Ch1: Introduction

**Computer Architecture** refers to those attributes of a system visible to programmer or those attributes that have a direct impact on the logical execution of program.

**How do I design a computer?**

Examples include the instruction set, the number of bits used to represent various data type, I/O mechanisms, and techniques for addressing memory.

**Computer Organization** refers to the operational unit and their interconnection that realize the architectural specification.

**How does a computer work?**

Organizational attributes include those hardware details transparent (clear) to the programmer, such as control signals, interfaces between computer and peripherals, and the memory technology used.

As an example, it is an *architecture design* issue whether a computer will have a multiply instruction. It is an *organizational* issue whether a computer will be implemented by a special multiply unit or by a mechanism that makes repeated use of the add unit of the system.

**All Intel x86 and IBM system/370 families share the same basic architecture But organization differs between different versions.**

A computer system is made up from

1. **Hardware: -** is the physical medium, for example circuit boards, processors and keyboard etc.
2. **Software: -** is a computer program, for example an operating system, editor and compiler etc.
3. **Firmware:** - is a combination of hardware and software.
   * Computer chips that have data and program recorded on them are firmware.
     1. ROM (Read-Only Memory)
     2. PROM (Programmable Read-Only Memory)
     3. EPROM (Erasable Programmable Read-Only Memory)
   * Firmware means microcode.
   * **Microcode** is a generic word for representing certain functions in programming. These functions have special status and special representation.

## **Principle of Equivalence of Hardware and software:**

“Anything that can be done with hardware can also be done with software and anything that can be done with software can also be done with hardware”.

**Structure:** the way in which the components are interrelated.

**Function:** the operation of each individual component as a part of the structure.

The basic functions that a computer can perform are given below. In general terms, there are only four:

1. Data processing
2. Data storage
3. Data movement
4. Control

**Microprocessor** is an electronic circuit that functions as the central processing unit (CPU) of a computer, providing computing control.Microprocessors are also used in other advanced electronic systems, such as computer printers, automobiles, and jet airliners.

**Microprocessor** incorporates (joins) the functions of a computer’s central processing unit (CPU) on a single integrated circuit (IC) or at most a few integrated circuits. It is a multipurpose, programmable device that accepts digital data as input, processes it according to instructions stored in the memory, and provides result as output.