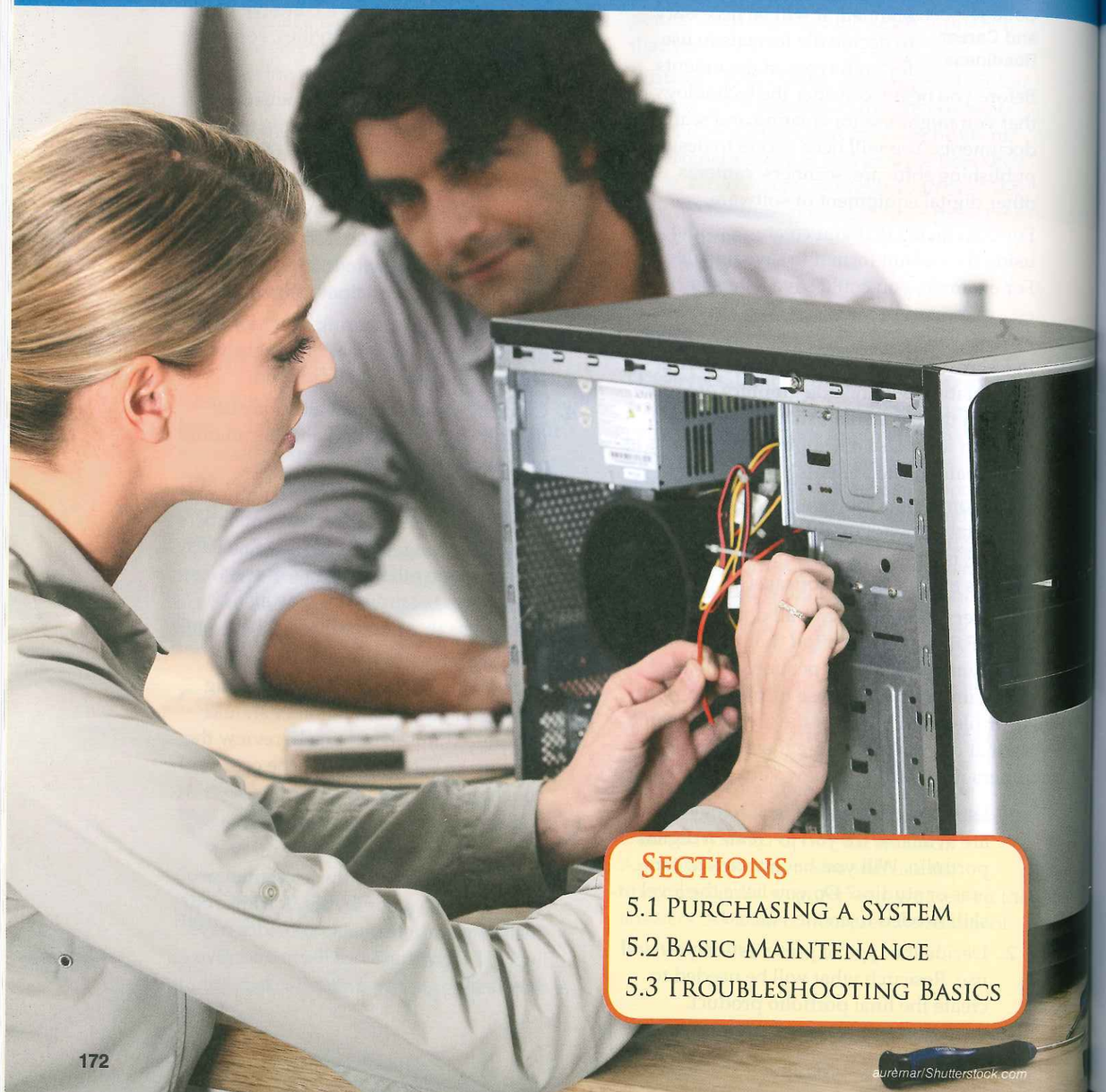
5 Purchasing, Maintaining, and Troubleshooting



Sections

Check Your IT IQ

Before you begin this chapter, see what you already know about information technology by scanning the QR code to take the chapter pretest. If you do not have a smartphone, visit www.g-wlearning.com.

Purchasing the correct type of computer is important in matching the computer to the goals of the technology. There are vast differences between computers. This means that the user has to assess his or her needs before purchasing a new system. Once the correct computer is purchased, it will be a wonderful tool as long as everything is working. Preventive maintenance on a computer system is just as important to keeping everything running as it is for an automobile. There are actions the user can take to minimize possible problems.

More software vendors than ever before are developing programs and more choices exist for hardware. Developers work very hard to make the installation an easy, problem-free experience. Yet, each time a new software program is installed or a new hardware device is attached, there is an opportunity for things to go awry. In addition, previously working parts may fail and cause problems. Fortunately, there are many avenues of help for resolving these problems. Developing troubleshooting skills means that each mishap can be dealt with in a direct manner. This chapter outlines steps to take when purchasing a system and when resolving technical problems.

IC3 Certification Objectives

Computing Fundamentals

Domain 3.0
Computer software and concepts
Objective 3.4
Software tools
Domain 4.0
Troubleshooting
Objective 4.1
Software
Objective 4.2
Hardware
Objective 4.3
Devices and peripherals

College and Career Readiness

Reading Prep. Before reading the chapter, skim the photos and their captions. As you read, determine how these concepts contribute to the ideas presented in the text.

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SECTION 5.1

PURCHASING A SYSTEM

Essential Question

How can conducting a needs assessment save you money when purchasing a computer?

Many categories of computers are available to the individual including desktops, notebooks, tablets, and even smartphones. Many choices exist within each category, and computer technology is always changing. One of the most important tasks before making a new purchase is to research the recent additions to the market.

In addition to finding the availability of new choices, reviews by the early adopters of the new technology should be read. These reviews can show what people who are actually using the technology think about it. Topics for research include initial purchase cost; suitability of the system to a user's needs, compatibility with current systems, amount of time required to master the new devices, and follow-on costs. A user must evaluate the purpose for the purchase and compare this assessment with time and budget constraints.

dolshock/Shutterstock.com

LEARNING GOALS

After completing this section, you will be able to:

- Identify basic computer models.
- Perform a needs assessment for a computer system.
- Describe recommended standard computer configurations.

TERMS

all-in-one computer
computer model
needs assessment

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Computer Models

The **computer model** is the form the computer takes. As discussed in Chapter 2, the three basic models of personal computers are desktops, laptops, and mobile devices. Within the laptop type, there are laptops, notebooks, netbooks, subnotebooks, ultrabooks, and convertibles. Mobile devices include tablets, mini tablets, phablets, and smartphones. When selecting a computer, the choices can be generalized between desktops, laptops, and tablets.

FYI

The model of computer is often the first decision made when purchasing a computer.

Desktop

Desktop computers are the most common type of computer found in office settings. In the home, desktops can be used as media centers or gaming machines in addition to typical computer uses. In general, you will get more computer for the money with a desktop model over other types of computers. The tradeoff is the larger size and lack of portability.

The monitor, keyboard, and mouse easily fit on most desks. The computer box often sits on the floor under or beside the desk. When combined with a comfortable chair and all-around ergonomic environment, desktop computers are a good choice for prolonged, stationary work.

A typical desktop computer setup may consist of:

- medium- or high-speed processor;
- high-powered video card;
- 4 GB to 6 GB of RAM;
- 500 GB to 2 TB hard drive;
- 24-inch flat-screen monitor; and
- DVD-ROM drive.

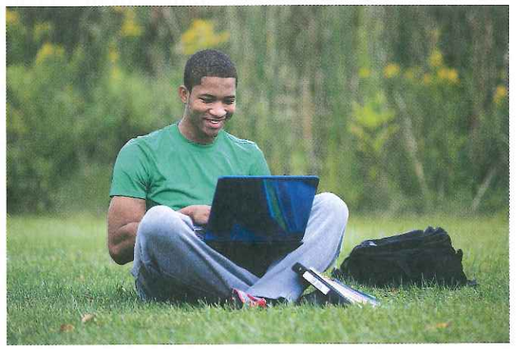
This configuration usually can be purchased for around $600 for the essentials to about $1,500 for the most powerful models. Systems designed specifically for gaming or high-end graphics work may cost between $2,000 and $3,000.

Laptop

Many laptops can run all of the software necessary to be used as a primary home or office computer. Their portability makes them very desirable, as shown in Figure 5-1. There is a wide range of laptops. All laptops resemble each other, but vary in size, power, storage, weight, and battery life.

The laptop or notebook model, which is generally the largest, may contain:

- high-speed processor;
- graphics processor separate from the CPU;
- 8 GB of RAM;
- 750 GB hard drive;



Flashon Studio/Shutterstock.com

Figure 5-1. One of the biggest advantages of laptop computers is portability. They can be used anywhere, unlike a desktop computer, which must be plugged into an electrical outlet.

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- 17-inch monitor; and
- DVD drive.

This setup can run many high-end video games and video-editing software as well as standard office applications. The cost is usually around $1,000 to $2,000, but may be as much as $5,000 for a high-end gaming machine.

A smaller laptop model, such as an ultrabook, generally weighs less than four pounds and may contain:

- low-power processor;
- long-life battery;
- 4 GB of RAM;
- 13-inch screen; and
- solid-state hard drive.

It can be used to run office software and play music, but usually does not have an internal DVD drive. The cost of an ultrabook varies from around $1,000 to about $2,500.

