



Geeky Hub
PRESENTS



Hardware Professional

ACCESS MORE COURSES PLAYLIST LINK IN
DESCRIPTION
BEGINNER TO EXPERT
GUARANTEED



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Topics going to Cover

1. Hardware Course Basics
2. Types of Computer
3. Peripherals & Components
4. Monitor & SmartTV
5. Keyboard & Remote
6. Mouse & Joystick
7. Speakers, Headphone & Microphone
8. Uniteruptable Power Supply (UPS)
9. CPU Cabinet with Assembling & Deassembling
10. Motherboard
11. Audio, Video & Graphic Card
12. Bluetooth & Wi-Fi
13. Hard drive
14. Solid State Drive
15. Random Access Memory
16. Read Only Memory
17. Microprocessor
18. Switch Mode Power Supply (SMPS)
19. Printer with its type
20. Scanner with its type



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Topics going to Cover

21. CD, VCD, DVD & Blu-ray Media
22. Memory Card, External HDD & Pendrive
23. Ports, Cables & Connectors
24. Basic Input Output System (BIOS)
25. Discussing about Troubleshooting
26. USB Booting & OS Installation
27. Basics Info Hardware Engineer Must Know

Cleaning Junks
Setting Resolution
Drivers Updation
Prompt Commands



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1.

Hardware Course Basics



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Hardware?

When Internal and External Components & Peripherals gets combined together then they assemble a computer. And these components and peripherals are known as computer Hardware.







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2.

Types of Computer



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What is Computer???

THE COMPUTER DEFINED

COMPUTER IS A DUMB MACHINE WHICH WORKS ONLY WHEN IT GET INSTRUCTIONS. THE ALGORITHM OF WORKING IS BASED ON BINARIES CALCULATIONS WHICH IS 0 & 1. COMPUTER IS USED FOR DOING WORK FASTER, EASIER, HIGHLY CAPACITIVE & ACCURATELY.



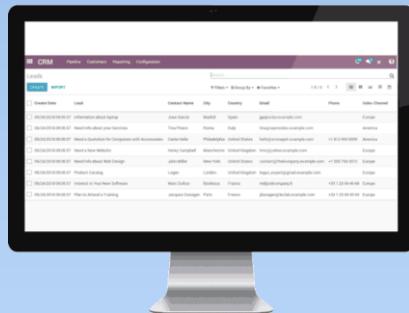
Types of Computer

1. MINICOMPUTER
2. PC/TABLET/SMARTPHONE/LAPTOP (Micro)
3. WORKSTATION
4. MAINFRAME
5. SUPERCOMPUTER



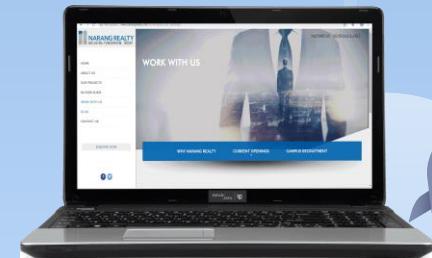
1. Mini Computer

Minicomputers are used by small businesses & firms. Minicomputers are also called as “Midrange Computers”. They are designed for special purposes like cash billing, Ticket booking & smart systems.



2. Micro Computer

Desktop computers, Tablet PC's, Smartphones, Calculators are all type of Microcomputers. They are handy and portable in some cases. Low capacitive and meant for normal uses.



3. Workstation

These are specially designed systems meant for special purposes like gaming, stock stalking & weather forecasting. Basically a well profiled and maintained setup.



4. Mainframe

A large, powerful computer that can handle many tasks concurrently and is usually used commercially. Mainframes are not as powerful as supercomputers. Mainframes can also process & store large amount of data.



5. Super Computer

Supercomputers are the most powerful computers made, and physically they are some of the largest. These systems can process huge amounts of data, and the fastest supercomputers can perform more than one trillion calculations per second.





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3.

Peripherals & Components



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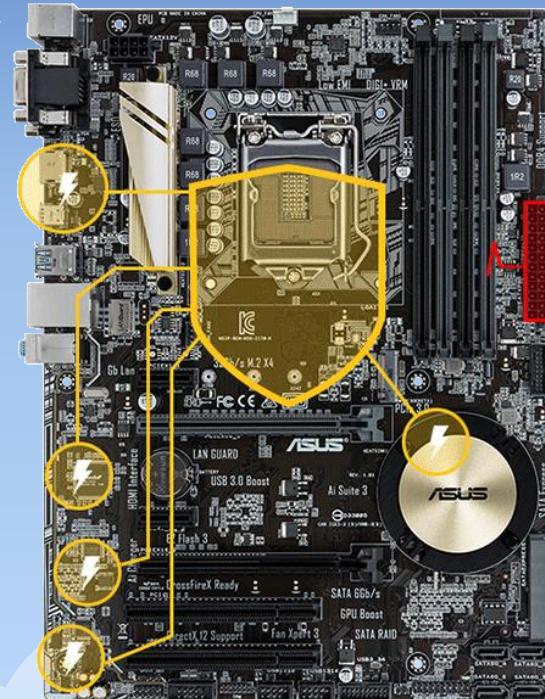
COMPONENTS

Components are those Hardware items which are Hard, Visible & Touchable. The Hard Components of a computer system are placed under a Cabinet. The Components which are usually popular is like – Hard disk Drive, Microprocessor and RAM etc.



COMPONENTS

- Microprocessor
- Hard Disk Drive
- Random Access Memory
- Power Supply
- Motherboard
- DVD Writer
- Graphics Card





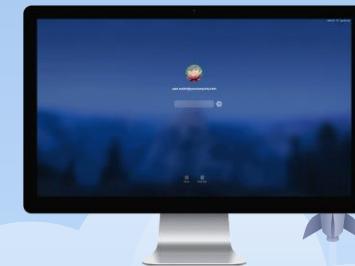
PERIPHERALS

Peripherals are those Hardware items which are Hard, Visible & Touchable. The Hard Components of a computer system which are used by User. The Peripherals which are usually popular is like – Mouse, Keyboard & Monitor etc.



Types of Peripherals Devices

- 1. Input Devices** :- Those Devices Which are used to give input in computer system are known as Input Devices
- 2. Output Devices** :- Those Devices Which are used to take Output as result of our Input in our Computer System are known as Output Devices



INPUT DEVICES

- Keyboard
- Mouse
- Trackball
- Graphics tablet
- Game Controllers
- Touch screen
- Webcam
- Microphone



OUTPUT DEVICES

- Monitor
- Printer
- Audio Speaker
- Headphones
- Projector
- GPS
- Sound Card
- Video Card



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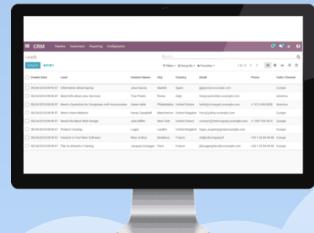


Assembling a Computer

We have two Option to assemble a PC. We also assemble a Computer System with same brand Peripherals and also different different brands Peripherals. And for Components we have many choice.



COMPUTER = PERIPHERALS + COMPONENTS





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Monitor & SmartTV

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What is Monitor?.

A Monitor is an Output Device used to display the output as result.

There are Many Types of Monitors :-

1. CRT – (Cathode Ray Tube)
2. LCD – (Liquid Crystal Display)
3. LED – (Light Emitting Diode)
4. TFT – (Thin Film Transistor)
5. OLED – (Organic Light Emitting Diode)
6. DLP – (Digital Light Processing)
7. Plasma Screen Monitors
8. Touch Screen Monitors



MONITORS

CRT – Cathode Ray Tube

These are the most heaviest and old generation monitors. There is an electron gun inside which emits RGB color electrons using vacuum tube and those electrons strikes in the fluricent or phosphor screen and form image.



LED – Light Emitting Diode

These are the most using monitor type which are designed with sleek and stylish body and low power consumption. It make images by using electrode, glass filter and RGB Led lights.



MONITORS

LCD – Liquid Crystal Display

These are second generation monitors. Which were designed with flat panel and thin body and it forms image by using mirror, glass filter, electrode & liquid.



OLED – Organic Light Emitting Diode

It is a new flat light-emitting display technology, which is more efficient, brighter, thinner, and better refresh rates feature and contrast as compared to the LCD display. It provides better image quality ever and used in tablets and high-end smartphones.



SAMOLED & DAMOLED

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MONITORS

Plasma Screen Monitors

Plasma displays have wide viewing angles, high contrast ratios, and high refresh rates, which is used to reduce a blur video. Additionally, it provides better quality pictures as it supports high resolutions of up to 1920 x 1080.



DLP – Digital Light Processing

which is used for presentations by projecting images from a monitor onto a big screen. Before developing the DLP, most of the computer projection systems produced faded and blurry images as they were based on LCD technology.



MONITORS

TFT – Thin Film Transistor

It is a type of LCD flat panel display, which stands for a thin-film transistor. In TFT monitors, all pixels are controlled with the help of one to four transistors. The high-quality flat-panel LCDs use these transistors.



Touch Screen Monitors

These monitors are also known as an input device. It enables users to interact with the computer by using a finger or stylus instead of using a mouse or keyboard.

Resistive Touch Screen

Surface Wave Touch Screens

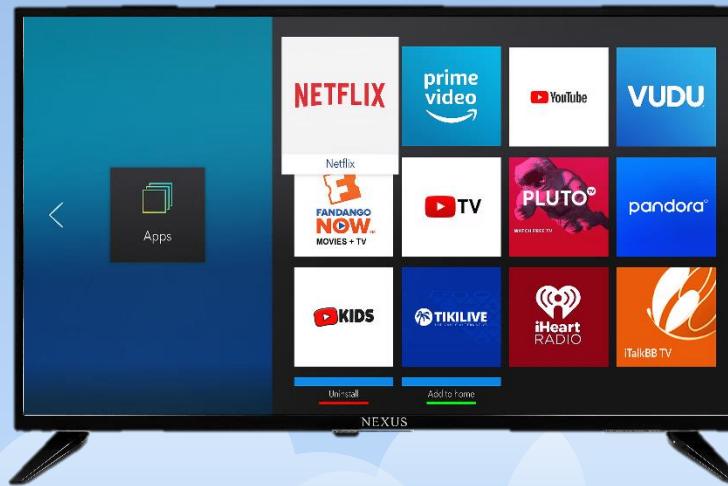
Capacitive Touch Screen



MONITORS

Smart TV

Smart TVs. Also known as an Internet TV, a Smart TV is any TV that can provide additional programs through internet connectivity. It's like having a computer built into your TV.

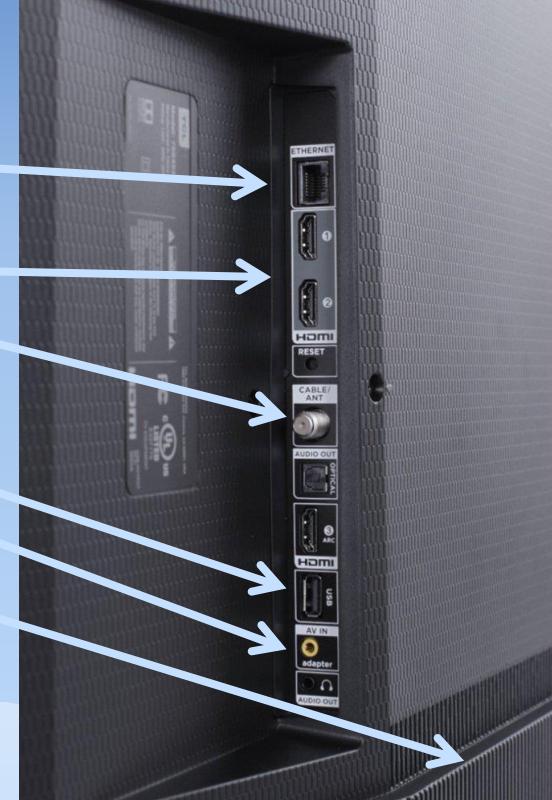


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Types of Ports in Monitors

1. LAN
2. Satellite Antenna
3. USB
4. HDMI
5. Video & Audio Input
6. VGA



Types of Connectors in Monitors

1. VGA – (Video Graphics Array)

15 pins (only Video)



2. DVI – (Digital Video Interface)

24 pins (Video & Audio)



3. HDMI – (High Definition Multimedia Interface)

19 pins (HD Video & Audio)





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5.

Keyboard & Remote



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What is Keyboard?

A Keyboard is a Input Device used to Input in Computer System using some Key Strokes.

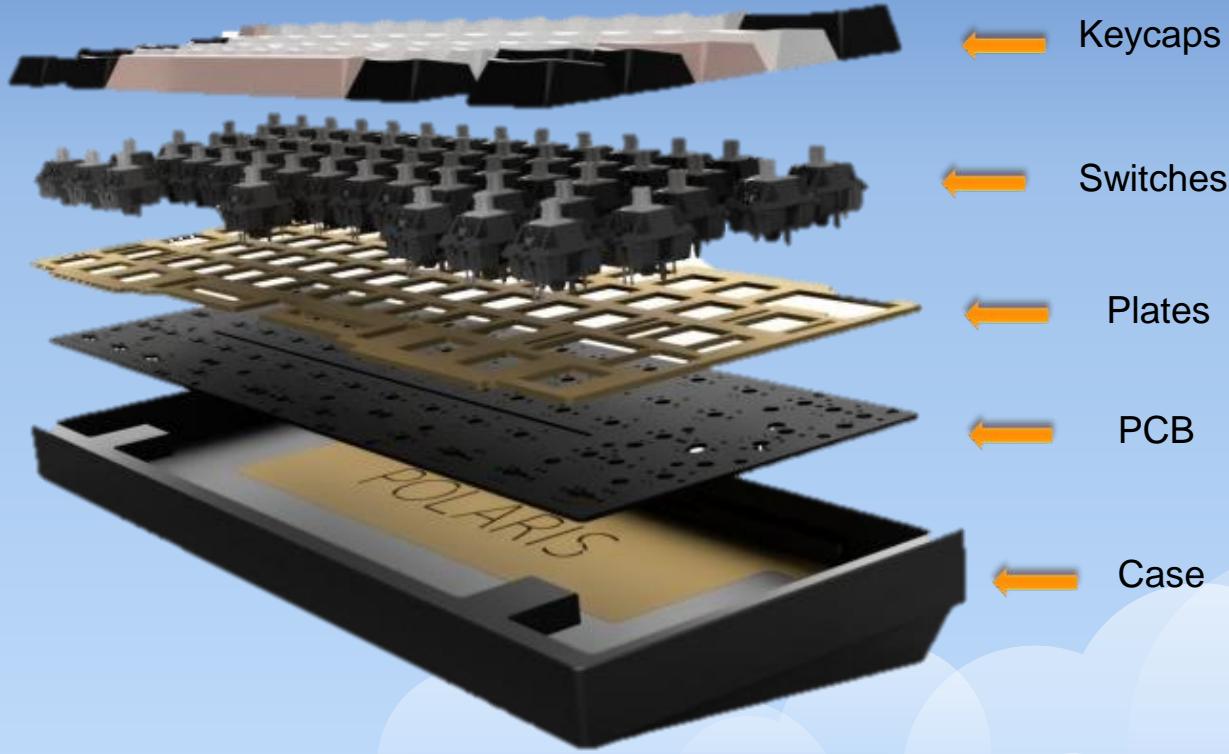
There are 5 Basic Types of Keyboards:-

1. Mechanical Keyboard
2. Gaming Keyboard
3. Standard Keyboard
4. Wireless Keyboard
5. Multimedia Keyboard

Connectors – PS2 & USB



Components of Keyboard





Gaming



Mechanical



Standard



Multimedia

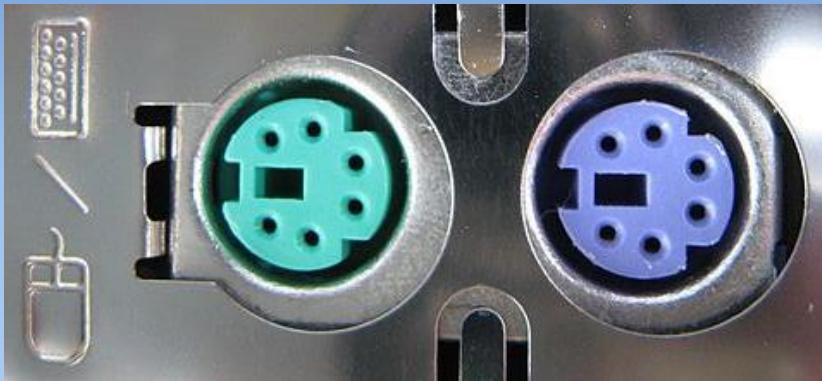


Wireless

1. Mechanical Keyboard
2. Gaming Keyboard
3. Standard Keyboard
4. Wireless Keyboard
5. Multimedia Keyboard



TYPES OF SUPPORTED PORTS?



