#  Chapter Two

# Understanding Hardware

## *1- Central Processing Unit (CPU):*  is a particularly important part of the computer known as the *central processing unit* (or *CPU*, for short). or the *microprocessor* (or *processor*, for short). The CPU does all the work: It calculates, it processes, it keeps things running smoothly.

## Speaking of which, speed is what the CPU is all about, and each successive version of the CPU gets progressively faster. A CPU’s speed is measured in megahertz (MHz) or in gigahertz (GHz). Another common measure of a CPU is how many bits it can handle at a time. A bit is the tiniest piece of information processed by a computer. Eight bits make up one byte, and one byte equals one character. Computers used to handle 8 or 16 bits; now they’re up to 32 and 64 at a time.

## *2- Memory:* Everything that a computer does is based on a combination of ones and zeros, which is known as the binary system. These ones and zeros are digits, known as *bits*, which are the smallest memory unit. The term *bit* is short for *binary digit*.



A recordable CD (CD-R) can have up to 700MB of memory.

A hard drive might have 60 GB of memory.

Bits and Bytes

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***Unit*** | ***Abbreviation*** | ***Size*** | ***Symbol*** | ***Equivalent*** |
| **Bit** | **—** | **—** | **—** | An atom or speck, the smallest unit of memory. |
| **Byte** | **—** | 8 bits |  | A single letter, a number, or a symbol. |
| **Kilobyte** | **K or KB** | 1,024 bytes |  | A one-page, double- spaced letter. |
| **Megabyte** | **M or MB** | 1,048,576 bytes |  | A best-selling novel. |
| **Gigabyte** | **G or GB** | 1,073,741,824 bytes |  | An encyclopedia set. |
| **Terabyte** | **T or TB** | 1,099, 511,627,776bytes |  | A bookstore. |

## 3- RAM and ROM

**RAM (random-access memory)**

 RAM is the computer’s main memory, which it uses to process information. Whenever you work with a file on your computer, you’re using RAM. And the data in that file is temporarily stored in RAM. However, RAM is volatile, which means that the data is stored only as long as the computer has power. Once you shut off your computer, the data is gone.

**ROM (read-only memory)**

 ROM is the computer’s low-level memory, which it uses to perform its most basic functions. This memory is permanent; the data remains even if you shut off the computer. This only makes sense because ROM is required to restart your computer.

**Comparing RAM and ROM**

|  |  |
| --- | --- |
| ***RAM*** | ***ROM*** |
| Random-access memory | Read-only memory |
| Main memory. | Low-level memory. |
| Necessary to process information (example: work with a file). | Necessary to perform the most basic functions (example: start the computer). |
| Volatile: If not saved, data disappears when you shut off the computer‘s power. It‘s temporary. | Nonvolatile: Data remains even when you shut off the computer‘s power. It‘s permanent. |
| Often discussed when buying a computer. | Seldom mentioned when buying a computer. |
| You can read from and write to it. Comparable to a notepad. | You can read from it, but you can‘t write to it. Comparable to a novel. |

***4- Mouse***

The mouse acts as a handheld pointing device that allows you to control the actions of that blinking item on your screen known as a cursor. Depending on the software you are using and the task you are doing, the cursor may resemble such symbols as a slanted arrow ( ), an ―I‖ (), or a vertical line.

***5- Keyboard***

Like the mouse, the keyboard is an input device that allows you to talk to the computer. The keyboard is easily recognizable because it resembles a typewriter keypad.

