
CHAPTER 1

COMPUTING: SOME CONCEPTS AND TERMINOLOGY

Practically all learning involves the learning of new terms and concepts. When we learn new things, we have to learn the language of the new area or field. For example, if you want to learn to play the game of golf, you have to learn what terms like "birdie", "bogey", and "eagle" mean. Similarly, to learn computer programming, you need to learn what is a "source program", what "compilation" means, what is a "floating-point variable" etc.

In this first chapter we shall study some of the basic terms of computing. We will examine the basic structure of a computer and the role of an operating system in a computer. You will be shown a C++ source program but we shall not try to understand it yet. Be patient! It is important to learn some basics before starting to study computer programming. You should also realize that this is not the only chapter where new terminology is introduced. The whole book is full of new terms which you should learn gradually as you proceed with your studies.

These are sample pages from Kari Laitinen's book
"A Natural Introduction to Computer Programming with C++".
For more information, please visit
<http://www.naturalprogramming.com/cppbook.html>

1.1 Hardware and software

Electronic computers were brought into commercial use shortly after World War II. During their history, computers have evolved tremendously. The first computers were large machines occupying entire rooms. Today, computers are small because electronic components and integrated circuits, which they are made of, are small. The early computers were used only by a few scientists and engineers. Nowadays, personal computers have become equally as common as radios and TVs. In addition to electronic devices which we call computers, there are hidden or embedded computers inside much commonplace equipment. For instance, modern mobile telephones contain computers that control the equipment.

Computers consist of hardware and software. Hardware is everything which we can see and touch in a computer. For example, in a personal computer (PC), the screen, the keyboard, the mouse, the hard disk, the integrated circuits, and other electronic components on the greenish boards inside the control unit are hardware. Software, on the other hand, is much more difficult to describe. Software is not visible in the same way as hardware. We cannot touch software.

Software makes computers do things. The user of a computer communicates with software that is being run (or executed) on the computer. The software of a computer consists of applications. Word processing programs, which are also called word processors, are a good example of application software. Microsoft Word is an example of a commercially available word processing program. You can run a word processing program on your computer, and thereby you apply your computer to word processing purposes. Other kinds of applications are, for example, computer games, Internet browsers, and C++ compilers. There are certainly thousands of different computer applications in the world. By studying this book, you will learn to create your own computer applications.

It is very hard to define the word "software" exactly, but after reading this book you will understand what this word means. Software makes computers "live", operate, and be useful. A computer without software is a little bit like a CD player without any music stored on CDs, or a TV without any VCRs, DVD players, or broadcasting or cable-TV companies. Because software is so important for computers, it is useful to learn how to develop software, and that is what this book will teach you.

1.2 Operating systems, main memory, and memory devices

In every modern computer, there is an operating system which is software. An operating system is software that makes the hardware of the computer come alive. Computers would be very difficult to use without operating systems. Operating systems are software that control all the basic operations of a computer. With the help of an operating system, it is possible to use other software packages, such as word processing programs, computer games, and Internet browsers.

Probably the most widely-known commercial operating system is Microsoft Windows of which there are several variations. An imitation of the MS-DOS operating system, the first operating system for personal computers, is hidden inside the Windows operating system. UNIX is the operating system for larger workstation computers. Apple Macintosh computers also have their own operating system. Linux is a free UNIX-like operating system for PCs.

An operating system is software that controls the essential hardware components of a computer. An operating system serves as a link between the application software and the hardware (see Figure 1-1). When you operate a personal computer, you always have to interact with the operating system.

