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Lec # 1

Introduction To Information Technology

Fundamental means:

- Being a core component or fact upon which other aspects are built
- A central or primary rule or principle on which something is based
- The main or most important rules or parts
- A basic principle, rule, law, or the like, that serves as the groundwork of a system;
- Essential part: to master the fundamentals of a trade.

Data : Collection of raw, facts and figures. It may consist of numbers,chracters,symbol or pictures

Information : to know anything .
Processed data is called information

Technology : way out to get the required work done efficiently:

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Information technology

(IT) is the use of any computers, storage, networking and other physical devices, infrastructure and processes to create, process, store, secure and exchange all forms of electronic data.

- Information technology is the technology that uses computing with high speed communication links to spread information from one place to another.
- Computer is a very important component of information technology
- The world has become "global village" due to advancement in IT.

The term global village represents the simplifying of the whole world into one village through the use of electronic media.

Computer
A computer is an electronic device, operating under the control of instructions stored in its own memory that can accept data (input), process the data according to specified rules, produce information (output), and store the information for future use[1].

Functionalities of a computer[2]
Any digital computer carries out five functions in gross terms:
- Takes data as input.
- Stores the data/instructions in its memory and use them when required.
- Processes the data and converts it into useful information.
- Generates the output
- Controls all the above four steps.

Computer Components
Any kind of computers consists of **HARDWARE** AND **SOFTWARE**.

- A computer is an electronic device that process data, converting it into information that is useful to people.

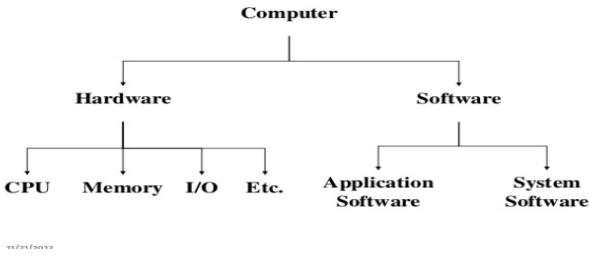
- A computer is controlled by the programmed instructions, which give the machine a purpose and tell what to do.

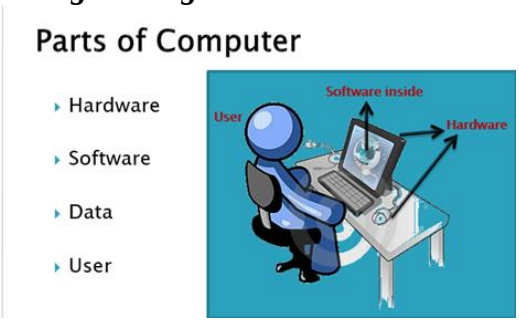
- **Modern computers are digital**
  - Two digits combine to make data
- **Older computers were analog**
  - A range of values made data

i) Analog Computers:

- An analog computer recognizes data as a continuous measurement of a physical property.
- It has no state
- Its output is usually displayed on a meter or graphs.
- Examples are Analog clock, speed of a car, thermometer etc

- It works with numbers
- They breaks all types of information into tiny units and use numbers to represent those pieces of information.
- Everything is described in two states i.e. either ON (1) or OFF (0).
- They are very fast and have big memory





Hardware:

- Computer hardware is the collection of physical elements that constitutes a computer system.
- Computer hardware refers to the physical parts or components of a computer such as the monitor, mouse, keyboard, computer data storage, hard drive disk (HDD), system unit (graphic cards, sound cards, memory, motherboard and chips), etc. all of which are physical objects that can be touched.

Software:

Software is a set of instructions that tell the computer what to do.

Software is a generic term for organized collections of computer data and instructions, often broken into two major categories:

- System Software
- Application Software

Computer can be classified as a:

Structure *is the way in which components relate to each other*

- *(a) CPU*
- *(b) MM*
- *(c) I/O*
- *(d) System Interconnection*

Function is the operation of individual components as part of the structure

- All computer functions are:
    - Data processing
    - Data storage
    - Data movement
    - Control

(a). Central Processing Unit (CPU) :A CPU is brain of a computer. It is responsible for all functions and processes. Regarding computing power, the CPU is the most important element of a computer system.

The CPU is comprised of three main parts : *

(i) Arithmetic Logic Unit (ALU): Executes all arithmetic and logical operations. Arithmetic calculations like as addition, subtraction, multiplication and division. Logical operation like compare numbers, letters, or special characters *

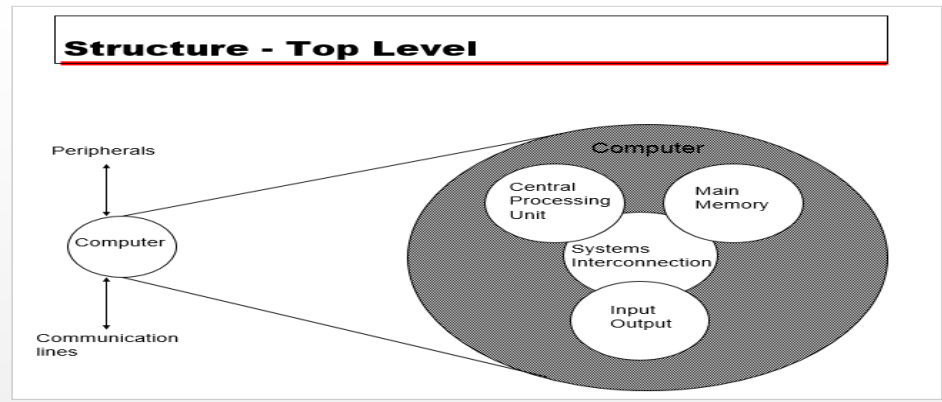
(ii) Control Unit (CU): controls and co-ordinates computer components.