PS2



USB



What is Remote?

A device used to control the operation of an apparatus or machine, as a television set, from a distance.

TV remote controls work in a similar way but using a type of light called infrared (or IR for short). The remote control has an LED light in it which flashes really quickly to emit a message which is then picked up by the TV. The remote is called the transmitter, and the TV is called the receiver.





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6.

Mouse & Joystick



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What is Mouse?

A Mouse is a Input Device used to Input in Computer System using a Pointer Arrow

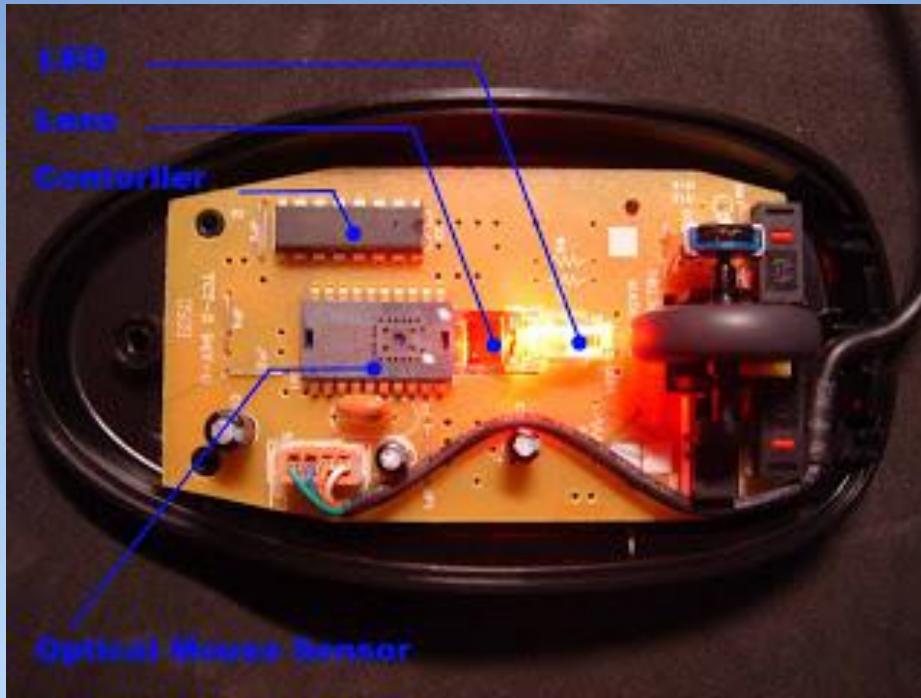
There are 5 Basic Types of Mouse are:-

1. Mechanical Mouse
2. Trackball Mouse
3. Optical mouse
4. Wireless Mouse
5. G-Stick Mouse

Connectors – PS2 & USB



Components of Mouse



LED

Lens

Controller

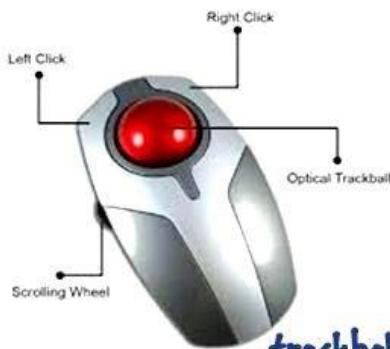
Optical Mouse Sensor

Case





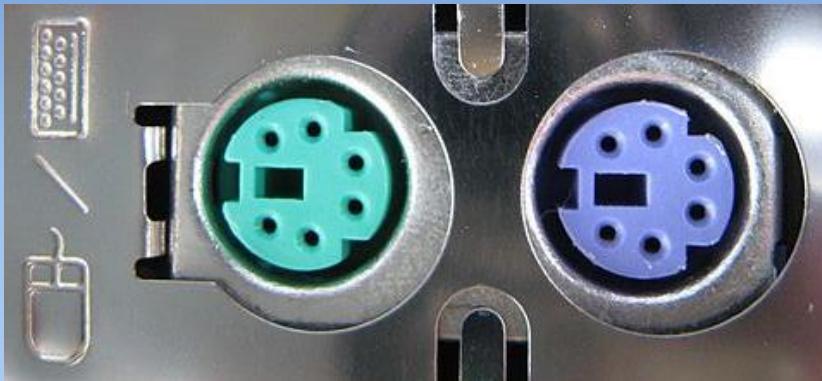
optical



1. Mechanical Mouse
2. Trackball Mouse
3. Optical mouse
4. Wireless Mouse
5. G-Stick Mouse



TYPES OF SUPPORTED PORTS?



PS2



USB



What is Joystick?

A joystick is an input device consisting of a stick that pivots on a base and reports its angle or direction to the device it is controlling.

A pointing device used to move an object on screen in any direction. It employs a vertical rod mounted on a base with one or two buttons. Joysticks are used extensively in video arcade games, and they were the primary game controller on home computers





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7.

Speakers, Headphone & Microphone



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What is Speaker?

A Speaker is a Output Device used to Output Audio in Computer System using a Woofer.

There are 3 Basic Types of Speaker are:-

1. Theatre Based Speakers
2. Integrated Speakers
3. Wireless Speakers

Connectors – Wireless & Audio Jack





Theatre-Based



Integrated



Wireless



TYPES OF SUPPORTED PORTS?



Bluetooth



Audio Jack



What is Headphone?

A Headphone is a Output Device used to Output voice in Computer System using lite Speakers

There are Many Types of Headphone:-

We are Considering a simple Headphone

Connectors – Audio Jack & Wireless





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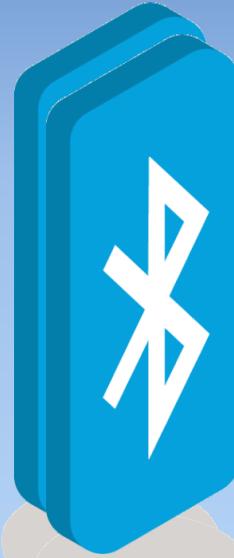


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TYPES OF SUPPORTED PORTS?



Headphone Jack



Bluetooth



What is Microphone?

A Microphone is an Input Device used to Input voice in Computer System using small mic

There are Many Types of Microphone are:-

We are Considering a simple Microphone

Connectors – Audio Jack

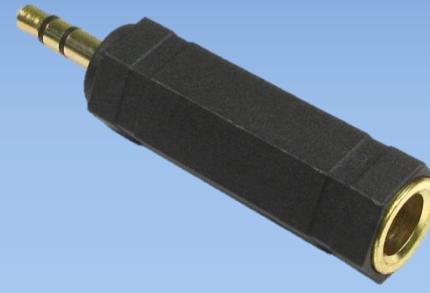




TYPES OF SUPPORTED PORTS?



Audio Mic Jack



XLR Stereo Jack





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8.

Uniteruptable Power Supply (UPS)



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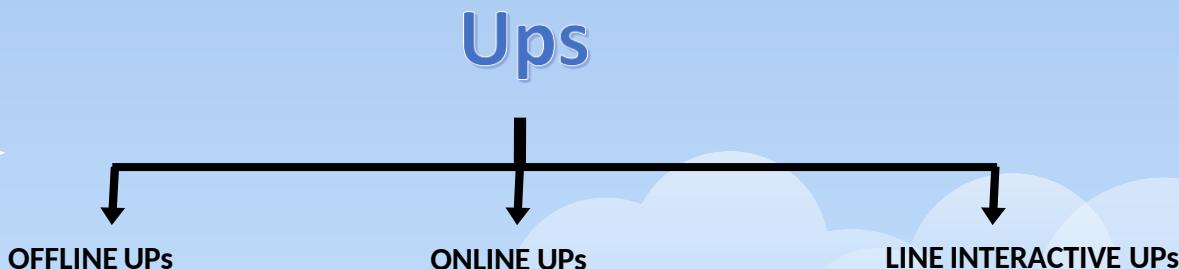
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What is UPS?

Ups(Uninterruptable Power Supply)

A UPS is an Input Device used as Power backup when mains off.

An uninterruptable power supply (Ups) is a device that allows a computer to keep running atleast a short time when primary power source is lost .It also provides protection from power fluctuation . Thus we can say that Ups is a device that helps to provide consistent power to computer system

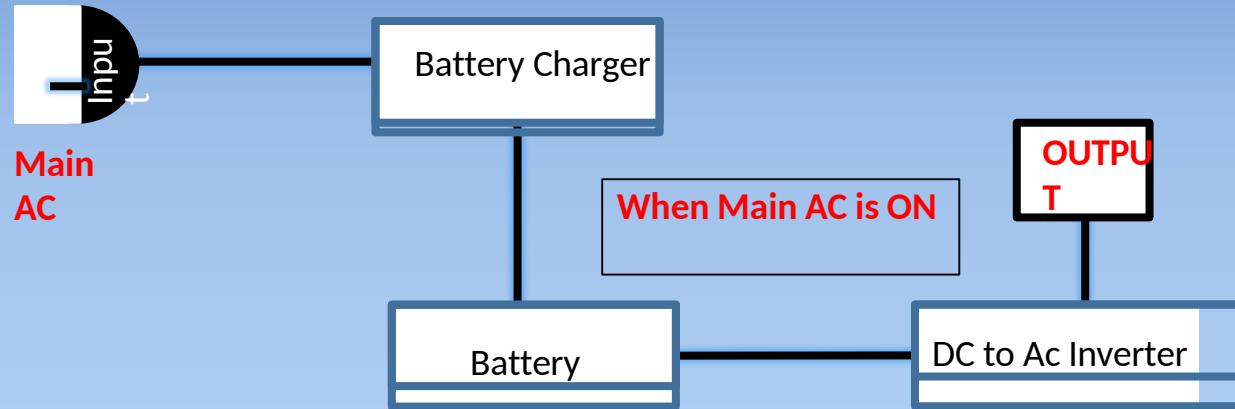


Online UPS

In this type of Ups, the system always remains on the Battery, Weather main is present or not.



Online UPS



(Block Diagram Of Online Ups)

When Main AC is Present, it provides power to DC Supply Of inverter Section as well as charges the battery simultaneously .

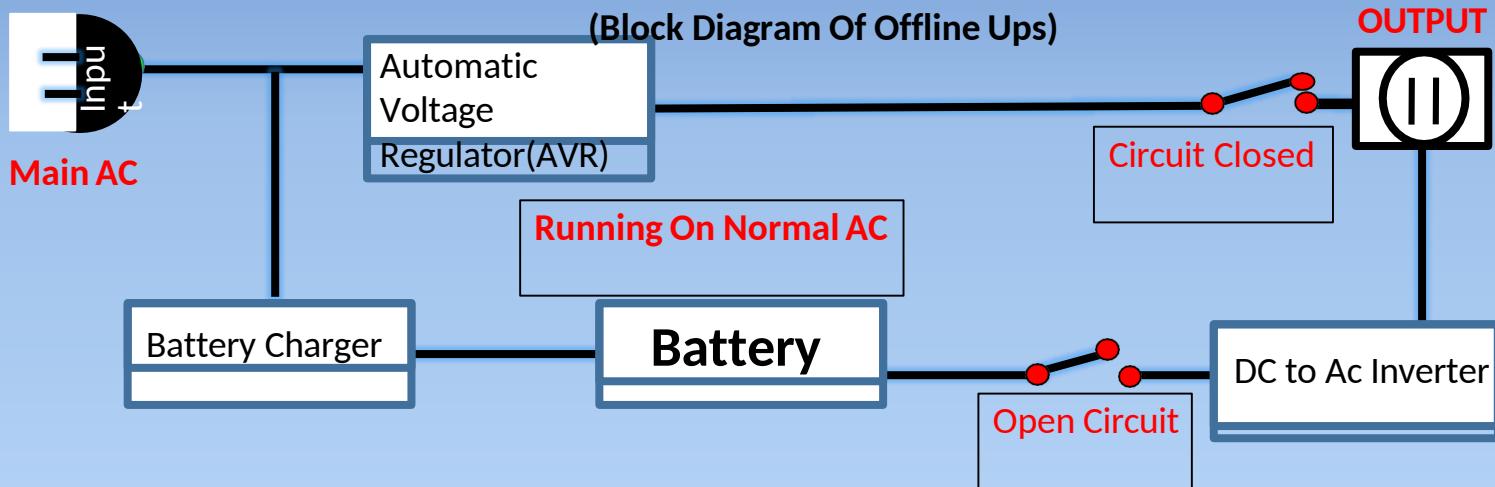


Offline UPS

When Main AC is present ,AVR provides as output as is the Input mains.



Offline UPS



- ❖ Offline Ups use automatic voltage regulator (AVR) to regulate the output voltage close to 220V AC.
- ❖ Offline Ups are normal weight Ups and are widely used for domestic computers.