**Special Keys and Their Functions**

|  |  |
| --- | --- |
| ***Key(s)*** | ***Description*** |
|  | **The <Alt> key doesn‘t do anything by itself—it needs another key to make things happen. For example, pressing the <Tab> key while holding down the <Alt> key switches between any programs that are currently running.** |
|  | **Just like the <Alt> key, the <Ctrl> key doesn‘t do anything by itself—you need to press another key with it to make things happen. For example, pressing the <X> key while holding down the <Ctrl> key cuts whatever is selected.** |
|  | **The <F1> key is the help key, and pressing it displays helpful information about what you‘re doing.** |
|  | **The <Esc> (Escape) key is the ―Wait, I‘ve changed my mind‖ key and is the same as clicking Cancel in a dialog box. For example, if you click something and an unfamiliar dialog box appears, you can close it by pressing the <Esc> key.** |
|  | **The <Enter> key is the ―Carry out my orders‖ key and is the same as clicking the OK button in a dialog box. For example, after you‘ve typed the name of a program you want to run in a dialog box, press <Enter> to run the program. The <Enter> key also adds new lines and starts new paragraphs if you‘re entering text.** |
|  | **When you‘re in a dialog box, pressing the <Tab> key moves to the next field.****When you‘re using a word processor, the <Tab> key works just like you‘d think it would and jumps to the nearest tab stop whenever you press it.** |
|  | **The arrow keys move your computer‘s cursor across the screen.** |
|  | **Nothing surprising here. The <Delete> key deletes or erases whatever you select—files, text, or graphical objects. If you‘re working with text, the <Delete> key erases characters to the right of the insertion point.** |
|  | **Use the <Backspace> key to fix your typing mistakes—it erases characters to the left of the insertion point.** |
|  | **The <Home> key jumps to the beginning of the current line when you‘re working with text.** |
|  | **The <End> key jumps to the end of the current line when you‘re working with text.** |
|  | **The <Page Up> key moves up one screen.** |
|  | **The <Page Down> key moves down one screen.** |

 6- **Monitor**: A computer’s monitor works a lot like a TV screen. The monitor is really only half of what makes text and images appear on the screen. The other half is the graphic card, or video/display adapter. The monitor plugs into the graphics card in the back of the computer. Flat panel or LCD (Liquid Crystal Display) monitors, will eventually replace older CRT monitors

* **Size:** The size of a monitor is measured diagonally across the screen, just like TVs. Common monitor sizes are 15, 17, 19, and 21 inches. The most popular monitor size is currently 17 inches.
* **Dot Pitch:** Dot pitch refers to the distance between each pixel, or dot, on the screen, as measured in millimeters (mm). The smaller the dot pitch, the closer the dots, and the sharper the image is. If you’re in the market for a monitor try to find one with a 0.28 mm or less.
* **Refresh Rate:** The refresh rate determines how quickly the monitor redraws, or updates, the image on the screen. Higher refresh rates are better, since they flicker less and are easier on the eyes. The refresh rate is measured in herz (Hz)
* **Screen Savers and Energy Star Compliance:** A screen saver is a moving picture that appears on your computer screen when you don’t use your computer for a while. Most monitors are Energy Star compliant. This means they automatically turn themselves off after a period of time to save electricity. You turn the monitor back only by simply moving the mouse or pressing a key on the keyboard.

 **7- Graphics Card:** The second part of a computer’s video system is the graphic card or video adapter. A graphics card is an expansion card that plugs into a computer’s motherboard and is responsible for all the text and pretty images that appear on your computer’s monitor. Many computers don’t have a graphics card at all—all the video capabilities are instead built into the computer’s motherboard.

 **8- Printer Basics:** A printer is an output device that puts text and graphics on paper. Using the printer is often the last step in creating something on a computer, whether it’s a letter, spreadsheet, or digital photograph.

 **Resolution:** A printer’s resolution helps determine the quality of the images it can produce. Higher resolution means higher quality images. Printer resolution is measured in dots per inch (dpi). Generally, 600-dpi resolution works great for text documents, while you will probably want 1200 dpi or better resolution for printing images.

 **9- Sound and Speakers:** The term sound card is a little misleading; sound cards used to be expansion cards that plugged into a computer’s motherboard. Although such sound cards still exist, today most computers have sound capabilities built-it to their motherboards. Either way, a sound card basically does two things: it plays and records digital sounds.