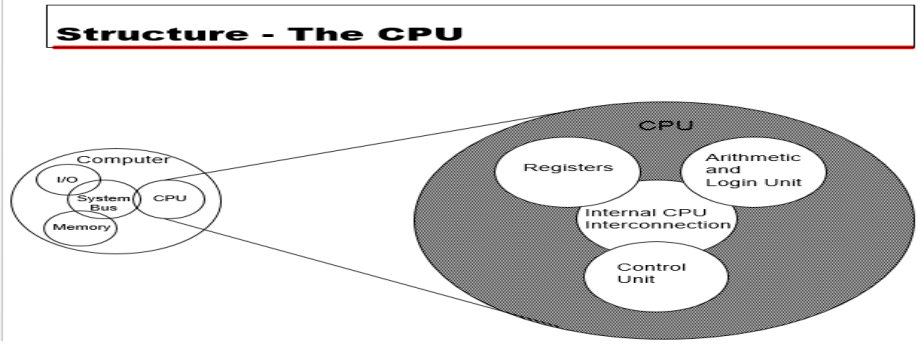
- ✓ Read the code for the next instruction to be executed.
- ✓ Increment the program counter so it points to the next instruction.
- ✓ Read whatever data the instruction requires from cells in memory.
- ✓ Provide the necessary data to an ALU or register.
- ✓ If the instruction requires an ALU or specialized hardware to complete, instruct the hardware to perform the requested operation. *

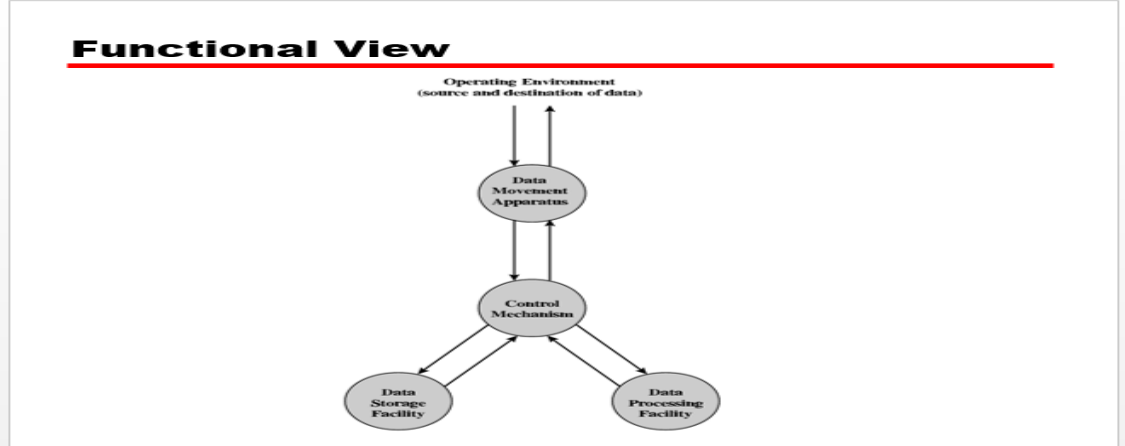
(iii) CPU Inter connection: Provide communication among CU , ALU & Register

(iv) Registers :Stores the data that is to be executed next, "very fast storage area".

- High Speed Storage Element
- Register can be General Purpose or Special Purpopse



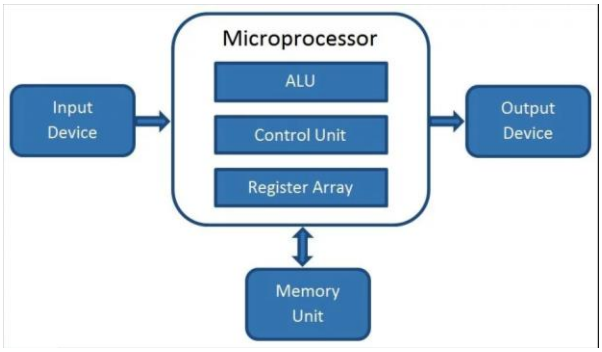




Microprocessor:

A **microprocessor** is an integrated circuit (IC) which incorporates core functions of a computer's central processing unit (CPU). It is a programmable multipurpose silicon chip, clock driven, register based, accepts binary data as input and provides output after processing it as per the instructions stored in the memory

The microprocessor, also known as the Central Processing Unit (CPU), is the brain of all computers and many household and electronic devices



How does a Microprocessor work?