Green Tech

Electronic Waste

Electronics should be properly disposed of, not just placed in the trash. Before discarding electronic waste, research how the item should be properly disposed. Sometimes, charities and community groups that are in need of electronics can refurbish and use older equipment. However, if the equipment is beyond repair, it should be recycled.

Tablet

Tablets are mobile devices. They come in many sizes, but the most notable characteristic of a tablet is its compact size and lack of a mouse and keyboard. All data entry and pointing are performed via a touch screen. The high-powered CPU and communication capability of a tablet make it possible to watch videos, play basic games, and browse the Internet.

A 10-inch model tablet may contain:

- dual or quad core 800MHz to 2 GHz processors;
- 3 GB of RAM;
- proprietary operating systems; and
- proprietary software.

The weight of a 10-inch tablet is about 1.5 pounds. The cost generally ranges from $300 to $500.

The 7-inch model tablet is best used for reading eBooks, browsing the Internet, and playing basic games. This model weighs less than one pound and costs around $200.

Needs Assessment

How the computer system is going to be used determines the requirements for the computer system. A **needs assessment** is a process of examining the current condition or state and determining how it differs from the desired condition or state. In terms of purchasing a new computer, look at how the current computer does not meet the user's needs. The needs of the user are the most important in the selection of a computer system. It may very well be that the needs result in a combination of the examples given here. Care must be taken to study the user's needs before purchase.

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Most productivity software, such as word processing, spreadsheet development, or presentation creation, has low computer requirements, as shown in Figure 5-2. These computer systems will also support Internet use and playing basic games. These devices may be a desktop or laptop model, depending on the mobility requirement of the user.

Multimedia, gaming, desktop publishing, and video-editing applications have higher requirements, as shown in Figure 5-3. Working with these software packages and files puts more demand on processing resources. Both desktop and laptop computers can be configured to

Processor Speed	All current processors are more than capable of running most productivity software. High-end quad-core processors are not required.
Monitor	One large monitor or a dual-monitor setup will aid productivity, especially for wide spreadsheets.
Memory Size	Most productivity software does not have a high RAM requirement. However, more RAM usually provides better response in loading and saving of files. If spreadsheet files have many calculations, more RAM will speed up that process.
Disk Size	The location of file storage is the consideration. If files are to be saved on the computer, a large disk drive will speed up loading, saving, and access times. If they are to be saved to the cloud or on a network computer, a large disk drive is not required.
Optical Drive	In most cases, a basic CD-ROM drive will be sufficient. However, consider if the productivity software is available on CD or DVD. A DVD-ROM drive may be required to install the software. For saving backups or to remove files for storage, a rewritable drive is a good choice. A Blu-ray player is needed to watch HD movies.
Keyboard	A physical keyboard is recommended over a virtual keyboard. The better choice for high-volume data entry is an ergonomic keyboard.
Pointing Device	A mouse is preferred over a touchpad for applications that involve frequent cursor movement or for precision placement. For applications that require frequent scrolling, such as word processing, a mouse with a wheel is recommended.
Operating System	A 32-bit system will suffice. Most productivity software applications will not make use of the advantages offered by a 64-bit system.
Software	Most productivity software is available for any of the operating systems found on desktop and laptop computers. However, the software is not cross-platform. If changing operating systems, and in many cases different versions of the same operating system, new software may need to be purchased. Also consult the system requirements of the software to ensure the computer system will run the software.
Internet	Most Internet browsers can run on any computer system. Most browsers are free, and many can carry over settings to the new system. However, if the system is to be equipped with a wireless card, consider the card's performance. Transmission speeds are due, in part, to the Internet service provider (ISP), but getting the proper router for the system is a consideration.
Printers	Depending on the amount of printing that is required, a low- to high-end printer is required. The cost of the printer is rarely a primary consideration. The primary consideration is usually how much it costs to replace the ink or toner cartridges. Print quality and speed are also considerations.

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Figure 5-2. For most productivity software, only a basic computer system is needed.

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handle these heavy loads. The requirement for mobility determines that choice. For casual e-book reading, high portability, light Internet browsing, and causal gaming, a low-end, small tablet may suffice.

Processor Speed	A dual-core processor with a high speed rating is required. A quad-core processor is often recommended, especially for high-end gaming and graphics applications.
Monitor	Large dual-monitor setups are common in the graphics and video industries. A dual-monitor setup facilitates a better working environment for detail work. Many gaming applications support dual monitors, but most gaming systems have a single large, widescreen monitor with a low dot pitch.
Memory Size	It is recommended to get as much RAM as can be installed. The files used in high-end graphics and video work can be very large. The more RAM a system has, the better it will be able to handle large files and computation-intensive applications. Fortunately, RAM is relatively inexpensive.
Disk Size	In many high-end graphics and video-editing applications, the files are stored on the local hard disk drive or on a network drive while at work. If files are to be stored on the local drive, a large hard disk drive is needed. Additionally, high-end graphics and video-editing applications need a large temporary file on the local drive, called the swap file or page file. A large hard drive is needed for this.
Optical Drive	Most high-end games are provided on DVD, if not downloaded from the Internet. A DVD-ROM drive is required for installation from a disc. A DVD-ROM drive also allows the system to be used as a media center for watching movies on disc.
Keyboard	Most users of high-end graphics and video-editing software make extensive use of keyboard shortcuts. A physical keyboard is recommended. As usually only one hand is on the keyboard while the other is on the pointing device, an ergonomic keyboard is not needed, but can be used if preferred.
Pointing Device	A trackball pointing device is often the choice for many users of video-editing software. Users of high-end graphics software often prefer a stylus or a trackball over a mouse, but many use a standard mouse. Systems for gaming may require a joystick or other specialized input device.
Operating System	A 64-bit operating system is recommended. The advantage of a 64-bit system is it has improved data throughput when compared to a 32-bit system. Additionally, most high-end software has a 64-bit version written to specifically take advantage of a 64-bit operating system. In order to run a 64-bit OS, the CPU must be a 64-bit processor.
Software	Most popular multimedia development software is expensive and not cross platform. If you are changing manufacturers, you may need to purchase new development software to use on the new computer.
Internet	Transmission of large files, such as those created by high-end graphics software, across the Internet through e-mail or file transfer protocol (FTP) require higher transfer speeds than smaller files, such as created by office suite software. Additionally, online gaming requires high-speed Internet access. For these reasons the wireless card or Ethernet setup is a concern. Transmission speeds are in part due to the Internet service provider (ISP), but getting the proper router for the system is a consideration.
Printer	Depending on the specific application, a printer may not be required. Gaming and video-editing applications are rarely used to create printouts. Users of high-end graphics software will print often, but their machines are often connected to a network printer. If a printer is required for the local machine, graphics output generally dictates the printer be a high-quality color printer.

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Figure 5-3. A higher-end system is needed for gaming, desktop publishing and video editing.

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Recommended Standard Configurations

Cost goes up with capability. It is always a balancing act between the cost and the capability of the system. The following are some recommendations for average use.

Desktop models with medium speed, 1 TB of storage, and a 24-inch monitor can be purchased for around $600. The advantage of this configuration is the suitability to an office or home environment. Generally, this system will be more powerful than a laptop or tablet purchased for the same amount of money.

Laptops with a 15-inch screen and 500 GB of storage can be purchased from $500 to $700. The advantage of a laptop is its portability. The "all in one" aspect of a laptop also omits the need for a standard office setup. An **all-in-one computer** is one in which all of the hardware, from input devices, processor, and display, are contained in a single unit. Laptops can be used in work, school, or any other location.

Tablets with a 10-inch monitor and 64 GB of storage can be purchased for around $500. The purpose of this type of device is mostly recreational. Tablets are lighter than even the smallest laptops and have a longer battery life.

HANDS-ON EXAMPLE 5.1.1

EVALUATE COMPUTER SYSTEMS

You have decided to purchase a computer for school use. Create a table similar to the one shown to compare features of three computers from three different manufacturers. Use the Internet or visit a store to complete the table. Evaluate the results, and select a computer. Write one paragraph explaining which computer you selected and why.

Type (desktop, laptop, tablet, etc.)	Manufacturer	Processing Speed (GHz)	Hard Drive Capacity (GB)	RAM (GB)	Display Size (Inches)	Operating System	Price

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5.1 Section Review

Check Your Understanding

1. What are the three basic models of personal computers?
2. Which model of computer generally provides more computer for the money than other models?
3. What is a needs assessment?
4. Which needs are the most important when conducting a needs assessment?
5. What is an all-in-one computer?

IC3 Certification Practice

The following question is a sample of the types of questions presented on the IC3 exam.

1. Which of these types of computers cannot be classified as a mobile device?
   A. Phablet
   B. Desktop
   C. Smartphone
   D. Tablet

Build Your Vocabulary

As you progress through this course, develop a personal IT glossary. This will help you build your vocabulary and prepare you for a career. Write a definition for each of the following terms and add it to your IT glossary.

all-in-one computer
computer model
needs assessment

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Section 5.2

Basic Maintenance


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Setting up procedures to ensure the efficient operation of the hardware and software provides a good return on investment for the expense of a computer system. The life of a system can be extended and repair costs minimized by performing preventive maintenance. Keeping the hardware in the system free of dust and placing the computer in a cool, dry location go a long way toward the goals of extending the computer's life and reducing repair costs.

