

Experiment No : 1

Aim: Introduction to Computer hardware: Physical identification of major components of a computer system such as mother board, RAM modules, daughter cards, bus slots, SMPS, internal storage devices, interfacing ports. Specification of desktop and server class computers.

Installation of common operating systems for desktop and server use.

Introduction:

Computer hardware (usually simply called hardware when a computing context is concerned) is the collection of physical elements that constitutes a computer system. Computer hardware is the physical parts or components of a computer, such as the monitor, mouse, keyboard, computer data storage, hard disk drive (HDD), graphic cards, sound cards, memory, motherboard, and so on, all of which are physical objects that are tangible.

The term hardware refers to mechanical device that makes up computer.

Computer hardware consists of interconnected electronic devices that we can use to control computer's operation, input and output. Examples of hardware are CPU, keyboard, mouse, hard disk, etc.

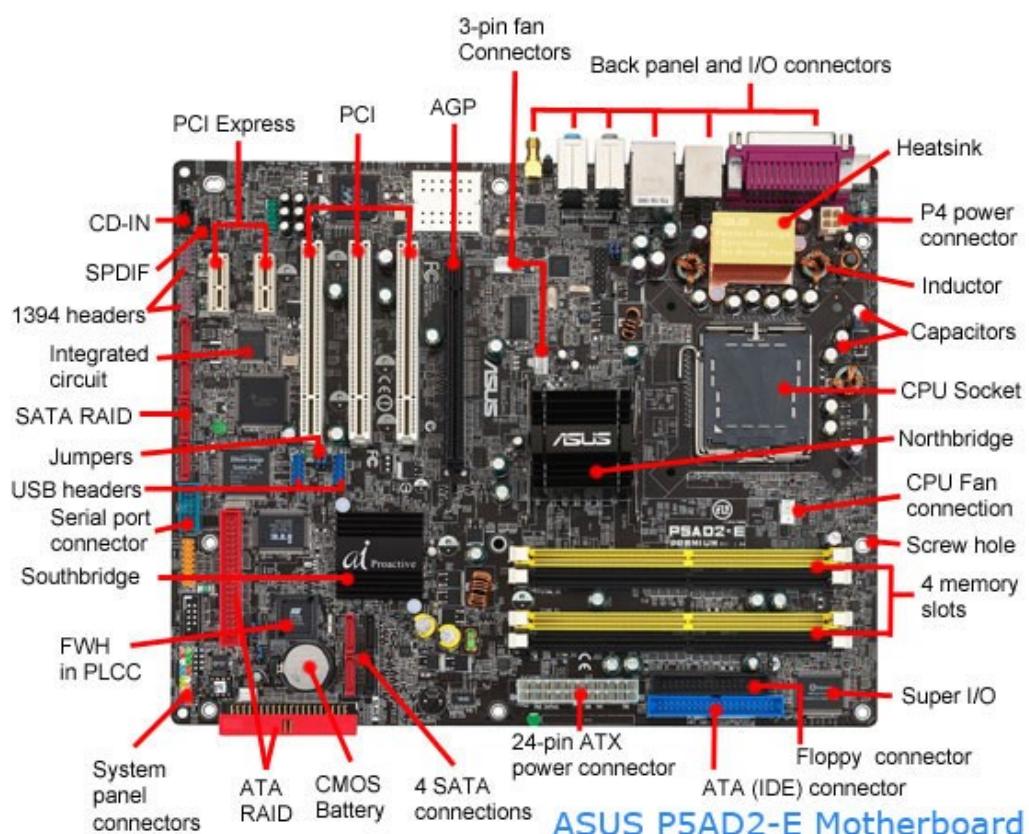


1.Motherboard

A motherboard provides connectivity between the hardware components of a computer, like the processor (CPU), memory (RAM), hard drive, and video card. There are multiple types of motherboards, designed to fit different types and sizes of computers.

Each type of motherboard is designed to work with specific types of processors and memory, so they don't work with every processor and type of memory. However, hard drives are mostly universal and work with the majority of motherboards, regardless of the type or brand.

The motherboard is a printed circuit board and foundation of a computer that is the biggest board in a computer chassis. It allocates power and allows communication to and between the CPU, RAM, and all other computer hardware components.



NORTH BRIDGE : Alternatively referred to as the PAC (PCI/AGP Controller) and nb, the Northbridge is an integrated circuit responsible for communications between the CPU interface, AGP, and the memory. The northbridge is usually slightly larger than the southbridge, and is positioned closer to the CPU and memory.

When the CPU needs data from RAM, a request is sent to the northbridge memory controller. After the request is received, the northbridge responds with how long the processor needs to wait to read memory over the front-side bus.

SOUTH BRIDGE : The southbridge is an IC on the motherboard responsible for the hard drive controller, I/O controller and integrated hardware. Integrated hardware can include the sound card and video card if on the motherboard, USB, PCI, ISA, IDE, BIOS, and Ethernet.

Although the southbridge handles most of the I/O devices, less prominent input/output devices, such as a serial port, keyboard, and non-USB mouse are handled by the SIO (super input/output).

CMOS : CMOS is short for Complementary Metal-Oxide Semiconductor. CMOS is an onboard, battery powered semiconductor chip inside computers that stores information. This information ranges from the system time and date to system hardware settings for your computer.

BIOS : Short for Basic Input/Output System, the BIOS is a ROM chip found on motherboards that allows you to access and set up your computer system at the most basic level. The BIOS includes instructions on how to load basic computer hardware. It also includes a test referred to as a POST (Power-On Self-Test) that helps verify the computer meets requirements to boot up properly. If the computer does not pass the POST, you hear a combination of beeps indicating what is malfunctioning in the computer.

POST(Power-On Self-Test) : Test the computer hardware and make sure no errors exist before loading the operating system.

Bootstrap Loader : Locate the operating system. If a capable operating system is located, the BIOS will pass control to it.

2. RAM (RANDOM ACCESS MEMORY)

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. Access time in RAM is independent of the address, that is, each storage location inside the memory is as easy to reach as other locations and takes the same amount of time. Data in the RAM can be accessed randomly but it is very expensive.

3.ROM (READ ONLY MEMORY)

Read-Only Memory (ROM), is a type of electronic storage that comes built in to a device during manufacturing. You'll find ROM chips in computers and many other types of electronic products; VCRs, game consoles, and car radios all use ROM to complete their functions smoothly. ROM chips come built into an external unit – like flash drives and other auxiliary memory devices – or installed into the device's hardware on a removable chip. Non-volatile memory like ROM remains viable even without a power supply.

4.Daughter board

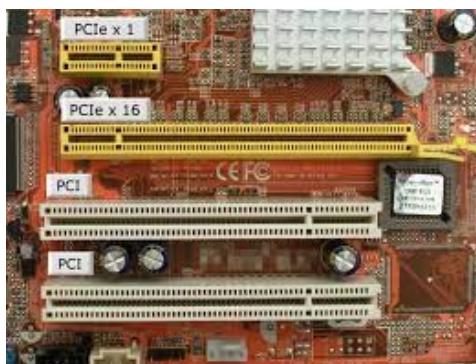
A daughterboard is type of circuit board that plugs in or is attached to the motherboard or similar expansion card to extend its features and services. A daughterboard complements the existing functionality of a motherboard or an expansion card.

5.Bus Slots

Alternatively known as a 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. An expansion slot is a socket on the motherboard that is used to insert an expansion card (or circuit board), which provides additional features to a computer such as video, sound, advanced graphics, Ethernet or memory.

The expansion card has an edge connector that fits precisely into the expansion slot as well as a row of contacts that is designed to establish an electrical connection between the motherboard and the electronics on the card, which are mostly integrated circuits. Depending on the form factor of the case and motherboard, a computer system generally can have anywhere from one to seven expansion slots. With a backplane system, up to 19 expansion cards can be installed.



6.SMPS

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

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



ComputerHope.com

7. Internal Storage Devices

Some storage devices are classed as 'internal' which means they are inside the computer case. Most computers have some form of internal storage. The most common type of internal storage is the hard disk.

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

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

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

8. Interfacing ports

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

Characteristics of Ports

A port has the following characteristics –

- External devices are connected to a computer using cables and ports.
- Ports are slots on the motherboard into which a cable of external device is plugged in.
- Examples of external devices attached via ports are the mouse, keyboard, monitor, microphone, speakers, etc.

Serial Port

- Used for external modems and older computer mouse
- Two versions: 9 pin, 25 pin model
- Data travels at 115 kilobits per second



Parallel Port

- Used for scanners and printers
- Also called printer port
- 25 pin model
- IEEE 1284-compliant Centronics port



PS/2 Port

- Used for old computer keyboard and mouse
- Also called mouse port
- Most of the old computers provide two PS/2 port, each for the mouse and keyboard
- IEEE 1284-compliant Centronics port



Universal Serial Bus (or USB) Port

- It can connect all kinds of external USB devices such as external hard disk, printer, scanner, mouse, keyboard, etc.

- It was introduced in 1997.
- Most of the computers provide two USB ports as minimum.
- Data travels at 12 megabits per seconds.
- USB compliant devices can get power from a USB port.



VGA Port

- Connects monitor to a computer's video card.
- It has 15 holes.
- Similar to the serial port connector. However, serial port connector has pins, VGA port has holes.



Power Connector

- Three-pronged plug.
- Connects to the computer's power cable that plugs into a power bar or wall socket.



Firewire Port

- Transfers large amount of data at very fast speed.
- Connects camcorders and video equipment to the computer.
- Data travels at 400 to 800 megabits per seconds.
- Invented by Apple.
- It has three variants: 4-Pin FireWire 400 connector, 6-Pin FireWire 400 connector, and 9-Pin FireWire 800 connector.



Modem Port

- Connects a PC's modem to the telephone network.



Ethernet Port

- Connects to a network and high speed Internet.
- Connects the network cable to a computer.
- This port resides on an Ethernet Card.
- Data travels at 10 megabits to 1000 megabits per seconds depending upon the network bandwidth.



Game Port

- Connect a joystick to a PC
- Now replaced by USB



Digital Video Interface, DVI port

- Connects Flat panel LCD monitor to the computer's high-end video graphic cards.
- Very popular among video card manufacturers.



System specifications

A system specification describes the operational and performance requirements of a system, such as a computer. System specifications help to define the operational and performance guidelines for a system. These are the necessary specifications our computer must have in order to use the software or hardware.

Factors affect the computer performance

In broad terms, the performance of a computer depends on four factors: the speed and architecture of its processor or "central processing unit" (CPU), how much random access memory (RAM) it has, its graphics system, and its internal hard drive speed and capacity. Also of importance to most users will be the specification of its Internet connection. Most computer users and in particular those working with a lot of photographs, music files or videos should also think about the most suitable storage devices they will need in order to keep and back up all of their valuable data.

Processor speed and architecture

The architecture of a processor is the most important factor to determine its performance, and refers to its basic design and complexity. The speed of a computer's processor chip (technically known as its "clock speed") is measured in gigahertz (GHz), with the fastest modern processors currently running at up to 4.7GHz. However, for most computing tasks, including web browsing, sending e-mails, word processing and spreadsheet work any processor running at 1GHz or more remains perfectly sufficient.

Cache is a form of very fast memory integrated into the processor chip, and used to store up instructions (work for the processor) so that it has to slow down as little as possible between tasks. For applications such as video editing, 3D graphics work and (for the majority of "power users") playing computer games, higher processor speeds are highly required. CPU performance is now determined by far more than raw speed alone. Intel made this very clear when it introduced its system of processor numbers. These provide an indication of a processor's "architecture", "cache" and "front side bus (FSB) speed" in addition to its clock speed.

Front side bus (FSB) speed is a measure of how fast a microprocessor communicates with the computer's main circuit board (or "motherboard") into which it is physically connected. Again, the higher the measure the better for overall performance, with FSB speeds currently ranging from 533MHz (still perfectly sufficient for the vast majority of applications) up to 1600 MHz.

