1. CPU is the brain of the computer. All types of data processing operations and all the important functions of a computer are performed by the CPU. It helps input and output devices to communicate with each other and perform their respective operations. It also stores data which is input, intermediate results in between processing, and instructions.

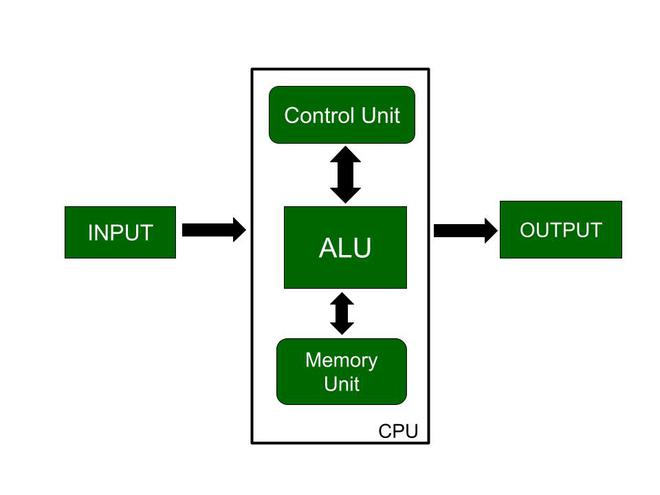
Now the CPU consists of 3 major units, which are;

Memory or Storage Unit

Control unit

ALU (Arithmetic logic unit)

Memory or Storage Unit

As the name suggests this unit can store instructions, data, and intermediate results. The memory unit is responsible for transferring information to other units of the computer when needed. It is also known as an internal storage unit or the main memory or the primary storage or Random Access Memory (RAM) as all these are storage devices.

Its size affects speed, power, and performance. There are two types of memory in the computer, which are primary memory and secondary memory. Some main functions of memory units are listed below:

Data and instructions are stored in memory units which are required for processing.

It also stores the intermediate results of any calculation or task when they are in process.

The final results of processing are stored in the memory units before these results are released to an output device for giving the output to the user.

All sorts of inputs and outputs are transmitted through the memory unit.

Control Unit, as the name suggests, a control unit controls the operations of all parts of the computer but it does not carry out any data processing operations. For executing already stored instructions, it instructs the computer by using the electrical signals to instruct the computer system. It takes instructions from the memory unit and then decodes the instructions after that it executes those instructions. So, it controls the functioning of the computer. Its main task is to maintain the flow of information across the processor. Some main functions of the control unit are listed below:

Controlling of data and transfer of data and instructions is done by the control unit among other parts of the computer.

The control unit is responsible for managing all the units of the computer.

The main task of the control unit is to obtain the instructions or data which is input from the memory unit, interprets them, and then directs the operation of the computer according to that.

The control unit is responsible for communication with Input and output devices for the transfer of data or results from memory.

The control unit is not responsible for the processing of data or storing data.

ALU (Arithmetic Logic Unit); ALU (Arithmetic Logic Unit) is responsible for performing arithmetic and logical functions or operations. It consists of two subsections, which are:

Arithmetic Section, Logic Section.

Arithmetic Section: By arithmetic operations, we mean operations like addition, subtraction, multiplication, and division, and all these operation and functions are performed by ALU. Also, all the complex operations are done by making repetitive use of the mentioned operations by ALU.

Logic Section: By Logical operations, we mean operations or functions like selecting, comparing, matching, and merging the data, and all these are performed by ALU.

1. Various Components of Motherboard;
2. Sockets and slots: - Socket is a place where we can fit electric devices and Slot is an opening in the computer motherboard which allow plugging in the circuit boards through this we can insert or connect the external devices into the motherboard.

The different classification of the motherboard is based on sockets and slots. This is because a particular socket is used to refer to that particular CPU as each of them will have specific type of socket. There they are designated as Socket 7, Slot 1, Slot 2, Socket 360, slot A, socket A, socket 432. Each of them is explained below.

