

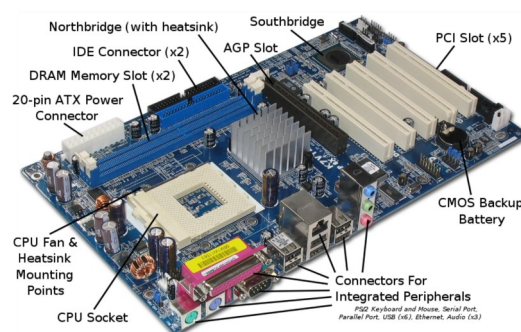
INTRODUCTION TO COMPUTER HARDWARE

COMPUTER HARDWARE:

Computer hardware includes the physical parts of a computer, such as the case, central processing unit (CPU), monitor, mouse, keyboard, computer data storage, graphic cards, sound card, speakers and motherboard. By contrast, software is the set of instructions that can be stored and run by hardware. Hardware is so-termed because it is "hard" or rigid with respect to changes, whereas software is "soft" because it is easy to change. Hardware is typically directed by the software to execute any command or instruction. A combination of hardware and software forms a usable computing system, although other systems exist with only hardware.

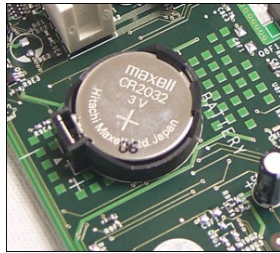
MOTHERBOARD:

The motherboard serves as a single platform to connect all of the parts of a computer together. It connects the CPU, memory, hard drives, optical drives, video card, sound card, and other ports and expansion cards directly or via cables. It can be considered as the backbone of a computer.



CMOS (COMPLEMENTARY METAL OXIDE SEMICONDUCTOR):

CMOS is a combination of NMOS and PMOS transistors that operates under the applied electrical field. The structure of CMOS was initially developed for high density and low power logic gates.



HDMI (HIGH DEFINITION MULTIMEDIA INTERFACE) :

The High-Definition Multimedia Interface, HDMI is an interface that is widely used for audio visual equipment for both domestic and professional applications. When HDMI was first introduced it offered a level of performance that was much greater than that available previously and since then it has developed to accommodate the latest audio and visual standards. The HDMI interface is used on many audio visual applications from televisions to computer monitors and home entertainment systems to video displays and much more.



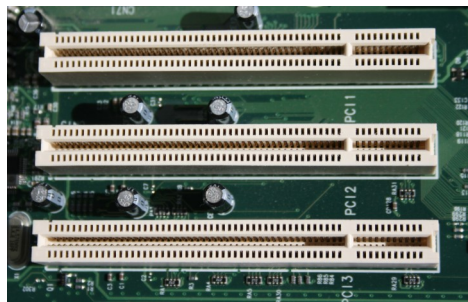
SMPS (Switched Mode Power Supply):

Switched Mode Power Supply also known as Switching Mode Power Supply. SMPS is an electronic power supply system that makes use of a switching regulator to transfer electrical power effectively. It is a PSU (power supply unit) and is usually used in computers to change the voltage to the appropriate range for the computer.



BUS SLOT:

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



GPU(GRAPHIC PROCESSING UNITS):

GPUs also known as graphic cards or video cards or graphics cards. In order to display pictures, videos, audios, and 2D or 3D animations, each device uses a GPU. A GPU performs fast calculations of arithmetic and frees up the CPU to do different things.



COOLING FAN:

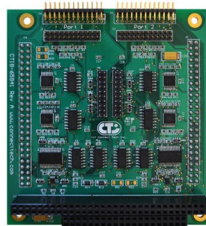
A computer is any fan inside, or attached to, a computer case used for active cooling. Fans are used to draw cooler air into the case from the outside.

Expel warm air from inside and move air across a heat sink to cool a particular component.