The least-reliable components of a computer system are those with moving parts. Printers, mice, and keyboards tend to require the most attention. However, software needs some attention as well. The program files can become corrupted and in need of repair, but also temporary files need to be deleted on a routine basis. Almost all software has a help feature that can provide insight on how to care for the software.

Essential Question

What impact does computer maintenance have on your productivity?

Terms

disk cleanup
hardware maintenance
repair function
sectors
software maintenance

Learning Goals

After completing this section, you will be able to:

- Identify basic hardware maintenance tasks.
- Describe software maintenance tasks.

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STEM

Science

Connectors are made of or contain metal to conduct signals between the cables that they connect. Pure silver, pure copper, pure gold, and aluminum make for the best conductors. Copper is commonly used in network cabling and can be found in both UTP and coaxial cabling.

FYI

Wiping the keyboard with a mild cleaning fluid is a good procedure to minimize the spread of germs among users.

Maintaining the Hardware

Hardware maintenance is the process of keeping the computer hardware in good working order. Computer systems do not operate well when the hardware is covered in dust, dirt, food crumbs, or other physical contaminants. Cleaning hardware devices helps to keep them functional. Inside the computer box, the ventilation system is the most prone to grime. Externally, keyboards are the most vulnerable.

Keyboard

The best advice for avoiding a malfunctioning keyboard is to follow the no-eating, no-drinking rule when using the computer. Contaminants, such as liquids and food particles, can interfere with the connection of the keys to the switches in the keyboard. Sticky beverages are the worst.

To clean a keyboard, first turn off the system. Next, disconnect the keyboard, turn it upside down, and gently shake it so all loose particles fall out. A small vacuum cleaner designed for cleaning computer systems can suck away smaller debris that does not shake loose. A can of compressed air can be used to force out the remaining particles from between the keys. However, use caution to avoid flying particles getting in your eyes.

The keys can be wiped with a mild cleaning fluid. Using a strong cleaning fluid may remove the printed characters from the keys. Allow the keyboard to dry before reconnecting it.

Ventilation

Keeping computers cool is necessary for optimal operation. The internal fans continuously run to help maintain a safe temperature for the system. However, the fan is very small and collects dust, dirt, and other particles, as shown in Figure 5-4. To clean the fans and vents, first disconnect power from the computer. Then, open the case, and use a small vacuum cleaner or compressed air to remove the dust and dirt.

Andrew Safonov/Shutterstock.com

Figure 5-4. The computer fan brings air into the computer box. This allows dust and dirt to collect on the internal parts.

Processors, hard drives, and graphic cards generate significant amounts of heat, and they are sensitive to temperature. An overheated system may crash or shut down. Desktop computers should be placed where air can freely circulate around them when running, not in a cabinet or a drawer. Laptops or notebooks are the most prone to overheating because of their compact size. To help avoid overheating of these computers, turn them off when not in use, work in a well-ventilated area, or place the unit on a chill mat while working.

Monitor

Cleaning procedures differ depending on the type of monitor, but the monitor should be turned

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off. Older CRT monitors with a glass screen can be cleaned with any glass-cleaning solution. However, because an LCD or flat-panel screen scratches easily, a special procedure is required for these monitors. A soft, dry cloth should be used, and gently wipe the screen. If fingerprints or dirt do not wipe off, a small amount of rubbing alcohol may be put onto the cloth. Do not apply rubbing alcohol directly to the screen.

Maintaining the Software

Computing Fundamentals
3.4.3, 4.1.1

Software maintenance is keeping the software, from the operating system to all applications, in good working order. For the most part, software is installed and just keeps running. On occasion, a program file may become corrupted. Removing the program and reinstalling it may clear up that problem. Keep the original disc and access code on hand for any proprietary software. Some software is installed with a repair function. A **repair function** allows the current installation to be corrected without completely uninstalling and reinstalling the software. Uninstallation and installation are covered in Chapter 3.

Computing Fundamentals
3.4.2

Often, a software developer makes updates to its program. These updates may include minor enhancements and bug fixes. Software often has the capability to check for updates whenever an Internet connection is sensed and to alert the user that an update is available. Generally, these updates are free to registered users.

FYI

In most cases, it is a best practice to install updates when available.

Disk Cleanup

Disk cleanup is an automated process of removing unneeded files. After performing a disk cleanup, there should be more free space on the disk and the computer may run faster. At any given time, there are a number of files on the hard drive that are not needed. These may be temporary files, system files that are no longer used, and files in the recycle bin. However, how does a user know which files are not needed and where the files are stored? The Windows Disk Cleanup utility automates the process of deleting these files, as shown in Figure 5-5. To run the Disk Cleanup utility:

1. In Windows 8, click the **Apps** menu button, and then click **Control Panel** in the **Windows System** group. Then, click **System and Security** followed by the **Free up disk space** link under the **Administrative Tools** heading. In Windows 7, click the **Start** menu button, and then click **All Programs>Accessories>System Tools>Disk Cleanup**.

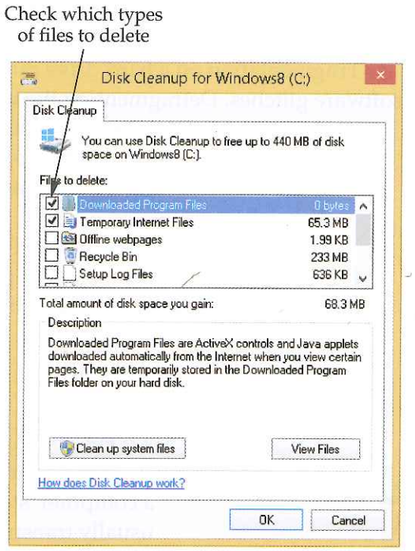

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Figure 5-5. The Disk Cleanup utility automates the process of removing certain files that are not needed.

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2. If prompted to select the drive to clean up, choose the local hard disk, and click the **OK** button. Windows analyzes the drive, which may take a few seconds. Then the **Disk Cleanup** dialog box is displayed, as shown in Figure 5-5.
3. Check the check boxes for the locations where files will be deleted.
4. Click the **OK** button.
5. When prompted to confirm the deletions, click the **Delete Files** button.

Computing Fundamentals 3.4.3

Disk Defragmenter

Hard drives store files in locations on the hard drive called **sectors**. As a file is saved over and over, the file is broken up into clusters of data saved in sectors across the hard drive. This leads to a scattered or *fragmented* pattern. Accessing the data in a file could be sped up if the pieces of the file, or clusters, were close together. Windows 8 has a utility program called Optimize Your Drives (Disk Defragmenter in Windows 7) that rearranges the clusters so they are next to each other. The utility is located in the Control Panel. Another function of the disk defragmenter is to rearrange other files to make room on the hard drive. In general, solid-state disks should not be defragmented.

FYI

With modern OSs and fast hard drives, disk fragmentation is not as critical of an issue as it was in the early days of personal computers.

HANDS-ON EXAMPLE 5.2.1

DISK DEFRAGMENTING

Fragmentation on a hard drive can sometimes cause problems, such as slow performance or software glitches. Defragmenting the hard drive is simple.

1. Click the **Apps** or **Start** menu button, and click **Control Panel** in the menu.
2. Click in the search box at the top of Control Panel, and enter defrag.
3. In the search results, click **Defrag and optimize your drives** (or **Defrag your hard drive**). The disk defragmenter is launched. In Windows 8, this is called Optimize Your Drives. In Windows 7, this is called Disk Defragmenter.
4. Select the local hard drive (C:), and click the **Analyze** or **Analyze disk** button.
5. What percentage of fragmentation is reported?
6. Close the disk defragmenter.

Virus and Malware Scans

Computing Fundamentals 4.1.3

Viruses and malware are computer programs designed to damage a computer, steal data, or otherwise cause harm. These programs are usually transmitted through the Internet, e-mail, or infected shared files. Antivirus, antimalware, and antispyware software is used to avoid viruses and malware and to clean the computer when it is infected by a virus or malware. Virus and malware scans should be run on a regular basis. This topic is covered in detail in Chapter 16.

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5.2 SECTION REVIEW

CHECK YOUR UNDERSTANDING

1. What is the best advice for avoiding a malfunctioning keyboard?
2. Which model of computer is the most prone to overheating?
3. What does a software repair function allow?
4. Which Windows utility automates the process of removing unneeded files?
5. What are the locations on a hard drive where file data are saved?

IC3 CERTIFICATION PRACTICE

The following question is a sample of the types of questions presented on the IC3 exam.

1. Interactive question:
   Demonstrate the procedure for running the disk defragmenter on the C: drive.

BUILD YOUR VOCABULARY

As you progress through this course, develop a personal IT glossary. This will help you build your vocabulary and prepare you for a career. Write a definition for each of the following terms and add it to your IT glossary.

disk cleanup
hardware maintenance
repair function
sectors
software maintenance

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SECTION 5.3

TROUBLESHOOTING BASICS

Essential Question

Why is it important for all computer users to have basic troubleshooting skills?

Computers are electronic appliances that have an expected life span. The average life span of a computer is from three to five years. Some sources estimate the average to be as low as two years. An average life span of two years does not mean the computer will break after two years. In fact, a computer may break down well before two years, while some users keep their computers functioning well beyond.

It is frustrating to sit down at the computer to get some work done and have a computer failure. The failure may be in the hardware or software, but the frustration is the same. Many users, especially novice users, become concerned that the problem may not be fixed in a timely manner or at all. However, having a clear plan for troubleshooting and resolving the problem will likely get the problem fixed and the user back to work quickly.