* Socket 7: these motherboards server the Pentium MMX CPUs, AMD series and Cyrix processors. They are available with AGP slot which are designated as Super 7. AGP or accelerated Graphic port is a port which is exclusively used for connecting video card to computer.
* Socket 8: these motherboards serve Pentium Pro CPUs. These processors if available now are mostly used in older network servers and workstations.
* Slot 1: these motherboards serve Pentium || and ||| CPUs. They are Single edge Cartridge (SEC) processors.
* Slot 2: - these motherboards also use SEC processors for advanced Pentium || or ||| Xenon processors. these kinds of motherboards are used in high end networks servers and workstations.
* Socket 360: these motherboards serve for Pentium ||| and above and also Celeron processors. These motherboards are easier to remove and have fewer problems in installation.
* Slot A: these motherboards serve later AMD Athlon and Duron processors.
* Socket 432: these motherboards are built to serve Pentium 4 processors.

Expansion slots: - Whenever additional device is required for the system to perform at its full potential you would have to connect devices such as video controller, SCSI host controller, network card etc. these devices are connected to the motherboard with the help of external connectivity called expansion slots. Expansion slots are slots that allow the system to communicate with the help of external connectivity called expansion slots. Expansion slots are slots that allows the system to communicate with the outside world with the help of additional boards. These expansion slots are present at the back of the computer and allow the ports in the card that go inside it to be accessed.

1. Mouse & keyboard: - Keyboard Connectors are two types basically. All PCs have a keyboard port connected directly to the motherboard. The oldest, but still quite common type, is a special DIN, and most PCs until recently this style connector. The AT- style keyboard connector is quickly disappearing, being replaced by the smaller mini-DIN PS/2 style keyboard connector.
2. USB (Universal Service bus): - USB is the General-purpose connection for PC. You can find USB version of many different devices, such as mouse, keyboards, scanners, cameras, and even printers. a USB connector’s distinctive rectangular shape makes it easily recognizable. USB has a number of features that makes it particularly popular on PCs. First, USB devices are hot swappable. You can insert or remove them without restarting the system.
3. Parallel port: - Most printers use a special connector called a parallel port. Parallel port carry data on more than one wire, as opposed to the serial port, which uses only one wire. Parallel ports use a 25-pin female DB connector. Parallel ports are directly supported by the motherboard through a dangle.
4. CPU Chip: - The central processing unit, also called the microprocessor performs all the calculations that takes place inside a pc. CPUs come in variety of shapes and sizes. Modern CPUs generate a lot of heat and thus require a cooling fan or heat sink. The cooling device is removable, although some CPU manufactures sell the CPU with a fan permanently attached.
5. RAM slots: - Random-Access Memory stores program and data currently being used by the CPU. RAM has been packaged in many different ways. The most current package is called a 168-pin DIMM.
6. Floppy controller: - The floppy drive connects to the computer via 34-pin ribbon cable, which in turn connects to the motherboard. A floppy controller is one of that used to control the floppy drive.
7. CMOS Battery: - To provide CMOS with the power when the computer is turned off all motherboards comes with a battery. These batteries mount on the motherboard in one of three ways: the obsolete external battery, the most common onboard battery, and built-in battery.
8. PCI slot: - Intel introduced the peripheral component interconnects bus protocol. The PCI bus is used to connect I/O devices to the main logic of the computer. PCI bus has replaced the ISA bus.
9. ISA slot: - It is the standard architecture of the expansion bus. Motherboard may contain some slots to connect ISA compatible cards.
10. IDE controller – Industry Standards define two common types of hard drives. EIDE and SCSI. Majority of the PCs use EIDE drives. SCSI drives show up in high end PCs such as network servers or graphical workstations. The EIDE drive connects to the hard drive via a 2-inch -wide, 40-pin ribbon cable, which in turn connects to the motherboard. IDE controller is responsible for controlling the hard drive.