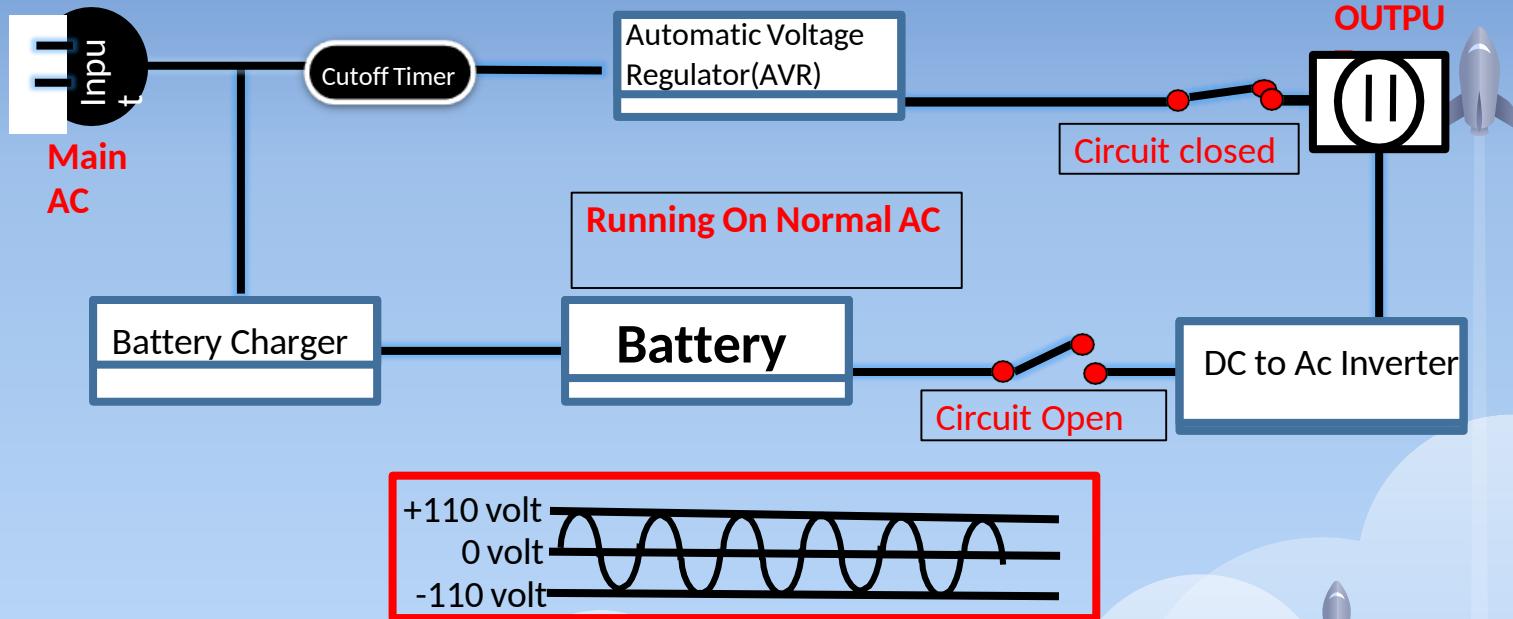


Line Interactive UPS

Line interactive Ups work like online and offline Ups.



Line Interactive UPS



When main Ac flows normal ,it works like offline UPS

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Advantages of UPS

1. Less Interruption
2. No Data loss
3. Enhance Components Health
4. Good for Emergency Time
5. Prevent Crash





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9.

CPU Cabinet with Assembling & Deassembling



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Building a PC

1. Monitor
2. Keyboard
3. Mouse
4. Speaker
5. Cabinet
6. UPS

1. Processor
2. RAM
3. Storage
4. Motherboard
5. Cabinet Tower
6. GPU



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10.

Motherboard



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MOTHERBOARD OR PRINTED CIRCUIT BOARD



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WHAT IS MOTHERBOARD

- 1 It is known as the Interconnection of Components in a computer
- 2 It is a Circuit board which have ports and sockets with transistors coating to connect components together
- 3 It is responsible for contact of flow of data and instruction with the help of BUSES
- 4 Two types of Motherboard
 - 1. Plane
 - 2. Mark





MAJOR BRANDS

DESKTOP MBOARD

1.

It is used in Desktop Systems. It comes with Upgradation Capability. We can Upgrade it Easily

LAPTOP MBOARD

2.

It is used in Laptop. All components are placed in limited space. Rare mboard allows Upgradation

SERVER MBOARD

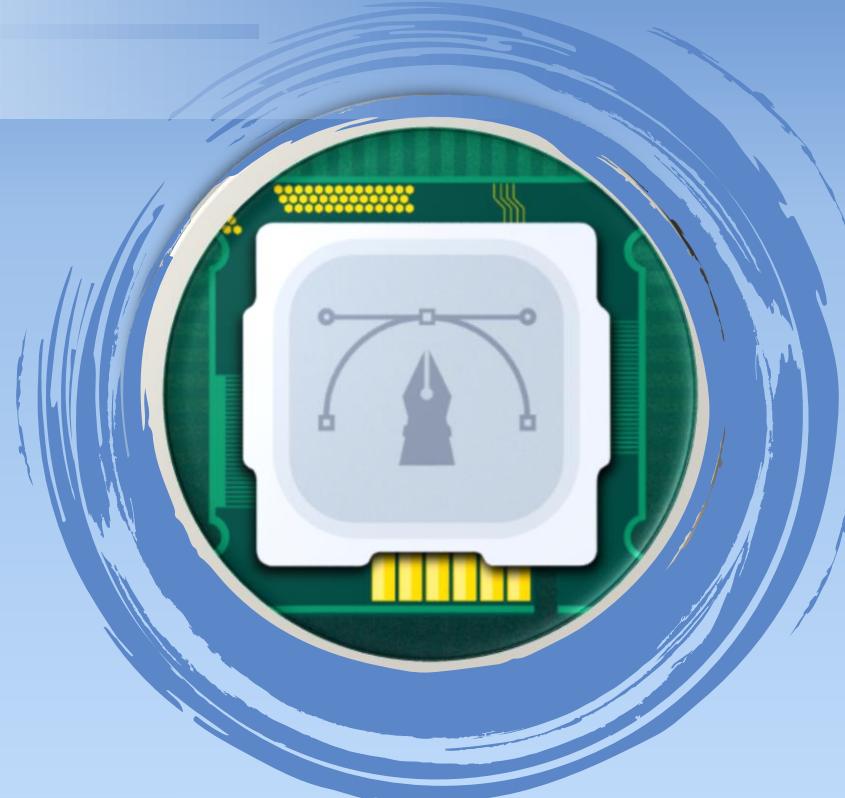
3.

It is used in Server. Bigger in size having many ports and designed for high end works



TYPES OF PCB

1. Mini ATX
2. Flex ATX
3. Micro ATX
4. EATX
5. Pico ATX
6. ITX
7. NLX
8. BTX
9. Mobile ATX
10. WATX



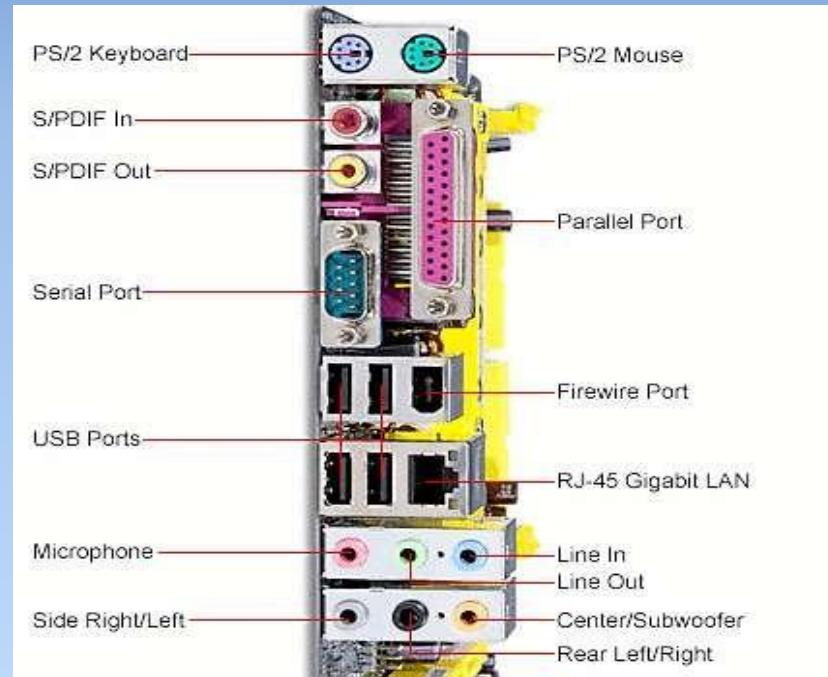
BUSES in Motherboard



- ❖ **DATA BUS** :- It Sends and Receives data to Memory.
- ❖ **ADDRESS BUS** :- It Sends Address of Inputs to the Memory or RAM
- ❖ **CONTROL BUS** :- It Makes the Communication between CPU and Components



BACK PANEL CONNECTORS AND PORTS





1. CPU Socket
2. RAM Slots
3. PCI Slots
4. CMOS
5. ATX Power
6. SATA Slots
7. AGP Slots
8. Chipset
9. North Bridge
10. South Bridge
11. Sandy Bridge



MICROPROCESSOR

A microprocessor is a computer processor where the data processing logic and control is included on a single integrated circuit, or a small number of integrated circuits. The microprocessor contains the arithmetic, logic, and control circuitry required to perform the functions of a computer's central processing unit.



SMPS – Switched Mode Power Supply

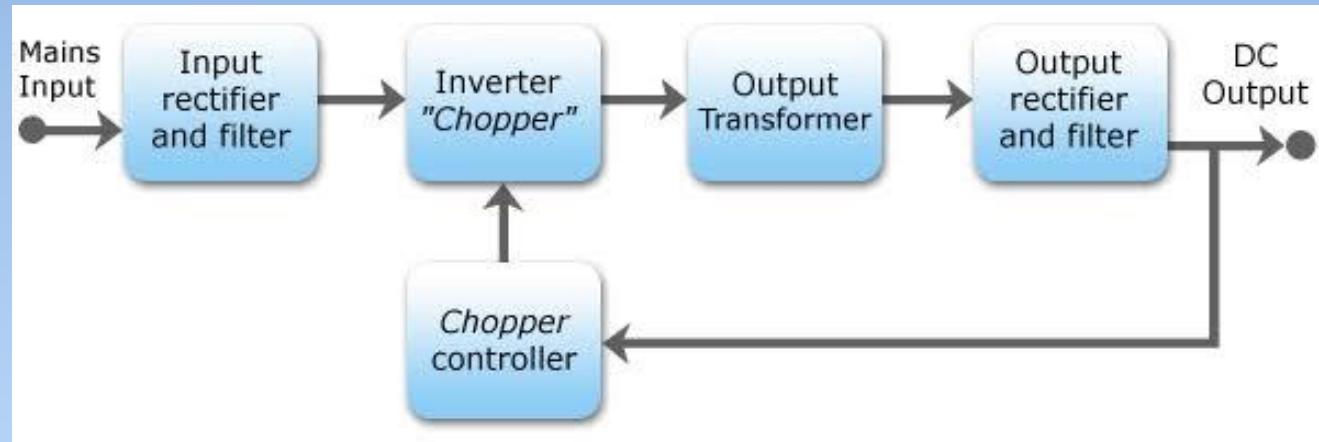


WHAT IS SWITCHED MODE POWER SUPPLY (SMPS)?

A SMPS IS A DEVICE USED TO INPUT POWER TO ALL COMPONENTS OF MOTHERBOARD IT CONTAINS DIFFERENT COLORS WIRES HAVING DIFFERENT VOLTAGE FOR DIFFERENT COMPONENTS IN CPU CABINET



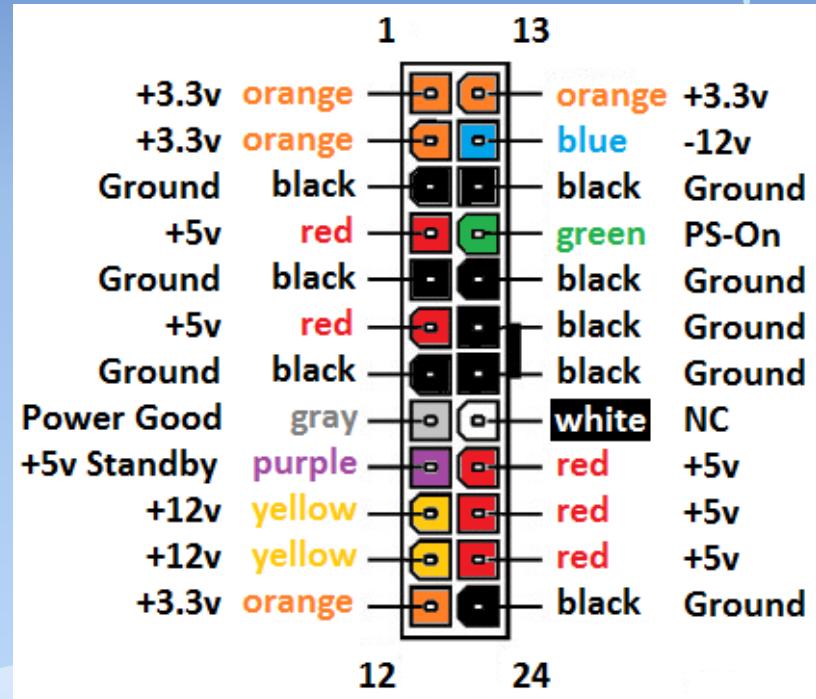
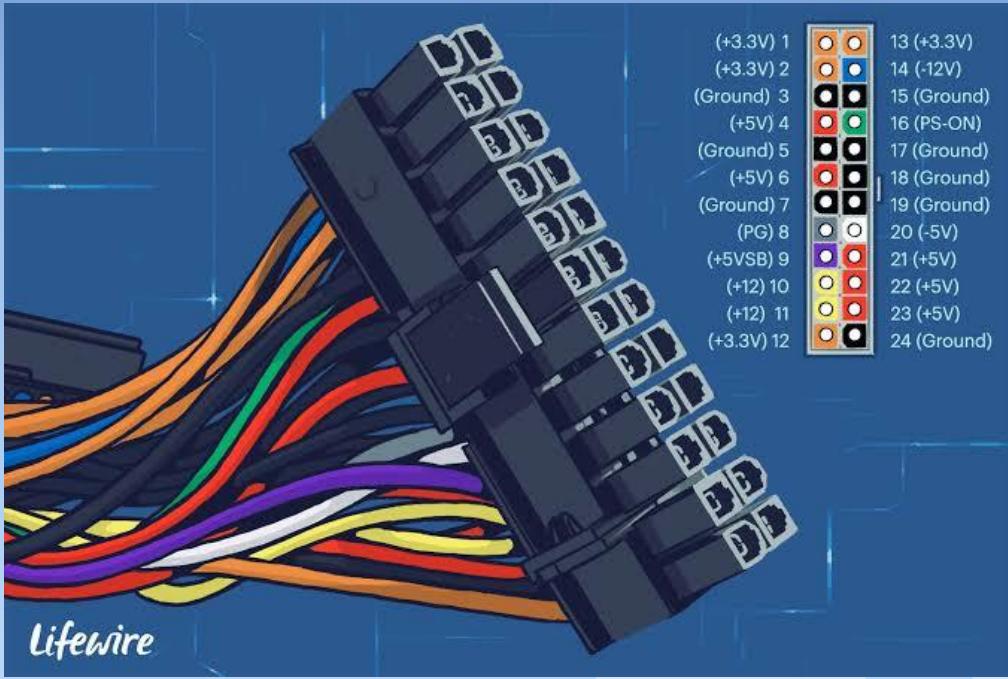
HOW SMPS WORKS



SMPS

1. Rectifier & Filter - It is responsible to converting AC to DC Current and Filter Filterize the Impurities in Current
2. Inverter - It emphasize the wire bunch of diffent components
3. Transformer - It Transfer the Power to different different Components
4. Rectifer - It pass the balanced current to the components





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Connectors

1. 4 PIN PCB Power
2. 20/24 PIN ATX
3. 15 PIN SATA Power
4. 6 PIN Floppy Power
5. 6/8 PIN PCI Power
6. 4 PIN MOLEX



CMOS BATTERY

- CMOS Battery is used to update Date & Time while the system is off
- Stands for Complementary Metal Oxide Semi Conductor
- Having Connection with RTC and Jumper Settings to RESET BIOS





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11.

