NETWORKING AND SYSTEM ADMINISTRATION LAB RECORD

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COMPUTER HARDWARE

COMPUTER HARDWARE:

Computer hardware refers to the physical elements of a computer.This is also sometime called the equipment of the computer.Hardware represent the physical and tangible components of a computer ,that is the component that can be seen and touched.It encompasses everything with a circuit board that operates within a pc or laptop.Computer hardware can be categorized as having either internal or external components.

- Internal component include items such as th motherboard,central processing unit(cpu),random access memory(RAM),hard drive,optical drive,heat sink,power supply,transistors,chips,graphics processing unit(GPU),network interface card(NIC) and universal serial bus(USB) ports.These components collectively process or store the instructions delivered by the program or operating system(OS).
- External components also called peripheral components, are those items that are often connected to the computer in order to control either its input or output. Common input component include a mouse,keyboard,microphone,camera,touchpad,stylus,joystick,scanner,USB flash drive or memory card.Monitors, printers,speakers,headphones and earphones/earbuds are all examples of output computer hardware.

Internal component:

- ✓ Motherboard

  The motherboard is at the center of what makes a PC work.It houses the CPU and is a hub that all other hardware runs through .The motherboard acts as a brain :allocating power where it's needed,communicating with and coordinating

across all other components-making it one of the most important pieces of hardware in a computer.

When choosing a motherboard,it's important to check what hardware ports the motherboard supplies.It's vital to check how many USB ports,and what grade they are,as well as what display ports are used and how many of each there are.

Although the motherboard is just one piece of circuitry,it is home to another one of the most important pieces of hardware :the processor.

- ✓ CPU(Central Processing Unit)

The CPU(Central Processing Unit) is responsible for processing all information from programs run by your computer.The clock speed or the speed at which the processor processes information,is measured in gigahertz(GHz).This means that a processor advertising a high GHz rating will likely perform faster than a similarly specified processor of the same brand and age.

- ✓ RAM(Random Access Memory)

Random Access Memory or RAM is hardware found in the slots of the motherboard.The role of RAM is to temporarily store on the fly information created by programs and to do so in a way that makes this data immediately accessible.The tasks that require random memory could be rendering images for graphic design ,edited video or photographs ,multi tasking with multiple apps open.

- ✓ Hard Drive

The hard drive is a storage device responsible for sorting permanent and temporary data.This data comes in many different forms,but is essentially anything saved or installed to a computer.There are two different types of storage device :traditional hard disk drive(HDD) and the newer solid state drives(SSD).Hard disk drive work by writing binary data on to spinning magnetic disks called platters that rotate at high speeds, while a solid state drive stores data by using static flash memory chips.

- ✓ Graphics Processing Unit(GPU)

A programmable processor specialized for rendering all images on the computer's screen. A GPU provides the fastest graphics processing, and for gamers, the GPU is a stand-alone card plugged into the PCI Express bus. GPU circuitry can also be part of the motherboard chipset or on the CPU chip. A GPU performs parallel operations. Although it is used for 2D data as well as for zooming and panning the screen, a GPU is essential for smooth decoding and rendering of 3D animations and video. The more sophisticated the GPU, the higher the resolution and the faster and smoother the motion. GPUs on stand-alone cards include their own memory, while GPUs built into the chipset or CPU chip share main memory with the CPU.

- ✓ Power Supply

The power supply converts the power from the outlet into usable power for the other components inside the computer.Typically ,more power is needed to run more complex system.

- ✓ Chip

A small piece of semiconducting material on which a integrated circuit is embedded.A typical chip is less than square inches and can contain millions of electronic components.Computer consist of many chips placed on electronic boards called printed circuit boards.

External components:

- ✓ Monitor

The computer's monitor or screen is the window into the workings of the computer.Its visual display allows for a visual interpretation of all that is happening.There are two major forms of computer monitor .The first is the CRT ,which projects the picture from behind the screen and is therefore very bulky and heavy. The second is LCD,which uses liquid crystals and electronic triggers to display images,allowing for a much more sleek and lightweight unit.

- ✓ Keyboard

The keyboard allows typed input into the computer.It has buttons for all the letters of the alphabet as well as numbers,symbols and special function keys.Some keyboards,especially on macintosh computers,have USB ports available on them for easy access.

- ✓ Mouse

The mouse allows movement of the cursor on the sreen.It allows the selection of icons and links much more quickly and smoothly than keyboard.

- ✓ Printers and Scanners

Printers and scanners although not necessary for the overall function of a computer, are helpful tool that allow for document management,whether that be uploading a document into the computer using the scanner and print a document using the printer.

HARDWARE VIRTUALIZATION

Hardware virtualization is the abstraction of physical computing resources from the software that uses the resources .This is made possible by a virtual machine (VM) manager called a hypervisor.Essentially the hypervisor creates virtual versions of internal hardware so that resources can be shared and used more efficiently.In cloud computing ,hardware virtualization is often associated with infrastructure as a services(IaaS).

IaaS is a delivery model for providing hardware resources over high-speed internet.In the IaaS model,a cloud provider hosts hardware components that are traditionally present in an onpremises data center, including servers,storage and networking hardware,but unlike a hardware as a services(HaaS) provider ,an IaaS provider will also host the software that makes virtualizatiom possible.Typically,an IaaS provider also supplies a range of services to accompany infrastructure components.These can include detailed billing,monitoring,log access ,security,load balancing and clustering as well as storage resiliency such as back up,replication and recovery.

OPERATING SYSTEM:

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

Some polpular Operating Systems include Linux operating system,windows operating system,VMS,OS/400,AIX,z/OS,etc.

History Of OS

- Operating systems were first developed in the late 1950s to manage tape storage
- The General Motors Research Lab implemented the first OS in the early 1950s for their IBM 701
- In the mid-1960s, operating systems started to use disks
- In the late 1960s, the first version of the Unix OS was developed
- The first OS built by Microsoft was DOS. It was built in 1981 by purchasing the 86-DOS software from a Seattle company
- The present-day popular OS Windows first came to existence in 1985 when a GUI was created and paired with MS-DOS.

Types of Operating System:

- Batch Operating System
- Multitasking/Time Sharing OS
- Multiprocessing OS
- Real Time OS

- Distributed OS
- Network OS
- Mobile OS

Batch Operating System

Some computer processes are very lengthy and time-consuming. To speed the same process, a job with a similar type of needs are batched together and run as a group.

The user of a batch operating system never directly interacts with the computer. In this type of OS, every user prepares his or her job on an offline device like a punch card and submit it to the computer operator.

Multi-Tasking/Time-sharing Operating systems

Time-sharing operating system enables people located at a different terminal(shell) to use a single computer system at the same time. The processor time (CPU) which is shared among multiple users is termed as time sharing.

Real time OS

A real time operating system time interval to process and respond to inputs is very small. Examples: Military Software Systems, Space Software Systems are the Real time OS example.

Distributed Operating System

Distributed systems use many processors located in different machines to provide very fast computation to its users.

Network Operating System

Network Operating System runs on a server. It provides the capability to serve to manage data, user, groups, security, application, and other networking functions.

Mobile OS

Mobile operating systems are those OS which is especially that are designed to power smartphones, tablets, and wearables devices.

Some most famous mobile operating systems are Android and iOS, but others include BlackBerry, Web, and watchOS.

Some of important functions of an operating system

- ✓ **Memory management**

Memory management refers to management of Primary Memory or main memory.Main memory is a large array of words or bytes where each word or byte has its own address.

Main memory provides a fast storage that can be accessed directly by the CPU.For a program to be executed,it must in the main memory.An operating System does the following activities for memory management:-

- Keeps tracks of primary memory ,that is ,what part of it are in use by whom,whwt part are not in use.
- In multiprogramming ,the os decides which process will get memory which and how much.
- Allocate the memory when a process request it to do so.

- De allocate the memory when a process no longer needs it or has been terminated.

✓ **Processor Management**

In multiprogramming environment, the OS decides which process gets the processor when and for how much time.This function is called process scheduling.An operating system does the following activity for processor management system:-

- Keeps tracks of processor and status of process.The program responsible for this task is known as traffic controller.
- Allocates the processor(CPU)to a process.
- De-allocates processor when a process is no longer required.

✓ **Device Management**

An operating system manages device communication via their respective drivers.It does the following activities for device management:-

- Keeps tracks of all dvices .Program responsible for this task is known as the I/O controller.
- Decides which process gets the device when and for how much time.
- Allocates the device in the effient way.
- De-allocates devices.

✓

✓ **File Management**

A file system is normally organized into directories for easy navigation and usage.These directories may contain files and other directions.

An operating system does the following activities for the file management:-

- Keeps track of information ,location,usage,status etc.The collective facilities are often known as file system.
- Decides who gets the resources.
- Allocate the resources.
- De-allocates the resources.

✓ **Other Important Activities**

Following are some of the important activities that an Operating System performs:-

- **Security**

By means of password and similar other techniques,it prevents unauthorized access to programs and data .

- **Control over system performance**

Recording delays between request for a service and response from the system.

Advantage of using Operating System

- Allows you to hide details of hardware by creating an abstraction
- Easy to use with a GUI
- Offers an environment in which a user may execute programs/applications
- The operating system must make sure that the computer system convenient to use
- Operating System acts as an intermediary among applications and the hardware components
- It provides the computer system resources with easy to use format
- Acts as an intermediator between all hardware's and software's of the system

Disadvantages of using Operating System

- If any issue occurs in OS, you may lose all the contents which have been stored in your system
- Operating system's software is quite expensive for small size organization which adds burden on them. Example Windows
- It is never entirely secure as a threat can occur at any time

Component of MotherBoard

Q)Prepare note on

1. **Components of a Motherboard**
2. **RAM Modules**
3. **Daughter Cards**
4. **Bus Slots**
5. **SMPS**
6. **Internal storage devices**
7. **Interfacing ports**

1.Component of MotherBoard

MotherBoard

Motherboard is the most important component in any personal computer. It contains almost : every important elements of the computer system. Normally, the motherboard contains the CPU, Memory, VGA, expansion slots etc.The motherboard of a computer is the main circuit board within a typical desktop computer, laptop or server. It is the central printed circuit board (RGB) in some complex electronic systems, such as modem personal computers. The motherboard is sometimes alternatively known as the mainboard, system board, or, on Apple computers, the logic board. It is also sometimes casually shortened to mobo.

Component of MotherBoard :

There are so many components present in the motherboard. The main Components are ,

Basic Input/output System (BIOS)

BIOS stands for Basic Input/Output System. BIOS is a "read-only" memory, which consists of low-level software that controls the system hardware and acts as an interface between the operating system and the hardware. BIOS is essentially the link between the computer hardware and software in a system. All motherboards include a small block of Read-Only Memory (ROM) which is separate from the main system memory used for loading and running software. On PCs, the BIOS contains all the code required to control the keyboard, display screen, disk drives, serial communications, and a number of miscellaneous functions. The system BIOS is a ROM chip on the motherboard used during the startup routine (boot process) to check out the system and prepare to run the hardware.

Central Processing Unit (CPU)

The CPU is the computer's brain. It is responsible for fetching, decoding, and executing program instructions as well as performing mathematical and logical calculations. The processor chip is identified by the processor type and the manufacturer. This information is usually inscribed on the chip itself. For example, Intel 386, Advanced Micro Devices (AMD) 386, Cyrix 486, Pentium MMX, Intel Core 2Duo, or Core i7. If the processor chip is not on the motherboard, you can identify the processor socket as socket 1 to Socket 8, LGA 775 among others. This can help you identify the processor that fits in the socket.

The CMOS Battery

Motherboards also include a small separate block of memory made from CMOS RAM chips which are kept alive by a battery (known as a CMOS battery)

even when the PC's power is off. This prevents reconfiguration when the PC is powered on. CMOS devices require very little power to operate.

The Computer Memory

Random-Access Memory is volatile, meaning it loses its contents once power is turned off. This is different from non-volatile memory, such as hard disks and flash memory, which do not require a power source to retain data. When a computer shuts down properly, all data located in RAM is returned to permanent storage on the hard drive or flash drive. At the next boot-up, RAM begins to fill with programs automatically loaded at startup, a process called booting. Later on, the user opens other files and programs that are still loaded in memory.

Cache Memory

Cache memory is a small block of high-speed memory (RAM) that enhances PC performance by pre-loading information from the (relatively slow) main memory and passing it to the processor on demand. Most CPUs have an internal cache memory which is referred to as Level 1 or primary cache memory. This can be supplemented by external cache memory fitted on the motherboard.

Expansion Buses

An expansion bus is an input/output pathway from the CPU to peripheral devices and it is typically made up of a series of slots on the motherboard. Expansion boards plug into the bus.

Chip-sets

A chipset is a group of small circuits that coordinate the flow of data to and from a PC's key components. These key components include the CPU itself, the

main memory, the secondary cache, and any devices situated on the buses. A chipset also controls data flow to and from hard disks and other devices connected to the IDE channels.

Expansion slots

The expansion slots are the backbone of a computer. Without the expansion slots computer will not be of much use. If we want to add some new peripheral devices to our computer, we need an expansion slot. Expansion slots are long thin connectors on the motherboard, on which one can connect various expansion cards such as display card, usb card, sound card, network card etc.These slots are categorized according to the number of bits that they can transfer at a time and the bus architecture used.

The expansion slots can be divided into the following categories:

- 8-bit ISA
- 16-bit ISA
- MCA
- EISA
- VESA Local or VL Bus
- PCI Local Bus
- PCI Express
- AGP

Modem Pentium based motherboards manufacturers stopped using ISA slots they provide only PCI, AGP and PCI Express slots.

Ports

Ports are used by a motherboard to interface with electronics both inside and outside of the computer. Integrated ports are those that are part of, directly wired to, the motherboard. Internal integrated ports are used to connect devices inside the system unit. External ports may be connected to the motherboard directly (integrated) or by circuit boards that are inserted into slots on the motherboard. It is often possible to add new external ports by inserting such a circuit board into an open slot. The external integrated ports are generally grouped together as shown below. Expansion card ports are arranged in a row of equal sized rectangular slots.

Typical integrated motherboard ports are

1. PS/2

PS/2 ports were for connecting peripherals such as mouse and keyboard to the computer, but are now outdated. PS/2 based mice and keyboards have now been replaced by USB ports as the popular standard. This trend for USB over PS/2 started in circa 2004.

2. USB

USB, or Universal Serial Bus, is a connectivity specification, currently at version 3 (V3). They are very common today, connecting flash drives and many peripherals. Modern desktop systems have should have 4-8 on the back of the computer and at least two on the front. USB is one of the most successful interconnect in computing history. V1 operates at 1.5 Mbps (low speed) or 12 Mbps (full speed), V2 (high speed) at 480 Mbps, and V3 (super speed) at up to 5Gbps. It can be found in over 2 billion PC and mobile devices. USB has strong consumer brand recognition and a reputation for ease-ofuse. USB connectors

are sometimes used to supply power, generally to recharge handheld devices like a smartphone.

3. Serial

An outdated piece of technology, serial ports were most often used to connect the mouse and keyboard. By circa 2000, most personal computers stopped relying on serial ports and were replaced by PS/2 and/or USB ports.

4. Parallel

Parallel ports are used to connect other peripherals such as joysticks, and more commonly, printers. Similar to the serial port, this technology is slowly being phased out in favor of USB. Parallel ports can still be found in many motherboards today.

5. VGA

A VGA, or Video Graphics Array, connector is used to connect a monitor or other video equipment. The same connector is sometimes used for high definition television and is sometimes called an RGB connector.

6. Audio

The audio input and stereo output ports connect to external speakers, a microphone, head sets, and possibly a game. The external ports are color coded by industry standard.

Firewire

Technically known as the IEEE 1394 interface, but dubbed by Apple as Firewire this connection medium hoped to surpass USB in terms of speed and popularity. While it did outperform USB v2 in speed tests, uptake was very limited due to the existing widespread use of USB. Firewire is the standard for

high definition audio and video transfer and may be found on many digital camcorders. Also known by the brand names i.LINK and Lynx.

Modem

For many years the telephone, or voice band, modem was the primary means of connecting desktop and laptop PCs to the Internet. Modems have not gone away, as broadband connections are not available in all areas. A standard telephone modem uses your existing analog telephone line at speeds up 56 Kbps. The speed is limited by the quality of the phone line connection — extraneous noise lowers the actual throughput.

ExpressCard

The ExpressCard and slot is used primarily on laptop computers. It replaces the older PC Card. The ExpressCard comes in two sizes, although the ExpressCard/34 may be used in an ExpressCard/54 slot. Hardware that may be plugged into a computer via an ExpressCard includes connect cards, FireWire 800 (1394B), USB 3.0, 1Gb/sec Ethernet, Serial ATA external stick drives, solid-state drives, external enclosures for desktop size PCI Express graphics cards, wireless network interface cards, TV tuner cards, common access card (CAC) readers, and sound cards.[src] Other card slots may also be available, such a PC cards, smart cards, and secure digital cards.

Graphics Card

Graphics cards are also called video cards or a video adapter. They are in all PCs, but may be integrated on the motherboard. Graphic cards generate output images that can be displayed on the monitor. While many graphics cards are built into the motherboard these days, enthusiasts will invest in stand-alone graphics cards with more powerful processing capabilities. This allows for heavy image editing, or better rendering and frame rates in computer games.

Sound Card

A sound card, also referred to as an audio card, facilitates the input and output of audio signals to and from a computer under the control of computer programs. Sound cards for computers were uncommon until 1988, which left the single internal PC speaker as the only way early PC software could produce sound and music. Uses of a sound card include the audio component's for multimedia applications such as games, video/audio editing software and music composition. Most computers today have sound capabilities built into the motherboard, while others require additional expansion cards.

Network Interface Card

A Network Interface Card (NIC), also called a network card, network adapter, or LAN Adapter is a piece of computer hardware designed to allow computers to communicate over a computer network. Used for remote communication via cable. Data is transmitted over a cable network. The NIC connects computers to the Internet and other devices, such as printers. Many modern motherboards have NICs built in by default. Most laptops also provide a wireless adapter or wireless network interface controller (WNIC).

2.RAM modules

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

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. 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.

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.

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.

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.

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

DRAM 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 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.

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.

The types of DRAM packages are

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.

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.Daughter card

A daughtercard is also called a daughterboard.A daughterboard (daughter card) 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 daughter boards 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 .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.

4.Expansion slot

It is also 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.

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.

6. INTERNAL STORAGE DEVICES

Internal storage can 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 is 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. This led to modern random-access memory (RAM). It is small-sized, light, but quite expensive at the same time

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 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 .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.

Secondary storage

Secondary storage also known as external memory or auxiliary storage is 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

nonvolatile (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.

Tertiary storage

Tertiary storage is a level below secondary storage. Typically, it involves a robotic mechanism which will mount 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. This is primarily useful for extraordinarily large data stores, accessed without human operators. Typical examples include tape libraries and optical jukeboxes.

7.INTERFACE PORT

A port is basically a physical docking point which is basically used to connect the external devices to the computer, or we can say that A port act as an interface between the computer and the external devices.

- ✓ **Ports**

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USB, or Universal Serial Bus, is a connectivity specification, currently at version 3 (V3). They are very common today, connecting flash drives and many peripherals. Modern desktop systems have should have 4-8 on the back of the computer and at least two on the front. USB is one of the most successful interconnect in computing history. V1 operates at 1.5 Mbps (low speed) or 12 Mbps (full speed), V2 (high speed) at 480 Mbps, and V3 (super speed) at up to 5Gbps. It can be found in over 2 billion PC and mobile devices. USB has strong consumer brand recognition and a reputation for ease-ofuse. USB connectors are sometimes used to supply power, generally to recharge handheld devices like a smartphone.

3. Serial

An outdated piece of technology, serial ports were most often used to connect the mouse and keyboard. By circa 2000, most

personal computers stopped relying on serial ports and were replaced by PS/2 and/or USB ports.

4. Parallel

Parallel ports are used to connect other peripherals such as joysticks, and more commonly, printers. Similar to the serial port, this technology is slowly being phased out in favor of USB. Parallel ports can still be found in many motherboards today.

5. VGA

A VGA, or Video Graphics Array, connector is used to connect a monitor or other video equipment. The same connector is sometimes used for high definition television and is sometimes called an RGB connector.

6. Audio

The audio input and stereo output ports connect to external speakers, a microphone, head sets, and possibly a game. The external ports are color coded by industry standard.

Basic Linux Commands

Basic Linux Commands

1) pwd (Print Working Directory)

- Used to find out the path of the current working directory

- Absolute path which is basically a path of all the directories that start with a forward slash(/)

- Relative path defined as the path related to the present working directory from root directory

```
ashtami@ashtami-VirtualBox:~$ pwd
/home/ashtami
```

2) history

- To review the commands you have entered before.

```
ashtami@ashtami-VirtualBox:~$ history
    1  pwd
    2  history
ashtami@ashtami-VirtualBox:~$
```

3)man

- shows the manual instruction of the tail command.

- man man to start learning about man utility**.**

4) cd

- To navigate througj the linux files and directories. - cd .. (to move one directory up) - cd (to go straight to the home folder) - cd - (to move to a previous directory)

```
ashtami@ashtami-VirtualBox:~$ cd Desktop
ashtami@ashtami-VirtualBox:~/Desktop$
```

05) **ls**

- Used to view the content of the directory.

- ls -R (Will list all the files in the subdirectory).

- ls -l (long listing)

– ls -a (will show hidden files)

– ls -al (will list all the files and directories with detailed information like the permissions,size,owners.)

- ls -t (list files sorted in the order of last modified)

- ls -r (option will reverse the natural sorting order.usually used in combination with order switches such as ls -tr.This will reverse the time wise listing.

```
ashtami@ashtami-VirtualBox:~/Desktop$ ls -R
.:
ashtami@ashtami-VirtualBox:~/Desktop$ ls -L
ashtami@ashtami-VirtualBox:~/Desktop$ ls -a
.  ..
ashtami@ashtami-VirtualBox:~/Desktop$ ls -al
total 8
drwxr-xr-x  2 ashtami ashtami 4096 Jun 13 07:29 .
drwxr-xr-x 15 ashtami ashtami 4096 Jun 13 07:36 ..
```

6) **mkdir**

- to make a new directory.

- mkdir – p (to create a directory in between two existing directories.

```
ashtami@ashtami-VirtualBox:~/Desktop$ mkdir mca
ashtami@ashtami-VirtualBox:~/Desktop$ mkdir -p mca/2021/newfile
ashtami@ashtami-VirtualBox:~/Desktop$
```

7) **rmdir**

-to delete a directory.(onlu allows you to delete empty directories).

```
ashtami@ashtami-VirtualBox:~/Desktop$ rmdir/root/Desktop/programs/rmca/networki
ng
```

8) **touch**

- to create a blank new file .

```
ashtami@ashtami-VirtualBox:~/Desktop$ touch /root/Desktop/programs/mca/example.
php
```

9) **rm**

- to delete directories and the contents within them .

- rm -r (to delete directory) .

