



INDIAN SCHOOL MUSCAT



CLASS XI

INFORMATION TECHNOLOGY(802)

Chapter -1: Computer Organization & OS : User Perspective

(REVISION)

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Some points to keep in mind.....



- Please avoid login from multiple systems.
- Kindly logout at the end of the session.
- Please turn off your mic and webcam
- If you have any doubt, write in the chat box
- If there is any technical problem, hold on – we will be back
- Since it is a lockdown situation you can use rough notebook or notepad or sheets of paper to take down notes. You may take screenshots during the course of delivery of topics.



This unit aims at making the students aware of the fundamental concepts of a computer system.

- Understanding of Hardware
- Basics of Operating System

The key concepts that will be addressed are

- Hardware
- Software
- Functionality of a computer Operating system
- Types of operating system



What is a computer?



In common terminology, we talk of a *computer* as a machine which executes a set of instructions provided by the user to produce the desired output. As per Oxford Dictionary, a *computer* is defined as “an electronic device which is capable of receiving information (data) in a particular form and of performing a sequence of operations in accordance with a predetermined but variable set of procedural instructions (program) to produce a result in the form of information or signals.”



The language understood by computers is what is termed as *binary language*, a language formulated as sequences of 0s and 1s. However, the instructions which are provided by the user are in the form of English like language. These therefore need to be converted to machine readable format (the binary format i.e. 0 and 1) and then processed by the machine.



Similarly, the result of the processing is also in a format understandable only to the machine.

This also needs to be converted back into a format which humans can understand. All this is achieved by an effective co-ordination of the components of the computer; broadly categorized as hardware and the software.



Characteristics of a computer



- **Speed:** A remarkable quality of computers is their ability to process data and instructions at a very high speed. A typical high-speed computer can perform about 3-4 *mips* (million instructions per second). Note that this is different from the speed with which information can be sent to and from a computer, which is normally measured in *baud*.
- **Versatility:** is the ability of a computer to do a variety of jobs with ease. One moment you can type a letter using any of the available word processing packages,



Characteristics continued...



and the other moment you can use the same machine to do calculations yielding the salaries of employees of an organization.

Accuracy: Not only does the machine performs varied jobs with high speed, but also does them with high precision and accuracy. Note that the errors that one may see in output produced by the computer is not because of the machine, but because of either wrong entry of data or wrong instructions given to compute. In computer terminology, this phenomena is often referred to as *GIGO* (Garbage In Garbage Out)



