



Figure 10: A Typical Hard Drive

Everything (data) in your computer is stored in the hard drive. The hard drive is a rectangular box that contains some discs and other parts. The information stored in a hard drive is written on its discs. The information can be written to, erased from, copied or moved among discs. Although you will perform these operations, the operating system is in charge of deciding how the operations are carried out inside. You will not need to know what is going on inside.

The hard drive is inside of the computer, connected to another wide flat object called the motherboard, using cables. This type of hard drive is referred to as internal and this the most classic type.

When you purchase a computer, it already has a hard drive. Later on, you can either add a second one to your computer or replace the hard drive in your computer.

2. External Hard Drives

Until recently, the hard drive was traditionally thought of as a piece of hardware inside the computer. For this reason, it couldn't be carried away easily: you had to open the computer, disconnect the cables, and then remove the hard drive. Even then, some other issues were related (such as the type of cable, etc) so much that people were not in the habit of carrying a hard drive from one computer to another. Fortunately, another technology was developed to use another type of hard drive that stays outside the computer and it is referred to as external.

An external hard drive is usually connected to the computer using a cable to a port (USB) outside the computer. What makes it valuable is that, by simply disconnecting its cable, an external hard drive can easily be carried from one computer to another. And because the external hard drive doesn't have the same particularities of cables (IDE vs SATA), it can easily be connected to almost any common computer (PC). The external hard drive is fairly easy to install. You primarily connect a (USB) cable from the back of the hard drive to a (USB) port on the computer. In most cases, it should be ready to install (Plug n' Play) or it may quickly install the software (driver) it needs to function. In some cases, after inserting the cable and turning the device on, a window may come up asking you to install something (a driver), which you would also have received from the manufacturer. Install it and continue to use the drive.

3. Internal CD Drives

One of the problems with external hard drives is that, sometimes they can be heavy (not too heavy but still). Another problem is that, to use them on another computer, you must have the right cable and you must physically connect them. The remedy to this is to use an object that holds its information but can be ready by a recognizable drive. A CD drive is an object that can be used to store information on a disk called a compact disc (CD). It is also connected similar to that of the internal hard drives.

4. External CD Drives

We also have another type of CD drive that stays outside the computer called an external CD drive. This type is usually connected to the computer through an external port (USB). Here is an example:



Figure 11: An External CD Drive

Like the internal hard drive, the CD drive uses a round disc to store its data. While the hard drive holds its own many discs inside, the CD drive doesn't actually have a disc. You insert the disc when you think it necessary, and you can insert only one disc. The CD drive can read regular data but it can also play CD music.

In early days, the CD drive was used only to read the data on a disc. Most CD drives nowadays are also used to write to a disc. They are called CD writers or CD burners. As such, the CD writer can be used to both read from, and write to, a disc.

5. Internal DVD Drives

As you can expect, the CD has some limitations. For example, it can hold only a specify amount of information and it can play only music. To overcome some of its limitations, there is the DVD (Digital Video Disc) drive. This drive looks like the CD drive and they have the same dimensions.

6. External DVD Drives

There is also an external DVD drive. Like the hard and the CD drives, the external DVD drive connects to the computer using a (USB) cable connected to a port on the computer.

7. Flash Drives

A flash drive is a small drive that can be used to hold data.

To use it, you insert its metallic side in a USB port on the computer. Once you do, it turns itself on and a window may come up asking you what you want to do. In some cases, the drive would need to install something (a driver) for it to work.



Figure 12: The Flash Drive

8. Memory Cards and Card Readers

The function of a memory card is similar to that of a flash drive except that the card needs a reader for it to be useful. You would buy them separately and insert the memory card into the card reader which is invariably connected to the computer via the USB port.

SIMPLE DISK MANAGEMENT

When a drive has been installed in the computer or inserted on a port, the operating system must recognize it. Once it does, for a computer that runs Microsoft Windows, it assigns a letter to it. In Windows Explorer or My Computer, a drive is represented by a letter. Here are examples:

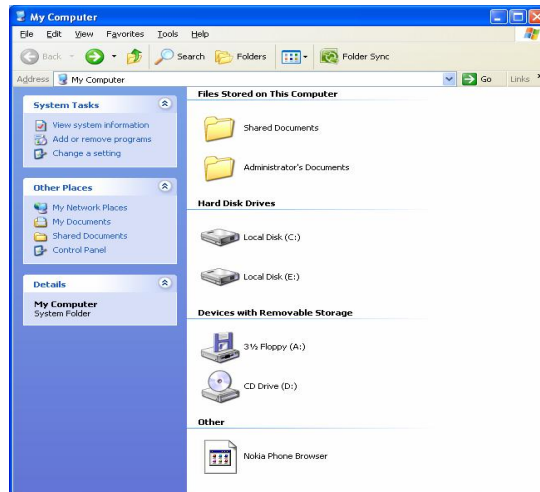


Figure 13: Window Explorer showing the drives on a Computer

Each letter, in this case A, C, D and E represents a drive. In some cases, a letter may not represent a real drive physical drive (it may represent a partition among many partitions on the same hard drive). To distinguish a letter of a drive from letters of normal words, the letter of a drive is always followed by a colon ":". In Windows Explorer or My Computer, the letter of a drive is also included in parentheses.

