Metric Ref  Use Iface
0.0.0.0         10.0.2.2      0.0.0.0        UG    100    0        0 enp0s3
10.0.2.0        0.0.0.0        255.255.255.0  U     100    0        0 enp0s3
169.254.0.0     0.0.0.0        255.255.0.0    U     1000   0        0 enp0s3
jisha@jisha-VirtualBox:~$ route -cn
route: invalid option -- 'c'
Usage: route [-nNvee] [-FC] [<AF>]          List kernel routing tables
          route [-v] [-FC] {add|del|flush} ...  Modify routing table for AF.
```

```
jisha@jisha-VirtualBox:~$ route -cn
route: invalid option -- 'c'
Usage: route [-nNvee] [-FC] [<AF>]           List kernel routing table
          route [-v] [-FC] {add|del|flush} ...  Modify routing table for

          route {-h|--help} [<AF>]             Detailed usage syntax for
          route {-V|--version}                  Display version/author an

          -v, --verbose                      be verbose
          -n, --numeric                       don't resolve names
          -e, --extend                        display other/more information
          -F, --fib                           display Forwarding Information Base (
          -C, --cache                         display routing cache instead of FIB

<AF>=Use -4, -6, '-A <af>' or '--<af>'; default: inet
List of possible address families (which support routing):
  inet (DARPA Internet) inet6 (IPv6) ax25 (AMPR AX.25)
  ipx (AMPR NET/ROM) ipx (Novell IPX) ddp (AppleTalk DDP)
```

## Ping

```
C:\Users\micromedia01>ping

Usage: ping [-t] [-a] [-n count] [-l size] [-f] [-i TTL] [-v TOS]
           [-r count] [-s count] [|- host-list] | [-k host-list]
           [-w timeout] [-R] [-S srcaddr] [-c compartment] [-p]
           [-4] [-6] target_name

Options:
  -t      Ping the specified host until stopped.
          To see statistics and continue - type Control-Break;
          To stop - type Control-C.
  -a      Resolve addresses to hostnames.
  -n count Number of echo requests to send.
  -l size Send buffer size.
  -f      Set the Don't Fragment flag in packet (IPv4-only).
  -i TTL Time To Live.
  -v TOS Type Of Service (IPv4-only. This setting has been deprecated
          and has no effect on the type of service field in the IP
          Header).
  -r count Record route for count hops (IPv4-only).
  -s count Timestamp for count hops (IPv4-only).
  -j host-list Loose source route along host-list (IPv4-only).
  -k host-list Strict source route along host-list (IPv4-only).
  -w timeout Timeout in milliseconds to wait for a reply.
  -R      Use router advertisement to reverse route also (IPv6-only).
          Per RFC 5895 the use of this routing header has been
          deprecated. Some systems may drop echo requests if
          this header is used.
  -S srcaddr Source address to use.
  -c compartment Routing compartment identifier.
  -p      Ping a Hyper-V Network Virtualization provider address.
  -4      Force using IPv4.
  -6      Force using IPv6.
```

```
C:\Users\micromedia02>ping /t
IP address must be specified.

C:\Users\micromedia02>ping /t 8.8.8.8

Pinging 8.8.8.8 with 32 bytes of data:
Reply from 8.8.8.8: bytes=32 time=166ms TTL=112
Reply from 8.8.8.8: bytes=32 time=153ms TTL=112
Reply from 8.8.8.8: bytes=32 time=171ms TTL=112
Reply from 8.8.8.8: bytes=32 time=64ms TTL=112
Reply from 8.8.8.8: bytes=32 time=54ms TTL=112
Reply from 8.8.8.8: bytes=32 time=50ms TTL=112
Reply from 8.8.8.8: bytes=32 time=62ms TTL=112
Reply from 8.8.8.8: bytes=32 time=80ms TTL=112
Reply from 8.8.8.8: bytes=32 time=48ms TTL=112
Reply from 8.8.8.8: bytes=32 time=41ms TTL=112
Reply from 8.8.8.8: bytes=32 time=59ms TTL=112
Reply from 8.8.8.8: bytes=32 time=45ms TTL=112
Reply from 8.8.8.8: bytes=32 time=68ms TTL=112

Ping statistics for 8.8.8.8:
    Packets: Sent = 13, Received = 13, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 41ms, Maximum = 171ms, Average = 81ms
Control-C
^C
C:\Users\micromedia02>ping /v 8.8.8.8
```

### Ping in linux

```
jisha@jisha-VirtualBox:~$ ping www.google.com
PING www.google.com (142.250.195.196) 56(84) bytes of data.
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=1 ttl=111 time=193 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=2 ttl=111 time=63.4 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=3 ttl=111 time=108 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=4 ttl=111 time=80.1 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=5 ttl=111 time=77.2 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=6 ttl=111 time=270 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=7 ttl=111 time=91.7 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=8 ttl=111 time=63.1 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=9 ttl=111 time=83.4 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=10 ttl=111 time=95.7 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=11 ttl=111 time=87.9 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=12 ttl=111 time=76.0 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=13 ttl=111 time=84.9 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=14 ttl=111 time=67.8 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=15 ttl=111 time=61.7 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=16 ttl=111 time=58.2 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=17 ttl=111 time=55.4 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=18 ttl=111 time=60.1 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=19 ttl=111 time=66.9 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=20 ttl=111 time=67.7 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=21 ttl=111 time=83.8 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=22 ttl=111 time=53.6 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=23 ttl=111 time=58.7 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=24 ttl=111 time=89.0 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=25 ttl=111 time=64.1 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=26 ttl=111 time=92.1 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=27 ttl=111 time=91.0 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=28 ttl=111 time=102 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=29 ttl=111 time=57.8 ms
64 bytes from maa03s42-in-f4.1e100.net (142.250.195.196): icmp_seq=30 ttl=111 time=81.8 ms
```

```
jisha@jisha-VirtualBox:~$ ping google.com
PING google.com (172.217.163.206) 56(84) bytes of data.
64 bytes from maa05s06-in-f14.1e100.net (172.217.163.206): icmp_seq=1 ttl=112 time=22
64 bytes from maa05s06-in-f14.1e100.net (172.217.163.206): icmp_seq=2 ttl=112 time=56
64 bytes from maa05s06-in-f14.1e100.net (172.217.163.206): icmp_seq=3 ttl=112 time=73
64 bytes from maa05s06-in-f14.1e100.net (172.217.163.206): icmp_seq=4 ttl=112 time=53
64 bytes from maa05s06-in-f14.1e100.net (172.217.163.206): icmp_seq=5 ttl=112 time=51
64 bytes from maa05s06-in-f14.1e100.net (172.217.163.206): icmp_seq=6 ttl=112 time=50
64 bytes from maa05s06-in-f14.1e100.net (172.217.163.206): icmp_seq=7 ttl=112 time=83
64 bytes from maa05s06-in-f14.1e100.net (172.217.163.206): icmp_seq=8 ttl=112 time=53
64 bytes from maa05s06-in-f14.1e100.net (172.217.163.206): icmp_seq=9 ttl=112 time=48
^C
--- google.com ping statistics ---
9 packets transmitted, 9 received, 0% packet loss, time 8012ms
rtt min/avg/max/mdev = 48.589/76.725/220.185/51.917 ms
jisha@jisha-VirtualBox:~$ ping 0
PING 0 (127.0.0.1) 56(84) bytes of data.
64 bytes from 127.0.0.1: icmp_seq=1 ttl=64 time=0.021 ms
64 bytes from 127.0.0.1: icmp_seq=2 ttl=64 time=0.043 ms
64 bytes from 127.0.0.1: icmp_seq=3 ttl=64 time=0.053 ms
64 bytes from 127.0.0.1: icmp_seq=4 ttl=64 time=0.032 ms
64 bytes from 127.0.0.1: icmp_seq=5 ttl=64 time=0.070 ms
64 bytes from 127.0.0.1: icmp_seq=6 ttl=64 time=0.064 ms
64 bytes from 127.0.0.1: icmp_seq=7 ttl=64 time=0.060 ms
64 bytes from 127.0.0.1: icmp_seq=8 ttl=64 time=0.101 ms
64 bytes from 127.0.0.1: icmp_seq=9 ttl=64 time=0.064 ms
64 bytes from 127.0.0.1: icmp_seq=10 ttl=64 time=0.050 ms
64 bytes from 127.0.0.1: icmp_seq=11 ttl=64 time=0.061 ms
64 bytes from 127.0.0.1: icmp_seq=12 ttl=64 time=0.065 ms
```