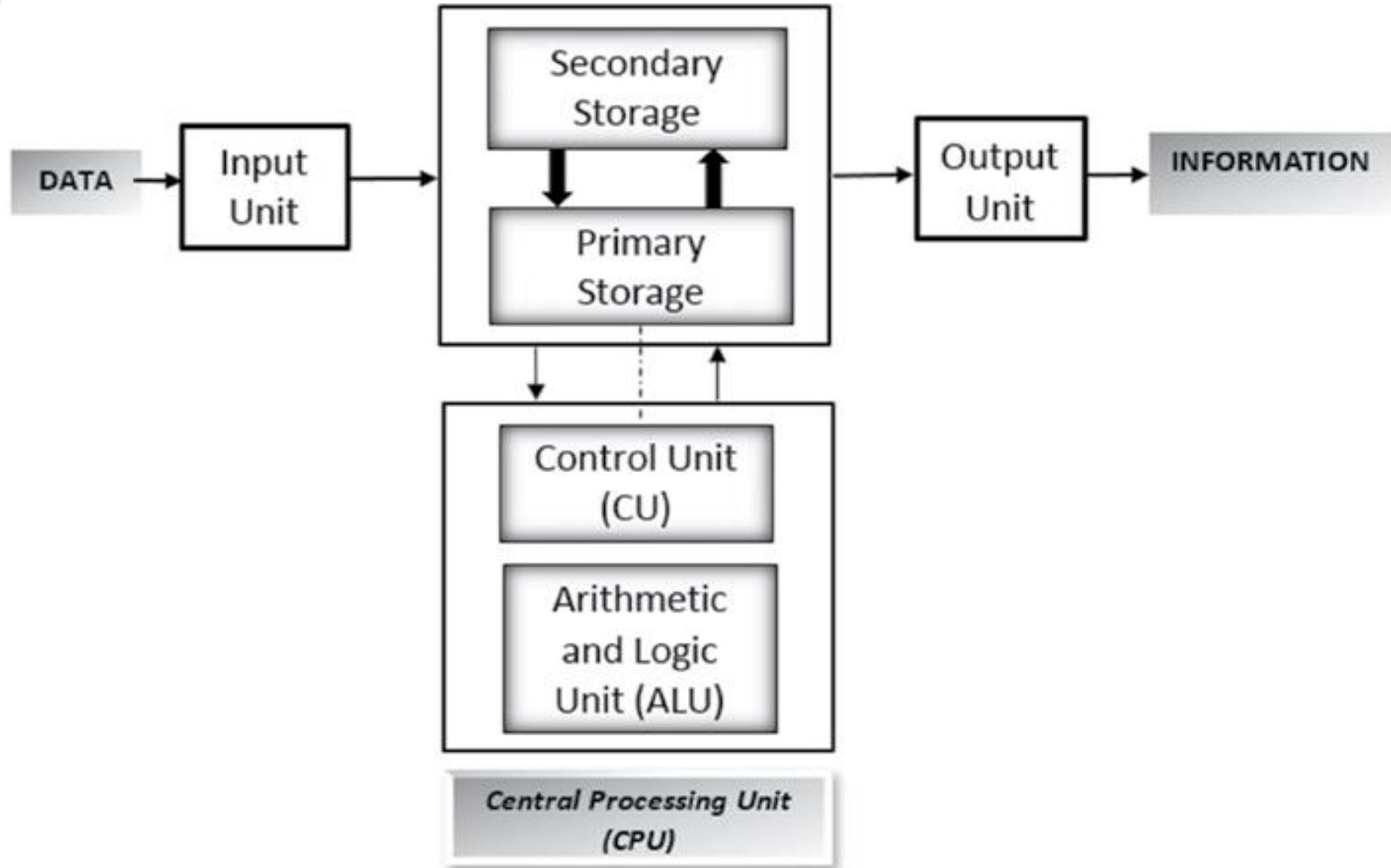
- **Diligence:** Another noteworthy feature of computer is its ability to perform the same task repeatedly over and over again without getting bored! For example a task of adding 1000 numbers repeatedly for 10000 times if given to a computer, it would be able to do the task with the same accuracy every time without complaining that it is being asked to do this job over and over again!!!
- **Memory:** One of the notable features of a computer is its memory. However, the computer's main memory is volatile, i.e., it is lost when we switch off the computer.



Therefore, computers are provided another form of memory that does not fade away when it is switched off. It is called *secondary memory* and is available in the form of floppy disks, pen drives, portable hard disks.

- **Storage:** Huge amount of data and information can be stored in a computer for future retrieval.
- **Intelligence:** In the early days, although computers possessed striking characteristics yet a prominent drawback was that they are merely dumb machines which were programmed to perform certain tasks.

Block diagram of a computer





Accepts Input: To initiate the process, the computer needs to be told of the problem to be solved. For this purpose, a set of instructions and data is provided through the input devices such as keyboard and mouse.

Storage: The inputs received in the above step are stored in the computer memory, called random access memory (RAM). It is also called main memory, primary memory, or working memory of the machine. All the inputs, the intermediate results of computation carried out, and the



final result are stored in the memory of the computer. The computer also has another form of memory called secondary memory.

Control Unit : The manner in which the program is to be executed is managed by the control unit of the computer. This unit decides the address from which the instructions to be executed is to be picked up, the memory location where the data or intermediate result is to be stored, etc.