- rm filename (to remove a file).

```
ashtami@ashtami-VirtualBox:~/Desktop$ rm example.php
```

10) **cat**

- list the content of a file

- cat >filename (create a new file)

- cat filename1 filename2>filename3 (join two files and store the output in the third file)

- cat filename | tr a-z A-Z >output.txt (to convert a file to upper or lower case)

- cat >>myfile (insert data to a file)

```
ashtami@ashtami-VirtualBox:~/Desktop$ cat >file2.txt
ashtami
insert
delete
how are you
```

1.echo

- To move some data into a file.
- To add a text.

```
ashtami@ashtami-VirtualBox:~$ echo basic linux commands part 2 >>file2.txt
ashtami@ashtami-VirtualBox:~$ cat file2.txt
basic linux commands part 2
ashtami@ashtami-VirtualBox:~$
```

2.head

- used to view the first lines of any text file.
- default it shows 10 lines.

```
ashtami@ashtami-VirtualBox:~$ head -n 1 /etc/passwd
root:x:0:0:root:/root:/bin/bash
ashtami@ashtami-VirtualBox:~$
```

3.tail

- will display the last ten lines of a text files.

```
ashtami@ashtami-VirtualBox:~$ tail /etc/passwd
nm-openvpn:x:118:124:NetworkManager OpenVPN,,,:/var/lib/openvpn/chroot:/usr/sbi
n/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/n
ologin
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
ashtami:x:1000:1000:Ashtami Prasad,,,:/home/ashtami:/bin/bash
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
```

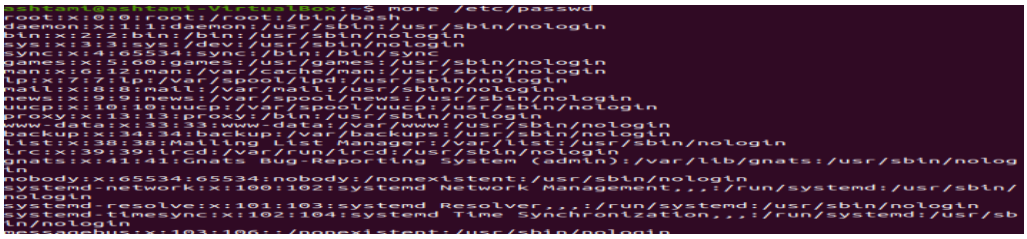
4.read

- read the contents of a line into a variable

```
ashtami@ashtami-VirtualBox:~$ read v1 v2 v3
hello dorA caps
ashtami@ashtami-VirtualBox:~$ echo "[$v1] [$v2] [$v3]"
[hello] [dorA] [caps]
```

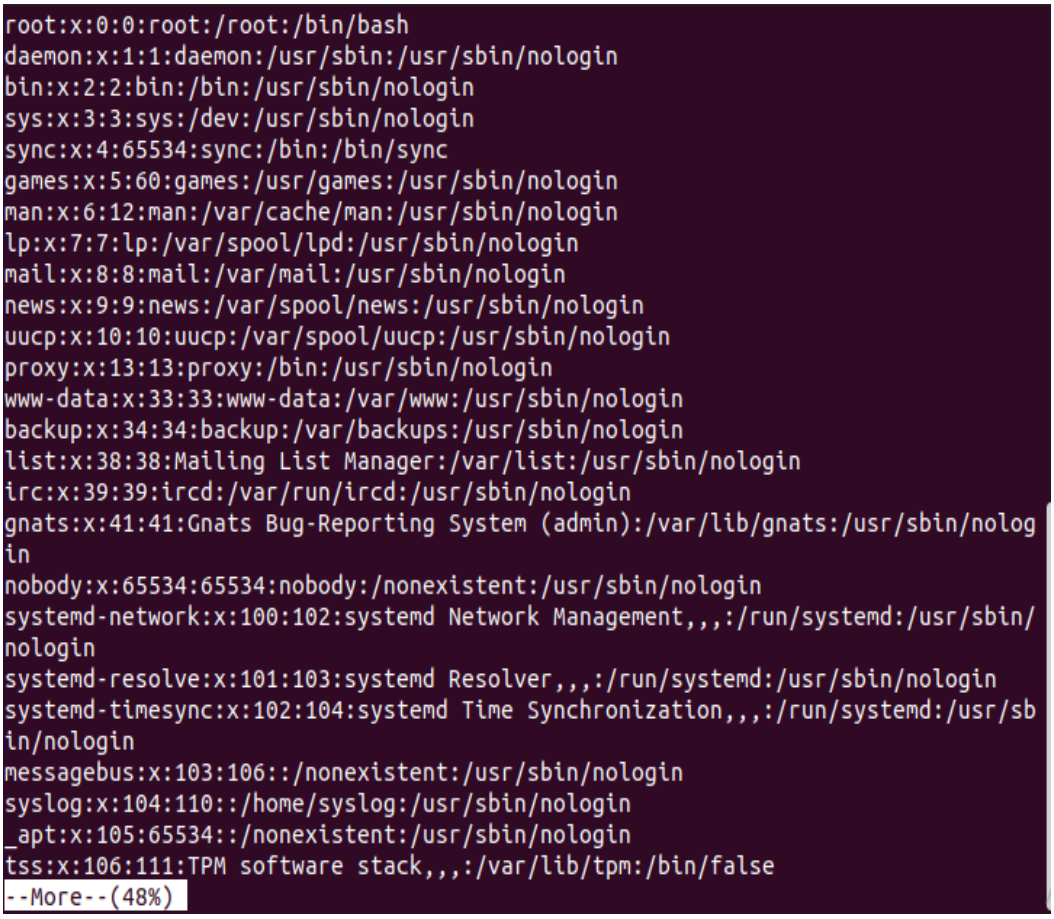
5.more

- 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.
- Enter key : to scroll down page line by line
- Space bar : to go to next page
- b key : to go to the backward page
- /key : to search string



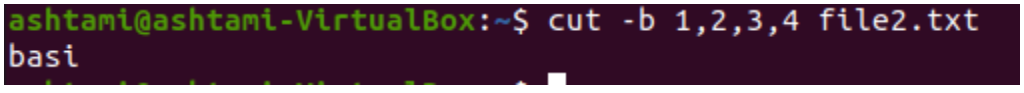
6.less

- Automatically adjust with the width and height of terminal window



7.cut

- used for cutting out the section from each lines of files and writing the standard output.
- It can be used to cut parts of a line by byte position character and field



8.paste

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

```
ashtami@ashtami-VirtualBox:~$ paste file2.txt q1.txt
basic linux commands part 2     paste: q1.txt: Is a directory
```

9. uname

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

```
ashtami@ashtami-VirtualBox:~$ uname
Linux
ashtami@ashtami-VirtualBox:~$ uname -r
5.8.0-43-generic
ashtami@ashtami-VirtualBox:~$ uname -a
Linux ashtami-VirtualBox 5.8.0-43-generic #49~20.04.1-Ubuntu
7:56 UTC 2021 x86_64 x86_64 x86_64 GNU/Linux
ashtami@ashtami-VirtualBox:~$ uname -s
Linux
ashtami@ashtami-VirtualBox:~$ uname -v
#49~20.04.1-Ubuntu SMP Fri Feb 5 09:57:56 UTC 2021
ashtami@ashtami-VirtualBox:~$ uname -i
x86_64
ashtami@ashtami-VirtualBox:~$ uname -n
ashtami-VirtualBox
ashtami@ashtami-VirtualBox:~$
```

10. cp

- used to copy files from the current directory to a different directory
- cp -i(will ask for user's consent in case of a potential file overwrite.)
- cp -p (will preserve source file mode, ownership and time stamp)
- cp -r (will copy directories recursively)
- cp -u (copies files only if the destination file is not existing or the source file is newer than the destination file)

```
ashtami@ashtami-VirtualBox:~$ cp -r file2.txt /rmca
```

11. mv

- to move files
- rename files

```
ashtami@ashtami-VirtualBox:~$ mv file2.txt /mca1
```

12. locate

- to find a file
- locate -i filename (make it case insensitive you can search file if you don't remember its exact name)
- * (to search for a file that contains two or more words)

```
ashtami@ashtami-VirtualBox:~$ locate -i where
```

13. find

- To search for files or directories
- Find. -name filename (to find files in the current directory)

```
ashtami@ashtami-VirtualBox:~$ find file2.txt
file2.txt
```

14. grep

- Search through all the text in a given file

```
ashtami@ashtami-VirtualBox:~$ grep 'hello' file2.txt
ashtami@ashtami-VirtualBox:~$ grep boo /etc/passwd
ashtami@ashtami-VirtualBox:~$ grep  /etc/passwd q1.txt
grep: q1.txt: Is a directory
```

15. df

- To get report on the system's disk space usage shows in percentage and kbs.

```
ashtami@ashtami-VirtualBox:~$ df -m
Filesystem     1M-blocks  Used Available Use% Mounted on
udev                 504     0       504   0% /dev
tmpfs                107     2       106   2% /run
/dev/sda5           9509  5623      3385  63% /
tmpfs                533     0       533   0% /dev/shm
tmpfs                  5     1         5   1% /run/lock
tmpfs                533     0       533   0% /sys/fs/cgroup
/dev/loop0            52    52         0 100% /snap/snap-store/518
/dev/loop1            65    65         0 100% /snap/gtk-common-themes/1514
/dev/loop3           219   219         0 100% /snap/gnome-3-34-1804/66
/dev/loop4            32    32         0 100% /snap/snapd/11036
/dev/loop2            56    56         0 100% /snap/core18/1988
/dev/sda1            511     1       511   1% /boot/efi
tmpfs                107     1       107   1% /run/user/1000
```

16. du

- to check how many space a file or directory takes.

```
ashtami@ashtami-VirtualBox:~$ du -h
4.0K    ./q1.txt/Ashtami
8.0K    ./q1.txt
4.0K    ./.ssh
4.0K    ./.config/gnome-session/saved-session
8.0K    ./.config/gnome-session
4.0K    ./.config/goa-1.0
```

17. useradd

- available only for system admins.
- To create new user

```
ashtami@ashtami-VirtualBox:~$ useradd ashtami
ashtami@ashtami-VirtualBox:~$ passwd ashtami
Changing password for ashtami.
Current password:
```

18. userdel

- remove user or delete user account

```
ashtami@ashtami-VirtualBox:~$ userdel ashtami
userdel: user ashtami is currently used by process 686
```

19. sudo

- SuperUserDo ,enables you to perform tasks that require administrativeq or root permissions.

```
ashtami@ashtami-VirtualBox:~$ sudo userdel dharani
[sudo] password for ashtami:
```

20. passwd

- to change passwords for user account.

```
ashtami@ashtami-VirtualBox:~$ passwd ashtami
```

Question: Basic Linux Commands: Explain linux commands usermod, groupadd, groups, groupmod, groupdel, chmod, chown, id, ps, top with examples.

usermod:

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

```
ashtami@ashtami-VirtualBox:~$ sudo usermod - G mca anu
[sudo] password for ashtami:
Usage: usermod [options] LOGIN

Options:
  -b, --badnames                allow bad names
  -c, --comment COMMENT         new value of the GECOS field
  -d, --home HOME_DIR           new home directory for the user account
  -e, --expiredate EXPIRE_DATE  set account expiration date to EXPIRE_DATE
  -f, --inactive INACTIVE       set password inactive after expiration
                                to INACTIVE
  -g, --gid GROUP               force use GROUP as new primary group
  -G, --groups GROUPS           new list of supplementary GROUPS
  -a, --append                  append the user to the supplemental GROUPS
                                mentioned by the -G option without removing
                                the user from other groups
  -h, --help                    display this help message and exit
  -l, --login NEW_LOGIN         new value of the login name
  -L, --lock                    lock the user account
  -m, --move-home               move contents of the home directory to the
                                new location (use only with -d)
  -o, --non-unique              allow using duplicate (non-unique) UID
  -p, --password PASSWORD       use encrypted password for the new password
  -R, --root CHROOT_DIR         directory to chroot into
  -P, --prefix PREFIX_DIR       prefix directory where are located the /etc/* f
iles
  -s, --shell SHELL             new login shell for the user account
  -u, --uid UID                 new UID for the user account
  -U, --unlock                  unlock the user account
-v, --add-subuids FIRST-LAST  add range of subordinate uids
-V, --del-subuids FIRST-LAST  remove range of subordinate uids
-w, --add-subgids FIRST-LAST  add range of subordinate gids
-W, --del-subgids FIRST-LAST  remove range of subordinate gids
-Z, --selinux-user SEUSER     new SELinux user mapping for the user account
```

groupadd:

- The groupadd command creates a new group account.

```
ashtami@ashtami-VirtualBox:~$ sudo groupadd newgrp
[sudo] password for ashtami:
```

```
ashtami@ashtami-VirtualBox:~$ sudo tail /etc/group
gdm:x:130:
lxd:x:131:ashtami
ashtami:x:1000:
sambashare:x:132:ashtami
systemd-coredump:x:999:
Mca:x:1001:
MCA:x:1002:
Newgrp:x:1003:
grp:x:1004:
newgrp:x:1005:
```

groups: .

- It prints the names of the primary and any supplementary groups for each given username.

```
ashtami@ashtami-VirtualBox:~$ groups ashtami
ashtami : ashtami adm cdrom sudo dip plugdev lpadmin lxd sambashare
```

groupmod:

- It is used to modify or change the existing group on Linux system.

```
ashtami@ashtami-VirtualBox:~$ sudo groupmod new MCA
Usage: groupmod [options] GROUP

Options:
  -g, --gid GID                 change the group ID to GID
  -h, --help                    display this help message and exit
  -n, --new-name NEW_GROUP      change the name to NEW_GROUP
  -o, --non-unique              allow to use a duplicate (non-unique) GID
  -p, --password PASSWORD       change the password to this (encrypted)
                                PASSWORD
  -R, --root CHROOT_DIR         directory to chroot into
  -P, --prefix PREFIX_DIR       prefix directory where are located the /etc/* f
iles
```

groupdel:

- It is used to delete a existing group.

```
ashtami@ashtami-VirtualBox:~$ ls
book        Downloads  MCA         newfile.txt  Public  Templates
Desktop     file1      Music       new.txt      q1.txt  Videos
Documents   file2.txt  myfile.txt  Pictures     q2.txt
ashtami@ashtami-VirtualBox:~$ sudo groupdel myfile.txt
[sudo] password for ashtami:
```

chmod:

- It is used to change the access mode of a file.

chmod+rwxfilename

To add permissions.

chmod-rwxdirectoryname

To remove permissions.

chmod+x filename

To allow executable permissions.

chmod-wxfilename

To take out write and executable permissions.

```
ashtami@ashtami-VirtualBox:~/mca$ chmod +rwx my.txt
ashtami@ashtami-VirtualBox:~/mca$ chmod -rwx my.txt
ashtami@ashtami-VirtualBox:~/mca$ chmod +r my.txt
ashtami@ashtami-VirtualBox:~/mca$ chmod -wx my.txt
ashtami@ashtami-VirtualBox:~/mca$ chmod g-rwx my.txt
```

chown:

- It is used to change the file Owner or group.

```
ashtami@ashtami-VirtualBox:~/mca$ chown ashtami my.txt
ashtami@ashtami-VirtualBox:~/mca$
```

Question:

Lab Assignment Managing Files, Creating Users and Groups Using Command-line tools.

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

```
ashtami@ashtami-VirtualBox:~$ touch song1.mp3 song2.mp3 song3.mp3 song4.mp3 son
g5.mp3 song6.mp3
ashtami@ashtami-VirtualBox:~$ touch snap1.mp3 snap2.mp3 snap3.mp3 snap4.mp3 sna
p5.mp3 snap6.mp3
ashtami@ashtami-VirtualBox:~$ touch film1.mp3 film2.mp3 film3.mp3 film4.mp3 fil
m5.mp3 film6.mp3
ashtami@ashtami-VirtualBox:~$ ls
archieve1.tar  file2.txt  film6.mp3    new.txt    snap2.mp3  song2.mp3  Videos
book           film1.mp3  mca          Pictures   snap3.mp3  song3.mp3
Desktop        film2.mp3  MCA          Public     snap4.mp3  song4.mp3
Documents      film3.mp3  Music        q1.txt     snap5.mp3  song5.mp3
Downloads      film4.mp3  myfile.txt   q2.txt     snap6.mp3  song6.mp3
file1          film5.mp3  newfile.txt  snap1.mp3  song1.mp3  Templates
ashtami@ashtami-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.

```
ashtami@ashtami-VirtualBox:~$ mv song1.mp3 song2.mp3 song3.mp3 song4.mp3 song5.
mp3 song6.mp3 ./Music/
ashtami@ashtami-VirtualBox:~$ ls
archieve1.tar  file1      film4.mp3  Music        Public     snap3.mp3  Videos
book           file2.txt  film5.mp3  myfile.txt   q1.txt     snap4.mp3
Desktop        film1.mp3  film6.mp3  newfile.txt  q2.txt     snap5.mp3
Documents      film2.mp3  mca        new.txt      snap1.mp3  snap6.mp3
Downloads      film3.mp3  MCA        Pictures     snap2.mp3  Templates
ashtami@ashtami-VirtualBox:~$ ls -R Music
Music:
song1.mp3  song2.mp3  song3.mp3  song4.mp3  song5.mp3  song6.mp3
ashtami@ashtami-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.

```
ashtami@ashtami-VirtualBox:~$ mkdir friends family work
ashtami@ashtami-VirtualBox:~$ ls
archieve1.tar  file1      film5.mp3  myfile.txt   q2.txt     snap6.mp3
book           file2.txt  film6.mp3  newfile.txt  snap1.mp3  Templates
Desktop        film1.mp3  friends    new.txt      snap2.mp3  Videos
Documents      film2.mp3  mca        Pictures     snap3.mp3  work
Downloads      film3.mp3  MCA        Public       snap4.mp3
family         film4.mp3  Music      q1.txt       snap5.mp3
```

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

```
ashtami@ashtami-VirtualBox:~$ cp Music/song6.mp3 friends
ashtami@ashtami-VirtualBox:~$ cp Music/song5.mp3 friends
ashtami@ashtami-VirtualBox:~$ cp Music/song4.mp3 friends
ashtami@ashtami-VirtualBox:~$ cp Music/song3.mp3 friends
ashtami@ashtami-VirtualBox:~$ cp Music/song2.mp3 friends
ashtami@ashtami-VirtualBox:~$ cp Music/song1.mp3 friends
ashtami@ashtami-VirtualBox:~$ ls
archieve1.tar  file1      film5.mp3  myfile.txt   q1.txt     snap5.mp3
book           file2.txt  film6.mp3  newfile.txt  q2.txt     snap6.mp3
Desktop        film1.mp3  friends    new.txt      snap1.mp3  Templates
Documents      film2.mp3  mca        Picture      snap2.mp3  Videos
Downloads      film3.mp3  MCA        Pictures     snap3.mp3  work
family         film4.mp3  Music      Public       snap4.mp3
```

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

```
ashtami@ashtami-VirtualBox:~$ rm -r family friends
ashtami@ashtami-VirtualBox:~$ ls
archieve1.tar  file2.txt  film6.mp3  new.txt   q2.txt     snap6.mp3
book           film1.mp3  mca        Pic       snap1.mp3  Templates
Desktop        film2.mp3  MCA        Picture   snap2.mp3  Videos
Documents      film3.mp3  Music      Pictures  snap3.mp3  work
Downloads      film4.mp3  myfile.txt Public    snap4.mp3
file1          film5.mp3  newfile.txt q1.txt   snap5.mp3
```

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

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

```
ashtami@ashtami-VirtualBox:~$ ls -al > allfile.txt
ashtami@ashtami-VirtualBox:~$ ls
allfile.txt    file1      film5.mp3   newfile.txt  q1.txt     snap5.mp3
archieve1.tar  file2.txt  film6.mp3   new.txt      q2.txt     snap6.mp3
book           film1.mp3  mca         Pic          snap1.mp3  Templates
Desktop        film2.mp3  MCA         Picture      snap2.mp3  Videos
Documents      film3.mp3  Music       Pictures     snap3.mp3  work
Downloads      film4.mp3  myfile.txt  Public       snap4.mp3
```

```
ashtami@ashtami-VirtualBox:~$ cat allfile.txt
total 192
drwxr-xr-x 24 ashtami ashtami  4096 Aug 17 09:19 .
drwxr-xr-x  3 root    root     4096 Jun 13 07:15 ..
-rw-rw-r--  1 ashtami ashtami     0 Aug 17 09:20 allfile.txt
-rw-rw-r--  1 ashtami ashtami 10240 Aug 12 10:07 archieve1.tar
-rw-------  1 ashtami ashtami  4247 Aug 17 08:50 .bash_history
-rw-r--r--  1 ashtami ashtami   220 Jun 13 07:15 .bash_logout
-rw-r--r--  1 ashtami ashtami  3771 Jun 13 07:15 .bashrc
drwxr-xr-x  2 ashtami ashtami  4096 Aug  9 09:36 book
drwx------ 13 ashtami ashtami  4096 Aug 17 08:20 .cache
drwx------ 14 ashtami ashtami  4096 Aug 10 04:19 .config
drwxr-xr-x  2 ashtami ashtami  4096 Aug 10 04:12 Desktop
drwxr-xr-x  3 ashtami ashtami  4096 Jun 15 05:54 Documents
drwxr-xr-x  2 ashtami ashtami  4096 Jun 13 07:29 Downloads
drwxrwxr-x  2 ashtami ashtami  4096 Aug  9 09:37 file1
-rw-rw-r--  1 ashtami ashtami    56 Jun 21 12:13 file2.txt
-rw-rw-r--  1 ashtami ashtami     6 Aug 17 08:12 film1.mp3
-rw-rw-r--  1 ashtami ashtami     6 Aug 17 08:12 film2.mp3
-rw-rw-r--  1 ashtami ashtami     6 Aug 17 08:12 film3.mp3
-rw-rw-r--  1 ashtami ashtami     6 Aug 17 08:12 film4.mp3
-rw-rw-r--  1 ashtami ashtami     6 Aug 17 08:12 film5.mp3
-rw-rw-r--  1 ashtami ashtami     6 Aug 17 08:12 film6.mp3
drwx------  3 ashtami ashtami  4096 Aug 17 08:09 .gnupg
drwx------  3 ashtami ashtami  4096 Jun 13 07:29 .local
drwxrwxr-x  2 ashtami ashtami  4096 Aug 12 09:41 mca
drwxr-xr-x  2 ashtami ashtami  4096 Aug 10 11:26 MCA
drwxr-xr-x  2 ashtami ashtami  4096 Aug 17 08:15 Music
-rw-rw-r--  1 ashtami ashtami     6 Aug 12 09:36 myfile.txt
```

```
-rw-rw-r--  1 ashtami ashtami     6 Aug 12 09:36 myfile.txt
-rw-rw-r--  1 ashtami ashtami    42 Aug  9 11:31 newfile.txt
-rw-rw-r--  1 ashtami ashtami     8 Aug  9 11:31 new.txt
drwxrwxr-x  2 ashtami ashtami  4096 Aug 17 08:53 Pic
drwxrwxr-x  2 ashtami ashtami  4096 Aug 17 08:20 Picture
drwxr-xr-x  2 ashtami ashtami  4096 Jun 13 07:29 Pictures
-rw-r--r--  1 ashtami ashtami   807 Jun 13 07:15 .profile
drwxr-xr-x  2 ashtami ashtami  4096 Jun 13 07:29 Public
drwxrwxr-x  3 ashtami ashtami  4096 Jun 15 05:55 q1.txt
drwxrwxr-x  2 ashtami ashtami  4096 Jun 21 11:58 q2.txt
-rw-rw-r--  1 ashtami ashtami     4 Aug 17 09:15 snap1.mp3
-rw-rw-r--  1 ashtami ashtami     5 Aug 17 08:12 snap2.mp3
-rw-rw-r--  1 ashtami ashtami     4 Aug 17 08:12 snap3.mp3
-rw-rw-r--  1 ashtami ashtami     4 Aug 17 08:12 snap4.mp3
-rw-rw-r--  1 ashtami ashtami     4 Aug 17 08:12 snap5.mp3
-rw-rw-r--  1 ashtami ashtami     4 Aug 17 08:12 snap6.mp3
drwx------  2 ashtami ashtami  4096 Aug 12 10:20 .ssh
-rw-r--r--  1 ashtami ashtami     0 Aug 10 04:15 .sudo_as_admin_successful
drwxr-xr-x  2 ashtami ashtami  4096 Jun 13 07:29 Templates
drwxr-xr-x  2 ashtami ashtami  4096 Jun 13 07:29 Videos
drwxrwxr-x  2 ashtami ashtami  4096 Aug 17 08:17 work
```

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

   month, date and year

```
ashtami@ashtami-VirtualBox:~$ date
Tue 17 Aug 2021 09:22:48 AM EDT
```

9. Add the user Juliet

```
ashtami@ashtami-VirtualBox:~$ sudo useradd juliet
[sudo] password for ashtami:
```

```
ashtami@ashtami-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:/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/nolog
in
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/sb
in/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
```

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

```
ashtami@ashtami-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:/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/nolog
in
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/sb
in/nologin
messagebus:x:103:106::/nonexistent:/usr/sbin/nologin
syslog:x:104:110::/home/syslog:/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-helpe
r:/usr/sbin/nologin
speech-dispatcher:x:114:29:Speech Dispatcher,,,:/run/speech-dispatcher:/bin/fal
se
avahi:x:115:121:Avahi mDNS daemon,,,:/var/run/avahi-daemon:/usr/sbin/nologin
kernoops: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/sbi
n/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/n
ologin
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
ashtami:x:1000:1000:Ashtami Prasad,,,:/home/ashtami:/bin/bash
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
juliet:x:1001:1006::/home/juliet:/bin/sh
```

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

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

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

```
ashtami@ashtami-VirtualBox:~$ sudo groupadd -g 3000 shakespheare
ashtami@ashtami-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,ashtami
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:ashtami
floppy:x:25:
```

```
floppy:x:25:
tape:x:26:
sudo:x:27:ashtami
audio:x:29:pulse
dip:x:30:ashtami
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:ashtami
staff:x:50:
games:x:60:
users:x:100:
nogroup:x:65534:
systemd-journal:x:101:
systemd-network:x:102:
systemd-resolve:x:103:
systemd-timesync:x:104:
crontab:x:105:
messagebus:x:106:
input:x:107:
```

13. Create a supplementary group called artists.

```
ashtami@ashtami-VirtualBox:~$ sudo groupadd artists
```

```
ashtami@ashtami-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,ashtami
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:ashtami
floppy:x:25:
tape:x:26:
sudo:x:27:ashtami
audio:x:29:pulse
dip:x:30:ashtami
www-data:x:33:
```

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

```
tcpdump:x:115:
avahi-autoipd:x:116:
rtkit:x:117:
ssh:x:118:
netdev:x:119:
lpadmin:x:120:ashtami
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:ashtami
ashtami:x:1000:
sambashare:x:132:ashtami
systemd-coredump:x:999:
Mca:x:1001:
MCA:x:1002:
Newgrp:x:1003:
grp:x:1004:
newgrp:x:1005:
juliet:x:1006:
shakespheare:x:3000:
artists:x:3001:
```

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

```
ashtami@ashtami-VirtualBox:~$ sudo usermod -G shakespheare juliet
ashtami@ashtami-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,ashtami
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:ashtami
floppy:x:25:
tape:x:26:
sudo:x:27:ashtami
audio:x:29:pulse
dip:x:30:ashtami
www-data:x:33:
backup:x:34:
```

```
tcpdump:x:115:
avahi-autoipd:x:116:
rtkit:x:117:
ssh:x:118:
netdev:x:119:
lpadmin:x:120:ashtami
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:ashtami
ashtami:x:1000:
sambashare:x:132:ashtami
systemd-coredump:x:999:
Mca:x:1001:
MCA:x:1002:
Newgrp:x:1003:
grp:x:1004:
newgrp:x:1005:
juliet:x:1006:
shakespheare:x:3000:juliet
artists:x:3001:
```

