At the end of this chapter you will be able to:

1. Fix issues and errors that may appear in the PC’s physical part.
2. Avoid potential hardware issues.
3. Use the operating system’s tools to optimize PC’s hardware performance.
4. Replace those PC parts that are damaged or do not meet your needs.
INTRODUCTION TO THE CHAPTER

In this chapter we will explain how to solve and avoid issues that may appear in our PC’s physical part, by taking advantage of the operating system’s tools. First, we will know our PC’s internal components, the location and the features of each element that is essential for the PC’s operation.

We will perform some simple tasks that will allow us to replace components that may be damaged or do not meet our needs, such as: change RAM memory, set up an internal card through PCI port, replace the hard drive or the DVD drive.

Later, we will work in the BIOS to understand its operation and the way we can make changes within the PC’s physical components through it.

We will also explain some errors that may appear in our installed hardware and how to fix them.

Finally, we will learn how to install USB devices to maximize the use of our computer.
Solution for configuration issues.
Obsolete or damaged drivers are the main cause for a component to operate incorrectly. Drivers search (Product CD, Windows Updates, manufacturer’s website, Windows 7 CD).

Dynamic Update
Update and search for drivers.
Set up of new devices
Windows 7 features

General tips: how to work correctly with PC’s internal devices
Change RAM memory
Set up a hard drive
Change a DVD drive
Set up a TV capture card

Set up and replace internal components. If there are operating issues or to enhance the PC performance.

MECHANICAL ISSUES

MECHANICAL ISSUES

CATEGORIES

OPERATING SYSTEM TOOLS

CONCEPTUAL MAP
OF THE CHAPTER
WHAT IS HARDWARE?

Before getting deeper into the main subject of this chapter, from which you will learn how to support your school’s PCs as regards physical components, it is important to remember what hardware specifically means. In computing science, this term is used to mention all PC’s physical and tangible components. For example: keyboard, processor, monitor, hard drive and many others. Besides, hardware can be classified according to the different units included in a PC:

- Central Processing Unit
- Mass Storage Devices
- Peripherals

Did you know…?

...that in 1623, Wilhelm Schickard built the first mechanical digital calculator, thus turning into the father of the computing era?
LET'S SEE THE PC'S INTERNAL PARTS...

Now that we know what hardware is, it's time to see what is inside the PC. The first and most important component we can see is the **motherboard**. It hosts all connections needed when assembling a PC: hard drive, micro-processor, source, memory, sound and video cards, internal and external ports, peripherals... all these are connected to the motherboard.

**motherboard**
The motherboard is a central circuit card of a complex electronic device, such as a PC. Its main task is to provide logical and electrical connections among the system components.
Micro-processor
The micro-processor is the PC’s central processing unit. It is the component that performs and controls all PC’s operations. The faster the processor is, the quicker the PC will be.

Cooler or Heat Sink
As the micro-processor works at high temperatures, below it we can find a big cooler or heat sink, which provides constant refrigeration.

Memory Slots
Within the motherboard we find memory slots. Remember that RAM is the PC’s volatile or temporary memory. According to the kind of memory used by the PC, this slot can be different and the technologies associated to it may also vary. Memories for new PCs are called DDR2 and have speeds that range from 533 to 1066Mhz. Today we also have the DDR3 memories with speeds that range from 533 to 1333 Mhz.

Expansion Ports
At the lower part of the motherboard we can find the expansion ports, also known as PCI and PCI Express ports. Through them we can optimize our PC operation, setting up additional TV capture cards, specialized video cards or other type, according to the tasks we need to carry out in our PCs.

Serial –ATA Connectors
If we pay attention to the right lower part, we will see some small red ports. Those are Serial -ATA connectors that are used to connect the hard drive. Previously, hard drives included IDE connectors and, as we can see in the motherboard, one of these ports is kept for compatibility reasons.
**f Source**
The source is in charge of providing energy that is needed for each above-mentioned device, and it is directly connected to the motherboard through a cable. The source has different voltages and includes a 24-pin connector.

**g Hard Drive**
The hard drive is a PC’s internal magnetic device where a great amount of information is stored, including applications, files, and more. Generally, the hard drive is known as Hard Disk or HD. The hard drive constitutes a non-volatile memory, ie, it keeps the information even if the energy is interrupted. As you will see later, there are two kinds of hard drives: IDE and Serial-ATA.

**h Video and sound cards**
The video card allows to handle graphic images in the PC, that’s why it is also known as “graphic adapter”. And the sound card enables the sound reproduction in the PC.

**i Ports**
Ports are slots - located at the front or back side of the PC - through which different devices can be connected to the PC. There are different kinds of ports, such as PCI, Ethernet, serial and USB ports.

