Chapter 1 :

Informatics Practices

Class XI (As per CBSE Board)

New Syllabus 2019-20

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Introduction

A computer is an electronic device, under the control of instructions stored in its memory that can accept data (input), process the data according to specified rules(Program), produce information (output), and store the information for future use.
Because of different units work as a single unit in computer for central objective ,that's why it is a system, i.e. computer system.

Data vs Information

Data are raw numbers or other findings which, by themselves, are of limited value.
Information is data that has been converted into a meaningful and useful context.

Computers are being used extensively nowadays in everyday life/every field In the form of laptop, desktop, smartphone,gadgets etc.

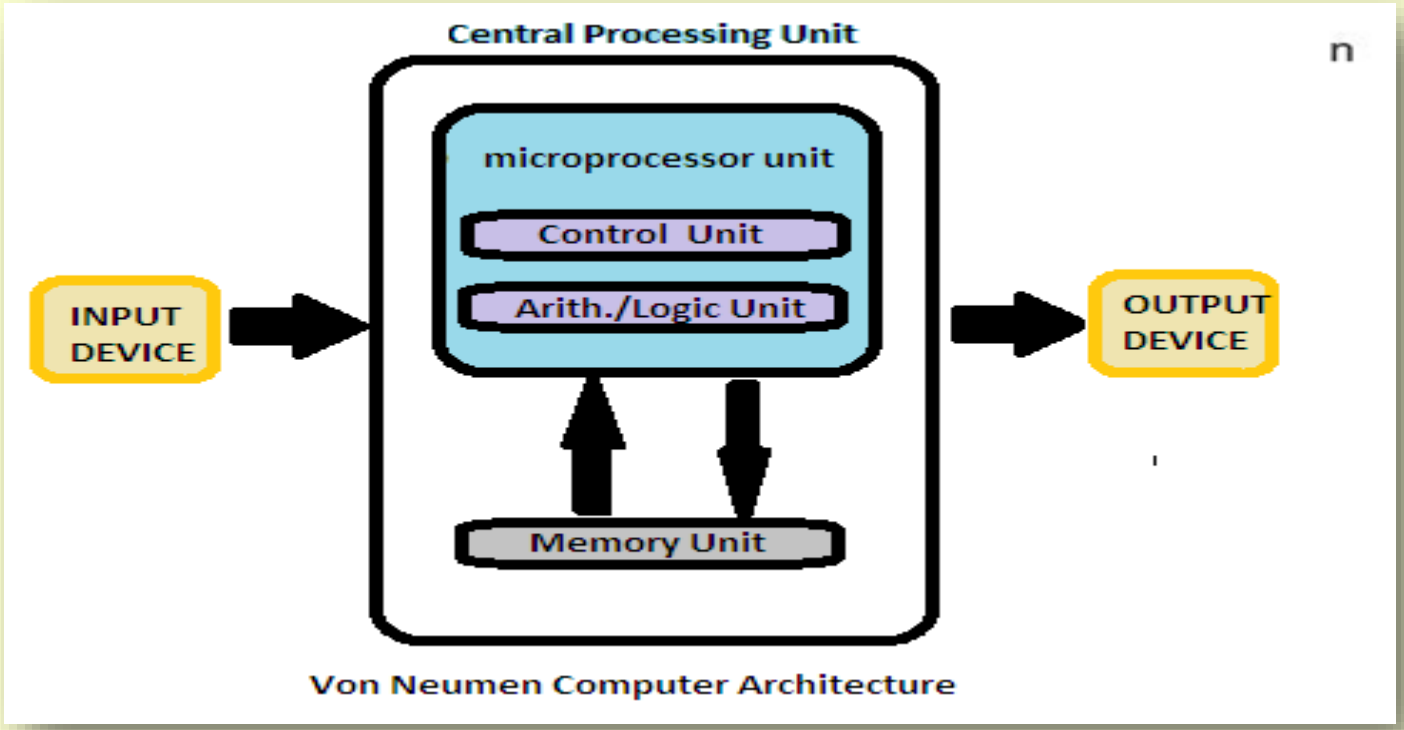
Functionalities of a computer

Any digital computer performs five functions in gross term.