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

```
ashtami@ashtami-VirtualBox:~$ id -u juliet
1001
ashtami@ashtami-VirtualBox:~$ id -g juliet
1006
```

17. Add Romeo and Hamlet to the Shakespeare group.

```
ashtami@ashtami-VirtualBox:~$ sudo usermod -G shakespheare romeo
ashtami@ashtami-VirtualBox:~$ sudo usermod -G shakespheare hamlet
ashtami@ashtami-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog
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:
floppy:x:25:
tape:x:26:
sudo:x:27:
audio:x:29:pulse
dip:x:30:
www-data:x:33:
backup:x:34:
operator:x:37:
```

```
tcpdump:x:115:
avahi-autoipd:x:116:
rtkit:x:117:
ssh:x:118:
netdev:x:119:
lpadmin:x:120:
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:
ashtami:x:1000:
sambashare:x:132:
systemd-coredump:x:999:
Mca:x:1001:
MCA:x:1002:
Newgrp:x:1003:
grp:x:1004:
newgrp:x:1005:
juliet:x:1006:
shakespheare:x:3000:juliet,ashtami,romeo,hamlet
artists:x:3001:
```

18. Add Reba, Dolly and Elvis to the artists group.

```
ashtami@ashtami-VirtualBox:~$ sudo useradd -g artists Reba
ashtami@ashtami-VirtualBox:~$ sudo useradd -g artists Dolly
ashtami@ashtami-VirtualBox:~$ Elvis
^[[AElvis: command not found
ashtami@ashtami-VirtualBox:~$ sudo useradd -g artists Elvis
```

```
ashtami@ashtami-VirtualBox:~$ sudo usermod -G artists Reba
ashtami@ashtami-VirtualBox:~$ sudo usermod -G artists Dolly
ashtami@ashtami-VirtualBox:~$ sudo usermod -G artists Elvis
ashtami@ashtami-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog
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:
floppy:x:25:
tape:x:26:
sudo:x:27:
audio:x:29:pulse
dip:x:30:
www-data:x:33:
```

```
tcpdump:x:115:
avahi-autoipd:x:116:
rtkit:x:117:
ssh:x:118:
netdev:x:119:
lpadmin:x:120:
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:
ashtami:x:1000:
sambashare:x:132:
systemd-coredump:x:999:
Mca:x:1001:
MCA:x:1002:
Newgrp:x:1003:
grp:x:1004:
newgrp:x:1005:
juliet:x:1006:
shakespheare:x:3000:juliet,ashtami,romeo,hamlet
artists:x:3001:Reba,Dolly,Elvis
```

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

```
tcpdump:x:115:
avahi-autoipd:x:116:
rtkit:x:117:
ssh:x:118:
netdev:x:119:
lpadmin:x:120:
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:
ashtami:x:1000:
sambashare:x:132:
systemd-coredump:x:999:
Mca:x:1001:
MCA:x:1002:
Newgrp:x:1003:
grp:x:1004:
newgrp:x:1005:
juliet:x:1006:
shakespheare:x:3000:juliet,ashtami,romeo,hamlet
artists:x:3001:Reba,Dolly,Elvis
```

20. Attempt to remove user Dolly.

```
ashtami@ashtami-VirtualBox:~$ sudo userdel Dolly
ashtami@ashtami-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog
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:
```

```
tcpdump:x:115:
avahi-autoipd:x:116:
rtkit:x:117:
ssh:x:118:
netdev:x:119:
lpadmin:x:120:
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:
ashtami:x:1000:
sambashare:x:132:
systemd-coredump:x:999:
Mca:x:1001:
MCA:x:1002:
Newgrp:x:1003:
grp:x:1004:
newgrp:x:1005:
juliet:x:1006:
shakespheare:x:3000:juliet,ashtami,romeo,hamlet
artists:x:3001:Reba,Elvis
```

Network Commands

1.Try out these network commands in Window as well as in Linux and perform at least 4 options with each command: ping route traceroute, nslookup,Ip Config, NetStat .

Windows

- **Ping**

```
Microsoft Windows [Version 10.0.17134.1]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Program Files>ping google.com

Pinging google.com [2404:6800:4007:825::200e] with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 2404:6800:4007:825::200e:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

```
C:\Program Files>ping -a google.com

Pinging google.com [2404:6800:4009:826::200e] with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 2404:6800:4009:826::200e:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

```
C:\Program Files>ping -j google.com

Pinging google.com [142.250.183.238] with 32 bytes of data:
General failure.
General failure.
General failure.
General failure.

Ping statistics for 142.250.183.238:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\Program Files>
```

```
C:\Program Files>ping -4 google.com

Pinging google.com [142.250.183.238] with 32 bytes of data:
Reply from 142.250.183.238: bytes=32 time=1584ms TTL=112
Reply from 142.250.183.238: bytes=32 time=349ms TTL=112
Reply from 142.250.183.238: bytes=32 time=1249ms TTL=112
Request timed out.

Ping statistics for 142.250.183.238:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 349ms, Maximum = 1584ms, Average = 1060ms

C:\Program Files>
```

Route

```
C:\Program Files>route print
===========================================================================
Interface List
 16...b4 b6 86 0c 1b 5b ......Realtek PCIe GBE Family Controller
 14...0a 00 27 00 00 0e ......VirtualBox Host-Only Ethernet Adapter
 20...82 c5 f2 9a 23 4d ......Microsoft Wi-Fi Direct Virtual Adapter
  8...80 c5 f2 9a 23 4d ......Microsoft Wi-Fi Direct Virtual Adapter #2
  3...00 ff 0d 16 c4 cf ......Kaspersky Security Data Escort Adapter
 18...00 ff ad e4 72 5a ......Kaspersky Security Data Escort Adapter #2
  4...80 c5 f2 9a 23 4d ......Realtek RTL8723DE 802.11b/g/n PCIe Adapter
 21...80 c5 f2 9a 23 4c ......Bluetooth Device (Personal Area Network)
  1...........................Software Loopback Interface 1
===========================================================================

IPv4 Route Table
===========================================================================
Active Routes:
Network Destination        Netmask          Gateway       Interface  Metric
          0.0.0.0          0.0.0.0     192.168.43.1   192.168.43.205     55
        127.0.0.0        255.0.0.0         On-link         127.0.0.1    331
        127.0.0.1  255.255.255.255         On-link         127.0.0.1    331
  127.255.255.255  255.255.255.255         On-link         127.0.0.1    331
     192.168.43.0    255.255.255.0         On-link    192.168.43.205    311
   192.168.43.205  255.255.255.255         On-link    192.168.43.205    311
   192.168.43.255  255.255.255.255         On-link    192.168.43.205    311
     192.168.56.0    255.255.255.0         On-link      192.168.56.1    281
     192.168.56.1  255.255.255.255         On-link      192.168.56.1    281
   192.168.56.255  255.255.255.255         On-link      192.168.56.1    281
        224.0.0.0        240.0.0.0         On-link         127.0.0.1    331
        224.0.0.0        240.0.0.0         On-link      192.168.56.1    281
        224.0.0.0        240.0.0.0         On-link    192.168.43.205    311
  255.255.255.255  255.255.255.255         On-link         127.0.0.1    331
  255.255.255.255  255.255.255.255         On-link      192.168.56.1    281
  255.255.255.255  255.255.255.255         On-link    192.168.43.205    311
===========================================================================
Persistent Routes:
  None
```

```
IPv6 Route Table
===========================================================================
Active Routes:
 If Metric Network Destination      Gateway
  4     71 ::/0                     fe80::82ce:b9ff:febf:4cfb
  1    331 ::1/128                  On-link
  4     71 2409:4073:4e01:734a::/64 On-link
  4    311 2409:4073:4e01:734a:188c:afcd:8641:4d25/128
                                    On-link
  4    311 2409:4073:4e01:734a:71c9:bb48:16af:dbb3/128
                                    On-link
 14    281 fe80::/64               On-link
  4    311 fe80::/64               On-link
  4    311 fe80::188c:afcd:8641:4d25/128
                                    On-link
 14    281 fe80::b8e1:1444:8093:966/128
                                    On-link
  1    331 ff00::/8                On-link
 14    281 ff00::/8                On-link
  4    311 ff00::/8                On-link
===========================================================================
Persistent Routes:
  None

C:\Program Files>ping -j google.com
```

```
C:\Program Files>route print -4
===========================================================================
Interface List
 16...b4 b6 86 0c 1b 5b ......Realtek PCIe GBE Family Controller
 14...0a 00 27 00 00 0e ......VirtualBox Host-Only Ethernet Adapter
 20...82 c5 f2 9a 23 4d ......Microsoft Wi-Fi Direct Virtual Adapter
  8...80 c5 f2 9a 23 4d ......Microsoft Wi-Fi Direct Virtual Adapter #2
  3...00 ff 0d 16 c4 cf ......Kaspersky Security Data Escort Adapter
 18...00 ff ad e4 72 5a ......Kaspersky Security Data Escort Adapter #2
  4...80 c5 f2 9a 23 4d ......Realtek RTL8723DE 802.11b/g/n PCIe Adapter
 21...80 c5 f2 9a 23 4c ......Bluetooth Device (Personal Area Network)
  1...........................Software Loopback Interface 1
===========================================================================

IPv4 Route Table
===========================================================================
Active Routes:
```

```
IPv4 Route Table
===========================================================================
Active Routes:
Network Destination        Netmask          Gateway       Interface  Metric
          0.0.0.0          0.0.0.0    192.168.43.1   192.168.43.205     55
        127.0.0.0        255.0.0.0         On-link         127.0.0.1    331
        127.0.0.1  255.255.255.255         On-link         127.0.0.1    331
  127.255.255.255  255.255.255.255         On-link         127.0.0.1    331
     192.168.43.0    255.255.255.0         On-link    192.168.43.205    311
   192.168.43.205  255.255.255.255         On-link    192.168.43.205    311
   192.168.43.255  255.255.255.255         On-link    192.168.43.205    311
     192.168.56.0    255.255.255.0         On-link     192.168.56.1    281
     192.168.56.1  255.255.255.255         On-link     192.168.56.1    281
   192.168.56.255  255.255.255.255         On-link     192.168.56.1    281
        224.0.0.0        240.0.0.0         On-link         127.0.0.1    331
        224.0.0.0        240.0.0.0         On-link     192.168.56.1    281
        224.0.0.0        240.0.0.0         On-link    192.168.43.205    311
  255.255.255.255  255.255.255.255         On-link         127.0.0.1    331
  255.255.255.255  255.255.255.255         On-link     192.168.56.1    281
  255.255.255.255  255.255.255.255         On-link    192.168.43.205    311
===========================================================================
Persistent Routes:
  None

C:\Program Files>
```

```
C:\Program Files>route print -6
===========================================================================
Interface List
 16...b4 b6 86 0c 1b 5b ......Realtek PCIe GBE Family Controller
 14...0a 00 27 00 00 0e ......VirtualBox Host-Only Ethernet Adapter
 20...82 c5 f2 9a 23 4d ......Microsoft Wi-Fi Direct Virtual Adapter
  8...80 c5 f2 9a 23 4d ......Microsoft Wi-Fi Direct Virtual Adapter #2
  3...00 ff 0d 16 c4 cf ......Kaspersky Security Data Escort Adapter
 18...00 ff ad e4 72 5a ......Kaspersky Security Data Escort Adapter #2
  4...80 c5 f2 9a 23 4d ......Realtek RTL8723DE 802.11b/g/n PCIe Adapter
 21...80 c5 f2 9a 23 4c ......Bluetooth Device (Personal Area Network)
  1...........................Software Loopback Interface 1
===========================================================================

IPv6 Route Table
===========================================================================
Active Routes:
 If Metric Network Destination      Gateway
  4     71 ::/0                     fe80::82ce:b9ff:febf:4cfb
  1    331 ::1/128                  On-link
  4     71 2409:4073:4e01:734a::/64 On-link
  4    311 2409:4073:4e01:734a:188c:afcd:8641:4d25/128
                                    On-link
  4    311 2409:4073:4e01:734a:71c9:bb48:16af:dbb3/128
                                    On-link
 14    281 fe80::/64               On-link
  4    311 fe80::/64               On-link
  4    311 fe80::188c:afcd:8641:4d25/128
                                    On-link
 14    281 fe80::b8e1:1444:8093:966/128
                                    On-link
  1    331 ff00::/8                On-link
 14    281 ff00::/8                On-link
  4    311 ff00::/8                On-link
===========================================================================
Persistent Routes:
  None
```

```
C:\Program Files>route print *157
===========================================================================
Interface List
 16...b4 b6 86 0c 1b 5b ......Realtek PCIe GBE Family Controller
 14...0a 00 27 00 00 0e ......VirtualBox Host-Only Ethernet Adapter
 20...82 c5 f2 9a 23 4d ......Microsoft Wi-Fi Direct Virtual Adapter
  8...80 c5 f2 9a 23 4d ......Microsoft Wi-Fi Direct Virtual Adapter #2
  3...00 ff 0d 16 c4 cf ......Kaspersky Security Data Escort Adapter
 18...00 ff ad e4 72 5a ......Kaspersky Security Data Escort Adapter #2
  4...80 c5 f2 9a 23 4d ......Realtek RTL8723DE 802.11b/g/n PCIe Adapter
 21...80 c5 f2 9a 23 4c ......Bluetooth Device (Personal Area Network)
  1...........................Software Loopback Interface 1
===========================================================================

IPv4 Route Table
===========================================================================
Active Routes:
  None
Persistent Routes:
  None

IPv6 Route Table
===========================================================================
Active Routes:
  None
Persistent Routes:
  None
```

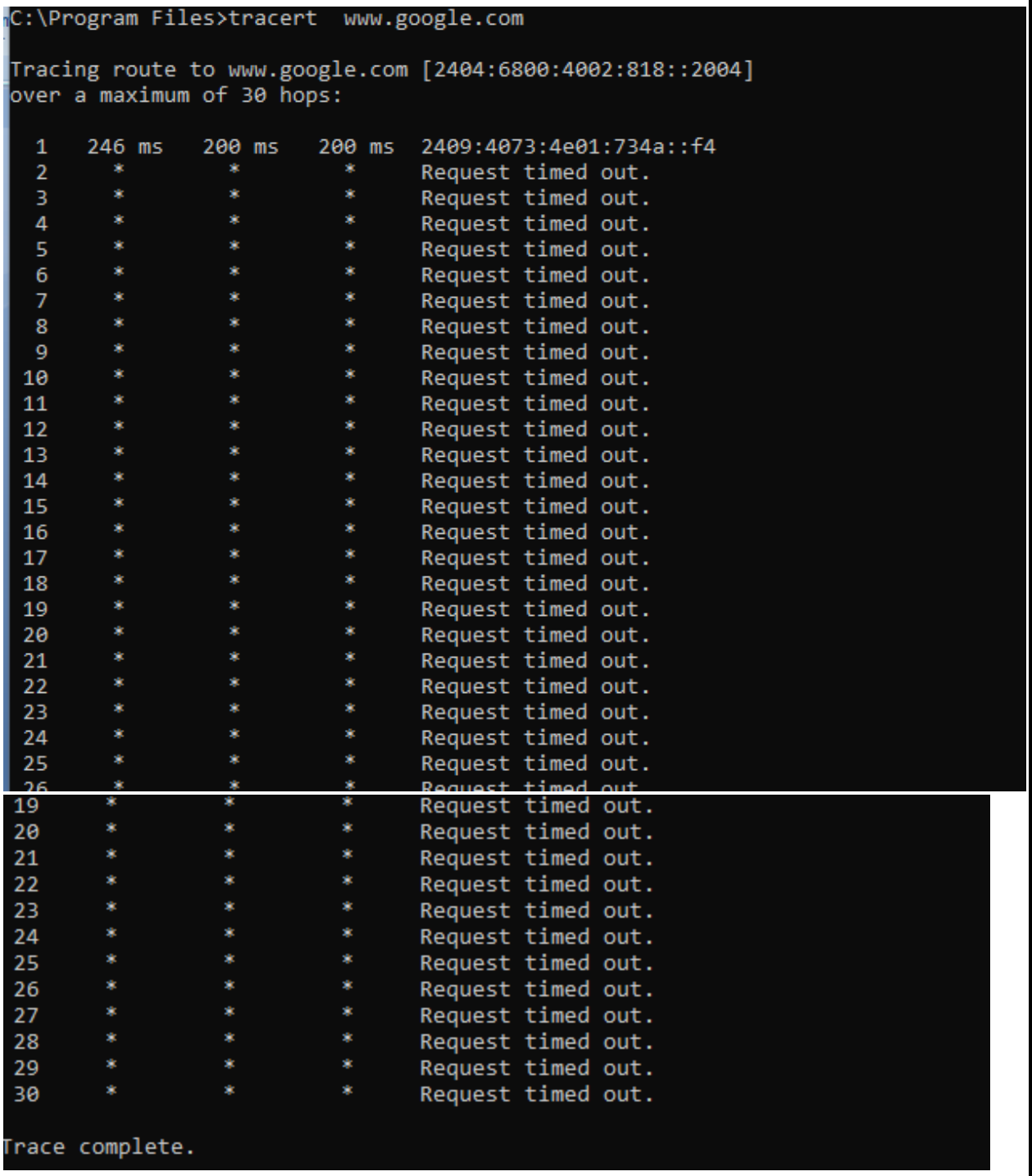
Tracert

```
C:\Program Files>tracert  192.168.1.1

Tracing route to 192.168.1.1 over a maximum of 30 hops

  1   323 ms   100 ms    95 ms  192.168.43.1
  2     *        *        *     Request timed out.
  3   210 ms   259 ms     *     56.8.126.45
  4   325 ms   201 ms   176 ms  172.26.104.197
  5   287 ms   303 ms   303 ms  172.26.104.211
  6   276 ms   302 ms  3374 ms  192.168.14.32
  7   272 ms   405 ms   610 ms  192.168.14.33
  8   245 ms   235 ms   307 ms  172.16.3.14
  9   420 ms   304 ms   301 ms  172.16.81.0
 10   475 ms   302 ms   215 ms  172.16.0.159
 11   279 ms   204 ms   187 ms  172.16.21.20
 12   217 ms   187 ms   190 ms  172.16.2.9
 13     *        *        *     Request timed out.
 14     *        *        *     Request timed out.
 15     *        *        *     Request timed out.
 16     *        *        *     Request timed out.
 17     *        *        *     Request timed out.
 18     *        *        *     Request timed out.
 19     *        *        *     Request timed out.
 20     *        *        *     Request timed out.
 21     *        *        *     Request timed out.
 22     *        *        *     Request timed out.
 23     *        *        *     Request timed out.
 24     *        *        *     Request timed out.
 25     *        *        *     Request timed out.
 26     *
 22      *        *        *     Request timed out.
 23      *        *        *     Request timed out.
 24      *        *        *     Request timed out.
 25      *        *        *     Request timed out.
 26      *        *        *     Request timed out.
 27      *        *        *     Request timed out.
 28      *        *        *     Request timed out.
 29      *        *        *     Request timed out.
 30      *        *        *     Request timed out.

Trace complete.
```



```
C:\Program Files>tracert  www.google.com

Tracing route to www.google.com [2404:6800:4002:818::2004]
over a maximum of 30 hops:

  1   246 ms   200 ms   200 ms  2409:4073:4e01:734a::f4
  2     *        *        *     Request timed out.
  3     *        *        *     Request timed out.
  4     *        *        *     Request timed out.
  5     *        *        *     Request timed out.
  6     *        *        *     Request timed out.
  7     *        *        *     Request timed out.
  8     *        *        *     Request timed out.
  9     *        *        *     Request timed out.
 10     *        *        *     Request timed out.
 11     *        *        *     Request timed out.
 12     *        *        *     Request timed out.
 13     *        *        *     Request timed out.
 14     *        *        *     Request timed out.
 15     *        *        *     Request timed out.
 16     *        *        *     Request timed out.
 17     *        *        *     Request timed out.
 18     *        *        *     Request timed out.
 19     *        *        *     Request timed out.
 20     *        *        *     Request timed out.
 21     *        *        *     Request timed out.
 22     *        *        *     Request timed out.
 23     *        *        *     Request timed out.
 24     *        *        *     Request timed out.
 25     *        *        *     Request timed out.
 26     *        *        *     Request timed out.
 19     *        *        *     Request timed out.
 20     *        *        *     Request timed out.
 21     *        *        *     Request timed out.
 22     *        *        *     Request timed out.
 23     *        *        *     Request timed out.
 24     *        *        *     Request timed out.
 25     *        *        *     Request timed out.
 26     *        *        *     Request timed out.
 27     *        *        *     Request timed out.
 28     *        *        *     Request timed out.
 29     *        *        *     Request timed out.
 30     *        *        *     Request timed out.

Trace complete.
```

```
C:\Program Files>tracert  -d www.yahoo.com

Tracing route to new-fp-shed.wg1.b.yahoo.com [2406:2000:e4:1605::9001]
over a maximum of 30 hops:

  1   156 ms   190 ms   405 ms  2409:4073:4e01:734a::f4
  2     *        *        *     Request timed out.
  3     *        *        *     Request timed out.
  4     *        *        *     Request timed out.
  5     *        *        *     Request timed out.
  6     *        *        *     Request timed out.
  7     *        *        *     Request timed out.
  8     *        *        *     Request timed out.
  9     *        *        *     Request timed out.
 10     *        *        *     Request timed out.
 11     *        *        *     Request timed out.
 12     *        *        *     Request timed out.
 13     *        *        *     Request timed out.
 14     *        *        *     Request timed out.
 15     *        *
```

```
  7     *        *        *     Request timed out.
  8     *        *        *     Request timed out.
  9     *        *        *     Request timed out.
 10     *        *        *     Request timed out.
 11     *        *        *     Request timed out.
 12     *        *        *     Request timed out.
 13     *        *        *     Request timed out.
 14     *        *        *     Request timed out.
 15     *        *        *     Request timed out.
 16     *        *        *     Request timed out.
 17     *        *        *     Request timed out.
 18     *        *        *     Request timed out.
 19     *        *        *     Request timed out.
 20     *        *        *     Request timed out.
 21     *        *        *     Request timed out.
 22     *        *        *     Request timed out.
 23     *        *        *     Request timed out.
 24     *        *        *     Request timed out.
 25     *        *        *     Request timed out.
 26     *        *        *     Request timed out.
 27     *        *        *     Request timed out.
 28     *        *        *     Request timed out.
 29     *        *        *     Request timed out.
 30     *        *        *     Request timed out.

Trace complete.
```

```
C:\Program Files>tracert 22.110.0.1

Tracing route to 22.110.0.1 over a maximum of 30 hops

  1     88 ms    100 ms    101 ms  192.168.43.1
  2      *         *         *     Request timed out.
  3      *       543 ms    612 ms  56.8.126.69
  4    215 ms    197 ms    226 ms  172.26.104.197
  5    173 ms    155 ms    187 ms  172.26.104.211
  6    434 ms    305 ms    203 ms  192.168.14.32
  7    211 ms    201 ms    183 ms  192.168.14.35
  8    275 ms    510 ms    305 ms  172.16.21.21
  9    190 ms    199 ms    237 ms  172.16.81.6
 10    275 ms    304 ms    306 ms  172.16.3.91
 11    302 ms    483 ms    203 ms  172.16.3.15
 12    731 ms    314 ms    399 ms  172.16.2.60
 13    425 ms      *       736 ms  103.198.140.27
 14   1031 ms   1326 ms   1276 ms  103.198.140.27
 15    436 ms   1543 ms    679 ms  hurricane.mrs.franceix.net [37.49.232.13]
 16    661 ms    406 ms    406 ms  port-channel1.core2.mrs1.he.net [184.104.197.42]
 17    564 ms    407 ms    305 ms  ve952.core1.bio1.he.net [184.104.196.78]
 18   1183 ms    668 ms    444 ms  100ge0-30.core1.orf2.he.net [184.105.64.122]
 19    500 ms    613 ms    509 ms  100ge15-1.core2.ash1.he.net [184.105.64.121]
 20      *         *         *     Request timed out.
 21      *         *         *     Request timed out.
 22      *         *         *     Request timed out.
 23      *         *         *     Request timed out.
 24      *         *         *     Request timed out.
 25      *         *         *     Request timed out.
 26      *         *         *     Request timed out.
 27      *         *         *     Request timed out.
 28      *         *         *     Request timed out.
 29      *         *         *     Request timed out.
 30      *         *         *     Request timed out.

Trace complete.
```

Nslookup

```
C:\Program Files>nslookup
Default Server:  UnKnown
Address:  192.168.43.1
```

```
C:\Program Files>nslookup google.com
DNS request timed out.
    timeout was 2 seconds.
Server:  UnKnown
Address:  192.168.43.1

Non-authoritative answer:
DNS request timed out.
    timeout was 2 seconds.
Name:    google.com
Address:  142.250.195.142
```

```
C:\Program Files>nslookup -q=MX  google.com
Server:  UnKnown
Address:  192.168.43.1

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

```
C:\Program Files>nslookup -type=ns google.com
Server:  UnKnown
Address:  192.168.43.1

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

Ipconfig

```
C:\Program Files>ipconfig

Windows IP Configuration


Ethernet adapter Ethernet:

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

Ethernet adapter VirtualBox Host-Only Network:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::b8e1:1444:8093:966%14
   IPv4 Address. . . . . . . . . . . : 192.168.56.1
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . :

Wireless LAN adapter Local Area Connection* 2:

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

Wireless LAN adapter Local Area Connection* 3:

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

Ethernet adapter Ethernet 2:
```

```
Ethernet adapter Ethernet 2:

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

Ethernet adapter Ethernet 3:

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

Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   IPv6 Address. . . . . . . . . . . : 2409:4073:4e01:734a:188c:afcd:86
   Temporary IPv6 Address. . . . . . : 2409:4073:4e01:734a:71c9:bb48:16
   Link-local IPv6 Address . . . . . : fe80::188c:afcd:8641:4d25%4
   IPv4 Address. . . . . . . . . . . : 192.168.43.205
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : fe80::82ce:b9ff:febf:4cfb%4
                                       192.168.43.1

Ethernet adapter Bluetooth Network Connection:

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

```
C:\Program Files>ipconfig /allcompartments

Windows IP Configuration


================================================================================
Network Information for Compartment 1 (ACTIVE)
================================================================================

Ethernet adapter Ethernet:

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

Ethernet adapter VirtualBox Host-Only Network:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::b8e1:1444:8093:966%14
   IPv4 Address. . . . . . . . . . . : 192.168.56.1
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . :

Wireless LAN adapter Local Area Connection* 2:

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

Wireless LAN adapter Local Area Connection* 3:
```

```
C:\Program Files>ipconfig /displaydns

Windows IP Configuration

    www.fastjobsearchers.com
    ----------------------------------------
    Record Name . . . . . : www.fastjobsearchers.com
    Record Type . . . . . : 1
    Time To Live  . . . . : 10241
    Data Length . . . . . : 4
    Section . . . . . . . : Answer
    A (Host) Record . . . : 119.18.54.75


    www.aesajce.in
    ----------------------------------------
    Record Name . . . . . : www.aesajce.in
    Record Type . . . . . : 5
    Time To Live  . . . . : 1310
    Data Length . . . . . : 8
    Section . . . . . . . : Answer
    CNAME Record  . . . . : aesajce.in


    Record Name . . . . . : aesajce.in
    Record Type . . . . . : 1
    Time To Live  . . . . : 1310
    Data Length . . . . . : 4
    Section . . . . . . . : Answer
```

```
C:\Program Files>ipconfig /release

Windows IP Configuration

No operation can be performed on Ethernet while it has its media disconnected.
No operation can be performed on Local Area Connection* 2 while it has its media disconnected.
No operation can be performed on Local Area Connection* 3 while it has its media disconnected.
No operation can be performed on Ethernet 2 while it has its media disconnected.
No operation can be performed on Ethernet 3 while it has its media disconnected.
No operation can be performed on Bluetooth Network Connection while it has its media disconnected.

