Computer Organization and Architecture

Referred Book

Computer_ Organization _ and_ Architecture - William Stallings

C h a p t e r 1 INTRODUCTION

➢ **Computer architecture** refers to those attributes of a system visible to a programmer or, those attributes that have a direct impact on the logical execution of a program. Examples of architectural attributes include the instruction set, the number of bits used to represent various data types (e.g., numbers, characters), I/O mechanisms, and techniques for addressing memory.

➢ **Computer organization** refers to the operational units and their interconnections that realize the architectural specifications. Organizational attributes include those hardware details transparent to the programmer, such as control signals; interfaces between the computer and peripherals; and the memory technology used.

➢ **Differentiate between Computer architecture and Computer organization**

Computer architecture	Computer organization
1. Architecture may survive many years.	1. Organization changes into changing technology.
2. All Intel 86 have the same architectural structure.	2. Organization differs into different version.
3. Example: Instruction Sets, Addressing Mode	3. Example: Interface between computer and peripheral techniques.

➢ **The functional view of a computer**

The designer is concerned with structure and function:

• **Structure:** The way in which the components are interrelated

• **Function:** The operation of each individual component as part of the structure

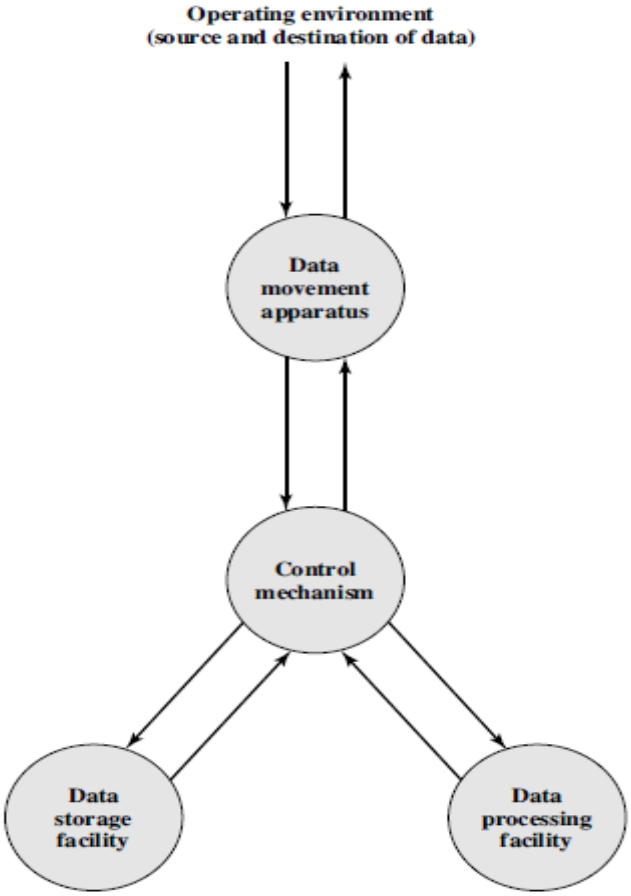

Figure 1.1 A Functional View of the Computer

- **Function**

Both the structure and functioning of a computer are, in essence, simple. Figure 1.1 depicts the basic functions that a computer can perform. In general terms, there are only four:

• Data processing
• Data storage
• Data movement
• Control

The computer, of course, must be able to **process data**. The data may take a wide variety of forms, and the range of processing requirements is broad.

It is also essential that a computer **store data**. The computer must temporarily store data or permanently store data.

The computer must be able to **move data** between itself and the outside world. The computer's operating environment consists of devices that serve as either sources or destinations of data.

Finally, there must be **control** of these three functions. Ultimately, this control is exercised by the individual(s) who provides the computer with instructions.

- **The internal structure of the computer**

In Following Figure, There are four main structural components:

• **Central processing unit (CPU):** Controls the operation of the computer and performs its data processing functions; often simply referred to as **processor**.

• **Main memory:** Stores data. The computer must temporarily store data or permanently store data.