Audio, Video & Graphic Card



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What is AUDIO CARD?

A sound card is an internal expansion card that provides input and output of audio signals to and from a computer under control of computer programs. The term sound card is also applied to external audio interfaces used for professional audio applications.



Outputs:

1. Audio Jacks



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Why Audio Card is Important?



What is VIDEO CARD?

A video card (also called a video adapter, display card, graphics card, graphics board, display adapter or graphics adapter and sometimes preceded by the word discrete or dedicated to emphasize the distinction between this implementation and integrated graphics) is an expansion card which generates a feed of output images to a display (such as a computer monitor).



Outputs:

1. VGA





Why Video Card is Important?

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GRAPHIC CARD



Graphics card or video card is display adaptor or hardware component whose function is to generate output images to display.

It is also called as dedicated expansion card. It is of 2 types :

1. Internal
2. External



Outputs:

1. DVI
2. VGA
3. HDMI





Why Graphic Card is Important?

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12.

Bluetooth & Wi-Fi



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Wi-Fi

□ What is Wi-Fi

- Short for “WirelessFidelity”
- A trademark of the Wi-Fi Alliance
- The brand name for products using the IEEE 802.11 family of standards
- Commonly used for “wireless local area network”(WLAN)



Wi-fi Standards

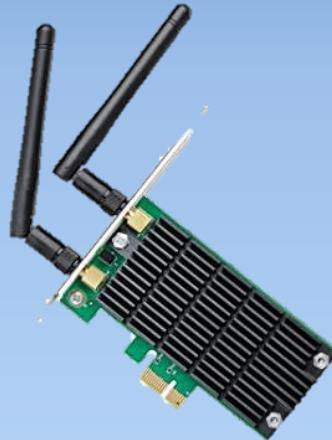


IEEE Standard	802.11a	802.11b	802.11g	802.11n	802.11ac	802.11ax
Year Released	1999	1999	2003	2009	2014	2019
Frequency	5Ghz	2.4GHz	2.4GHz	2.4Ghz & 5GHz	2.4Ghz & 5GHz	2.4Ghz & 5GHz
Maximum Data Rate	54Mbps	11Mbps	54Mbps	600Mbps	1.3Gbps	10-12Gbps



Wi-Fi CARD

- Internal
- External



Internal



External



Bluetooth

- Wireless Personal Area Networks (WPAN)
- Design goal
 - Cable replacement
 - Low cost
 - Low power
 - Small size
 - For mobile devices
- Standard: IEEE 802.15.1



Bluetooth Evolution

Year Introduced	Bluetooth Version	Feature
2004	2.0	Enhanced Data Rate
2007	2.1	Secure Simple Pairing
2009	3.0	High Speed with 802.11 Wi-Fi Radio
2010	4.0	Low-energy protocol
2013	4.1	Indirect IoT device connection
2014	4.2	IPv6 protocol for direct internet connection
2016	5.0	4x range, 2x speed, 8x message capacity + IoT



Bluetooth CARD

- Internal
- External



Internal



External





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13.

Hard Drive



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HDD

A **hard disk drive (HDD)** is a traditional storage device that uses mechanical platters and a moving read/write head to access data.

Unit of HDD is RPM.

- **SATA (Serial Advanced Technology Attachment) – 7 pins for data 15 pins power 4 pins molex speed upto 600MBPS**

SATA 1 - 150 MBPS

SATA 2 - 300 MBPS

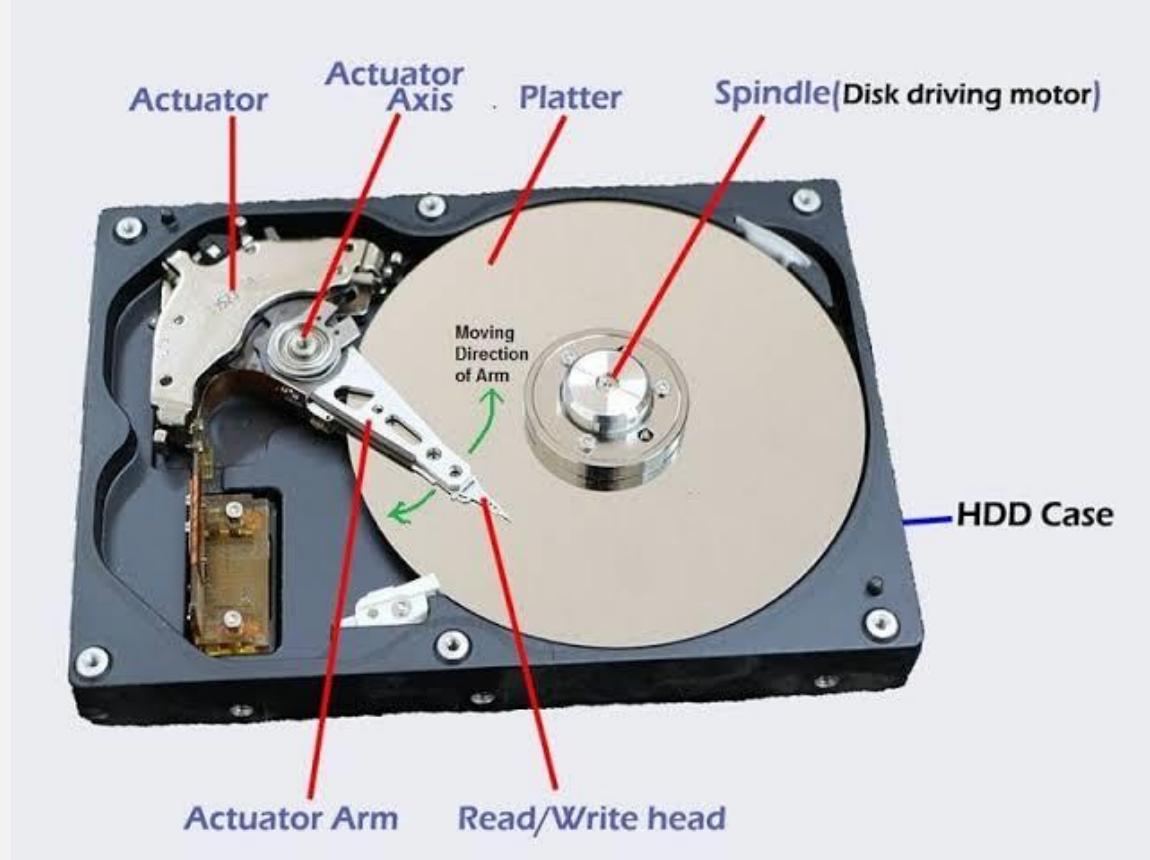
SATA 3 - 600 MBPS

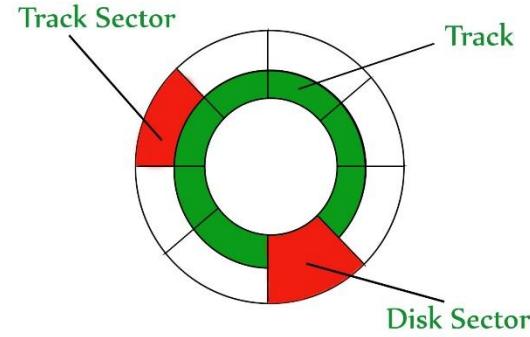
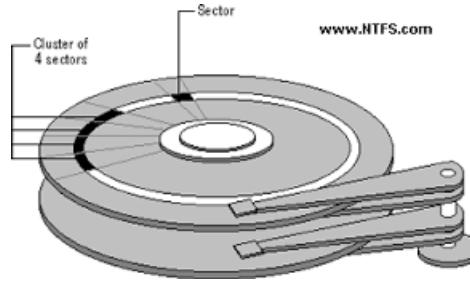
- **IDE (Integrated Drive Electronics) - 40 pins for data 4 pins for Power 4 pins molex speed upto 133MBPS**

ATAPI – I - 100MBPS

ATAPI – II - 133MBPS









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14.

Solid State Drive



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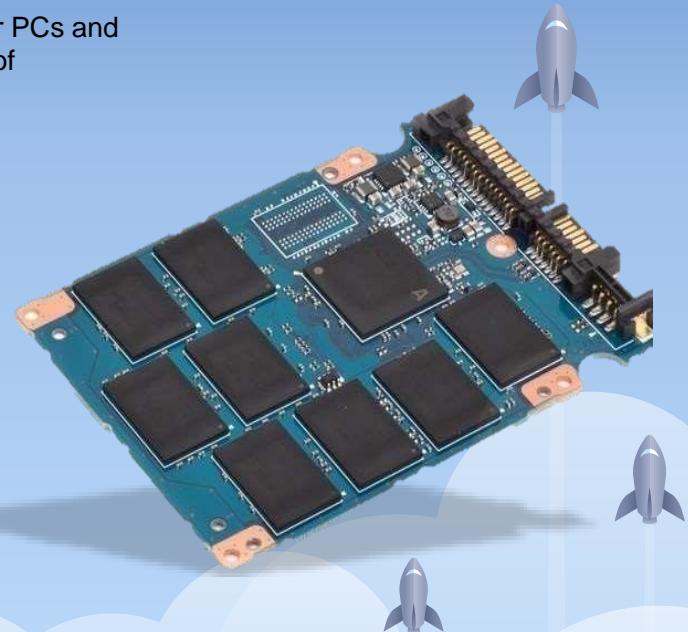
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SSD

Solid State Drive, is one of the newest generation of storage device that's used for PCs and Laptops. In contrast to traditional Hard Disk Drives or HDD, a memory consisting of semiconductors is used to store data.

- **High performance-Significantly faster than a standard HDD.**
- **Faster seek time-Up to 60x faster than HDD.**
- **Higher reliability-No moving parts.**
- **Lower power-Lesser power consumption, cooler operation.**
- **Silent Operation-Ideal for post production environments.**
- **Light weight-Perfect for portable devices.**
- **Wider Operating Temp.**





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15.

Random Access Memory



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Memory ?

In computing, memory is a device or system that is used to store information for immediate use in a computer or related computer hardware and digital electronic devices.

In the term of computing we measure memory with bits.



What is Bit ?

- First we know about what is bit.
- Computer circuit need power of electricity.
- Electricity power mode On and Off
- The on and Off is Bit in electricity.
- Because the computer are store the data in form off electricity.
- In Electricity also called bit.
- Only two value in bit 0 and 1 mean on and off.



Units of Computer Memory Measurement

Cell, Nibble, Crum

@techetarian

1 Bit = Binary Digit

8 Bits = 1 bytes

1024 Bytes = 1 Kilobytes

1024 Kilobytes = 1 Megabytes

1024 Megabytes = 1 Gigabytes

1024 Gigabytes = 1 Terabytes

1024 Terabytes = 1 Petabytes

1024 Petabytes = 1 Exabytes

1024 Exabytes = 1 Zettabytes

1024 Zettabytes = 1 Yottabytes

1024 Yottabytes = 1 Brontobytes

1024 Brontobytes = 1 Geopbytes

1024 Geopbyte=1 Saganbytes

1024 Saganbyte=1 Pijabytes

Alphabyte = 1024 Pijabytes

Kryatbyte = 1024 Alphabytes

Amosbyte = 1024 Kryatbytes

Pectrolbyte = 1024 Amosbytes

Bolgerbyte = 1024 Pectrolbytes

Sambobyte = 1024 Bolgerbytes

Quesabyte = 1024 Sambobyes

Kinsabyte = 1024 Quesabytes

Rutherbyte = 1024 Kinsabytes

Dubnibyte = 1024 Rutherbytes

Seaborgbyte = 1024 Dubnibyes

Bohrbyte = 1024 Seaborgbytes

Hassiubyte = 1024 Bohrbytes

Meitnerbyte = 1024 Hassiubyes

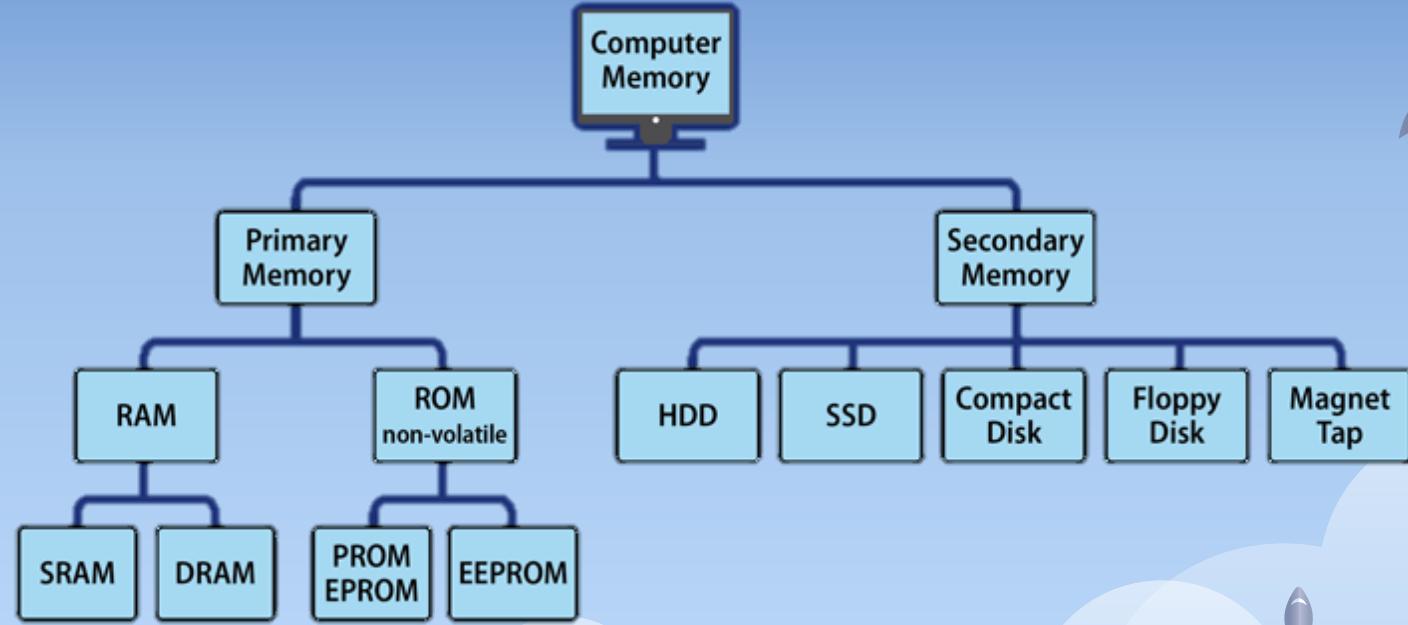
Darmstadbyte = 1024 Meitnerbytes

Roentbyte = 1024 Darmstadbytes

Coperbyte = 1024 Roentbytes

Note:- Still Some Left and Some to be made





RAM

Computer memory or **random access memory (RAM)** is your system's short-term data storage; it stores the information your computer is actively using so that it can be accessed quickly. The more programs your system is running, the more memory you'll need. Frequency measures in Mhz.