Ethernet adapter Ethernet:

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

Ethernet adapter VirtualBox Host-Only Network:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::b8e1:1444:8093:966%14
   IPv4 Address. . . . . : 192.168.56.1
   Subnet Mask . . . . . : 255.255.255.0
   Default Gateway . . . . . :

Wireless LAN adapter Local Area Connection* 2:

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

Netstat

```
C:\Program Files>netstat

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:54159  maa05s20-in-x03:https  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:54289  maa03s44-in-x04:https  ESTABLISHED
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:57218  sc-in-xbc:5228         ESTABLISHED
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:57302  maa05s22-in-x03:https  ESTABLISHED
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:60597  maa05s22-in-x03:https  ESTABLISHED
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:61313  del12s07-in-x01:https  ESTABLISHED
```

```
C:\Program Files>netstat -n

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:50204  [2404:6800:4009:824::200e]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:53337  [2404:6800:4007:81d::2003]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:54159  [2404:6800:4007:81b::2003]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:54289  [2404:6800:4007:829::2004]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:55506  [2404:6800:4007:81b::2003]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:57218  [2404:6800:4003:c02::bc]:5228  ESTABLISHED
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:57584  [2404:6800:4009:812::200e]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:60077  [2404:6800:4009:824::200e]:443  ESTABLISHED
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:60597  [2404:6800:4007:81d::2003]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:61313  [2404:6800:4002:824::2001]:443  TIME_WAIT
```

```
C:\Program Files>netstat -n 5

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:50204  [2404:6800:4009:824::200e]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:53337  [2404:6800:4007:81d::2003]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:54159  [2404:6800:4007:81b::2003]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:54289  [2404:6800:4007:829::2004]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:55506  [2404:6800:4007:81b::2003]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:57218  [2404:6800:4003:c02::bc]:5228  ESTABLISHED
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:57584  [2404:6800:4009:812::200e]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:60077  [2404:6800:4009:824::200e]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:60597  [2404:6800:4007:81d::2003]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:61313  [2404:6800:4002:824::2001]:443  TIME_WAIT

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:50204  [2404:6800:4009:824::200e]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:53337  [2404:6800:4007:81d::2003]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:54159  [2404:6800:4007:81b::2003]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:54289  [2404:6800:4007:829::2004]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:55506  [2404:6800:4007:81b::2003]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:57218  [2404:6800:4003:c02::bc]:5228  ESTABLISHED
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:57584  [2404:6800:4009:812::200e]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:60077  [2404:6800:4009:824::200e]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:60597  [2404:6800:4007:81d::2003]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:61313  [2404:6800:4002:824::2001]:443  TIME_WAIT
```

```
C:\Program Files>netstat -a

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    0.0.0.0:135            DESKTOP-IPG3LL3:0      LISTENING
  TCP    0.0.0.0:445            DESKTOP-IPG3LL3:0      LISTENING
  TCP    0.0.0.0:5040           DESKTOP-IPG3LL3:0      LISTENING
  TCP    0.0.0.0:7680           DESKTOP-IPG3LL3:0      LISTENING
  TCP    0.0.0.0:49664          DESKTOP-IPG3LL3:0      LISTENING
  TCP    0.0.0.0:49665          DESKTOP-IPG3LL3:0      LISTENING
  TCP    0.0.0.0:49666          DESKTOP-IPG3LL3:0      LISTENING
  TCP    0.0.0.0:49667          DESKTOP-IPG3LL3:0      LISTENING
  TCP    0.0.0.0:49668          DESKTOP-IPG3LL3:0      LISTENING
  TCP    0.0.0.0:49669          DESKTOP-IPG3LL3:0      LISTENING
  TCP    127.0.0.1:5939         DESKTOP-IPG3LL3:0      LISTENING
  TCP    127.0.0.1:49670        DESKTOP-IPG3LL3:0      LISTENING
  TCP    169.254.77.37:139      DESKTOP-IPG3LL3:0      LISTENING
  TCP    192.168.56.1:139       DESKTOP-IPG3LL3:0      LISTENING
  TCP    [::]:135               DESKTOP-IPG3LL3:0      LISTENING
  TCP    [::]:445               DESKTOP-IPG3LL3:0      LISTENING
  TCP    [::]:7680              DESKTOP-IPG3LL3:0      LISTENING
  TCP    [::]:49664             DESKTOP-IPG3LL3:0      LISTENING
  TCP    [::]:49665             DESKTOP-IPG3LL3:0      LISTENING
  TCP    [::]:49666             DESKTOP-IPG3LL3:0      LISTENING
  TCP    [::]:49667             DESKTOP-IPG3LL3:0      LISTENING
  TCP    [::]:49668             DESKTOP-IPG3LL3:0      LISTENING
  TCP    [::]:49669             DESKTOP-IPG3LL3:0      LISTENING
```

Linux

- **Ping**

```
ashtami@ashtami-VirtualBox:~$ ping google.com
PING google.com (142.250.77.142) 56(84) bytes of data.
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=1 ttl=112 ti
me=361 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=2 ttl=112 ti
me=229 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=3 ttl=112 ti
me=270 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=4 ttl=112 ti
me=235 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=5 ttl=112 ti
me=192 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=6 ttl=112 ti
me=203 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=7 ttl=112 ti
me=198 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=8 ttl=112 ti
me=190 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=9 ttl=112 ti
me=193 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=10 ttl=112 t
ime=194 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=11 ttl=112 t
ime=200 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=12 ttl=112 t
ime=226 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=13 ttl=112 t
ime=267 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=14 ttl=112 t
```

```
ashtami@ashtami-VirtualBox:~$ ping  -a google.com
PING google.com (142.250.77.142) 56(84) bytes of data.
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=1 ttl=112 ti
me=271 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=2 ttl=112 ti
me=294 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=3 ttl=112 ti
me=215 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=4 ttl=112 ti
me=237 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=5 ttl=112 ti
me=181 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=6 ttl=112 ti
me=182 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=7 ttl=112 ti
me=183 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=9 ttl=112 ti
me=177 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=11 ttl=112 t
ime=196 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=12 ttl=112 t
ime=185 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=13 ttl=112 t
ime=183 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=14 ttl=112 t
ime=181 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=15 ttl=112 t
ime=182 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=16 ttl=112 t
```

```
ashtami@ashtami-VirtualBox:~$ ping -v google.com
PING google.com (142.250.195.142) 56(84) bytes of data.
```

```
ashtami@ashtami-VirtualBox:~$ ping -b google.com
PING google.com (142.250.195.142) 56(84) bytes of data.
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=3 ttl=111 t
ime=1641 ms
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=4 ttl=111 t
ime=1744 ms
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=5 ttl=111 t
ime=1360 ms
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=6 ttl=111 t
ime=1399 ms
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=7 ttl=111 t
ime=1118 ms
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=8 ttl=111 t
ime=790 ms
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=9 ttl=111 t
ime=481 ms
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=10 ttl=111
time=1559 ms
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=11 ttl=111
time=1129 ms
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=12 ttl=111
time=920 ms
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=14 ttl=111
time=1784 ms
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=15 ttl=111
time=1411 ms
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=16 ttl=111
time=1329 ms
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=17 ttl=111
```

- **Route**

```
ashtami@ashtami-VirtualBox:~$ 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
```

```
ashtami@ashtami-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
```

```
ashtami@ashtami-VirtualBox:~$ route -Cn
Kernel IP routing cache
Source          Destination     Gateway         Flags Metric Ref    Use Iface
```

```
ashtami@ashtami-VirtualBox:~$ ip route
default via 10.0.2.2 dev enp0s3 proto dhcp metric 100
10.0.2.0/24 dev enp0s3 proto kernel scope link src 10.0.2.15 metric 100
169.254.0.0/16 dev enp0s3 scope link metric 1000
```

- **Traceroute**

```
ashtami@ashtami-VirtualBox:~$ traceroute
Usage:
  traceroute [ -46dFITnreAUDV ] [ -f first_ttl ] [ -g gate,... ] [ -i device ]
[ -m max_ttl ] [ -N squeries ] [ -p port ] [ -t tos ] [ -l flow_label ] [ -w MA
X,HERE,NEAR ] [ -q nqueries ] [ -s src_addr ] [ -z sendwait ] [ --fwmark=num ]
host [ packetlen ]
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,...
                              Route packets through the specified gateway
                              (maximum 8 for IPv4 and 127 for IPv6)
  -I  --icmp                  Use ICMP ECHO for tracerouting
  -T  --tcp                   Use TCP SYN for tracerouting (default port is 80)
  -i device  --interface=device
                              Specify a network interface to operate with
  -m max_ttl  --max-hops=max_ttl
                              Set the max number of hops (max TTL to be
                              reached). Default is 30
  -N squeries  --sim-queries=squeries
                              Set the number of probes to be tried
                              simultaneously (default is 16)
  -n                          Do not resolve IP addresses to their domain names
  -p port  --port=port        Set the destination port to use. It is either
                              initial udp port value for "default" method
```

- **Ipconfig**

```
ashtami@ashtami-VirtualBox:~$ 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::4664:8ca7:83d6:e512  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:02:c3:08  txqueuelen 1000  (Ethernet)
        RX packets 1355  bytes 1221479 (1.2 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1265  bytes 116277 (116.2 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (Local Loopback)
        RX packets 3962  bytes 321045 (321.0 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 3962  bytes 321045 (321.0 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

- **nslookup**

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

- **Netstat**

```
ashtami@ashtami-VirtualBox:~$ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
udp        0      0 ashtami-VirtualB:bootpc _gateway:bootps         ESTABLISHED
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags       Type       State         I-Node   Path
unix  2      [ ]         DGRAM                    26494    /run/user/1000/syste
md/notify
unix  2      [ ]         DGRAM                    15155    /run/systemd/journal
/syslog
unix  15     [ ]         DGRAM                    15165    /run/systemd/journal
/dev-log
unix  8      [ ]         DGRAM                    15169    /run/systemd/journal
/socket
unix  3      [ ]         DGRAM                    15141    /run/systemd/notify
unix  3      [ ]         DGRAM                    26496
unix  2      [ ]         DGRAM                    32327
unix  3      [ ]         STREAM     CONNECTED     31641
unix  3      [ ]         STREAM     CONNECTED     29439    @/tmp/.X11-unix/X0
unix  3      [ ]         STREAM     CONNECTED     28033
unix  3      [ ]         STREAM     CONNECTED     22100    /run/systemd/journal
/stdout
unix  3      [ ]         STREAM     CONNECTED     124099
unix  3      [ ]         STREAM     CONNECTED     31414    @/tmp/dbus-YF3pZfSXR
X
unix  3      [ ]         DGRAM                    16272
unix  3      [ ]         STREAM     CONNECTED     33084
```

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

1. Hostname

To communicate with each and other, the computer needs a unique address. A hostname can be alphabetic or alphanumeric and contain specific symbols used specifically to define a specific node or device in the network. For example, a hostname should have a domain name (TLD) of the top-level and a distance between one and 63 characters when used in a domain name system (DNS) or on the Internet.

```
ashtami@ashtami-VirtualBox:~$ hostname
ashtami-VirtualBox
ashtami@ashtami-VirtualBox:~$
```

2. df

df is a standard Unix command used to display the amount of available disk space for file systems on which the invoking user has appropriate read access. df is typically implemented using the statfs or statvfs system calls.

```
ashtami@ashtami-VirtualBox:~$ df
Filesystem     1K-blocks     Used Available Use% Mounted on
udev              515780        0    515780   0% /dev
tmpfs             108992     1344    107648   2% /run
/dev/sda5        9736500  7116844   2105352  78% /
tmpfs             544952        0    544952   0% /dev/shm
tmpfs               5120        4      5116   1% /run/lock
tmpfs             544952        0    544952   0% /sys/fs/cgroup
/dev/loop2         56832    56832         0 100% /snap/core18/2128
/dev/loop1         56832    56832         0 100% /snap/core18/2074
/dev/loop0        224256   224256         0 100% /snap/gnome-3-34-1804/66
/dev/loop3        224256   224256         0 100% /snap/gnome-3-34-1804/72
/dev/loop5         66688    66688         0 100% /snap/gtk-common-themes/1515
/dev/loop4         66432    66432         0 100% /snap/gtk-common-themes/1514
/dev/loop6         52352    52352         0 100% /snap/snap-store/518
/dev/loop7         33152    33152         0 100% /snap/snapd/12704
/dev/loop9         33152    33152         0 100% /snap/snapd/12883
/dev/loop8         52224    52224         0 100% /snap/snap-store/547
/dev/sda1         523248        4    523244   1% /boot/efi
tmpfs             108988       32    108956   1% /run/user/1000
ashtami@ashtami-VirtualBox:~$
```

3.env

env is a shell command for Unix and Unix-like operating systems. It is used to either print a list of environment variables or run another utility in an altered environment without having to modify the currently existing environment.

```
ashtami@ashtami-VirtualBox:~$ env
SHELL=/bin/bash
SESSION_MANAGER=local/ashtami-VirtualBox:@/tmp/.ICE-unix/1155,unix/ashtami-Virt
ualBox:/tmp/.ICE-unix/1155
_WSREP_START_POSITION=
QT_ACCESSIBILITY=1
COLORTERM=truecolor
XDG_CONFIG_DIRS=/etc/xdg/xdg-ubuntu:/etc/xdg
XDG_MENU_PREFIX=gnome-
GNOME_DESKTOP_SESSION_ID=this-is-deprecated
GNOME_SHELL_SESSION_MODE=ubuntu
SSH_AUTH_SOCK=/run/user/1000/keyring/ssh
XMODIFIERS=@im=ibus
DESKTOP_SESSION=ubuntu
SSH_AGENT_PID=1106
GTK_MODULES=gail:atk-bridge
PWD=/home/ashtami
LOGNAME=ashtami
XDG_SESSION_DESKTOP=ubuntu
XDG_SESSION_TYPE=x11
GPG_AGENT_INFO=/run/user/1000/gnupg/S.gpg-agent:0:1
XAUTHORITY=/run/user/1000/gdm/Xauthority
GJS_DEBUG_TOPICS=JS ERROR;JS LOG
WINDOWPATH=2
HOME=/home/ashtami
USERNAME=ashtami
IM_CONFIG_PHASE=1
LANG=en_US.UTF-8
LS_COLORS=rs=0:di=01;34:ln=01;36:mh=00:pi=40;33:so=01;35:do=01;35:bd=40;33;01:c
```

4.Od

od is a command on various operating systems for displaying data in various human-readable output formats. The name is an acronym for "octal dump" since it defaults to printing in the octal data format.

```
ashtami@ashtami-VirtualBox:~$ od -b file2.txt
0000000 142 141 163 151 143 040 154 151 156 165 170 040 143 157 155 155
0000020 141 156 144 163 040 160 141 162 164 040 062 012 012 012 012 012
0000040 012 012 012 012 012 012 012 012 012 012 012 012 012 012 012 012
0000060 012 012 012 012 033 133 101 012
0000070
```

5.cal

cal will print a calendar of the current month.

```
ashtami@ashtami-VirtualBox:~$ cal
    September 2021
Su Mo Tu We Th Fr Sa
            1  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 29 30
```

Id:

- It is used to find out user and group names and numeric ID's (of the current user or any other user in the server.

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

Ps:

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

```
ashtami@ashtami-VirtualBox:~/mca$ ps -a
    PID TTY          TIME CMD
    759 tty2     00:00:10 Xorg
    885 tty2     00:00:00 gnome-session-b
   1638 pts/0    00:00:00 ps
```

top:

- It is used to show the Linux processes.

```
ashtami@ashtami-VirtualBox:~/mca$ top -u ashtami

top - 09:49:38 up 16 min,  1 user,  load average: 0.16, 0.27, 0.43
Tasks: 165 total,   1 running, 164 sleeping,   0 stopped,   0 zombie
%Cpu(s): 23.8 us,  4.1 sy,  0.0 ni, 72.1 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
MiB Mem :   1064.4 total,     72.7 free,    565.5 used,    426.2 buff/cache
MiB Swap:    448.5 total,    400.8 free,     47.7 used.    353.0 avail Mem

    PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
   1028 ashtami   20   0 3689572 285608  89712 S  13.9  26.2   0:37.38 gnome-+
    759 ashtami   20   0  527404  43568  28676 S   8.3   4.0   0:10.94 Xorg
   1481 ashtami   20   0  823332  49520  36904 S   4.3   4.5   0:06.41 gnome-+
   1644 ashtami   20   0   20496   3776   3204 R   0.7   0.3   0:00.12 top
   1176 ashtami   20   0  699344  30476  19772 S   0.3   2.8   0:00.80 gsd-me+
   1187 ashtami   20   0  357604  29388  18708 S   0.3   2.7   0:00.74 gsd-xs+
    710 ashtami   20   0   19268   8744   7264 S   0.0   0.8   0:01.47 systemd
    711 ashtami   20   0  168968   2024      0 S   0.0   0.2   0:00.00 (sd-pa+
    748 ashtami    9 -11 1417016  12396  10540 S   0.0   1.1   0:02.05 pulsea+
    751 ashtami   39  19  520016  14624  12628 S   0.0   1.3   0:00.47 tracke+
    753 ashtami   20   0  248660   5476   4964 S   0.0   0.5   0:00.15 gnome-+
    757 ashtami   20   0  172652   6028   5740 S   0.0   0.6   0:00.04 gdm-x-+
```

1.Try out these network commands in Window as well as in Linux and perform at least 4 options with each command: ping route traceroute, nslookup,Ip Config, NetStat .

Windows

- **Ping**

```
Microsoft Windows [Version 10.0.17134.1]
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C:\Program Files>ping google.com

Pinging google.com [2404:6800:4007:825::200e] with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 2404:6800:4007:825::200e:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

```
C:\Program Files>ping -a google.com

Pinging google.com [2404:6800:4009:826::200e] with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 2404:6800:4009:826::200e:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

```
C:\Program Files>ping -j google.com

Pinging google.com [142.250.183.238] with 32 bytes of data:
General failure.
General failure.
General failure.
General failure.

Ping statistics for 142.250.183.238:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\Program Files>
```

```
C:\Program Files>ping -4 google.com

Pinging google.com [142.250.183.238] with 32 bytes of data:
Reply from 142.250.183.238: bytes=32 time=1584ms TTL=112
Reply from 142.250.183.238: bytes=32 time=349ms TTL=112
Reply from 142.250.183.238: bytes=32 time=1249ms TTL=112
Request timed out.

Ping statistics for 142.250.183.238:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 349ms, Maximum = 1584ms, Average = 1060ms

C:\Program Files>
```

Route

```
C:\Program Files>route print
===========================================================================
Interface List
 16...b4 b6 86 0c 1b 5b ......Realtek PCIe GBE Family Controller
 14...0a 00 27 00 00 0e ......VirtualBox Host-Only Ethernet Adapter
 20...82 c5 f2 9a 23 4d ......Microsoft Wi-Fi Direct Virtual Adapter
  8...80 c5 f2 9a 23 4d ......Microsoft Wi-Fi Direct Virtual Adapter #2
  3...00 ff 0d 16 c4 cf ......Kaspersky Security Data Escort Adapter
 18...00 ff ad e4 72 5a ......Kaspersky Security Data Escort Adapter #2
  4...80 c5 f2 9a 23 4d ......Realtek RTL8723DE 802.11b/g/n PCIe Adapter
 21...80 c5 f2 9a 23 4c ......Bluetooth Device (Personal Area Network)
  1...........................Software Loopback Interface 1
===========================================================================

IPv4 Route Table
===========================================================================
Active Routes:
Network Destination        Netmask          Gateway       Interface  Metric
          0.0.0.0          0.0.0.0     192.168.43.1   192.168.43.205     55
        127.0.0.0        255.0.0.0         On-link         127.0.0.1    331
        127.0.0.1  255.255.255.255         On-link         127.0.0.1    331
  127.255.255.255  255.255.255.255         On-link         127.0.0.1    331
     192.168.43.0    255.255.255.0         On-link    192.168.43.205    311
   192.168.43.205  255.255.255.255         On-link    192.168.43.205    311
   192.168.43.255  255.255.255.255         On-link    192.168.43.205    311
     192.168.56.0    255.255.255.0         On-link      192.168.56.1    281
     192.168.56.1  255.255.255.255         On-link      192.168.56.1    281
   192.168.56.255  255.255.255.255         On-link      192.168.56.1    281
        224.0.0.0        240.0.0.0         On-link         127.0.0.1    331
        224.0.0.0        240.0.0.0         On-link      192.168.56.1    281
        224.0.0.0        240.0.0.0         On-link    192.168.43.205    311
  255.255.255.255  255.255.255.255         On-link         127.0.0.1    331
  255.255.255.255  255.255.255.255         On-link      192.168.56.1    281
  255.255.255.255  255.255.255.255         On-link    192.168.43.205    311
===========================================================================
Persistent Routes:
  None
```

```
IPv6 Route Table
===========================================================================
Active Routes:
 If Metric Network Destination      Gateway
  4     71 ::/0                     fe80::82ce:b9ff:febf:4cfb
  1    331 ::1/128                  On-link
  4     71 2409:4073:4e01:734a::/64 On-link
  4    311 2409:4073:4e01:734a:188c:afcd:8641:4d25/128
                                    On-link
  4    311 2409:4073:4e01:734a:71c9:bb48:16af:dbb3/128
                                    On-link
 14    281 fe80::/64                On-link
  4    311 fe80::/64                On-link
  4    311 fe80::188c:afcd:8641:4d25/128
                                    On-link
 14    281 fe80::b8e1:1444:8093:966/128
                                    On-link
  1    331 ff00::/8                 On-link
 14    281 ff00::/8                 On-link
  4    311 ff00::/8                 On-link
===========================================================================
Persistent Routes:
  None

C:\Program Files>ping -j google.com
```

```
C:\Program Files>route print -4
===========================================================================
Interface List
 16...b4 b6 86 0c 1b 5b ......Realtek PCIe GBE Family Controller
 14...0a 00 27 00 00 0e ......VirtualBox Host-Only Ethernet Adapter
 20...82 c5 f2 9a 23 4d ......Microsoft Wi-Fi Direct Virtual Adapter
  8...80 c5 f2 9a 23 4d ......Microsoft Wi-Fi Direct Virtual Adapter #2
  3...00 ff 0d 16 c4 cf ......Kaspersky Security Data Escort Adapter
 18...00 ff ad e4 72 5a ......Kaspersky Security Data Escort Adapter #2
  4...80 c5 f2 9a 23 4d ......Realtek RTL8723DE 802.11b/g/n PCIe Adapter
 21...80 c5 f2 9a 23 4c ......Bluetooth Device (Personal Area Network)
  1...........................Software Loopback Interface 1
===========================================================================