(3) Password is a means of protecting your system away from the malicious  
and snooping entities. When there is shift or transfer of system from one  
person to another or one department to another department, then there  
is a great chance of losing the password. This will lead to unused of the  
system because computer will not start without the password luckily this  
data will be stored in the CMOS settings. If you could manage to clear  
the CMOS RAM you can easily disable the password security. But you  
should be careful while clearing the settings because some of the  
settings are very crucial and if they are lost then it is very difficult to get  
them back.

You may deal with these unwanted passwords in many ways with the  
help of some of the tips given below.  
(a) Ask a friend: Whenever you lose your CMOS password it can sometime  
happen that one of your friends or colleagues knows about it. Ask them  
if anybody knows the password. This saves so much of difficulty and any  
time after log in you can change the set up.

(2) Check for the jumper by name Clear password: - Jumper is a conductor  
which is used to close a break or bypass part of an electrical circuit.  
These are used basically to set up or adjust mother boards. You can  
take a look inside the motherboard and check for the jumper on the  
mother board by name password clear. It will be written clearly with  
similar names for the reason of security once you find the jumper then  
you can set it and boot the system. Later you may cut the power supply  
and reset the jumper. By now your password should be clear and your  
CMOS settings will not be lost.  
(3) Prompt for configuration change: you can also disconnect SIMM (single  
inline memory module) or DIMM (dual inline memory module) from the  
system and start the computer. BIOS will recognize the configuration  
change and give you an error message prompting you to setup the  
CMOS. This allows you to disable the password by entering inside the  
CMOS without clearing the other settings inside it.  
(4) Clear the CMOS RAM: finally, this can be used to clear the password.  
But this is the most crucial step because if you are careless enough to  
lose the important CMOS settings then it is very difficult to get back the  
settings unless you tweak it. Here you can search for the jumper on the  
motherboard which is written as CMOS clear. Start the computer by  
setting the jumper. You can see message indicating the loading of  
default settings or CMOS clear. Now switch off the computer and reset  
the jumper. By now your password will be disabled. Now you can restart  
and reconfigure the CMOS setting from the beginning.

Features of BIOS:

1. CPU Support: It Should support wide range of CPUs specifically based on the manufacturers like Intel, AMD Cyrix.
2. Chipset support - It Should support the new chipset families like Intel’s Core 2 and AMD CPUs. This support is very important because chipset is  
   responsible for motherboard designers to implement the other features like memory architecture, BUS architecture, etc.
3. Memory Support - It Should support the modern memory and auto-size itself. Parity and error checking and correction (ECC) should be  
   supported. BIOS can support up to 4GB of RAM.
4. Drive support - It Should support 32-bit disk transfers.  
    BIOS should also support removable media drives like zip  
   (medium-capacity removable disk storage system) or  
   SyQuest (it is a removable mass storage system that  
   comes in 44 Mb and 80 Mb sizes and a product of SyQuest  
   Co.) drives. BIOS may also support RAID functions.
5. Power Management Support - It Should support the ACPI (Advanced Configuration and Power Interface) is a standard specification provides an  
   open standard for unified operating system-centric device configuration and power management) specification. Power management is very much important for desktop and lower version of the system to avoid wastage of energy. It Should support DPMS (Display Power management Signalling is a specific standard used to reduce the power consumption in the monitor) for monitors and other display devices.

(5) . Hard drive consists of magnetic read/write heads that reads the data from the rotating discs. It consists of the different part which serves the different function of the hard disc. Hard disc consists of one or more rough and solid substrate called as  
Platters. Platters are made out of aluminium as it is a light material. They are circular in shape and magnetic substances are coated to both the sides of the platters for read/write the data. A two or more magnetic heads are connected to the platter in order to read/write the data into the disc. Platters move on the common axis and heads are allowed to move on the radius on the platter. Therefore, it allows the heads to read all parts of the surface. The information of each division of the platter is formed to represent a specific location. This forms a design of set of concentric circles which is  
used to record the data. Each concentric circle on a platter is called as track and these tracks are further divided into sections. When the head of one surface on one track, the head of the corresponding other surface is also on the respective track. All the tracks are together called as cylinder. Sometimes track and cylinder are used interchangeably a typical assembly of platter and its data organization.