Computergeek.com



SRAM

It stores the data in a static form which means that the data remains in the memory as long as the computer system is on. SRAM is faster and more expensive than DRAM. It uses a matrix of six transistors and no capacitors. As the transistors do not need the power to prevent leakage, hence, there is no requirement to refresh SRAM again and again.



DRAM

DRAM is widely used in computer systems. Previously, there was a single data rate (SDR) DRAM in computers. At present, computers are using a dual data rate (DDR) DRAM. DDR is also available in different versions such as DDR2, DDR3, and DDR4, which are more energy-efficient and are providing better performance.



SIMM
DIMM
RDRAM
SDRAM
DDR
DDR2
DDR3
DDR4

Note, as well as the different number of pins, the different spacing of the slots in the connector-edge



30 pin SIMM



72 pin SIMM



MicroDIMM
(rare)



184 pin Rambus RDRAM RIMM



100 pin DIMM
printer RAM



72 pin SODIMM
(rare)



144 pin SDRAM
SODIMM



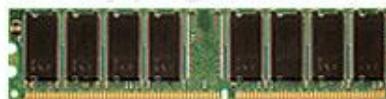
200 pin DDR
SODIMM



200 pin DDR-2
SODIMM



168 pin SDRAM DIMM



184 pin DDR DIMM



240 pin DDR-2 DIMM



DDR2 FB-DIMM
flat heatsink



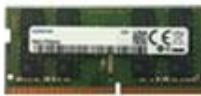
204 pin DDR-3 SODIMM



240 pin DDR-3 DIMM



DDR-2 FB-DIMM
with large Apple MacPro heatsink



260 pin DDR-4 SODIMM



288 pin DDR-4 DIMM
note curved edge on pins

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16.

Read Only Memory



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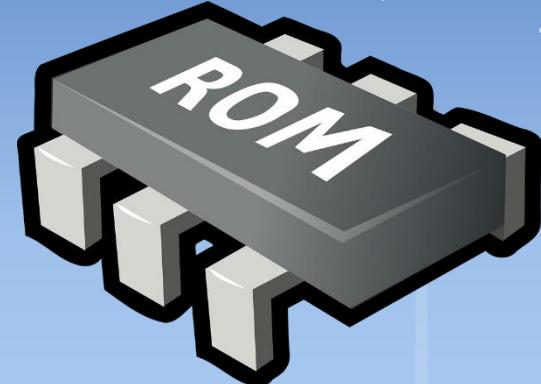
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ROM

Stores crucial information essential to operate the system like the program essential to boot the computer. It is not volatile.

Used in embedded systems or where the programming needs no change.
Used in calculators and peripheral devices.

ROM is further classified into 4 types- *ROM*, *PROM*, *EPROM*, and *EEPROM*.



PROM

It can be programmed by user. Once programmed, the data and instructions in it cannot be changed.



EPROM

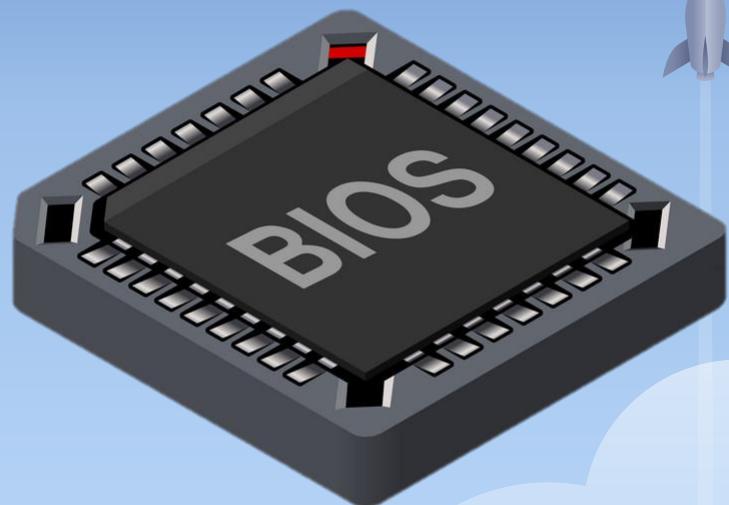
It can be reprogrammed. To erase data from it, expose it to ultra violet light. To reprogram it, erase all the previous data.

EEPROM

The data can be erased by applying electric field, no need of ultra violet light. We can erase only portions of the chip.



BISO Chip is Type of EPROM ?





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17.

Microprocessor

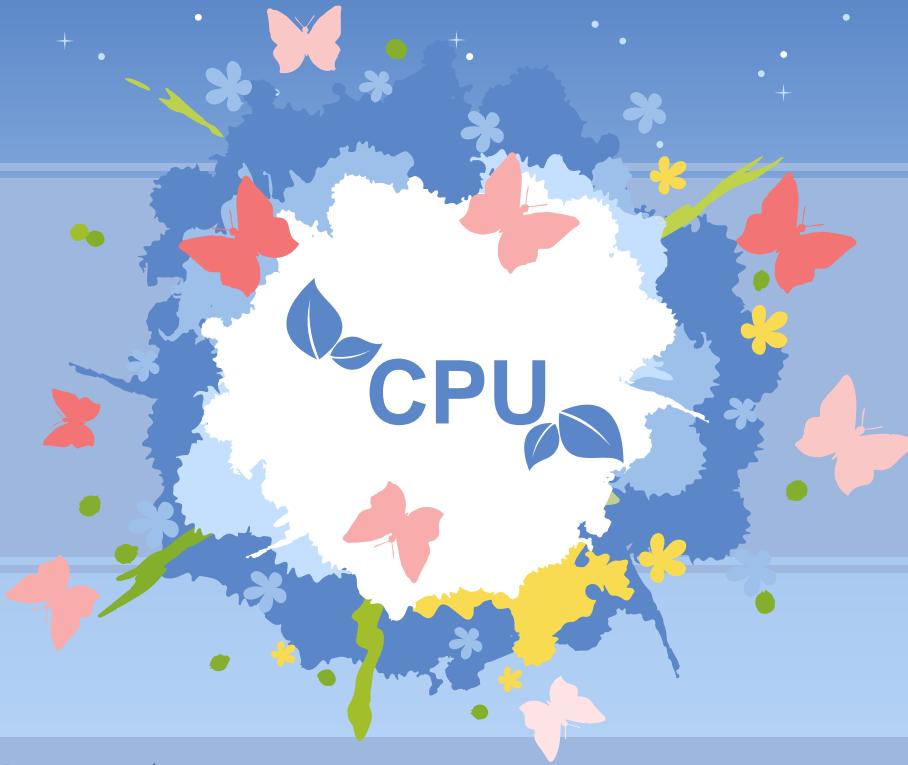


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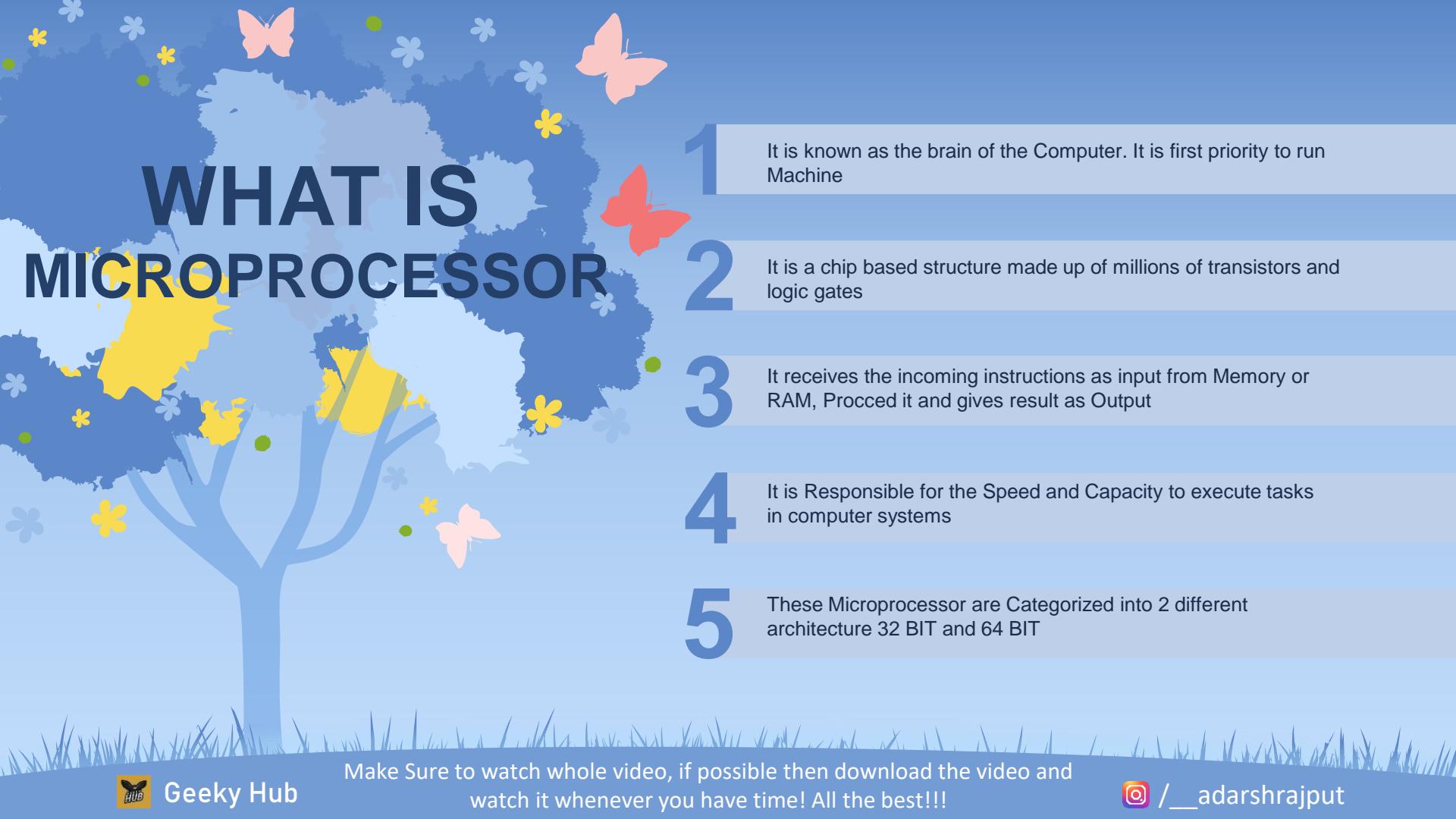


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Control Processing Unit





WHAT IS MICROPROCESSOR

- 1 It is known as the brain of the Computer. It is first priority to run Machine
- 2 It is a chip based structure made up of millions of transistors and logic gates
- 3 It receives the incoming instructions as input from Memory or RAM, Procced it and gives result as Output
- 4 It is Responsible for the Speed and Capacity to execute tasks in computer systems
- 5 These Microprocessor are Categorized into 2 different architecture 32 BIT and 64 BIT



SEGMENTS OF CPU

CATEGORIZED INTO 2 DIFFERENT SEGMENTS

ARITHMETIC LOGICAL UNIT

Known as ALU

It performs all the Arithmetic, mathematical, algebraical and logical tasks like Addition, Divide, Multiplication, Subtraction and Modulus. It also performs Logic tasks like OR, AND and NOT



CONTROL UNIT

Known as CU

It is responsible for controlling the flow of data between Microprocessor and the external components of the computer using the CPU Buses.

THESE ARE THE FACTORS WHICH MAKES A PROCESSOR TO PERFORM TASKS FREQUENTLY!



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BUSES in MICROPROCESSOR

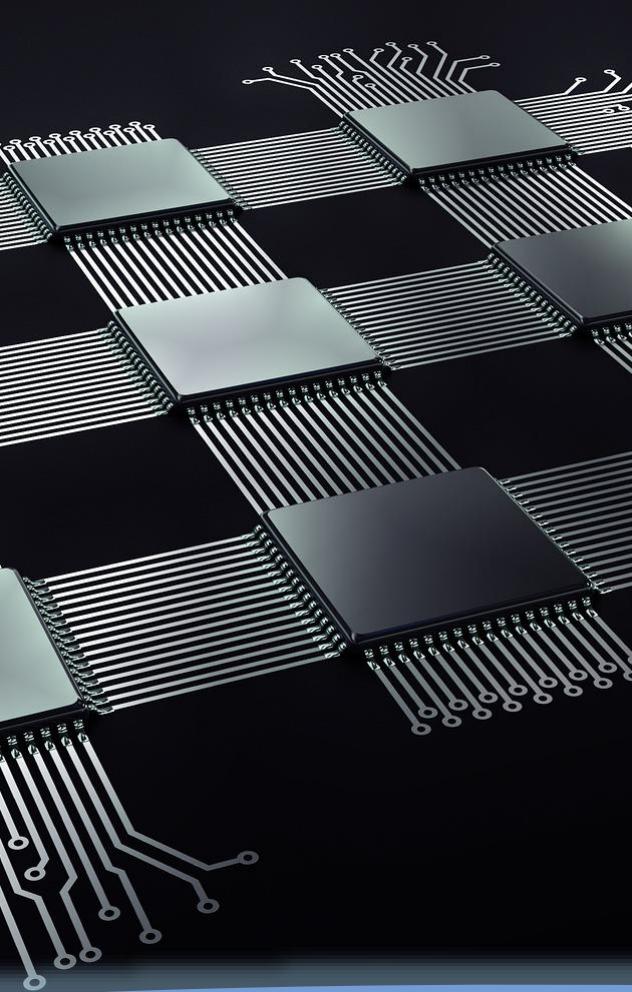


CPU consists 3 Buses mention below. Basically Buses are used as medium or carrier of information or data between the microprocessor and the memory and components of the system. It carries the instruction from memory to CPU & back CPU to memory after processing....