Rob Byron/Shutterstock.com

LEARNING GOALS

After completing this section, you will be able to:

- Explain a basic procedure for troubleshooting computer problems.
- Identify the steps for analyzing hardware problems.
- Describe common troubleshooting steps for software problems.

TERMS

device firmware upgrade (DFU) mode
hard reboot
hard stop
rebooting
restore point
safe mode
soft reboot
task manager
troubleshooting

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Troubleshooting

It is a worrisome situation for the user when the computer begins to show signs of trouble. The problems can come from hardware malfunctions or software issues. Sometimes the problems are created by the user. The basic maintenance discussed in the previous section goes a long way toward avoiding problems. However, when problems do occur, there are a few general actions to take in troubleshooting. **Troubleshooting** is systematically analyzing the problem to find a solution. If the user can analyze the nature of the problem, that is a good step in solving the problem.

1. Identify the symptom of the problem. If the system was working before, something has changed. Try to find what has changed.
2. If the system is not running, be sure electricity is available and there is power going to the system. A laptop or tablet may have drained its power without your noticing.
3. If the system is still running, look for messages on the display. Windows will try to alert the user to any problems and will suggest remedies.
4. Launch the Windows Help and Support feature. Search for troubleshooting.
5. Visit online forums to read what others have done or to post a question on the forum.
6. Ask a knowledgeable friend or colleague. If the device is a work or school computer, ask the IT department for help.
7. Contact technical support for the computer manufacturer, software developer, or hardware developer.

Many times, rebooting may solve the problem. **Rebooting** is restarting the system. A **soft reboot**, or *warm reboot*, is using the restart function of the operating system, as shown in Figure 5-6. A **hard reboot**, or *cold reboot*, is powering down, or shutting off, the system and then restarting it. Booting is described in detail in Chapter 2.

Getting Troubleshooting Help

There is an extensive help and support feature in Windows. In Windows 8, the help feature is accessed through the charms menu. The easiest way to access the help feature in Windows 7 is to press the [F1] function key. Be sure the desktop or the **Start** menu is active before pressing the [F1] key, otherwise help may be displayed for the active software.

In addition to using the Windows knowledge base, forums and self-help websites can provide insight into the problems and their resolutions. A forum is a large database of conversations consisting of help topics for installing, operating, and fixing software and hardware. Assisted by search, users can ask questions and wait for answers by knowledgeable members of the forum or they can search for answers that other members have logged.

Career Skills

IT Technician

Although almost every field requires IT support, schools and educational institutions often have an entire team of trained IT specialists who purchase, maintain, and troubleshoot problems with a school's computers and other technology. These IT technicians manage networks, communications, hardware, and software to provide a seamless integration of technology and learning.

Computing Fundamentals 4.1.5

FYI

Most Windows applications use the [F1] key to launch help.

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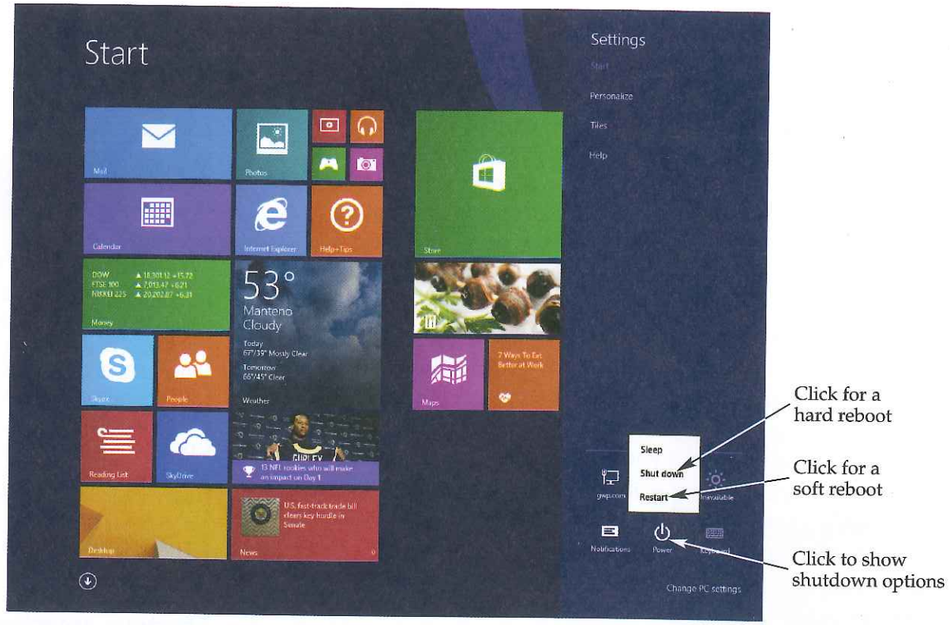

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Figure 5-6. Use the **Restart** option to perform a soft reboot of the system.

To conserve paper and to reduce shipping costs, vendors do not bundle user printed manuals with their products. A setup guide is usually included, but for help in greater detail, online user manuals are generally available. These manuals may be useful because all of the information about a particular device is gathered in one location.

When searching for a user manual on the Internet, be specific with the search phrase. A basic search phrase of user manuals will yield tens of millions of returned results, most of them not even related to IT. Suppose the task is to troubleshoot a printer with a model number of HP 6490. Perform an Internet search with the search phrase HP 6490 user manual. The first few returned results will most likely be either the user manual for this printer or troubleshooting information related to the printer.

HANDS-ON EXAMPLE 5.3.1

Computing Fundamentals 4.1.5

ONLINE TROUBLESHOOTING HELP

Know where to look to solve a hardware problem. Because printed manuals are no longer produced, use a search engine to locate online manuals.

1. In Windows 8, move the cursor to the lower-right corner of the screen to display the charms menu, and then click **Settings** followed by **Help** in the menu. In Windows 7, click the **Start** menu button, and then click **Help and Support**.

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HANDS-ON EXAMPLE 5.3.1 (CONTINUED)

2. In the **Windows Help and Support** dialog box that is displayed, verify that the **Online Help** option is selected in the lower-right or lower-left corner. If not, click the button, and click **Get Online Help** in the shortcut menu.
3. Click in the search box, and enter troubleshoot as the search term.
4. Click the **Search** button (magnifying glass). A list of specific troubleshooting topics is displayed.
5. Click the topic **Troubleshoot Problems with Installing Updates** or other topic. Make note of how the material is organized. Each help topic is called an article. Many articles contain links to either expand the current article, display a different article, or launch an application, such as a troubleshooting wizard.
6. Click the **Back** button at the top of the dialog box to return to the previous screen. Navigation within the help function is much like a web browser.

Safe Mode

Computing Fundamentals 4.1.4

Safe mode is a Windows boot setting in which the computer starts up with the minimum of functions necessary to run. It is a troubleshooting mode that allows the computer to start up in most cases after an error has occurred. Only a limited part of the operating system is loaded. Enough functionality is present to permit an experienced troubleshooter to investigate what is wrong. The keyboard, mouse, and screen will be on, but all other peripheral devices may not be functional. The screen does not display the normal GUI, rather the background is black and the letters are white or gray. In safe mode, the hardware or software that is not working can be located and uninstalled.

Troubleshooting Checklist

It is a good idea to have a set sequence of steps to take to ensure all issues are considered. Figure 5-7 provides a two-stage checklist. The first stage is for assessing the problem. The second stage is for applying the fix. These are general checklists that provide a basic foundation for troubleshooting.

Troubleshooting Hardware Problems

The most dreaded hardware failure is the hard stop. A **hard stop** occurs when the computer completely ceases to function. In the Windows environment, it has been nicknamed the "blue screen of death" due to the blue background of the message screen displayed when a hard stop occurs. The usual GUI is not displayed on the monitor, rather the message on the blue screen indicates the system cannot recover from an error. The computer can no longer understand input. The system is not helping you analyze the cause. If the screen just displays indecipherable lines, the graphic card may be broken. At this point, a hard reboot may resolve the problem, at least temporarily. If the problem persists, the situation requires expert technical assistance.