1. **Take data as input**
2. **Stores data/instructions**
3. **Process those stored data**
4. **Generate the output**
5. **Control all above steps**

Basic Computer Organization

Functional components of a computer



Basic Computer Organization

Input/Output Units

Input Unit

A device through which data and programs from the outside world enter the computer system.

Output unit

A device through which results stored in the computer memory are made available outside the computer system.

Basic Computer Organization

Input Devices

Input devices can send data or information to a computer or another device.

Keyboard: It is an input device which sends data in to the computer. The data send depends on the key pressed by the user.

Mouse: A mouse is a small handheld input device which controls a cursor in a graphical user interface. It can move and select text, files, folders etc. on our computer according to the user input.

Scanner: Scanner optically reads and document, file or image and then changes it into digital signal and sends to the computer.

OMR: optical mark recognition/ reader, is used to read marks on a document and send them to computer.

OCR: OCR stands for optical character Recognition, is an input device which reads printed text and sends that to computer.

MICR: Magnetic Ink Character Reader is an input device which generally finds application is banks to process cheques.

Microphone: it receives audio generated by some input source and sends the same to a computer.

Webcam: it sends the captured images to a computer.

Graphics Tablets: This input device is used to draw using hand.

Trackballs: an upside down mouse ,encased within a socket. Is a cursor control device.

Barcode reader: It is used to read the barcode of various items and feed the same to computer.

Gamepad: Also known as joy pad is the input controller for video games.

Joystick: these input devices are used to control video games.

Basic Computer Organization

Output Devices

A device that can receive data from computer or another device and create output with that data is called output device. Examples of various output devices are as :

Monitor: A monitor is an output device that is responsible for receiving data from a computer and displaying that information as text or images for users to see.

Speakers: Receives sound signal from a computer and then plays that sound signal and thus we hear songs or music or any other audio.

Projector: Gets data from a computer and displays or projects the same information onto a screen or a wall. Projector cannot directly accept data from a user and send that data to another device.

Basic Computer Organization

Both Input / Output Devices

An input/output device is capable of receiving data from users or another devices and also sending data to another devices or computers. That means a devices which can be used as both input device and output device are called Input / Output (I/O) devices. Some examples of input/output devices are as:

USB drive: Also known as pen drive or flash stick works as both input device to computer and as an output device. USB drives receive or save data from a computer as an input and it can also send data to a computer or another device.

Facsimile: Facsimile or FAX machine has a scanner which is an input device and a small printer to provide output.

Modems: It is used to transmit and receive data from one computer to another computer or other devices using telephone lines

CD-RW drives and DVD-RW drives: Receives data from a computer as input to copy onto and save into writable CD or DVD. We also use CDs or DVDs to transfer data to a computer.

Touch Screen: Touch screen is both input and output device. By touching the screen input is provided and being a screen, it is used as an output device.

Headsets: Headset consists of speaker as an output device and microphone functions as an input device.

Basic Computer Organization

Control Unit

Control unit

It organizes the computer to work computer as single unit

Arithmetic/Logic Unit

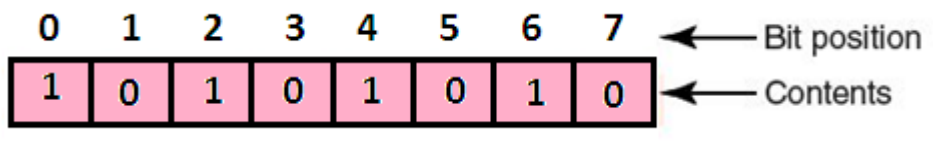
Performs basic arithmetic operations such as addition and subtraction
Performs logical operations such as AND, OR, and NOT.Most modern ALUs have a small amount of special storage units called registers that can be accessed faster than main memory.