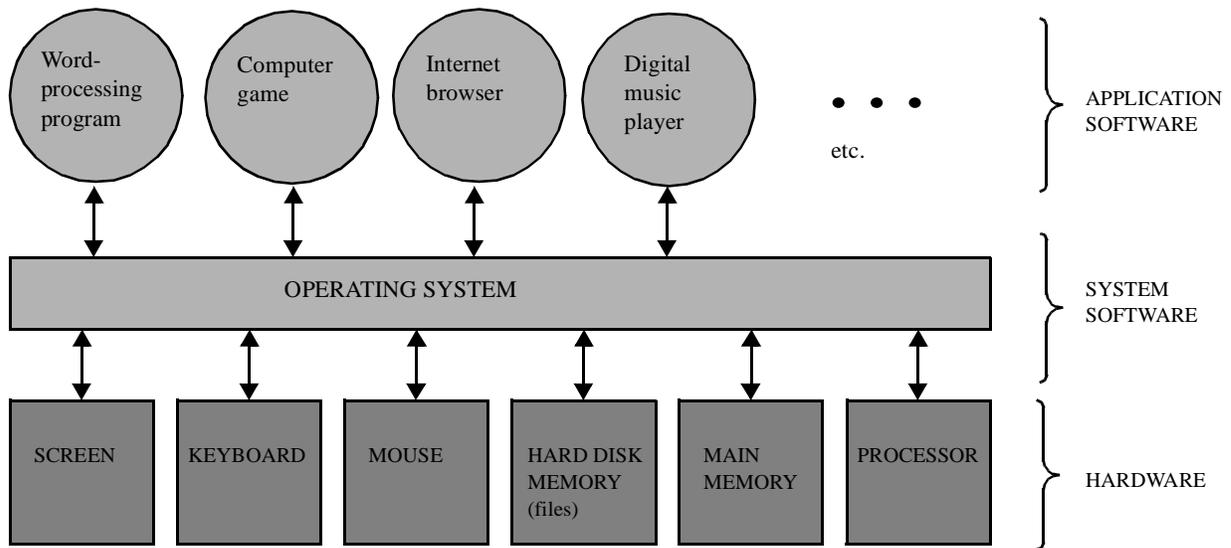


Figure 1-1. An operating system is a link between hardware and application software.

Computers need memory devices in order to operate and store information. The most important piece of memory in a computer is its main memory. The main memory is also called "the immediate access memory" or "the main storage". The main memory of a PC is made of RAM components. RAM is an abbreviation of "random access memory" which means that a processor of a computer can access all memory locations with a certain numerical memory address. (Don't panic if this sounds somewhat difficult. The operation of computer memory will be studied more thoroughly in Chapter 3.)

In addition to the main memory, a computer usually has various kinds of memory devices which we can refer to with the term "auxiliary memory". Auxiliary memory devices are usually slower and cheaper than the components of the main memory. In a PC, the most important auxiliary memory device is a hard disk where information is stored magnetically on rotating plates. Other auxiliary memory devices in a typical PC are floppy disks and CDs.

The auxiliary memory devices of a computer could be called the file memory because all information in the auxiliary memory is stored in files. Every file must have a unique name that identifies it. A file name usually consists of the actual file name and a file name extension. For example, in the name **sum.cpp** (pronounced "sum dot c p p"), **sum** is the actual file name and **.cpp** is the file name extension. A file name extension usually shows what is contained in a file or how a file ought to be used. For example, the extension **.cpp** reveals that the file contains a C++ source program, the extension **.exe** is for files that contain executable computer programs, and **.txt** terminates the names of files that contain readable unformatted texts.

Because the memory devices of a computer can contain thousands of files, there must be some kind of system to organize the files into groups so that they can be easily found. For this reason, it is possible to create directories on hard disks and other memory devices. Directories are also called folders. A directory can contain a set of files and other directories that are called subdirectories.

There must also be a means to identify different memory devices. In PCs that run the Windows operating system, different memory devices are identified with letters like A, C, D, E, etc. These letters are called drives. Usually drive A: is a floppy disk drive, drive C: and often also drive D: are on the hard disk, then drive E: might be a CD drive, and so on. All the memory devices, the drives, have a root directory that contains the other directories that are stored on the memory device.