

COMPUTER ORGANIZATION AND ARCHITECTURE

01

Introduction to Computer Architecture and organization $\Rightarrow$

- **Computer Architecture** refers to those attributes of a System that have a direct impact on the Logical Execution of a program. Such as:-
 - The instruction set
 - The number of bits used to represent various data types.
 - I/O mechanisms
 - memory addressing techniques.
- **Computer Organization** refers to the operational units & their interconnections that realize the architectural specifications. Examples are things that are transparent to the programmer:
 - Control signals
 - Interface between Computer and peripherals
 - The memory technology being used.

- The **Architecture** of a Computer System can be considered as a Catalogue of tools or attributes that are visible to the user such as instruction sets, no. of bits used for data, addressing techniques etc. (02)
- The **Organization** of a Computer System defines the way system is structured so that all those catalogued tools can be used.
- The significant component of computer organization are ALU, CPU, memory organization.
- Computer organization and Architecture is used to design computer system.

Difference b/w Computer Architecture & Computer Organization

(03)

Computer Architecture

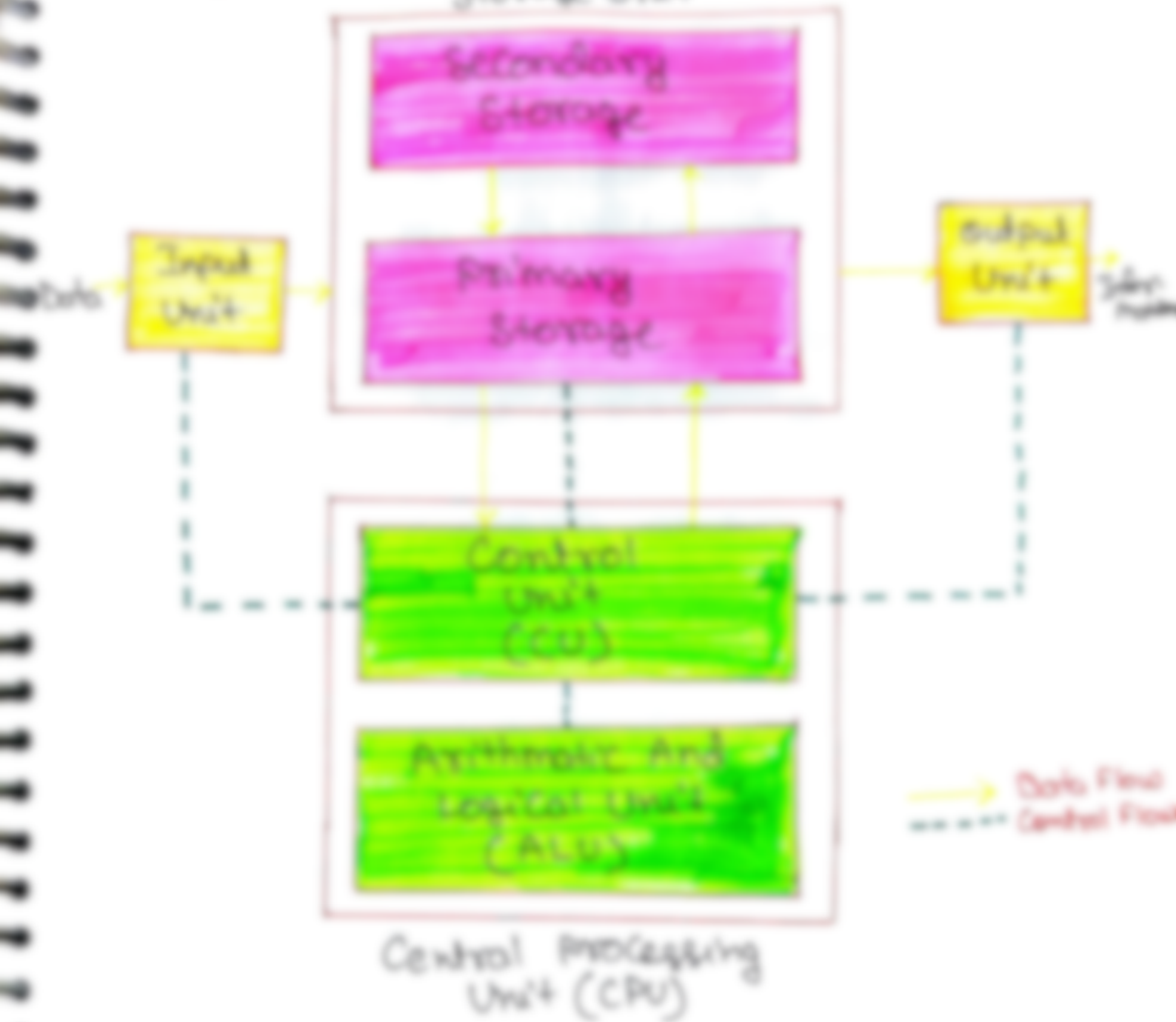
- 1⇒ Architecture describes what the computer does.
- 2⇒ Computer Architecture deals with the functional behavior of computer system.
- 3⇒ It acts as the interface between hardware and software.
- 4⇒ A programmer can view architecture in terms of instructions, addressing mode and registers.
- 5⇒ Computer Architecture deal with high-level design issues.
- 6⇒ Computer Architecture is also called Instruction Set Architecture (ISA)
- 7⇒ Computer Architecture comprises logical functions such as instruction sets, registers, datatypes and addressing modes.

Computer Organization

- 1⇒ The organization describes how it does it.
- 2⇒ Computer Organization deals with a structural relationship.
- 3⇒ It deals with the components of a connection in a S/m.
- 4⇒ Organization Express the realization of architecture.
- 5⇒ Computer organization deals with low-level design issues.
- 6⇒ Computer organization is frequently called microarchitecture.
- 7⇒ Computer Organization consists of physical units like circuit designs, ~~the~~ peripherals, and address.

Functional Blocks of a Computer

(19)



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Control Processing Unit (CPU) ⇒ • Once the information is entered into the computer by the input device, the processor processes it. (6)

- The CPU is called the brain of the computer because it is the control center of the computer.
 - It first fetches instructions from memory and then interprets them so as to know what is to be done. If required, data is fetched from memory or input device.
- ⇒ The CPU has three main components which are responsible for different functions:

1. Arithmetic Logic Unit (ALU) ⇒

- The ALU performs mathematical calculations and takes logical decisions.
- Arithmetic calculations include addition, subtraction, multiplication and division.
- Logical decisions involve comparison of two data items to see which one is larger or smaller or equal.

2. Control Unit (CU) ⇒ • The control unit coordinates

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- It decodes the fetched instruction, interprets it and sends control signals to input/output devices until the required operation is done properly by ALU and memory.

Memory Registers → • A Register is a temporary unit of memory in the CPU.

These are used to store the data which is directly used by the processor.

- Registers can be of different sizes (16 bit, 32 bit, 64 bit and so on) and each register inside the CPU has a specific function like storing data, storing an instruction, storing address of a location in memory etc.
- The user registers can be used by an Assembly language programmer for storing operands, intermediate result etc.
- Accumulator (ACC) is the main register in the ALU and contains one of the operands of an operation to be performed in the ALU.

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