Processing: The inputs provided by the user are processed by the central processing unit as per the specified instructions. The result of the processing is then either directed to the output devices or to a memory location for storage.

Provides Output: The outcome of the computation carried out by the computer is often directed to the display device such as the monitor or printer. Other forms of devices are not uncommon, for example, the computer may output music or video.



Arithmetic Logic Unit (ALU) is responsible for processing of data. It retrieves the data from the storage unit and performs the arithmetic calculations and/or comparisons on them and the processed data is then sent back to the storage.

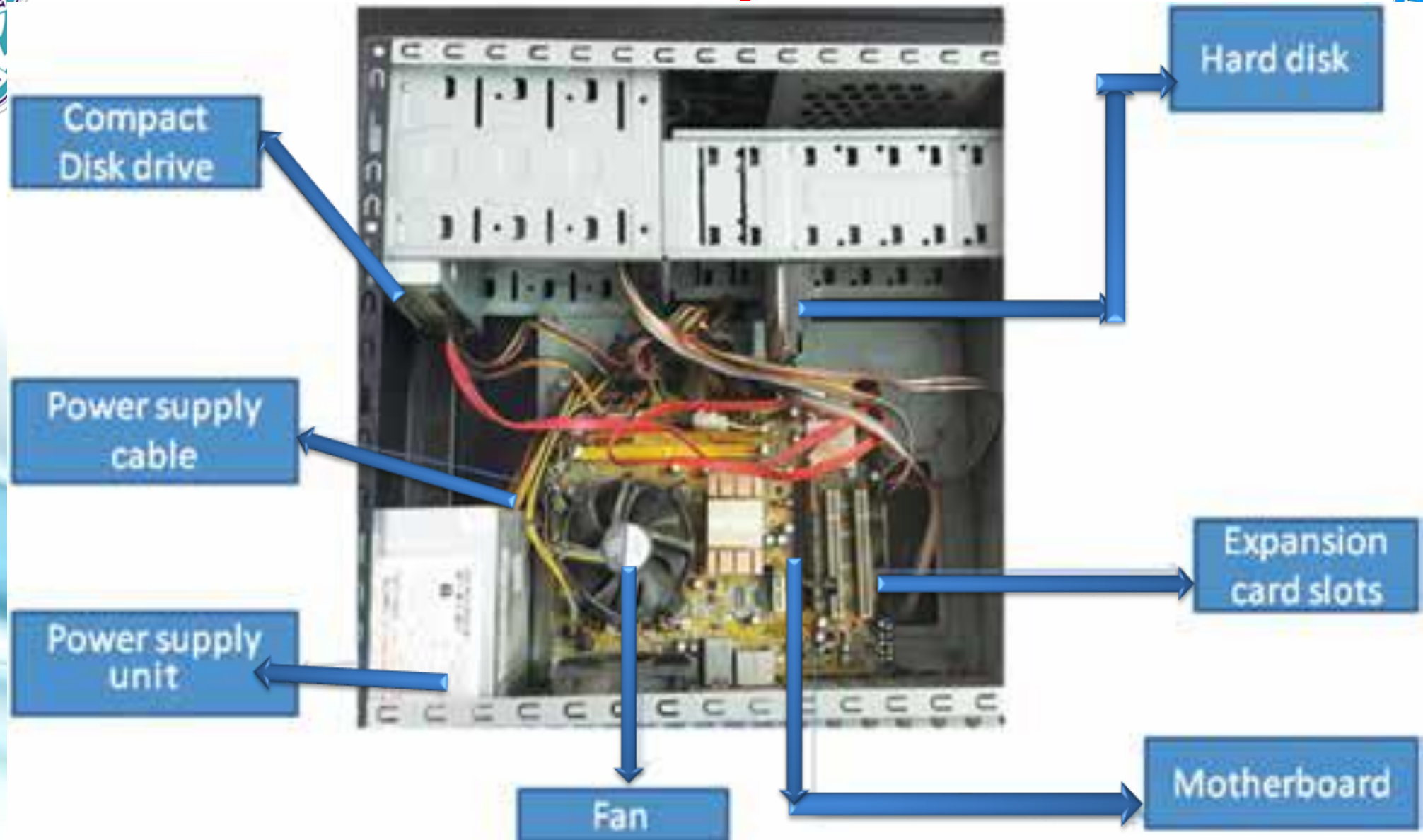
Primary Storage: The main memory in the computer, also called primary storage comprises of RAM. This storage is relatively fast and expensive as compared to the secondary storage. These are directly connected to the CPU.