DAUGHTER CARDS:

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



STORAGE DEVICES:

The storage unit is a part of the computer system which is employed to store the information and instructions to be processed. A storage device is an integral part of the computer hardware which stores information/data to process the result of any computational work. Without a storage device, a computer would not be able to run or even boot up. Or in other words, we can say that a storage device is hardware that is used for storing, porting, or

extracting data files. It can also store information/data both temporarily and permanently

Primary Memory:

Primary storage or memory is also known as the main memory, which is the part of the computer that stores current data, programs, and instructions. Primary storage is stored in the motherboard which results in the data from and to primary storage can be read and written at a very good pace. It is a segment of computer memory that can be accessed directly by the processor. In a hierarchy of memory, primary memory has access time less than secondary memory and greater than cache memory. Generally, primary memory has a storage capacity lesser than secondary memory and greater than cache memory.

Classification of Primary Memory:

Primary memory can be broadly classified into two parts:

1. READ-ONLY MEMORY
2. RANDOM-ACCESS MEMORY

READ-ONLY MEMORY:

Any data which need not be altered are stored in ROM. ROM includes those programs which run on booting of the system (*known as a bootstrap program* that initializes OS) along with data like algorithm required by OS. Anything stored in ROM cannot be altered or changed.

RANDOM ACCESS MEMORY(RAM):

Any process in the system which needs to be executed is loaded in RAM which is processed by the CPU as per Instructions in the program. Like if we click on applications like Browser, firstly browser code will be loaded by the

Operating system into the RAM after which the CPU will execute and open up the Browser.

SECONDARY MEMORY:

Secondary storage is a memory that is stored external to the computer. It is mainly used for the permanent and long-term storage of programs and data. Hard Disks, CDs, DVDs, Pen/Flash drives, SSD, etc, are examples of secondary storage. Secondary memory is a type of computer memory that is used to store data and programs that can be accessed or retrieved even after the computer is turned off. Unlike primary memory, which is volatile and temporary, secondary memory is non-volatile and can store data and programs for extended periods of time.

Secondary memory devices

Following are the commonly used secondary memory devices are:

1. Floppy Disk: A floppy disk consists of a magnetic disc in a square plastic case. It is used to store data and to transfer data from one device to another device. Floppy disks are available in two sizes (a) Size: 3.5 inches, the Storage capacity of 1.44 MB (b) Size: 5.25 inches, the Storage capacity of 1.2 MB. To use a floppy disk, our computer needs to have a floppy disk drive. This storage device becomes obsolete now and has been replaced by CDs, DVDs, and flash drives.



2. Blu-ray Disc: A Blu-ray disc looks just like a CD or a DVD but it can store data or information up to 25 GB data. If you want to use a Blu-ray disc, you need a Blu-ray reader. The name Blu-ray is derived from the technology that is used to read the disc 'Blu' from the blue-violet laser and 'ray' from an optical ray.



3. Hard Disk: A hard disk is a part of a unit called a hard disk drive. It is used to storing a large amount of data. Hard disks or hard disk drives come in different storage capacities.(like 256 GB, 500 GB, 1 TB, and 2 TB, etc.). It is created using the collection of discs known as platters. The platters are placed one below the other. They are coated with magnetic material. Each platter consists of a number of invisible circles and each circle having the same centre called tracks. Hard disk is of two types (i) Internal hard disk (ii) External hard disk.



4. Solid-state disk: It is also known as SSD. It is a non-volatile storage device that is used to store and access data. It is faster, does noiseless operations(because it does not contain any moving parts like the hard disk), consumes less power, etc. It is a great replacement for standard hard drives in

computers and laptops if the price is low and it is also suitable for tablets, notebooks, etc because they do not require large storage.



INPUT DEVICE:

The electromagnetic devices that accept data or a set of instructions from the outside world and then translate that data into machine-readable and understandable form are known as input devices. Computer input devices serve as an interface between the outside world and the computer for proper communication. When the users enter data using various input devices, the data can be saved in computer memory for further processing and preparation. Using the output device, the intended and calculated results can be acquired when the processing and handling are completed. An input device transmits data to a computer and allows you to communicate with it and control it.

Different Types of Input Devices:

Following are some of the important input devices which are used in a computer ,

1.Keyboard: Keyboard is the most common and very popular input device which helps to input data to the computer. The layout of the keyboard is like that of traditional typewriter, although there are some additional keys provided for performing additional functions. Keyboards are of two sizes 84 keys or

101/102 keys, but now keyboards with 104 keys or 108 keys are also available for Windows and Internet.