IPv4 Route Table
===========================================================================
Active Routes:
```

```
IPv4 Route Table
===========================================================================
Active Routes:
Network Destination        Netmask          Gateway       Interface  Metric
          0.0.0.0          0.0.0.0    192.168.43.1   192.168.43.205     55
        127.0.0.0        255.0.0.0         On-link         127.0.0.1    331
        127.0.0.1  255.255.255.255         On-link         127.0.0.1    331
  127.255.255.255  255.255.255.255         On-link         127.0.0.1    331
     192.168.43.0    255.255.255.0         On-link    192.168.43.205    311
   192.168.43.205  255.255.255.255         On-link    192.168.43.205    311
   192.168.43.255  255.255.255.255         On-link    192.168.43.205    311
     192.168.56.0    255.255.255.0         On-link      192.168.56.1    281
     192.168.56.1  255.255.255.255         On-link      192.168.56.1    281
   192.168.56.255  255.255.255.255         On-link      192.168.56.1    281
        224.0.0.0        240.0.0.0         On-link         127.0.0.1    331
        224.0.0.0        240.0.0.0         On-link      192.168.56.1    281
        224.0.0.0        240.0.0.0         On-link    192.168.43.205    311
  255.255.255.255  255.255.255.255         On-link         127.0.0.1    331
  255.255.255.255  255.255.255.255         On-link      192.168.56.1    281
  255.255.255.255  255.255.255.255         On-link    192.168.43.205    311
===========================================================================
Persistent Routes:
  None
```

```
C:\Program Files>route print -6
===========================================================================
Interface List
 16...b4 b6 86 0c 1b 5b ......Realtek PCIe GBE Family Controller
 14...0a 00 27 00 00 0e ......VirtualBox Host-Only Ethernet Adapter
 20...82 c5 f2 9a 23 4d ......Microsoft Wi-Fi Direct Virtual Adapter
  8...80 c5 f2 9a 23 4d ......Microsoft Wi-Fi Direct Virtual Adapter #2
  3...00 ff 0d 16 c4 cf ......Kaspersky Security Data Escort Adapter
 18...00 ff ad e4 72 5a ......Kaspersky Security Data Escort Adapter #2
  4...80 c5 f2 9a 23 4d ......Realtek RTL8723DE 802.11b/g/n PCIe Adapter
 21...80 c5 f2 9a 23 4c ......Bluetooth Device (Personal Area Network)
  1...........................Software Loopback Interface 1
===========================================================================

IPv6 Route Table
===========================================================================
Active Routes:
 If Metric Network Destination      Gateway
  4     71 ::/0                     fe80::82ce:b9ff:febf:4cfb
  1    331 ::1/128                  On-link
  4     71 2409:4073:4e01:734a::/64 On-link
  4    311 2409:4073:4e01:734a:188c:afcd:8641:4d25/128
                                    On-link
  4    311 2409:4073:4e01:734a:71c9:bb48:16af:dbb3/128
                                    On-link
 14    281 fe80::/64               On-link
  4    311 fe80::/64               On-link
  4    311 fe80::188c:afcd:8641:4d25/128
                                    On-link
 14    281 fe80::b8e1:1444:8093:966/128
                                    On-link
  1    331 ff00::/8                On-link
 14    281 ff00::/8                On-link
  4    311 ff00::/8                On-link
===========================================================================
Persistent Routes:
  None
```

```
C:\Program Files>route print *157
===========================================================================
Interface List
 16...b4 b6 86 0c 1b 5b ......Realtek PCIe GBE Family Controller
 14...0a 00 27 00 00 0e ......VirtualBox Host-Only Ethernet Adapter
 20...82 c5 f2 9a 23 4d ......Microsoft Wi-Fi Direct Virtual Adapter
  8...80 c5 f2 9a 23 4d ......Microsoft Wi-Fi Direct Virtual Adapter #2
  3...00 ff 0d 16 c4 cf ......Kaspersky Security Data Escort Adapter
 18...00 ff ad e4 72 5a ......Kaspersky Security Data Escort Adapter #2
  4...80 c5 f2 9a 23 4d ......Realtek RTL8723DE 802.11b/g/n PCIe Adapter
 21...80 c5 f2 9a 23 4c ......Bluetooth Device (Personal Area Network)
  1...........................Software Loopback Interface 1
===========================================================================

IPv4 Route Table
===========================================================================
Active Routes:
  None
Persistent Routes:
  None

IPv6 Route Table
===========================================================================
Active Routes:
  None
Persistent Routes:
  None
```

Tracert

```
C:\Program Files>tracert  192.168.1.1

Tracing route to 192.168.1.1 over a maximum of 30 hops

  1   323 ms   100 ms    95 ms  192.168.43.1
  2     *        *        *     Request timed out.
  3   210 ms   259 ms     *     56.8.126.45
  4   325 ms   201 ms   176 ms  172.26.104.197
  5   287 ms   303 ms   303 ms  172.26.104.211
  6   276 ms   302 ms  3374 ms  192.168.14.32
  7   272 ms   405 ms   610 ms  192.168.14.33
  8   245 ms   235 ms   307 ms  172.16.3.14
  9   420 ms   304 ms   301 ms  172.16.81.0
 10   475 ms   302 ms   215 ms  172.16.0.159
 11   279 ms   204 ms   187 ms  172.16.21.20
 12   217 ms   187 ms   190 ms  172.16.2.9
 13     *        *        *     Request timed out.
 14     *        *        *     Request timed out.
 15     *        *        *     Request timed out.
 16     *        *        *     Request timed out.
 17     *        *        *     Request timed out.
 18     *        *        *     Request timed out.
 19     *        *        *     Request timed out.
 20     *        *        *     Request timed out.
 21     *        *        *     Request timed out.
 22     *        *        *     Request timed out.
 23     *        *        *     Request timed out.
 24     *        *        *     Request timed out.
 25     *        *        *     Request timed out.
 26     *
```

```
 22     *        *        *     Request timed out.
 23     *        *        *     Request timed out.
 24     *        *        *     Request timed out.
 25     *        *        *     Request timed out.
 26     *        *        *     Request timed out.
 27     *        *        *     Request timed out.
 28     *        *        *     Request timed out.
 29     *        *        *     Request timed out.
 30     *        *        *     Request timed out.

Trace complete.
```

```
C:\Program Files>tracert  www.google.com

Tracing route to www.google.com [2404:6800:4002:818::2004]
over a maximum of 30 hops:

  1   246 ms   200 ms   200 ms  2409:4073:4e01:734a::f4
  2     *        *        *     Request timed out.
  3     *        *        *     Request timed out.
  4     *        *        *     Request timed out.
  5     *        *        *     Request timed out.
  6     *        *        *     Request timed out.
  7     *        *        *     Request timed out.
  8     *        *        *     Request timed out.
  9     *        *        *     Request timed out.
 10     *        *        *     Request timed out.
 11     *        *        *     Request timed out.
 12     *        *        *     Request timed out.
 13     *        *        *     Request timed out.
 14     *        *        *     Request timed out.
 15     *        *        *     Request timed out.
 16     *        *        *     Request timed out.
 17     *        *        *     Request timed out.
 18     *        *        *     Request timed out.
 19     *        *        *     Request timed out.
 20     *        *        *     Request timed out.
 21     *        *        *     Request timed out.
 22     *        *        *     Request timed out.
 23     *        *        *     Request timed out.
 24     *        *        *     Request timed out.
 25     *        *        *     Request timed out.
 26     *        *        *     Request timed out.
```

```
 19     *        *        *     Request timed out.
 20     *        *        *     Request timed out.
 21     *        *        *     Request timed out.
 22     *        *        *     Request timed out.
 23     *        *        *     Request timed out.
 24     *        *        *     Request timed out.
 25     *        *        *     Request timed out.
 26     *        *        *     Request timed out.
 27     *        *        *     Request timed out.
 28     *        *        *     Request timed out.
 29     *        *        *     Request timed out.
 30     *        *        *     Request timed out.

Trace complete.
```

```
C:\Program Files>tracert  -d www.yahoo.com

Tracing route to new-fp-shed.wg1.b.yahoo.com [2406:2000:e4:1605::9001]
over a maximum of 30 hops:

  1   156 ms   190 ms   405 ms  2409:4073:4e01:734a::f4
  2     *        *        *     Request timed out.
  3     *        *        *     Request timed out.
  4     *        *        *     Request timed out.
  5     *        *        *     Request timed out.
  6     *        *        *     Request timed out.
  7     *        *        *     Request timed out.
  8     *        *        *     Request timed out.
  9     *        *        *     Request timed out.
 10     *        *        *     Request timed out.
 11     *        *        *     Request timed out.
 12     *        *        *     Request timed out.
 13     *        *        *     Request timed out.
 14     *        *        *     Request timed out.
 15     *        *
```

```
  7     *        *        *     Request timed out.
  8     *        *        *     Request timed out.
  9     *        *        *     Request timed out.
 10     *        *        *     Request timed out.
 11     *        *        *     Request timed out.
 12     *        *        *     Request timed out.
 13     *        *        *     Request timed out.
 14     *        *        *     Request timed out.
 15     *        *        *     Request timed out.
 16     *        *        *     Request timed out.
 17     *        *        *     Request timed out.
 18     *        *        *     Request timed out.
 19     *        *        *     Request timed out.
 20     *        *        *     Request timed out.
 21     *        *        *     Request timed out.
 22     *        *        *     Request timed out.
 23     *        *        *     Request timed out.
 24     *        *        *     Request timed out.
 25     *        *        *     Request timed out.
 26     *        *        *     Request timed out.
 27     *        *        *     Request timed out.
 28     *        *        *     Request timed out.
 29     *        *        *     Request timed out.
 30     *        *        *     Request timed out.

Trace complete.
```

```
C:\Program Files>tracert 22.110.0.1

Tracing route to 22.110.0.1 over a maximum of 30 hops

  1     88 ms    100 ms    101 ms  192.168.43.1
  2      *         *         *     Request timed out.
  3      *       543 ms    612 ms  56.8.126.69
  4    215 ms    197 ms    226 ms  172.26.104.197
  5    173 ms    155 ms    187 ms  172.26.104.211
  6    434 ms    305 ms    203 ms  192.168.14.32
  7    211 ms    201 ms    183 ms  192.168.14.35
  8    275 ms    510 ms    305 ms  172.16.21.21
  9    190 ms    199 ms    237 ms  172.16.81.6
 10    275 ms    304 ms    306 ms  172.16.3.91
 11    302 ms    483 ms    203 ms  172.16.3.15
 12    731 ms    314 ms    399 ms  172.16.2.60
 13    425 ms      *       736 ms  103.198.140.27
 14   1031 ms   1326 ms   1276 ms  103.198.140.27
 15    436 ms   1543 ms    679 ms  hurricane.mrs.franceix.net [37.49.232.13]
 16    661 ms    406 ms    406 ms  port-channel1.core2.mrs1.he.net [184.104.197.42]
 17    564 ms    407 ms    305 ms  ve952.core1.bio1.he.net [184.104.196.78]
 18   1183 ms    668 ms    444 ms  100ge0-30.core1.orf2.he.net [184.105.64.122]
 19    500 ms    613 ms    509 ms  100ge15-1.core2.ash1.he.net [184.105.64.121]
 20      *         *         *     Request timed out.
 21      *         *         *     Request timed out.
 22      *         *         *     Request timed out.
 23      *         *         *     Request timed out.
 24      *         *         *     Request timed out.
 25      *         *         *     Request timed out.
 26      *         *         *     Request timed out.
 27      *         *         *     Request timed out.
 28      *         *         *     Request timed out.
 29      *         *         *     Request timed out.
 30      *         *         *     Request timed out.

Trace complete.
```

Nslookup

```
C:\Program Files>nslookup
Default Server:  UnKnown
Address:  192.168.43.1
```

```
C:\Program Files>nslookup google.com
DNS request timed out.
    timeout was 2 seconds.
Server:  UnKnown
Address:  192.168.43.1

Non-authoritative answer:
DNS request timed out.
    timeout was 2 seconds.
Name:    google.com
Address:  142.250.195.142
```

```
C:\Program Files>nslookup -q=MX  google.com
Server:  UnKnown
Address:  192.168.43.1

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

```
C:\Program Files>nslookup -type=ns google.com
Server:  UnKnown
Address:  192.168.43.1

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

Ipconfig

```
C:\Program Files>ipconfig

Windows IP Configuration


Ethernet adapter Ethernet:

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

Ethernet adapter VirtualBox Host-Only Network:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::b8e1:1444:8093:966%14
   IPv4 Address. . . . . . . . . . . : 192.168.56.1
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . :

Wireless LAN adapter Local Area Connection* 2:

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

Wireless LAN adapter Local Area Connection* 3:

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

Ethernet adapter Ethernet 2:
```

```
Ethernet adapter Ethernet 2:

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

Ethernet adapter Ethernet 3:

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

Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   IPv6 Address. . . . . . . . . . . : 2409:4073:4e01:734a:188c:afcd:86
   Temporary IPv6 Address. . . . . . : 2409:4073:4e01:734a:71c9:bb48:16
   Link-local IPv6 Address . . . . . : fe80::188c:afcd:8641:4d25%4
   IPv4 Address. . . . . . . . . . . : 192.168.43.205
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : fe80::82ce:b9ff:febf:4cfb%4
                                       192.168.43.1

Ethernet adapter Bluetooth Network Connection:

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

```
C:\Program Files>ipconfig /allcompartments

Windows IP Configuration


================================================================================
Network Information for Compartment 1 (ACTIVE)
================================================================================

Ethernet adapter Ethernet:

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

Ethernet adapter VirtualBox Host-Only Network:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::b8e1:1444:8093:966%14
   IPv4 Address. . . . . . . . . . . : 192.168.56.1
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . :

Wireless LAN adapter Local Area Connection* 2:

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

Wireless LAN adapter Local Area Connection* 3:
```

```
C:\Program Files>ipconfig /displaydns

Windows IP Configuration

    www.fastjobsearchers.com
    ----------------------------------------
    Record Name . . . . . : www.fastjobsearchers.com
    Record Type . . . . . : 1
    Time To Live  . . . . : 10241
    Data Length . . . . . : 4
    Section . . . . . . . : Answer
    A (Host) Record . . . : 119.18.54.75


    www.aesajce.in
    ----------------------------------------
    Record Name . . . . . : www.aesajce.in
    Record Type . . . . . : 5
    Time To Live  . . . . : 1310
    Data Length . . . . . : 8
    Section . . . . . . . : Answer
    CNAME Record  . . . . : aesajce.in


    Record Name . . . . . : aesajce.in
    Record Type . . . . . : 1
    Time To Live  . . . . : 1310
    Data Length . . . . . : 4
    Section . . . . . . . : Answer
```

```
C:\Program Files>ipconfig /release

Windows IP Configuration

No operation can be performed on Ethernet while it has its media disconnected.
No operation can be performed on Local Area Connection* 2 while it has its media disconnected.
No operation can be performed on Local Area Connection* 3 while it has its media disconnected.
No operation can be performed on Ethernet 2 while it has its media disconnected.
No operation can be performed on Ethernet 3 while it has its media disconnected.
No operation can be performed on Bluetooth Network Connection while it has its media disconnected.

Ethernet adapter Ethernet:

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

Ethernet adapter VirtualBox Host-Only Network:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::b8e1:1444:8093:966%14
   IPv4 Address. . . . . . . . . . . : 192.168.56.1
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . :

Wireless LAN adapter Local Area Connection* 2:

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

Netstat

```
C:\Program Files>netstat

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:54159  maa05s20-in-x03:https  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:54289  maa03s44-in-x04:https  ESTABLISHED
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:57218  sc-in-xbc:5228         ESTABLISHED
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:57302  maa05s22-in-x03:https  ESTABLISHED
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:60597  maa05s22-in-x03:https  ESTABLISHED
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:61313  del12s07-in-x01:https  ESTABLISHED
```

```
C:\Program Files>netstat -n

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:50204  [2404:6800:4009:824::200e]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:53337  [2404:6800:4007:81d::2003]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:54159  [2404:6800:4007:81b::2003]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:54289  [2404:6800:4007:829::2004]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:55506  [2404:6800:4007:81b::2003]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:57218  [2404:6800:4003:c02::bc]:5228  ESTABLISHED
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:57584  [2404:6800:4009:812::200e]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:60077  [2404:6800:4009:824::200e]:443  ESTABLISHED
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:60597  [2404:6800:4007:81d::2003]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:61313  [2404:6800:4002:824::2001]:443  TIME_WAIT
```

```
C:\Program Files>netstat -n 5

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:50204  [2404:6800:4009:824::200e]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:53337  [2404:6800:4007:81d::2003]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:54159  [2404:6800:4007:81b::2003]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:54289  [2404:6800:4007:829::2004]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:55506  [2404:6800:4007:81b::2003]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:57218  [2404:6800:4003:c02::bc]:5228  ESTABLISHED
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:57584  [2404:6800:4009:812::200e]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:60077  [2404:6800:4009:824::200e]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:60597  [2404:6800:4007:81d::2003]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:61313  [2404:6800:4002:824::2001]:443  TIME_WAIT

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:50204  [2404:6800:4009:824::200e]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:53337  [2404:6800:4007:81d::2003]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:54159  [2404:6800:4007:81b::2003]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:54289  [2404:6800:4007:829::2004]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:55506  [2404:6800:4007:81b::2003]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:57218  [2404:6800:4003:c02::bc]:5228  ESTABLISHED
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:57584  [2404:6800:4009:812::200e]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:60077  [2404:6800:4009:824::200e]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:60597  [2404:6800:4007:81d::2003]:443  TIME_WAIT
  TCP    [2409:4073:4e01:734a:71c9:bb48:16af:dbb3]:61313  [2404:6800:4002:824::2001]:443  TIME_WAIT
```

```
C:\Program Files>netstat -a

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    0.0.0.0:135            DESKTOP-IPG3LL3:0      LISTENING
  TCP    0.0.0.0:445            DESKTOP-IPG3LL3:0      LISTENING
  TCP    0.0.0.0:5040           DESKTOP-IPG3LL3:0      LISTENING
  TCP    0.0.0.0:7680           DESKTOP-IPG3LL3:0      LISTENING
  TCP    0.0.0.0:49664          DESKTOP-IPG3LL3:0      LISTENING
  TCP    0.0.0.0:49665          DESKTOP-IPG3LL3:0      LISTENING
  TCP    0.0.0.0:49666          DESKTOP-IPG3LL3:0      LISTENING
  TCP    0.0.0.0:49667          DESKTOP-IPG3LL3:0      LISTENING
  TCP    0.0.0.0:49668          DESKTOP-IPG3LL3:0      LISTENING
  TCP    0.0.0.0:49669          DESKTOP-IPG3LL3:0      LISTENING
  TCP    127.0.0.1:5939         DESKTOP-IPG3LL3:0      LISTENING
  TCP    127.0.0.1:49670        DESKTOP-IPG3LL3:0      LISTENING
  TCP    169.254.77.37:139      DESKTOP-IPG3LL3:0      LISTENING
  TCP    192.168.56.1:139       DESKTOP-IPG3LL3:0      LISTENING
  TCP    [::]:135               DESKTOP-IPG3LL3:0      LISTENING
  TCP    [::]:445               DESKTOP-IPG3LL3:0      LISTENING
  TCP    [::]:7680              DESKTOP-IPG3LL3:0      LISTENING
  TCP    [::]:49664             DESKTOP-IPG3LL3:0      LISTENING
  TCP    [::]:49665             DESKTOP-IPG3LL3:0      LISTENING
  TCP    [::]:49666             DESKTOP-IPG3LL3:0      LISTENING
  TCP    [::]:49667             DESKTOP-IPG3LL3:0      LISTENING
  TCP    [::]:49668             DESKTOP-IPG3LL3:0      LISTENING
  TCP    [::]:49669             DESKTOP-IPG3LL3:0      LISTENING
```

Linux

- **Ping**

```
ashtami@ashtami-VirtualBox:~$ ping google.com
PING google.com (142.250.77.142) 56(84) bytes of data.
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=1 ttl=112 ti
me=361 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=2 ttl=112 ti
me=229 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=3 ttl=112 ti
me=270 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=4 ttl=112 ti
me=235 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=5 ttl=112 ti
me=192 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=6 ttl=112 ti
me=203 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=7 ttl=112 ti
me=198 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=8 ttl=112 ti
me=190 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=9 ttl=112 ti
me=193 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=10 ttl=112 t
ime=194 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=11 ttl=112 t
ime=200 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=12 ttl=112 t
ime=226 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=13 ttl=112 t
ime=267 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=14 ttl=112 t
```

```
ashtami@ashtami-VirtualBox:~$ ping  -a google.com
PING google.com (142.250.77.142) 56(84) bytes of data.
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=1 ttl=112 ti
me=271 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=2 ttl=112 ti
me=294 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=3 ttl=112 ti
me=215 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=4 ttl=112 ti
me=237 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=5 ttl=112 ti
me=181 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=6 ttl=112 ti
me=182 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=7 ttl=112 ti
me=183 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=9 ttl=112 ti
me=177 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=11 ttl=112 t
ime=196 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=12 ttl=112 t
ime=185 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=13 ttl=112 t
ime=183 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=14 ttl=112 t
ime=181 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=15 ttl=112 t
ime=182 ms
64 bytes from maa05s16-in-f14.1e100.net (142.250.77.142): icmp_seq=16 ttl=112 t
```

```
ashtami@ashtami-VirtualBox:~$ ping -v google.com
PING google.com (142.250.195.142) 56(84) bytes of data.
```

```
ashtami@ashtami-VirtualBox:~$ ping -b google.com
PING google.com (142.250.195.142) 56(84) bytes of data.
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=3 ttl=111 t
ime=1641 ms
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=4 ttl=111 t
ime=1744 ms
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=5 ttl=111 t
ime=1360 ms
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=6 ttl=111 t
ime=1399 ms
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=7 ttl=111 t
ime=1118 ms
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=8 ttl=111 t
ime=790 ms
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=9 ttl=111 t
ime=481 ms
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=10 ttl=111
time=1559 ms
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=11 ttl=111
time=1129 ms
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=12 ttl=111
time=920 ms
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=14 ttl=111
time=1784 ms
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=15 ttl=111
time=1411 ms
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=16 ttl=111
time=1329 ms
64 bytes from maa03s40-in-f14.1e100.net (142.250.195.142): icmp_seq=17 ttl=111
```

- **Route**

```
ashtami@ashtami-VirtualBox:~$ 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
```

```
ashtami@ashtami-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
```

```
ashtami@ashtami-VirtualBox:~$ route -Cn
Kernel IP routing cache
Source          Destination     Gateway         Flags Metric Ref    Use Iface
```

```
ashtami@ashtami-VirtualBox:~$ ip route
default via 10.0.2.2 dev enp0s3 proto dhcp metric 100
10.0.2.0/24 dev enp0s3 proto kernel scope link src 10.0.2.15 metric 100
169.254.0.0/16 dev enp0s3 scope link metric 1000
```

- **Traceroute**

```
ashtami@ashtami-VirtualBox:~$ traceroute
Usage:
  traceroute [ -46dFITnreAUDV ] [ -f first_ttl ] [ -g gate,... ] [ -i device ]
[ -m max_ttl ] [ -N squeries ] [ -p port ] [ -t tos ] [ -l flow_label ] [ -w MA
X,HERE,NEAR ] [ -q nqueries ] [ -s src_addr ] [ -z sendwait ] [ --fwmark=num ]
host [ packetlen ]
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,...
                              Route packets through the specified gateway
                              (maximum 8 for IPv4 and 127 for IPv6)
  -I  --icmp                  Use ICMP ECHO for tracerouting
  -T  --tcp                   Use TCP SYN for tracerouting (default port is 80)
  -i device  --interface=device
                              Specify a network interface to operate with
  -m max_ttl  --max-hops=max_ttl
                              Set the max number of hops (max TTL to be
                              reached). Default is 30
  -N squeries  --sim-queries=squeries
                              Set the number of probes to be tried
                              simultaneously (default is 16)
  -n                          Do not resolve IP addresses to their domain names
  -p port  --port=port        Set the destination port to use. It is either
                              initial udp port value for "default" method
```

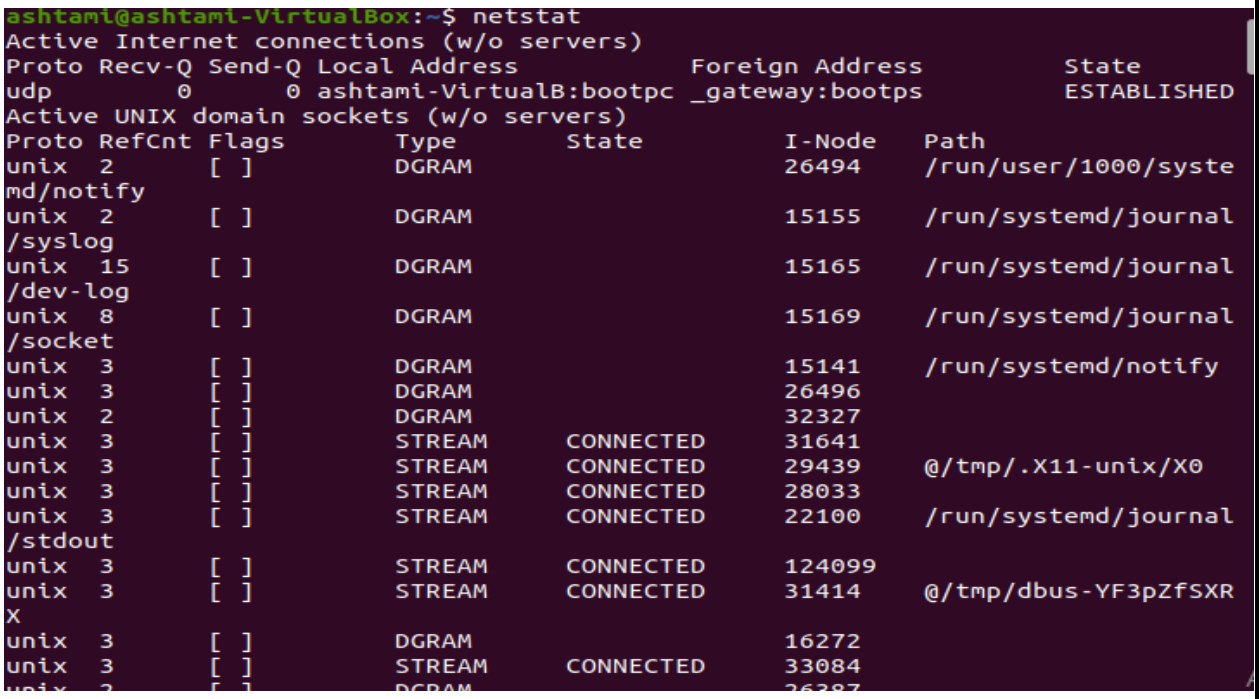
- **Ipconfig**