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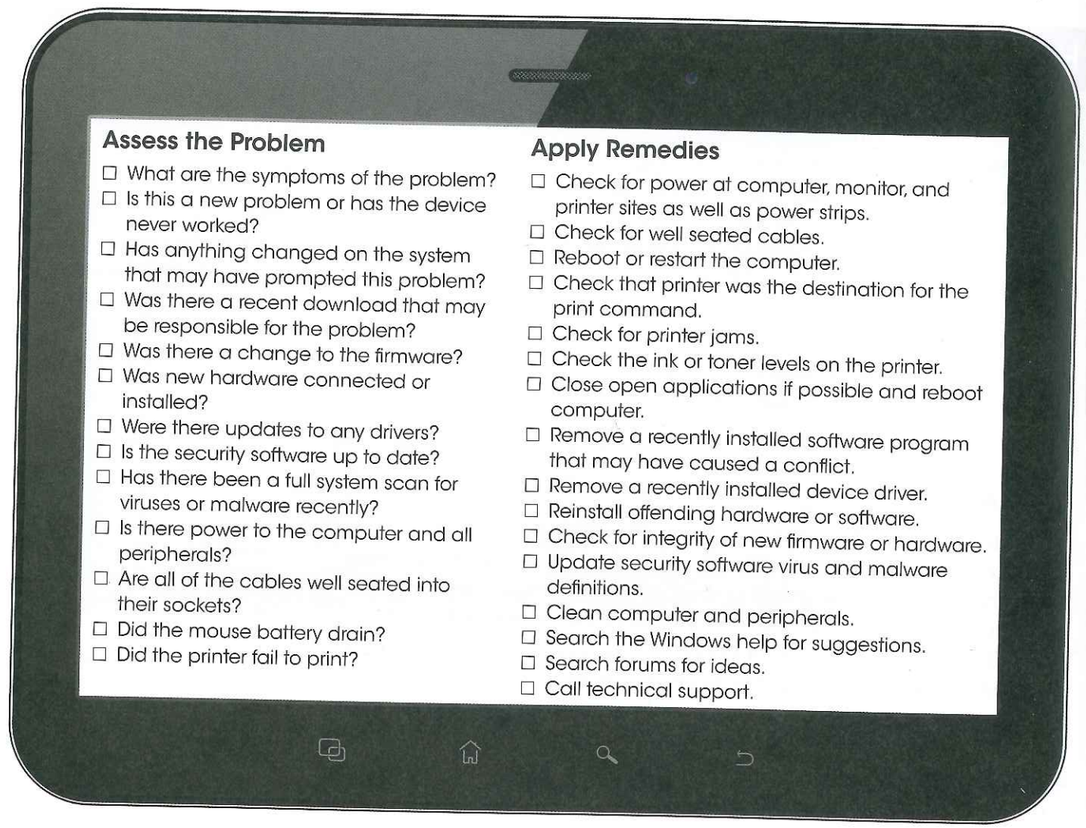

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Figure 5-7. Use these sequences to approach troubleshooting in a methodical way.

Analysis

Other situations may occur that are not as drastic as a hard stop. If the GUI is still functioning, there are steps that can be taken to analyze the problem. Make notes of what you have tried and investigated so this can be shared with a technician if you cannot solve the problem on your own. Another good reason to keep notes is so you do not waste time repeating tests or strategies.

1. Write down any error messages that are displayed. Also note any other relevant information, such as what actions were being performed when things went awry.
2. If a hardware component has flashing LEDs or ones are on that are normally off, try to determine what this indicates. Check the installation and user manuals for the hardware device for the interpretation code.
3. Check to see that all cables are properly connected. Occasionally the vibrations or movement of the computer may wiggle the connections loose. Ensure that the cable connectors are well seated.

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4. Restart the stalled device. If there is a reset button, use that. Otherwise it may be necessary to turn off the device and restart it. Finally, disconnect the device from the computer, wait a minute, and then reassemble the device.
5. Slowly pass a hand over the hardware parts. If they seem too warm, that is an indication of a problem. Shut down the system, and allow the components to cool. Investigate the item that overheated. On occasion the system will shut itself down leaving a message on the screen detailing that the system overheated.
6. Run antispyware, antimalware, and antivirus software. Malicious programs that have been introduced can cause the system to act strangely, but can also damage the system. This topic is discussed in detail in Chapter 16.
7. In Windows 8, move the cursor to the lower-right corner of the screen to display the charms menu, then click **Power** followed by **Restart**. In Windows 7, click the **Start** menu button, click the arrow next to **Shutdown**, and click **Restart**. If the menu is not functioning, press the [Ctrl][Alt][Del] key combination. On the screen that appears, click the arrow next to the **Shutdown** button, and click **Restart** in the menu, as shown in Figure 5-8.
8. If available, use the diagnosis assistance provided by Windows. This provides suggestions for ways to correct the problem.

FYI

If a computer is not operable, use another system and enter the symptoms into the diagnosis assistance provided by Windows.

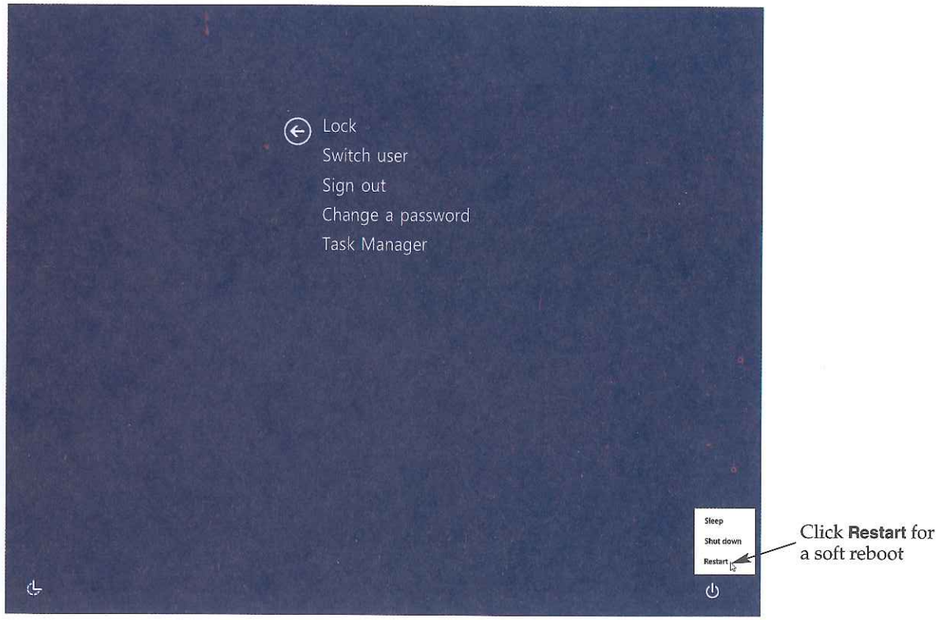

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Figure 5-8. Performing a soft reboot.

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Computing Fundamentals 4.3.1

Firmware

Firmware is permanently stored software. Updates to firmware include changes to hardware-related instructions. In most cases, firmware will not be the cause of a problem. However, if a firmware update is needed, a device driver will need to be installed to perform the update.

The Apple device family is unique when it comes to firmware. The iOS devices have a **device firmware upgrade (DFU) mode** that provides the ability to upgrade or downgrade the firmware. DFU mode essentially places the device in a recovery mode. This allows any iOS device to be restored to original firmware programming.

Updating the firmware on an iOS device is not to be confused with updating an app from the Apple App Store. Apps are extra software programs installed by the user, not firmware. These more volatile apps are included in the synchronization process for backup.

Computing Fundamentals 4.2.2

Cables and Connections

In addition to verifying cable connections are secure, it is important to check that the cables are in good condition. On occasion, exposed cables can be worn due to people walking over them or by pets chewing on them. If the protective Mylar cover is damaged, the wires may be damaged as well. Also be sure the cables are proper for the application.

Inspect the connectors on the cables, as shown in Figure 5-9. Look for bent or missing pins or incorrect matching of the socket to the connector. Look for frayed wires at the junction of the connector and the cable. Look for an excessively long or joined Ethernet cable. A long length of Ethernet cable may degrade the transmitted signal.

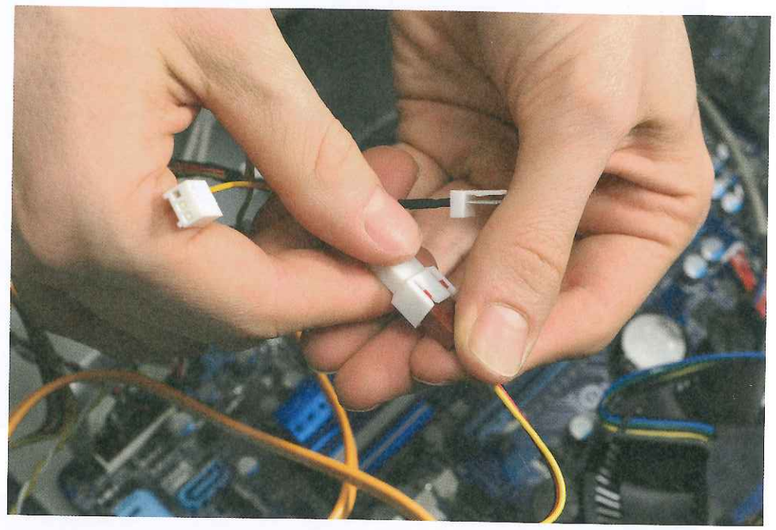

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Figure 5-9. Troubleshooting hardware may involve inspecting connectors and cables for damage.

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Troubleshooting Devices and Peripherals

Installation of a new device or peripheral frequently causes problems in the computer system. The devices may arrive with a device driver on an installation disc. Likely this information is out of date and may conflict with updates to the computer system itself. Always download and install the newest drivers. Even the installation of the device may cause a conflict in the system that must be fixed.

External Storage

Most external storage devices do not have on-and-off switches. They are supposed to be recognized and powered as soon as the device is connected to a USB port. These devices are prone to problems because they are inserted and removed so many times. If the system does not identify an external storage device when it is connected, the system needs to be rebooted with the device already connected.

Take care to properly remove external storage devices. This can help avoid the problem of an unrecognized device. To properly remove an external storage device, click the **Safely Remove Hardware and Eject Media** icon in the system tray (systray) on the task bar, as shown in Figure 5-10. Then, click **Eject** in the menu that appears. A message will be displayed when it is safe to disconnect the device.

FYI

It is common for a user to remove an external device by simply unplugging it, but this is an improper procedure that should be avoided.

