



BOOKMARK

Computer Science



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Student Learning Outcomes

- ◆ To review the computer components.

Computer hardware consists of physical equipments. It includes not only peripherals but also essential parts that are present in the computer system. This chapter explains the details of components of a computer which are as follows:

1. Input devices
2. Central Processing Unit
3. Storage devices
4. Output Devices

**Motherboard**

This is the main circuit board of a microcomputer. The motherboard contains connectors for attaching additional devices. Typically, the motherboard contains CPU, BIOS, memory, storage, expansion slots and all the controllers required to control standard peripheral devices, such as the display screen, keyboard and disk drive.

**Microprocessor**

This is a silicon chip that contains CPU. In the world of personal computers, the terms microprocessor and CPU are used interchangeably. At the heart of all personal computers and most workstations sits a microprocessor. Microprocessors also control the logic of almost all digital devices, from clock radios to fuel-injection systems for automobiles.

Central Processing Unit (CPU)

The Central Processing Unit (CPU) is the brain of a computer system. We use the CPU to control all input and output connections inside and outside a computer and the programs that are currently present in a computer are worked upon to produce the correct answer for the user.

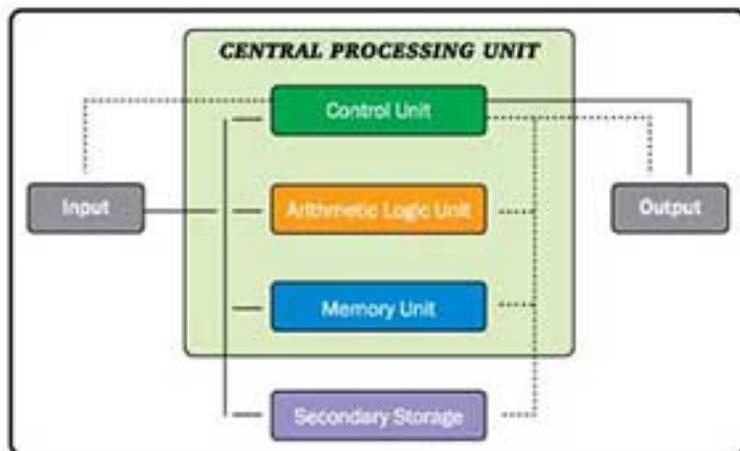
Functions of the CPU

- ◆ Sorts the data instructions.
- ◆ Controls the sequence of operations.

- Gives commands to all parts of the computer system.
- Carries out processing.
- Performs arithmetic and logical operations.

The CPU is divided into three parts

1. Control Unit (CU)
2. Arithmetic Logic Unit (ALU)
3. Memory Unit (MU)



1. Control Unit (CU)

The Control Unit (CU) acts like a supervisor. It monitors all the operations ensuring that all operations are performed orderly. The control unit (CU) directs and coordinates the entire computer system. Its functions involve controlling the input/output units, arithmetic logical operation of the CPU, transmitting data to and from the main memory.

2. Arithmetic Logic Unit (ALU)

The ALU performs arithmetic calculations such as addition, subtraction, multiplication and logical functions such as comparison of two numbers. For example $A+B$, $A \times B$ are arithmetic functions. If salary is 30000 then bonus will be 3000 is a logical function.

Registers

Registers are special storage areas built-in a microprocessor to access data at a high speed. There are fourteen registers in a microprocessor. The new microprocessors have a few more registers for specific reasons.

3. Memory Unit (MU)

Memory Unit (MU) is the place where the computer programs and data are stored during processing. There are two types of memory: internal memory and external memory. Internal memory is a set of chips located on the motherboard; while external memory are physical devices for backups that are separated from the motherboard. The internal memory consists of the following two types:

- a) RAM
- b) ROM

a) RAM (Random Access Memory)

It is the part of main memory where data and program instructions are held while being processed. This type of memory allows you to enter data into memory (writing) and then to retrieve data from it (reading). It is purely a temporary memory and if once the computer is switched off, everything in RAM is wiped out. In other words, it is a volatile memory.