Secondary Storage: The memory which is external to the computer system forms the secondary storage, for example, the magnetic tapes, compact disks, pen drives are all example of the secondary storage. These are not directly connected to the CPU.



Inside the computer





Components



Motherboard: This is the main circuit board which holds together various components like CPU, memory, connectors for the hard drive and optical drives, expansion cards to control the video and audio, and connections in the form of various ports (such as USB ports). It provides a connection to every component of the computer. The motherboard houses the main processor or the CPU (Central Processing Unit). CPU executes the user instruction and coordinates amongst all other units of the computer.



There are a variety of processors in the market categorized on the basis of the speed, technology (dual-core, quad-core, octa-core) and their manufacturers (Intel and AMD to name just two). Speed of a processor usually measured in megahertz (MHz) – millions of instructions per second; and gigahertz (GHz) – billions of instructions per second, is indicative of its power.



Motherboard diagram



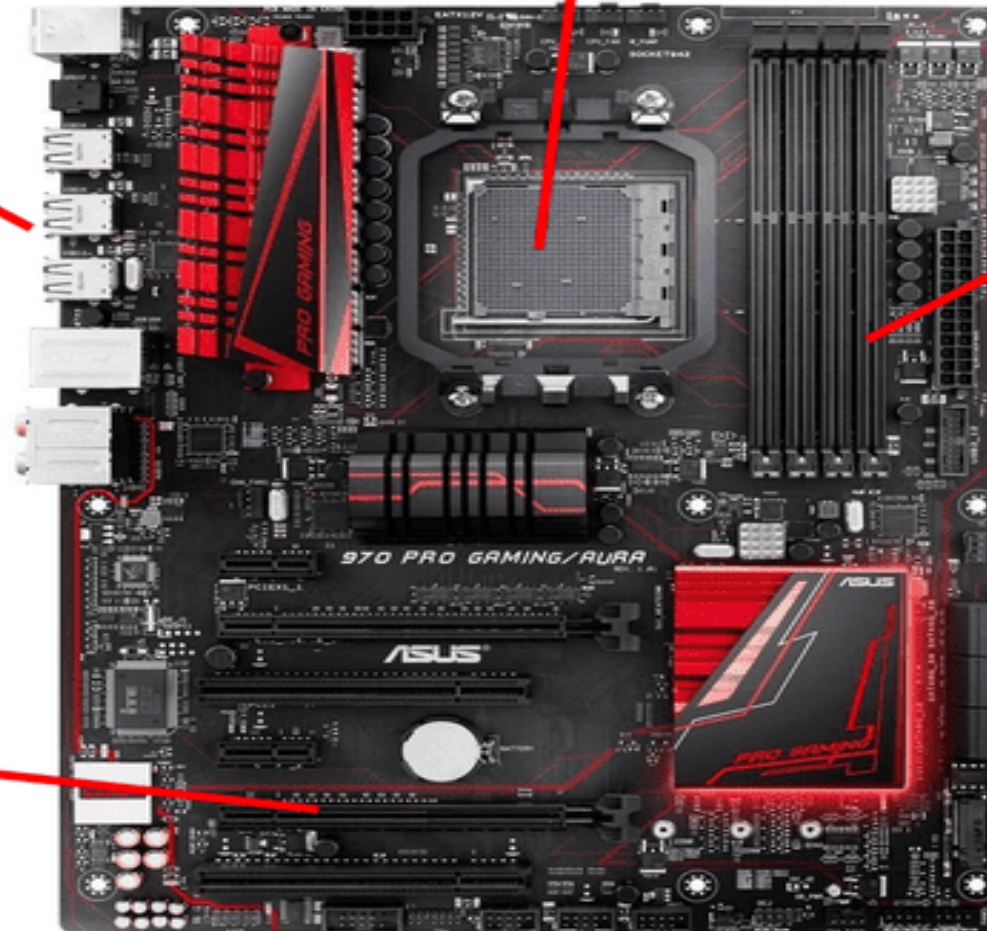
Back Panel
Connectors

CPU Socket

Memory
Slots

Expansion
Slots

Storage Drive
Connections





Power Supply Unit: This component of the computer is the one which converts the alternate current power supply being received by homes or offices to the low voltage direct current required by the machine.

Power Supply Unit





CPU



CPU: The motherboard houses the main processor or the CPU (Central Processing Unit). CPU executes the user instruction and coordinates amongst all other units of the computer. Thus, it is primarily responsible for the performance of the machine. There are a variety of processors in the market categorized on the basis of their speed, technology (dual-core, quad-core, octa-core) and their manufacturers (Intel and AMD to name just two).