In most cases, you should accept the letters, In some cases, you may need to change them. For example, if you insert a flash drive, you hear a sound that the computer has recognized it, but the content of the drive doesn't show, or the drive letter is not (automatically) assigned (by the operating system). The problem could be that the letter the operating system attempted to assign to the drive is already taken but the operating system didn't attempt to assign another letter.

To manage the letters of the drives, you can open the Computer Management MMC. To do this, you can right-click My Computer → click Manage → in the left frame, click Disk Management. One of the actions you can perform here consists of changing a drive letter. To do this, you can right-click a drive letter in the top-right frame or a section in the lower-right frame → click Change Drive Letter And Paths... This would open a dialog box that you can use to change the letter.

DOCUMENTS

When you open an application, such as a text editor, it displays an empty area with a blinking caret. In the same way, if you open a graphics application or a spreadsheet, it also displays an empty area, waiting for your work. You can then start performing the type of assignment that the application is expecting. For a graphics application, you can start drawing or loading pictures. For a spreadsheet, you can start entering numbers and performing calculations. When you start entering text in a text editor or a word processor, you are said to create, or work on, a document. If you start drawing shapes or manipulating pictures in a graphics application, you are said to work on a document. If you start entering numbers and performing calculations in a spreadsheet, you are said to work on a document.

Saving a Document

After creating a document, you may want to preserve it for later use. Preserving a document is referred to as saving it. You have many options and this may depend on the application you are using. In most cases, if an application was created using the standards described and recommended by Microsoft, to save the document, on the main menu, click File → Save:

- If the document was never saved before, a dialog box would come to assist you
- If the document was saved previously, it would be saved behind the scenes and the new version would include the new changes

A document can also be saved when you attempt to close an application:

- If you create a document or modify one, if you close the application (or the window), you will be asked whether you want to save it. If you want to save it, you should click Yes. If the document was not saved previously, a dialog box would come up.
- If you have modified a previously saved document and if you attempt to close the application (or the window), the computer would ask you whether you want to save the document. If you want to save it, you should click Yes. In this case, the new version of the document would keep the changes you made. If you click No, the document would revert back to what it was before it was opened or the previous time it was saved

When saving a document for the first time, you must give it a name and a location.

To make it possible to easily recognize its information in a computer that runs Microsoft Windows, a drive, such as those we have reviewed above, uses some units. The primary unit is called a directory. In Windows Explorer or My Computer, a directory is represented by a letter. When (the disc of) a drive is created, it doesn't contain directories. This is because the manufacturer doesn't decide how and on what type of computer the drive will be used. When a drive is installed on a computer, the operating system decides about the drive, creates it as a directory and assign a letter to it. You can store a document on a drive but this is not recommended.

Creating a Folder

To better organize the information that it contains, one or more units can be created on a drive. Each unit is called a folder. When (the disc of) a drive is created, it doesn't contain folders. When the operating system is installed, it creates a few folders. You also can create a folder and you have many alternatives.

When it comes to folders, a drive is called the root folder or simply, the root. To create a folder in the root, in Windows Explorer or My Computer:

- In the left frame, click the drive. On the main menu, click File → New → Folder and give it a name
- In the left frame, click the drive. In the right frame, right-click a white empty area → position the mouse on New → click Folder. Then give it a name

You can also create a folder inside of another. The folder that will contain the new one is referred to as the parent folder. The other will be referred to as a child folder. To create a folder in another folder, in Windows Explorer or My Computer:

- In the left frame, expand the drive by clicking its + button. Under the drive, click the folder name. If the new folder will be created inside of another folder that itself has a parent, expand it also and click the parent folder. On the main menu, click File → New → Folder and give it a name

- In the left frame, click the drive and click the parent folder. In the right frame, right-click the parent folder, position the mouse on New and click Folder, then give it a name

You can also create a folder when saving a file. To do this, in the dialog box that comes up, click the Create New Folder button and give it a name.

Naming a Folder

There are some suggestions you should follow and various rules you must observe when naming a folder:

- The name of a folder can be a single letter or a digit
- The name of a folder can also be a single special character except the following: | > / : \ < ? * and "
- The name of a folder can be a combination of letters, digits, and some special characters

As a suggestion, you should use a name that indicates what is stored in the folder. This makes it easy to find information.

