

BASIC COMPUTER ARCHITECTURE

BHARAT SCHOOL OF BANKING- VELLORE

The system concept: A system is a group of integrated parts, which have the common purpose of achieving some objectives.

Some properties of system are-

- (i) A system has more than one element.
- (ii) All the elements of a system are logically related.
- (iii) All the elements of a system are controlled in a manner to achieve the system goal.

A complete computer system consists of four parts:

- Hardware
- Software
- One or more user
- Data

Hardware:

The physical devices that make up the computer are called hardware. Hardware is any part of the computer you can touch.

The term device refers to any piece of hardware.

Hardware has many parts and the critical components fall into one of four categories.

- Processor
- Memory
- Input and Output device
- Storage

The Processor:

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The procedure that transforms raw data into information is called processor. The processor is like the brain of the computer; it organizes and carries out instructions that come from either the user or the software. In a personal computer, the processor usually consists of one or more microprocessors (sometimes called chips). The motherboard is a rigid rectangular card containing the circuitry that connects the processor to the other hardware. The term central processing unit (CPU) refers to a computer's processor.

Memory:

Memory is like an electronic scratch pad inside the computer. When you launch a program, it is loaded into and run from memory. Data used by the program is also loaded into memory for fast access. As new data is entered into the computer, it is also stored in memory-but only temporarily. The most common type of memory is called random access memory, or RAM. As a result, the term memory is commonly used to mean to RAM. Data is both written to and read from this memory. For this reason RAM is also sometimes called read / write memory.

One of the most important factors affecting the speed and power of computer is the amount of RAM it has. Generally, the more RAM a computer has, the more it can do and the faster it can perform certain tasks. Computers use other types of memory, too. Examples are read-only memory (ROM), which permanently stores instructions that the computer needs to operate; flash memory, like the kind used in digital cameras to store images; and cache memory, which helps the CPU retrieve data and instructions more quickly.

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Input and Output Devices:

Input Devices:

The most common input device is the keyboard which accepts letters, numbers and commands from the user. Another important type of input device is the mouse, which let you select options from on-screen menus. Other popular input devices are trackballs, touchpads, joysticks, scanners, digital cameras and microphones.

Output Device:

The most common Output devices are the monitor and the printer. Just as computers can accepts sound as input, they can use stereo speakers or headphones as output devices to produce a sound.

Some types of hardware can act as both input and output devices. A touch screen, for example, is a type of monitor that displays text or icons you can touch.

Communications devices are the most common types of devices that can perform both input and output.

Storage:

The purpose of storage is to hold data permanently.

There are three major distinctions between storage and memory-

(i) There is more room in storage than in memory, just as there is more room in a file cabinet that there is on a tabletop.

(ii) Contents are retained in storage when the computer is turned off, whereas the programs or the data you put into memory disappear when you shut down the computer.

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(iii) Storage is very slow compared to memory, but it is much cheaper than memory.

There are many types of storage devices, including tape drives, optical drives, and removable hard drives. The most common storage medium is the magnetic disk. A disk is a round, flat object that spins around its center. The device that holds a disk is called a disk drive.

The **CD-ROM** drive is another common type of storage device. Compact disks (**CDs**) are a type of optical storage device, identical to audio **CDs**. Until recently, a standard **CD** could store 74 minutes of audio or 650 **MB** of data. A newer breed of **CDs** can hold 80 minutes of audio or 700-**MB** of data. The type used in computers is called Compact Disk-Read-Only Memory (**CD-ROM**). If you purchase a **CD-Recordable (CD-R)** drive, you have the option of creating your own **CDs**. A **CD-R** drive can write data to and read data from a compact disk. To create your own compact disks, you must use special **CD-R** disks, which can be written on only once, or **CD-Rewritable (CD-RW)** disks, which can be written to multiple times, like a floppy disk.

Another increasingly popular data storage technology is the Digital Video Disk (**DVD**), which is revolutionizing home entertainment. Using sophisticated compression technologies, a single **DVD** can store an entire full-length movie. **DVDs** can hold a minimum of 4.7 **GB** of data and as much as 17 **GB**.

Software: Software is a set of instructions that makes the computer perform tasks. The term program refers to any piece of software. In another word, the ingredient that enables a computer

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to perform a special task is software, which consists of electronic instructions.

Most Software falls into two major categories:

- System Software
- Application Software

System Software are of two types:

- Operating System
- Network Operating System

Operating System: It tells the computer how to use its own components.

Network Operating System: It allows computers to communicate and share data across a Network.

Application Software: It tells the computer how to accomplish specific tasks, such as word processing or drawing, for user.

Users

People are the computer operators, also known as users.

