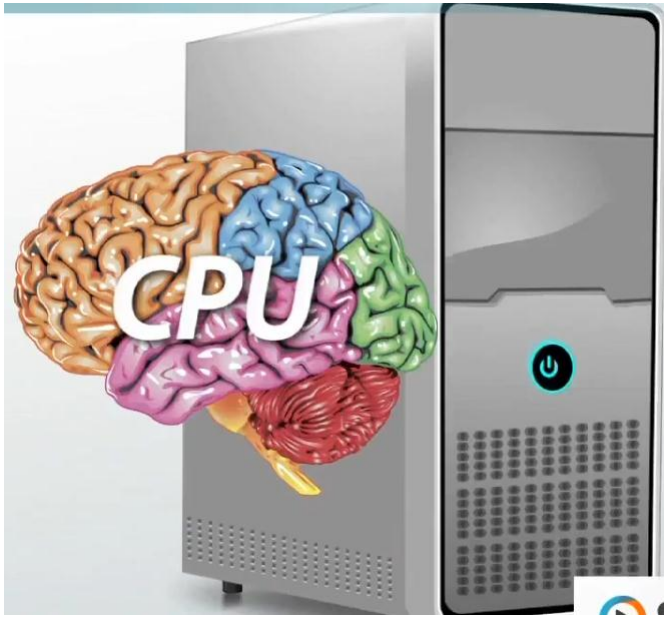
CPU

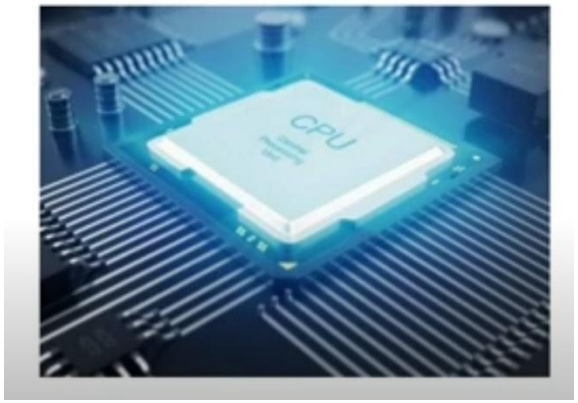
CPU

- Control all the activities
- Brain
- Processes the input data and produces desired output
- Single integrated circuit chip - Microprocessor
- Motherboard



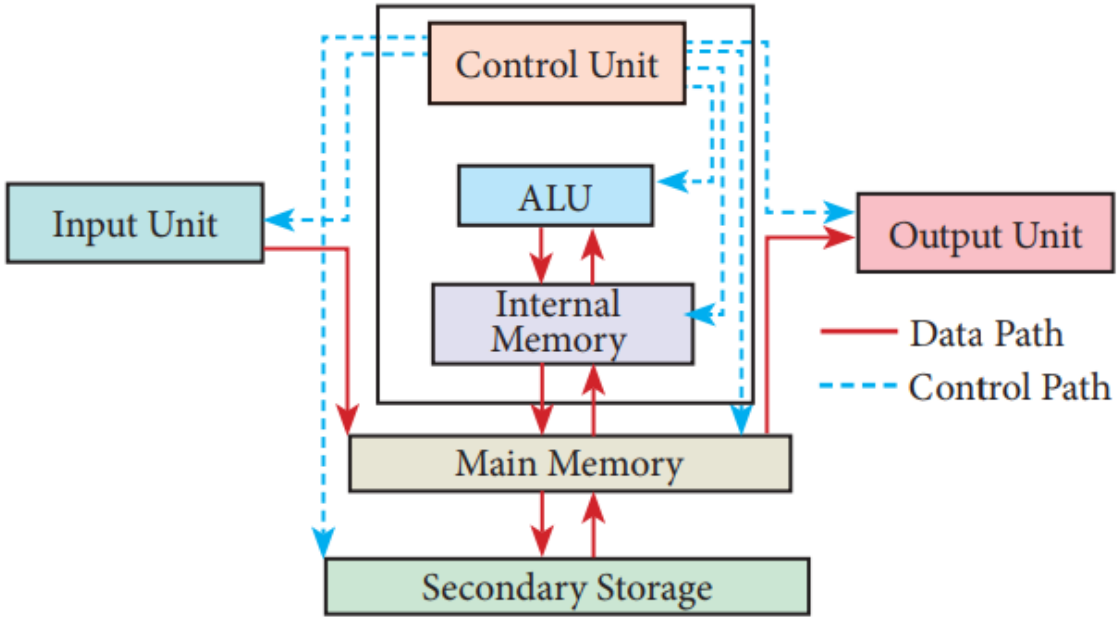
Main operations of the CPU

- **Fetching the instruction** – main memory
- **Decode or translate** the fetched instruction into commands
- **Executing** the instructions
- **Storing** the results back in the memory