```
jisha@jisha-VirtualBox:~$ ping -c
ping: option requires an argument -- 'c'
```

#### Usage

ping [options] <destination>

#### Options:

<destination>	dns name or ip address
-a	use audible ping
-A	use adaptive ping
-B	sticky source address
-c <count>	stop after <count> replies
-D	print timestamps
-d	use SO_DEBUG socket option
-f	flood ping
-h	print help and exit
-I <interface>	either interface name or address
-i <interval>	seconds between sending each packet
-L	suppress loopback of multicast packets

## 2. Identify and perform 5 more network commands and it's

#### working Getmac

```
C:\Users\micromedia02>getmac
Physical Address      Transport Name
----- 
0C-F5-05-F4-B5-11  \Device\Tcpip_{06C3EBFF-6ED4-43D0-82F5-FC83D45ASBE3}
80-E8-2C-8D-21-99  Media disconnected
0C-F5-05-F4-B5-10  \Device\Tcpip_{A42D1934-E311-4A22-8455-4E4C696D5120}
0A-00-27-00-00-00
```

## Hostname

```
C:\> C:\Windows\system32\cmd.exe

C:\Users\micromedia02>getmac
Physical Address Transport Name
===== =====
DC-F5-05-F4-B5-11 \Device\Tcpip_{06C3EBFF-6ED4-43B0-82F5-FC83D045A5BE3}
BB-E8-C2-BD-21-99 Media disconnected
DC-F5-05-F4-B5-10 Media disconnected
0A-00-27-00-00-00 \Device\Tcpip_{A4D01934-E311-4A22-B455-4E4C696D5120}

C:\Users\micromedia02>hostname
LAPTOP-HIRSTONI

C:\Users\micromedia02>
```

## ARP

```
C:\Users\micromedia02>arp
Displays and modifies the IP-to-Physical address translation tables used by
address resolution protocol (ARP).

ARP -s [inet_addr eth_addr] [if_addr]
ARP -d [inet_addr] [if_addr]
ARP -a [inet_addr] [-N if_addr] [-v]

    -s           Displays current ARP entries by interrogating the current
                protocol data. If inet_addr is specified, the IP and
                addresses for only the specified computer are displayed. If
                more than one network interface uses ARP, entries for each ARP
                table will be displayed.
    -g           Same as -s.
    -v           Displays current ARP entries in verbose mode. All invalid
                entries and entries on the loop-back interface will be shown.
    inet_addr   Specifies an internet address.
    -N if_addr  Displays the ARP entries for the network interface specified
                by if_addr.
    -d           Deletes the host specified by inet_addr. inet_addr may be
                followed with * to delete all hosts.
    -s           Adds the host and associates the Internet address inet_addr
                with the Physical address eth_addr. The Physical address is
                given as 6 hexadecimal bytes separated by hyphens. The entry
                is permanent.
    eth_addr    Specifies a physical address.
    if_addr     If present, this specifies the Internet address of the
                interface whose address translation table should be modified.
                If not present, the first applicable interface will be used.

Example:
> arp -s 157.55.85.212 00-aa-00-62-c6-09 .... Adds a static entry.
> arp -a          .... Displays the arp table.

C:\Users\micromedia02>
```

## Systeminfo

```
C:\> Command Prompt
C:\Users\micromedia02>systeminfo

Host Name: LAPTOP-HIRSTONI
OS Name: Microsoft Windows 10 Home Single Language
OS Version: 10.0.19042 N/A Build 19042
OS Manufacturer: Microsoft Corporation
OS Configuration: Standalone Workstation
OS Build Type: Multiprocessor Free
Registered Owner: micromedia02
Registered Organization: HP
Product ID: 00327-35142-31596-AA0EM
Original Install Date: 25-05-2021, 15:54:34
System Boot Time: 31-08-2021, 16:27:21
System Manufacturer: HP
System Model: HP Laptop 15-da0xxx
System Type: x64-based PC
Processor(s):
  1 Processor(s) Installed.
    [01]: Intel® Family 6 Model 142 Stepping 10 GenuineIntel ~2300 Mhz
BIOS Version: Insyde F.21, 25-07-2019
Windows Directory: C:\WINDOWS
System Directory: C:\WINDOWS\system32
Boot Device: \Device\HarddiskVolume1
System Locale: en-US (United States)
Input Locale: 04000409
Time Zone: (UTC+05:30) Chennai, Kolkata, Mumbai, New Delhi
Total Physical Memory: 4,007 MB
Available Physical Memory: 714 MB
Virtual Memory: Max Size: 7,847 MB
Virtual Memory: Available: 2,546 MB
Virtual Memory: In Use: 5,301 MB
Page File Location(s): C:\pagefile.sys
Domain: WORKGROUP
Logon Server: \\LAPTOP-HIRSTONI
Hotfix(s):
  6 Hotfix(s) Installed.
    [01]: KB4578968
    [02]: KB4562830
    [03]: KB4570334
    [04]: KB4580325
    [05]: KB4586664
    [06]: KB4586781
Network Card(s):
  4 NIC(s) Installed.
    [01]: Intel(R) Dual Band Wireless-AC 7265 802.11b/g/n PCIe Adapter
      Connection Name: Wi-Fi
      DHCP Enabled: Yes
      DHCP Server: 192.168.43.1
      IP address(es)
        [01]: 192.168.43.220
        [02]: fe80::a83c:cd31:7f17:8b0c
        [03]: 2409:4073:4e09:8072:5464:c3cb:9f04:e6fb
        [04]: 2409:4073:4e09:8072:a83c:c31:7f17:8b0c
Desktop 1629 09-09-2021 ENG
```

## Pathping

```
C:\Users\micromedia02>pathping
Usage: pathping [-g host-list] [-h maximum_hops] [-i address] [-n]
                [-p period] [-q num_queries] [-w timeout]
                [-A] [-6] target_name

Options:
  -g host-list    Loose source route along host-list.
  -h maximum_hops Maximum number of hops to search for target.
  -i address      Use the specified source address.
  -n              Do not resolve addresses to hostnames.
  -p period       Wait period milliseconds between pings.
  -q num_queries  Number of queries per hop.
  -w timeout      Wait timeout milliseconds for each reply.
  -A              Force using IPv4.
  -6              Force using IPv6.

C:\Users\micromedia02>systeminfo
Host Name:          LAPTOP-HIRSTONI
OS Name:            Microsoft Windows 10 Home Single Language
OS Version:         10.0.19042 N/A Build 19042
OS Manufacturer:   Microsoft Corporation
OS Configuration:  Standalone Workstation
OS Product Edition: Windows家庭版
```

## Net

```
C:\> Select Command Prompt
Connection Name: VirtualBox Host-Only Network
DHCP Enabled: No
IP address(es)
[01]: 192.168.56.1
[02]: fe80::916d:54ef:c3d6:57b3
Hyper-V Requirements: VM Monitor Mode Extensions: Yes
Virtualization Enabled In Firmware: Yes
Second Level Address Translation: Yes
Data Execution Prevention Available: Yes

C:\Users\micromedia02>nbtstat
'nbtstat' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\micromedia02>net
The syntax of this command is:

NET [
  ACCOUNTS | COMPUTER | CONFIG | CONTINUE | FILE | GROUP | HELP |
  HELPMSC | LOCALGROUP | PAUSE | SESSION | SHARE | START |
  STATISTICS | STOP | TIME | USE | USER | VIEW ]
```

## Nbtstat

```
C:\> Command Prompt
Type "TASKKILL /?" for usage.

