

# What is Hardware?

## What is Hardware outside the box?

Teacher Rachele Di Palo

*The computer is done only hardware?*

*The computer is done only software?*

*Can the computer operate only with the hardware?*

*Can the computer operate only with the software?*

*What is the difference between Hardware and Software ?*

***Hardware and software work together in digital devices and systems to provide computerized functionality.***

Hardware includes the physical components, such as the motherboard, chips, memory, and hard drives, while software includes the programs that run on the hardware.

Ergo, a computer is hardware, while an operating system such as Microsoft Windows is the software that makes the hardware functional.

**Though hardware and software are most often associated** with computers, software also runs on other hardware, such as cellular phones, personal digital assistants (PDAs), Global Positioning Satellite (GPS) units, medical equipment, and air traffic control systems.



# What is Hardware?

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### What is Hardware?

With hardware, electrical, computer and telecommunications engineering indicates the physical part of a personal computer, or anything that's magnetic, optical, mechanical and electronic equipment that allow the operation (also called instruments).

More generally, the term refers to any physical component of a device or an electronic device.

The etymology of the word comes from a combination of two English words, hard (hard) and Ware (artifact, object), as opposed to the software, the logic (and therefore soft, "soft") that makes up the personal computer .

### Hardware are "box" and the electronic circuitry



The term "Hardware" arose as a way to distinguish the "box" and the electronic circuitry and components of a computer from the program you put in it to make it do things. Hardware implies permanence and invariability. Hardware includes the cables, connectors, power supply units, and peripheral devices such as the keyboard, mouse, audio speakers, and printers.

You can, however, change the modular configurations that most computers come with by adding new adapters or cards that extend the computer's capabilities.

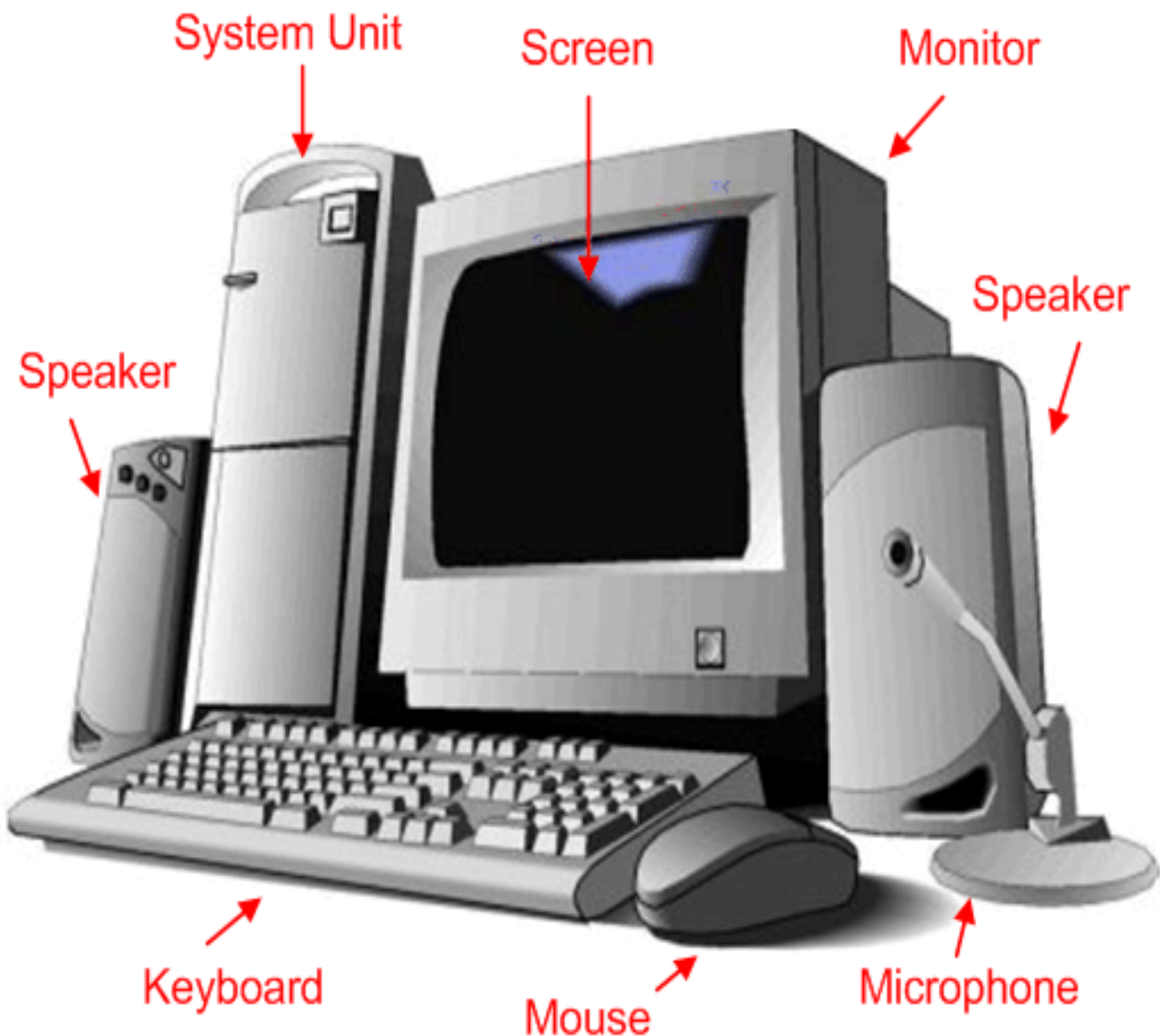
# What is Hardware?