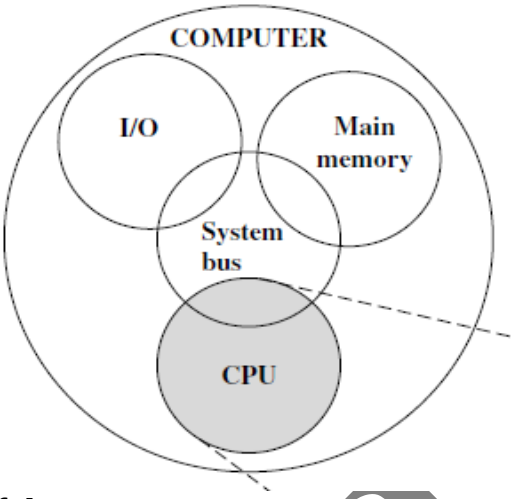

Figure: Internal structure of the computer

• **I/O:** Moves data between the computer and its external environment.

• **System interconnection:** Some mechanism that provides for communication among CPU, main memory, and I/O. A common example of system interconnection is by means of a **system bus**, consisting of a number of conducting wires to which all the other components attach.

- **The internal structure of the CPU**

The most interesting and in some ways the most complex component is the CPU. Its major structural components are as follows:

• **Control unit:** Controls the operation of the CPU and hence the computer

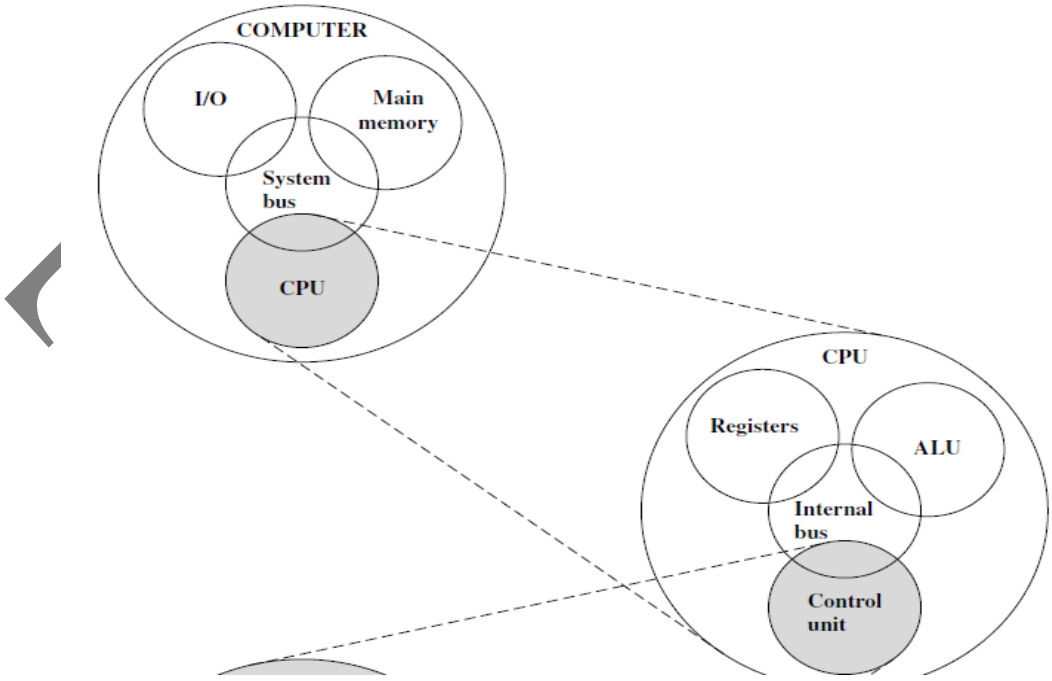

Figure: Internal structure of CPU

• **Arithmetic and logic unit (ALU):** Performs the computer's data processing functions

• **Registers:** Provides storage internal to the CPU
• **CPU interconnection:** Some mechanism that provides for communication among the control unit, ALU, and registers