# CPU/ALU/CU

CPU

CENTRAL PROCESSING UNIT

DEFINITION

A Central Processing Unit is the most important component of a computer system. A CPU is a hardware that performs data input/output, processing and storage functions for a computer system. A CPU can be installed into a CPU socket. These sockets are generally located on the motherboard. CPU can perform various data processing operations. CPU can store data, instructions, programs, and intermediate results.

DIFFERENT PARTS OF CPU

The CPU consists of 3 major units, which are:

1. MEMORY OR STORAGE UNIT

2. CONTROL UNIT

3. ALU (ARITHMETIC LOGIC UNIT)

LET US NOW LOOK AT THE BLOCK DIAGRAM OF THE COMPUTER:
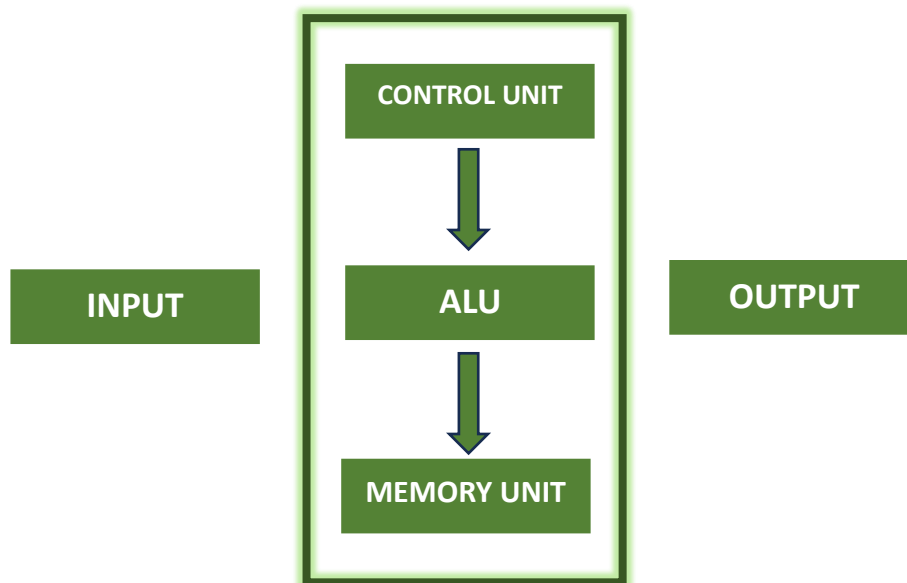
CPU is made of silicon. silicon is semiconductor metal. An electrical connections to the pins that create contact with the motherboard. CPU produces lot of heat that's why an "integrated heat spreader" is also exist to the top.

WHAT DOES CPU DO

❖ **FETCH:** the first CPU gets the instruction. That means binary numbers that are passed from RAM to CPU.

❖ **DECODE:** When the instruction is entered into the CPU, it needs to decode the instructions. with the help of ALU(Arithmetic Logic Unit) the process of decode begins.

❖ **EXECUTE:** After decode step the instructions are ready to execute

❖ **STORE:** After execute step the instructions are ready to store in the memory.

TYPES OF CPU

1. **SINGLE CORE CPU**: The oldest type of computer CPUs is single core CPU. These CPUs were used in the 1970s. these CPUs only have a single core that preform different operations. This means that the single core CPU can only process one operation at a single time. single core CPU is not suitable for multitasking.

2. **DUAL-CORE CPU:** Dual-Core CPUs contain a single Integrated Circuit with two cores. Each core has its cache and controller. These controllers and cache are work as a single unit. dual core CPUs can work faster than the single-core processors.

3. **QUAD-CORE CPU:** Quad-Core CPUs contain two dual-core processors present within a single integrated circuit (IC) or chip. A quad-core processor contains a chip with four independent cores. These cores read and execute various instructions provided by the CPU. Quad Core CPU increases the overall speed for programs. Without even boosting the overall clock speed it results in higher performance

ALU

ARITHMETIC LOGICAL UNIT

DEFINITION

ALU is a digital circuit that provides arithmetic and logic operations. It is the fundamental building block of the central processing unit of a computer. A modern central processing unit(CPU) has a very powerful ALU and it is complex in design. In addition to ALU modern CPU contains a control unit and a set of registers. Most of the operations are performed by one or more ALUs, which load data from the input register.

CU

CONTROL UNIT

DEFINITION

A **Control Unit** is the most important component of a computer system. A control unit is a part of the CPU. A control unit controls the operations of all parts of the computer but it does not carry out any data processing operations.

FUNCTIONS OF CONTROL UNIT

♦ It coordinates the sequence of data movements into, out of, and between a processor's many sub-units.
♦ It interprets instructions.
♦ It controls data flow inside the processor.
♦ It receives external instructions or commands to which it converts to sequence of control signals.
♦ It controls many execution units(i.e. ALU, data buffers and registers) contained within a CPU.
♦ It also handles multiple tasks, such as fetching, decoding, execution handling and storing results.

TYPES OF CONTROL UNIT

There are two types of control units:
• Hardwired
• Micro programmable control unit.

ADVANTAGES OF CONTROL UNIT

• EFFICIENT INSTRUCTION EXECUTION
• IMPROVED PERFORMANCE
• SUPPORT FOR COMPLEX INSTRUCTIONS
• IMPROVED RELIABILITY
• LOWER POWER CONSUMPTION
• BETTER BRANCH PREDICTION
• IMPROVED SCALABILITY
• BETTER SUPPORT FOR PARALLELISM
• IMPROVED SECURITY
• LOWER COST

DISADVANTAGES OF CONTROL UNIT

• REDUCED PERFORMANCE
• INCREASED COMPLEXITY
• HIGHER POWER CONSUMPTION
• REDUCED RELIABILITY
• LIMITATIONS ON INSTRUCTION SET
• POOR SUPPORT FOR PARALLELISM
• SECURITY VULNERABILITIES
• HIGHER COST