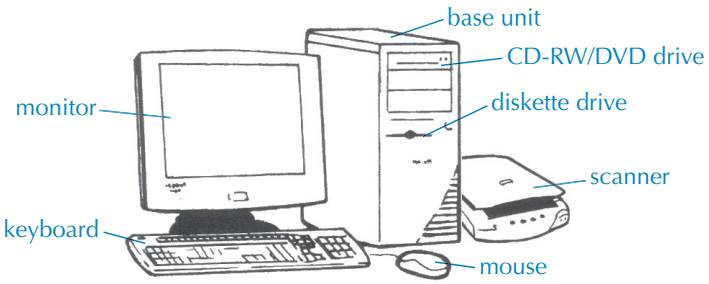
Computer Hardware

The physical components of the computer, such as the monitor and base unit, are referred to as hardware:



- *Input devices*, such as a keyboard, mouse, scanner, microphone, digital camera, CD-RW/DVD drive, and disk drive are used to enter data and instructions into the computer.
- *Peripheral devices*, such as printers and scanners, are added to make a computer more versatile. A peripheral device is attached to a *port* on the computer. There are different types of ports, such as serial, parallel, FireWire, USB, and Bluetooth ports.
- Computers process data into meaningful, useful information. Processed data is conveyed using *output devices*. Monitors and printers display data, CD-RWs, disk drives, and memory keys store data, and speakers communicate audio output.

The base unit also contains the *motherboard*, which is the main circuit board. The motherboard contains several components:

- *Expansion boards* are circuit boards that connect to the motherboard to add functionality to the computer. Examples include sound cards and video adapters.
- The *CPU* (Central Processing Unit), or processor, processes data and controls the flow of data between the computer's other units. Within the CPU is the ALU (Arithmetic Logic Unit), which can perform arithmetic and logic operations. It can also make comparisons, which is the basis of the computer's decision-making power. The ALU is so fast that the time needed to carry out a single addition is measured in nanoseconds (billionths of a second). The speed at which a CPU can execute instructions is determined by the computer's *clock rate*. The clock rate is measured in *megahertz* (MHz, million of cycles per second) or *gigahertz* (GHz, billion of cycles per second).
- A *bus* is a set of circuits that connect the CPU to other components. The data bus transfers data between the CPU, memory, and other hardware devices on the motherboard. The *address bus* carries memory addresses that indicate where the data is located and where the data should go. A *control bus* carries control signals. All data flows through the CPU:

Scanner

A scanner is an input device that uses a laser to create a digital image from artwork such as photos and drawings. The digitized image can then be incorporated into an electronic document.

Printers

A laser printer uses a laser and toner to generate characters and graphics on paper. An inkjet printer uses an ink cartridge to place very small dots of ink onto paper to create characters and graphics.

Making CPUs Faster

Intel and AMD are the two leading CPU manufacturers. Each are developing multi-core CPUs that include two or more processors. The Intel Core™ 2 Duo and the AMD64 processor families use two processors on one chip. With multiple processors, a computer can truly multitask when more than one application is running.

Real-time Clock

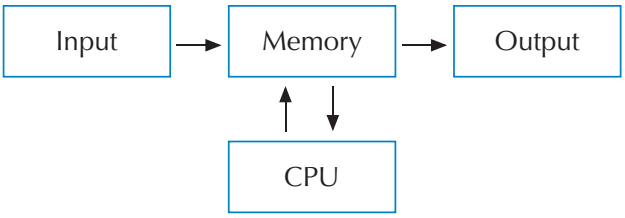
A battery chip called a real-time clock keeps track of the date and time in a computer even when the computer is off.

Integrated Circuits

Integrated circuits, also called chips, are created from silicon wafers which are etched with intricate circuits and coated with a metallic oxide to allow the circuits to conduct electricity. The silicon wafers are housed in special plastic cases that have metal pins. The pins allow the integrated circuits to be plugged into circuit boards.

BIOS

BIOS (basic input/output system) is firmware that contains the computer's start-up instructions. Firmware is instructions or data that is written onto ROM.



- Memory in the form of *integrated circuits* (ICs) stores data electronically. *ROM* (Read Only Memory) contains the most basic operating instructions for the computer. The data in ROM is a permanent part of the computer and cannot be changed. *RAM* (Random Access Memory), also called *primary or main memory*, is memory where data and instructions are stored temporarily. Data stored in RAM can be written to *secondary memory*, which includes any type of storage media, such as a floppy disk, hard disk, memory key, or CD-RW. Secondary memory must be copied into primary memory before it is processed by the CPU. *SRAM* (Static Random Access Memory) is high-speed memory referred to as *cache* (pronounced "cash"). This memory is used to store frequently used data so that it can be quickly retrieved by an application.