A processor is the brain of a computer which basically consists of Arithmetical and Logical Unit (ALU), Control Unit and Register Array. As the name indicates ALU performs all arithmetic and logical operations on the data received from input devices or memory. Register array consists of a series of registers like accumulator (A), B, C, D etc. which acts as temporary fast access memory locations for processing data. As the name indicates, control unit controls the flow of instructions and data throughout the system.

So basically a microprocessor takes input from input devices, process it as per instructions given in the memory and produces output.

Advantages of a Microprocessor

- **Low Cost**
  Microprocessors are available at low cost due to integrated circuit technology. Which will reduce the cost of a computer system.
- **High Speed**
  Microprocessor chips can work at very high speed due to the technology involved in it. It is capable of executing millions of instructions per second.
- **Small Size**
  Due to very large scale and ultra large scale integration technology, a microprocessor is fabricated in a very less footprint. This will reduce the size of the entire computer system.
- **Versatile**
  Microprocessors are very versatile, the same chip can be used for a number of applications by simply changing the program (instructions stored in the memory).
- **Low Power Consumption**
  Microprocessors are usually manufactured using metal oxide semiconductor technology, in which MOSFETs (Metal Oxide Semiconductor Field Effect Transistors) are working in saturation and cut off modes. So the power consumption is very low compared to others.
- **Less Heat Generation**
  Compared to vacuum tube devices, semiconductor devices won't emit that much heat.
- **Reliable**
  Microprocessors are very reliable, failure rate is very less as semiconductor technology is used.
- **Portable**
  Devices or computer system made with microprocessors can be made portable due to the small size and low power consumption

Types of Computers

1. Supercomputers, Most powerful type of computer with High data capacity ,and used by large organization
2. Mainframe computers (Less powerful then supercomputers but still Capable of great processing speed and Large data storage capacity ,
3. Minicomputers(midrange computers), Desk-sized machines
4. Microcomputers(Least powerful but most popular)
5. Network Sever.

1.

Supercomputers

- Fastest computer
- Can cost one million to 350 million dollars
- looks like rows of refrigerator-size boxes
- Consists of thousands of processors and can carry out several trillion calculations per second.
- Used for computer simulations
  - tracking hurricanes, biological contamination, or understanding ocean currents.

2.

Mainframes

- Small mainframes (mid-size computers or minicomputers).
- 5,000 to 5 million dollars
- Used in large organizations – banks, airlines, insurance companies, colleges.
- Processes billions of instructions per second.
- Often used with a terminal.

3.

- Mini computer :
  - Mini computers somewhere between main frame and personal computers
  - Like main frame, mini computers can handle much more input and output than personal computers
  - A multi-user computer capable of supporting from 10 to hundreds of users simultaneously.

- **4.**

Servers

- The word "server" refers to how a computer is used.
- Server - a central computer that holds collections of data & programs for clients
- Clients - PCs, workstations, & other devices attached to a server
- Server + Clients linked together form a client/server network

5. Computers for Individual User /Personal Computers:

Microcomputers

- Least powerful but most popular
- Sizes range from desktop to handheld
- Includes:
  1. Desktop - fit on desk tops, but not portable
  2. Laptop(notebook) - portable
  3. Tablet PC type of notebook that accept handwriting .
  4. PDAs- Personal digital assistants, also called palmtop computers, or handheld computers

- ✓ Any computer system that is designed for use by a single person.
- ✓ Also known as "Microcomputers".
- ✓ Among the smallest computer created for people.
- ✓ Mention below all systems are Personal Computers (PC).
  - Desktop Computers
  - Workstations
  - Notebook Computers
  - Tablet Computers
  - Handheld Computers
  - Smart Phones

i). Desktop/PC:

- A PC that is designed to sit on a desk or table.
- Mostly used in school, homes and offices.
- People do their job with greater ease and efficiency but they can be used to communicate, produce music, edit photographs and videos, play games and much more.

ii) Workstations

- A powerful, single-user computer. A workstation is like a personal computer, but it has a more powerful microprocessor and a higher-quality monitor
- Specialized computers
- Optimized for science ,graphics or engineering purpose
- More powerful than a desktop

iii) Notebook Computers

- Small portable computers
- Weighs between 3 and 8 pounds
- About 8 ½ by 11 inches
- Typically as powerful as a desktop also called laptop

iv) Tablet Computers

- Newest development in portable computers
- Input is through a pen (stylus)
- Run specialized versions of office products
- Can be connected to keyboard and full sized monitors

v) Handheld Computers

- Small enough to fit on hand
- Personal Digital Assistant (PDAs)
- Used for taking notes, addresses and agendas.

vi) Smartphones

- Some cellular phones offer advanced features that is usually not found in mobiles.
- Like Web and email access
- Special software and hardware
- A smartphone is a powerful mobile phone that is designed to run a variety of applications in addition to phone service.
- They are basically small tablet computers, and they can be used for web browsing, watching videos, reading e-books, playing games and more.