```
ashtami@ashtami-VirtualBox:~$ 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::4664:8ca7:83d6:e512  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:02:c3:08  txqueuelen 1000  (Ethernet)
        RX packets 1355  bytes 1221479 (1.2 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1265  bytes 116277 (116.2 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (Local Loopback)
        RX packets 3962  bytes 321045 (321.0 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 3962  bytes 321045 (321.0 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

- **nslookup**

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

- **Netstat**

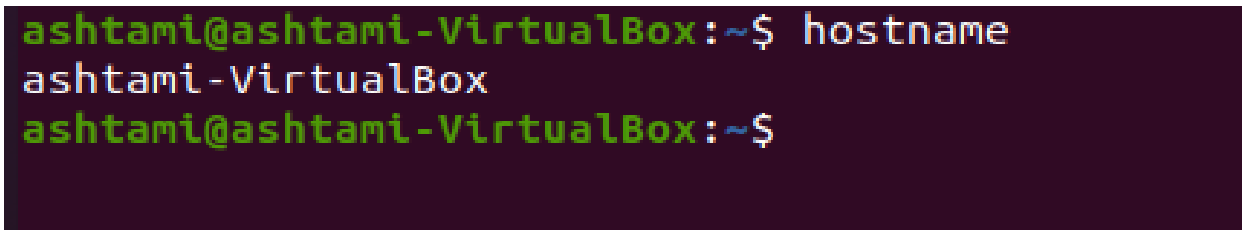


```
ashtami@ashtami-VirtualBox:~$ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
udp        0      0 ashtami-VirtualB:bootpc _gateway:bootps         ESTABLISHED
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags       Type       State         I-Node   Path
unix  2      [ ]         DGRAM                    26494    /run/user/1000/syste
md/notify
unix  2      [ ]         DGRAM                    15155    /run/systemd/journal
/syslog
unix  15     [ ]         DGRAM                    15165    /run/systemd/journal
/dev-log
unix  8      [ ]         DGRAM                    15169    /run/systemd/journal
/socket
unix  3      [ ]         DGRAM                    15141    /run/systemd/notify
unix  3      [ ]         DGRAM                    26496
unix  2      [ ]         DGRAM                    32327
unix  3      [ ]         STREAM     CONNECTED     31641
unix  3      [ ]         STREAM     CONNECTED     29439    @/tmp/.X11-unix/X0
unix  3      [ ]         STREAM     CONNECTED     28033
unix  3      [ ]         STREAM     CONNECTED     22100    /run/systemd/journal
/stdout
unix  3      [ ]         STREAM     CONNECTED     124099
unix  3      [ ]         STREAM     CONNECTED     31414    @/tmp/dbus-YF3pZfSXR
X
unix  3      [ ]         DGRAM                    16272
unix  3      [ ]         STREAM     CONNECTED     33084
```

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

1. Hostname

To communicate with each and other, the computer needs a unique address. A hostname can be alphabetic or alphanumeric and contain specific symbols used specifically to define a specific node or device in the network. For example, a hostname should have a domain name (TLD) of the top-level and a distance between one and 63 characters when used in a domain name system (DNS) or on the Internet.



```
ashtami@ashtami-VirtualBox:~$ hostname
ashtami-VirtualBox
ashtami@ashtami-VirtualBox:~$
```

2. df

df is a standard Unix command used to display the amount of available disk space for file systems on which the invoking user has appropriate read access. df is typically implemented using the statfs or statvfs system calls.

```
ashtami@ashtami-VirtualBox:~$ df
Filesystem     1K-blocks    Used Available Use% Mounted on
udev              515780       0    515780   0% /dev
tmpfs             108992    1344    107648   2% /run
/dev/sda5        9736500 7116844   2105352  78% /
tmpfs             544952       0    544952   0% /dev/shm
tmpfs               5120       4      5116   1% /run/lock
tmpfs             544952       0    544952   0% /sys/fs/cgroup
/dev/loop2         56832   56832         0 100% /snap/core18/2128
/dev/loop1         56832   56832         0 100% /snap/core18/2074
/dev/loop0        224256  224256         0 100% /snap/gnome-3-34-1804/66
/dev/loop3        224256  224256         0 100% /snap/gnome-3-34-1804/72
/dev/loop5         66688   66688         0 100% /snap/gtk-common-themes/1515
/dev/loop4         66432   66432         0 100% /snap/gtk-common-themes/1514
/dev/loop6         52352   52352         0 100% /snap/snap-store/518
/dev/loop7         33152   33152         0 100% /snap/snapd/12704
/dev/loop9         33152   33152         0 100% /snap/snapd/12883
/dev/loop8         52224   52224         0 100% /snap/snap-store/547
/dev/sda1         523248       4    523244   1% /boot/efi
tmpfs             108988      32    108956   1% /run/user/1000
ashtami@ashtami-VirtualBox:~$
```

3.env

env is a shell command for Unix and Unix-like operating systems. It is used to either print a list of environment variables or run another utility in an altered environment without having to modify the currently existing environment.

```
ashtami@ashtami-VirtualBox:~$ env
SHELL=/bin/bash
SESSION_MANAGER=local/ashtami-VirtualBox:@/tmp/.ICE-unix/1155,unix/ashtami-Virt
ualBox:/tmp/.ICE-unix/1155
_WSREP_START_POSITION=
QT_ACCESSIBILITY=1
COLORTERM=truecolor
XDG_CONFIG_DIRS=/etc/xdg/xdg-ubuntu:/etc/xdg
XDG_MENU_PREFIX=gnome-
GNOME_DESKTOP_SESSION_ID=this-is-deprecated
GNOME_SHELL_SESSION_MODE=ubuntu
SSH_AUTH_SOCK=/run/user/1000/keyring/ssh
XMODIFIERS=@im=ibus
DESKTOP_SESSION=ubuntu
SSH_AGENT_PID=1106
GTK_MODULES=gail:atk-bridge
PWD=/home/ashtami
LOGNAME=ashtami
XDG_SESSION_DESKTOP=ubuntu
XDG_SESSION_TYPE=x11
GPG_AGENT_INFO=/run/user/1000/gnupg/S.gpg-agent:0:1
XAUTHORITY=/run/user/1000/gdm/Xauthority
GJS_DEBUG_TOPICS=JS ERROR;JS LOG
WINDOWPATH=2
HOME=/home/ashtami
USERNAME=ashtami
IM_CONFIG_PHASE=1
LANG=en_US.UTF-8
LS_COLORS=rs=0:di=01;34:ln=01;36:mh=00:pi=40;33:so=01;35:do=01;35:bd=40;33;01:c
```

4.Od

od is a command on various operating systems for displaying data in various human-readable output formats. The name is an acronym for "octal dump" since it defaults to printing in the octal data format.

```
ashtami@ashtami-VirtualBox:~$ od -b file2.txt
0000000 142 141 163 151 143 040 154 151 156 165 170 040 143 157 155 155
0000020 141 156 144 163 040 160 141 162 164 040 062 012 012 012 012 012
0000040 012 012 012 012 012 012 012 012 012 012 012 012 012 012 012 012
0000060 012 012 012 012 033 133 101 012
0000070
```

5.cal

cal will print a calendar of the current month.

```
ashtami@ashtami-VirtualBox:~$ cal
    September 2021
Su Mo Tu We Th Fr Sa
            1  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 29 30
```

LAMPP Installation

[Topic:LAMPP Installation]

Install Apache

- Update your system

  sudo apt update

- Install Apache using apt:

  sudo apt install apache2

- Confirm that Apache is now running with the following command:

  sudo systemctl status apache2

- if it is not working

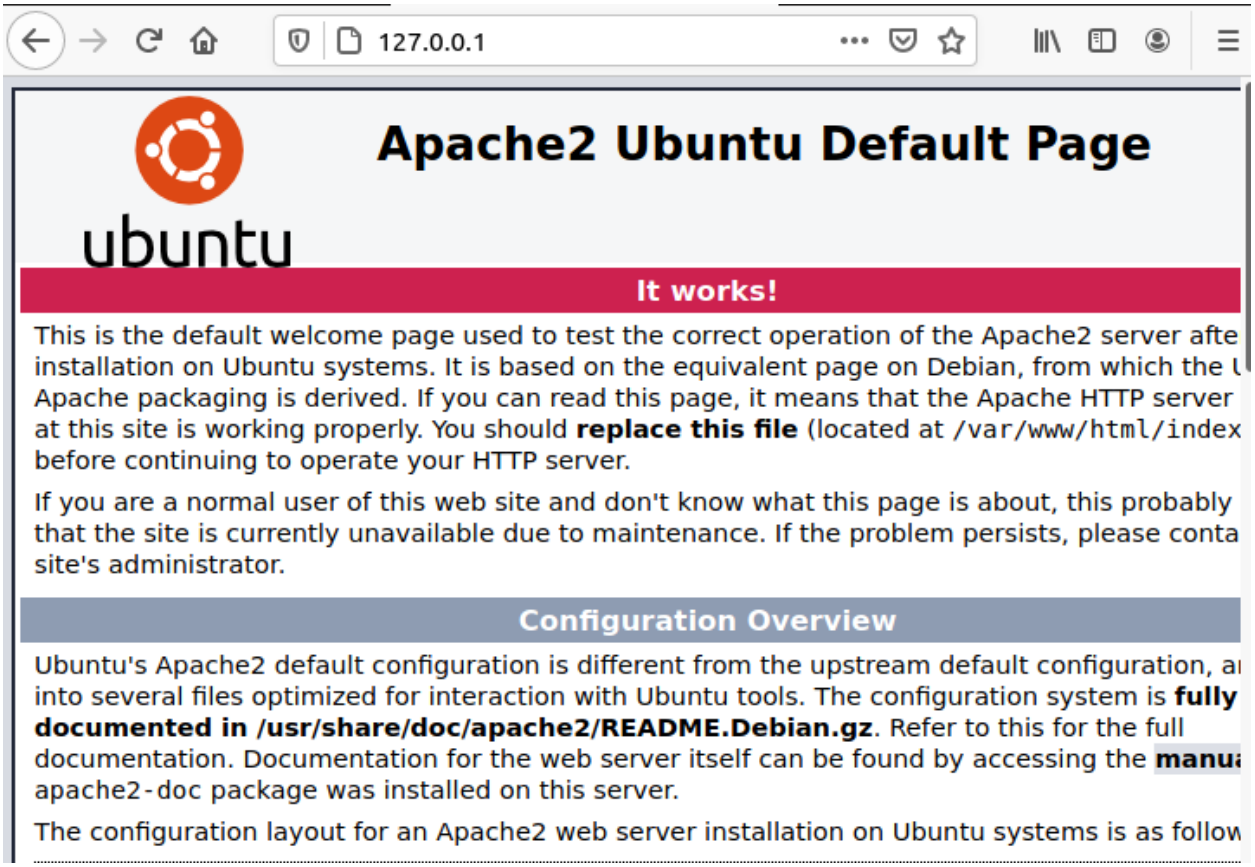
  sudo systemctl start apache2

```
ashtami@ashtami-VirtualBox:~$ sudo systemctl status apache2
[sudo] password for ashtami:
● apache2.service - The Apache HTTP Server
     Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor pres>
     Active: active (running) since Tue 2021-09-28 10:54:11 EDT; 3min 8s ago
       Docs: https://httpd.apache.org/docs/2.4/
    Process: 632 ExecStart=/usr/sbin/apachectl start (code=exited, status=0/SU>
   Main PID: 759 (apache2)
      Tasks: 6 (limit: 1208)
     Memory: 14.7M
     CGroup: /system.slice/apache2.service
             ├─759 /usr/sbin/apache2 -k start
             ├─798 /usr/sbin/apache2 -k start
             ├─799 /usr/sbin/apache2 -k start
             ├─800 /usr/sbin/apache2 -k start
             ├─801 /usr/sbin/apache2 -k start
             └─802 /usr/sbin/apache2 -k start

Sep 28 10:54:00 ashtami-VirtualBox systemd[1]: Starting The Apache HTTP Server>
Sep 28 10:54:10 ashtami-VirtualBox apachectl[674]: [Tue Sep 28 10:54:10.296693>
Sep 28 10:54:10 ashtami-VirtualBox apachectl[674]: AH00558: apache2: Could not>
Sep 28 10:54:11 ashtami-VirtualBox systemd[1]: Started The Apache HTTP Server.
lines 1-20/20 (END)
```

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

  http://youripaddress

(find out your ip address using iffconfig)



Install MariaDB

- Install mariaDB

sudo apt install mariadb-server mariadb-client

- Check mariadb Installation

sudo systemctl status mysql

(if it is not working sudo systemctl start mysql)

```
ashtami@ashtami-VirtualBox:~$ sudo systemctl status mariadb
[sudo] password for ashtami:
● mariadb.service - MariaDB 10.3.31 database server
     Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor pres>
     Active: active (running) since Tue 2021-09-28 10:54:16 EDT; 31min ago
       Docs: man:mysqld(8)
             https://mariadb.com/kb/en/library/systemd/
    Process: 641 ExecStartPre=/usr/bin/install -m 755 -o mysql -g root -d /var>
    Process: 681 ExecStartPre=/bin/sh -c systemctl unset-environment _WSREP_ST>
    Process: 685 ExecStartPre=/bin/sh -c [ ! -e /usr/bin/galera_recovery ] && >
    Process: 863 ExecStartPost=/bin/sh -c systemctl unset-environment _WSREP_S>
    Process: 867 ExecStartPost=/etc/mysql/debian-start (code=exited, status=0/>
   Main PID: 744 (mysqld)
     Status: "Taking your SQL requests now..."
      Tasks: 30 (limit: 1208)
     Memory: 15.2M
     CGroup: /system.slice/mariadb.service
             └─744 /usr/sbin/mysqld

Sep 28 10:54:11 ashtami-VirtualBox mysqld[744]: 2021-09-28 10:54:11 0 [Note] />
Sep 28 10:54:16 ashtami-VirtualBox systemd[1]: Started MariaDB 10.3.31 databas>
Sep 28 10:54:16 ashtami-VirtualBox /etc/mysql/debian-start[872]: Upgrading MyS>
Sep 28 10:54:17 ashtami-VirtualBox /etc/mysql/debian-start[876]: Looking for '>
Sep 28 10:54:17 ashtami-VirtualBox /etc/mysql/debian-start[876]: Looking for '>
Sep 28 10:54:17 ashtami-VirtualBox /etc/mysql/debian-start[876]: Version check>
```

Install PHP and commonly used modules

sudo apt install php libapache2-mod-php php-opcache 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
- Open a browser
  - http://127.0.0.1/phpinfo.php

```
ashtami@ashtami-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
```

PHP Version 7.4.3

System	Linux ashtami-VirtualBox 5.8.0-43-generic #49~20.(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/ph /7.4/apache2/conf.d/10-pdo.ini, /etc/php/7.4/apache /20-bz2.ini, /etc/php/7.4/apache2/conf.d/20-calendar /etc/php/7.4/apache2/conf.d/20-curl.ini, /etc/php/7.4 /7.4/apache2/conf.d/20-exif.ini, /etc/php/7.4/apache /20-fileinfo.ini, /etc/php/7.4/apache2/conf.d/20-ftp.in /7.4/apache2/conf.d/20-gettext.ini, /etc/php/7.4/apac /conf.d/20-json.ini, /etc/php/7.4/apache2/conf.d/20-m mysqli.ini, /etc/php/7.4/apache2/conf.d/20-pdo_mysq

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

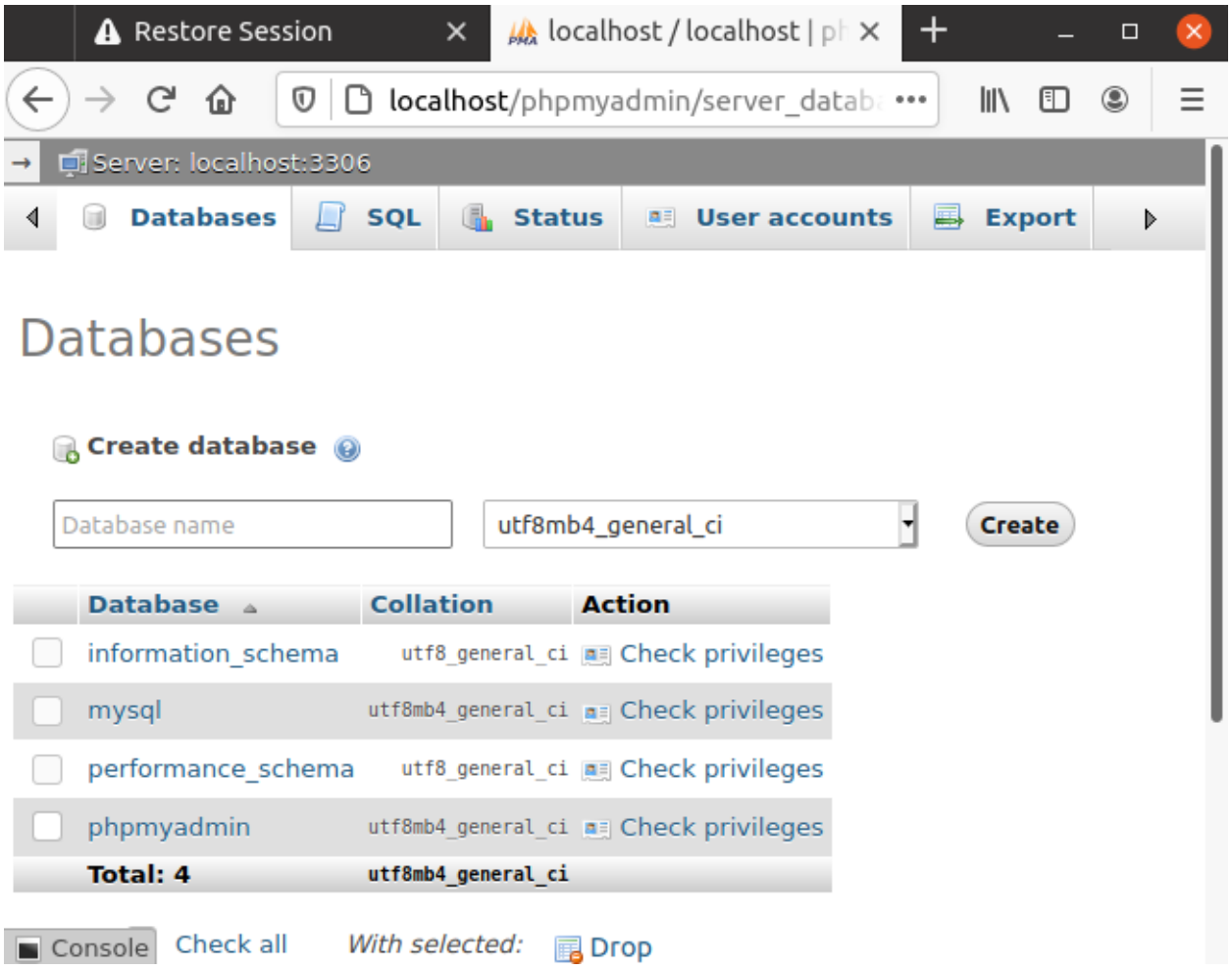
- Check phpmyadmin

Open a browser

http://localhost/phpmyadmin

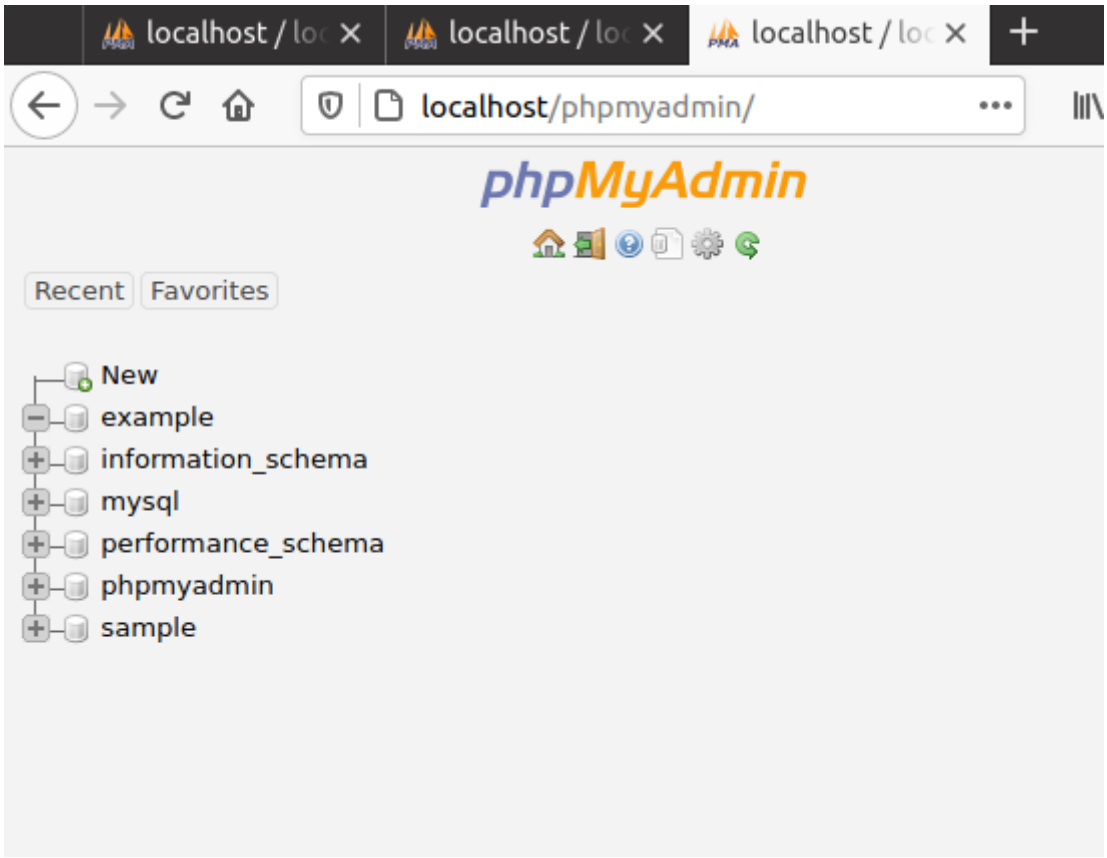
username : root

password : yourpassword




```
ashtami@ashtami-VirtualBox:~$ sudo mysql -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 29
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 example;
Query OK, 1 row affected (0.001 sec)

MariaDB [(none)]> show databases;
+--------------------+
| Database           |
+--------------------+
| example            |
| information_schema |
| mysql              |
| performance_schema |
| phpmyadmin         |
| sample             |
+--------------------+
6 rows in set (0.001 sec)
```



Ansible Installation

```
ashtami@ashtami-VirtualBox:~$ sudo apt-get install ansible
[sudo] password for ashtami:
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-xmltodict
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-xmltodict
The following packages will be upgraded:
  python3-lib2to3
1 upgraded, 17 newly installed, 0 to remove and 318 not upgraded.
Need to get 9,942 kB of archives.
After this operation, 92.0 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://us.archive.ubuntu.com/ubuntu focal/main amd64 python3-jinja2 all 2
.10.1-2 [95.5 kB]
Get:2 http://us.archive.ubuntu.com/ubuntu focal/main amd64 python3-crypto amd64
 2.6.1-13ubuntu2 [237 kB]
```

```
h a literal. Did you mean "=="?
  if original_result is 0:
Setting up python3-requests-kerberos (0.12.0-2) ...
Setting up ieee-data (20180805.1) ...
Setting up python3-dnspython (1.16.0-1build1) ...
Setting up python3-selinux (3.0-1build2) ...
Setting up python3-crypto (2.6.1-13ubuntu2) ...
Setting up python3-argcomplete (1.8.1-1.3ubuntu1) ...
Setting up python3-lib2to3 (3.8.10-0ubuntu1~20.04) ...
Setting up python3-distutils (3.8.10-0ubuntu1~20.04) ...
Setting up python3-requests-ntlm (1.1.0-1) ...
Setting up python3-libcloud (2.8.0-1) ...
Setting up python3-netaddr (0.7.19-3) ...
/usr/lib/python3/dist-packages/netaddr/strategy/__init__.py:189: SyntaxWarning:
 "is not" with a literal. Did you mean "!="?
  if word_sep is not '':
Setting up python3-winrm (0.3.0-2) ...
Setting up ansible (2.9.6+dfsg-1) ...
Processing triggers for man-db (2.9.1-1) ...
```

Ansible Version

```
ashtami@ashtami-VirtualBox:~$ ansible --version
ansible 2.9.6
  config file = /etc/ansible/ansible.cfg
  configured module search path = ['/home/ashtami/.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]
```

Wireshark

Wireshark

Wireshark allows you to filter the log either before the capture starts or during analysis, so you can narrow down and zero into what you are looking for in the network trace. For example, you can set a filter to see TCP traffic between two IP addresses. You can set it only to show you the packets sent from one computer. The filters in Wireshark are one of the primary reasons it became the standard tool for packet analysis.

