Computing Systems: Hardware and Software

- A **computer** is a ma chine that is designed to perform operations that are specified with a set of instructions called a program.
  - Computer Hardware
    - It refers Computer equipment or devices (thumb drive, a keyboard, a flat-screen monitor, or a printer)
  - Computer software
    - Programs that describe the steps we want the computer to perform
    -

Computer Hardware

- Central Processing Unit (CPU)
  - Processor
  - Arithmetic logic unit (ALU)
- Memory

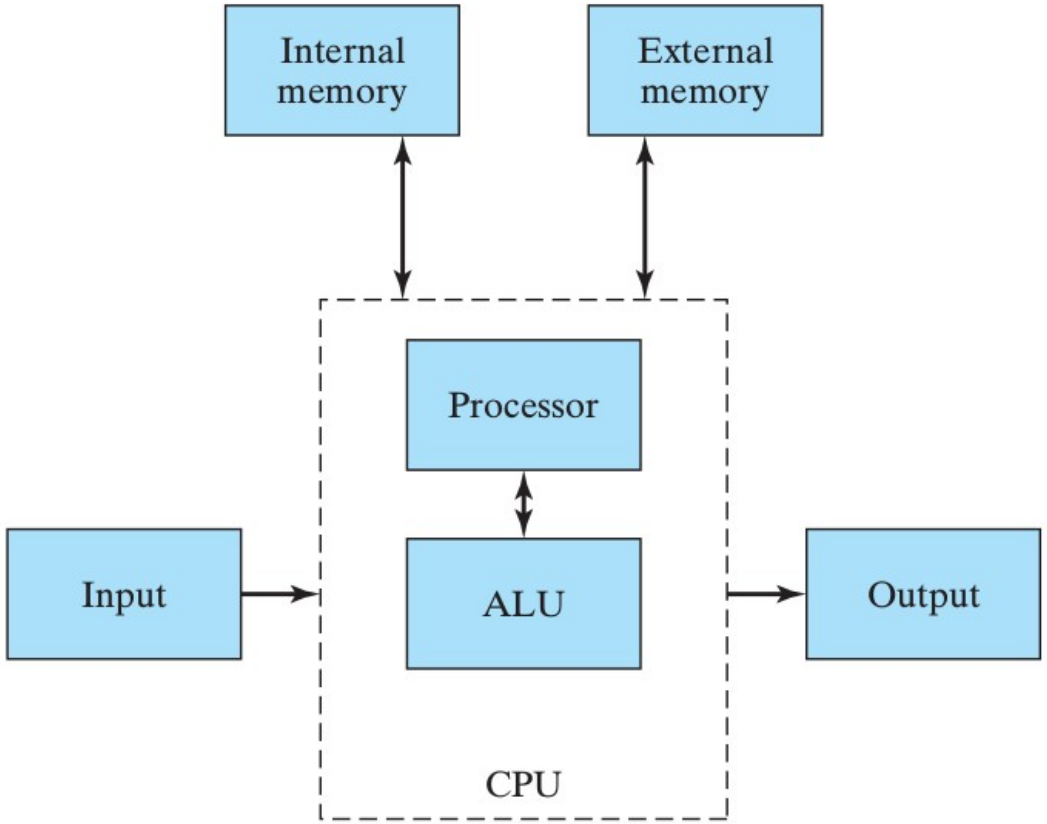

Figure 1.1 *Internal organization of a computer.*

Computer Software

Computer software contains the instructions or commands that we want the computer to perform

System Software:

- software designed to provide a platform for other software.
- **Operating Systems:**
- Desktop operating systems include Windows, Mac OS, Unix, and Linux.

Application Software

- Software tools are programs that have been written to perform common operations
- Microsoft Excel, Database management tools

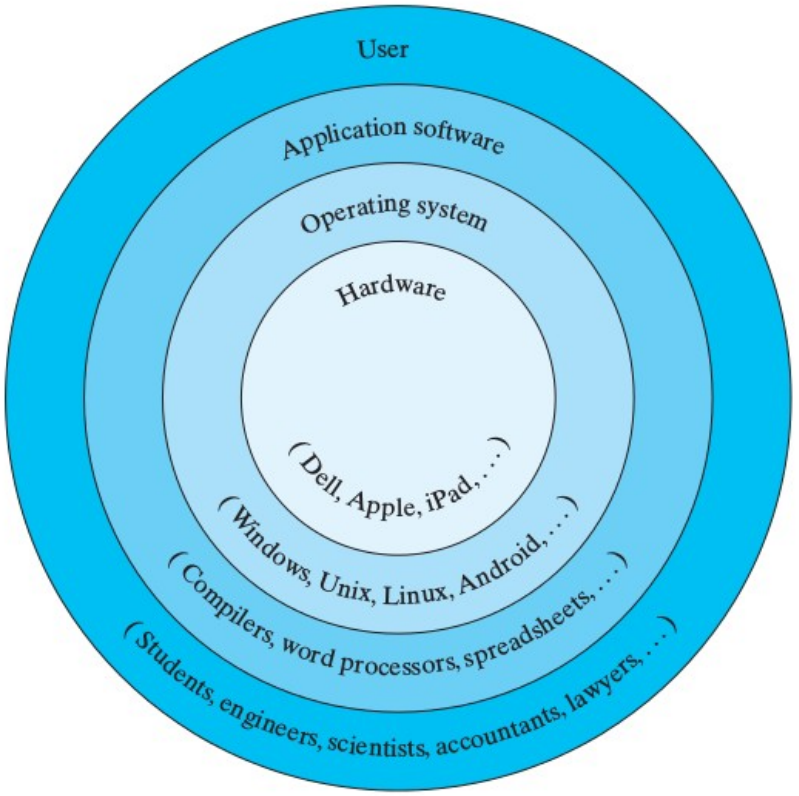

Figure 1.2 *Software interface to the computer.*

Computer Languages.

- **High-level languages**
  - use English-like commands
  - Easier than writing programs in machine language or in assembly language
  - These languages include C, C++, C#, and Java
- **Assembly language**
  - Unique to a specific computer design
  - Instructions are written in symbolic statements instead of binary
- **Machine languages (Binary Bits)**
  - Often written in binary strings
  - consisting of 0s and 1s (also called bits).

C language

- C is a general-purpose language that evolved from two languages
- In 1972, Dennis Ritchie developed and implemented the first C compiler at Bell Laboratories.
- It is hardware-independent.

Executing a Computer Program.

- C must be translated into machine language before the instructions can be executed by the computer.

An Engineering Problem-Solving Methodology

1) State the problem clearly.

2) Describe the input and output information.

3) Work the problem by hand (or with a calculator) for a simple set of data.

4) Develop a solution and convert it to a computer program.

5) Test the solution with a variety of data.

Compute the straight-line distance between two points in a plane.