Archive

Archives are files that contain other files. Typically the files in an archive are compressed. Archives usually have file names ending with ZIP, LZH, ARJ, or ARC, depending on how they were created. Archives make it easy to group files and make transporting and copying these files faster.

Typical Uses of Archives

- Most files available on the Internet and on electronic services like America Online are distributed as archives. Two benefits of using archives for electronic file distribution are that only one file transfer operation ("download") is required to obtain all related files, and file transfer time is minimized because the files in an archive are compressed.
- It is often useful to send a group of related files to an associate. Rather than distributing individual files it is often easier to distribute the files as an archive to benefit from the file grouping and compression.
- Some files are important but not used often. To save disk space simply compress these files into an archive when they are not used, and decompress them only when needed.

Self-Extracting Zip File

A self-extracting Zip file is an executable program file (.EXE file) that includes both a Zip file and software to extract or "unzip" the contents of the Zip file. Users can extract the contents of a self-extracting Zip file by simply running it. This is convenient, because the end user does not need an unzip program (like WinZip®) to extract files from these self-extracting archives.

WinZip Self-Extractor Personal Edition, included with WinZip, creates Windows self-extracting Zip files.

Archive formats:

- Zip files are the most common archive format. Zip files can span multiple disks, and provide both compression and file grouping. WinZip does not use external programs to work with Zip files.

- TAR, Z, GZ, TAZ, and TGZ files are often found on Unix-based Internet sites. TAR stands for "Tape ARchive". The TAR format does not provide compression; it is used only to group files. GZ and Z files are gzip files. GZ and Z files cannot contain multiple files. TAZ and TGZ files are TAR files compressed in the gzip format. Since almost all new archives are created in Zip format, WinZip does not provide facilities to add to or create files in these formats (however, all other WinZip functions are supported). WinZip does not use external programs when working with files in these formats.
- File formats such as UUencoded, XXencoded, BinHex, and MIME are used primarily to transfer binary files by Internet e-mail. If you encounter one of these files, you can open it and extract its contents with WinZip. You can UUencode an archive using the UUencode entry in the WinZip Actions pull-down menu. WinZip does not use external programs when working with files in these formats.
- WinZip also handles most files in the old Microsoft Compress format (also known as LZEXPAND format). However, there are several variations on this format, and Microsoft has not released documentation on these variations. WinZip issues an appropriate message if you attempt to decompress a file not supported by your version of Windows. Microsoft Compress files usually end with a trailing underscore, for example, "commdlg.dl_". Like Z and GZ files, Microsoft Compress format files contain only one file. This format is used for many files on the Windows 3.1 distribution disks and many older Microsoft products. Note that not all files ending with an underscore are Microsoft Compress format files. WinZip does not use external programs when working with files in these formats.
- The Microsoft CAB (short for Cabinet) format is used by most Microsoft setup programs, including those used to install Windows. CAB files provide both file compression and file grouping. You can use WinZip to open and extract the contents of CAB files. WinZip will handle most self-extracting CAB files. WinZip does not use external programs when working with CAB files.
- ARC, ARJ, and LZH are older formats that provide both grouping and compression, like Zip files. Unlike other supported file formats, WinZip's optional support for these formats requires external programs that are not included as part of the WinZip distribution.

Files

In our introductions, we defined a document as what you create in an application. In a word processor, the characters you type constitute a document. For a graphics application, the drawings you perform or the picture you manipulate is called a document. In order to keep such a document for later use, you must store it somewhere. A file is an object used to hold a document. Put it another way, in order to have a file, you must save a document. We have mentioned how to save a document. Like a folder, you must name a file when saving a document. The name of a file follows the same rules we defined for a folder.

FILE MANAGEMENT

Bits and Bytes

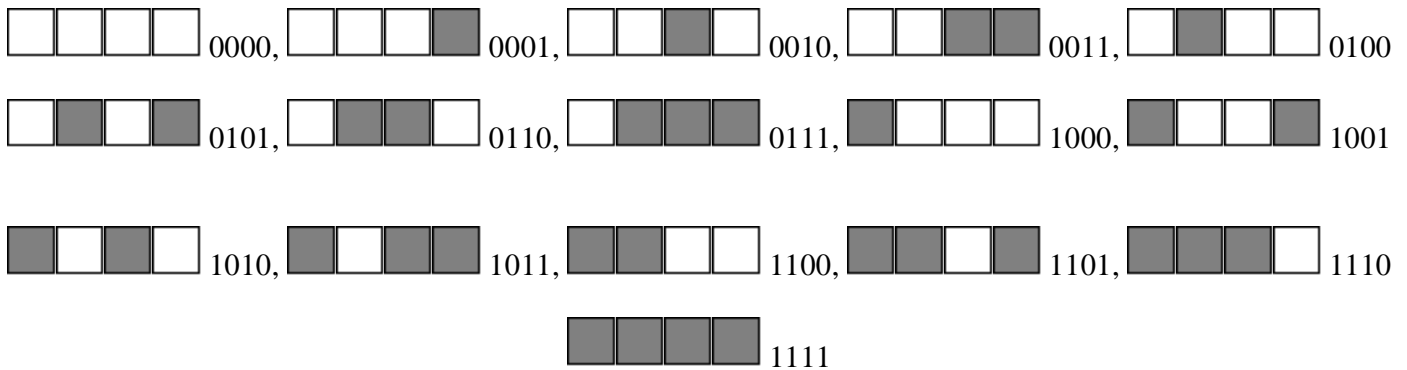
To hold information, a medium such as a hard disk uses a system that resembles a combination of small boxes. Let's illustrate it as follows:



This box can hold only a small piece of information. It can only be either 0 or 1. When the box is empty, it holds a value of 0. When it is full, it holds a value of 1:



You can represent a piece of information with one of two states. This box used to represent a value is called a binary digit; in its abbreviated form, it is called a **bit** (for *binary digit*).

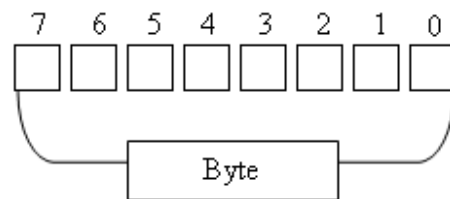


This produces the following binary combinations: 0000, 0001, 0010, 0011, 0100, 0101, 0110, 0111, 1000, 1001, 1010, 1011, 1100, 1101, 1110, 1111 = 16 combinations. When using the decimal system, these combinations can be represented as 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, and 15.

This combination is also a system that the computer uses to count bits internally. This technique is valuable and allows you to always identify a number as a divider of 4.

When all bits of a group of 4 are 0, the combination has the lowest value, which is 0000. Any of the other combinations has at least one 0 bit, except for the last one. When all bits are 1, this provides the highest value possible for a group of 4 bits. The lowest value, also considered the minimum value, can be represented as 0. The highest value, also considered the maximum, can be expressed in decimal value as 2^4 (2 represents the fact that there are two possible states: 0 and 1; 4 represents the fact that there are four possible combinations), which is 16. This produces 16 because $2^4 = 16$.

A combination of 8 consecutive bits is called a **byte**. The bits are counted from right to left starting at 0:



You can represent a byte using a combination of 0s and 1s. If you have the patience to create combinations of bits using the boxes as we did for the group of 4, you would find out that there are 256 possible combinations. Another way to find it out is by using the base 2 technique:

$$\begin{aligned}
 &2^7 + 2^6 + 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0 \\
 = &128 + 64 + 32 + 16 + 8 + 4 + 2 + 1 \\
 = &255
 \end{aligned}$$

Therefore, the maximum decimal value you can store in a byte is 255. Remember that the byte with all bits having a value of 0 has its value set to 0. Since this byte also holds a valid value, the number of combinations = $255 + 1 = 256$.

The only type of information you can store in a byte is a character or symbol, such as a readable letter from the alphabet: a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z, A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, and Z. Besides these readable characters, a byte can also hold one digit: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. A byte can also hold a readable or non-readable symbols such as ` ~ ! @ # \$ % ^ & * () - _ = + [{] } \ | ; : ' < ? . / , > "

This means that a combination of 8 bits, called a byte, is enough to represent one symbol recognized in the English language. In this globalization word, a computer also needs to be able to store characters from other Latin-based languages such as letters from Français or Español. To make this possible, instead of 8 bits, the operating system must use 16 bits. A combination of 16 consecutive bits is also called a word.

A group of 1000 bytes is supposed to be called a kilobyte but, based on the way the computer calculates the bits, a group of 1024 bytes is called a kilobyte or KB. A group of 1,000,000 bytes is called a megabyte but actually it is a group of 1,024,000 bytes that is called a megabyte or MB. A group of 1,000,000,000 bytes or actually a group of 1,073,741,824 bytes is called a gigabyte or GB.

The Size of a Drive

Because a drive cannot have unlimited space, it is recognized for its size. The size of a drive can be measured by, or specified in, MB or GB. For example, a typical CD can hold 700MB of data. A regular DVD can hold information up to 4.7GB in size. The sizes of hard drives are very varied. To find the size of a hard drive in your computer, from either Windows Explorer or My Computer, you can right-click the drive letter and click Properties.

The Size of a File

In order to keep track of the various files in a computer, each file has a size. The size of a file can be measured in bytes, kilobytes, or megabytes. To know the size of a file, in either Windows Explorer or My Computer, you can right-click it and click Properties.