WireShark installation:

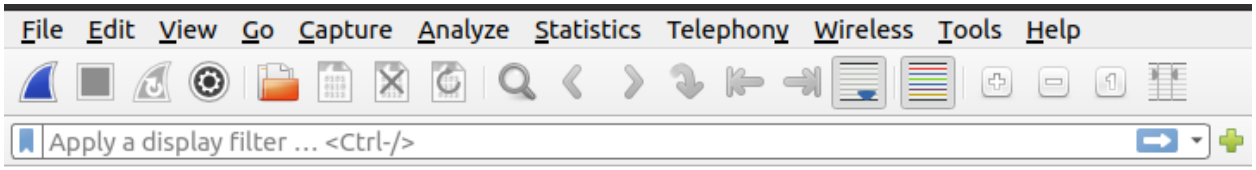
```
ashtami@ashtami-VirtualBox:~$ sudo apt-get install wireshark
[sudo] password for ashtami:
Reading package lists... Done
Building dependency tree
Reading state information... Done
wireshark is already the newest version (3.2.3-1).
0 upgraded, 0 newly installed, 0 to remove and 318 not upgraded.
```

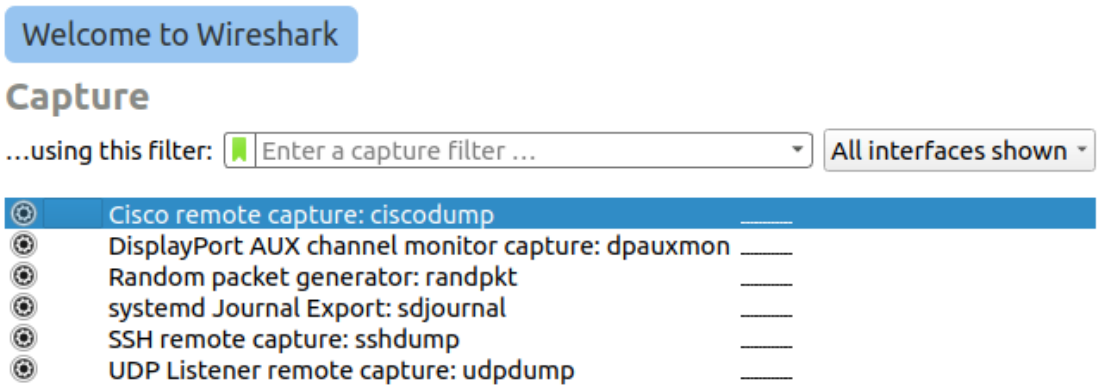
WireShark Version:

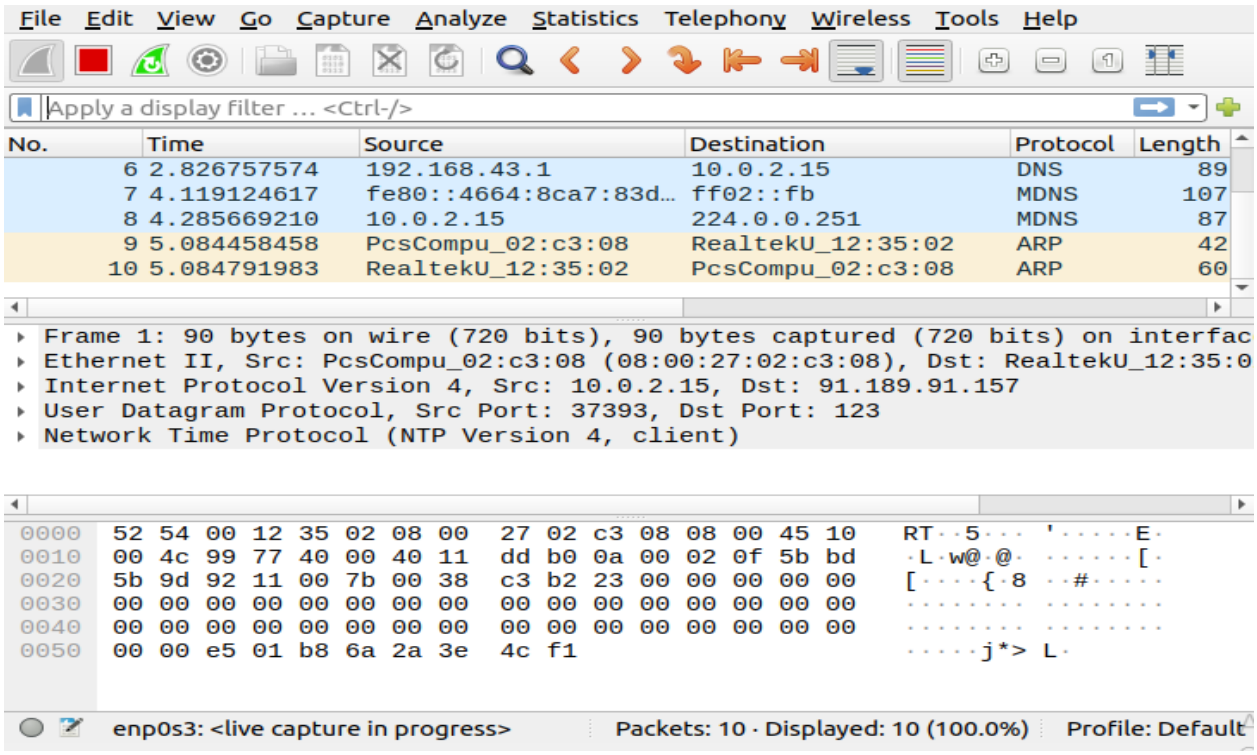
```
ashtami@ashtami-VirtualBox:~$ wireshark --version
Wireshark 3.2.3 (Git v3.2.3 packaged as 3.2.3-1)

Copyright 1998-2020 Gerald Combs <gerald@wireshark.org> and contributors.
License GPLv2+: GNU GPL version 2 or later <https://www.gnu.org/licenses/gpl-2.
0.html>
This is free software; see the source for copying conditions. There is NO
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.

Compiled (64-bit) with Qt 5.12.8, with libpcap, with POSIX capabilities (Linux)
,
with libnl 3, with GLib 2.64.2, with zlib 1.2.11, with SMI 0.4.8, with c-ares
1.15.0, with Lua 5.2.4, with GnuTLS 3.6.13 and PKCS #11 support, with Gcrypt
1.8.5, with MIT Kerberos, with MaxMind DB resolver, with nghttp2 1.40.0, with
brotli, with LZ4, with Zstandard, with Snappy, with libxml2 2.9.10, with
QtMultimedia, without automatic updates, with SpeexDSP (using system library),
with SBC, with SpanDSP, without bcg729.

Running on Linux 5.8.0-43-generic, with Intel(R) Core(TM) i3-6006U CPU @ 2.00GH
z
(with SSE4.2), with 1064 MB of physical memory, with locale en_US.UTF-8, with
libpcap version 1.9.1 (with TPACKET_V3), with GnuTLS 3.6.13, with Gcrypt 1.8.5,
with brotli 1.0.7, with zlib 1.2.11, binary plugins supported (0 loaded).

Built using gcc 9.3.0.
```

```
ashtami@ashtami-VirtualBox:~$ sudo dpkg-reconfigure wireshark-common
ashtami@ashtami-VirtualBox:~$
```

```
ashtami@ashtami-VirtualBox:~$ sudo adduser $USER wireshark
Adding user `ashtami' to group `wireshark' ...
Adding user ashtami to group wireshark
Done.
ashtami@ashtami-VirtualBox:~$
```







Netcat

```
ashtami@ashtami-VirtualBox:~$ sudo apt-get install netcat
[sudo] password for ashtami:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  netcat
0 upgraded, 1 newly installed, 0 to remove and 318 not upgraded.
Need to get 2,172 B of archives.
After this operation, 15.4 kB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu focal/universe amd64 netcat all 1.206
-1ubuntu1 [2,172 B]
Fetched 2,172 B in 2s (1,113 B/s)
Selecting previously unselected package netcat.
(Reading database ... 160612 files and directories currently installed.)
Preparing to unpack .../netcat_1.206-1ubuntu1_all.deb ...
Unpacking netcat (1.206-1ubuntu1) ...
Setting up netcat (1.206-1ubuntu1) ...
```

Nc

```
ashtami@ashtami-VirtualBox:~$ nc -h
OpenBSD netcat (Debian patchlevel 1.206-1ubuntu1)
usage: nc [-46CDdFhklNnrStUuvZz] [-I length] [-i interval] [-M ttl]
          [-m minttl] [-O length] [-P proxy_username] [-p source_port]
          [-q seconds] [-s source] [-T keyword] [-V rtable] [-W recvlimit] [-w
timeout]
          [-X proxy_protocol] [-x proxy_address[:port]]          [destination]
 [port]
        Command Summary:
                -4              Use IPv4
                -6              Use IPv6
                -b              Allow broadcast
                -C              Send CRLF as line-ending
                -D              Enable the debug socket option
                -d              Detach from stdin
                -F              Pass socket fd
                -h              This help text
                -I length       TCP receive buffer length
                -i interval     Delay interval for lines sent, ports scanned
                -k              Keep inbound sockets open for multiple connects
                -l              Listen mode, for inbound connects
                -M ttl          Outgoing TTL / Hop Limit
                -m minttl       Minimum incoming TTL / Hop Limit
                -N              Shutdown the network socket after EOF on stdin
                -n              Suppress name/port resolutions
                -O length       TCP send buffer length
                -P proxyuser    Username for proxy authentication
                -p port         Specify local port for remote connects
```

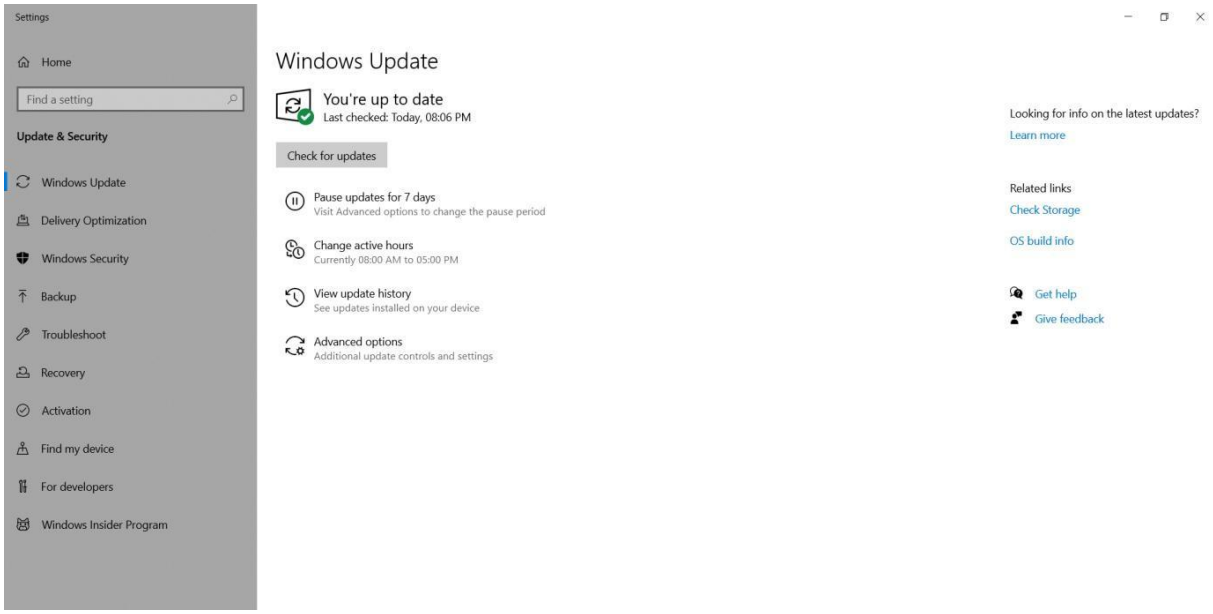
Docker

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

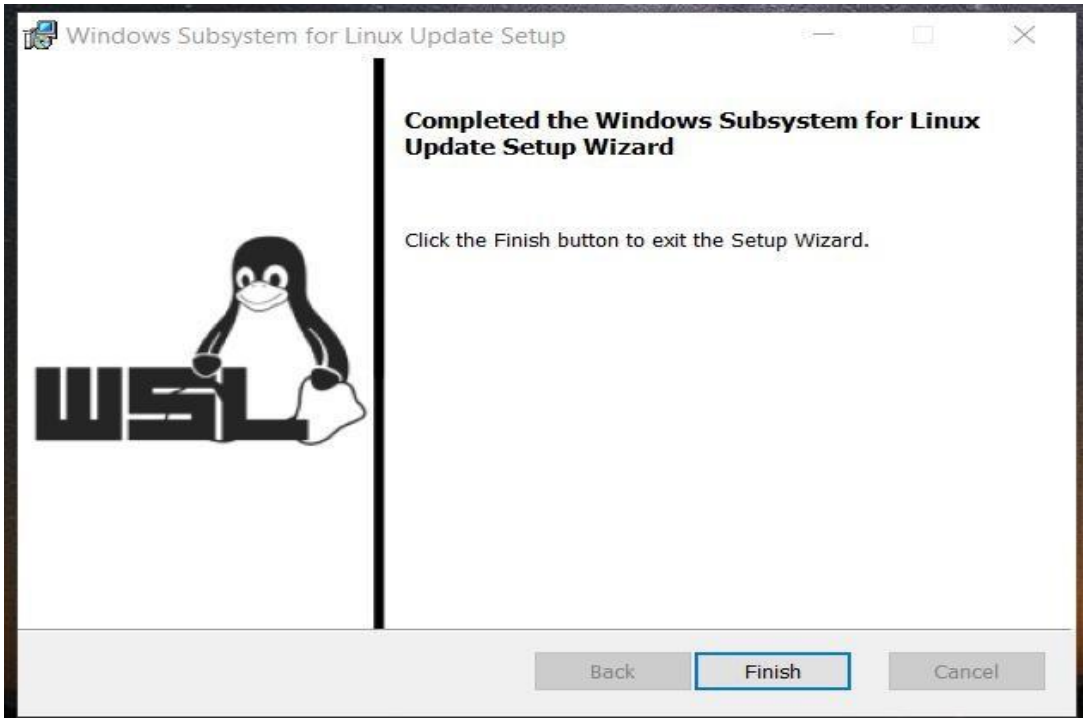
- From the Windows Search Type "powershell" then right-click on Windows PowerShell and then Run as administrator.
- Click `Yes' to allow PowerShell to make changes to your device.
- In the Administrator: Windows PowerShell window run (copy and past) "wsl –install" to install Windows Services for Linux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

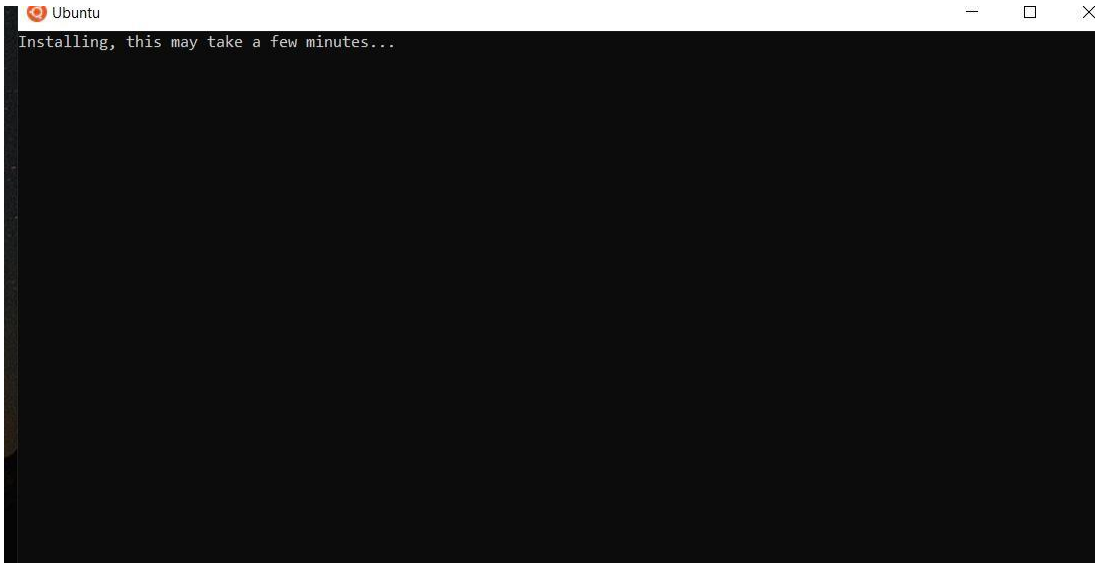
- Next enable the Virtual Machine Platform. In the Administrator:Windows PowerShell run (copy and past) "dism.exe /online /enable-feature /featurename:VirtualMachinePlatform /all /norestart".

```
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



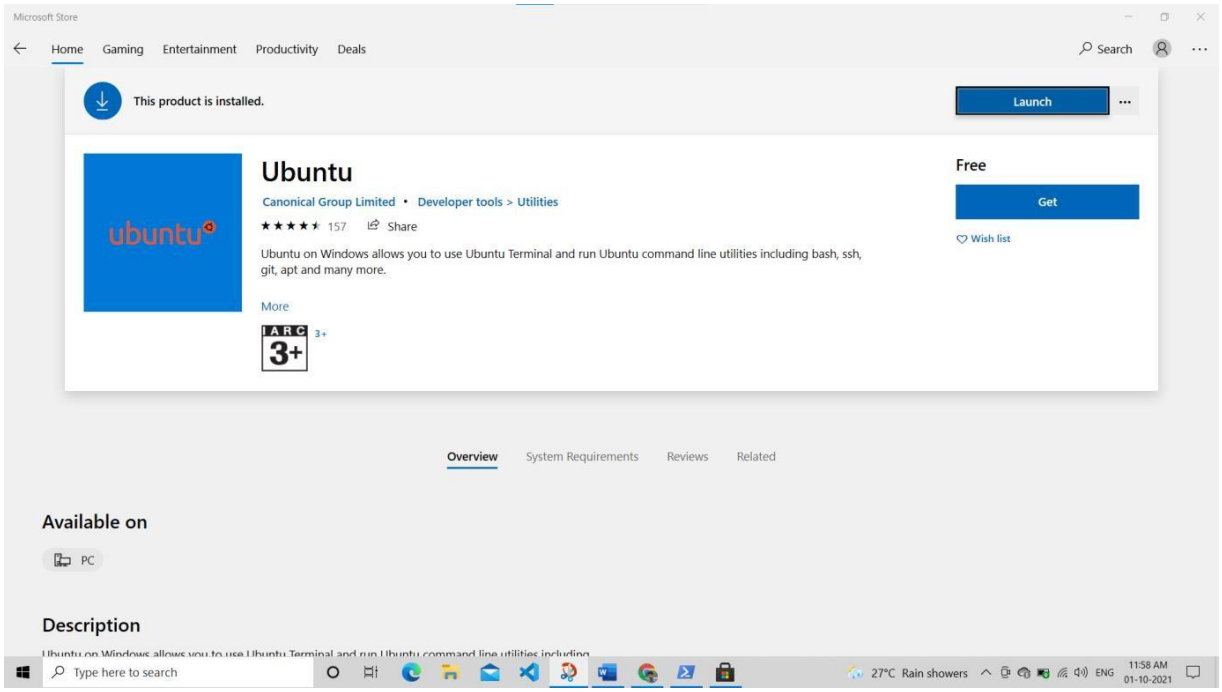

```
Retype new password:
passwd: password updated successfully
Installation successful!
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

