

The Primary Functions of a Computer

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WHAT'S COVERED

Computers have had a huge impact on the manner in which society operates. Increased efficiency, through automation and organization, only scratches the surface of what computing technology has afforded humanity. In fact, technology has progressed so much that people not utilizing computing technology in their businesses are at a disadvantage, as the computer today has an almost endless array of applications and functions. With consideration to this seemingly limitless potential, at their core, ALL computers perform the same basic functions on data: input, output, processing, and storage. Here we will take a look at the basic functions of a computer.

Our discussion breaks down as follows:

1. Functions of a Computer

For the most part, all personal computers consist of the same basic components: a Central Processing Unit (CPU), memory, circuit board, storage, and input/output devices. All computer applications make use of these components in different ways and combinations. It also turns out that almost every digital device uses the same set of components, so examining the personal computer will give us insight into the structure of a variety of digital devices. Thinking about computers in terms of their basic components, and the functionality associated with each component, reveals the primary functions of the computer in general. Remember that the computer is simply an electronic device that manipulates data. There are four primary functions of a computer — input, output, processing, and storage. These functions describe what is meant by the term “manipulate” when used to describe what a computer is.

2. Input/Output

In order for a personal computer to be useful, it must have channels for receiving input from the user, and channels for delivering output to the user. Input and output are artifacts through which computers communicate and interact with their environments, be it a user, a system, or a hardware. **Input** refers to the mode by which data is put into the computer. All personal computers need components that allow the user to input data. Early computers used simply a keyboard to allow the user to enter data or select an item from a menu to run a program. With the advent of the graphical user interface, the mouse became a standard component of a computer. These two components are still the primary input devices to a personal computer, though variations of each have been introduced. For example, many new devices now use a touch screen as the primary way of entering data. Output devices are essential as well. **Output** refers to the mode by which

data is delivered. The most obvious output device is a display, visually representing the state of the computer. Besides displays, other output devices include speakers for audio output and printers for printed output.



TERMS TO KNOW

Input

Mode by which data enters the computer.

Output

Mode by which data is delivered.

3. Data Processing

The majority of all computing devices have a similar architecture. The core of this architecture is the **central processing unit (CPU)**. The CPU can be thought of as the “brains” of the device. The CPU carries out the commands sent to it by the software and returns results to be acted upon. The earliest CPUs were large circuit boards with limited functionality. Today, a CPU is generally on one chip and can perform a large variety of functions. The overall effectiveness of a CPU is determined by its speed. The speed or “clock time” of a CPU is measured in hertz. A hertz is defined as one cycle per second. The CPU’s processing power is increasing at an amazing rate. Besides a faster clock time, many CPU chips now contain multiple processors per chip, working in parallel and balancing the load of instructions to be processed in a shorter time. These chips, known as dual-core (two processors) or quad-core (four processors), increase the processing power of a computer by providing the capability of multiple CPUs.



DID YOU KNOW

In 1965 Gordon Moore, one of the founders of Intel, recognized that microprocessor transistor counts had been doubling every year. His insight eventually evolved into Moore’s Law, which states that the number of transistors on a chip will double every two years. This has been generalized into the concept that computing power will double every two years for the same price point. Another way of looking at this is to think that the price for the same computing power will be cut in half every two years. Though many have predicted its demise, Moore’s Law has held true for over 40 years.



TERM TO KNOW

Central Processing Unit (CPU)

The “brains” of the device; it performs computations and logic operations sent to it by application software, and returns results to be acted upon.

4. Data Storage

A computer without an adequate amount of memory would only be able to perform limited instructions with data being output immediately. For example, a calculator provides users with fixed mathematical operations that are stored in memory. When a user performs any of the fixed operations on two or more operands, the calculator immediately displays the answer as an output on its screen. This is fine in situations where it is known beforehand that only mathematical computation is required; however, people who utilize PCs need a device that is more versatile. Remember that the CPU is what processes data by carrying out instructions. Modern computers place fast small storage options close in proximity to the CPU and slower larger storage

options further away from the CPU.

When a computer starts up, it begins to load information from the hard disk into its working memory. A hard disk is where data is stored when the computer is turned off and where it is retrieved from when the computer is turned on. Why is it called a hard disk? A hard disk consists of a stack of disks inside a hard metal case. This working memory, called **random-access memory (RAM)**, can transfer data much faster than the hard disk. Any program that you are running on the computer is loaded into RAM for processing.

In order for a computer to work effectively, a minimal amount of RAM must be installed. In most cases, adding more RAM will allow the computer to run faster. Another characteristic of RAM is that it is **volatile**. This means that it can store data as long as it is receiving power; when the computer is turned off, any data stored in RAM is lost. Even so, the computer also needs a place to store data for the longer term. Most of today's personal computers use a hard disk for long-term data storage. Unlike RAM, the computer's hard disk is not volatile. This means that data stored on a hard disk can be stored even when the computer is turned off.

A relatively new component becoming more common in some personal computers is the **solid-state drive (SSD)**. The SSD performs the same function as a hard disk: long-term storage. Instead of spinning disks, the SSD uses flash memory, which is much faster. Besides fixed storage components, removable storage media are also used in most personal computers. Removable media allows you to take your data with you. And just as with all other digital technologies, these media have gotten smaller and more powerful as the years have gone by. Early computers used floppy disks, which could be inserted into a disk drive in the computer. Around the turn of the century, a new portable storage technology was being developed: the USB flash drive. This device attaches to the universal serial bus (USB) connector, which became standard on all personal computers beginning in the late 1990s.



DID YOU KNOW

Although the terms have become interchangeable, “memory” is used to refer to the fast storage options closer to the CPU (for example RAM) and “storage” is used to refer to the slower storage options further away from the CPU (for example a hard drive).



TERMS TO KNOW

Random-Access Memory (RAM)

The working memory of a computer that transfers data from the hard disk upon starting the device.

Volatile

Computer storage that only holds data while power remains on.

Solid-State Drive (SSD)

Form of data storage that uses flash memory; all data is stored on a microchip.



SUMMARY

In this tutorial, we reviewed the primary **functions of the computer** such as **input**, **output**, **storage**, and **processing**. These functions are what the phrase “manipulate data” refer to when describing a computer. The primary functions of a computer can also be used to describe the functionality of various computer components. For example, a keyboard can be described as an input device.

Source: Derived from Chapter 1 from “Information Systems for Business and Beyond” by David T. Bourgeois. Some sections removed for brevity.

<https://www.saylor.org/site/textbooks/Information%20Systems%20for%20Business%20and%20Beyond/Textbook.html>



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