The architecture of a processor is the most important factor to determine its performance, and refers to its basic design and complexity. Some processors are simply more sophisticated than others, with Intel (for example) producing "basic" processors called Celerons and Pentiums, as well as more powerful

processors under its "Core" processor family. The later include the Core 2, Core i3, Core i5 and Core i7, with the last of these being the most powerful.

In addition to clock speed and architecture, a processor's cache and front side bus (FSB) speed also determine a computer's overall power. Cache is a form of very fast memory integrated into the processor chip, and used to store up instructions (work for the processor) so that it has to slow down as little as possible between tasks. Cache is measured in megabytes (MB), with (for example) low-end Celeron processors having as little as 0.25MB of cache (256KB), and high-end Itaniums having up to 24MB. The simple message is, the more cache the better- though high levels of cache still come at a very significant price.

Random Access Memory (RAM)

The part of the computer in which information is stored temporarily when a program is being used.

RAM is measured in megabytes (MB) and gigabytes (GB), as detailed on the storage page. To a large extent, the more RAM a computer has the faster and more effectively it will operate. Computers with little RAM have to keep moving data to and from their hard disks in order to keep running. This tends to make them not just slow in general, but more annoyingly intermittently sluggish.

Just how much RAM a computer needs depends on the software it is required to run effectively. A computer running Windows XP will usually function quite happily with 1GB of RAM, whereas twice this amount (ie 2GB) is the realistic minimum for computers running Windows 7.

Graphics system

Determines how well it can work with visual output. Graphics systems can either be integrated into a computer's motherboard, or plugged into the motherboard as a separate "video card".

A computer's graphics system determines how well it can work with visual output. Graphics systems can either be integrated into a computer's motherboard, or plugged into the motherboard as a separate "video card". Graphics systems integrated into the motherboard (also known as "onboard graphics") are now quite powerful, and sufficient for handling the requirements of most software applications aside from games playing, 3D modeling, and some forms of video editing.

Any form of modern computer graphics system can now display high-resolution color images on a standard-sized display screen (ie any monitor up to about 19" in size). The more sophisticated graphics cards now determines how well a computer can handle the playback of high definition video, as well as the speed and quality at which 3D scenes can be rendered. Another key feature of separate graphics cards is that most of them now allow more than one display screen to be connected to a computer. Others also permit the recording of video.

Hard Drive Speed and Capacity

A part of the computer that is used for storing computer data and that contains one or more hard disks.

Today 40GB is an absolute minimum hard drive size for a new computer running Windows 7, with a far larger capacity being recommended in any situation where more than office software is going to be installed. Where a computer will frequently be used to edit video, a second internal hard disk dedicated only to video storage is highly recommended for stable operation. Indeed, for professional video editing using a program like Premiere Pro CS5, Adobe now recommend that a PC has at least three internal hard disks (one for the operating system and programs, one for video project files, and one for video media).

Two key factors that determine the speed of traditional, spinning hard disks

1. rotational velocity of the physical disk itself.
2. interface used to connect it to the computer's motherboard.

Three types of interface

1. Serial Advance Technology Attachment (SATA) the most modern and now pretty much the norm on new PCs
2. Integrated Device Electronics (IDE) (also known as UDMA)- a slower and older form of interface
3. Small Computer System Interface (SCSI)-the oldest but in its most modern variant is still the fastest disk interface standard.

Servers

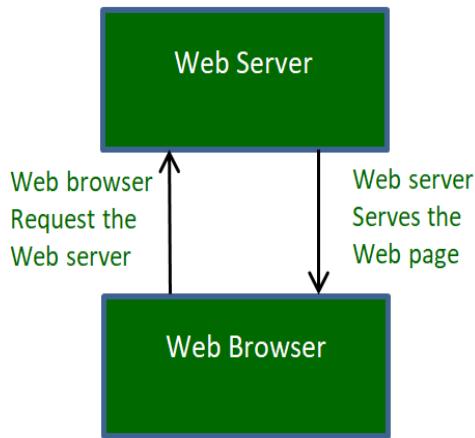


In computing, a server is a piece of computer hardware or software (computer program) that provides functionality for other programs or devices, called "clients". This architecture is called the client–server model. Servers can provide various functionalities, often called "services", such as sharing data or resources among multiple clients, or performing computation for a client. A single server can serve multiple clients, and a single client can use multiple servers. A client process may run on the same device or may connect over a network to a server on a different device. On a network, a server is known as **host**. The devices are connecting to the server known as **clients**.

A server is a software or hardware device that accepts and responds to requests made over a network. The device that makes the request, and receives a response from the server, is called a client. On the Internet, the term "server" commonly refers to the computer system that receives requests for a web files and sends those files to the client.

Servers manage network resources. For example, a user may set up a server to control access to a network, send/receive e-mail, manage print jobs, or host a website. They are also proficient at performing intense calculations. Some servers are committed to a specific task, often referred to as dedicated. However, many servers today are shared servers that take on the responsibility of e-mail, DNS, FTP, and even multiple websites in the case of a web server.

Server Working:



Every time you use the internet you are accessing a server. When you enter a URL into a browser your computer communicates with the server hosting that website and pulls the data onto your machine.

This is a simplistic view of how the process works

- You enter a URL and your web browser requests a web page
- The web browser requests a full URL for the site it wants to display
- This information is sent to the server
- The web server finds and builds all the data needed to display the site (this is why some sites load quicker than others)
- Your web browser receives the data and displays the website to you

Types of Servers

Web server

A web server offers web pages or other content to the web browser by loading the information from a disc and transfer files by using a network to the user's web browser. It is used by a computer or collection of computers to provide content to several users over the internet. This exchange was done with the help of HTTP communicating between the browser and the server.

It provides static content to a web browser by loading a file from a disc and transferring it across the network to the user's web browser. This exchange is intermediates by the browser and the server, communicating using HTTP.

Application server

It is an environment where applications are able to run, no matter which types of applications and what operation they perform. It is also known as a type of middleware and can be able to develop and run web-based applications.

Generally, it is used to connect database servers and end-user. There are several types of application servers, as well as .NET Framework, Java, and PHP application servers.

Database server

It is a computer system that allows other systems to access and retrieve data from a database. These servers respond to several requests to the clients and run database applications. Databases can require extraordinary amounts of disk space and can be accessed by multiple clients at any given time. It is also used by many companies for storage purposes. It allows users to access the data with the help of running a query by using a query language specific to the database. For example, SQL is a structured query language, which allows executing a query to access the data. The most common types of database server software include DB2, Oracle, Microsoft SQL, and Informix.

File server

It is a computer on a network that is used to store and distribute files. It allows multiple users or clients to share files, which is stored on a server. Furthermore, it can improve performance by maximizing readability and writing speeds.

Email server

The email server provides the facility of sending emails to the receiver and to receive emails from the sender as well as stores all the details and messages of the users' account on the server. The email server is also called mail server transfer agent (MTA) or internet mailer.

Whenever you mail or send a message to someone, it first accesses to SMTP (Simple Mail Transfer Protocol) and then identifies the address of the person

whom you want to send mail and then mail goes to the recipient. In short, these types of servers act as a virtual post office.

STEP 1: Go to VirtualBox website to download the binary for your current operating system and install Virtual box.

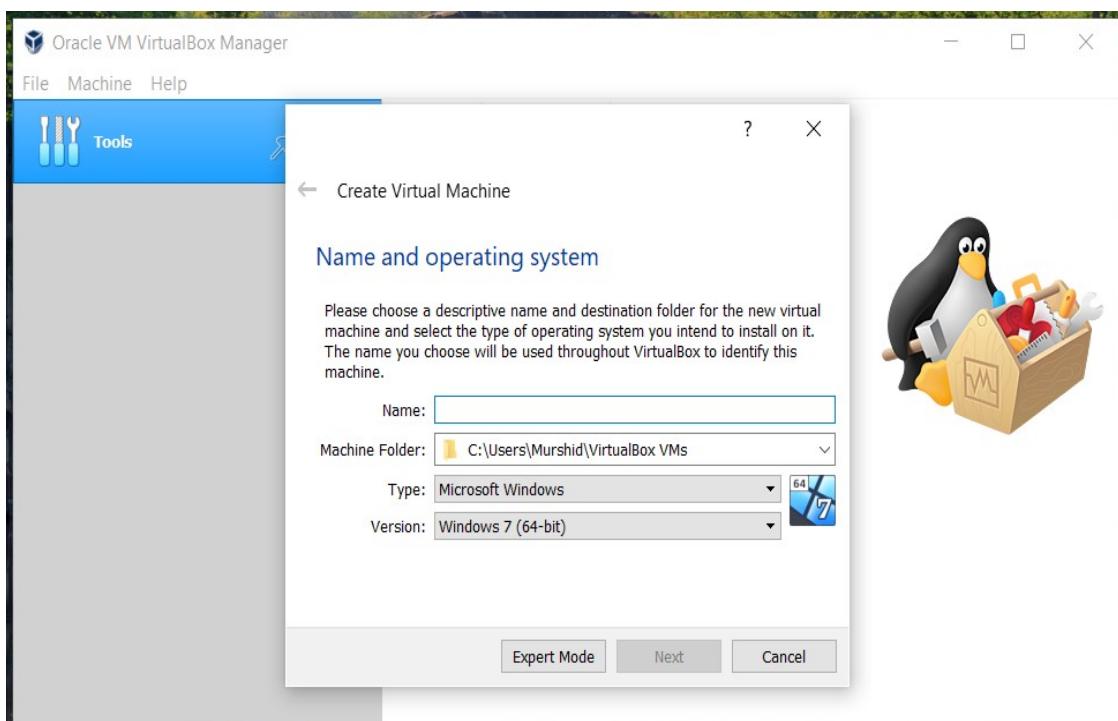
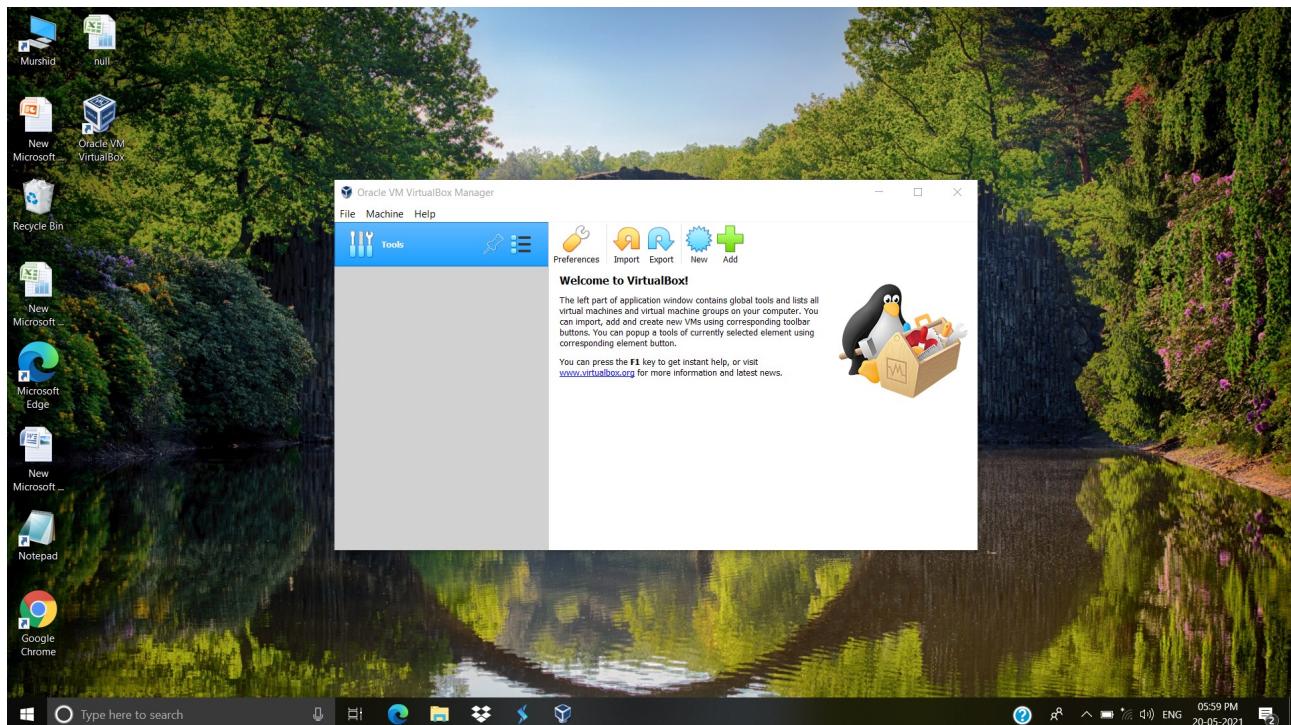
The screenshot shows the official VirtualBox website at virtualbox.org. The page features a large blue header with the "VirtualBox" logo and the text "Welcome to VirtualBox.org!". Below the header, there's a section titled "Hot picks:" with links to pre-built virtual machines, Hyperbox, and phpVirtualBox. To the right, a "News Flash" sidebar lists several recent releases and announcements. At the bottom, there's an "ORACLE" logo and links to Contact, Privacy policy, and Terms of Use. A Windows taskbar is visible at the bottom, showing icons for File Explorer, Task View, Start, Taskbar settings, and the date/time (08:35 AM 20-05-2021).



