

## **The CPU contains following elements:**

- **Control Unit:**

The control unit of the CPU contains circuitry that uses electrical signals to direct the entire computer system to execution stored program instructions.

The control unit does not execute program instructions; it directs other parts of the system to do so. The control unit communicates with both the ALU and memory.

- **Arithmetic Logic Unit (ALU):**

The arithmetic/logic unit (ALU) is a digital electronic circuit within the processor that executes all arithmetic and logical operations.

The ALU performs the mathematical calculations using data stored within the CPU registers.

- **Registers:**

The registers are memory storage areas within the CPU that hold the data that is worked on by the ALU.

- **BUS:**

A bus is a group of wires on the main circuit board of the computer. It is a pathway for data flowing between components.

## **The basic concept of memory**

- The processor performs all the fundamental computation of the computer system.
- Other components share to the computation by doing such things as storing data or moving data into and out of the processor.
- But the processor is where the fundamental action takes place.

- A processor chip has little memory. It has only enough memory to hold a few instructions of a program and the data they process.
- Complete programs and data sets are held in memory external to the processor.
- This memory is of two fundamental types: *main memory*, and *secondary memory*.
- Main memory is sometimes called volatile because it loses its information when power is removed.
- Secondary memory is usually nonvolatile because it keep its information when power is removed.
- Normally when people talk about memory in relation to a PC, they are talking about RAM.

## Main Memory

Main memory is where programs and data are kept when the processor is actively using them.

When programs and data become active, they are copied from secondary memory into main memory where the processor can interact with them.

Main memory is intimately connected to the processor, so moving instructions and data into and out of the processor is very fast. Main memory is sometimes called RAM.

## Secondary memory

Secondary memory is where programs and data are kept on a long-term basis. Common secondary storage devices are the hard disk and optical disks.

## **Comparison of main memory and secondary memory:**

### **Main memory:**

- closely connected to the processor.
- stored data are quickly and easily changed.
- holds the programs and data that the processor is actively working with.
- interacts with the processor millions of times per second.
- needs constant electric power to keep its information.

### **Secondary memory:**

- connected to main memory through the bus and a controller.
- stored data are easily changed, but changes are slow compared to main memory.
- used for long-term storage of programs and data.
- before data and programs can be used, they must be copied from secondary memory into main memory.
- does not need electric power to keep its information.

## **RAM**

Random Access Memory (RAM) is the main memory used by the computer. Data and programs stored in RAM are volatile (i.e. the information is lost when you switch off the computer).

When the operating system loads from disk when you first switch on the computer, it is copied into RAM.

Nothing permanent is kept in main memory. Sometimes data are placed in main memory for just a few seconds, only as long as they are needed.

## **ROM**

Read Only Memory (ROM) as the name suggests is a special type of memory chip which holds software which can be read but not written to. A good example is the ROM-BIOS chip, which contains read-only software. Often network cards and video cards also contain ROM chips.

## **ROM-BIOS**

The (Read Only Memory-Basic Input Output System) chip is a chip located on the computer's system (mother) board, which contains software. This software performs a multi of tasks.

- When you first switch on the computer the ROM-BIOS software performs a self-diagnostic to check that the computer is working OK.
- This software then loads your operating system from the disk into the RAM.

## **Video (graphics) memory**

The picture which you see on your screen is a form of data and this data has to be stored somewhere. The on-screen pictures are held in special memory chips called video memory chips; these chips are usually located on the video card. A modern computer will be supplied with several Megabytes or Gigabytes of video memory.