- ❖ **DATA BUS** :- It Sends and Receives data to Memory.
- ❖ **ADDRESS BUS** :- It Sends Address of Inputs to the Memory or RAM
- ❖ **CONTROL BUS** :- It Makes the Communication between CPU and Components



Specifications of CPU



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MAJOR SPECIFICATION OF MICROPROCESSOR

- ◆ **Clock Speed** :- Clock Speed is a unit to measures the number of instructions executes by the working microprocessor within a second is called Clock speed. It is measured in GHz.
- ◆ **Cache Memory** :- It is Static natured and Quick responsive memory, by structural it is made up of 6 Transistors and 1 Capacitors in each cell block. cache Memory are categorized into 3 types L1, L2 and L3
- ◆ **Operating Voltage** :- It means how much Power or Voltage a microprocessor needs to performs tasks.
- ◆ **FSB** :- It stands for Front Side Bus. It is a data bus which carries the data from RAM to Processor and then back processor to RAM as a procced instruction.

All the Information mentioned upon the Processor

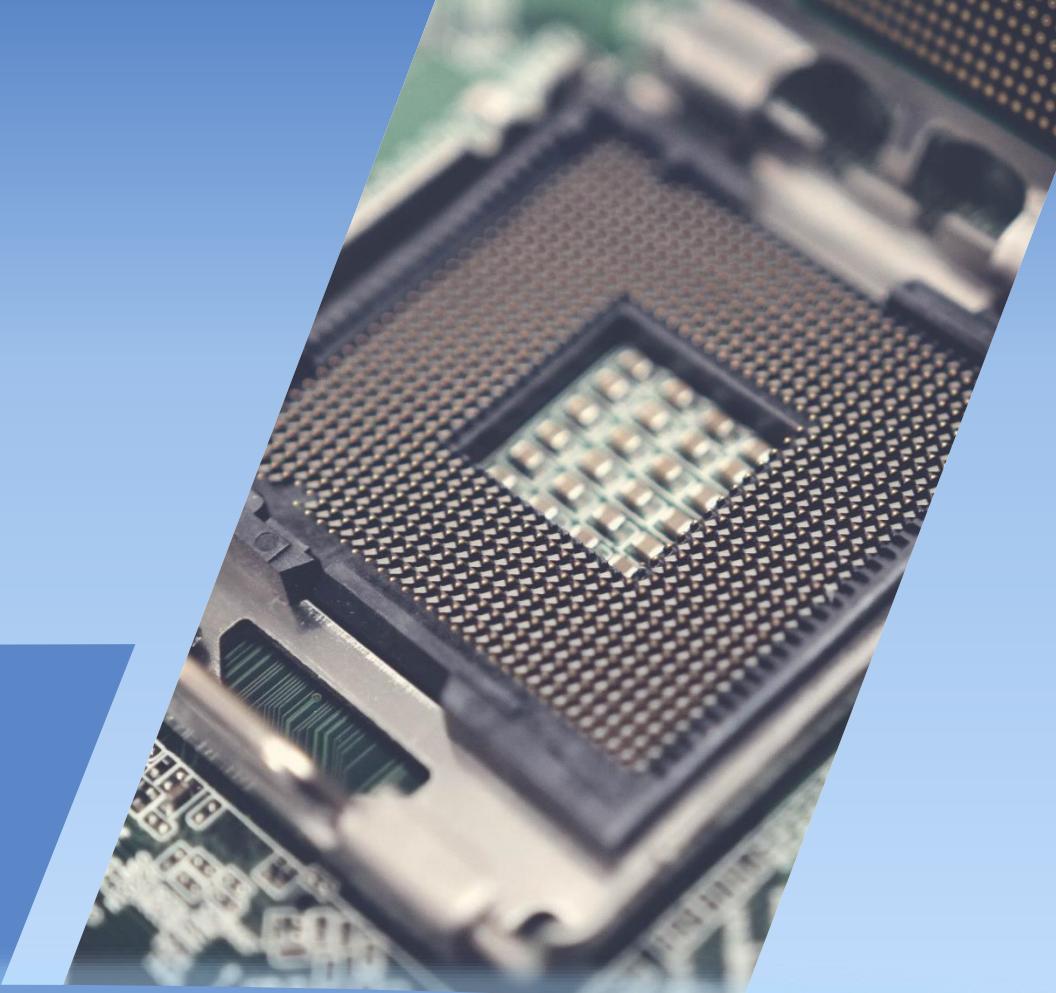


PACKAGING???

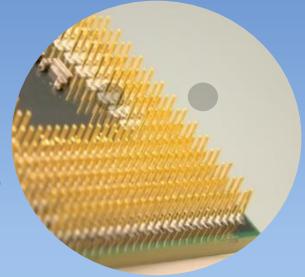
The process of installing the microprocessor in motherboard is known as packaging. In Motherboard there are different different types of packaging for different different types of micro processor.....

Packaging is based upon which micro processor you want to install in your system. The processor is install and fix with the Socket in Motherboard....

CPU Installation



SOCKETS FOR CPU



- ❖ According to Structure Sockets are a collection or a Array of Pins which holds Microprocessor.
- ❖ Sockets are used to adjust the position of Microprocessor in the Motherboard. These are Categorized according to the Brands and Version of Microprocessors...
- ❖ For Latest Intel 10th Generation Core i9 Processor Supports LGA 2066 Socket.

INTEL	No. of pins	Processor
LGA	1151 to 1155	I3, i5 & i7
PGA	478	Pentium I
PPGA	775	Pentium II
FC-PGA	479	Pentium III

AMD	No. of pins	Processor
C Series	Socket C32	Opteron
AM Series	AM 1 to 4	Ryzen 3, 5, 7, Phenom, Athlon & Sempron
A Series	Socket A462	Duron & Athlon
FM Series	FM 1 to 2	Trinity & Llano



HEAT SINK SOLUTION FOR OVERHEATING

When we use system it release a lots of heat. To prevent and Release heat we install Heatsink in our Motherboard.

Types of Heatsinks :-

Active Heatsink :- Heatsink which have Fan Installed is known as Active Heatsink

Passive Heatsink :- Heatsink which have Fan Installed is known as Passive Heatsink

Heatsink is attached with Microprocessor with the contact of **Thermal Paste** or **Grease** Which extremely absorb heat from microprocessor.





1. Generation
2. Core
3. Threads
4. Frequency
5. L1, L2 & L3 Cache
6. Hyper threading
7. Overclocking
8. Turbo Boost
9. Integrated GPU
10. Transistor Size
11. Bottleneck





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18.

Switched Mode Power Supply (SMPS)



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SMPS – Switched Mode Power Supply

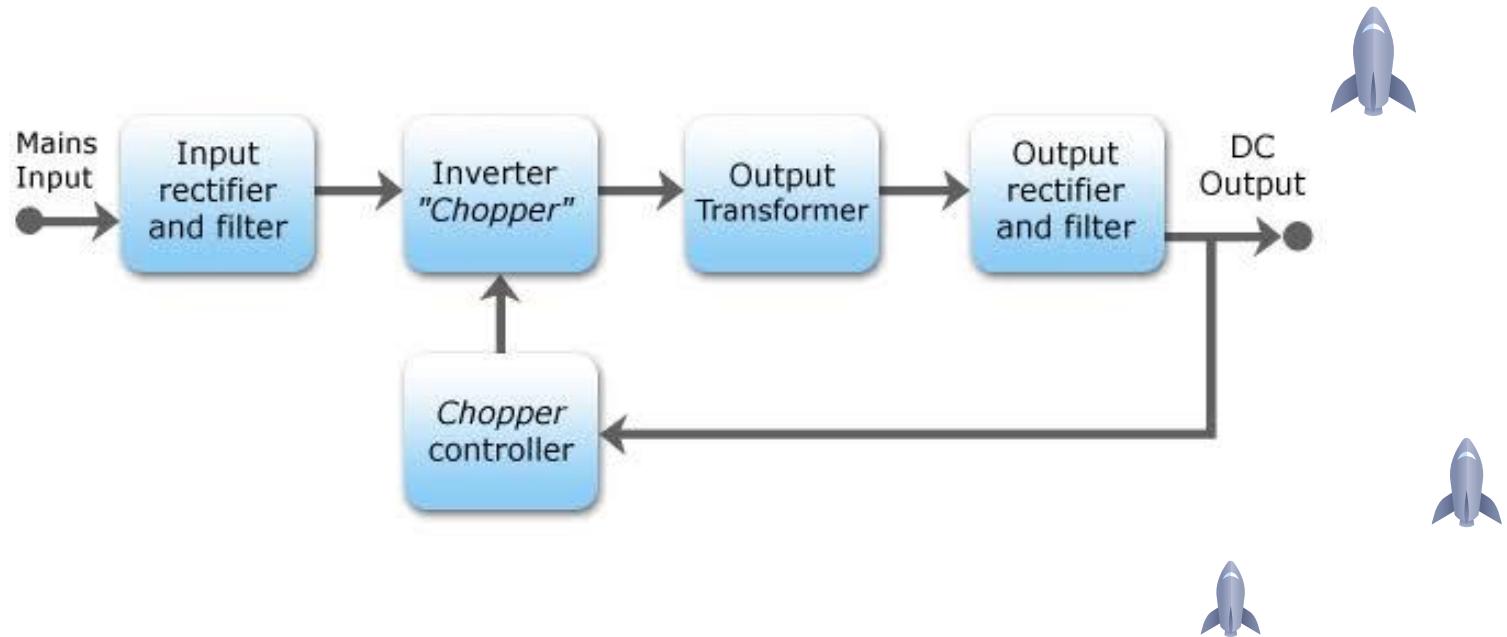


WHAT IS SWITCHED MODE POWER SUPPLY (SMPS)?

A **SMPS** IS A DEVICE USED TO INPUT POWER TO ALL COMPONENTS OF MOTHERBOARD IT CONTAINS DIFFERENT COLORS WIRES HAVING DIFFERENT VOLTAGE FOR DIFFERENT COMPONENTS IN CPU CABINET



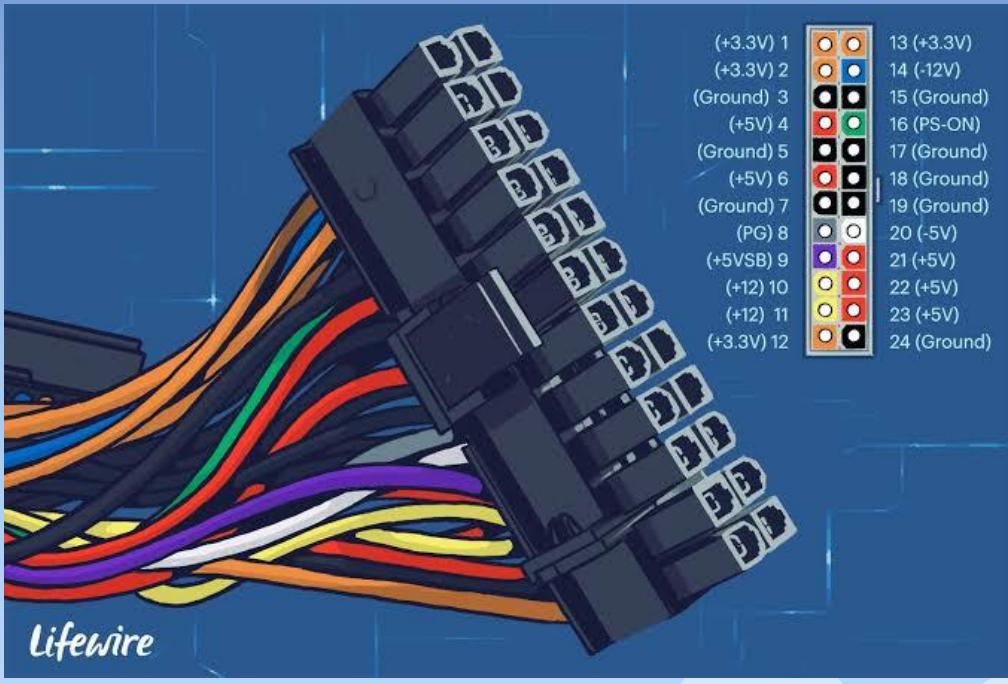
HOW SMPS WORKS



Key Factors

1. **Rectifier & Filter** - It is responsible to converting AC to DC Current and Filterize the Impurities in Current
2. **Inverter** - It emphasize the wire bunch of diffent components
3. **Transformer** - It Transfer the Power to different different Components
4. **Rectifer** - It pass the balanced current to the components





	1	13		
+3.3v	orange	orange	+3.3v	
+3.3v	orange	blue	-12v	
Ground	black	black	Ground	
+5v	red	red	green	PS-On
Ground	black	black	black	Ground
+5v	red	black	black	Ground
Ground	black	black	black	Ground
Power Good	gray	white	NC	
+5v Standby	purple	red	+5v	
+12v	yellow	red	+5v	
+12v	yellow	red	+5v	
+3.3v	orange	black	Ground	
	12	24		

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Connectors

1. 4 PIN PCB Power
2. 20/24 PIN ATX
3. 15 PIN SATA Power
4. 6 PIN Floppy Power
5. 6/8 PIN PCI Power
6. 4 PIN MOLEX





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19.

Printer



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What is Printer?

A Printer is an Output Device which converts the Soft copy into Hard copy. It converts Digital copy into Physical Copy.

