Computer Architecture and Organization

Computer Architecture and Organization is the study of internal working, structuring, and implementation of a computer system. Architecture in the computer system, same as anywhere else, refers to the externally visual attributes of the system

- Computer architecture explains **what a computer should do**.
- Computer organization explains **how a computer works**.

Computer Architecture

Computer Architecture is a blueprint for design and implementation of a computer system. It provides the functional details and behavior of a computer system and comes before computer organization. Computer architecture deals with 'What to do?'

Computer Organization

Computer Organization is how operational parts of a computer system are linked together. It implements the provided computer architecture. Computer organization deals with 'How to do?'

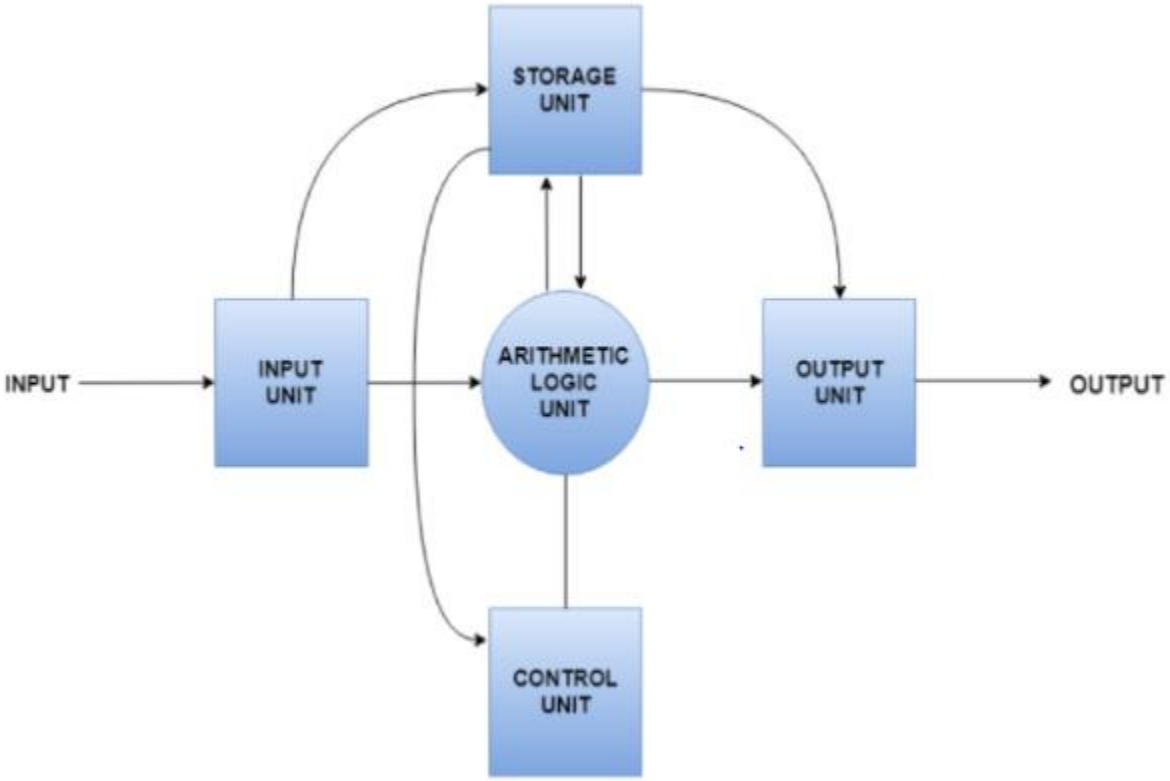
Following are some of the important differences between Computer Architecture and Computer Organization:

Sr. No.	Key	Computer Architecture	Computer Organization
1	Purpose	Computer architecture explains what a computer should do.	Computer organization explains how a computer works.
2	Target	Computer architecture provides functional behavior of computer system.	Computer organization provides structural relationships between parts of computer system.
3	Design	Computer architecture deals with high level design.	Computer organization deals with low level design.
4	Actors	Actors in Computer architecture are hardware parts.	Actor in computer organizaton is performance.
5	Order	Computer architecture is designed first.	Computer organization is started after finalizing computer architecture.

Computer Components:

A computer system is basically a machine that simplifies complicated tasks. It should maximize performance and reduce costs as well as power consumption. **The different components in the Computer System Architecture are:**

- Input Unit
- Output Unit
- Storage Unit (Memory)
- Arithmetic Logic Unit (ALU)
- Control Unit etc.