Components

- Arithmetic Logic Unit (ALU)
- Floating Point Unit (FPU)
- Interface Unit (IU)
- Control Unit (CU)
- Registers



Arithmetic Logic Unit

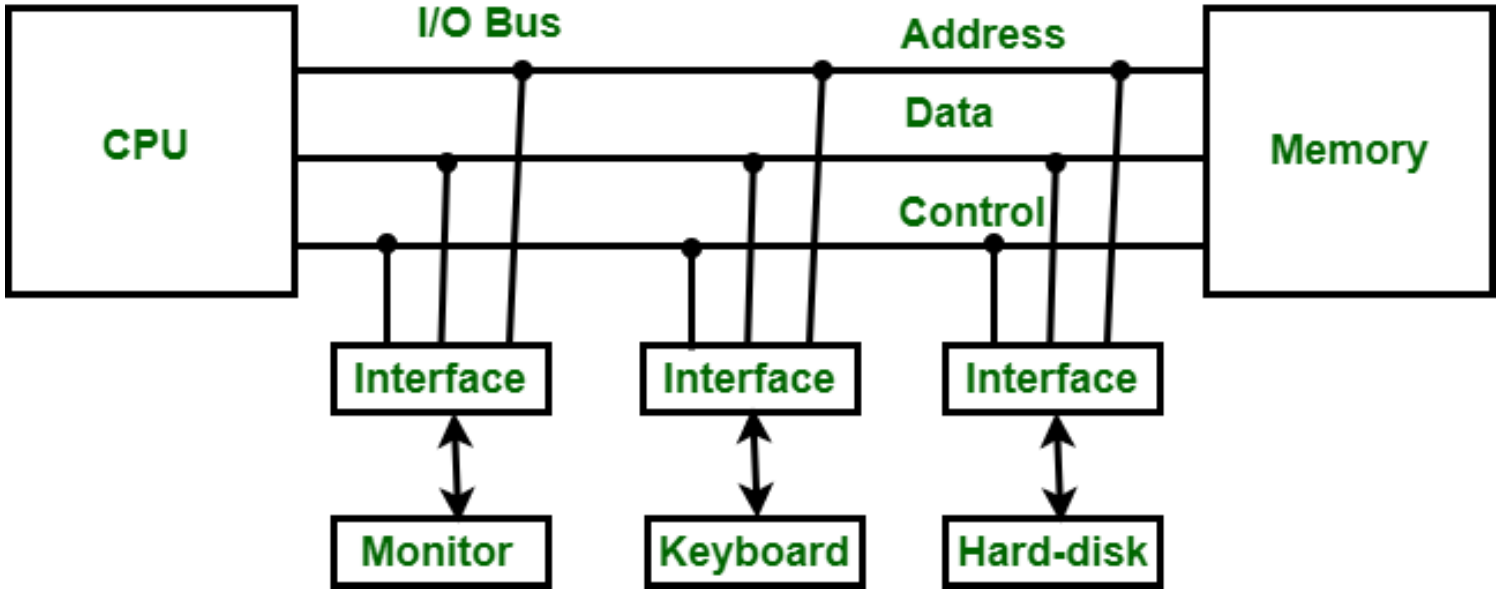
- Arithmetic – Addition, Subtraction, Multiplication and Division
- Logical – AND, OR, NOT, equal to, greater than, less than
- Integer and bitwise calculations