## What is Hardware outside the box?

### Hardware : objects that you can actually touch.

The hardware you can actually see and touch.

Not everybody has exactly the same hardware. But those of you who have a desktop system, like the example shown in Figure probably have most of the components shown in that same figure. Those of you with notebook computers probably have most of the same components. Only in your case the components are all integrated into a single book-sized portable unit.



**hardware outside the box**

# What is Hardware?

## What is Hardware outside the box?

### keyboard

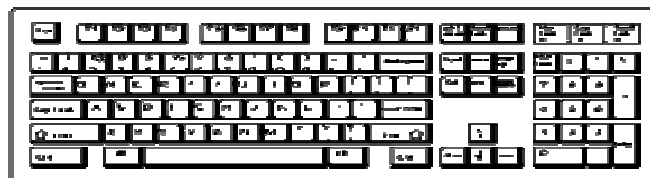
The set of typewriter-like keys that enables you to enter data into a computer.



XT Keyboard



AT (Standard)



AT (Enhanced)

Computer keyboards are similar to electric-typewriter keyboards but contain additional keys. The keys on computer keyboards are often classified as follows:

- alphanumeric keys -- letters and numbers
- punctuation keys -- comma, period, semicolon, and so on.
- special keys -- function keys, control keys, arrow keys, Caps Lock key, and so on.

There are actually three different PC keyboards: the original PC keyboard, with 84 keys; the AT keyboard, also with 84 keys; and the *enhanced keyboard*, with 101 keys. The three differ somewhat in the placement of function keys, the Control key, the Return key, and the Shift keys. In addition to these keys, IBM keyboards contain the following keys: Page Up, Page Down, Home, End, Insert, Pause, Num Lock, Scroll Lock, Break, Caps Lock, Print Screen. There are several different types of keyboards for the Apple Macintosh. All of them are called *ADB keyboards* because they connect to the Apple Desktop bus (*ADB*). The two main varieties of Macintosh keyboards are the *standard* keyboard and the *extended keyboard*, which has 15 additional special-function keys.

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### Printer

#### A device that prints text or illustrations on paper.



There are many different type printers. In terms of the technology utilized, printers fall into the following categories:

- **daisy-wheel:** Similar to a ball-head typewriter, this type of printer has a plastic or metal wheel on which the shape of each character stands out in relief. A hammer presses the wheel against a ribbon, which in turn makes an ink stain in the shape of the character on the paper. Daisy-wheel printers produce letter-quality print but cannot print graphics.

- **dot-matrix:** Creates characters by striking pins against an ink ribbon. Each pin makes a dot, and combinations of dots form characters and illustrations.

- **ink-jet:** Sprays ink at a sheet of paper. Ink-jet printers produce high-quality text and graphics.