Printers

Computing Fundamentals 4.3.3

Printers experience issues such as an empty paper tray or low ink or toner. Common minor mechanical problems with printers are paper jams and incorrectly installed cartridges. If a printer is not printing, a message generally will be displayed on the printer's screen after the system has diagnosed the nature of the problem. In many cases, the computer operating system also displays the error message.

Another problem that may occur with printers is that the device driver has become corrupted or has otherwise developed an error. In this case, there are two solutions. The driver can be reinstalled from either the CD that came with it or a new copy can be downloaded from the manufacturer over the Internet. When searching the Internet for the driver, search by manufacturer and model number. Downloading a new

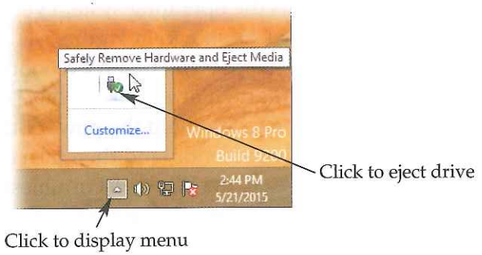

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Figure 5-10. When disconnecting a flash drive, be sure to use the icon in the system tray.

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driver may be the best option because always doing so ensures the most up-to-date version is installed.

Computing Fundamentals 4.3.2

OS Versioning

The drivers that are supplied with a device will support certain operating systems. If the operating system is upgraded to a newer version, the device driver may not be compatible and can cause problems. It is important to match device drivers to the OS version on the computer. If the OS is upgraded or changed, be sure to update all device drivers. This will ensure all devices have the most current drivers and that the drivers are compatible with the operating system.

Troubleshooting Software Problems

For the most part, software runs well and has no problems. On occasion, a program may become unresponsive or react in an unexpected way to your interaction. Software problems become apparent when a particular application stops working or does not respond to mouse or keyboard input. Other symptoms of a software problem may include a slowdown during loading of an application or a lag in responding to commands.

Each major software company, whether a developer of system or application software, provides online support for its programs. Similarly, there are websites and forums to consult in the case of mishap. A key tool in managing the software on a Windows system is the Task Manager.

Computing Fundamentals 4.1.2

Operating Systems

The operating system is composed of many different programs. If one of them develops a problem, the OS is said to be corrupted. The system may be difficult to start, freeze up, not permit data entry, or generally act unstable. The corruption within the OS can be for no apparent reason or can be introduced through malicious software from the Internet, e-mail, or a shared file.

There are a wide variety of operating systems and different versions of each. When troubleshooting a computer, it is important to identify the installed OS and version. If the computer does not have the latest version of the operating system installed, important updates to the operating system are missing. It may be that the problem at hand is due to an out-of-date OS. On Windows systems the operating system version number is located through the Control Panel, as shown in Figure 5-11.

If the OS is showing signs of a problem, first try rebooting the system. If possible, follow the proper shutdown procedure. If this is not possible, such as when the OS is frozen, press and hold the power button until the computer turns off. Next, wait five seconds, and then turn on the system.

If a reboot does not fix the issue, the Windows troubleshooting guide may help. This feature provides a wizard-like interface that will step the user through diagnosing various problems. If the troubleshooting guide does not help correct the problem, contact technical support or a computer-service company.

Ethics

Customer Data

Some company websites gather personal and confidential information from customers such as credit card numbers or phone numbers. Sharing or tampering with personal information is not only unethical, but may also be illegal. Protecting the customers' data will help protect the reputation of the business and encourage customer loyalty.

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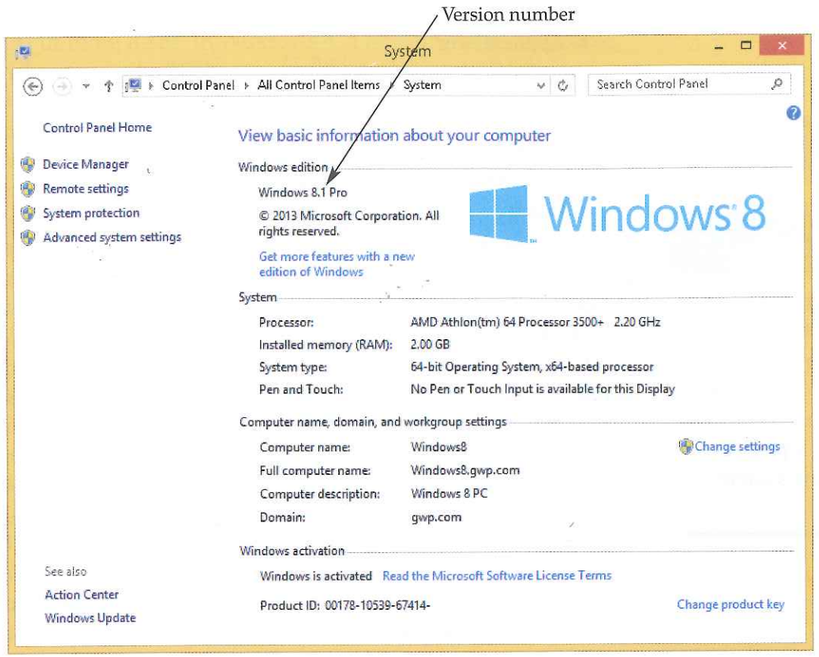

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Figure 5-11. The Windows version can be displayed using the Control Panel.

Using Task Manager

Computing Fundamentals 4.1.6

The Windows Task Manager is an excellent utility for monitoring the software activity of a system. Each operating system has a task manager, but by a different name, such as Activity Monitor for the Mac iOS. The **task manager** analyzes what is going on in the system and reports the results. In addition, the task manager can be used to close, or terminate, a program or service that is not responding.

There are several ways to launch the Windows Task Manager. The traditional method is to press the [Ctrl][Alt][Del] key combination and then click **Start Task Manager** in the menu that is displayed. Another method is to right-click on an empty space in the taskbar, and click **Task Manager** or **Start Task Manager** in the shortcut menu. In Windows 8, there are seven tabs in Task Manager:

- **Processes**
- **Performance**
- **App History**
- **Startup**
- **Users**
- **Details**
- **Services**

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In Windows 7, there are six tabs:

- **Applications**
- **Processes**
- **Services**
- **Performance**
- **Networking**
- **Users**

FYI

Do not terminate a process without knowing exactly what function it is performing for the system. Terminating a process may make the system unstable.

The **Processes** tab lists all of the currently running processes and the percentage of CPU time each is consuming. Some processes are started by the OS, while others are started by an application. This tab can be used to see which processes are creating the greatest load on the CPU.

In Windows 8, the **Processes** tab also lists currently running applications (apps) along with the status of each. In Windows 7, these are listed on the **Applications** tab, and the running applications are called tasks. Each application or task should be a program name that you recognize because these are programs you launched. If the Status column reports the program as Not Responding, the program is frozen. The choices are either to wait until the OS and the program try to resolve the issue or to forcibly terminate the program. The problem with terminating the program is that most software performs a cleanup operation during normal exiting. Terminating the program may not permit that to occur.

The **Performance** tab displays a time line of the CPU and RAM usage, as shown in Figure 5-12. This information shows the load on the system.

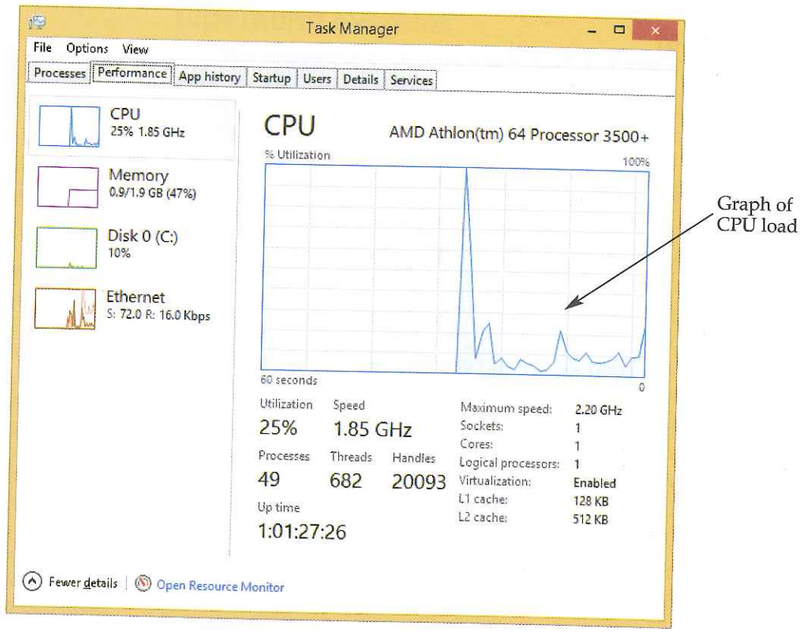

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Figure 5-12. The Task Manager can provide much information about the system, including the load on the CPU.

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If the load is consistently heavy, this may indicate the need for a more powerful CPU or more RAM. In Windows 8, a time line of the available network connections and activity are also displayed on the **Performance** tab. In Windows 7, this is displayed on the **Networking** tab.

The **App History** tab lists how much CPU time has been used by each app in the Windows 8 Metro interface. It also shows how much data have been transferred via the network by the apps.