C:\Users\micromedia02>nbtstat
Displays protocol statistics and current TCP/IP connections using NBT
(NETBIOS over TCP/IP).

NBSTAT [ [-A RemoteName] [-A IP address] [-c] [-n]
          [-r] [-R] [-RR] [-s] [-S] [interval] ]

-a (adapter status) Lists the remote machine's name table given its name
-A (Adapter status) Lists the remote machine's name table given its
                   IP address.
-c (cache)        Lists NBT's cache of remote [machine] names and their IP addresses
-n (names)        Lists local NetBIOS names.
-r (resolved)     Lists names resolved by broadcast and via WINS
-R (Reload)       Purges and reloads the remote cache name table
-S (Sessions)    Lists sessions table entries and destination IP addresses
-s (sessions)    Lists sessions table contents by destination IP
                   addresses to computer NETBIOS names.
-RR (ReleaseRefresh) Sends Name Release packets to WINS and then, starts Refresh

RemoteName  Remote host machine name.
IP address  Dotted decimal representation of the IP address.
interval   Redisplays selected statistics, pausing interval seconds
           between each display. Press Ctrl+C to stop redisplaying
           statistics.

C:\Users\micromedia02>
```

## Linux

### commands ls

```
jisha@jisha-VirtualBox:~$ ls
allfiles.txt appu      book      dai.txt  Documents  ha.pub    hi.txt      minnu      Pictures  Videos
allfolder     appu.txt  BOOKS    Desktop  Downloads  hello     h.txt      Music      Public   wordpress
ammu.txt      archive.tar class.txt de.txt   ha        hello.txt latest.tar.gz number.txt Templates work
```

```
jisha@jisha-VirtualBox:~$ history
1 ls
2 pwd
3 history
4 man
5 man ls
6 cd
7 cd .
8 cd /
9 ls
10 mkdir jisha
11 mkdir ammu
12 mkdir -p jisha
13 mkdir
14 mkdir -m ammu
15 mkdir jisha
16 cd jisha
17 cd desktop
18 cd --
19 mkdir minnu
20 cd minnu
21 rmdir minnu
22 rm -r minnu
```

```
jisha@jisha-VirtualBox:~$ touch test1.txt
jisha@jisha-VirtualBox:~$ mkdir book
jisha@jisha-VirtualBox:~$ ls
allfiles.txt appu book class.txt de.txt ha hello.txt latest.tar.gz number.txt Templates wordpress
allfolder appu.txt books dat.txt Documents ha.pub hl.txt minnu Pictures test1.txt work
ammu.txt archive.tar BOOKS Desktop Downloads hello h.txt Music Public Videos
jisha@jisha-VirtualBox:~$ pwd
/home/jisha
jisha@jisha-VirtualBox:~$ sudo hostname
jisha-VirtualBox
```

dig

```
jisha@jisha-VirtualBox:~$ dig google.com

; <>> DiG 9.16.1-Ubuntu <>> google.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 38604
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;google.com.           IN      A

;; ANSWER SECTION:
google.com.        224      IN      A      142.250.205.238

;; Query time: 71 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Sun Sep 12 14:41:33 IST 2021
;; MSG SIZE  rcvd: 55
```

arp

```
jisha@jisha-VirtualBox:~$ arp -e
Address          HWtype  HWaddress          Flags Mask      Iface
_gateway         ether    52:54:00:12:35:02  C          enp0s3
```

host

```
-o use IPv4 query transport only
jisha@jisha-VirtualBox:~$ host google.com
google.com has address 142.250.205.238
google.com has IPv6 address 2404:6800:4007:808::200e
google.com mail is handled by 10 aspmx.l.google.com.
google.com mail is handled by 20 alt1.aspmx.l.google.com.
google.com mail is handled by 30 alt2.aspmx.l.google.com.
google.com mail is handled by 50 alt4.aspmx.l.google.com.
google.com mail is handled by 40 alt3.aspmx.l.google.com.
jisha@jisha-VirtualBox:~$
```

## Ansible installation

```
jisha@jisha-VirtualBox:~$ sudo apt-get install ansible
[sudo] password for jisha:
Sorry, try again.
[sudo] password for jisha:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  ieee-data python3-argcomplete python3-crypto python3-distutils
  python3-dnspython python3-jinja2 python3-jmespath python3-kerberos
  python3-lib2to3 python3-libcloud python3-netaddr python3-ntlm-auth
  python3-requests-kerberos python3-requests-ntlm python3-selinux
  python3-winrm python3-xmldict
Suggested packages:
  cowsay sshpass python-jinja2-doc ipython3 python-netaddr-docs
The following NEW packages will be installed:
  ansible ieee-data python3-argcomplete python3-crypto python3-distutils
  python3-dnspython python3-jinja2 python3-jmespath python3-kerberos
  python3-libcloud python3-netaddr python3-ntlm-auth python3-requests-kerberos
  python3-requests-ntlm python3-selinux python3-winrm python3-xmldict
The following packages will be upgraded:
  python3-lib2to3
1 upgraded, 17 newly installed, 0 to remove and 329 not upgraded.
Need to get 9,865 kB/9,942 kB of archives.
```

## Version

```
jisha@jisha-VirtualBox:~$ ansible --version
ansible 2.9.6
  config file = /etc/ansible/ansible.cfg
  configured module search path = ['/home/jisha/.ansible/plugins/modules', '/usr/share/ansible/plugins/modules']
  ansible python module location = /usr/lib/python3/dist-packages/ansible
  executable location = /usr/bin/ansible
  python version = 3.8.5 (default, Jul 28 2020, 12:59:40) [GCC 9.3.0]
jisha@jisha-VirtualBox:~$
```

## **Install Apache**

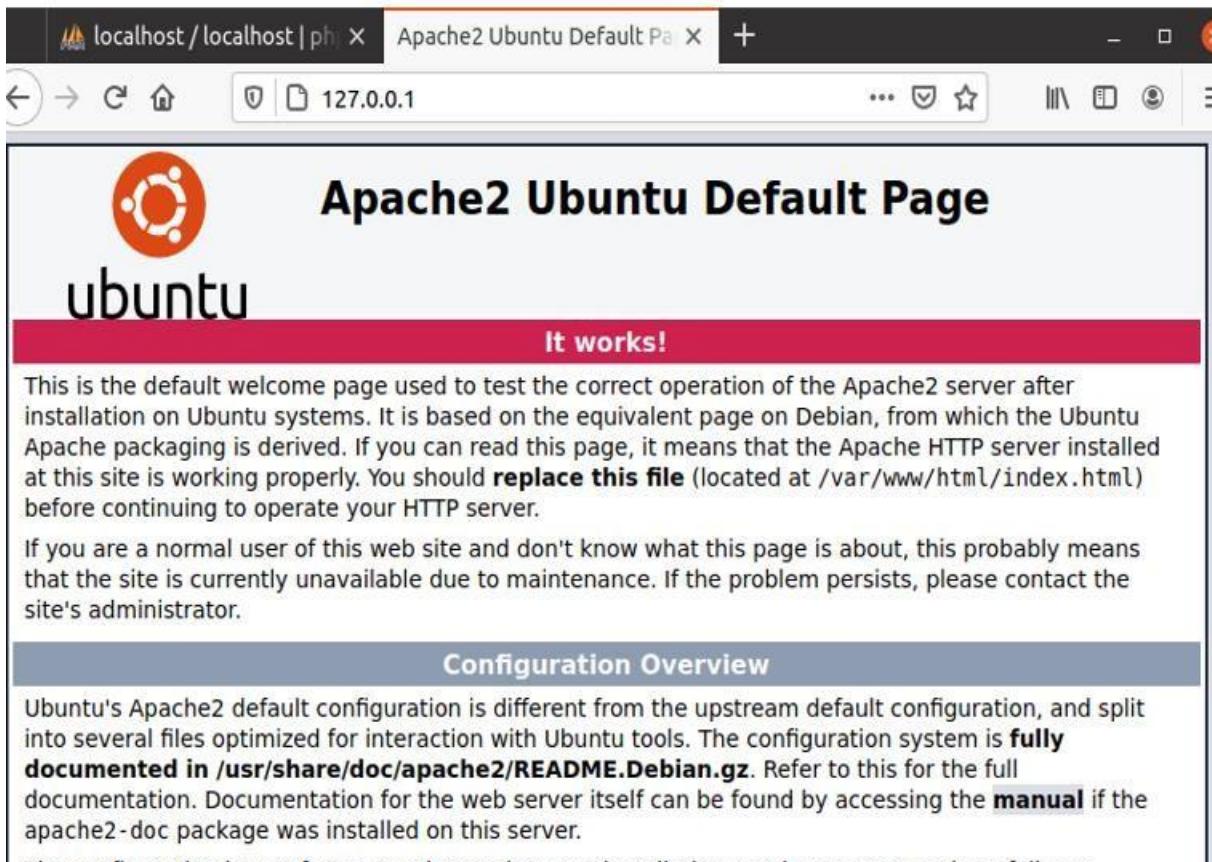
- Update your system  
    sudo apt update
- Install Apache using apt:  
    sudo apt install apache2
- sudo systemctl status apache2
- sudo systemctl start apache2