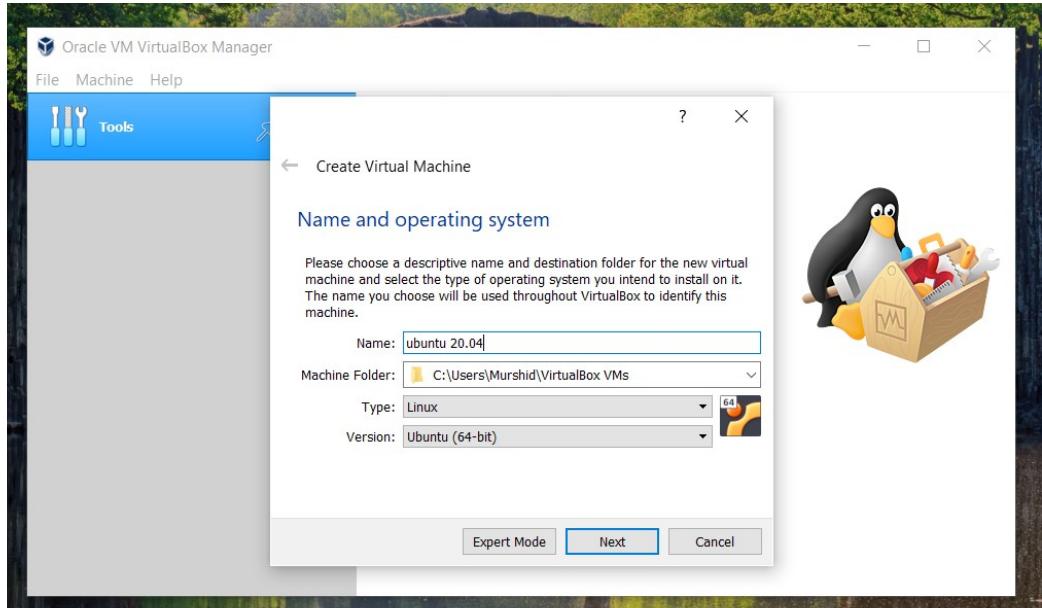


STEP 2: Create Virtual Machine

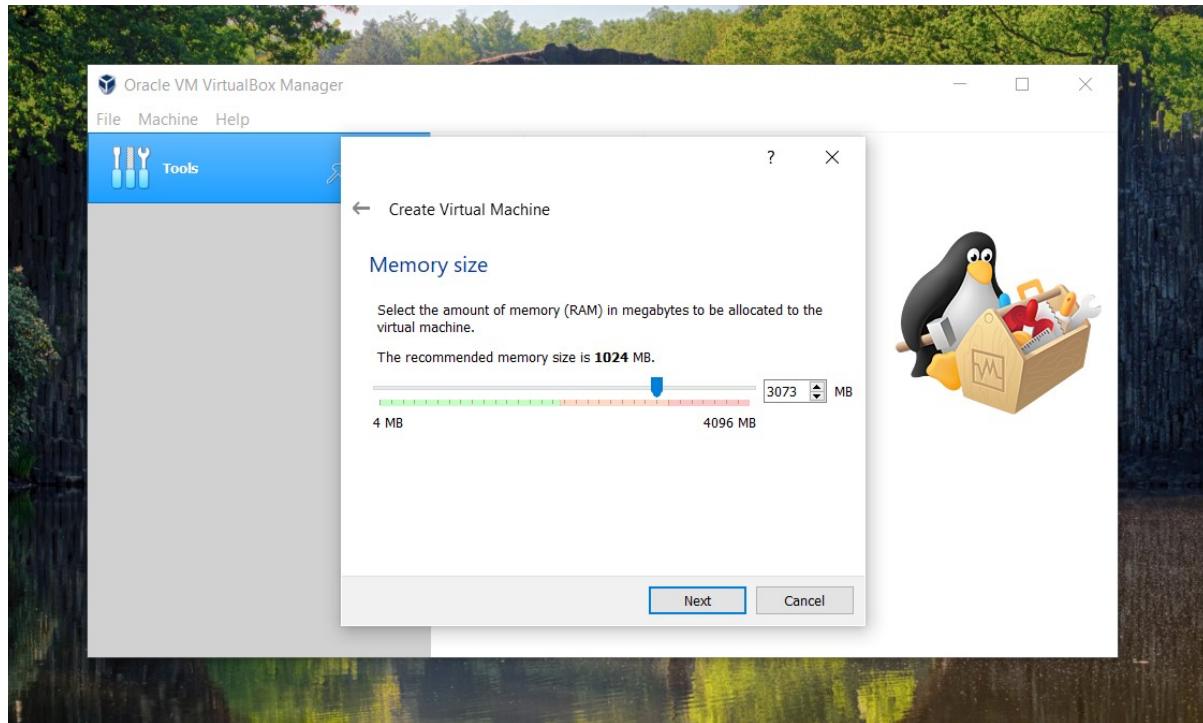
Click 'New' button to open a dialog.



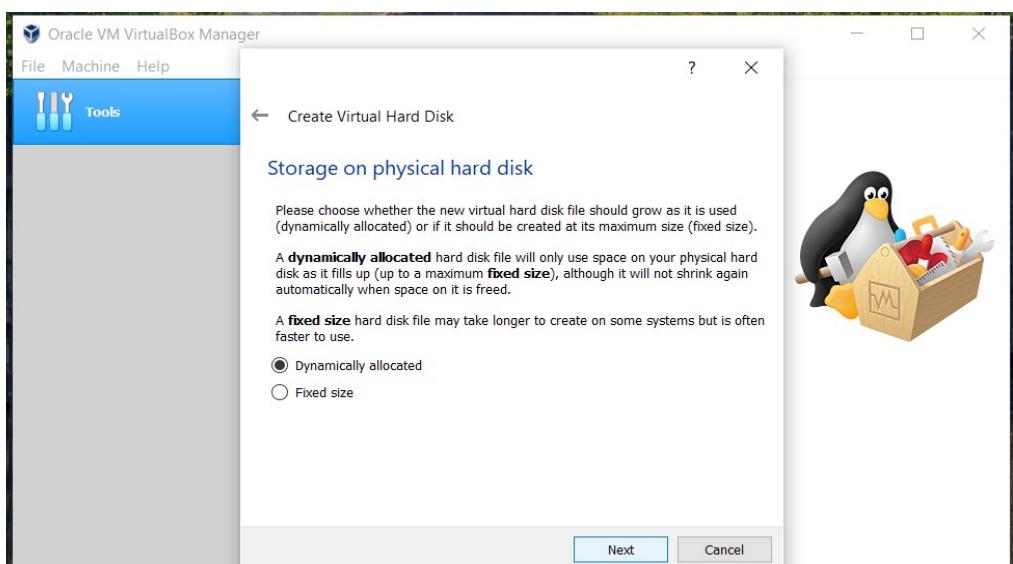
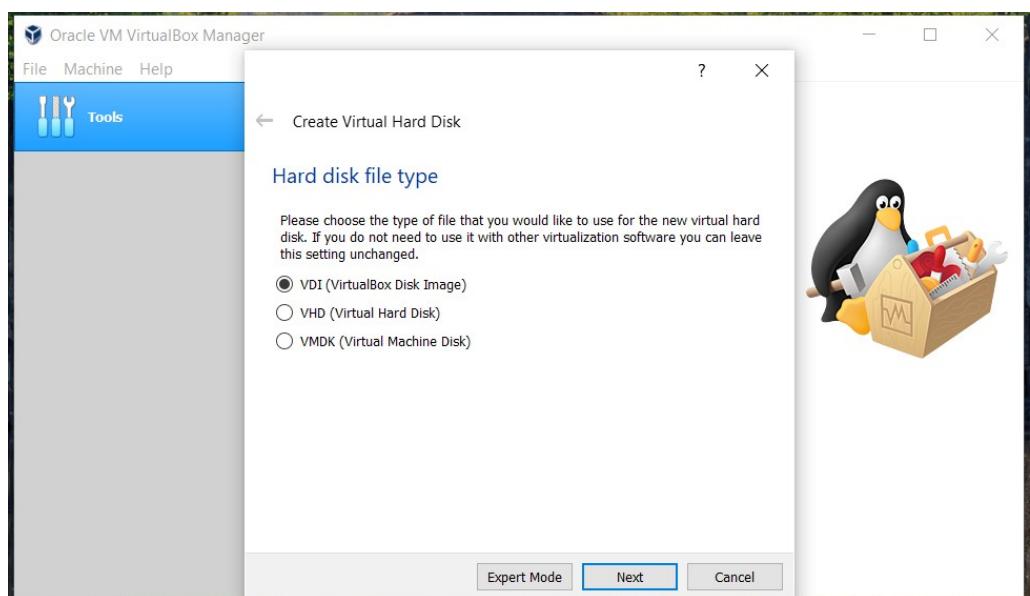
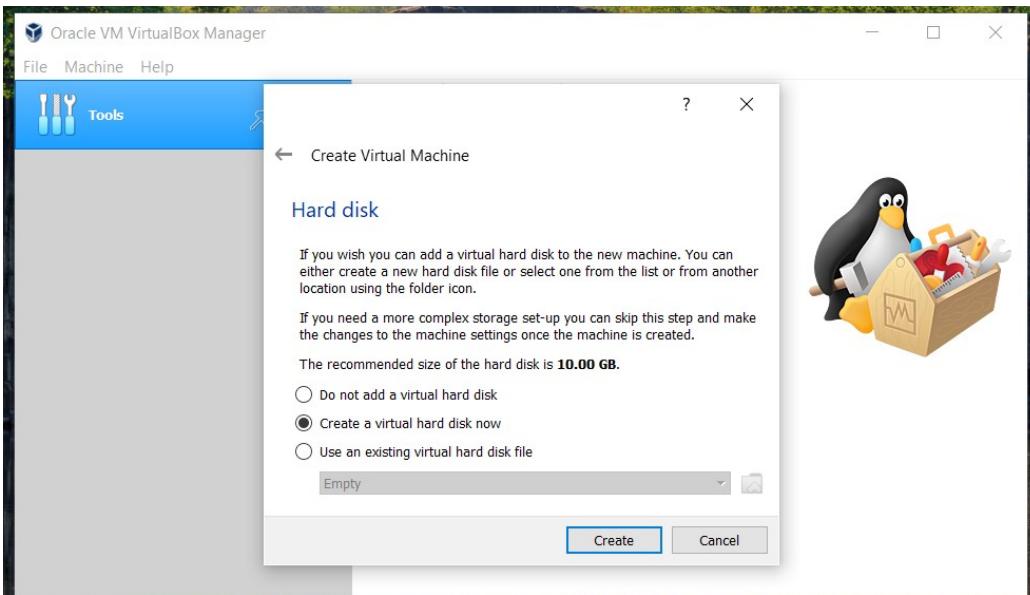
Type a name for the new virtual machine.