Memory

A collection of cells, each with a unique physical address

Most computers are byte-addressable

Cell at address 11111110 contains 10101010



Basic Computer Organization

Memory Units

UNIT	STORAGE	ABBREVIATION
Bit	Binary Digit, Single 1 or 0	B
Nibble	4 bits	-
Byte/Octet	8 bits	B
Kilobyte	1024 bytes	KB
Megabyte	1024 KB	MB
Gigabyte	1024 MB	GB
Terabyte	1024 GB	TB
Petabyte	1024 TB	PB
Exabyte	1024 PB	EB
Zettabyte	1024 EB	ZB
Yottabyte	1024 ZB	YB

Basic Computer Organization

RAM and ROM

Random Access Memory (RAM)

Memory in which each location can be accessed and changed

Read Only Memory (ROM)

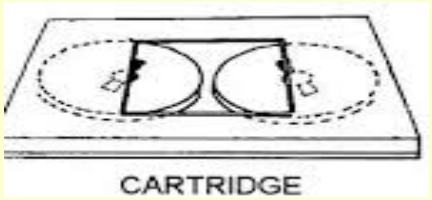
Memory in which each location can be accessed but *not* changed

RAM is volatile, ROM is not

Secondary Storage Devices

Magnetic Tape

mass auxiliary storage device

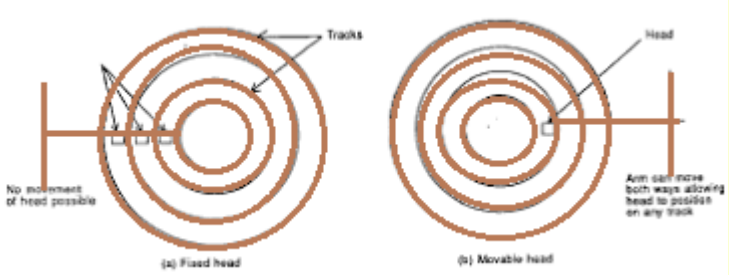


Basic Computer Organization

Secondary Storage Devices

Hard disk

Fixed Head HDD / Movable head HDD



A hard disk is a set of stacked disks. Each disk has data recorded electromagnetically in concentric circles, or tracks, on the disk

Hard Drive Types

1. **Parallel Advanced Technology Attachment (PATA)**
2. **Serial ATA (SATA)**
3. **Small Computer System Interface (SCSI)**
4. **Solid State Drives (SSD)**

Upto 12 TB sized HDD is available in the market

Basic Computer Organization

Power consumption in computer

Vital component of computer system is power.without power computer is inert box. In computer SMPS (Swithed mode power supply) which is power supply unit which converts the alternating current (AC) line from your home/office to the direct current (DC) needed by the personal computer in the form of different voltage levels.

The typical voltages supplied are:

- 3.3 volts
- 5 volts
- 12 volts

The 3.3- and 5-volts are typically used by digital circuits, while the 12-volt is used to run motors in disk drives and fans.

Basic Computer Organization

Battery

A battery is a hardware component that supplies power to a device, enabling that device to work without a power cord.

There are three computer batteries types used with computers. First, is the backup battery, which is commonly referred to as the **CMOS battery** that holds your computer's settings, such as the time and date.

Next, the **bridge battery** is only found in portable computers as a temporary backup for the main battery. A bridge battery allows you to remove the main battery and replace it with a good battery without having to turn off the computer.

Finally, the **main battery** in portable computers is an alternate source of energy for when the computer is not connected to a wall outlet.

Basic Computer Organization

Battery technologies

- **LI-ION (Lithium Ion) - Short for lithium-ion and sometimes abbreviated as Li-on, Li-ion is a fragile technology requiring a protector circuit. Rechargeable batteries using lithium metal as an electrode are capable of providing both high voltage and excellent capacity**
- **Li-polymer (Lithium Polymer) - Short for lithium-polymer, Li-polymer is a battery technology that is a lower cost version of the Li-ion that first started being used in 1996.**
- **NICAD (Nickel-Cadmium) - NiCad is a rechargeable battery made mostly of nickel and cadmium. Compared to other battery technologies, the NiCad variety offer performance at low temperatures, decent capacity, and a good life cycle.**
- **NIMH (Nickel-Metal Hydride) - Short for nickel-metal hydride and also abbreviated as Ni-MH, NiMH is a rechargeable battery used primarily in portable computers. the NiMH has steadily improved, mainly in terms of energy density. Design engineers have indicated that the NiMH has the potential of higher energy densities.**

Basic Computer Organization

DEVELOPMENT OF COMPUTER/CALCULATOR TO SMART DEVICE

Abacus is known to be the first mechanical calculating device. Which was used to be performed addition and subtraction easily and speedily? This device was a first develop Ed by the Egyptians in the 10th centaury B.C, but it was given it final shape in the 12th centaury A.D. by the Chinese educationists.