A platter contains thousands of tracks. Tracks are further divided into a  
smaller segment which is called as sector. Each sector holds a 512 byte of data which include error checking and housekeeping data that are used to identify sector, track and CRC (Cyclic Redundancy check) result. CRC is also called as polynomial code checksum is a function that is designed to detect the changes that occur to the computer data accidently. The hard disk must be manufactured in high priority due to extreme smaller versions of the components. The main part of the hard disk is separated from the contact of external air so that no dust should enter the platter and avoid the damage caused to the read/write head  
typical assembly of platter and its data organization.

* Data Density Characteristics: We should take care that all the  
  information must be fact in the media of hard drive platter. We can get  
  the maximum amount of capacity in terms of megabytes per square inch  
  (MBSI) from areal density of the media. The following are the factors that affect the real density.  
  1. The size of the magnetic particle is a barrier to areal density. Areal  
  density is more if the coercivity (it is the magnetic field applied during  
  magnetization of any Ferro magnetic material) of the hard drive is  
  large and tighter magnetization field with smaller read/write head  
  allow higher areal density.  
  2. The altitude of a read/write head over the platter surface (which is  
  also called as head height) affects density if the read/write head  
  passes closer to the hard drive then areal densities will be more. If  
  then read/write head passes away from the media then due to  
  magnetic field areal densities will be reduced.  
  3. Another major important limiting factor is surface smoothness  
  because smoother surface allows read/write head to fly closer to the  
  media.
* Latency and Seek: Latency is the time delay that exists between the moment that read/write command is initiated over the physical interface of the drive and the moment where the desired information is placed. Latency also refers to the time taken to pass the needed byte under a read/write head. If the read/write head has not quite reached the desired location there will be short latency. If the head has just missed the desired location, then the head must wait for one full rotation. Therefore, latency can be very long. Seek time is the time taken to step the read/write head between another delay added by the track to the hard  
  drive performance. There are number of ways in seek time listing they are track-to-tack seek, full stroke seek and average seek.  
   Track-to-track seek is the time required to step between two adjacent tracks on the platter. Full stroke is the time required to step from inner most to the outer most tracks. This time is relatively longer. The average seek time is half the full stroke seek time.  
  Seek and latency is together needed to load and save files. For  
  example, while loading a file certain amount of seek time is taken to locate the track which contains starting of the file. There is some latency during the platter rotating around the necessary sector.  
  The major parts of the hard disk are the frame, platters, read/write  
  heads, head actuators, spindle motor and electronics package
* . Frame: The frame is also called as chassis which is an important  
  part of the hard drive. This affects the structural thermal and  
  electrical integrity of the drive. In order to mount the other  
  components on the hard drive the frame must be strong and provide steady platform. Therefore, cast aluminium is used in larger drives for chassis and the smaller drive in the laptop computer uses a plastic chassis. Read/Write Heads: Read/write head form the interface between the electronic circuitry and magnetic media of the hard drive. While writing, electronic signals are translated into the magnetic flux transitions with the help of a head which saturate points on the media where the transition takes place. The read operation works almost reverse to this process. Here flux transitions induce electrical signals in the head that are amplified, filtered and translated into respective logic signals.
* Head Actuators: Hard drives use voice coil motors which are also  
  called as rotary coil motors which are used to actuate head moment. Voice coil motors work with the principal of analogy meter moments that is a permanent magnet is enclosed within two opposing coils. When there is a current flow in the coil, it produces a magnetic field which opposes the permanent magnet. In order to cause a deflection which is directly proportional to the amount of driving current, a force of opposition is maintained by attaching the head arms to the rotating magnet. The greater opposition and deflection are obtained by increasing current signals. You can choose the cylinder by incrementing the servo signal and maintaining the signal in a desired level. Voice coil motors are very small and light assemblies that are well suited to fast access times and small hard drive assemblies. The process of track following is called serving the heads.
* Spindle motors: The speed at which the media passes under the  
  read/write heads are one of the major factors that are responsible for drives performance. Media is passed under the read/write heads by spinning the platter at a high rate of speed. The spindle motor is a brushless, low profile DC motor (Direct Current) which is responsible for spinning the platter. An index censor provides a feedback pulse signals which detects the spindle as it rotates. Index signals is used by control electronics of the drive which is used to regulate spindle speed as precisely as possible.