2.Mouse:Mouse is the most popular pointing device. It is a very famous cursor-control device having a small palm size box with a round ball at its base, which senses the movement of the mouse and sends corresponding signals to the CPU when the mouse buttons are pressed. Generally, it has two buttons called the left and the right button and a wheel is present between the buttons. A mouse can be used to control the position of the cursor on the screen, but it cannot be used to enter text into the computer.



3.Scanner:Scanner is an input device, which works more like a photocopy machine. It is used when some information is available on paper and it is to be transferred to the hard disk of the computer for further manipulation. Scanner captures images from the source which are then converted into a digital form that can be stored on the disk. These images can be edited before they are printed.



OUTPUT DEVICE:

The output device displays the result of the processing of raw data that is entered in the computer through an input device. There are a number of output devices that display output in different ways such as text, images, hard copies, and audio or video. They bridge the gap between digital data and human perception, letting users engage with computer-generated information. Understanding the many forms of output devices and their importance in computing is essential for making informed decisions while selecting the right devices for certain applications.

Different Types of output Devices:

Some of the popular visual output devices are:

1. Monitor: A monitor is also called a Visual Display Unit (VDU). A VDU consists of a display device and a keyboard, and could also include a mouse. The design of an effective visual display is based on general principles involving both the nature of human vision and the nature of the task.



2. Plotter : A plotter is a device that prints high-quality graphics in a variety of color formats. It works in a similar way to a printer, although it has more advanced features. It is used to print large maps, architectural drawings, large-

format printing, and create pictures, 3D postcards, advertising signs, charts, and various designs of the internal structure of building machines, as well as create pictures, 3D postcards, advertising signs, charts, and various designs of the internal structure of building machines.



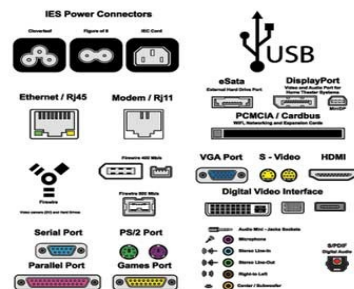
Drum Plotter

3. Projector: A projector is a device that allows users to project their output onto a large area, such as a screen or a wall. It can be used to project the output of a computer and other devices onto a screen. It magnifies texts, photos, and movies using light and lenses. As a result, it's an excellent output device for giving presentations or teaching big groups of people.



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.





DESKTOP

A desktop computer (often abbreviated desktop) is a personal computer designed for regular use at a stationary location on or near a desk (as opposed to a portable computer) due to its size and power requirements. Unlike portable computers, desktops are larger and have specific power requirements.

A typical desktop system includes the following components:

Monitor: Displays visual output.

Keyboard: Used for input.

Mouse: Another input device.

Computer Case: Contains the motherboard, processor, memory, and other electronic components.

Disk Storage: Usually one or more hard disk drives, solid-state drives, and optical disc drives.

Speakers: For audio output.

Printer (often optional): For producing hard copies of documents



SERVER OPERATING SYSTEM

A server is a hardware device or software that processes requests sent over a network and replies to them. A client is the device that submits a request and waits for a response from the server. A server operating system is a type of operating system that is designed to be installed and used on a server computer. It is an advanced version of an operating system, having features and capabilities required within a client-server architecture or similar enterprise computing environment.

DATA SERVER: A data server is a software program/platform used to provide database service like storing, processing, and securing data.

Mainly three types:

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.

MAIL SERVER: A mail server is a central computer that stores electronic emails for clients over the network. It is much like the post office that obtains emails sent to the user and stores them until it is not requested by a user. It uses standard email protocols to send and receive an email like, simple mail transfer protocol (SMTP) handles outgoing mail requests and sends messages. The POP3 and IMAP protocols are used to process incoming mail and also receive messages. These protocols handle all the connections when users log on to a mail server by using email or webmail interface.