NAPIER'S BONES John Napier's of Scotland invented a calculating device, in the year 1617 called the Napier Bones. In the device, Napier's used the bone rods of the counting purpose where some no. is printed on these rods. These rods that one can do addition, subtraction, multiplication and division easily.

Pascal's calculator In the year 1642, Blaise Pascal a French scientist invented an adding machine called Pascal's calculator, which represents the position of digit with the help of gears in it.

Leibnz Calculator In the year 1671, a German mathematics, Gottfried Leibniz modified the Pascal calculator and he developed a machine which could perform various calculation based on multiplication and division as well.

Analytical EngineIn the year 1833, a scientist form England knows to be Charles Babbage invented such a machine. Which could keep our data safely? This device was the first mechanical computer. Charles Babbage is also known as the father of the computer.

Basic Computer Organization

DEVELOPMENT OF COMPUTER/CALCULATOR TO SMART DEVICE

1943-1944: Two University of Pennsylvania professors, John Mauchly and J. Presper Eckert, build the Electronic Numerical Integrator and Calculator (ENIAC). Considered the grandfather of digital computers

1976: Steve Jobs and Steve Wozniak start Apple Computers on April Fool's Day and roll out the Apple I, the first computer with a single-circuit board, according to Stanford University.

2007: The iPhone brings many computer functions to the smartphone.

Basic Computer Organization

GENERATION OF COMPUTER

Generatio	Year	Characteristics
1st	1944-59	Use Valves (Vacuum tubes)
2nd	1959-64	Use transistors
3rd	1964-75	Large Scale Integrated Circuits
4th	1975-	Very Large Scale Integrated Circuits
5th	Under development	"Artificial Intelligence" based computers

Basic Computer Organization

Trouble shooting with parts of computer

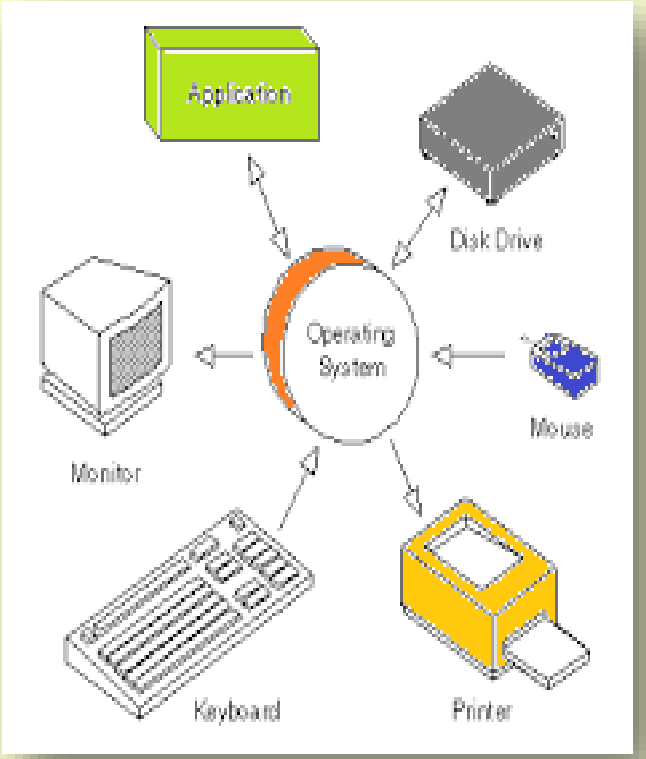
- First check the cable. Unplug it from the computer and the outlet. Re-plug in both sides and try booting it again.
- Check the wall outlet. Plug something else into the outlet and see if it works. If have a surge protector try a different outlet.
- Turn the system off and wait 30 seconds and then try again.
- Reach behind the machine and see if feel air blowing out of the power supply. If do, then you know the machine is getting some power.
- Look at the keyboard for the indicator lights being lit up as the machine boots.
- Sometimes the monitor has something to do with the system acting up. Unplug the power cord from the monitor and the wall and re-plug it. Unplug the cable from the computer to the monitor and re-plug it into the monitor. Try rebooting.

