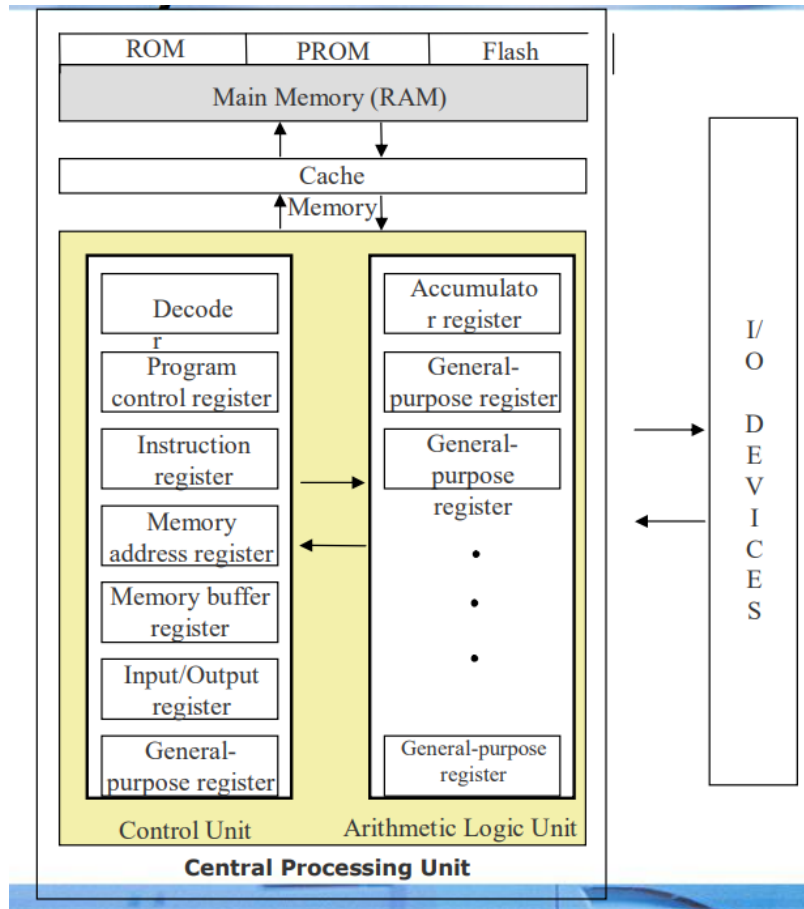# Basic Processor of computer

Central Processing Unit (CPU) The CPU is the brain of a computer, containing all the circuitry needed to process input, store data, and output results. The CPU is constantly following instructions of computer programs that tell it which data to process and how to process it.

ROM	PROM	Flash

Main Memory (RAM)

Cache
Memory

Control Unit	Arithmetic Logic Unit
Decode r	Accumulato r register
Program control register	General- purpose register
Instruction register	General- purpose register
Memory address register	•
Memory buffer register	•
Input/Output register	•
General- purpose register	General-purpose register

I/O DEVICES

Central Processing Unit

Control Unit (CU)

❖ One of the two basic components of CPU
❖ Acts as the central nervous system of a computer system
❖ Selects and interprets program instructions, and coordinates execution
❖ Has some special purpose registers and a decoder to perform these activities

Arithmetic Logic Unit (ALU)

❖ One of the two basic components of CPU.
❖ Actual execution of instructions takes place in ALU

❖ Has some special purpose registers
❖ Has necessary circuitry to carry out all the arithmetic and logic operations included in the CPU instruction set

Instruction Set

❖ CPU has built-in ability to execute a particular set of machine instructions, called its instruction set
❖ Most CPUs have 200 or more instructions (such as add, subtract, compare, etc.) in their instruction set
❖ CPUs made by different manufacturers have different instruction sets
❖ Manufacturers tend to group their CPUs into "families" having similar instruction sets
❖ New CPU whose instruction set includes instruction set of its predecessor CPU is said to be *backward compatible* with its predecessor

Registers

1. Special memory units, called registers, are used to hold information on a temporary basis as the instructions are interpreted and executed by the CPU
2. Registers are part of the CPU (not main memory) of a computer
3. The length of a register, sometimes called its word size, equals the number of bits it can store
4. With all other parameters being the same, a CPU with 32-bit registers can process dat`
5. a twice larger than one with 16-bit registers

Function of commonly used registers

SQ	Name of Register	Function
1	Memory Address (MAR)	Holds address of the active memory location
2	Memory Buffer (MBR)	Holds contents of the accessed (read/written) memory word
3	Program Control (PC)	Holds address of the next instruction to be executed
4	Accumulator (A)	Holds data to be operated upon, intermediate results, and the results

5	Instruction (I)	Holds an instruction while it is being executed
6	Input/Output (I/O)	Used to communicate with the I/O devices

Processor Speed

- ❖ Computer has a built-in system clock that emits millions of regularly spaced electric pulses per second (known as clock cycles)
- ❖ It takes one cycle to perform a basic operation, such as moving a byte of data from one memory location to another
- ❖ Normally, several clock cycles are required to fetch, decode, and execute a single program instruction
- ❖ Hence, shorter the clock cycle, faster the processor
- ❖ Clock speed (number of clock cycles per second) is measured in Megahertz (10^6 cycles/sec) or Gigahertz (10^9 cycles/sec)

Types of Processor

Type of Architecture	Features	Usage
CISC (Complex Instruction Set Computer)	§ Large instruction set § Variable-length instructions § Variety of addressing modes § Complex & expensive to produce	Mostly used in personal computers
RISC (Reduced Instruction Set Computer)	§ Small instruction set § Fixed-length instructions § Reduced references to memory to retrieve operands	Mostly used in workstations
EPIC (Explicitly Parallel Instruction Computing)	§ Allows software to communicate explicitly to the processor when operations are parallel § Uses tighter coupling between the compiler and the processor § Enables compiler to extract maximum parallelism in the	Mostly used in high-end servers and workstations

	original code, and explicitly describe it to the processor	
Multi-Core Processor	§ Processor chip has multiple cooler-running, more energy efficient processing cores § Improve overall performance by handling more work in parallel § can share architectural components, such as memory elements and memory management	Mostly used in high-end servers and workstations

Main Memory

§ Every computer has a temporary storage built into the computer hardware

§ It stores instructions and data of a program mainly when the program is being executed by the CPU.

§ This temporary storage is known as main memory, primary storage, or simply memory.

§ Physically, it consists of some chips either on the motherboard or on a small circuit board attached to the motherboard of a computer

§ It has random access property.

§ It is volatile.