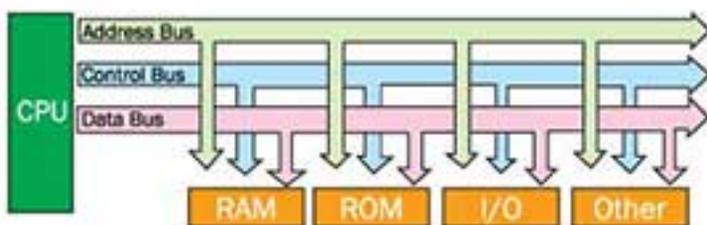
b) ROM (Read Only Memory)

The information stored in ROM can only be read. It may contain information such as how to start the computer and it also gives instructions to the internal operating system. The actual contents of ROM are usually set by the manufacturer. It is a nonvolatile memory, because it is permanent and does not lose information when the power is switched off.

Busses

The CU, ALU and the main memory have links to communicate with each other. Each of this link is called a BUS. Bus is a thin metallic line which allows to transmit data and instructions. A bus is a single highway which is used to interconnect various components of the system. There are three kinds of buses:

- a) Control Bus
- b) Address Bus
- c) Data Bus



External Memory

To store data and information permanently, we use external memory. It consists of floppy disks, hard disk, magnetic tape, USB, CD-ROM etc.

Input and Output Devices

Input devices are those by which data can be entered into the computer; while output devices means those devices which receive information from the CPU and present it in a readable form.

Student Learning Outcomes

- To differentiate between external and internal memory.
- To describe units of memory; expansion slots and cards.

Memory refers to computer components, devices and recording media that retain digital data used for computing. It provides one of the core functions i.e. data retention. It is one of the fundamental components of all modern computers coupled with a central processing unit.

Internal Memory

It is also called "Main Memory" or "Primary Storage". It is used for these activities. Input/output operations, manipulation of text and calculation, comparison operations, storage and retrieval operations. There are two types of internal memory.

1. RAM (Random Access Memory)

It is used for temporary storage of programs and data while the computer is on. All the data in RAM is stored in unique locations each of which is identified by its unique address. It is a type of computer memory that can be accessed randomly. There are two types of RAM:

- **DRAM** (Dynamic Random Access Memory)
- **SRAM** (Static Random Access Memory)

2. ROM (Read Only Memory)

It is a preprogrammed chip which stores programs permanently that are needed to start the computer. Permanent software and data is stored in ROM. A common use for this is 'start-up' routine, which allows a computer to load the operating system of a disk. There are three types of ROM.

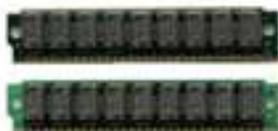
- **PROM** (Programmable Read-Only Memory)
- **EPROM** (Erasable Programmable Read-Only Memory)
- **EEPROM** (Electrically Erasable Programmable Read-Only Memory)

Differences between RAM and ROM

RAM	ROM
<ul style="list-style-type: none"> • RAM is the part of the memory which is volatile. • Users have access to RAM. • RAM is expandable. • When power is switched off, the information stored in RAM is lost. 	<ul style="list-style-type: none"> • ROM is the part of memory which is non volatile. • Stores instructions for booting the computer. • The size of the ROM is limited. • When power is switched off, the information stored in ROM is not lost.

SIMM

SIMM is the acronym for Single In-line Memory Module. A small circuit board designed to accommodate surface-mount memory chips.

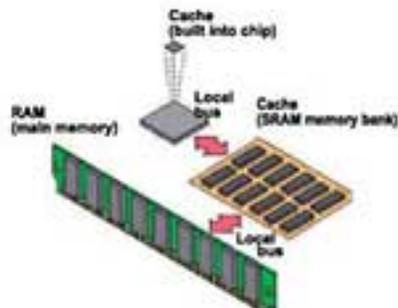


DIMM

DIMM is the acronym for Dual In-line Memory Module. A memory board on which memory chips are mounted and separate connector pins are on both sides of the circuit board. This increases the amount of memory that can be plugged into a single connector and also increases the size of the data path for faster data transfers.

Buffer

A storage area where data is stored temporarily, often to compensate for difference in speed between two devices I.e. computer and printer.



Cache

A component that transparently stores data so that future requests for that data can be served faster. The data stored in cache are values computed earlier. If data is stored in cache, the request is served by reading the cache at a fast rate.

About the Series

Computer Science series for primary and secondary grades is being prepared to familiarize the students with the development of latest technologies and information. Demonstrative illustrations and easy to understand language make the learning experience fun for children. Activities are prepared so appropriately that students' understanding can be evaluated easily. It promotes technical competencies within the children.



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