**j Network Card**
The network card can be inserted into the motherboard or a USB port and allows to connect the PC to a network; in this way, it enables resource sharing such as files, printers and the Internet. There are also wireless network cards that have the same features, but these do not require cables to transmit information.
Soup of Components!

Find the different internal components you know and review them by playing.

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HOW CAN YOU FIX HARDWARE ISSUES?

Now that you know the features of each of our PC components, it is important to learn how to solve hardware issues. There are two possible ways to support the PC’s physical components:

- Change the PC’s internal devices, because they do not operate anymore or they are not suitable for the tasks we need to perform.

- Use the operating system’s tools to optimize the PC operation.

**Important!**

**When working with the PC’s internal components, you need to assure that the PC is unplugged and disconnected from the power supply.**

Set up and replace internal components

One way to support the hardware is to change the PC’s internal devices when they do not operate anymore or because we want to set up a new one to enhance the performance of our PC. Anyway, here you will learn how to correctly set up and replace components of your PC.
How can you change the RAM memory card?

01 The memory card has a little cut in its pins. This cut is not exactly in the middle. We need to pay attention to the slot, because the side in which it is located will help us where to set it up.

02 If we see the slot, we'll also see two seals on the edges. We open those seals and put the memory in both sides at the same time, slightly pushing down until the seals close. It's important to push in both sides because if it is done in only one side, we can break it. The memory is already set up and ready to work.

You can change the memory card to optimize the PC performance. As regards performance, the greater RAM is, the better it will be and you will be able to work with more applications at the same time.
Do you want to connect a hard drive?

The hard drive is a very important component in our PC: it stores the operating system, the programs, the information we use for work, the music we listen to, the games we play...all these are saved in our hard drive. Nowadays, PCs include hard drives with more storage capacity. But we can also replace our PC’s hard drive. Let’s see how to do it in case we need to change the hard drive. There are two kinds of hard drives, IDE and Serial-ATA:

IDE DISK

01 If you grab the hard drive, you will see that it has two connectors: a larger connector called IDE and a shorter one with only 4 contacts, which is the power supply connector.

02 You need to grab an IDE cable and connect it to your PC’s IDE port, and then to the hard drive. In the IDE cable you’ll see a red line that needs to be next to the power supply.

03 Once you have done this, grab one of the power supply cables and connect it.

04 Lastly, you need to see the Jumper slot. Through its position, you will be able to change the hard drive behavior. Generally, it already comes prepared out-of-the-box to work efficiently. If you need to change it, you must refer to the hard drive manual to know which position you should change so that it works correctly after the modification.

JUMPER

A drive that allows to change the configuration or the way a device operates.
- It is used to define, for instance, the processor’s voltage and speed.

SERIAL-ATA DISK

01 These connectors are different. You just need to connect a cable from the motherboard port to the same port of the new hard drive.

02 The power supply connector may vary: some of them still use the old connector, like the IDE disk, while others use the new one:

03 Then you need to screw the disk to the cabinet... and that’s it! Your PC hard drive is already connected and ready to work.

Do you want to connect a hard drive?

...that’s it! Your PC hard drive is already connected and ready to work.

05
Steps to change a DVD drive

The set-up process of a DVD drive is similar to the hard drive set-up because it also has two kinds of connectors, IDE and S-ATA. Once you have identified the kind of connector your DVD drive has, you will do the replacement and the connection in the same way as with your PC hard drive. This is an easy task that you will be able to solve in a few minutes.

Installing a TV capture card

The different components turn PCs into multimedia centers, through which you can listen to music, watch movies and more. Maybe you would like to watch TV in your PC. If that’s the case, you may add a TV capture card to enable that experience. To do so, follow these steps:

01 Before connecting the TV capture card, according to the cabinet you have, you need to open the lapel through which the card will interact with the user, ie, from where it will connected to the external part.

02 Once you’ve opened the CPU, you’ll need to identify the PCI ports that are located at the motherboard.

03 Then, you need to grab the card and put it above the cabinet, by pressing it until the card is set up correctly.

04 Once it is connected, remember to screw it so that it doesn’t snap due to the proper use of the PC or generate potential connection problems or signal loss. If you pay attention to this recommendation, you’ll avoid future problems.

PCI Ports

PCI (Peripheral Component Interconnect) Ports are expansion slots through which certain devices can be connected to the PC, such as sound cards, network cards, and more.
In Concepción de Sacojito, Guatemala, there are many children, teachers and schools that maximize their lives with technology. Laura Esther, a 6th-grade teacher, says that they started to develop educational projects by integrating new Information and Communication Technologies and using the same instructional methods they’ve always used; thus, it’s easier for them to perform the tasks. On the other hand, César, a rural school teacher, says that the continuous update and teachers’ readiness are the key to success. However, he highlights that the “heart” is the most important thing a teacher has to have in order to enjoy the processes through which students – boys and girls – can enrich their knowledge even more. The leading characters of Concepción de Sacojito also say that, in many occasions, teachers and students learn at the same time, which enables new education ways where technology plays the main role. Thus, teachers and students face every day the challenge to show their potential.
Operating system tools to support hardware

You have already learned to replace internal devices to support your PC and the school’s, but you can also do it through the software.