```
jisha@jisha-VirtualBox:~$ sudo systemctl start apache2
[sudo] password for jisha:
jisha@jisha-VirtualBox:~$ sudo systemctl status apache2
[sudo] password for jisha:
● apache2.service - The Apache HTTP Server
   Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor prese>
   Active: active (running) since Wed 2021-09-29 14:01:28 IST; 26min ago
     Docs: https://httpd.apache.org/docs/2.4/
 Main PID: 749 (apache2)
    Tasks: 6 (limit: 1376)
   Memory: 10.5M
      CGroup: /system.slice/apache2.service
              └─749 /usr/sbin/apache2 -k start
                  ├─783 /usr/sbin/apache2 -k start
                  ├─784 /usr/sbin/apache2 -k start
                  ├─785 /usr/sbin/apache2 -k start
                  ├─786 /usr/sbin/apache2 -k start
                  └─787 /usr/sbin/apache2 -k start

Sep 29 14:01:20 jisha-VirtualBox systemd[1]: Starting The Apache HTTP Server...
Sep 29 14:01:27 jisha-VirtualBox apachectl[645]: AH00558: apache2: Could not re>
Sep 29 14:01:28 jisha-VirtualBox systemd[1]: Started The Apache HTTP Server.
lines 1-18/18 (END)
```

- Once installed, test by accessing your server's IP in your browser:

<http://youripaddress>



## Install mariADB

- sudo apt install mariadb-server mariadb-client

Check mariadb Installation

- sudo systemctl status mysql

```
jisha@jisha-VirtualBox:~$ sudo systemctl status mysql
● mariadb.service - MariaDB 10.3.31 database server
  Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor prese>
  Active: active (running) since Wed 2021-09-29 15:07:57 IST; 3min 33s ago
    Docs: man:mysqld(8)
          https://mariadb.com/kb/en/library/systemd/
   Process: 581 ExecStartPre=/usr/bin/install -m 755 -o mysql -g root -d /var/>
   Process: 600 ExecStartPre=/bin/sh -c systemctl unset-environment _WSREP_STA>
   Process: 606 ExecStartPre=/bin/sh -c [ ! -e /usr/bin/galera_recovery ] && V>
   Process: 829 ExecStartPost=/bin/sh -c systemctl unset-environment _WSREP_ST>
   Process: 831 ExecStartPost=/etc/mysql/debian-start (code=exited, status=0/S>
 Main PID: 689 (mysqld)
   Status: "Taking your SQL requests now..."
     Tasks: 31 (limit: 1376)
    Memory: 40.8M
      CGroup: /system.slice/mariadb.service
              └─689 /usr/sbin/mysqld

Sep 29 15:07:48 jisha-VirtualBox systemd[1]: Starting MariaDB 10.3.31 database >
Sep 29 15:07:53 jisha-VirtualBox mysqld[689]: 2021-09-29 15:07:53 0 [Note] /usr/>
Sep 29 15:07:57 jisha-VirtualBox systemd[1]: Started MariaDB 10.3.31 database s>
Sep 29 15:07:57 jisha-VirtualBox /etc/mysql/debian-start[833]: Upgrading MySQL >
```

## Install PHP and commonly used modules

- sudo apt install php libapache2-mod-php php-ocache php-cli  
php-gd php-curl php-mysql
- Restart apache2
- sudo systemctl restart apache2

## Now you can check php installation

```
sudo echo "<?php phpinfo(); ?>" | sudo tee -a /var/www/html/phpinfo.php>/dev/null
```

```
jisha@jisha-VirtualBox:~$ php -v
PHP 7.4.3 (cli) (built: Jul 5 2021 15:13:35) ( NTS )
Copyright (c) The PHP Group
Zend Engine v3.4.0, Copyright (c) Zend Technologies
    with Zend OPcache v7.4.3, Copyright (c), by Zend Technologies
jisha@jisha-VirtualBox:~$ █
```

## Open a browser

PHP Version 7.4.3	
System	Linux ubuntu 5.8.0-43-generic #49~20.04.1-Ubuntu SMP Fri Feb 5 09:57:56 UTC 2021 x86_64
Build Date	Jul 5 2021 15:13:35
Server API	Apache 2.0 Handler
Virtual Directory Support	disabled
Configuration File (php.ini) Path	/etc/php/7.4/apache2
Loaded Configuration File	/etc/php/7.4/apache2/php.ini
Scan this dir for additional .ini files	/etc/php/7.4/apache2/conf.d
Additional .ini files parsed	/etc/php/7.4/apache2/conf.d/10-mysqlnd.ini, /etc/php/7.4/apache2/conf.d/10-opcache.ini, /etc/php/7.4/apache2/conf.d/10-pdo.ini, /etc/php/7.4/apache2/conf.d/15-xml.ini, /etc/php/7.4/apache2/conf.d/20-bz2.ini, /etc/php/7.4/apache2/conf.d/20-calendar.ini, /etc/php/7.4/apache2/conf.d/20-ctype.ini, /etc/php/7.4/apache2/conf.d/20-curl.ini, /etc/php/7.4/apache2/conf.d/20-dom.ini, /etc/php/7.4/apache2/conf.d/20-fileinfo.ini, /etc/php/7.4/apache2/conf.d/20-ftp.ini, /etc/php/7.4/apache2/conf.d/20-gd.ini, /etc/php/7.4/apache2/conf.d/20-gettext.ini, /etc/php/7.4/apache2/conf.d/20-iconv.ini, /etc/php/7.4/apache2/conf.d/20-json.ini, /etc/php/7.4/apache2/conf.d/20-mbstring.ini, /etc/php/7.4/apache2/conf.d/20-mysqli.ini, /etc/php/7.4/apache2/conf.d/20-pdo_mysql.ini, /etc/php/7.4/apache2/conf.d/20-phar.ini, /etc/php/7.4/apache2/conf.d/20-posix.ini, /etc/php/7.4/apache2/conf.d/20-readline.ini, /etc/php

## Install phpmyadmin

★ sudo apt install phpmyadmin php-mbstring php-zip php-gd php-json php-curl

(It asks for webserver select apache2, select db-configuration and set password)

Restart apache2

★ sudo systemctl restart apache2

```
jisha@jisha-VirtualBox:~$ sudo mysql -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 50
Server version: 10.3.31-MariaDB-0ubuntu0.20.04.1 Ubuntu 20.04

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

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

```
MariaDB [(none)]> create database ammu;
Query OK, 1 row affected (0.410 sec)
```

```
MariaDB [(none)]> show databases;
+-----+
| Database           |
+-----+
| ammu              |
| information_schema |
| mysite             |
| mysql              |
| performance_schema |
| phpmyadmin         |
+-----+
6 rows in set (0.367 sec)

MariaDB [(none)]> exit
Bye
jisha@jisha-VirtualBox:~$
```

## Check phpmyadmin

The screenshot shows the phpMyAdmin configuration page. On the left, there's a sidebar with a tree view of databases: ammu, information\_schema, mysite, mysql, performance\_schema, and phpmyadmin. The main area has several tabs at the top: Databases, SQL, Status, User accounts, Export, Import, Settings, Replication, Variables, Charsets, Engines, and Plugins. The 'Settings' tab is active.