The **Startup** tab lists the programs and services that are automatically launched when Windows 8 is started. During installation, many software programs add startup files to the computer configuration. These startup files create processes that consume system resources. Some are for programs that are regularly used and make the loading of larger programs go more quickly. Some of these are for programs that are seldom used, yet the startup program is loaded every time the system is booted or rebooted. If there are many of these, the system will run more slowly. Startup programs that are not frequently used should be disabled.

FYI

In Windows 7, the startup programs are accessed with the msconfig.exe utility.

The **Users** tab shows the users who are currently logged into the computer. For most computers, there will be only one user. If the computer is a server, this tab will list all of the users currently using the server's services.

The **Details** tab lists the currently running processes with expanded information not displayed in the **Processes** tab. The priority of a process can be set on the **Details** tab by right-clicking on the process name, and then clicking **Set priority** in the shortcut menu. The **Details** tab only appears in the Windows 8 Task Manager, but it is very similar to the **Processes** tab found in the Windows 7 Task Manager.

The **Services** tab lists the programs operating in the background. These programs support logging in users, monitoring the health of the system, scheduling processes, and making user notifications. The information on this tab is display only. It cannot be changed or edited, however a service can be started or stopped by right-clicking on it. To manage the services, click the **Open Services** link or the **Services...** button.

Stopping Applications

Computing Fundamentals 4.1.6

If a program has become unresponsive, the title bar of the application window will indicate this. Task Manager can be used to terminate an application that has become unresponsive. Launch Task Manager, and display the **Processes** tab in Windows 8 or the **Applications** tab in Windows 7. Click the name of the application that is frozen, and then click the **End Task** button at the bottom of the Task Manager, as shown in Figure 5-13. The application will be terminated, and it will no longer appear in the list.

Stopping Processes

Computing Fundamentals 4.1.6

Some processes are necessary, while others are not always needed. Processes that are not currently needed slow down the system. Processes can be terminated using Task Manager. Launch Task Manager, and

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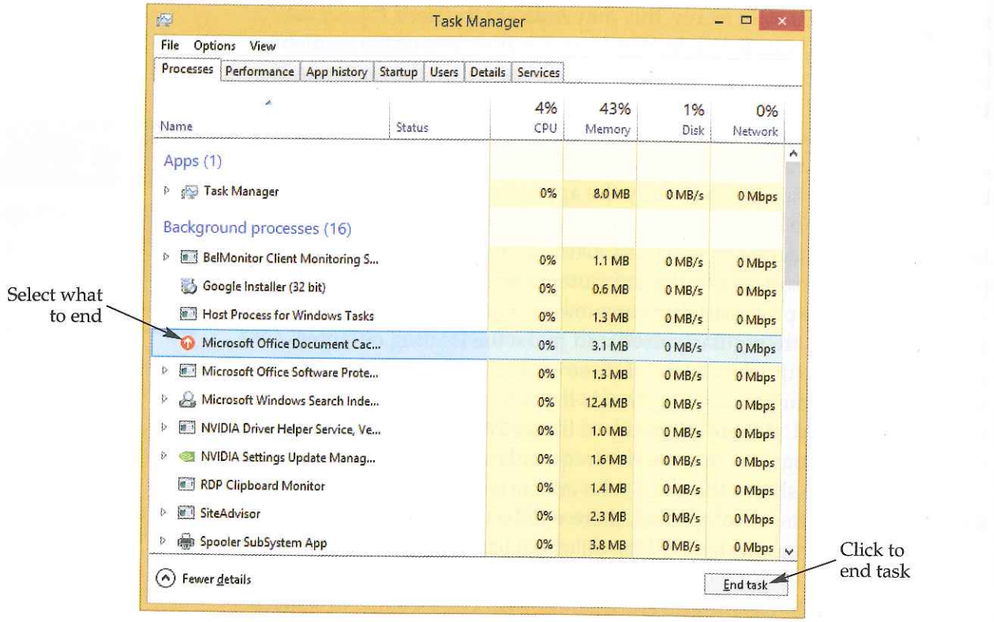

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Figure 5-13. Task Manager can be used to end an application that has stopped working.

display the **Processes** or **Details** tab in Windows 8 or the **Processes** tab in Windows 7. Click the name of the process to terminate, and then click the **End Task** or **End Process** button at the bottom of the Task Manager. The process will be terminated, and it will no longer appear in the list.

HANDS-ON EXAMPLE 5.3.2

TERMINATING A PROGRAM

Task Manager is a utility that can be used as part of the troubleshooting process for software. It displays the current system activity. It can also be used to terminate a program.

1. Launch Notepad. This is located in the **Accessories** group in the **Apps** or **Start** menu.
2. Launch Task Manager.
3. In Windows 8, click the **Processes** tab. In Windows 7, click the **Applications** tab. Notepad appears in the list of currently running applications. A button for Notepad appears on the Windows task bar, which indicates that it is running.
4. In Task Manager, select Notepad in the list of running applications.
5. Click the **End Task** button at the bottom of Task Manager. Notice that Notepad disappears from the list in Task Manager, and the button on the task bar is no longer displayed. Notepad has been terminated.

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TITANS OF TECHNOLOGY

Peter Norton was the first person to develop utilities and sell them to the general public. In 1982, he founded Peter Norton Computing, inventing an industry for troubleshooting help for personal computers. The same year, his company introduced Norton Utilities. His most popular utility was UNERASE, which was for recovering erased files from DOS disks. Today, computer users are familiar with the Recycle Bin or Trash, but at the time UNERASE was the first readily available way to restore a deleted file. Norton sold his company to Symantec Corporation in 1990. Norton has published many books and articles on personal computer technology. His first book was published in 1983. He also wrote monthly columns in computer magazines in the 1980s. During this time, he became a recognized authority on PC technology. Norton supports many philanthropic efforts through the Peter Norton Family Foundation and other organizations. He has also accumulated a vast collection of modern art, many pieces of which are displayed in various locations around the world.

Windows 7 Startup Programs

The System Configuration utility is a troubleshooting tool used to help diagnose problems with Windows startup. It displays which processes are included in the startup configuration file. These processes can be turned on and off to isolate a problem. To run the utility, open the **Run** dialog box by pressing the [Windows Key][R] key combination. Enter msconfig in the text box in the **Run** dialog box, and click the **OK** button. The System Configuration utility is displayed, as shown in Figure 5-14.

Click the **Startup** tab in the System Configuration utility. All of the processes that are launched whenever Windows is started are displayed. To disable a process, uncheck the check box to the left of its name. Click the **OK** button to apply the change. A message appears indicating the

FYI

The System Configuration utility is available in Windows 8, however the startup configuration must be set using Task Manager.

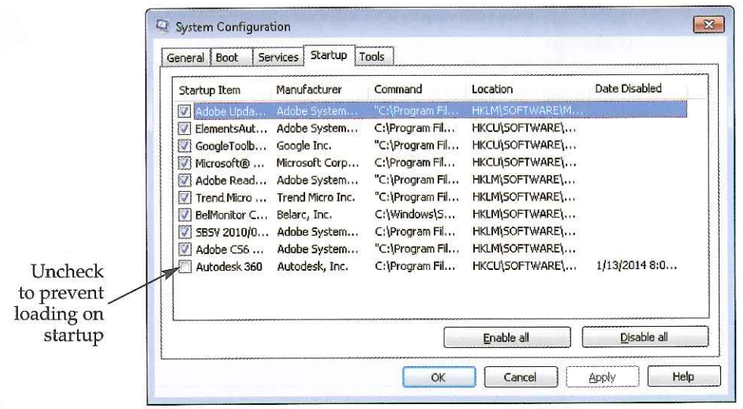

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Figure 5-14. In Windows 7, the System Configuration utility can be used to disable processes that load on startup.

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system must be restarted for the change to be activated. Either click the **Restart** button to restart the computer or click the **Exit without restart** button to restart the computer at a later time.

HANDS-ON EXAMPLE 5.3.3

STARTUP PROCESSES

Many software programs add a startup process during the installation process. Often, these processes are not needed and can cause the system to slow down.

1. In Windows 8, launch Task Manager. In Windows 7, launch the System Configuration utility.
2. Click the **Startup** tab.
3. Make note of the processes that are loaded on Windows startup.
4. Use a web browser and Internet search engine to research what one of the listed programs does. In Windows 8, right-click on the item, and click **Search Online** in the shortcut menu. Speculate if the process is one that should be enabled on startup.

System Restore

In some cases, it may be necessary to perform a system restore to fix a problem. In Windows, System Restore is a utility that returns system files and settings to the state they were in, or **restore point**, at an earlier date or time, as shown in Figure 5-15. A restore point is a copy of the system files in their state at the earlier date or time. Windows creates a restore point

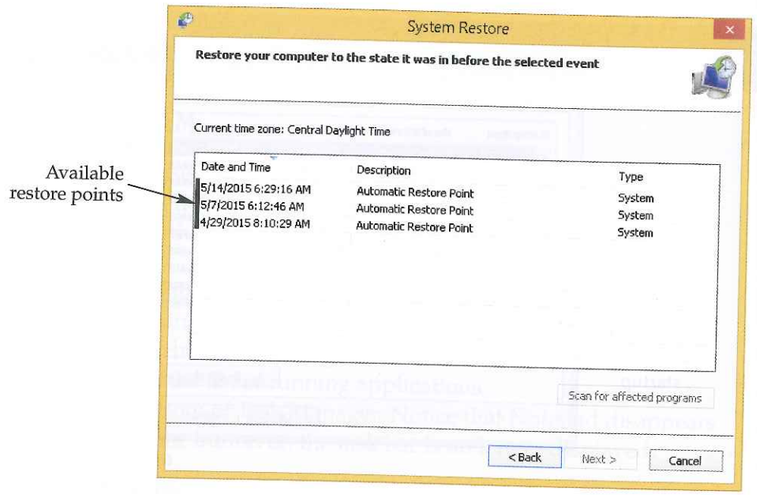

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Figure 5-15. System Restore can be used to reset the computer to an earlier state, which can be helpful when troubleshooting software problems.