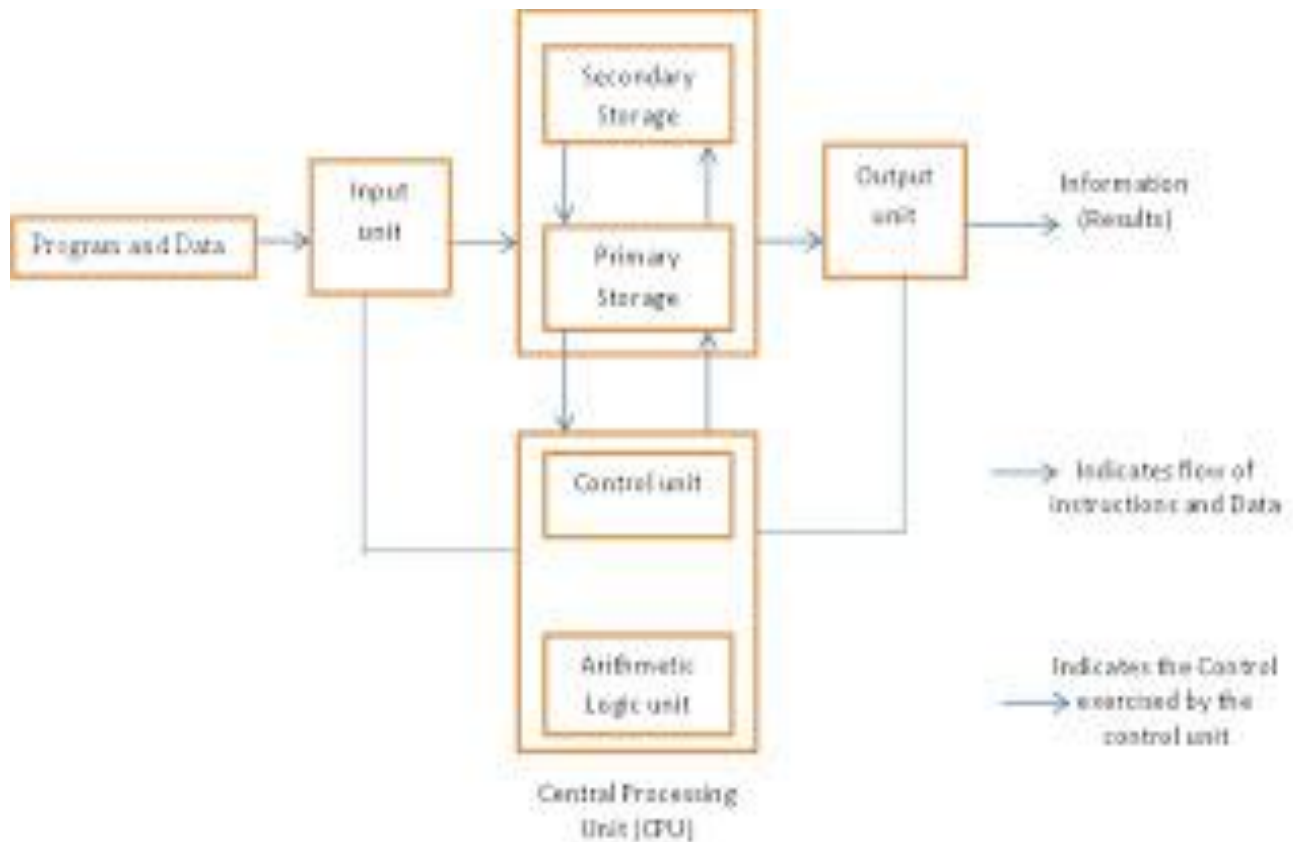
Data

Data consists of individual facts or bits of information which by themselves may not make much sense to person.

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Basic Organization of a Computer System

Input Unit:

The following functions are performed by an Input unit:

- (i) It accepts (reads) the instructions and data from the outside world.
- (ii) It converts these instructions and data in computer acceptable form.
- (iii) It supplies the converted instructions and data to the computer system for further processing.

Output Unit:

The following functions are performed by an Output unit:

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- (i) It accepts the results produced by the computer, which are in coded form and hence, cannot be easily understood by us.
- (ii) It converts these coded results to human acceptable (readable) form.
- (iii) It supplies the converted results to the Outside world.

Storage Unit:

The specific functions of the storage unit are to hold (store)

- (i) The data and instructions required for processing (received from input devices).
- (ii) Intermediate results of processing.
- (iii) Final results of processing, before these results are released to an output device.

The storage unit of all computers is comprised of the following two types of storage.

Primary Storage: The primary storage, also known as main memory, is used to hold pieces of program instructions and data, intermediate results of processing, and recently produced results of processing, of the Jobs, which the computer system is currently working on. The primary memory can hold information only while the computer system is on. As soon as the computer system is switched off or reset, the information held in the primary storage disappears.

Secondary Storage: The Secondary Storage, also known as auxiliary storage, is used to take care of the limitations of the primary storage. That is, it is used to supplement the limited

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storage capacity and the volatile characteristic of primary memory. This is because secondary storage is much cheaper than primary storage, and it can retain information even when the computer system is switched off or reset. The secondary storage is normally used to hold the program instructions, data, and information of those Jobs, on which the computer system is not working on currently, but needs to hold them for processing later.

Arithmetic Logic Unit:

The Arithmetic Logic Unit (**ALU**) of a computer system is the place, where the actual execution of the instructions takes place during the processing operation. To be more precise, calculations are performed, and all comparisons (decisions) are made in the **ALU**. Almost all **ALUs** are designed to performed the four basic arithmetic operations (add subtract, multiply and divide), and logic operations or comparisons, such as less than, equal to, and greater than.

Control Unit:

How does the input device know that it is time for it to feed data into the storage unit? How does the **ALU** know what should be done with the data once they are received? Moreover, how is it that only the final results are sent to the output device, and not the intermediate results? All this is possible due to the control unit of the computer system. Although, it does not perform any actual processing on the data, the control unit acts as a central nervous system, for the other components of the computer system. It manages and co-ordinates the entire computer system. It obtains instructions from the program stored in main memory,

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interprets the instructions and issues signals, which cause other units of the system to execute them.

Central Processing Unit:

The control unit and arithmetic logic unit of a computer system are jointly known as the Central Processing Unit (**CPU**)

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