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5. Although difficult intermittent problems might give rise to keyboard errors,  
generally two simple problems are usually faced by users: Defective cables, Stuck keys.

Defective cables are easy to spot if the failure is not intermittent. If the keyboard stops working altogether or every keystroke results in an error or incorrect character, then the problem lies with the cable. Troubleshooting such a fault is simple, especially if you have a spare cable on hand. To do this simply replace the suspected cable with one from a known working keyboard, and ensure that the problem is set right. However, if the problem. till exists then you should try to look elsewhere for its source. By using a DMM (Digital Multi-Meter). you can test the cable for continuity by removing it from the keyboard. Keyboard stuck key failure When you press a key on the keyboard, the processor built into the keyboard (8048- or 6805-type) reads the keys witch location in the keyboard matrix. The processor then sends to the motherboard a serial packet of data containing the scan code for the key that was pressed. This is called the Make code. When the key is released, a corresponding Break code is sent, indicating to the motherboard that the key has been released. The Break code is equivalent to the Make scan code plus 80h (‘h’ stands for hexadecimal). For example, if the Make scan code for the "A" key is 1Eh, the Break code would be 9Eh. By using both Make and Break scan codes, the system can determine whether a particular key has been held down and determine whether multiple keys are being pressed. If you get the message. keyboard struck, key failure, you can look up the scan code to determine which key switch is causing the problem. You can solve the problem removing the keycap of the offending key and cleaning the switch. . Many newer systems have an electrical fuse that can be replaced. This protects the motherboard keyboard and mouse connectors. Locate any type of fuse on the motherboard in the vicinity of the keyboard or mouse connectors. Some other systems may have a socketed keyboard controller chip (8042-type), in which case, it may be possible to repair the motherboard keyboard circuit by replacing this chip. As these chips have ROM code in them, it is advisable to get the replacement from the motherboard or BIOS manufacturer.  
Cleaning a Keyboard; - Periodical cleaning is a part of maintenance, which is essential to maintain a keyboard in good condition. Preventive maintenance requires that vacuum clean the keyboard weekly or at least monthly. You could also use canned compressed air (available at electronics supply stores) to blow the dust and dirt out instead of using a vacuum cleaner. Before you dust a keyboard with the compressed air, turn the keyboard upside down so that the particles of dirt and dust collected inside can fall out.

(6) Compatibility mode: This mode is used to define the basic protocol used in  
the computers to transfer data from computer to printer. It is also called as  
Centronics mode. It was mainly designed to serve the dot matrix and older  
laser printers. In this mode, data is kept on the data signal and status is  
checked for errors and busy signals. When this is clear strobe signal is  
initiated to send the data to the printer. In this mode it carries data rate up to  
150 bytes/second at 6 meter or 20 ft. with an AB-cable or up to 150 kbps at  
10 meter or 32.8 ft. with a CC-cable (composite connector which is used to  
connect newer peripherals, wiring between the connectors in a cable and  
connecting the board to the parallel port of the PC). The drawback of this  
mode is that there is a serious problem in communicating with LAN (Local  
Area Network) adapters, removable disk drives and the newest generation  
of laser printers.  
Nibble mode: this mode allows reverse data transfer to the computer.  
Combining with compatibility mode it can create bidirectional data transfer  
line. As nibble is half byte (4 bits) of the data units nibble mode is capable of  
sending 2 nibbles of data from peripheral to the computer in two data transfer  
cycles. Nibble mode is best suited for printers and can operate on all PCs  
that have a parallel port. It does not have much effect on low bandwidth but  
may not support it when used with other bidirectional devices other than

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printers. This mode carries data rate up to 50 kbps at 6 meter or 20 ft. with a  
CC-cable which can be increased to up to 150 kbps at 10 meter or 32.6.