CPU



Speed of a processor usually measured in megahertz(MHz) – millions of instructions per second; and gigahertz (GHz) – billions of instructions per second, is indicative of its power.



HARD DISK



Hard disk: It is the secondary storage device for storing the data. The program which is to be executed is first stored in the hard disk from where it is transferred to RAM. On completion of work, the program is again saved on the hard disk.



HARD DISK (HDD)



Two sided view of a sealed hard disk unit



It is usually characterized by the performance and its capacity. Memory capacity is specified in terms of bytes. These days the capacity of a hard disk is expressed in terms of Gigabytes, Terabytes.



Everything in computer is stored in terms of Bits (Binary Digits) i.e 0's and 1's



1 nibble = 4 bits

1 byte = 8 bits

1024 bytes = 1 Kilobyte (KB)

1024 KB = 1 Megabyte (MB)

1024 MB = 1 Gigabyte (GB)

1024 GB = 1 Terabyte (TB)

1024 TB = 1 Petabyte (PB)

1024 PB = 1 Exa Byte (EB)

1024 EB = 1 Zetta Byte (ZB)



COMPACT DISK DRIVE(CD/DVD DRIVE)





Random Access Memory (RAM): This memory storage plays an important role in the functioning of a computer system. Every time you start up the computer, the *operating system* (the system software that manages the device's interaction with the peripherals and the internal resources) is loaded in the RAM.



The program that needs to be executed at any point of time also needs to be brought in the RAM. These days the PCs have around 8-32 GB RAM. More the RAM, more will be the space for the programs leading to faster execution. Of course, everything in computers is subject to some limits.