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/wsl2
The operation completed successfully.
PS C:\Windows\system32>
```

- Next install a Linux distribution from the Microsoft Store

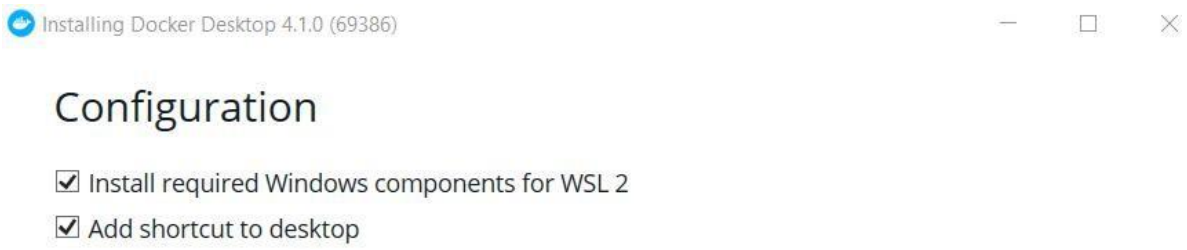


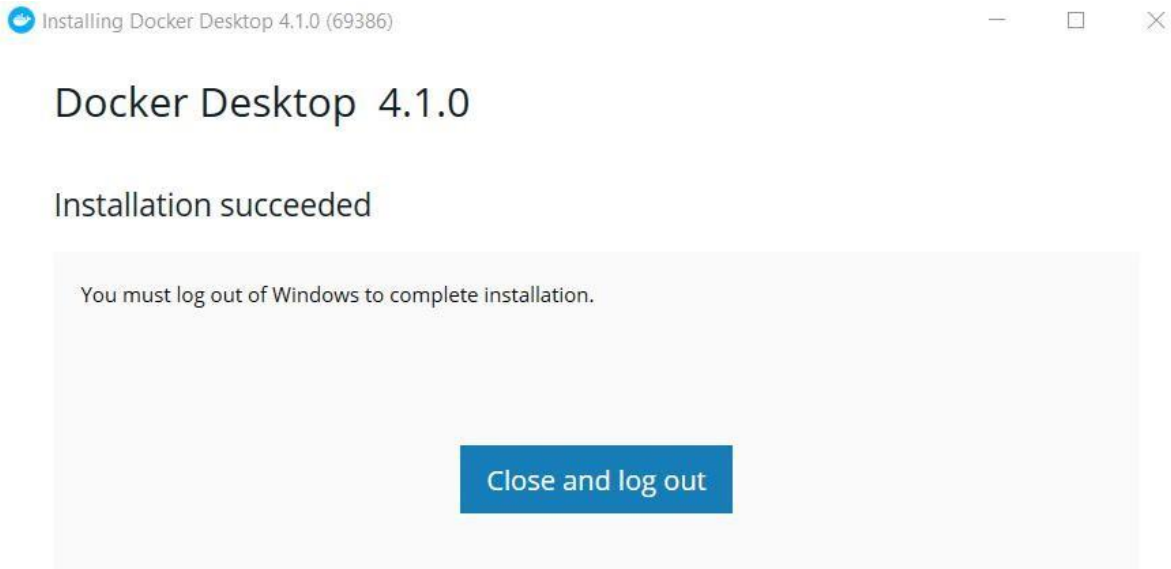
- You will now be able to run Linux commands in the Ubuntu terminal window.

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

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

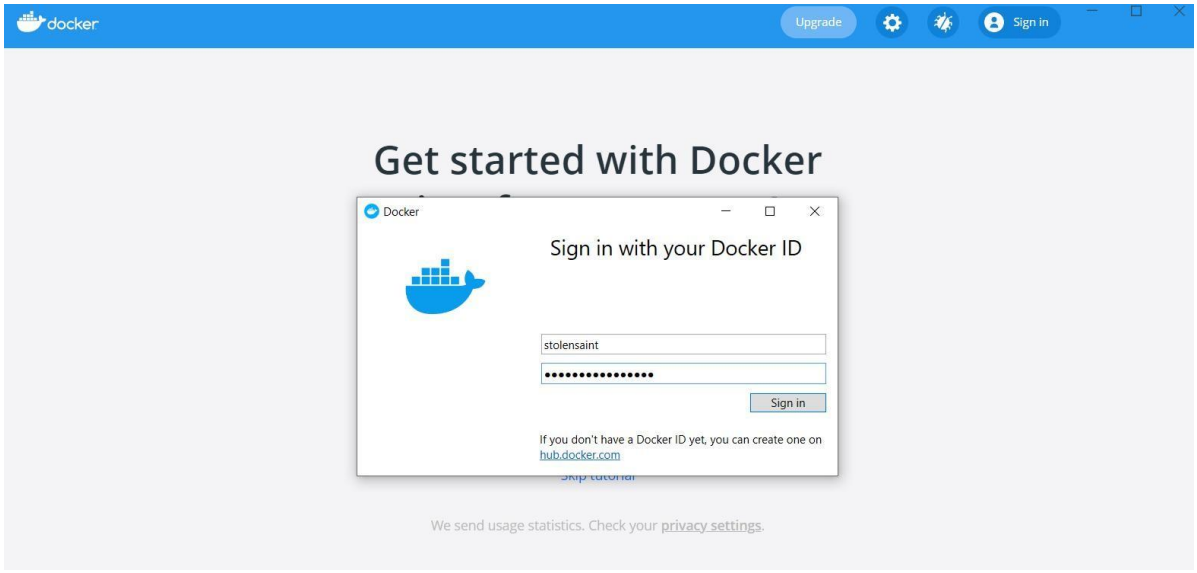
Now you can install Docker Desktop for Windows

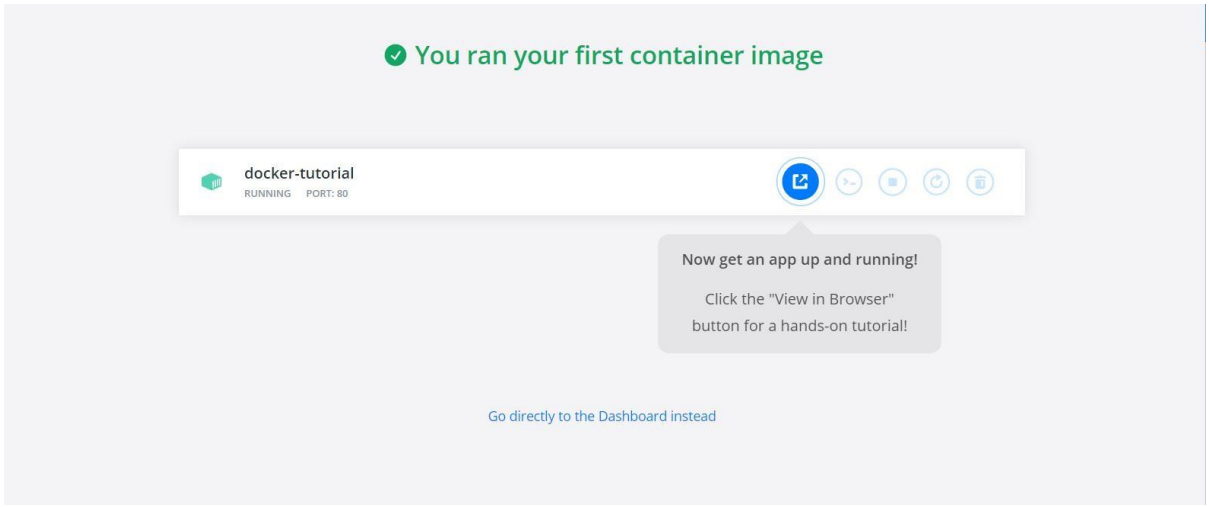
- Download the Docker Desktop for Windows installer from https://www.docker.com/products/docker-desktop
- Run the installer.

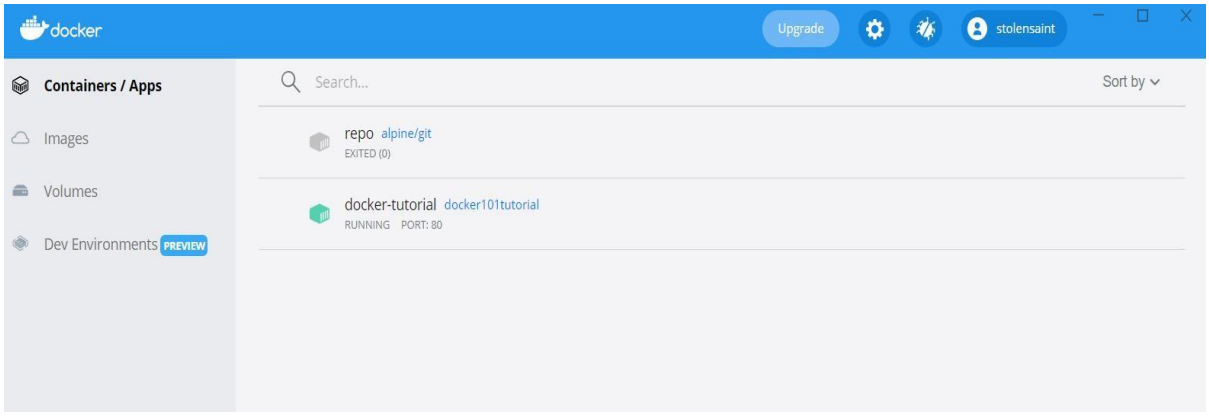




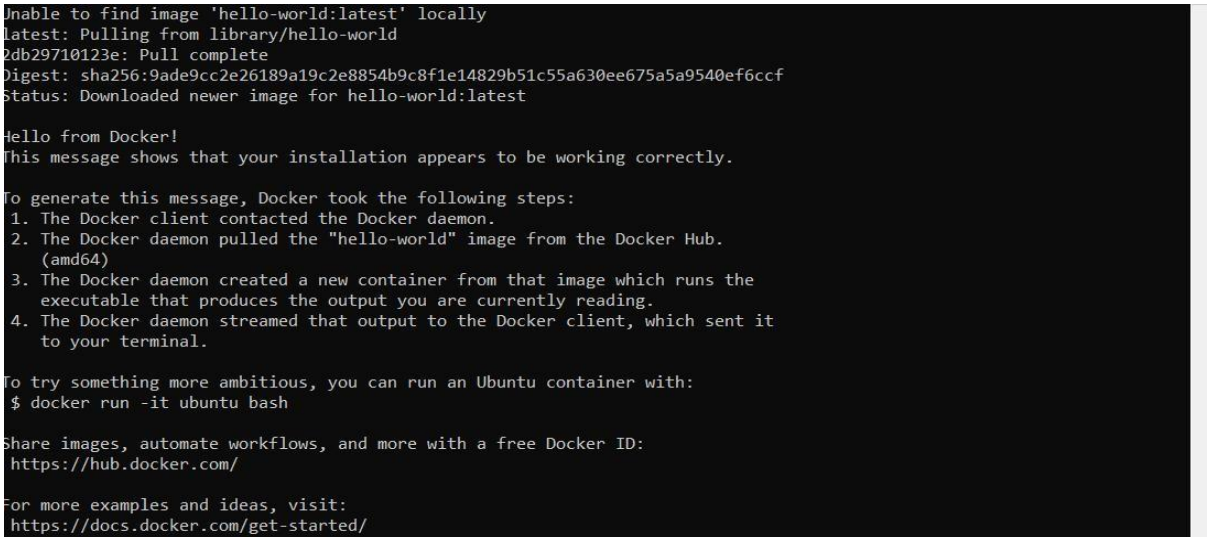
- Reboot Windows.
- Login to Windows and let Docker finish setting up. This can take a few minutes depending on your machine.





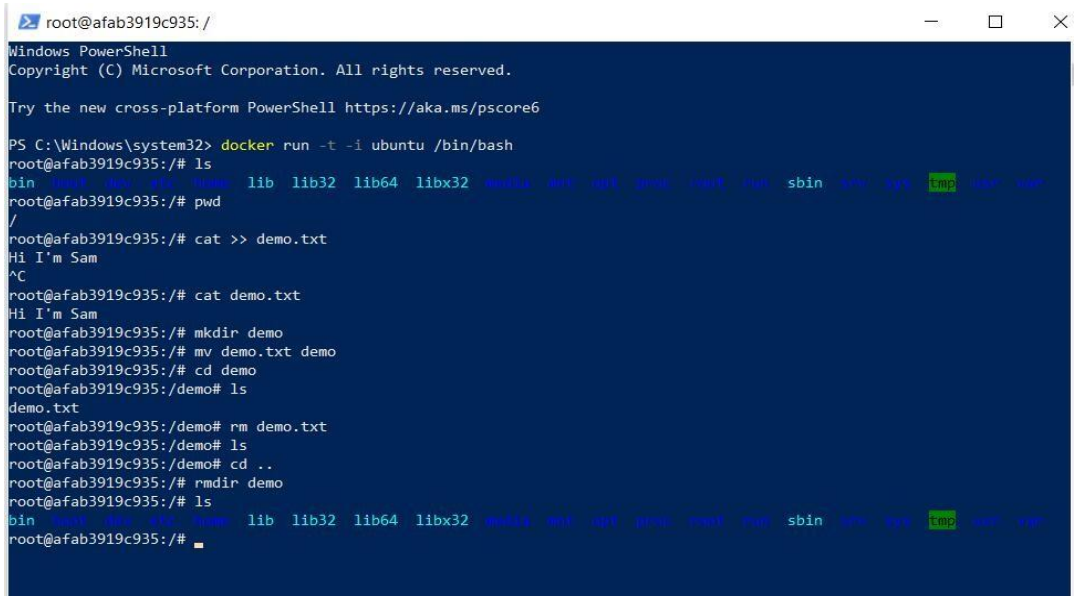


- Run the docker “**Hello World**” from an Ubuntu Terminal run "**docker run hello-world**".

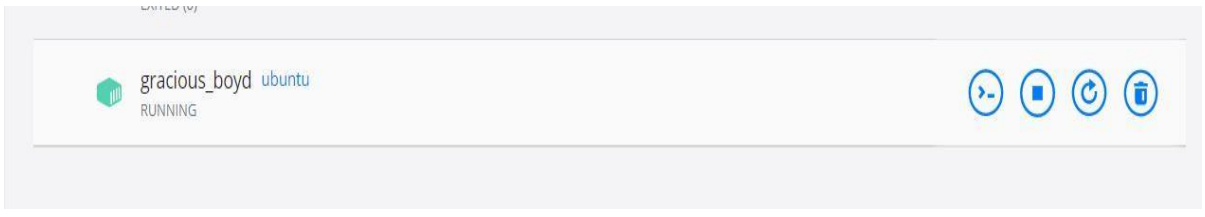


Running Ubuntu Machine

- Run the command **“docker run -t -i ubuntu /bin/bash**” in powershell
- This is a Linux root bash, try some commands



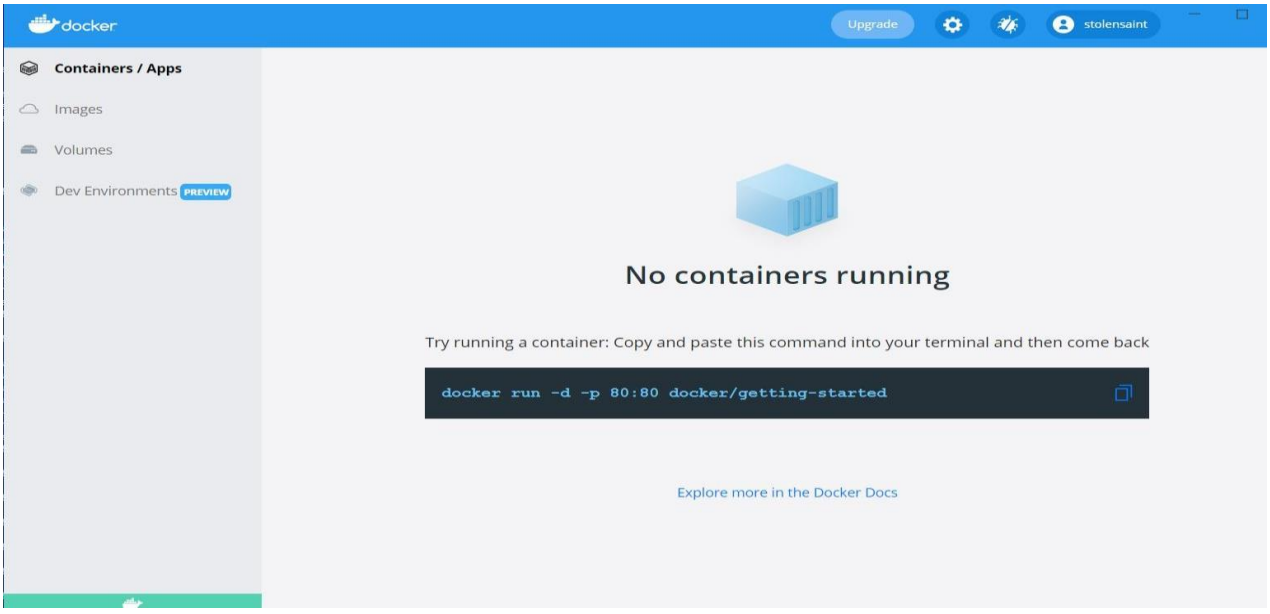
Docker GUI-Containers



Removing All Containers

```
root@afab3919c935:/# exit
exit
PS C:\Windows\system32> docker ps -a
CONTAINER ID   IMAGE              COMMAND                  CREATED        STATUS                     PORTS     NAMESafab3919c935   ubuntu
acious_boyd
8d21c1d81c22   ubuntu:latest      "bash"                   6 hours ago    Exited (255) 8 minutes ago           busy_maxwell
1b0186a069a3   ubuntu             "bash"                   6 hours ago    Exited (0) 6 hours ago               serene_dubinsky
48ab9a4423d5   ubuntu             "bash"                   7 hours ago    Exited (0) 7 hours ago               serene_bhaskara
fd9061619454   ubuntu             "bash"                   7 hours ago    Exited (0) 7 hours ago               beautiful_tereshkova
398156a697cc   hello-world        "/hello"                 8 hours ago    Exited (0) 8 hours ago               jolly_torvalds
a7e83e3eeeda   docker101tutorial  "/docker-entrypoint.…"   8 hours ago    Exited (0) 7 hours ago               docker-tutorial
e750d0f55bb4   alpine/git         "git clone https://g…"   8 hours ago    Exited (0) 8 hours ago               repo
```

```
PS 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             gracious_boyd
1b0186a069a3   ubuntu             "bash"                   6 hours ago     Exited (0) 6 hours ago               serene_dubinsky
48ab9a4423d5   ubuntu             "bash"                   8 hours ago     Exited (0) 7 hours ago               serene_bhaskara
fd9061619454   ubuntu             "bash"                   8 hours ago     Exited (0) 7 hours ago               beautiful_tereshkova
398156a697cc   hello-world        "/hello"                 8 hours ago     Exited (0) 8 hours ago               jolly_torvalds
a7e83e3eeeda   docker101tutorial  "/docker-entrypoint.…"   8 hours ago     Exited (0) 8 hours ago               docker-tutorial
e750d0f55bb4   alpine/git         "git clone https://g…"   8 hours ago     Exited (0) 8 hours ago               repo
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>
```



Shell Programming

1. Write a shell script to ask your name, and college name and print it on the screen.

```
#!/bin/bash
echo " Enter Details and View”
echo "================"
echo Enter your Name
read name
echo Enter your College name
read college
clear
echo Details you entered
echo Name: $name
echo College: $college
```

```
ashtami@ashtami-VirtualBox:~/Desktop$ chmod u+x s1.txt
ashtami@ashtami-VirtualBox:~/Desktop$ ./s1.txt
Enter details and view
----------------------
enter your name
Ashtami Prasad
enter your college name
Amaljyothi College of Engineering
```

```
details you entered
name:Ashtami Prasad
college:Amaljyothi College of Engineering
```

2. Write a shell script to set a value for a variable and display it on command line interface.

```
#!/bin/bash
echo "Display value of a Variable "
echo  "====================="
a=10
echo "$a"
```

3. Write a shell script to perform addition, substation, multiplication, division with two numbers that is accepted from user.

```
#!/bin/bash
echo "ARITHMETIC OPERATIONS"
echo "======================"
echo "Enter a number"
read a
echo "Enter another number"
read b
echo "Enter operation needed"
echo "\n1.Addition\n2.Substraction\n3.Multiplication\n4.Division"
read op
```

```
case "$op" in
"1") echo "a+b="$(($a+$b));;
"2") echo "a-b="$(($a-$b));;
"3") echo "a*b="$(($a*$b));;
"4") echo "a/b="$(($a/$b));;
esac
```

```
ashtami@ashtami-VirtualBox:~$ chmod u+x s3.txt
ashtami@ashtami-VirtualBox:~$ ./s3.txt
ARITHMETIC OPERATIONS
=====================
Enter a number
5
Enter another number
6
Enter operation needed
\n1.Addition\n2.Substraction\n3.Multiplication\n4.Division
1
a+b=11
```

```
ashtami@ashtami-VirtualBox:~$ chmod u+x s3.txt
ashtami@ashtami-VirtualBox:~$ ./s3.txt
ARITHMETIC OPERATIONS
=====================
Enter a number
6
Enter another number
5
Enter operation needed
\n1.Addition\n2.Substraction\n3.Multiplication\n4.Division
2
a-b=1
ashtami@ashtami-VirtualBox:~$ ./s3.txt
ARITHMETIC OPERATIONS
=====================
Enter a number
6
Enter another number
5
Enter operation needed
\n1.Addition\n2.Substraction\n3.Multiplication\n4.Division
3
a*b=30
```

```
ashtami@ashtami-VirtualBox:~$ ./s3.txt
ARITHMETIC OPERATIONS
=====================
Enter a number
6
Enter another number
5
Enter operation needed
\n1.Addition\n2.Substraction\n3.Multiplication\n4.Division
4
a/b=1
```

4. Write a shell script to check the value of a given number and display whether the number is found or not.

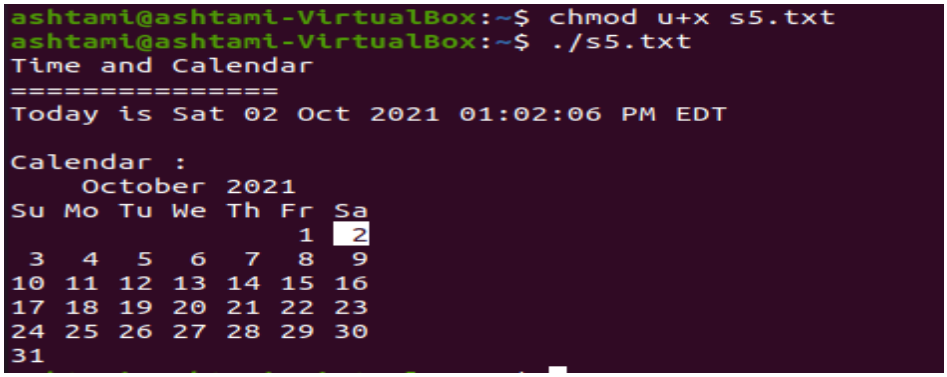
```
#!/bin/bash
echo "Finding a number"
echo "================"
echo "Enter a number"
read a
if [ $a == 10 ]; then
      echo "Number found ;)"
else
      echo "Number NOT found !"
fi
```

```
ashtami@ashtami-VirtualBox:~$ chmod u+x s4.txt
ashtami@ashtami-VirtualBox:~$ ./s4.txt
```

```
ashtami@ashtami-VirtualBox:~$ ./s4.txt
Finding a number
================
Enter a number
5
Number NOT found !
ashtami@ashtami-VirtualBox:~$
```

5. Write a shell script to display current date, calendar.

```
#!/bin/bash
echo "Time and Calendar"
echo "================"
echo "Today is $(date)"
echo ""
echo "Calendar :"
cal
```



6. Write a shell script to check a number is even or odd.

```
#!/bin/bash

echo "EVEN OR ODD"

echo "==========="

echo "Enter a number"

read n

x=$(($n%2))

if [ $x -eq 0 ]; then

  echo "Number is Even"

else

  echo "Number is odd"

fi
```

```
ashtami@ashtami-VirtualBox:~$ nano
ashtami@ashtami-VirtualBox:~$ chmod u+x s6.txt
ashtami@ashtami-VirtualBox:~$ ./s6.txt
EVEN OR ODD
===========
Enter a number
10
Number is Even
```

7. Write a shell script to check a number is greater than, less than or equal to another number.

```
#!/bin/bash
echo "Comparing numbers"
echo "================"
echo "Enter first number"
read a
echo "Enter second number"
read b
if [ $a -gt $b ]; then
  echo "$a is greater"
elif [ $b -gt $a ];then
  echo "$b is greater"
else
  echo "Both are Equal"
fi
```

```
ashtami@ashtami-VirtualBox:~$ chmod u+x s7.txt
ashtami@ashtami-VirtualBox:~$ ./s7.txt
Comparing numbers
================
Enter first number
100
Enter second number
50
100 is greater
```

8.Write a shell script to find the sum of first 10 numbers.

```
#!/bin/bash
echo "Sum of Numbers "
echo "=============="
s=0
for (( i=1;i<=10;i++ ))
do
s=`expr $s + $i`
done
echo “Sum of first 10 numbers = $s”
```

```
ashtami@ashtami-VirtualBox:~$ chmod u+x s8.txt
ashtami@ashtami-VirtualBox:~$ ./s8.txt
Sum of Numbers
==============
“Sum of first 10 numbers = 55”
```

9. Write a shell script to find the sum, the average and the product of the four integers entered.

```
#!/bin/bash
echo  "AVG, SUM & Product of 4 No."
echo  "========================"
echo "Please enter your first number: "
read a
echo "Second number: "
read b
echo "Third number: "
read c
echo "Fourth number: "
read d

sum=$(($a + $b + $c + $d))
avg=$(echo $sum / 4 | bc -l )
prod=$(($a * $b * $c * $d))

echo "The sum of these numbers is: " $sum
```

```
echo "The average of these numbers is: " $avg
echo "The product of these numbers is: " $prod
```

```
ashtami@ashtami-VirtualBox:~$ chmod u+x s9.txt
ashtami@ashtami-VirtualBox:~$ ./s9.txt
AVG, SUM & Product of 4 No.
----------------------------------------
Please enter your first number:
1
Second number:
5
Third number:
9
Fourth number:
8
The sum of these numbers is:  23
The average of these numbers is:  5.75000000000000000000
The product of these numbers is:  360
```

10. Write a shell script to find the smallest of three numbers.

```
#!/bin/bash
echo "LARGEST OF THREE"
echo "================"
echo "Enter first number"
read a
echo "Enter second number"
read b
echo "Enter third number"
read c
if [$a -gt $b]; then
if [$a -gt $c]; then
echo "$a is big"
```

```
else
echo "$c is big"
fi
elif [$b -gt $c];then
echo "$b is big"
else
echo "$c is big"
fi
```

```
ashtami@ashtami-VirtualBox:~$ chmod u+x s16.txt
ashtami@ashtami-VirtualBox:~$ ./s16.txt
LARGEST OF THREE
================
Enter first number
5
Enter second number
10
Enter third number
20
20 is big
```

11. Write a shell program to find factorial of given number.

```
#!/bin/bash
echo "Factorial"
echo "======="
echo "Enter a number"
read num
fact=1

for((i=2;i<=num;i++))
      {
            fact=$((fact * i))  #fact = fact * i
       }
echo "Factorial is $fact"
```

```
ashtami@ashtami-VirtualBox:~$ chmod u+x s11.txt
ashtami@ashtami-VirtualBox:~$ ./s11.txt
Factorial
=======
Enter a number
4
Factorial is 24
```

12. Write a shell program to check a number is palindrome or not.

```
#!/bin/bash
echo "Palindrome or Not"
echo "================"
echo "Enter number to check"
read n
rev=$(echo $n | rev)
if [ $n -eq $rev ]; then
    echo "Number is Palindrome"
else
    echo "Number is not Palindrome"
fi
```

```
ashtami@ashtami-VirtualBox:~$ chmod u+x s12.txt
ashtami@ashtami-VirtualBox:~$ ./s12.txt
Palindrome or Not
================
Enter number to check
1233
Number is not Palindrome
```

13.Write a shell script to find the average of the numbers entered in command line.

```
#!/bin/bash
echo "Average of N numbers"
echo "================="
echo "Enter Size"
read n
```

```
i=1
sum=0

echo "Enter Numbers"
while [ $i -le $n ]
do
  read num
  sum=$((sum + num))
  i=$((i + 1))
done
avg=$(echo $sum / $n | bc -l)
echo $avg
```

```
ashtami@ashtami-VirtualBox:~$ chmod u+x s13.txt
ashtami@ashtami-VirtualBox:~$ ./s13.txt
Average of N numbers
====================
Enter Size
3
Enter Numbers
7
6
11
8.00000000000000000000
```

14.Write a shell program to find the sum of all the digits in a number.

```
#!/bin/bash
echo "Sum of all digits"
echo "============="
echo "Enter a number:"
read num
sum=0

while [ $num -gt 0 ]
do
      mod=$((num % 10))
      sum=$((sum + mod))
      num=$((num / 10))
done
echo "Sum of digits is $sum"
```

```
ashtami@ashtami-VirtualBox:~$ chmod u+x s14.txt
ashtami@ashtami-VirtualBox:~$ ./s14.txt
Sum of all digits
=============
Enter a number:
6
Sum of digits is 6
```

15.Write a shell Script to check whether given year is leap year or not.

```
#!/bin/bash
echo "LEAP YEAR OR NOT"
echo "==============="
echo "Enter the year"
read y
a=`expr $y % 4`
b=`expr $y % 100`
c=`expr $y % 400`
if [ $a -eq 0 -a $b -ne 0 -o $c -eq 0 ];
then
echo "$y is leap year"
else
echo "$y is not leap year"
fi
```

```
ashtami@ashtami-VirtualBox:~$ chmod u+x s15.txt
ashtami@ashtami-VirtualBox:~$ ./s15.txt
LEAP YEAR OR NOT
===============
Enter the year
2020
2020 is leap year
```