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weekly and also whenever a change is made to the system files. It is also possible to manually create a restore point.

System Restore does not affect the user's documents, such as text files, image files, or e-mails. However, for some applications, such as games, System Restore may reset the application to an earlier state. Even though System Restore does not affect user files, using it is often a last resort. It reverses security updates, driver updates, and, in some cases, antivirus software updates. After using System Restore, it is necessary to make sure all of these critical items are updated.

5.3 SECTION REVIEW

CHECK YOUR UNDERSTANDING

1. What is the difference between a soft reboot and a hard reboot?
2. What is safe mode in Windows?
3. What has been nicknamed "the blue screen of death" in the Windows environment?
4. Which utility in Windows can be used to stop a process or application that is not responding?
5. Which utility restores the hard drive to a previously saved point?

IC3 CERTIFICATION PRACTICE

The following question is a sample of the types of questions presented on the IC3 exam.

1. Interactive question:
   Use Task Manager to locate a nonresponsive program and terminate the task.

BUILD YOUR VOCABULARY

As you progress through this course, develop a personal IT glossary. This will help you build your vocabulary and prepare you for a career. Write a definition for each of the following terms and add it to your IT glossary.

device firmware upgrade (DFU) mode
hard reboot
hard stop
rebooting
restore point
safe mode
soft reboot
task manager
troubleshooting

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5 Review and Assessment

Chapter Summary

Section 5.1
Purchasing a System

- The computer model is the form the computer takes. The three basic models of personal computers are desktops, laptops, and mobile devices.
- A needs assessment is a process of examining the current condition or state and determining how it differs from the desired condition or state. Look at how the current computer does not meet the user's needs because the needs of the user are the most important.
- When purchasing a system, balance the cost with the capability of the system. A general desktop model can be purchased for around $600, a laptop for between $500 and $700, and a tablet for around $500.

Section 5.2
Basic Maintenance

- Hardware maintenance is the process of keeping the computer hardware in good working order. Inside the computer box, the ventilation system is the most prone to grime, while externally keyboards are the most vulnerable.
- Software maintenance is keeping the software, from the operating system to all applications, in good working order. Often, software programs have updates made available, which may include enhancements or bug fixes.

Section 5.3
Troubleshooting Basics

- Troubleshooting is systematically analyzing the problem to find a solution. A few general actions can be taken to help the user analyze the nature of the problem.
- The most dreaded hardware failure is the hard stop, which occurs when the computer completely ceases to function. Other situations may occur with hardware that are not as drastic as a hard stop.
- A software program may become unresponsive or react in an unexpected way to your interaction. Windows Task Manager can be used to stop programs and functions that are not responding, and the System Restore function can reset the system to a previously working point.

Now that you have finished this chapter, see what you know about information technology by scanning the QR code to take the chapter posttest. If you do not have a smartphone, visit www.g-wlearning.com.

Chapter 5 Test

Multiple Choice

Select the best response.

1. What is the most important consideration in purchasing a new computer system?
   A. clock speed
   B. user's needs
   C. amount of RAM
   D. size of the hard disk
2. Which of these environmental factors may cause a computer to shut down?
   A. overheating
   B. dust in a keyboard
   C. printer jam
   D. low lighting
3. Which Windows utility automates the process of removing unneeded files?
   A. Antivirus
   B. Task Manager
   C. Disk Cleanup
   D. Optimize Your Drive or Disk Defragmenter
4. Working systematically to uncover and repair computer problems is called:
   A. defragmenting
   B. updating
   C. uninstalling
   D. troubleshooting
5. What does the task manager do?
   A. Cleans up the hard drive by removing unneeded files.
   B. Analyzes what is going on in the system and reports the results.
   C. Moves clusters on the hard drive so they are next to each other.
   D. Configures the system.

Completion

Complete the following sentences with the correct word(s).

6. The three models of personal computer are _____.
7. When conducting a(n) _____, look at how the current computer does not meet the user's needs.
8. To help prevent overheating of a laptop, place it on a(n) _____ while working.
9. _____ is systematically analyzing the problem to find a solution.
10. _____ is a boot setting in which only the minimum of functions are supported.

Matching

Match the correct term with its definition.

A. mobile devices
B. needs assessment
C. hardware maintenance
D. sectors
E. hard reboot

11. Cleaning devices helps to keep them functional.
12. Determining how the current state differs from the desired state.
13. Shutting off the system and then restarting it.
14. Includes tablets, mini tablets, phablets, and smartphones.
15. Locations on the hard drive where data are stored.

Application and Extension of Knowledge

1. Research tablet computers. Select one unit, and make a list of its specifications. Compare that with your current computer. Determine if an upgrade to the tablet is a good idea. Be prepared to justify your answer in a class discussion.
2. Identify a device attached to your computer, such as a CD-ROM drive. Locate the manufacturer and model number. Visit the manufacturer's website and locate the most up-to-date device driver.
3. Identify three third-party software solutions that offer to help maintain your computer. Create a chart that compares cost, platforms served, features, advantages, drawbacks. Determine if you need one of these packages. Write one paragraph for each solution that describes why you would or would not select it.

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4. Research troubleshooting checklists. Locate an example checklist for computer troubleshooting. Identify a step included in that checklist not discussed in this chapter. Apply critical thinking skills to determine if the step should be included.
5. Open the Windows Control Panel. Click in the search box at the top, and enter troubleshooter. In the search results, click **Troubleshooting**. On the new page that is displayed, click **Troubleshoot audio playback**. A wizard is launched. Step through the wizard, providing answers to any questions. Make note of how the troubleshooter functions. Did it find any problems?

Online Activities

Complete the following activities, which will help you learn, practice, and expand your knowledge and skills.

Certification Practice. Complete the certification practice test for this chapter.

Vocabulary. Practice vocabulary for this chapter using the e-flash cards, matching activity, and vocabulary game until you are able to recognize their meanings.

Communication Skills

College and Career Readiness

Reading. After you have read this chapter, identify the explicit details, as well as the author's main idea for the chapter. Apply appropriate reading techniques to identify the main ideas and purpose of the information that is presented. Draw conclusions about the author's purpose. Share your findings with the class.

Writing. Standard English means that word choice, sentence structure, paragraphs, and the format of communication follow standard conventions used by those who speak English. Research the topic of ways to take a business global. Write an informative report, consisting of several paragraphs to describe your findings. Edit the writing for proper syntax, tense, and voice.

Speaking. The workplace requires that employees adapt to diversity of the many individuals with whom they will come in contact. The interaction can be in formal or informal situations. Make a list of potential barriers that can evolve and solutions to eliminate those barriers. Share your list with the class.

Internet Research

Annotation Techniques. Using the Internet, research different ways to annotate and take notes as you read. Which techniques are commonly used? Did you learn about any new ones? Write a brief summary of the techniques you researched. Then, create a system for annotating works, such as color coding, a symbol system, or listing topics of interest.

Teamwork

Form a team with three to four classmates. Together, you will create a digital media presentation in the form of an infomercial for your school's STEM department. The goal of the presentation is to make the audience aware of the subjects that are available to learn, the real-world applications of these subjects, and the opportunities to have experiences beyond the traditional academic setting. As a team, work through the planning stages, determine what form the presentation will take, create or obtain all components of the presentation, create the presentation, and package and deliver the presentation.

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Portfolio Development

College and Career Readiness

Digital Presentation Options. Before you begin collecting items for a digital portfolio, you will need to decide how you are going to present the final product. For example, you could create an electronic presentation with slides for each section. The slides could have links to documents, videos, graphics, or sound files. This will dictate file naming conventions and file structure.

Websites are another option for presenting a digital portfolio. You could create a personal website to host the files and have a main page with links to various sections. Each section page could have links to pages containing your documents, videos, graphics, or sound files. (Be sure you read and understand the user agreement for any site on which you place your materials.)

Another option is to place the files on a CD. The method you choose should allow the viewer to easily navigate and find items. There are many creative ways to present a digital portfolio.

1. Establish the types of technology that are available for you to create a digital portfolio. Will you have access to cameras or studios? Do you have the level of skill needed to create videos?
2. Decide the type of presentation you will use. Research what will be needed to create the final portfolio product.

CTSOs

EVENT PREP

Ethics. Many competitive CTSO events include an ethics component that covers multiple topics. The ethics component of an event may be part of an objective test. However, ethics may also be a part of the competition in which teams participate to defend a given position on an ethical dilemma or topic. To prepare for an ethics event, complete the following activities.

1. Read the guidelines provided by your organization.
2. Make notes on index cards about important points to remember. Use these notes to study.
3. To get an overview of various ethical situations that individuals encounter, read each of the Ethics features that appear throughout this text.
4. Ask someone to practice role-playing with you by asking questions or taking the other side of an argument.
5. Use the Internet to find more information about ethical issues. Find and review ethics cases that involve business situations.

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