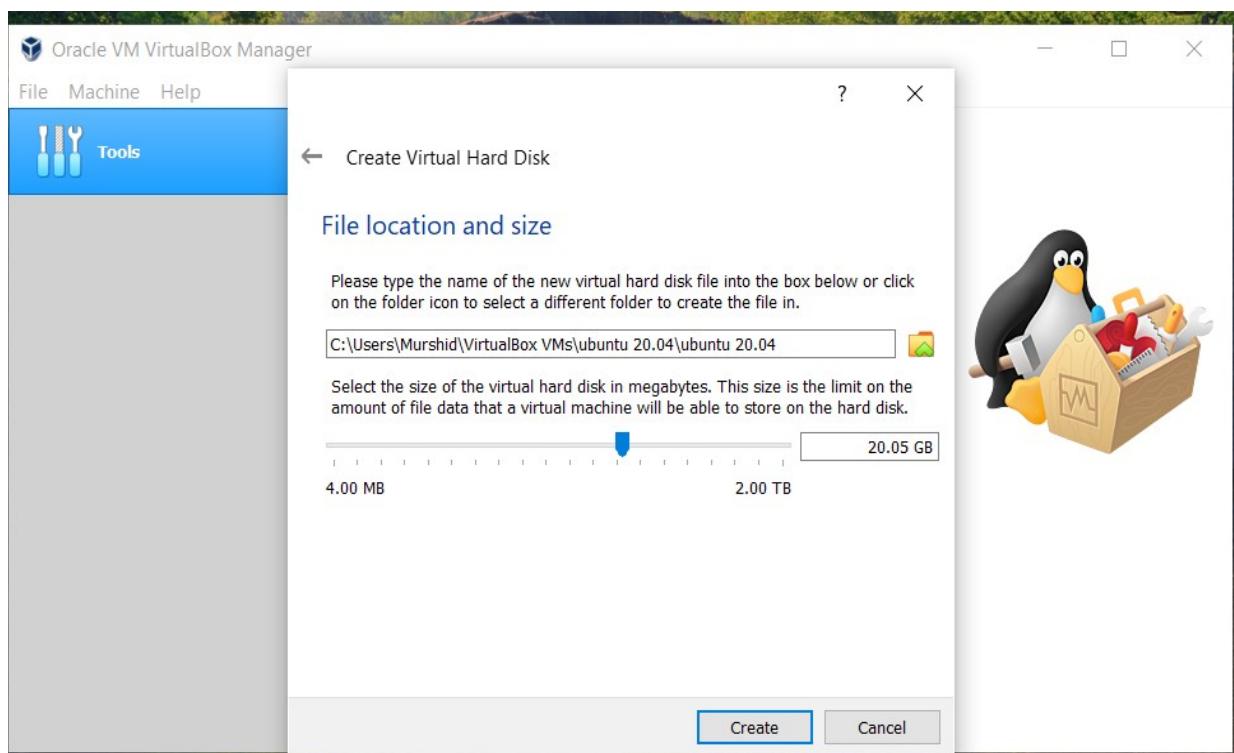
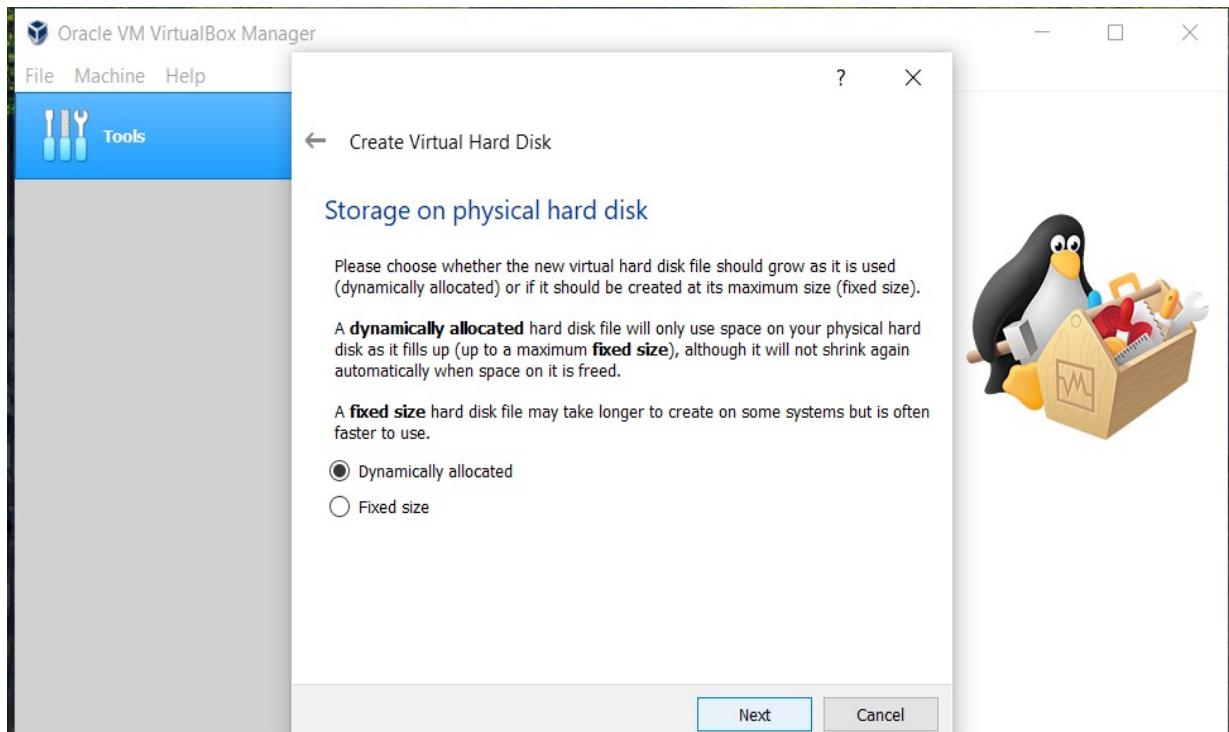


The memory size depends on your host machine memory size. Note that VirtualBox will create a swap partition with the same amount space as base memory you have entered here. So later when you are selecting the size of the virtual hard drive, make sure it is large enough since the hard drive will be splitted into root (/)and swap partitions. The root partition contains by default all your system files, program settings and documents.

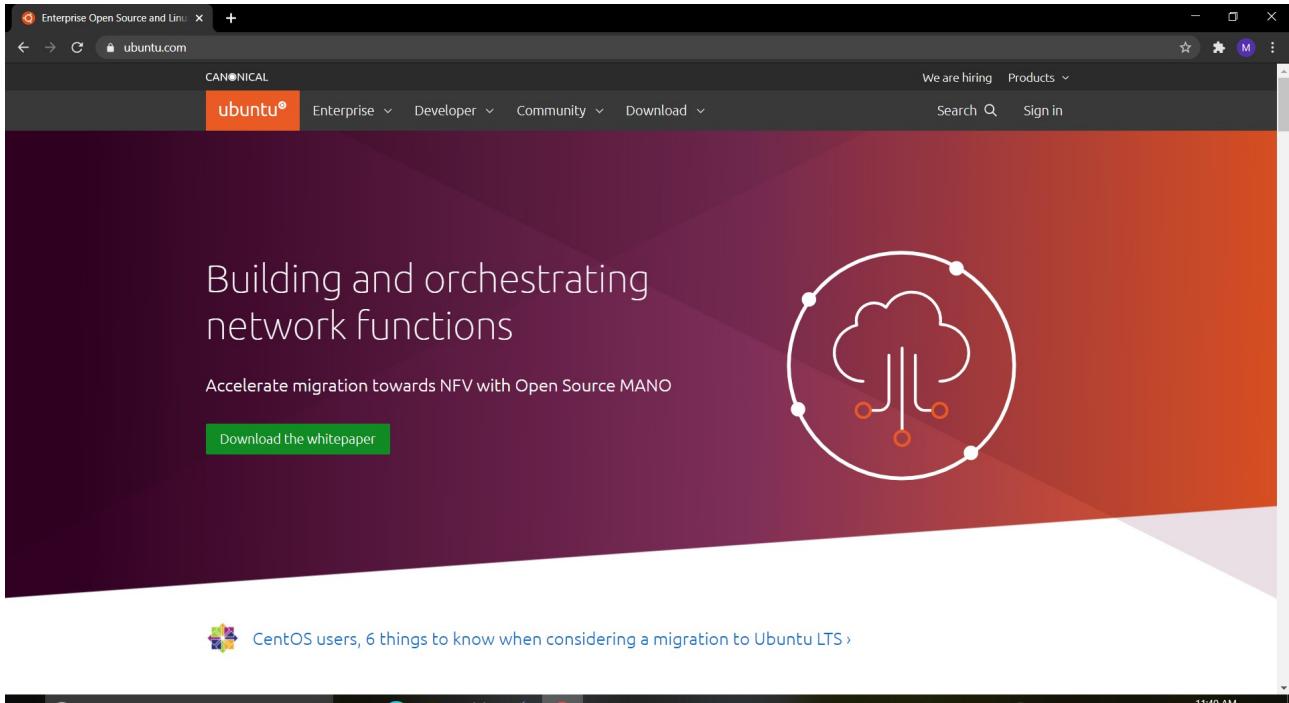


Do the following steps





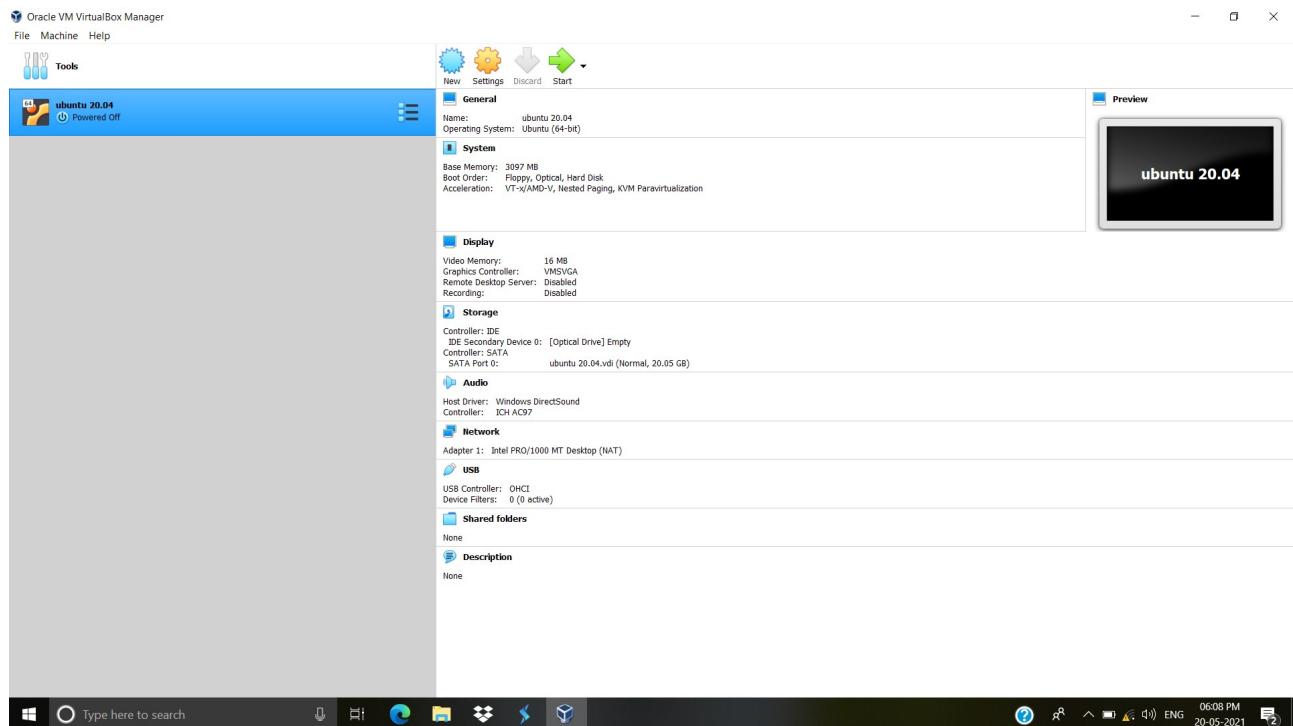
STEP 3: Download iso file of latest version of Ubuntu.