- **laser:** Uses the same technology as copy machines. Laser printers produce very high quality text and graphics.

- **LCD & LED :** Similar to a laser printer, but uses liquid crystals or light-emitting diodes rather than a laser to produce an image on the drum.

- **line printer:** Contains a chain of characters or pins that print an entire line at one time. Line printers are very fast, but produce low-quality print.

- **thermal printer:** An inexpensive printer that works by pushing heated pins against heat-sensitive paper. Thermal printers are widely used for receipts and labels.

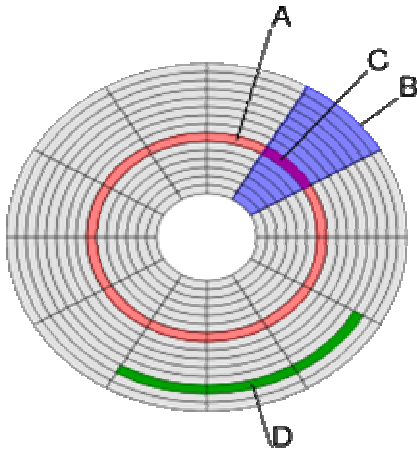
**There are two basic types of disks:  
magnetic disks and optical disks.**

On magnetic disks, data is encoded as microscopic magnetized *needles* on the disk's

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### Magnetic disks come in a number of different forms:

□ **floppy disk** : A typical 5¼-inch floppy disk can hold 360K or 1.2MB (megabytes). 3½-inch floppies normally store 720K, 1.2MB or 1.44MB of data. □ **hard disk** : Hard disks can store anywhere from 20MB to more than 200GB. Hard disks are also from 10 to 100 times faster than floppy disks. □ **removable cartridge** : Removable cartridges are hard disks encased in a metal or plastic cartridge, so you can remove them just like a floppy disk. Removable cartridges are very fast, though usually not as fast as fixed hard disks.

### Optical disks come in three basic forms:

□ **CD-ROM** : Most optical disks are read-only. When you purchase them, they are already filled with data. You can read the data from a CD-ROM, but you cannot modify, delete, or write new data. □ **WORM** : Stands for *write-once, read-many*. WORM disks can be written on once and then read any number of times; however, you need a special WORM disk drive to write data onto a WORM disk. □ **erasable optical (EO)** : EO disks can be read to, written to, and erased just like magnetic disks.

**DISK DRIVE** The machine that spins a disk is called a disk drive. Within each disk drive is one or more heads (often called read/write heads) that actually read and write data

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The *system unit* is the actual computer; everything else is called a *peripheral* device. Your computer's system unit probably has at least one floppy disk drive, and one CD or DVD drive, into which you can insert floppy disks and CDs. There's another disk drive, called the hard disk inside the system unit, as shown in Figure. You can't remove that disk, or even see it. But it's there. And everything that's currently "in your computer" is actually stored on that hard disk. (We know this because there is no place else inside the computer where you can store information!).



The floppy drive and CD drive are often referred to as *drives with removable media* or *removable drives* for short, because you can remove whatever disk is currently in the drive, and replace it with another. Your computer's hard disk can store as much information as tens of thousands of floppy disks, so don't worry about running out of space on your hard disk any time soon. As a rule, you want to store everything you create or download on your hard disk. Use the floppy disks and CDs to send copies of files through the mail, or to make backup cop.

## The Mouse

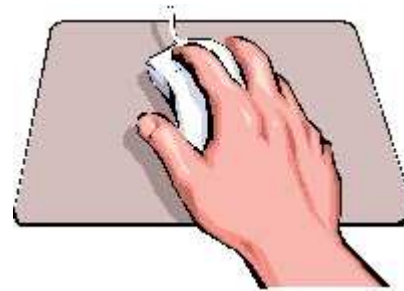
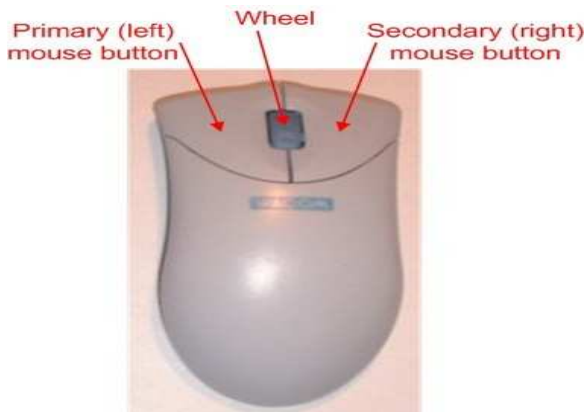
Obviously you know how to use your mouse, since you must have used it to get here. But let's take a look at the facts and buzzwords anyway. Your mouse probably