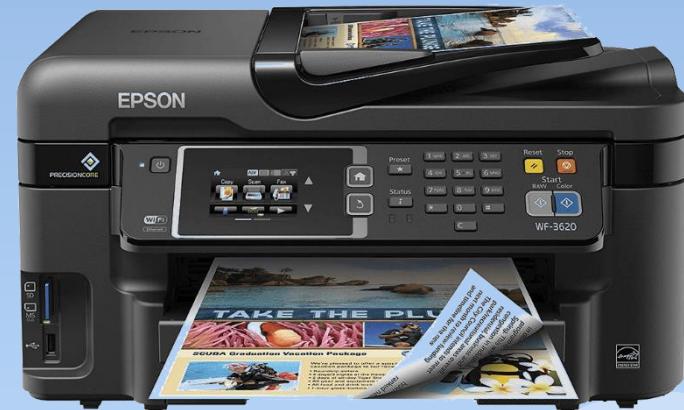
There are 2 Basic Types of Printer are:-

1. Impact Printers

- Line Printer
- Character Printer

2. Non-Impact Printer

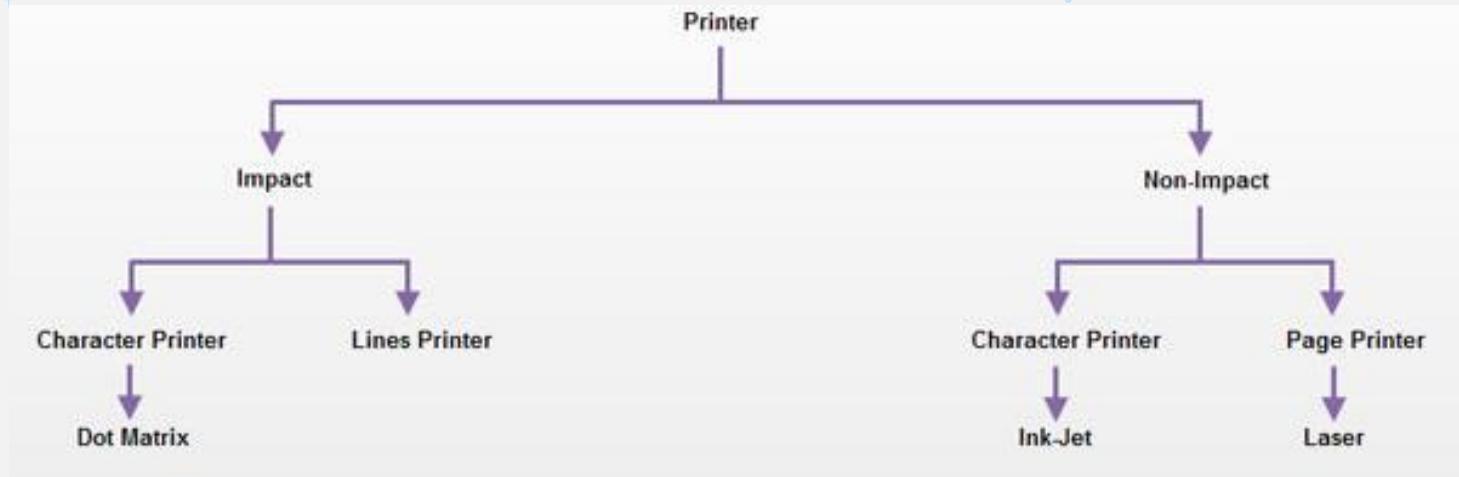
- Page Printer
- Character Printer



Types of Printers :-

1. **Impact Printer :-** Impact Printers are those Printers which have physical contact between the print head, ribbon on Cartilage and Paper.
2. **Non-Impact Printer :-** Non-Impact Printers are those Printers which do not have physical contact between the print head, ribbon on Cartilage and Paper.





Character Printer :- Those Printer Which Print Paper Character Wise ex. typewriter.

Line Printer :- Those Printer Which Print Paper Line Wise ex. Chain, Drum & Band

Page Printer :- Those Printer Which Print Whole Paper at a Time ex. Laser



Impact Printers

Dot-Matrix Printer

It has an array of pins which helps to print the paper with tiny Dots ex. Railway Ticket Printer. Speed up to 100 to 600 CPS having 9 to 24 Pins



Line Printer

They are used by Offices where they need to print data at large scale ex. Poster Drum Printer. Speed up to 1200 to 6000 LPM



Non-Impact Printers

Ink-Jet Printer

Ink-jet Printer is similar as Dot-Matrix but it doesn't have any physical contact with External media. It gives Printout with the help of Spray Speed up to 250 CPS.



Laser Printer

Laser Printer Which uses Laser Beam and Heated Toner to produce Printout on a Paper.
Speed up to 6000 to 12000 pages per hour



Thermal Printers

A Thermal Printer is one that uses heat to transfer an impression into paper types of thermal printer

1. **Thermal Wax Transfer Printer** – Where a thermal print head melts ink and transfer with the help of ribbon onto paper. After cooling the wax is permanent ex. DTDC Bus Ticket
2. **Direct Thermal** – Where a printer prints the image by burning dots onto a coated paper ex. Barcode Generator



Other Printers

1. **Virtual Printer** – A Virtual Printer is a simulated device whose user interface and API are similar to a printer driver, but the device is not connected with a physical printer ex. Microsoft XPS Document Writer, Cute PDF Writer
2. **Multi Functional Device(MFD)** – It is also known as all in one Printer. This is a combination of various functionalities like Printer, Scanner and Photocopy etc.



TIP -

Type SERVICES.MSC in cmd to show the running Printing processes also allow to restart and stop processes



Types of Connectors in Printers

1. Serial/Com Port – 9 & 25 pins connector



2. Parallel Port - 40 pins connector



3. USB Port – 4 pins connector



4. LAN Port – 8 pins connector



5. Wireless – without connector





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20.

Scanner



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What is Scanner?

A Scanner is an Input Device which converts the hard copy into soft copy. It converts Hard copy into Digital copy.

Types of Scanners :-

1. Specialized Scanner
2. Handheld Scanner
3. Standard Scanner (Flatbed & Sheet fed)
4. Scanning Applications



Specialized Scanner

Those Scanners which are used to scan some special documents like. Business card & Metro Card



Handheld Scanner

Those Scanners which are Smaller and easy to hand held and uses to scan a lot of things very quickly like. Barcode Scanner



Standard Scanner

Flatbed Scanner

In a Flatbed Scanner the Documents or pages are placed on the screen for scanning. These maybe standalone or integrated in a printer



Sheetfed Scanner

A Sheetfed scanner is a smaller and Portable scanner in comparing of Flatbed
You can scan a whole book using sheetfed scanner



Application Scanner

Those Scanners which need Mobile Phone to be Operate like CamScan & Genius Cam



Types of Connectors in Scanners

1. Serial/Com Port – 9 & 25 pins connector



2. Parallel Port - 40 pins connector



3. USB Port – 4 pins connector



4. LAN Port – 8 pins connector



5. Wireless – without connector





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21.

CD, VCD, DVD & Blu-ray Media



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CD

A Compact Disc, also called a **CD** are small plastic discs which store and retrieve computer data or music using light. ... **CDs** that have computer information on them are called **CD**.

CD-ROM

(Compact Disc-Read Only Memory) only readable.

CD-R

(Compact Disc-Read Only Memory) only recordable.

CD-RW

(Compact Disc-Read Only Memory) can be rewritable.



DVD

"Digital Versatile Disc." A **DVD** is a type of optical media used for storing digital data. It is the same size as a CD, but has a larger storage capacity. Some **DVDs** are formatted specifically for video playback, while others may contain different types of data, such as software programs and computer files. Size is 4.7 GB.

DVD-ROM

(Compact Disc-Read Only Memory) only readable.

DVD-R

(Compact Disc-Read Only Memory) only recordable.

DVD-RW

(Compact Disc-Read Only Memory) can be rewritable.



Blu-ray Disc.

The Blu-ray Disc, often known simply as Blu-ray, is a digital optical disc storage format. It is designed to supersede the DVD format, capable of storing several hours of video in high-definition video. Size is 25, 50 & 100 GB.

BD-ROM

(Compact Disc-Read Only Memory) only readable.

BD-R

(Compact Disc-Read Only Memory) only recordable.

BD-RW

(Compact Disc-Read Only Memory) can be rewritable.



Floppy

A floppy disk or floppy diskette is a type of disk storage composed of a thin and flexible disk of a magnetic storage medium in a square or nearly square plastic enclosure lined with a fabric that removes dust particles from the spinning disk. Floppy disks are read from and written to by a floppy disk drive. Size is about 1.44 MB or 2.8 MBs.



Audio Tapes

The Compact Cassette or Musicassette, also commonly called the tape cassette, cassette tape, audio cassette, or simply tape or cassette, is an analog magnetic tape recording format for audio recording and playback.

each second of **recording** carries 25 such frames which is 6.7 megabytes.
each minute of **recording** carries then 60 times more which is about 403MB
(almost a half of GB) each hour of **recording** is then about 23 GB.
typical **cassette** was 180 minutes long which makes it capable
of **storing** about 69 GB of information.



Video Tapes

Videotape is magnetic tape used for storing video and usually sound in addition. Information stored can be in the form of either an analog signal or digital signal. Videotape is used in both video tape recorders or, more commonly, videocassette recorders and camcorders.





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22.

Memory Card, External HDD & Pendrive



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Pendrive

The definition of a **pen drive** is small storage device shaped like a **pen** with built-in data storage that connects to a computer by a **USB** port. An example of a **pen drive** is a **pen** with a hidden **USB** port for saving data.

Characteristics

1. These are able to store large amounts of data in a small chip.
2. Next, my product can store data such as pictures, songs, files, and etc.
3. Pendrive are Portable and plug and play device.
4. It can only be connected to a device that has a usb port



Memory Card.

A memory card or memory cartridge is an electronic data storage device used for storing digital information, typically using flash memory. You can store music, pictures, videos & documents etc in memory cards. It uses in different different devices like mobiles, camera, ipod & home theatres etc.

Compact Flash



Multimedia Card



Secure Digital Card



Micro SD



Mini SD Card



External Hard drive

An external hard drive is a device which is plugged into your machine to give almost-immediate storage space, without the need to open your computers internal storage and make upgrades. External drives are portable storage devices typically used to **store data such as photos, videos, and documents.**

USB 3.0 Cable A to Micro B





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23.

Ports, Cables & Connectors



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What is a Cable?

An electrical cable is an assembly of one or more wires running side by side or bundled, which is used to carry electric current. A cable assembly is the composition of one or more electrical cables and their corresponding connectors.



What is a Connector?

A Connector is generally a specific Interface which is used to connect a device physically with a computer system with stability

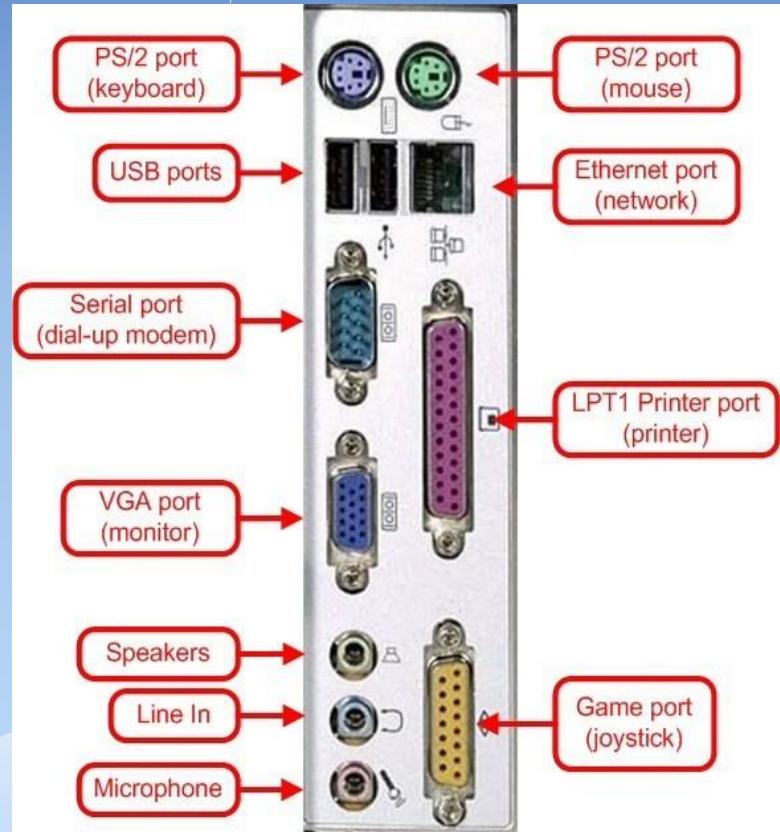
It is used to install the Cable or interface of external media or devices to a computer system.



What is a Port?

A port is generally a specific place for being physically connected to some other device, usually with a socket or plug which we call Connectors

It is used to install the connector or interface of external media or devices to a computer system.



1. VGA Cable

VGA stands for Video Graphics Array. A **VGA cable** is a device used to transfer video signals.



VGA Port

- Connects monitor to a computer's video card.
- It has 15 holes.
- Can transmit with resolution of 640x480
- Similar to the serial port connector. However, serial port connector has pins, VGA port has holes.



2. DVI Cable

DVI stands for Digital Visual Interface. The digital interface is used to connect a video source, such as a video display controller, to a display device, such as a computer monitor.

DVI Port

- Connects Flat panel LCD & CRT monitor to the computer's high-end video video cards.
- Very popular among video card manufacturers
- Transmission resolution 2560x1600



3. HDMI Cable

HDMI stands for High-Definition Multimedia Interface, a standard for simultaneously transmitting digital video and audio from a source, such as a computer or TV **cable** box, to a computer monitor, TV or projector.



HDMI Port

- It can transmit both HD audio and Video at a time 2560x1600
- Used for high data transfer bandwidth
- Uses in Gaming Consoles like Play station and HDTV



4. PS2 Cable

The PS/2 (Personal System/2) also referred to as the **mouse** cable or **keyboard** cable, was developed by IBM. It is used to connect a computer **mouse** or **keyboard** to an IBM compatible computer. The PS/2 port is a mini DIN plug containing six pins



PS2 Port

- Used for old computer keyboard and mouse
- Also called mouse port
- Green for Mouse Purple for Keyboard



5. Twisted Pair Cable

Twisted-pair cable is a type of **cabling** that is used for telephone communications and most modern **Ethernet networks**. A **pair** of wires forms a circuit that can transmit data. The **pairs** are **twisted** to provide protection against crosstalk, the noise generated by adjacent **pairs having RJ-11 & RJ-45 Jacks**.

Two Types :-

1. **STP (Shielded Twisted Pair Cable)**
2. **UTP (Unshielded Twisted Pair Cable)**



Ethernet Port

- Connects to a network and high speed Internet upto 100baseT.
- Known as RJ-45 Port which use RJ-45 Jack as Interface
- This port resides on an Ethernet Card.



6. Mini Plug Cables

A **Mini Plug** is a 3.5mm male connector found on computer headphone, headset, microphone, and speakers, which connects to the computer's sound card.



Mini Port

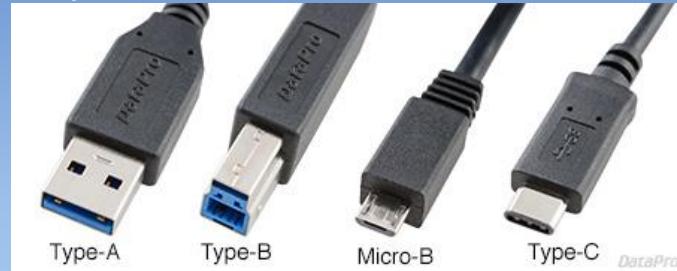
- Connects Microphone, Headphone & Speakers.
- Used 3.5mm jack to connect devices in it.

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7. USB Cable

A **USB port** is a standard **cable connection** interface for personal **computers** and consumer electronics devices. **USB** stands for Universal Serial Bus, an industry standard for short-distance digital data communications.



USB Port

- It can connect all kinds of external USB devices such as external hard disk, printer, scanner, mouse, keyboard, etc.
- Most of the computers provide two USB ports as minimum.
- Data travels with different speeds depend on ver.
- USB compliant devices can get power from a USB port.



More



USB Plug (Male):



Micro B



Mini B



8 Pin Lightning



Type A 2.0



Type B 2.0



Type A 3.0



Type B 3.0



Type C 3.0

USB Port (Female):



Micro B



Mini B



8 Pin Lightning



Type A 2.0



Type B 2.0



Type A 3.0



Type B 3.0



Type C 3.0



8. Power Cord

A **power cord**, **line cord**, or **mains cable** is an electrical cable that temporarily connects an appliance to the mains electricity supply via a wall socket or extension **cord**.



