The structure of CPU:
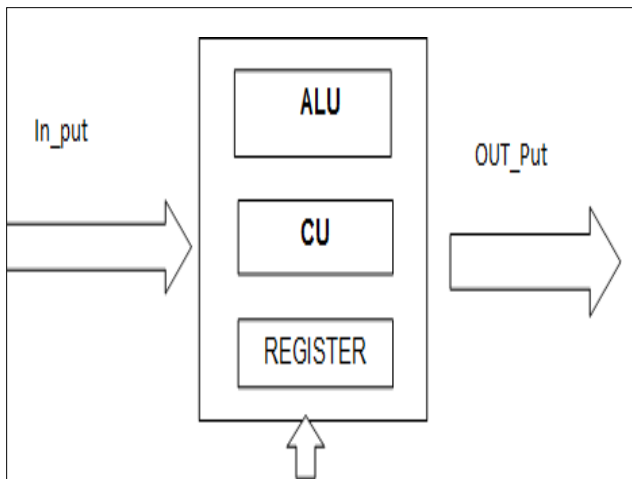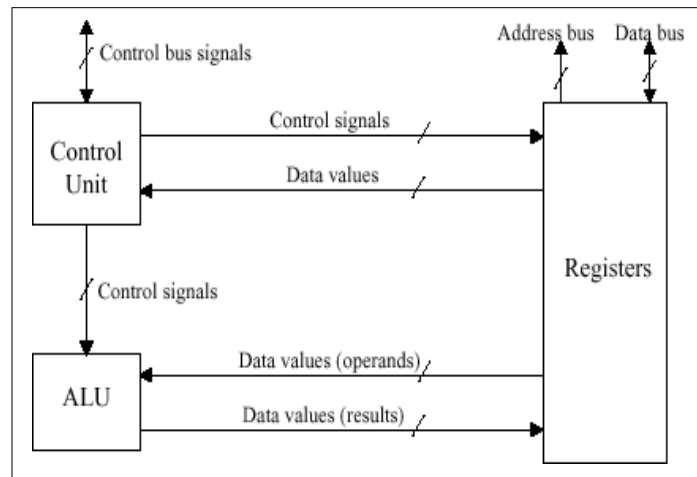

Fig.no1.10

Fig.no 1.11

Arithmetic Logical Unit (ALU)

ALU is the combination of arithmetic unit and logical unit is used to perform an arithmetic operation on the input data (+, -, *, /). Logical unit is used to perform logical operation on input data (<, >, <=, >=, =, OR, NOT, AND)

Control Unit (CU)

CU is an important component that controls the flow of data and information. It is important for the proper execution of the instruction.

Cache Memory

Cache memory is a small fast and expensive memory that stores the copies of data that needs to be accessed frequently from main memory.

Types of Cache memory

Primary Cache : - It is also known as L1 cache or internal cache it is located inside the CPU and provides quick access to the frequently provided data to the microprocessor.

Secondary Cache : - **-** It is also known as L2 cache or External cache it is located outside the CPU and positioned on the motherboard. It is slower as compared to L1.

Register (Memory Unit)

The register is used to quickly accept, store, and transfer data and instructions that are being used immediately by the CPU, there are various types of Registers those are used for various purposes. Register are special purpose high-speed temporary storage area for holding data, address, and instruction during processing of the instruction. The register is always on the CPU.

PC : - The **program counter (PC)** just part of the instruction sequencer in some computers is a processor register. It keeps track of the **next memory address** of the instruction that is to be executed once the execution of the current instruction is completed. **In other words, it holds the address of the memory location of the next instruction when the current instruction is executed.**

AC: -Accumulator : This Register is used for storing the Results those are produced by the System. When the CPU will generate Some Results after the Processing then all the Results will be Stored into the **AC Register**.
IR: - Instruction Register: store the instruction currently being executed.

MAR : - (Memory address register) this register holds the memory addresses of data and instructions. This register is used to access data and instructions from memory during the execution phase of an instruction. Suppose CPU wants to store some data in the memory or to read the data from the memory. It places the address of the required memory location in the MAR.

MBR : - Memory buffer register: -MBR stands for Memory Buffer Register**. This register holds the contents of data or instruction read from, or written in the memory. It means that this register is used to store data/instruction coming from the memory or going to the memory.**

MDR : - (Memory Data register) MDR is the register of a computer's control unit that contains the **data to be stored in the computer storage** (e.g. RAM), or the **data after a fetch from the computer storage**. It acts **as a buffer** and holds anything that is copied from the memory ready for the processor to use it.

Internal Communication
- **Processor to memory communication**
- **Processor to I/O device**

Communication Bus Architecture: -

A bus is a set of wire that is used to connect the different internal components of a computer system for transferring data, address, and control.

There may be several buses in a computer system broadly divided into categories.
- **Serial Bus**
- **Parallel Bus**

The speed of any type of bus is measured in terms of the number of bits transferred per second, between two components.
In Serial Bus only one bit of data is transferred at a time, amongst the various hardware components.

In Parallel Bus, several bits of data can be transferred at a time, amongst the various hardware components.

e Control Bus manages the transfer of data and address among various components by transferring appropriate control signals.
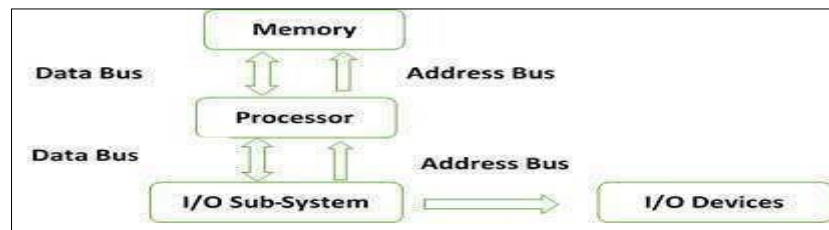

Fig.no 1.12

DATA BUS: -

The Data Bus in a computer system is used to transfer data amongst the different internal components. The speed of the data bus also affects the overall processing power of a computer system. The modern computer system uses 32-bit data buses for data transfer. This means that these buses can transfer 32 bits of data at a time.
The data bus implemented between the main memory and the processor of a computer system.

The above figure shows that a bidirectional data bus is implemented between the main memory and processor of the computer system. The bidirectional data bus allows the transfer of data in both the directions. The data bus is generally bi-directional in nature in the most computer system.

ADDRESS BUS: -

The address bus is also known as the memory bus. It transfers the memory address for reading and writes memory operations. It contains many address lines that determine the range of memory addresses that can be referenced using the address bus.
For Example-a 32-bit address bus can be used to reference 2 Memory locations. Like data bus, the address bus can also be a serial or a parallel bus.