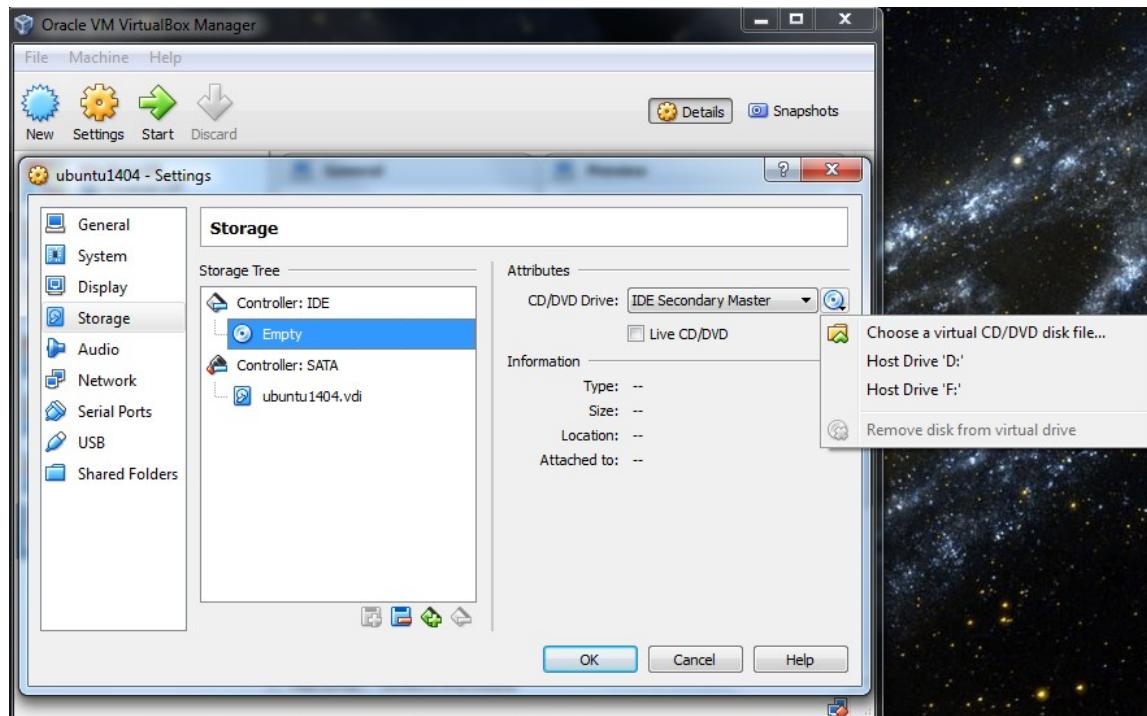
Download 20.04LTS from Ubuntu Desktop

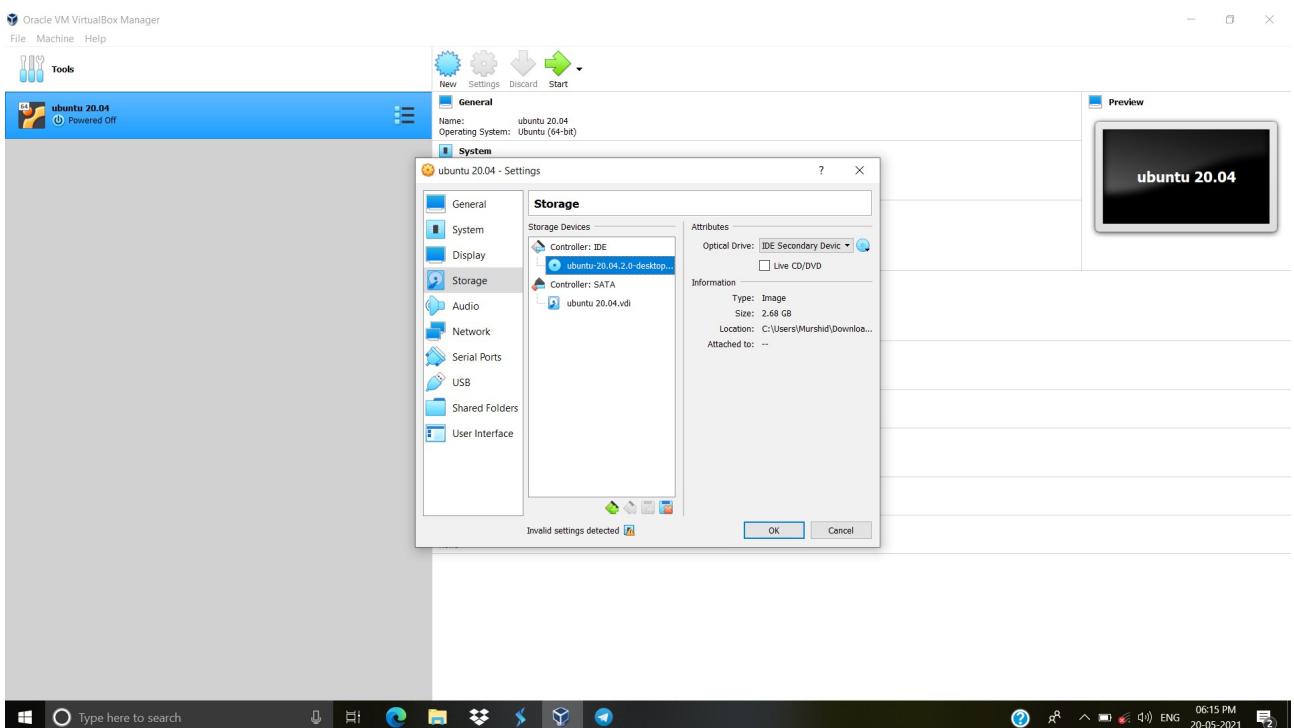
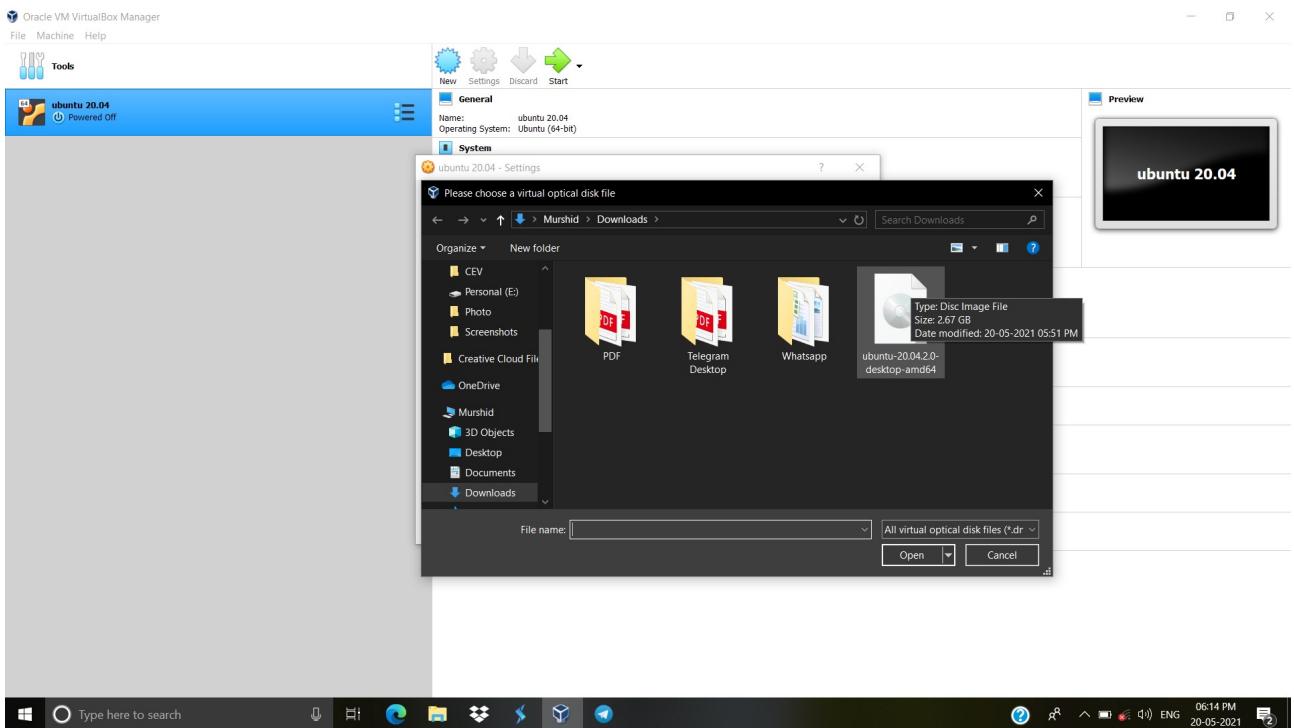
A screenshot of a web browser displaying the Ubuntu download page. The header is identical to the main site, with the "Download" menu item being the active one. The main content area is titled "Ubuntu Desktop >" and features a "20.04 LTS" download button. To the right, there are sections for "Ubuntu Server >", "Ubuntu for IoT >", and "Ubuntu Cloud >". Each section lists various download options and links. At the bottom, there are four columns: "TUTORIALS", "READ THE DOCS", "OTHER WAYS TO DOWNLOAD", and "UBUNTU FLAVOURS". Each column contains links to specific resources. The footer of the page shows the URL "https://ubuntu.com/#download-content".

STEP 4: Now the virtual machine is created. We are ready to install Ubuntu in this virtual machine.