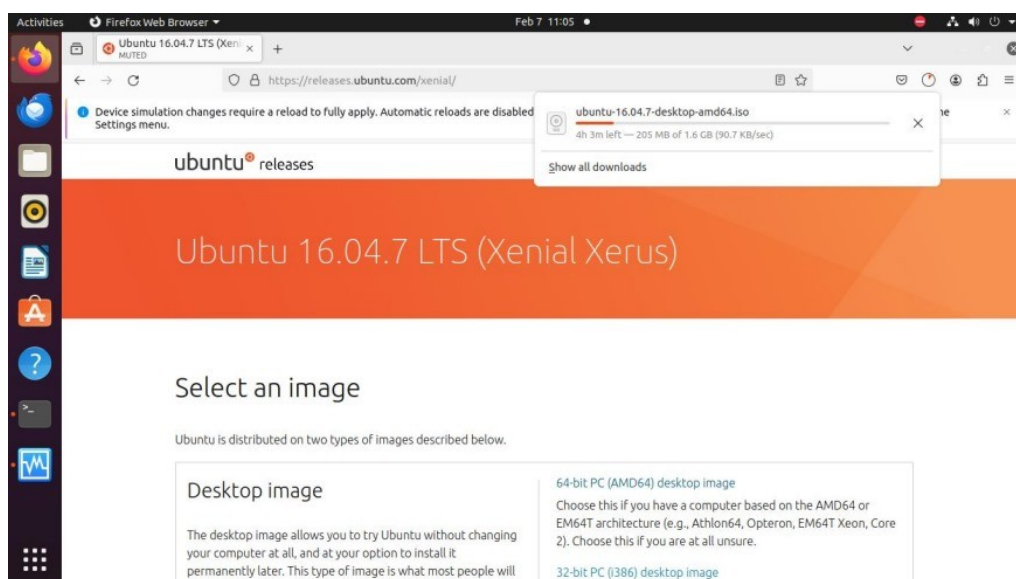
WEB SERVER: A web server offers web pages or other content to the web browser by loading the information from a disc and transfer files by using a

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. These exchange was done with the help of HTTP communicating between the browser and the server.

INSTALL UBUNTU ON VIRTUALBOX

Virtualbox by Oracle is a powerful virtualization software that allows users to run multiple operating systems on one physical computer. VirtualBox is open-source software for virtualizing the x86 computing architecture. It acts as a hypervisor, creating a VM (virtual machine) where the user can run another OS (operating system). The operating system where VirtualBox runs is called the "host" OS. The operating system running in the VM is called the "guest" OS. VirtualBox supports Windows, Linux, or macOS as its host OS.

Before we begin with installation process, we need to download ISO for Ubuntu.



VirtualBox Installation:

```
sudo apt-get install virtualbox
```

```
Activities Terminal Feb 7 11:07 student@mca-H81M-S:~$ sudo apt-get install virtualbox
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  build-essential dctrl-tools dkms dpkg-dev fakeroot g++ g++-9
  libalgorithm-diff-perl libalgorithm-diff-xs-perl libalgorithm-merge-perl
  libdouble-conversion3 libfakeroot libgsoap-2.8.9i liblz1 libpcrz-16-0
  libqt5core5a libqt5dbus5 libqt5gui5 libqt5network5 libqt5opengl5
  libqt5printsupport5 libqt5svg5 libqt5widgets5 libqt5xml5 libqt5xmlpatterns5
  libstdl1.2deb1 libstdc++-9-dev libvncserver1 libxcb-xinerama0
  libxcb-xinput0 make qt5-gtk-platformtheme qttranslations5-l10n
  virtualbox-dkms virtualbox-qt
Suggested packages:
  debtags menu debian-keyring g++-multilib g++-9-multilib gcc-9-doc
  qt5-image-formats-plugins qtwayland5 libstdc++-9-doc make-doc vde2
  virtualbox-guest-additions-iso
The following NEW packages will be installed:
  build-essential dctrl-tools dkms dpkg-dev fakeroot g++ g++-9
  libalgorithm-diff-perl libalgorithm-diff-xs-perl libalgorithm-merge-perl
  libdouble-conversion3 libfakeroot libgsoap-2.8.9i liblz1 libpcrz-16-0
  libqt5core5a libqt5dbus5 libqt5gui5 libqt5network5 libqt5opengl5
  libqt5printsupport5 libqt5svg5 libqt5widgets5 libqt5xml5 libqt5xmlpatterns5
  libstdl1.2deb1 libstdc++-9-dev libvncserver1 libxcb-xinerama0
  libxcb-xinput0 make qt5-gtk-platformtheme qttranslations5-l10n virtualbox
  virtualbox-dkms virtualbox-qt
0 upgraded, 35 newly installed, 0 to remove and 67 not upgraded.
Need to get 66.4 MB of archives.
After this operation, 277 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu focal/main amd64 make amd64 4.2.1-1.2 [162 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 dpkg-dev all 1.19.7ubuntu3.2 [679 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 libstdc++-9-dev amd64 9.4.0-1ubuntu1-20.04.2 [1,722 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 g++-9 amd64 9.4.0-1ubuntu1-20.04.2 [8,421 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu focal/main amd64 g++ amd64 4:9.3.0-1ubuntu2 [1,604 B]
Get:6 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 build-essential amd64 12.8ubuntu1.1 [4,664 B]
Get:7 http://in.archive.ubuntu.com/ubuntu focal/main amd64 dctrl-tools amd64 2.24-3 [61.5 kB]
Get:8 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 dkms all 2.8.1-Subuntuz [66.8 kB]
```