OPERATING SYSTEM

OPERATING SYSTEM

An Operating System (OS) is a system program that controls and manages the computer resources(resource manager) so that application software can run on it.

Example: Microsoft Windows, Solaris, Linux, MAC OS,Ubuntu, Apple's i-Phone OS etc.



OPERATING SYSTEM

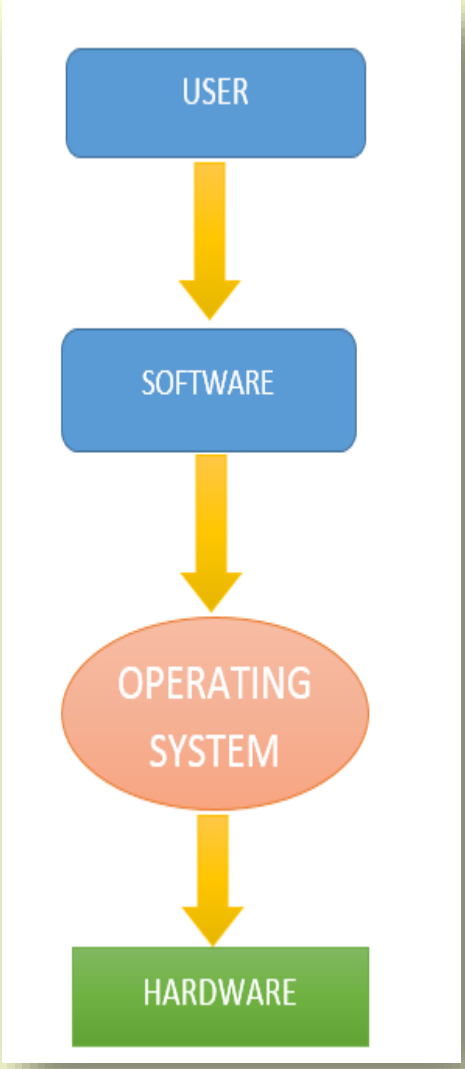
HOW OPERATING SYSTEM WORKS

In any computer or mobile device, the operating system can be termed as the back bone when it comes to software. This is because it has to be there before other programs can be run.It works as a middleman (interface) between machine and user.

At the simplest level, an operating system does two things:

- It manages the hardware resources of the computer system. These resources include such things as the processor, memory, disk space, etc.

- It provides a stable, consistent way for applications to deal with the hardware without having to know all the details of the hardware.



OPERATING SYSTEM

FUNCTIONS OF OPERATING SYSTEM

- **Processor management**

Loads, schedules and execute process/programs.

- **Memory management**

Allocates /De-allocation of memory for program execution.

- **Device management**

Communicate and controls various I/O devices.

- **Storage management**

Manages and controls the storage device to provide space to program for execution & data save.

- **Application interface**

API/drivers provide a way for applications to make use of hardware subsystems

- **User interface**

structure for interaction between a user and the computer

OPERATING SYSTEM

TYPE OF OPERATING SYSTEM

*** Single-User, Single Task Operating System:**

These operating systems work on single task & single user at a time.E.g. DOS

* **Single-User, Multi-Task Operating System:**

These operating systems works on more than one task and process them concurrently at a time.E.g. windows 95 or later version of windows

*** Multiuser Operating System:**

In these OS, multiple users are allowed to access the same data or information at a time via a **network**. E.g. Unix,Linux,Windows7.

*** Multiprocessing Operating System:**

Here, a single process runs on two or more processors. All the processing and their management takes place in a parallel way, hence this OS are also called as **Parallel Processing**. E.g. Linux, UNIX and Windows 7.

*** Embedded Operating System:**

These are embedded in a device, which is located in ROM.E.g. OS of microwaves,washing machine.

*** Distributed Operating System:**

In these OS, the computers work in co-operation with each other.