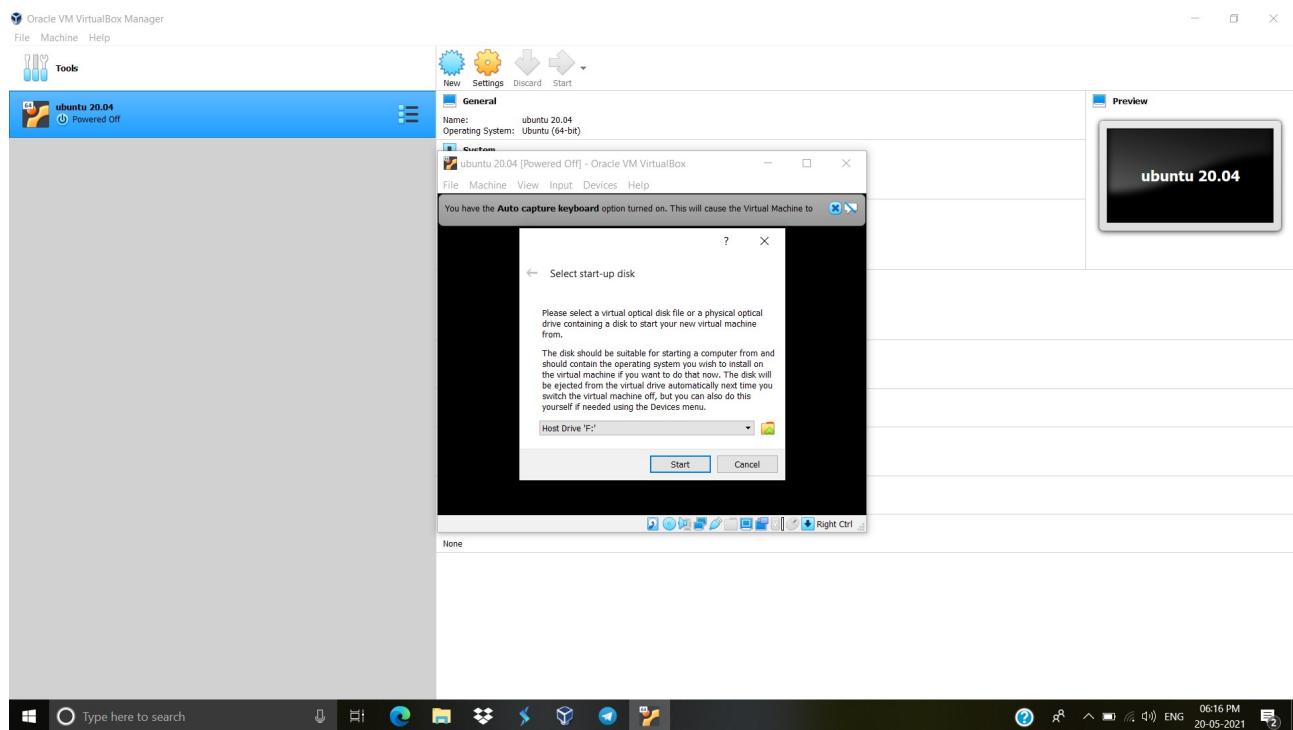
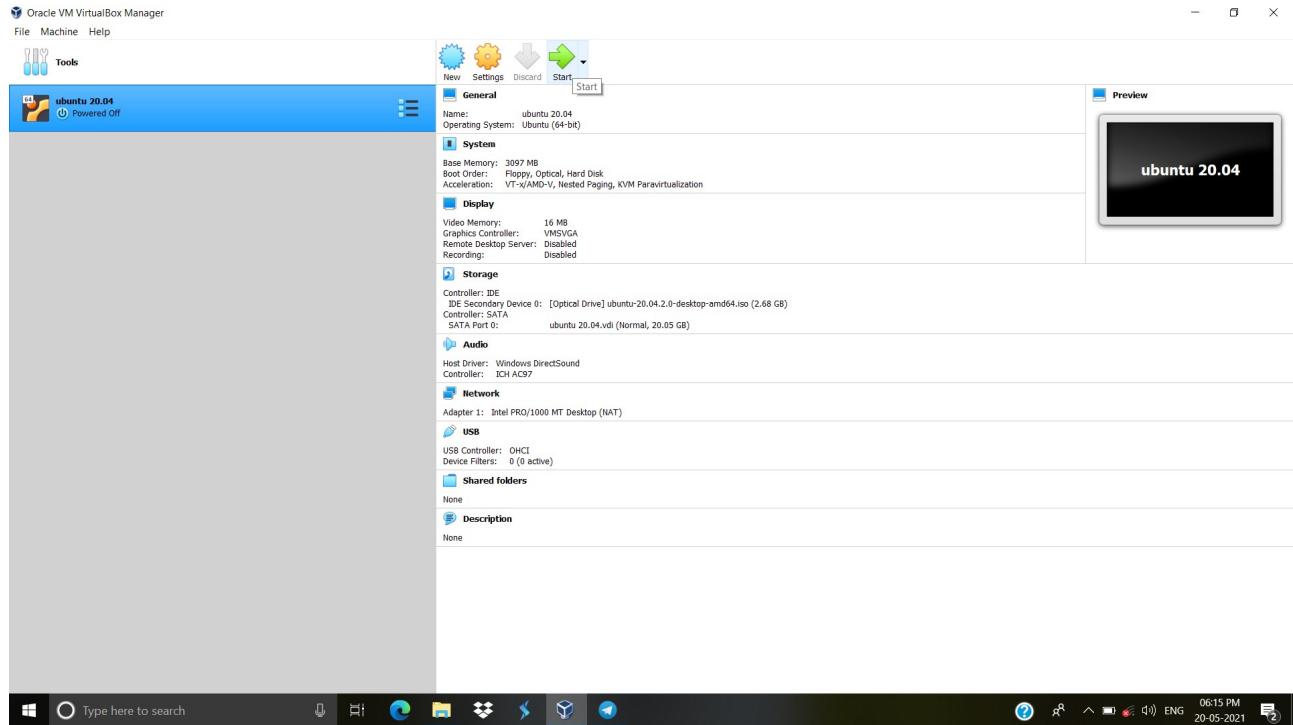
Select your new virtual machine and click 'Settings' button. Click on 'Storage' category and then 'Empty' under Controller:IDE. Click "CD/DVD" icon on right hand side and select the ubuntu ISO file to mount.

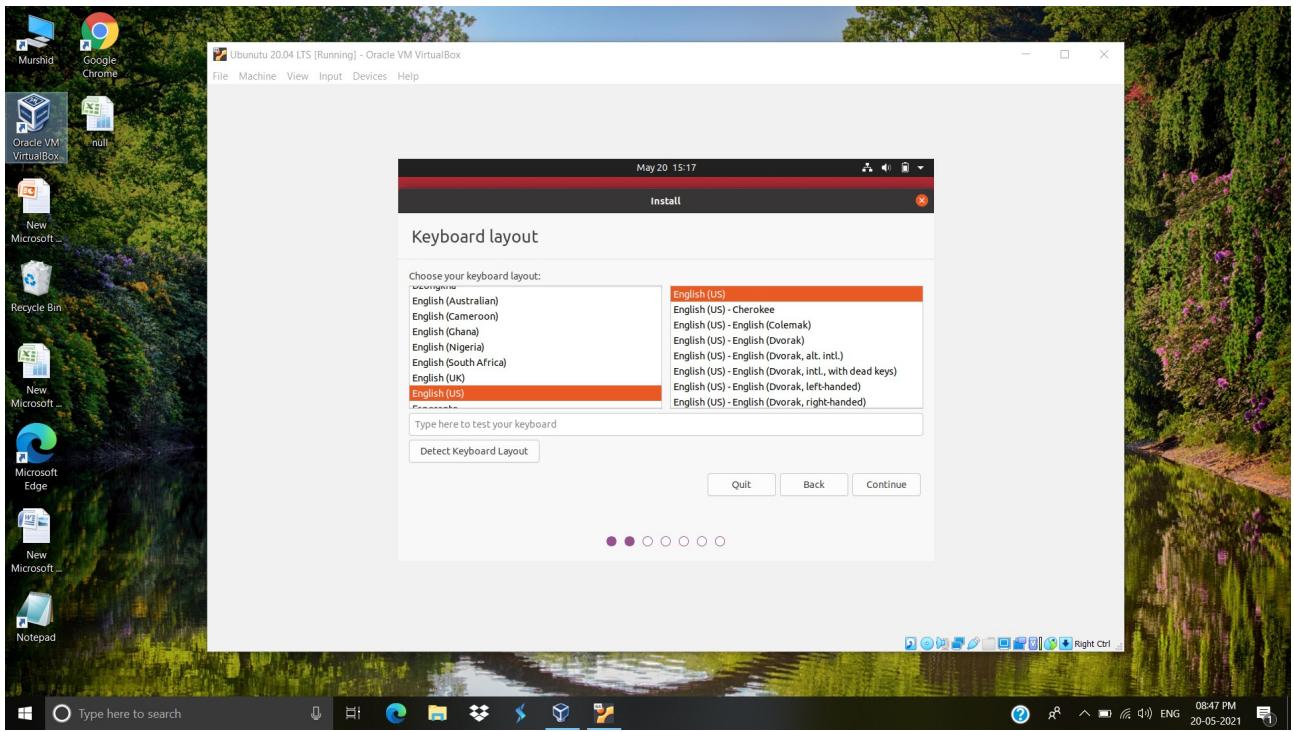
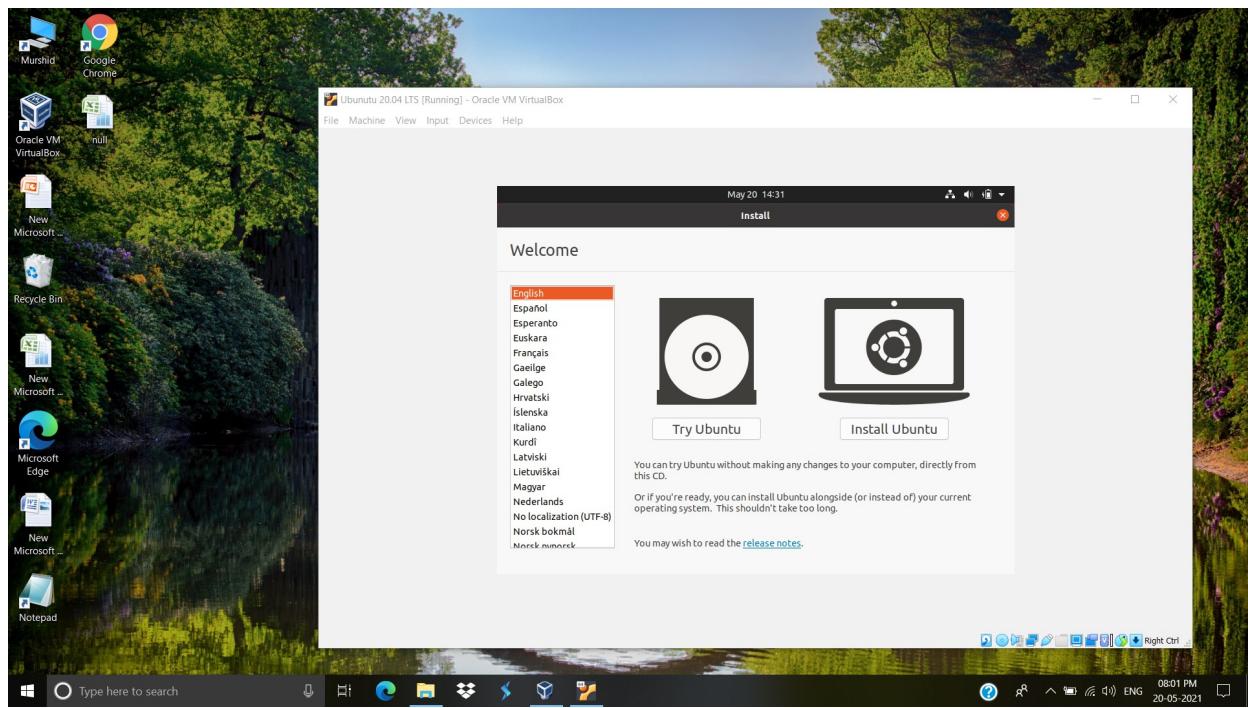