Operating system



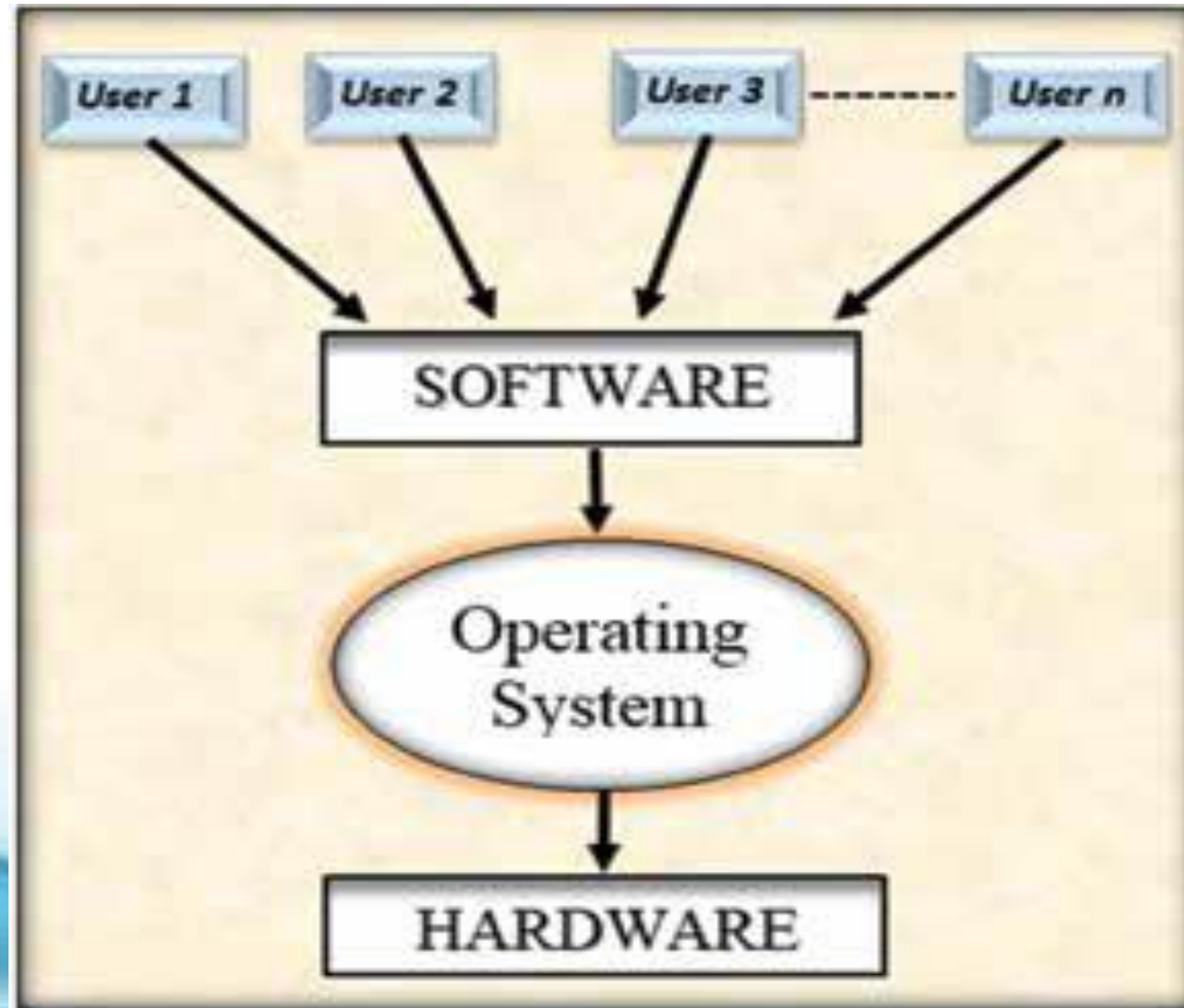
A computer needs to communicate with both the hardware and software; to do this; it utilizes the services of an *Operating system*. Examples of some popular operating system are Windows, Linux, Unix, MS-DOS, SOLARIS, MAC OS. The operating system acts as an interface between the users of the system and hardware of the system.



Operating system continued.....



It also acts like a government which lays down policies for efficient utilization of the resources and provides for effective co-ordination amongst the various components of a computer. Every computer system whether it is an independent system like a desktop or a cell phone must have an operating system for performing the core functionalities like accepting input from various input devices, directing the output to the display, managing the files and directories, communicating with hardware, and installing/ uninstalling of peripheral devices.