Floating Point Unit

- Non-integer mathematical operations – decimal point

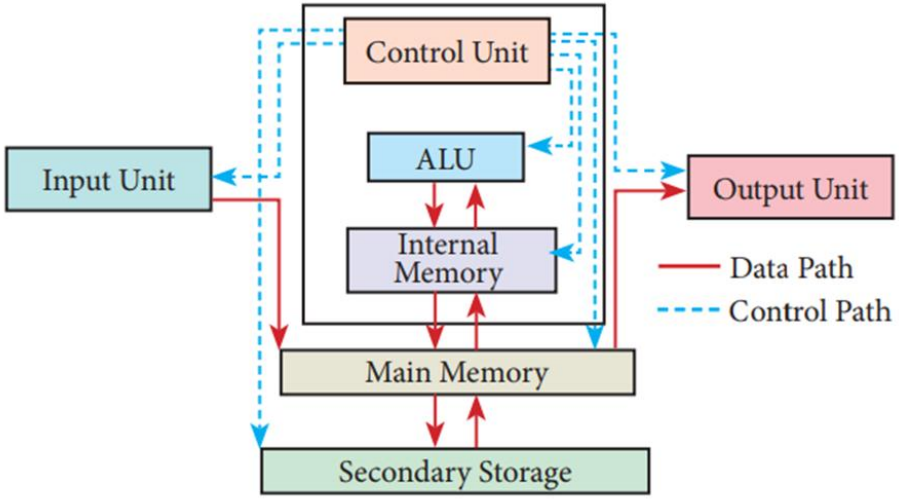
Interface Unit

- Connections between CPU and other parts of the computer system



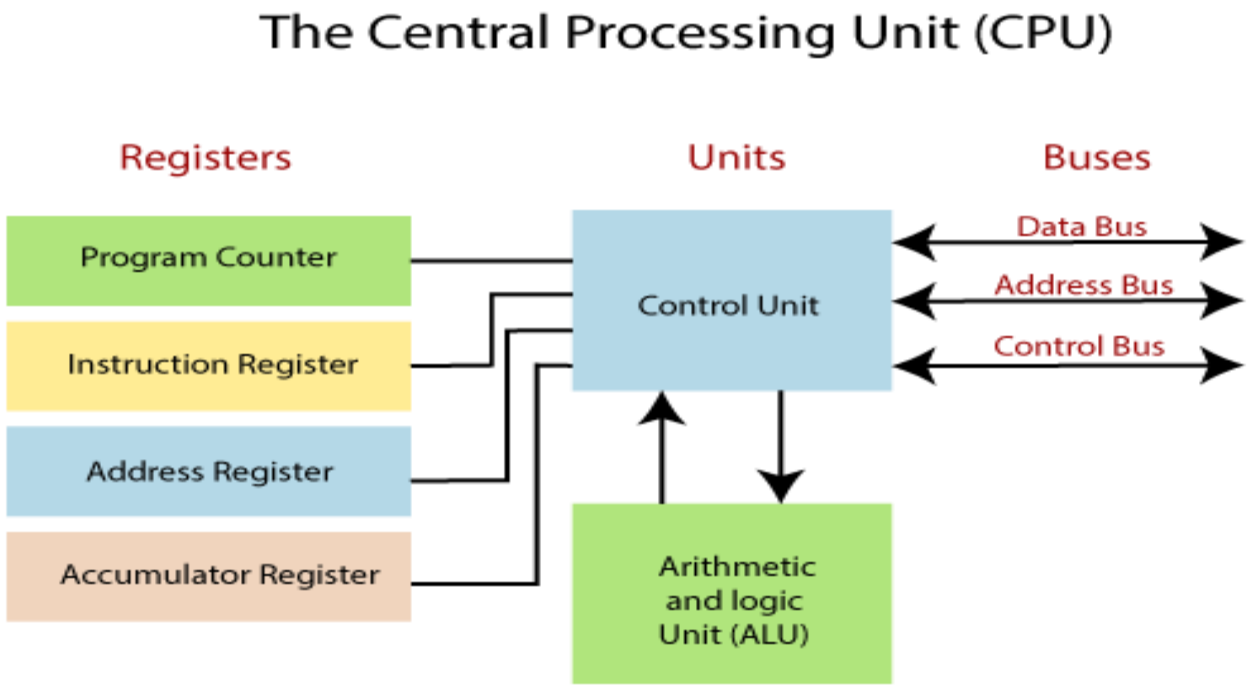
Control Unit

- Supervisor
- Coordinates the operations of memory, ALU, input and output units
- It has a **Program Counter (PC) register** - to keep track of the instruction to be executed next
- CU uses the instruction in the **Instruction Register (IR)** to decide which circuit is to be activated.



Registers

- **Temporary storage** unit
- High speed memory locations in the CPU.
- Hold various types of information such as data, instructions, addresses and intermediate results of calculations.
- Currently working information of the CPU.