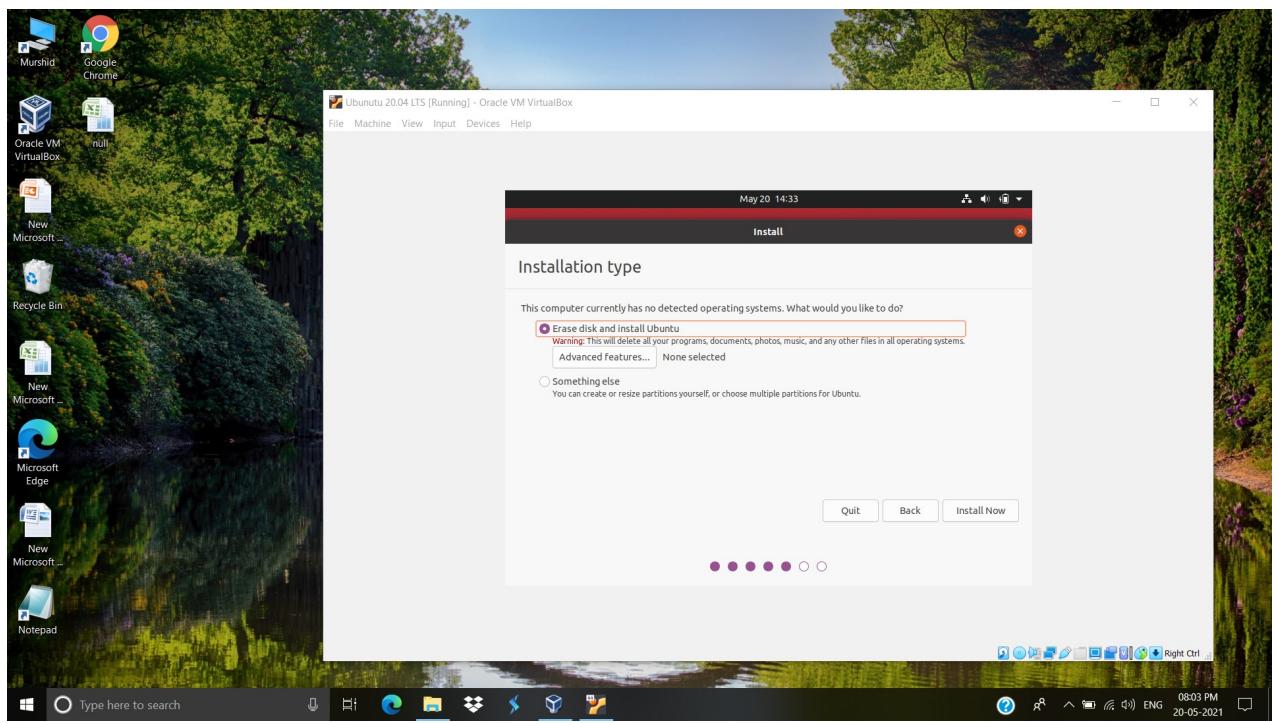
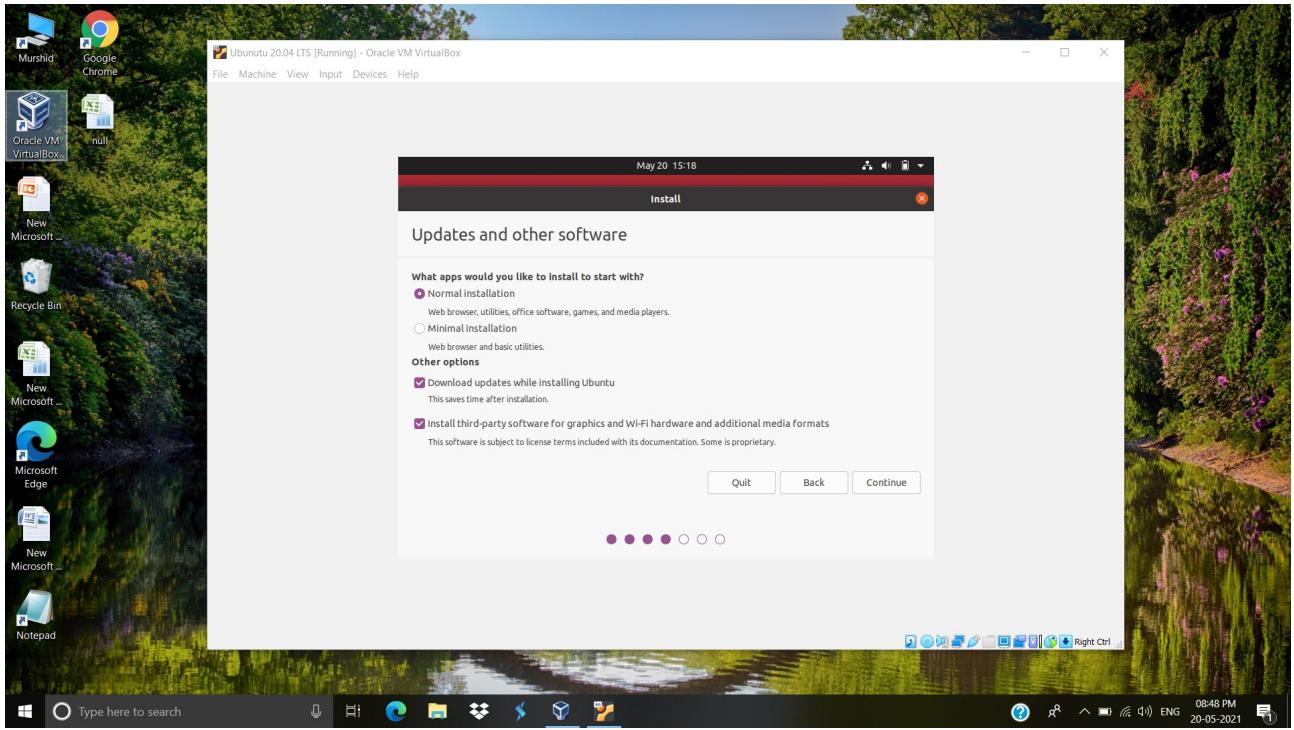


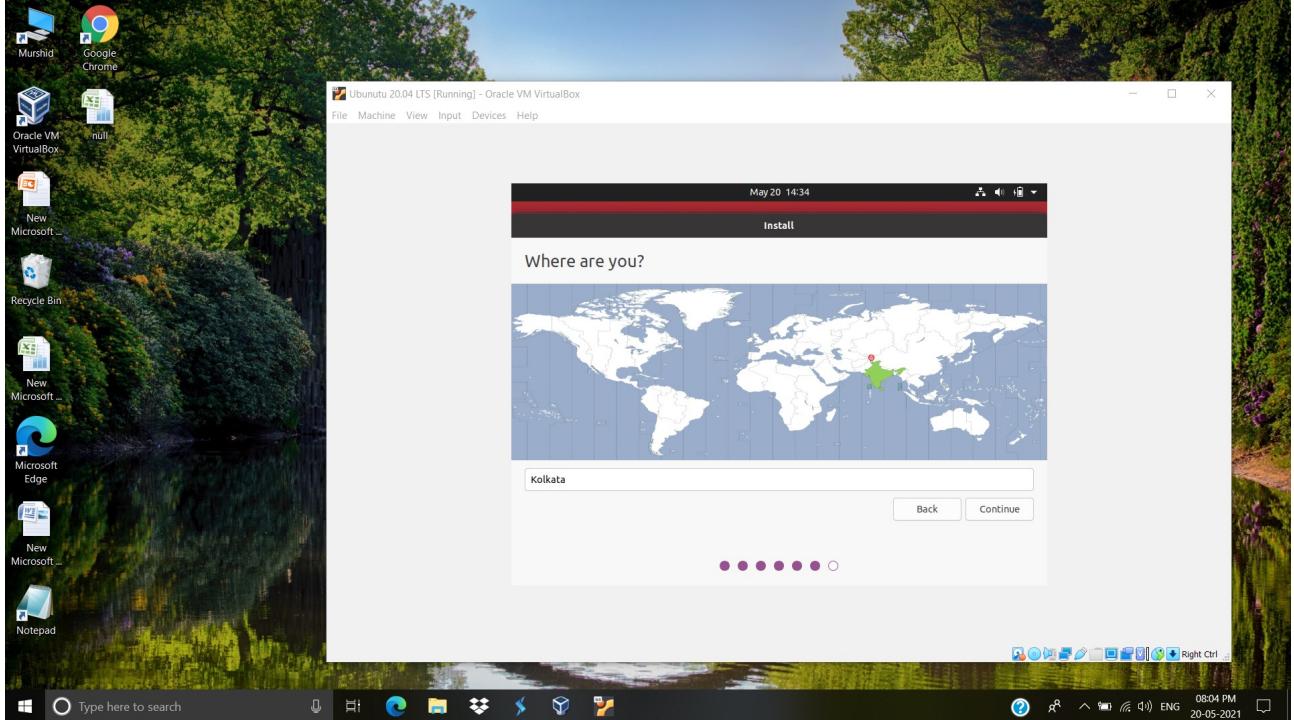
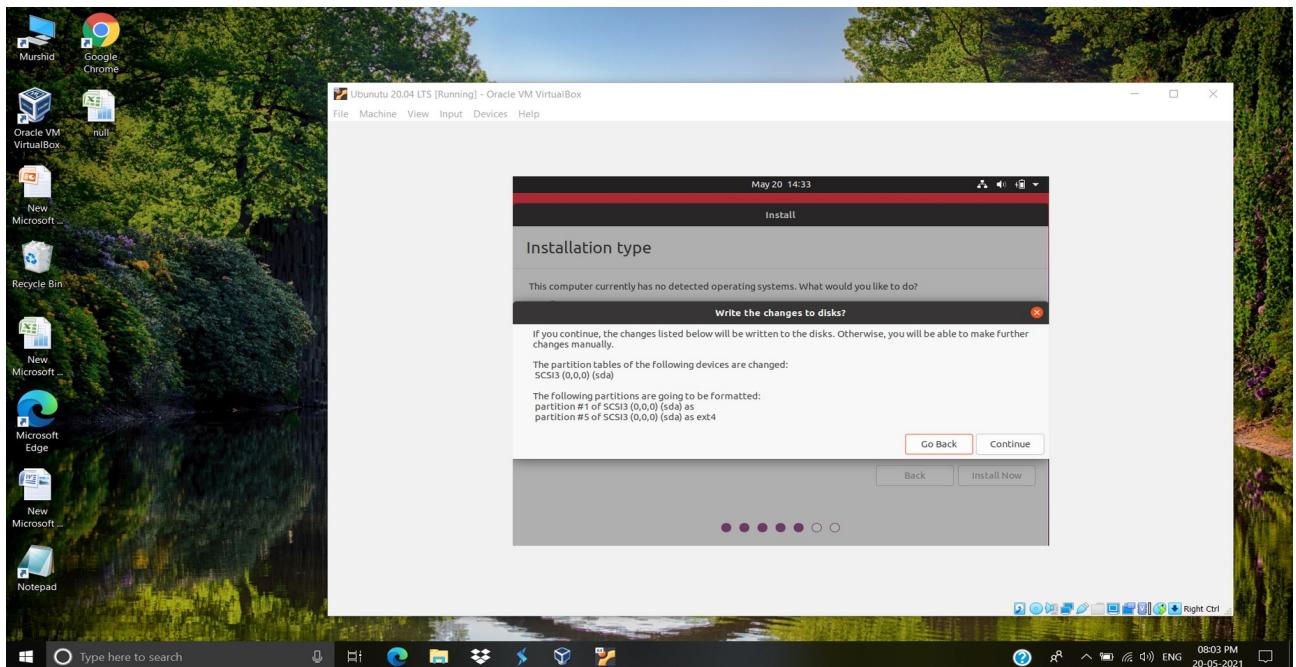
STEP 5: Install Ubuntu 20.04