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has at least two buttons on it. The button on the left is called the *primary mouse button*, the button on the right is called the *secondary mouse button* or just the *right mouse button*. I'll just refer to them as the left and right mouse buttons. Many mice have a small wheel between the two mouse buttons, as illustrated in Figure.



The idea is to rest your hand comfortably on the mouse, with your index finger touching (but not pressing on) the left mouse button. Then, as you move the mouse, the *mouse pointer* (the little arrow on the screen) moves in the same direction. When moving the mouse, try to keep the buttons aimed toward the monitor -- don't "twist" the mouse as that just makes it all the harder to control the position of the mouse pointer. If you find yourself reaching too far to get the mouse pointer where you want it to be on the screen, just pick up the mouse, move it to where it's comfortable to hold it, and place it back down on the mousepad or desk. The buzzwords that describe how you use the mouse are as follows:

- **Point:** To point to an item means to move the mouse pointer so that it's touching the item.
- **Click:** Point to the item, then tap (press and release) the left mouse button.
- **Double-click:** Point to the item, and tap the left mouse button twice in rapid succession - click-click as fast as you can.
- **Right-click:** Point to the item, then tap the mouse button on the right.
- **Drag:** Point to an item, then hold down the left mouse button as you move the mouse. To *drop* the item, release the left mouse button.
- **Right-drag:** Point to an item, then hold down the right mouse button as you move the mouse. To *drop* the item, release the right mouse button.
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## THE MONITOR

A monitor or display (sometimes called a visual display unit) is an electronic visual display for computers. The monitor comprises the display device, circuitry, and an

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enclosure. The display device in modern monitors is typically a thin film transistor liquid crystal display (TFT-LCD) thin panel, while older monitors use a cathode ray tube about as deep as the screen size. Originally computer monitors were used for data processing and television receivers for entertainment; increasingly computers are being used both for data processing and entertainment. ***The size of an approximately rectangular display is usually given as the distance between two opposite screen corners, that is, the diagonal of the rectangle***  
***Performance measurements***

**The performance of a monitor is measured by the following parameters:**

- Luminance is measured in candelas per square meter (cd/m<sup>2</sup> also called a Nit).
- Viewable image size is measured diagonally. For CRTs, the viewable size is typically 1 in (25 mm) smaller than the tube itself.
- Aspect ratios is the ratio of the horizontal length to the vertical length. 4:3 is the standard aspect ratio, for example, so that a screen with a width of 1024 pixels will have a height of 768 pixels. If a widescreen display has an aspect ratio of 16:9, a display that is 1024 pixels wide will have a height of 576 pixels.
- Display resolution is the number of distinct pixels in each dimension that can be displayed. Maximum resolution is limited by dot pitch.
- Dot pitch is the distance between subpixels of the same color in millimeters. In general, the smaller the dot pitch, the sharper the picture will appear.
- Refresh rate is the number of times in a second that a display is illuminated. Maximum refresh rate is limited by response time.
- Response time is the time a pixel in a monitor takes to go from active (black) to inactive (white) and back to active (black) again, measured in milliseconds. Lower numbers mean faster transitions and therefore fewer visible image artifacts.
- Contrast ratio is the ratio of the luminosity of the brightest color (white) to that of the darkest color (black) that the monitor is capable of producing.
- Power consumption is measured in watts.
- Viewing angle is the maximum angle at which images on the monitor can be viewed, without excessive degradation to the image. It is measured in degrees horizontally and vertically.

**Tipologie of monitor:** CRT - (Cathode Ray Tube) display ; LCD - (Liquid Crystal Display) as of 2010, it is the primary visual display for personal computers. ; LED - (light-emitting diode) display ; OLED - Organic Light-Emitting Diode