The input data travels from input unit to ALU. Similarly, the computed data travels from ALU to output unit. The data constantly moves from storage unit to ALU and back again. This is because stored data is computed on before being stored again. The control unit controls all the other units as well as their data.

Details about all the computer units are −

✓ **Input Unit**

The input unit provides data to the computer system from the outside. So, basically it links the external environment with the computer. It takes data from the input devices, converts it into

machine language and then loads it into the computer system. Keyboard, mouse etc. are the most commonly used input devices.

- ✓ **Output Unit**

The output unit provides the results of computer process to the users i.e. it links the computer with the external environment. Most of the output data is the form of audio or video. The different output devices are monitors, printers, speakers, headphones etc.

- ✓ **Storage Unit**

Storage unit contains many computer components that are used to store data. It is traditionally divided into primary storage and secondary storage. Primary storage is also known as the main memory and is the memory directly accessible by the CPU. Secondary or external storage is not directly accessible by the CPU. The data from secondary storage needs to be brought into the primary storage before the CPU can use it. Secondary storage contains a large amount of data permanently.

- ✓ **Arithmetic Logic Unit**

All the calculations related to the computer system are performed by the arithmetic logic unit. It can perform operations like addition, subtraction, multiplication, division etc. The control unit transfers data from storage unit to arithmetic logic unit when calculations need to be performed. The arithmetic logic unit and the control unit together form the central processing unit.

- ✓ **Control Unit**

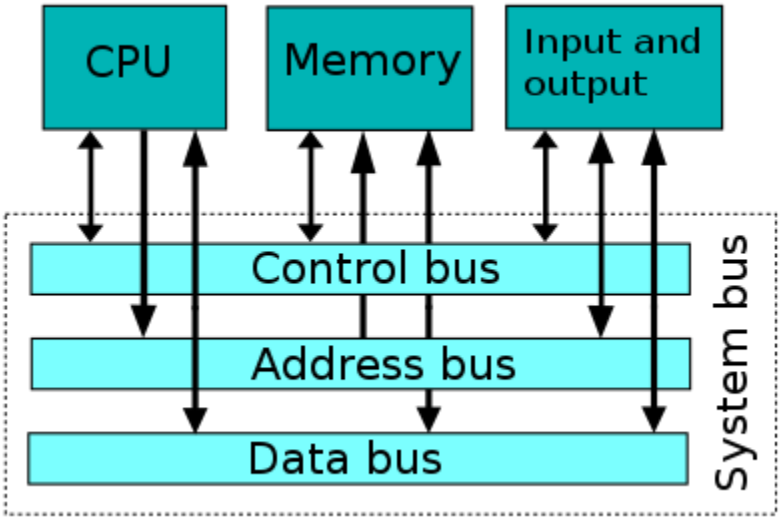
This unit controls all the other units of the computer system and so is known as its central nervous system. It transfers data throughout the computer as required including from storage unit to central processing unit and vice versa. The control unit also dictates how the memory, input output devices, arithmetic logic unit etc. should behave.

Buses

A bus is a high-speed internal connection. Buses are used to send control signals and data between the processor and other components.

Three types of bus are used.

- ✓ **Address bus** - carries memory addresses from the processor to other components such as primary storage and input/output devices. The address bus is unidirectional.
- ✓ **Data bus** - carries the data between the processor and other components. The data bus is bidirectional.
- ✓ **Control bus** - carries control signals from the processor to other components. The control bus also carries the clock's pulses. The control bus is unidirectional.



From another source

BUS:

In computing, a bus is defined as a set of physical connections (Cables, Printed circuits, etc.), which can be shared by multiple hardware components in order to communicate with one another.

All computers have three fundamental buses: Control, Instruction and Address bus.

- ✓ **Control Bus:** The motherboard's control bus manages the activity in the system. The control bus, like the other buses, is simply a set of connections among the parts in the computer.

- ✓ **Data Bus:** The data bus acts as a conduit for data from the keyboard, memory and other devices. It passes information at speeds up to billions of characters per second. The central processor reads the data, performs calculations, and moves new data back to memory, the hard drive and other locations.

- ✓ **Address Bus:** The computer must be able to access every character of memory rapidly, so every character has its own address number. The central processor specifies which addresses it wants to read or write and the address bus carries this information to a memory controller circuit, which locates and fetches the information.

For more details Click Here.