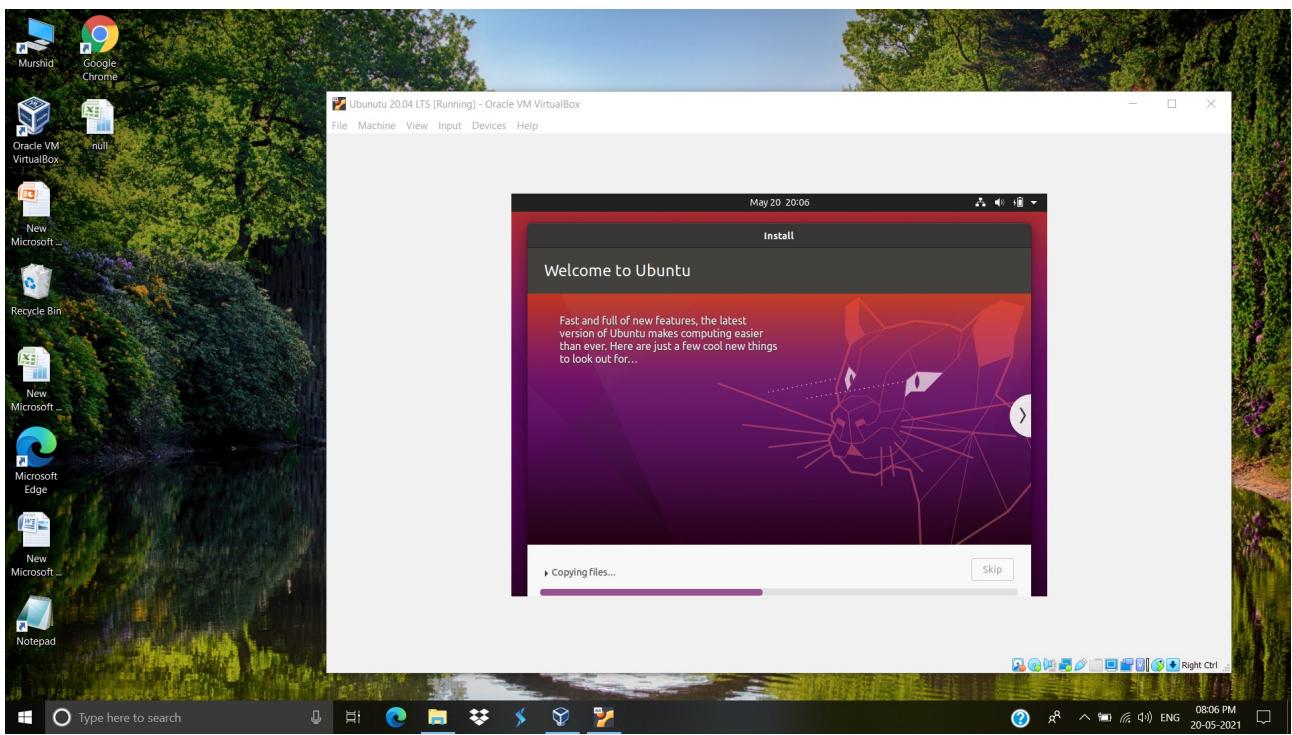
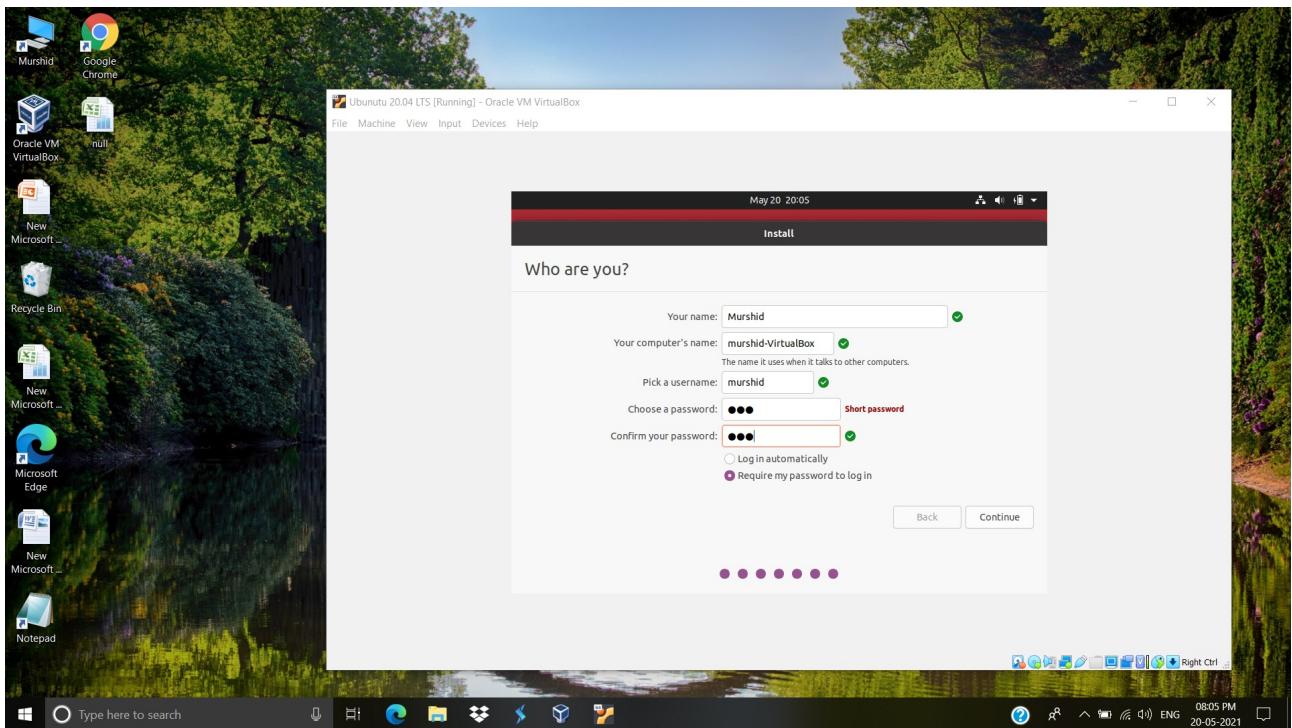
Back to Oracle VM VirtualBox Manager, click on the new Ubuntu virtual machine and hit 'Start' button. Now you shall see a 'Welcome' screen and do the following steps.



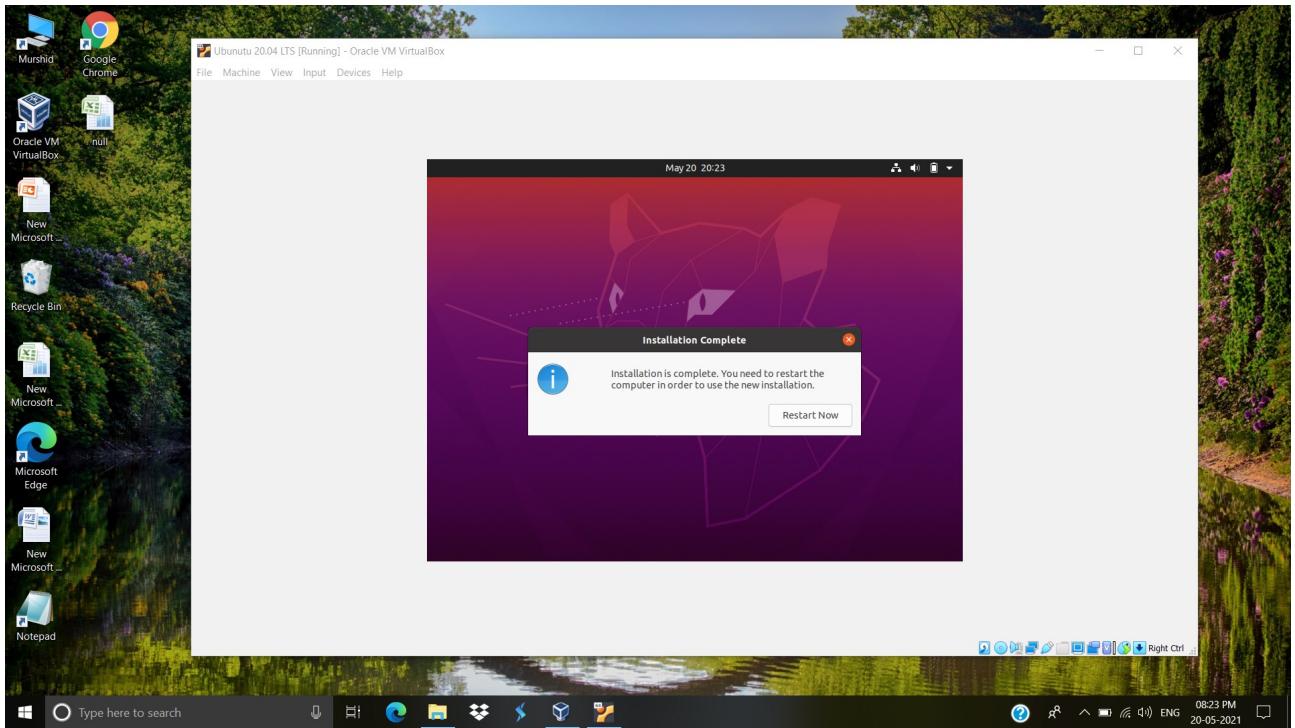




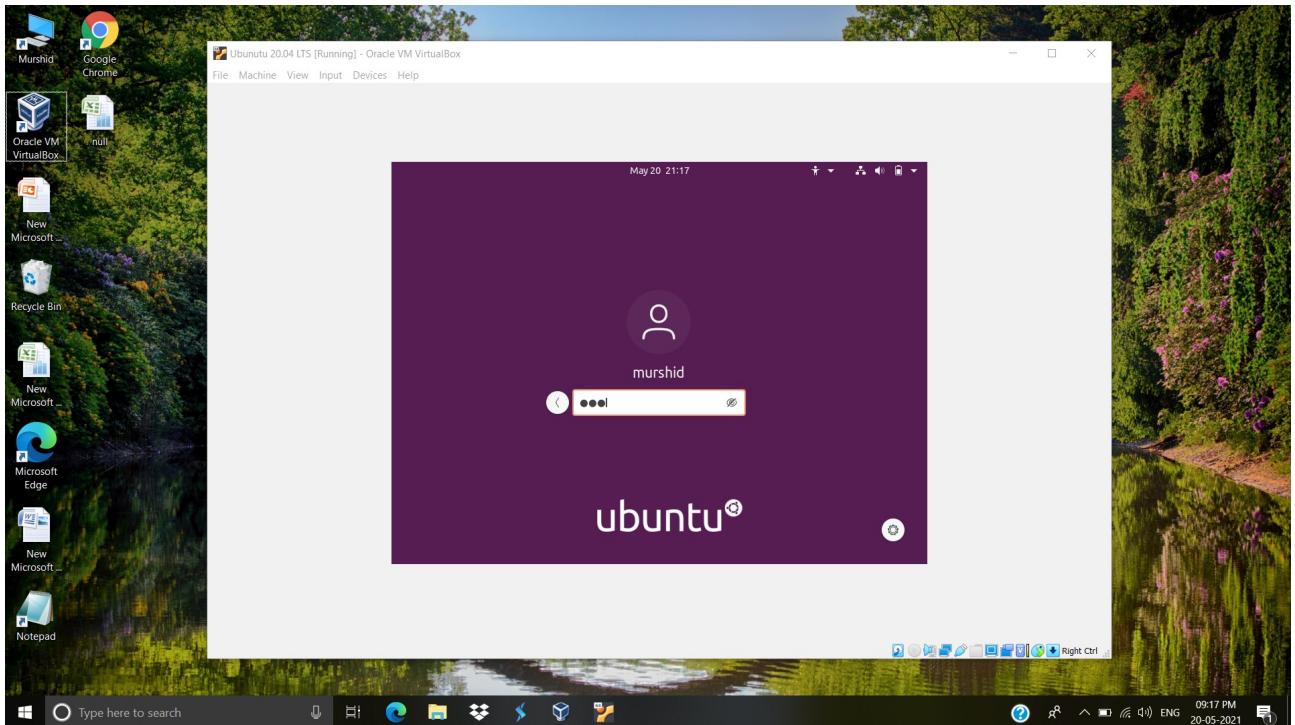




After installation is complete, click 'Restart Now' button.



Enter the password you have chosen and press 'Enter'.



The Ubuntu Desktop OS is ready