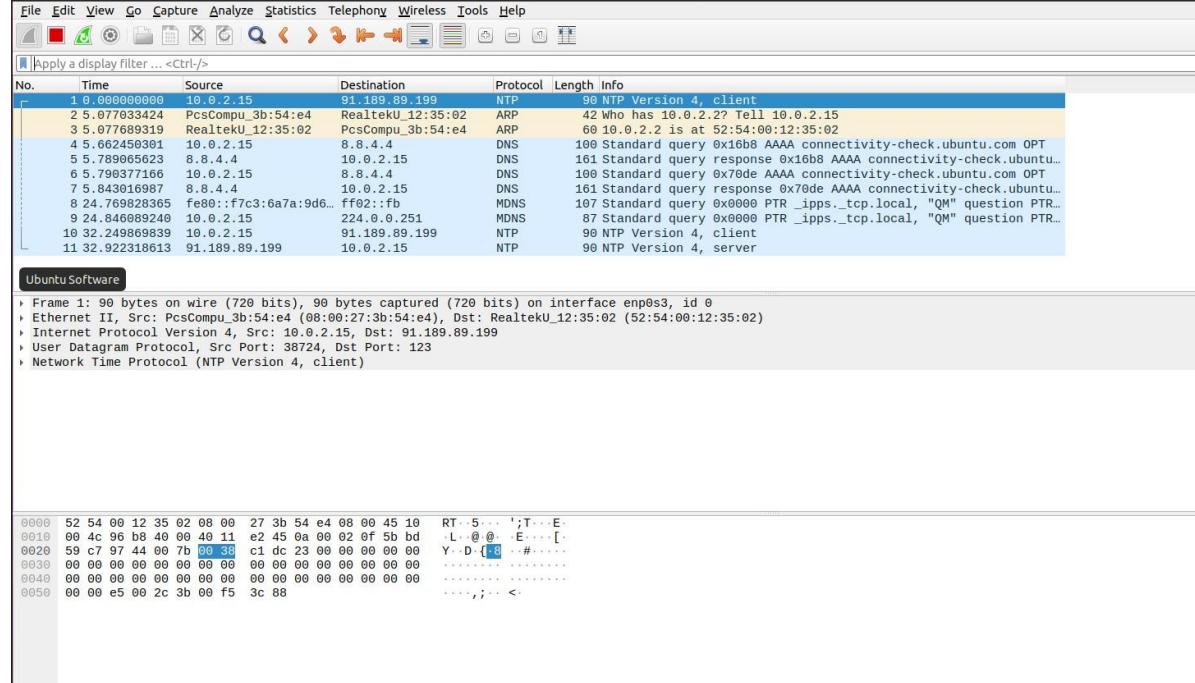
- General settings:** Shows 'Server connection collation' set to utf8mb4\_unicode\_ci.
- Database server:** Displays server details: Localhost via UNIX socket, MariaDB, SSL not being used, Server version 10.3.31-MariaDB-0ubuntu0.20.04.1 - Ubuntu 20.04, Protocol version 10, User jisha@localhost, and Server charset UTF-8 Unicode (utf8mb4).
- Web server:** Shows Apache/2.4.41 (Ubuntu), PHP client version libmysql - mysqld 7.4.3, PHP extension mysqli, curl, mbstring, and PHP version 7.4.3.
- phpMyAdmin:** Footer links include Version information: 4.9.5deb2, Documentation, Official Homepage, Contribute, Get support, List of changes, and License.

## Wireshark installation

```
jisha@jisha-VirtualBox:~$ sudo apt-get install wireshark
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libc-ares2 libdouble-conversion3 libpcre2-16-0 libqt5core5a libqt5dbus5
  libqt5gui5 libqt5multimedia5 libqt5multimedia5-plugins
  libqt5multimeddiagsttools5 libqt5multimediacwidgets5 libqt5network5
  libqt5opengl5 libqt5printsupport5 libqt5svg5 libqt5widgets5 libsmi2ldbl
  libspandsp2 libssh-gcrypt-4 libwireshark-data libwireshark13 libwiretap10
  libwsutil11 libxcb-xinerama0 libxcb-xinput0 qt5-gtk-platformtheme
  qttranslations5-l10n wireshark-common wireshark-qt
Suggested packages:
  qt5-image-formats-plugins qtwayland5 snmp-mibs-downloader geoipupdate
  geoip-database geoip-database-extra libjs-leaflet
  libjs-leaflet.markercluster wireshark-doc
The following NEW packages will be installed:
  libc-ares2 libdouble-conversion3 libpcre2-16-0 libqt5core5a libqt5dbus5
  libqt5gui5 libqt5multimedia5 libqt5multimedia5-plugins
  libqt5multimeddiagsttools5 libqt5multimediacwidgets5 libqt5network5
  libqt5opengl5 libqt5printsupport5 libqt5svg5 libqt5widgets5 libsmi2ldbl
  libspandsp2 libssh-gcrypt-4 libwireshark-data libwireshark13 libwiretap10
```

```
jisha@jisha-VirtualBox:~$ sudo dpkg-reconfigure wireshark-common
jisha@jisha-VirtualBox:~$ sudo adduser $USER wireshark
Adding user 'jisha' to group 'wireshark' ...
Adding user jisha to group wireshark
Done.
```

```
jisha@jisha-VirtualBox:~$
```

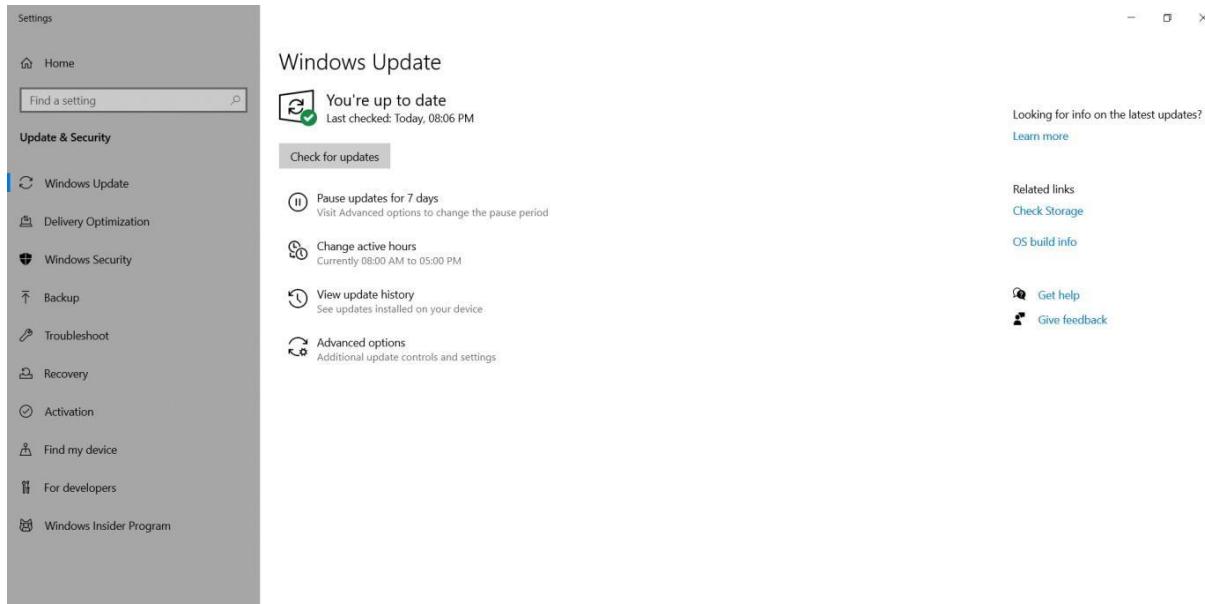


# Installing Docker on Windows 10

## First make sure Windows is up to date.

In the Windows search type "Windows Update" and select Windows Update setting.