In that case, you will need drivers, which are applications that act as intermediates between the operating system and the devices. They organize the operation and try that both can "understand each other” and work together.

Before Windows 7 appeared, we needed these drivers in order to set up a device. Windows 7 includes a technology called Dynamic Update, which tries to find them automatically via Internet and install them in the PC. You can enable it from the Start menu by clicking on Windows Update.

Thus, any device you need to connect - an MP3 player, external disks, pen drives, etc. - will operate immediately, without any problem or delay.

Imagine that you are doing a job and you need to save it in a portable storage device, such as a pen drive. The task is extremely simple: the only thing you need to do is locate a free USB port of your PC and connect your device.

Windows 7 will automatically recognize it and will ask you to wait while it is recognizing the device and checks if there are drivers in the PC, or it installs them once they’re found on the Internet.

Once this process has been completed, Windows 7 will notify you that the device is ready to use.

After saving the material you need, you must disconnect the device by selecting the "Remove hardware securely" option in...
the bar and, after verifying it, you will be able to remove it and store the information in it until you need it in the future.

Remember... remove devices securely.

Let’s laugh at ourselves!

Green Tip

You surely have heard about recycling as one of the key messages to protect the environment. Recycling is turning garbage into raw material in order to produce new products. The most common recyclable materials we can find are glass, paper and cardboard, plastic, cans and more. Organic waste can also be recycled through a composting process.

But have you ever imagined that hardware can be recycled?

Hardware recycling process includes the dismantling of PCs and other devices such as printers, scanners, video cameras, etc, in order to restore them and turn them into usable components. This process prevents the hardware pieces from being disposed of, thus affecting the environment.

In the 21st century the “electronic garbage” is continuously growing, so we need to take responsible measures regarding this issue.

If at school or at home you have old PCs or obsolete components, do a research about recycling programs of electronic garbage of your hometown and help protect our natural environment.

Let’s laugh at ourselves!

Hard...

When you told me your boyfriend was a hard specialist, I thought he was something else...
How much have you learned in this chapter?
Do the following exercises to review the subjects

A. Open your PC cabinet carefully and see the motherboard, comparing it with the image of this chapter. Write the components you find. Repeat the process with your school’s PCs.

___________________________________________________________________________________________________________________________________________________
___________________________________________________________________________________________________________________________________________________

B. Have you replaced any component from your PC? Share your experience and write a card with tips so that your classmates can do that in the future.

If you need to change a component from your PC, consider the following:
1. _______________________________________________________________
2. _______________________________________________________________
3. _______________________________________________________________

Good luck!

C. Is there any term that you haven’t understood? Find the words you haven’t understood in the chapter, search on the Internet or ask any teacher about their meaning, and write it down here for future reference.

Term: __________________________________________________________________________________________
Definition: _______________________________________________________________________________________

D. Do a quick review of the chapter and check if you have understood its development. Write your doubts and comments.

___________________________________________________________________________________________________________________________________________________
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Chapter 5: Hardware Support
Self-assessment
Answer the questionnaire and check how much you have learned in this chapter.

1. What is hardware?
   a. The term that refers to programs and applications of a PC
   b. The term that refers to all physical and tangible components of a PC
   c. PC’s motherboard

2. Which additional cards can you set up in the expansion ports?
   a. TV capture cards
   b. Video cards and other specialized cards
   c. All the answers are correct.

3. What is hard drive?
   a. A mass storage volatile memory
   b. A magnetic device of non-volatile memory
   c. The PC’s central processing unit

4. Which is the device responsible for performing and controlling all PC operations?
   a. The micro-processor
   b. The motherboard
   c. The hard drive

5. What component is also known as "graphic adapter"?
   a. Touchscreen monitor
   b. Pen drive
   c. Video card

6. Changing the PC’s internal devices is one way to support hardware.
   a. True
   b. False

7. Which is the PC’s internal component that provides the power supply for each device?
   a. The Ports
   b. The Source
   c. The micro-processor

8. The greater the RAM memory is, the better will be the PC performance and its operation will be optimized.
   a. True
   b. False
   c. Indistinct.

9. Which of the following are types of hard drive?
   a. SERIAL ATA
   b. USB PORT
   c. IDE DISK

10. What are drivers?
    a. Physical devices that are connected to the motherboard
    b. Applications that act as intermediates between the operating system and the devices
    c. None of the options are correct