Types of registers

- General purpose register
- Floating point register
- Program counter register
- Instruction register
- Status register
- Memory data register

Memory Unit

- *Ability to store, retain and recall the data and instructions.*
- Combination of bit (0,1)
- Memory devices
  - RAM
  - ROM
  - Cache
  - Buffers
  - Magnetic tape
  - Hard disk
  - Floppy disk
  - Compact disc
  - Flash drive

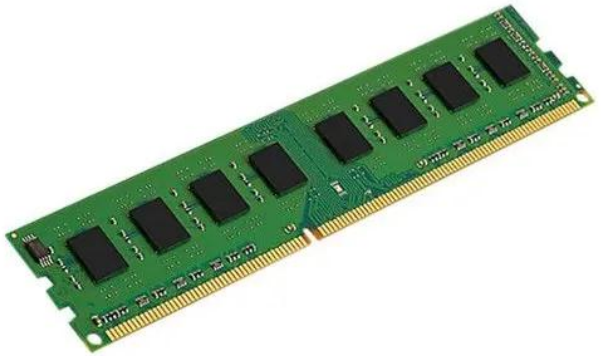
Primary memory

- ***Store data*** *for calculation process and storage of values that need frequent access and update by CPU.*
- Internal or Main memory
- Built-in within the computer
- Volatile – temporary
- Smaller
- expensive

Random Access Memory

- *Any byte of memory can be accessed without touching the preceding byte*
- Read/write memory
- Volatile memory
- Stored or retrieve from all the locations at the same speed.
- Temporary storage

Types - RAM

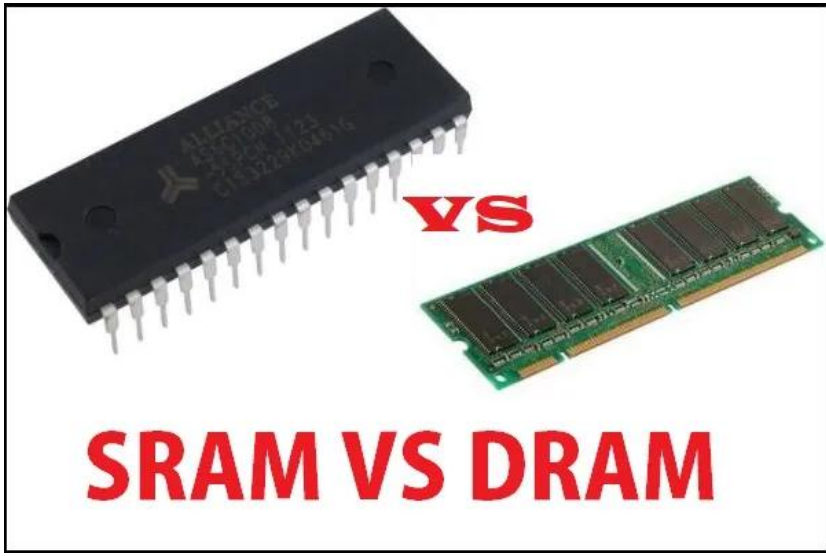


Static RAM

- Faster access
- Expensive
- More power
- No need to refresh periodically

Dynamic RAM

- slower access
- Not expensive
- Less power
- Constantly refreshed



ROM

- Stores programs or data – can't be modified or deleted
- Non-volatile
- memory will not be erased – power off

4 Types

- PROM (Programmable ROM)
  - PROM programmer – write
  - Cannot be erased and reprogrammed
  - Used in video games and electronic dictionaries

- EPROM (Erasable Programmable ROM)
  - UV light – erase
  - Program can be stored at point of time.
  - The entire programs should be deleted and new program is added.
  - Stores data for long period of time
- EEPROM (Electrically Erasable Programmable ROM)
  - Electric pulse for reprogramming
  - Stores data permanently.
  - Can change the portion of data by electric current
  - Slow
- Flash ROM
  - Electronically erased and reprogrammed.
  - Easily stored and transferred to other devices using data cable, Bluetooth and infrared technology
  - Used in Memory cards, digital cameras, ipods

Cache memory

- It is a small memory chip for the temporary storage of data being processed by the CPU.
- Between CPU and Main memory
- Store currently executing program, temporary program or data frequently used
- When the CPU starts processing, it first searches the cache memory for the data and then the RAM
- Small size
- Instant memory