Kettle Input

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



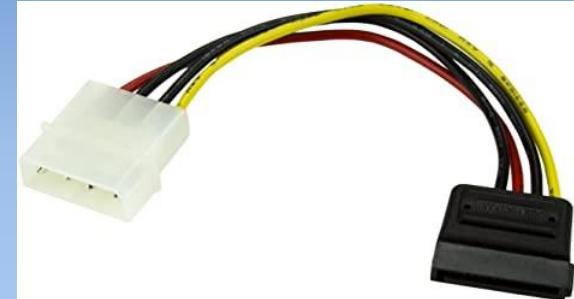
9. HDD Wires



SATA Cable



IDE Cable



Molex Cable

These Cables are used to Connect Hard Disk Drive to Computer



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10. SMPS Wires

1. CPU Power
2. ATX Power
3. SATA Power
4. Floppy Power
5. PCI Power
6. ODD Power



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11. Parallel Cable

Parallel cables have mostly given way to serial cables, where data is transferred one bit after another.



Parallel Port

- Used for scanners and printers
- Also called printer port
- 25 pin model



12. Serial Cable

A **serial cable** is a **cable used to** transfer information between two devices **using a serial** communication protocol.



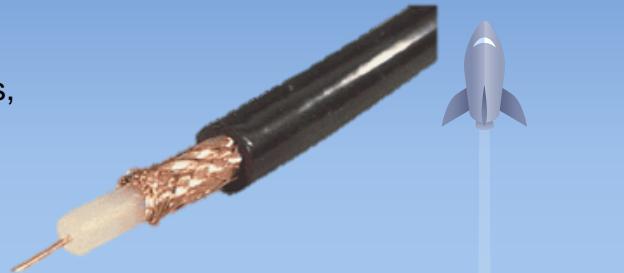
Serial Port

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



13. Coaxial Cable

Coaxial cable is commonly **used by cable** operators, telephone companies, and internet providers around the world to convey data, video, and voice communications to customers. It has also been **used** extensively within homes.



BNC Connector

Bayonet Neill-Concelman BNC connector is a series of connectors used for connecting thinnet coaxial cabling to various networking components.



14. Optic Fibre Cable

Fibre optics is a modern technology used mostly in the telecommunication industry to transmit information digitally as pulses of light through strands of fibre made of glass. Also known as Optical fibres, these strands are about the diameter of a human hair follicle. When bundled into an optical fibre cable, they can transmit data in volumes faster than other mediums over really long distances.



Subscriber Connector SC

This Connector is for structural cabling it is used for high speed
And for single mode fibre cabling



Straight Tip ST

This Connector is for structural cabling it is used for high speed
And for Multi mode fibre cabling





Geeky Hub

24.

Basic Input Output System (BIOS)



Geeky Hub

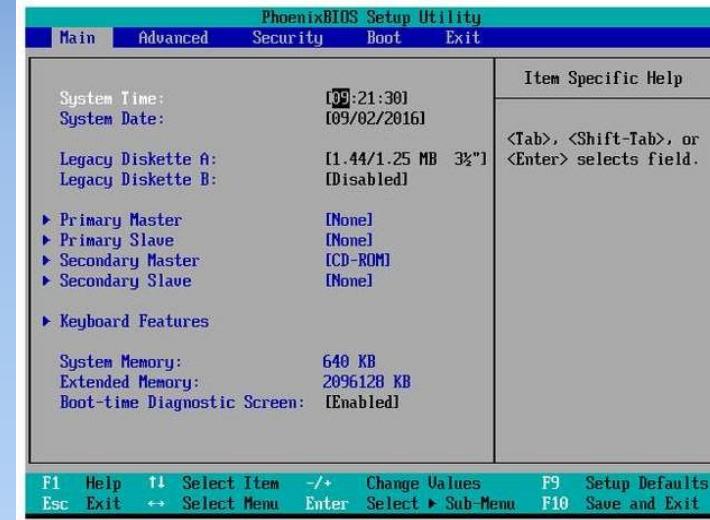
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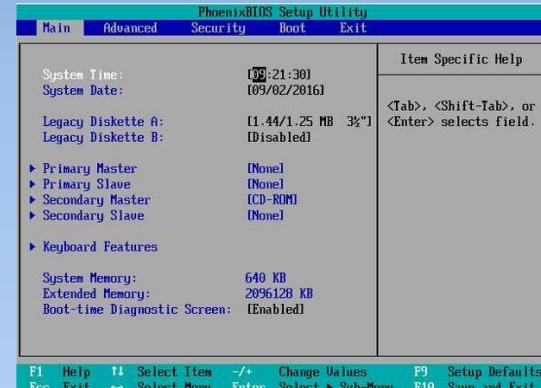
BIOS –Basic Input / Output System

As your PC's most important startup program, BIOS, or **Basic Input/Output System**, is the built-in core processor software responsible for booting up your system. Typically embedded into your computer as a motherboard chip, the BIOS functions as a catalyst for PC functionality action.



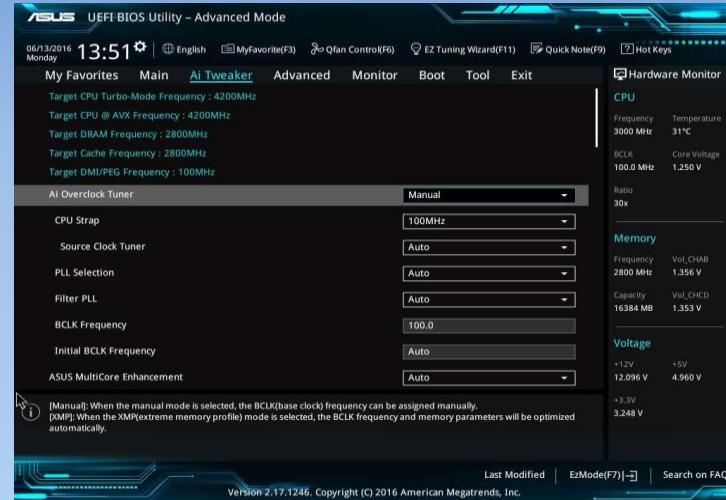
Legacy BIOS

- Legacy boot is **the boot process used by basic input/output system (BIOS) firmware**. ... UEFI boot is the successor to BIOS. UEFI uses the globally unique identifier (GUID) partition table (GPT) whereas BIOS uses the master boot record (MBR) partitioning scheme.



UEFI BIOS

- **UEFI** replaces the traditional BIOS on PCs. There's no way to switch from BIOS to **UEFI** on an existing PC. You need to buy new hardware that supports and includes **UEFI**, as most new computers do. Most **UEFI** implementations provide BIOS emulation so you can choose to install and boot old operating systems that expect a BIOS instead of **UEFI**, so they're backwards compatible.



UEFI VERSUS LEGACY BOOT

UEFI

A booting process in modern computers that provides advanced capabilities than BIOS

Uses UEFI firmware that maintains a list of valid boot volumes known as EFI Service Partitions for the boot process

Has additional security features and is more efficient

More user-friendly

Uses the GUID Partition Table (GPT)

LEGACY BOOT

The process of booting the computer using the BIOS firmware

Uses the BIOS firmware for the boot process

Not as efficient as UEFI

Less user-friendly

Uses the Master Boot Record (MBR) partitioning scheme

Visit www.PEDIAA.com





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25.

Discussing about Troubleshooting



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TECHNICAL ISSUES

#1 – Wrong Input

#2 – Restarting many times

#3 – beep sounds

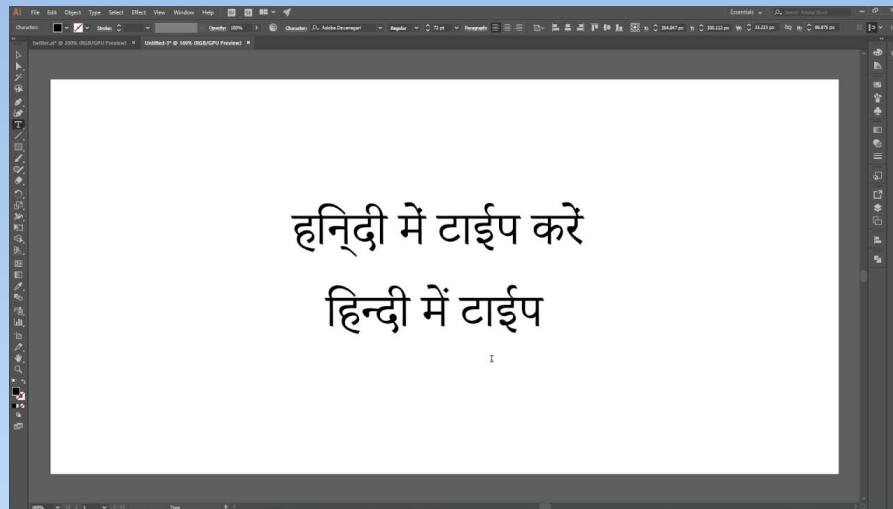
#4 – PC Overheating

#5 – Incompatibility



#1 – Wrong Input

Wrong Input is a issue which occurs in when you install somme new fonts or attach new keyboard. This issue occurs because of some Driver issues and font issues. The Solution is to update or reinstall drivers and fonts.



#2 – Restarting many times

There are many reasons behind this problem. It can be a result of various issues, including corrupted drivers, faulty hardware, and malware infection, among others. It can be difficult to pinpoint exactly what keeps your computer in a reboot loop.



#3 – Beep sounds

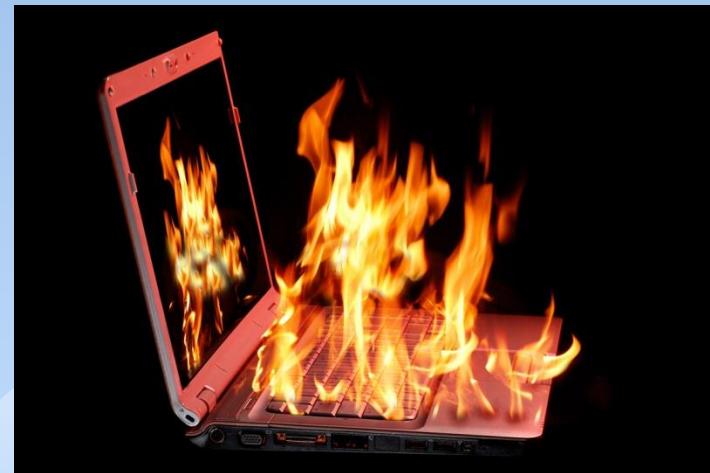
Beep Sounds are indication of some issues mentioned on table below in this slide. Take a look in the table.

Answer: The following are AMI BIOS Beep Codes that can occur.

Beep Code	Descriptions
1 short	Memory refresh timer error.
2 short	Parity error.
3 short	Main memory read / write test error.
4 short	System timer failure.
5 short	Process error.
6 short	Keyboard controller BAT test error.
7 short	General exception error.
8 short	Display memory error.
9 short	ROM BIOS checksum error.
10 short	CMOS shutdown Read/Write error.
11 short	Cache Memory bad.

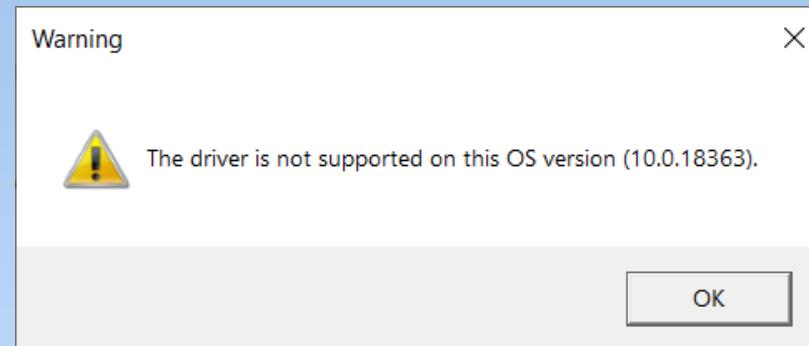
#4 – PC Overheating

Restarting many times is a common issue which generally occurs when your CPU becomes Hot. When a lots of heat is generating in the CPU. To prevent heat you have to shutdown your system for some time or install some cooling devices and cooler fans.



#5 – Incompatibility

Incompatibility issue occurs when you plugged a uncompatiable matched peripheral with your pc. It also applies in your software side sometime you got some lagg or crash in software which was usually unwanted or accidental. It also depends on the requirement of software and your specification. So you have to give your attention toward your need and then you have to purchase the laptop as per your need. For peripheral sometime it reolves just by drivers update.





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26.

USB Booting & OS Installation



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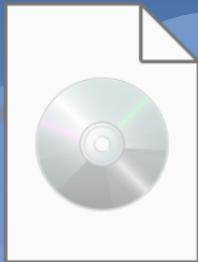
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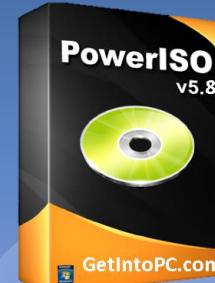
USB



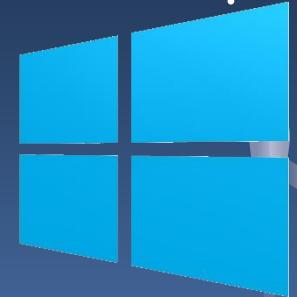
USB Booting?



ISO Image File



Booting Tool



OS Installation



Boot Menu



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27.

Basics Info Hardware Engineer Must Know



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1. Cleaning.Junks

- **System Temporary Files**
- **Internet Temporary Files**
- **Prefetch Files**
- **Recent Files**
- **Disk Cleanup**
- **Clean Manager**
- **Recycle Bin**
- **Uninstall Unnecessary items**

2. Setting Resolution

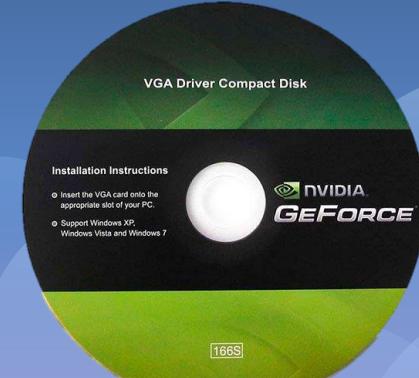


Resolution??



3. Drivers Updation

A driver, or device driver, is a **set of files that tells a piece of hardware how to function by communicating with a computer's operating system**. All pieces of hardware require a driver, from your internal computer components, such as your graphics card, to your external peripherals, like a printer.



4. Prompt Commands

Computer Information

Systeminfo
Msinfo32
Driverquery
Getmac
Vol C:
Diskpart
Winver
chkdsk

User Management

Net user
Net user username password /add
Net user username /del
Net user username *
Net user Administrator /active:yes
Net user Administrator /active:no

Utilities

Label D:
Diskpart Format
Ipconfig
Netsh wlan show all
Hostname
Date
Time



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