You should see a green check and "You're up to date". If not click "Check for updates". You will need to repeat this process until you no longer have any updates to install.



## Next install WSL2

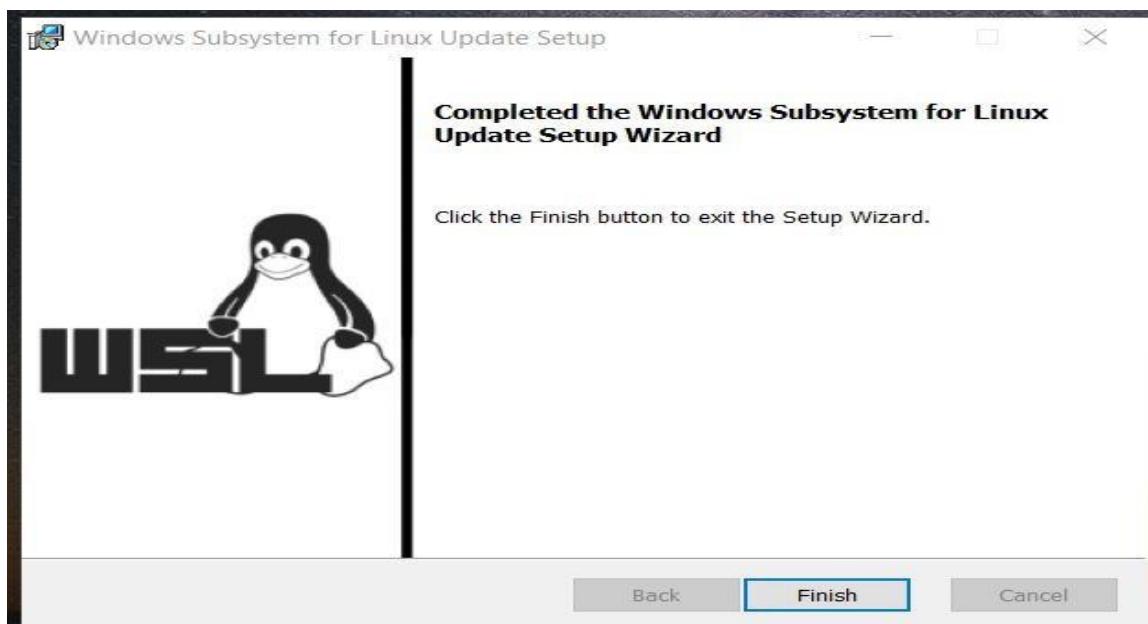
- From the Windows Search Type "powershell" then right-click on Windows PowerShell and then Run as administrator.
- Click 'Yes' to allow PowerShell to make changes to your device.
- In the Administrator: Windows PowerShell window run (copy and past) "wsl –install" to install Windows Services for Linux (wsl).

```
Display usage information.  
PS C:\Windows\system32> wsl --install  
Installing: Virtual Machine Platform  
Virtual Machine Platform has been installed.  
Installing: Windows Subsystem for Linux  
Windows Subsystem for Linux has been installed.  
Downloading: WSL Kernel  
Installing: WSL Kernel  
WSL Kernel has been installed.  
Downloading: Ubuntu  
The requested operation is successful. Changes will not be effective until the system is rebooted.  
PS C:\Windows\system32>
```

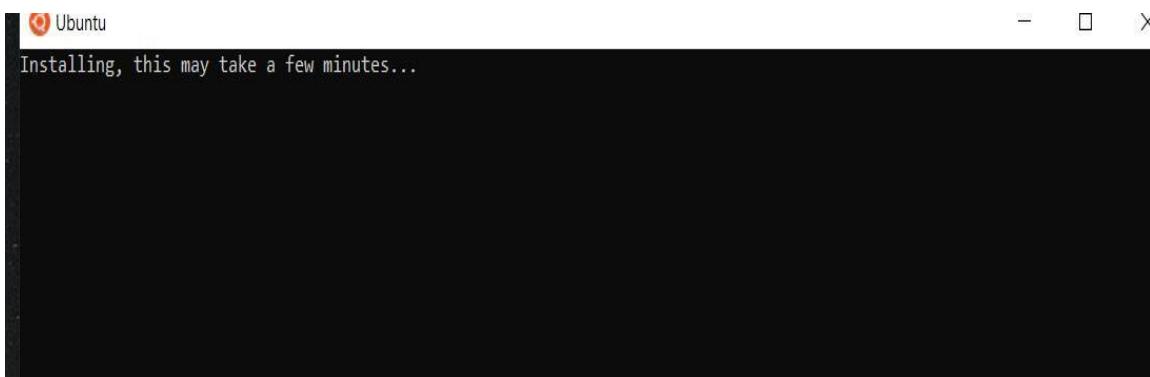
- Next enable the Virtual Machine Platform. In the Administrator: Windows PowerShell run (copy and past) "dism.exe /online /enable-feature /featurename:VirtualMachinePlatform /all /norestart".

```
PS C:\Windows\system32> dism.exe /online /enable-feature /featurename:VirtualMachinePlatform /all /norestart  
Deployment Image Servicing and Management tool  
Version: 10.0.19041.844  
  
Image Version: 10.0.19043.1266  
  
Enabling feature(s)  
[=====100.0%=====]  
The operation completed successfully.  
PS C:\Windows\system32>
```

- Download and install the WSL2 Linux kernel update package for x64 machines



- set up a Linux user



```
Retype new password:  
passwd: password updated successfully  
Installation successful!  
To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo_root" for details.
```

```
Welcome to Ubuntu 20.04 LTS (GNU/Linux 5.10.16.3-microsoft-standard-WSL2 x86_64)
```

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

```
System information as of Fri Oct 1 11:50:30 IST 2021
```

```
System load: 0.16 Processes: 8  
Usage of /: 0.4% of 250.98GB Users logged in: 0  
Memory usage: 2% IPv4 address for eth0: 172.24.46.235  
Swap usage: 0%
```

```
0 updates can be installed immediately.  
0 of these updates are security updates.
```

```
The list of available updates is more than a week old.  
To check for new updates run: sudo apt update
```

```
This message is shown once once a day. To disable it please create the  
/home/sam/.hushlogin file.
```

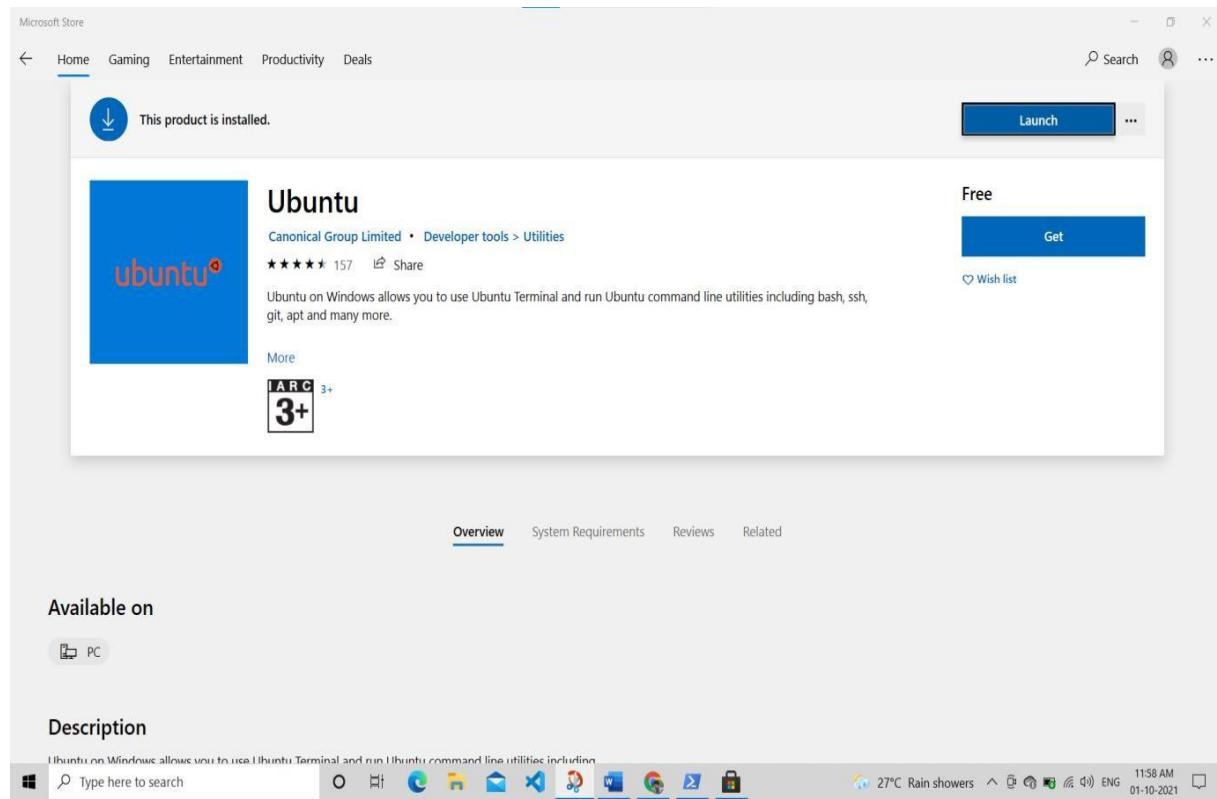
- Reboot Windows.
- Again, from the Windows Search Type "powershell" then right-click on Windows PowerShell and then Run as administrator.
- In the PowerShell window run "**wsl --set-default-version 2**".