Operating system an interface

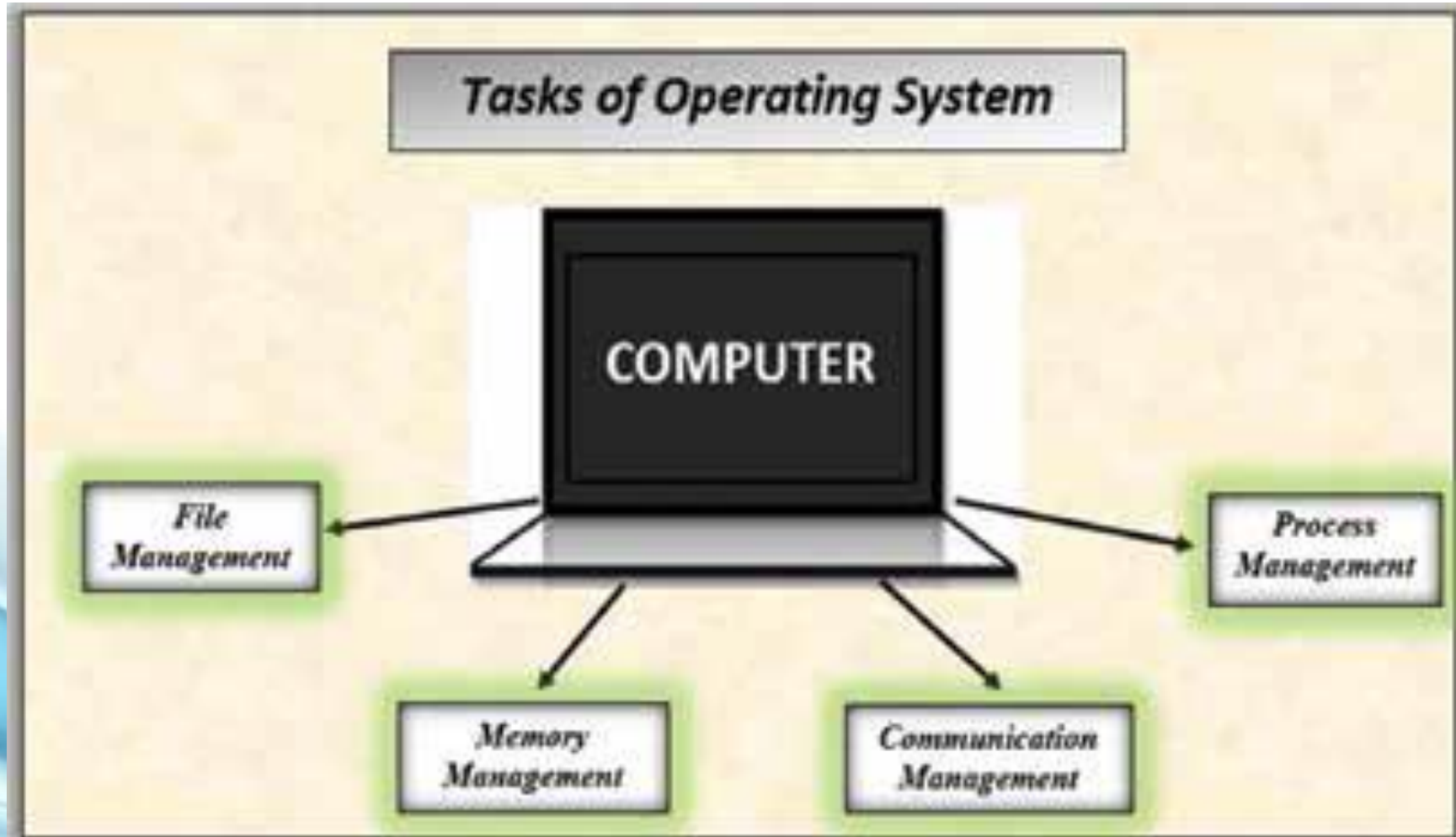


Functions of an Operating system



The prime functions of an operating system can be broadly categorized as:

- Providing for communication between User and computer
- Resource management
- Process management
- File management
- Memory management



Various tasks of operating system



Communication Manager: Manages the communication needs of the system, be it communicating with the peripheral devices or the internet, are addressed by the operating system. Each of the peripheral devices like printer, mouse have unique characteristics and the computer needs to know these unique properties, to interact with them. For this, the operating system uses special programs called *drivers* which enable recognition of these devices and their properties.