**10- Modem:** A modem translates a computer’s ones and zeros into audio tones, so that it can transmit information over the phone lines to other modems. The speed of a modem is measured by how fast it can transmit information in bits per second (bps).

**Internal**: Most computers have an internal modem. Internal modems often plug into an expansion slot and are cheaper than external modems.

**External**: An external modem plugs in to a computer’s serial port. Newer, broadband modem may plug into the USB or Ethernet port. A broadband modem transmits information directly over a connection, unlike older traditional modems that have to convert the information to tones or sounds first. Because of this, broadband modems are very, very fast—much faster than standard modems. DSL and Cable are the most common types of broadband connections.

**11- Input /Output:** Some computer devices can be categorized as both an input device and an output device. For example, a multifunction printer has a scanner (input) and a printer (output). Touch screen monitors are another example of an input/output device; they display images (output) and also let users interact with the computer by pressing areas of the screen (input).

**12- Hard Drive:** A hard drive or hard disk is a computer’s main storage device. Most hard drives are tucked away in the system unit of a computer and hidden from view. Although you normally can’t see a computer’s internal hard drive you can usually hear it whirring inside when you start the computer or a program. An external hard drive sit outside the computer’s system unit and plugs into a USB, Firewire, or SCSI port.

So what’s stored on a hard drive? Let’s take a look…

* Operating System Files
* Program Files
* Data Files

**Repair a Hard Drive:** Over time, hard drives can become damaged, effecting their performance. Fortunately most of the hard drive damage is caused by normal wear and tear and is not serious. You can diagnose and correct most hard drive problems with a hard drive repair program.

Microsoft Windows comes with a built-in hard drive repair program.

* **Defragmenting a Hard Drive:** Normally a computer stores a file in the same location on a hard drive. Over time, a hard drive can become fragmented, and instead of storing a file in the same location it begins storing parts of it all over. When the computer needs to read a fragmented file, it must read several different parts of the hard drive instead of just one. Defragmenting a hard drive puts the fragmented files back together in one place. You should defragment your computer’s hard drive about once a month.
* **Backing up a Hard Drive:** A computer’s hard drive stores information even when the computer is turn off, but you should still back up the documents you create to some type of removable storage, like a CD-RW or tape backup. This will give you an extra copy of your files in case your hard drive is damaged.
* **Virus Protection:** A computer virus is actually a small computer program written by a malicious person with the purpose of vandalizing computers by erasing information on their hard drive and causing other problems. Anti-Virus programs that protect computers against viruses, like Norton AntiVirus or McAfee VirusScan, are available at most computer stores. If you’re even thinking about connecting to the Internet, you need to have AntiVirus software installed on your computer.
* **Hard Drive Compression:** A computer can increase space on a hard drive by using a special program to compress the files stored on a hard drive. Most data compression programs can effectively double the amount of information a hard drive can store.
* So why don’t many people use disk compression?
* 1- Data compression slows your hard drive because the computer has to un-compress files before it can read them.

2- Data compression often causes more problems in hard drives.

3- Several programs won’t run on the computer with compressed hard drives. Don’t compress your hard drive unless you absolutely have to, and even then it might be better to start looking for a new, larger hard drive than to use data compression.

**13- CD-ROM Drive**

CD-ROMs can store lots of information: a single CD-ROM can hold more than 700 Megabytes (MB) of data

**14- DVD** **Drive**

Next generation DVD drives are quickly replacing CD-ROM drives in newer computers. A DVD (stands for Digital Versatile Disc) disc looks just like a CD-ROM, but it can store more than 4 Gigabytes (GB) of information—as much as seven CDs.

**15- USB Flash Drive:** A USB flash drive is really another type of Flash Card that plugs into a USB port. USB flash drives range in sizes from 16 MB to 2000 GB.