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\Windows\system32> wsl --set-default-version 2
For information on key differences with WSL 2 please visit https://aka.ms/ws12
The operation completed successfully.
PS C:\Windows\system32>
```

- Next install a Linux distribution from the Microsoft Store



- You will now be able to run Linux commands in the Ubuntu terminal window.

```
un a command as administrator (user "root"), use "sudo <command>".  
"man sudo_root" for details.
```

```
LAPTOP-2S6KTBFB:~$ ls  
LAPTOP-2S6KTBFB:~$ exit
```

## Now you can install Docker Desktop for Windows

- Download the Docker Desktop for Windows installer from <https://www.docker.com/products/docker-desktop>
- Run the installer.



### Configuration

- Install required Windows components for WSL 2
- Add shortcut to desktop



### Docker Desktop 4.1.0

Unpacking files...

```
Unpacking file: resources/docker-desktop.iso  
Unpacking file: resources/ddvp.ico  
Unpacking file: resources/config-options.json  
Unpacking file: resources/componentsVersion.json  
Unpacking file: resources/bin/docker-compose  
Unpacking file: resources/bin/docker  
Unpacking file: resources/.gitignore  
Unpacking file: InstallerCli.pdb  
Unpacking file: InstallerCli.exe.config  
Unpacking file: frontend/vk_swiftshader_icd.json  
Unpacking file: frontend/v8_context_snapshot.bin  
Unpacking file: frontend/snapshot_blob.bin  
Unpacking file: frontend/resources/regedit/vbs/util.vbs  
Unpacking file: frontend/resources/regedit/vbs/regUtil.vbs
```



## Docker Desktop 4.1.0

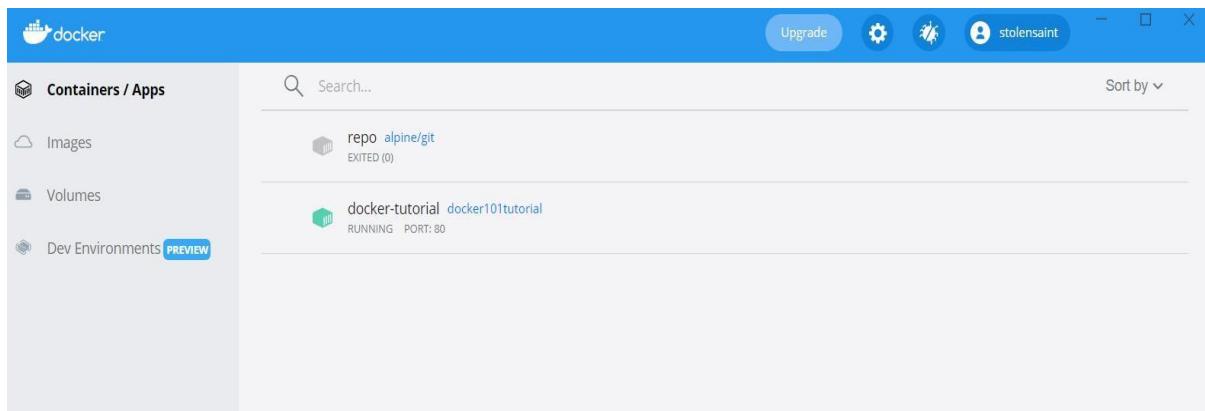
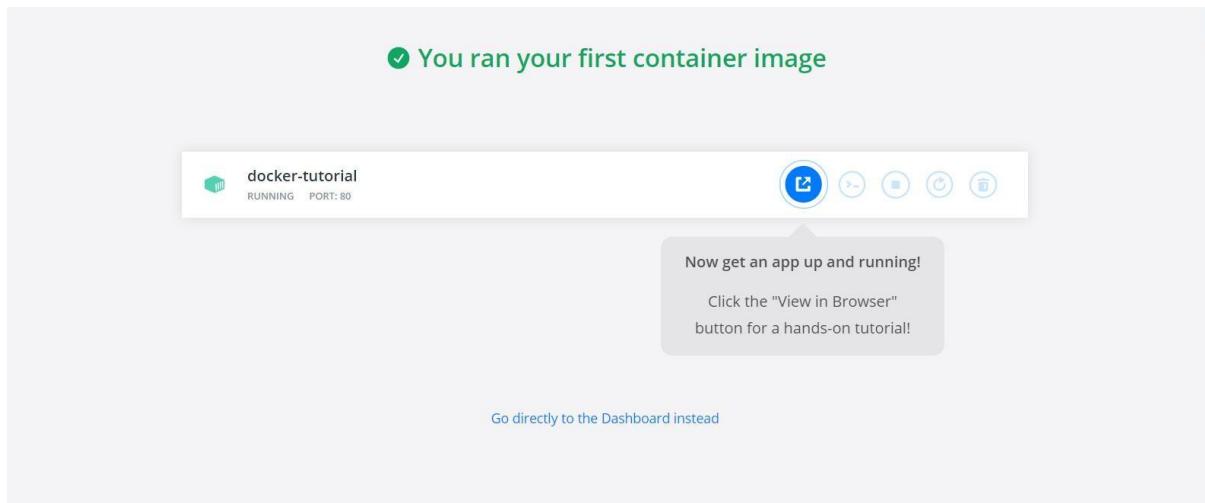
Installation succeeded

You must log out of Windows to complete installation.

**Close and log out**

- Reboot Windows.
- Login to Windows and let Docker finish setting up. This can take a few minutes depending on your machine.





- Run the docker “Hello World” from an Ubuntu Terminal run "docker run hello-world".

```
Unable to find image 'hello-world:latest' locally
latest: Pulling from library/hello-world
2db29710123e: Pull complete
Digest: sha256:9ade9cc2e26189a19c2e8854b9c8f1e14829b51c55a630ee675a5a9540ef6ccf
Status: Downloaded newer image for hello-world:latest

Hello from Docker!
This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:
 1. The Docker client contacted the Docker daemon.
 2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
    (amd64)
 3. The Docker daemon created a new container from that image which runs the
    executable that produces the output you are currently reading.
 4. The Docker daemon streamed that output to the Docker client, which sent it
    to your terminal.