sudo apt-get update

```
Activities Terminal Feb 7 11:06 student@mca-H81M-S:~$ sudo apt-get update
Setting up libqt5opengl5:amd64 (5.12.8+dfsg-0ubuntu2.1) ...
Setting up virtualbox (6.1.48-dfsg-1-ubuntu1.20.04.1) ...
Setting up libqt5xml5:amd64 (5.12.8-0ubuntu1) ...
Setting up libqt5svg5:amd64 (5.12.8-0ubuntu1) ...
Setting up virtualbox-qt (6.1.48-dfsg-1-ubuntu1.20.04.1) ...
Processing triggers for desktop-file-utils (0.24-1ubuntu3) ...
Processing triggers for mime-support (3.64ubuntu1) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for gnome-menus (3.36.0-1ubuntu1) ...
Processing triggers for libc-bin (2.31-0ubuntu9.14) ...
Processing triggers for systemd (245.4-4ubuntu3.20) ...
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for shared-mime-info (1.15-1) ...
student@mca-H81M-S:~$ sudo apt-get update
Hit:1 http://in.archive.ubuntu.com/ubuntu focal InRelease
Get:2 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:4 http://security.ubuntu.com/ubuntu focal-security/main amd64 Packages [2,680 kB]
Hit:5 http://in.archive.ubuntu.com/ubuntu focal-backports InRelease
Get:6 http://in.archive.ubuntu.com/ubuntu focal-updates/main i386 Packages [926 kB]
Get:7 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [3,868 kB]
Get:8 http://security.ubuntu.com/ubuntu focal-security/main i386 Packages [700 kB]
Get:9 http://in.archive.ubuntu.com/ubuntu focal-updates/main Translation-en [493 kB]
Get:10 http://in.archive.ubuntu.com/ubuntu focal-updates/restricted amd64 Packages [2,625 kB]
Get:11 http://in.archive.ubuntu.com/ubuntu focal-updates/restricted Translation-en [366 kB]
Get:12 http://in.archive.ubuntu.com/ubuntu focal-updates/universe amd64 Packages [1,162 kB]
Get:13 http://in.archive.ubuntu.com/ubuntu focal-updates/universe i386 Packages [772 kB]
Get:14 http://in.archive.ubuntu.com/ubuntu focal-updates/universe Translation-en [279 kB]
Get:15 http://security.ubuntu.com/ubuntu focal-security/main Translation-en [410 kB]
Get:16 http://security.ubuntu.com/ubuntu focal-security/restricted amd64 Packages [2,506 kB]
Get:17 http://security.ubuntu.com/ubuntu focal-security/restricted Translation-en [349 kB]
Get:18 http://security.ubuntu.com/ubuntu focal-security/universe amd64 Packages [935 kB]
Get:19 http://security.ubuntu.com/ubuntu focal-security/universe i386 Packages [644 kB]
Get:20 http://security.ubuntu.com/ubuntu focal-security/universe Translation-en [197 kB]
Fetched 18.3 MB in 22s (818 kB/s)
Reading package lists... Done
student@mca-H81M-S:~$ virtualbox
```

Create virtual machine by just clicking on this new

Click -> new

we can install ubuntu so type ubuntu And choose the type