Resource Management: The working of a computer system is predominantly dependent on how its resources are being managed. The resources that we talk of here; are the memory of the computer, the CPU time, files, secondary storage, input/output devices etc. The operating system handles the allocation of all such resources, the priority in which these are allotted to the various processes to get an optimum performance from the system.



Process Management: A process is a program currently executing in the memory or waiting for the CPU. In a computer there are multiple processes in the system. The OS manages, controls, schedules all the processes being executed in the computer. It decides which process gets the processor and for how long.



Memory Management: For a process to be executed, it has to be loaded in the working memory that is the RAM (Random Access Memory). The memory management component of an operating system allocates memory to the processes in a dynamic manner that is allocated on demand and released when not needed.



File Management: Operating system takes care of all the files and folders (directories) maintained on the computer disk. The basic tasks that a user needs to perform on files are creation, renaming, deletion, copying or moving of a file or folder. All the files stored in a computer system can be located through the file system. Two main types of file system are File Allocation table (FAT) or New Technology File system (NTFS).



Types of Operating System



Operating systems can be classified in different ways; depending on various parameters.

Single-tasking and Multi-tasking

Single tasking such operating systems allow execution of only a single program at any given instant. Eg: OS used in mobile phones(Android OS)

Mutli-tasking As the name suggests, can execute more than one programs simultaneously. The processor time, in this case, is divided amongst various processes.

Eg: Windows, Linux



Operating System continued...



Single user and Multi-user

Single-user operating systems allow only one user to use the system. The desktop systems can be classified as typical single user systems.

Eg: Windows, Mac OS X

Multi-user operating systems allow many users to access the system by maintaining an account of all the registered users. Eg: Linux, Unix



Operating System continued...



Real-time Operating System

Operating systems which ensure that the response time is fixed are categorized as real-time operating systems. They are intended for applications where data needs to be processed quickly, without any significant delays. For example, an anti-aircraft missile system must fire as soon as it receives signal from the enemy aircraft, before it leaves the bomb and flies away.

Usage: Traffic Lights control, Heart rate monitoring, Aircraft control, Controlling robots. Eg: IBM's [OS/390](#)



Operating System continued...



Batch Processing Systems

In a batch processing systems, similar jobs are clubbed together and submitted as a block to the processor for execution. User intervention is minimal in such systems. The jobs are picked up one by one and executed.

Usage: Electricity, Gas and telephone bills calculated on a monthly basis. Eg: IBSYS for IBM's 709x



Worksheet-1



1.	What is a computer?
2.	What are the characteristics of a computer? Explain.
3.	Draw a neat block diagram of a computer system and label the blocks.
4.	Write short notes on : a) Input unit. b) CPU. c) ALU. d) Control unit. e) Output Unit.
5.	Discuss on Primary storage (RAM) and Secondary storage.



Worksheet-1 Continued.....



5.	Write short notes on: a) Units of memory. b) Motherboard. c) Power Supply Unit.
6.	What do you mean by an operating system? Explain.
7.	Name 4 commonly used operating systems.
8.	Draw a neat block diagram of Operating system as an interface and label the parts.



Worksheet-1 Continued.....



9.	Explain in detail about the functions of an operating system.
10.	Write short notes on: a) Single Tasking and Multitasking OS. b) Single user and Multi-user OS. c) Real time OS. d) Batch Processing OS.



Any Questions?