To try something more ambitious, you can run an Ubuntu container with:
$ docker run -it ubuntu bash

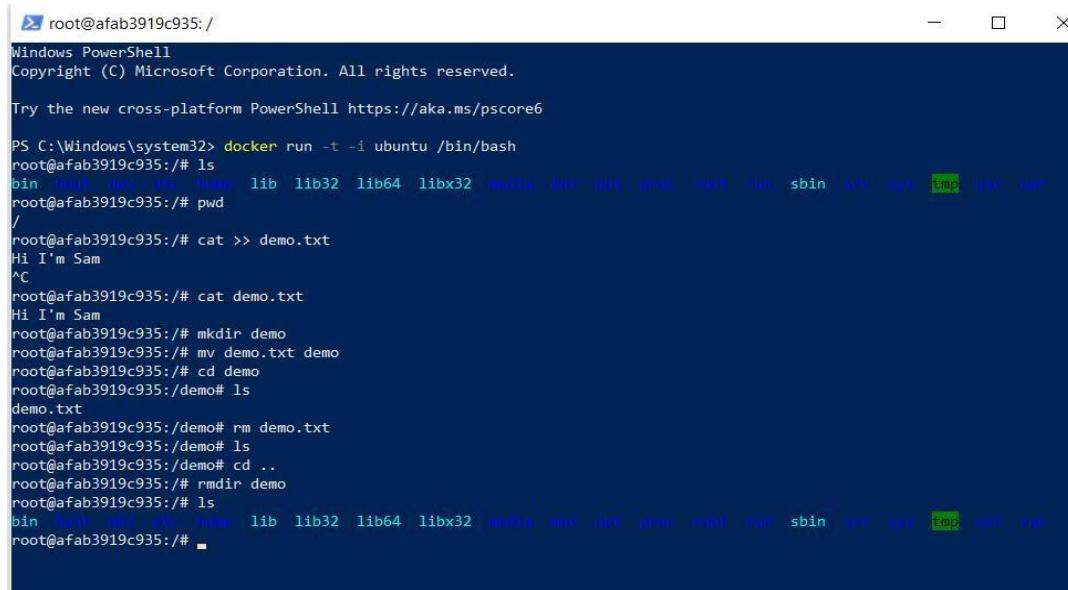
Share images, automate workflows, and more with a free Docker ID:
https://hub.docker.com/

For more examples and ideas, visit:
https://docs.docker.com/get-started/
```

## Running Ubuntu Machine

- Run the command “**docker run -t -i ubuntu /bin/bash**” in powershell

- This is a Linux root bash, try some commands



```

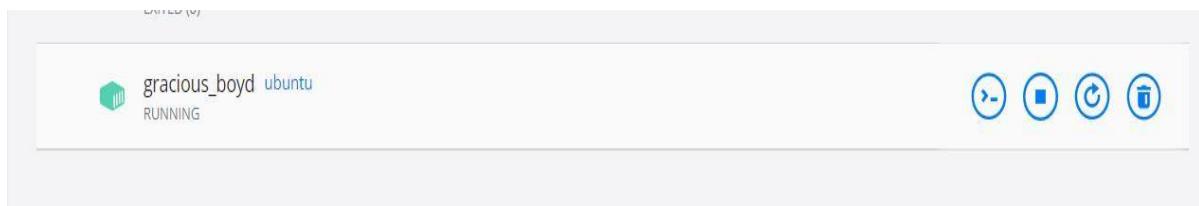
root@afab3919c935:/#
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

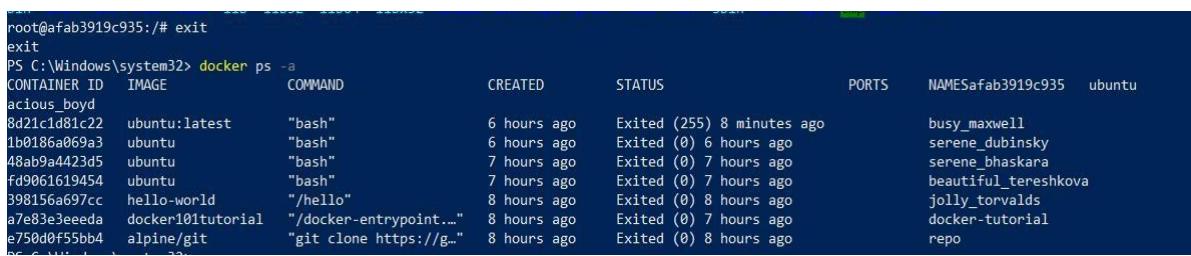
PS C:\Windows\system32> docker run -t -i ubuntu /bin/bash
root@afab3919c935:/# ls
bin  boot  dev  etc  home  lib  lib32  lib64  libx32  media  opt  proc  root  run  sbin  smm  sys  tmp  var  var
root@afab3919c935:/# pwd
/
root@afab3919c935:/# cat >> demo.txt
Hi I'm Sam
^C
root@afab3919c935:/# cat demo.txt
Hi I'm Sam
root@afab3919c935:/# mkdir demo
root@afab3919c935:/# mv demo.txt demo
root@afab3919c935:/# cd demo
root@afab3919c935:/demo# ls
demo.txt
root@afab3919c935:/demo# rm demo.txt
root@afab3919c935:/demo# ls
root@afab3919c935:/demo# cd ..
root@afab3919c935:/# rmdir demo
root@afab3919c935:/# ls
bin  boot  dev  etc  home  lib  lib32  lib64  libx32  media  opt  proc  root  run  sbin  smm  sys  tmp  var  var
root@afab3919c935:/# 

```

## Docker GUI-Containers



## Removing All Containers



```

root@afab3919c935:/# exit
exit
PS C:\Windows\system32> docker ps -a
CONTAINER ID   IMAGE     COMMAND      CREATED     STATUS          PORTS     NAMES
acius_boyd     ubuntu:latest "bash"       6 hours ago   Exited (255) 8 minutes ago   busy_maxwell
8d21c1d81c22   ubuntu:latest "bash"       6 hours ago   Exited (0) 6 hours ago   serene_dubinsky
1b0186a069a3   ubuntu:latest "bash"       6 hours ago   Exited (0) 6 hours ago   serene_bhaskara
48ab9a4423d5   ubuntu:latest "bash"       7 hours ago   Exited (0) 7 hours ago   beautiful_tereshkova
fd9061619454   ubuntu:latest "bash"       7 hours ago   Exited (0) 7 hours ago   jolly_torvalds
398156a697cc   hello-world:latest "/hello"   8 hours ago   Exited (0) 8 hours ago   docker-tutorial
a7e83e3eeda   docker101tutorial:latest "/docker-entrypoint..." 8 hours ago   Exited (0) 7 hours ago   repo
e750d0f55bb4   alpine/git:latest "git clone https://g..." 8 hours ago   Exited (0) 8 hours ago

```

```
C:\Windows\system32> docker rm -f busy_maxwell
busy_maxwell
PS C:\Windows\system32> docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
afab3919c935 ubuntu "/bin/bash" 7 minutes ago Exited (0) 2 minutes ago
1b0186a069a3 ubuntu "bash" 6 hours ago Exited (0) 6 hours ago
48ab9a4423d5 ubuntu "bash" 8 hours ago Exited (0) 7 hours ago
fd9061619454 ubuntu "bash" 8 hours ago Exited (0) 7 hours ago
398156a697cc hello-world "/hello" 8 hours ago Exited (0) 8 hours ago
a7e83e3eeeda docker101tutorial "/docker-entrypoint..." 8 hours ago Exited (0) 8 hours ago
e750d0f55bb4 alpine/git "git clone https://g..." 8 hours ago Exited (0) 8 hours ago
PS C:\Windows\system32> docker rm -f gracious_boyd
gracious_boyd
PS C:\Windows\system32> docker rm -f serene_dubinsky
serene_dubinsky
PS C:\Windows\system32> docker rm -f serene_bhaskara
serene_bhaskara
PS C:\Windows\system32> docker rm -f beautiful_tereshkova
beautiful_tereshkova
PS C:\Windows\system32> docker rm -f jolly_torvalds
jolly_torvalds
PS C:\Windows\system32> docker rm -f docker-tutorial
docker-tutorial
PS C:\Windows\system32> docker rm -f repo
repo
PS C:\Windows\system32> docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
PS C:\Windows\system32>
```

