

# Introduction to computers by peter norton 6th ed

[Technology](#), [Computer](#)



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Depending on the location of the touch, the computer determines what information to display or what action to take next. Communications devices are the most common types of devices that can perform both input and output. These devices connect one computer to another—a process known as networking. The most common kinds of communications devices are modems, which enable computers to communicate through telephone lines or cable television systems, and network interface cards (NICs), which let users connect a group of computers to share data and devices. Storage Devices A computer can function with only processing, memory, input, and output devices.

To be really useful, however; a computer also needs a place to keep program files and related data when they are not in use. The purpose of storage is to hold data permanently, even when the computer is turned off. You may think of storage as an electronic file cabinet and RAM as an electronic worktable. When you need to work with a program or a set of data, the computer locates it in the file cabinet and puts a copy on the table. After you have finished working with the program or data, you put it back into the file cabinet. The changes you make to data while working on it replace the original data in the file cabinet (unless you store it in a different place). Novice computer users often confuse storage with memory.

Although the functions of storage and memory are similar; they work in different ways. There are three major distinctions between storage and memory: » There is more room in storage than in memory, just as there is more room in a file cabinet than there is on a tabletop. » Contents are retained in storage when the computer is turned off, whereas programs or

the data in memory disappear when you shut down the computer. » Storage devices operate much slower than memory chips, but storage is much cheaper than memory. For more information on storage visit <http://www.mhhe.com/petemorton> There are two main types of computer storage: magnetic and optical. Both are covered in the following sections.

**Magnetic Storage** There are many types of computer storage, but the most common is the magnetic disk. A disk is a round, flat object that spins around its center. (Magnetic disks are almost always housed inside a case of some kind, so you can't see the disk itself unless you open the case.) Read/write heads, which work in much the same way as the heads of a tape recorder or VCR, are used to read data from the disk or write data onto the disk. The device that holds a disk is called a disk drive. Some disks are built into the drive and are not meant to be removed; other kinds of drives enable you to remove and replace disks (see Figure 1B. 12).

Most personal computers have at least one nonremovable hard disk (or hard drive). In addition, there is also a diskette drive, which allows you to use removable diskettes (or floppy disks). The hard disk serves as the computer's primary filing cabinet because it can store far more data than a diskette can contain. Diskettes are used to load data onto the hard disk, to trade data with other users, and to make backup copies of the data on the hard disk. *Introducing Computer Systems* sch :: FIGURE 1B. 12 Standard PCs have a built-in hard disk and a diskette drive. The hard disk is built into the computer's case. Diskettes can be inserted into and removed from the diskette drive. **Optical Storage**

In addition to magnetic storage, nearly every computer sold today includes at least one form of optical storage—devices that use lasers to read data from or write data to the reflective surface of an optical disc. The CD-ROM drive is the most common type of optical storage device. Compact discs (CDs) are a type of optical storage, identical to audio CDs. Until recently, a standard CD could store about 74 minutes of audio or 650 MB of data. A newer breed of CDs can hold 80 minutes of audio or 700 MB of data (see Figure 1B.13). The type used in computers is called Compact Disc Read-Only Memory (CD-ROM). As the name implies, you cannot change the information on the disc, just as you cannot record over an audio CD.

If you purchase a CD-Recordable (CD-R) drive, you have the option of creating your own CDs. A CD-R drive can write data to and read data from a compact disc. To record data with a CD-R drive, you must use a special CD-R disc, which can be written on only once, or a CD-ReWritable (CD-RW) disc, which can be written to multiple times, like a floppy disk. An increasingly popular data storage technology is the Digital Video Disc (DVD), which is revolutionizing home entertainment. Using sophisticated compression technologies, a single DVD (which is the same size as a standard compact disc) can store an entire full-length movie. DVDs can hold a minimum of 4.7 GB of data and as much as 17 GB.

Future DVD technologies promise much higher storage capacities on a single disc. DVD drives also can locate data on the disc much faster than standard CD-ROM drives. DVDs require a special player (see Figure 1B.14). Many DVD players, however, can play audio, data, and DVD discs, freeing the user from purchasing different players for each type of disc. DVD drives

are now standard equipment on many new personal computers. Users not only can install programs and data from their standard CDs, but they also can watch movies on their personal computers by using a DVD. FIGURE 1B.

13 Software makers commonly sell their products on CD because of the disc's high storage capacity. Software Brings the Machine to Life

The ingredient that enables a computer to perform a specific task is software, which consists of instructions. A set of instructions that drive a computer to perform specific tasks is called a program. These instructions tell the machine's physical components what to do; without the instructions, a computer could not do anything at all. When a computer uses a particular program, it is said to be running or executing that program. Although the array of available programs is vast and varied, most software falls into two major categories: system software and application software. ONLINE For more information on computer software, visit <http://www.mhhe.com/petemorton> 32 Chapter 1 System Software

System software is any program that controls the computer's hardware or that can be used to maintain the computer in some way so that it runs more efficiently. There are three basic types of system software: » An operating system tells the computer how to use its own components. Examples of operating systems include Windows, the Macintosh Operating System, and Linux (see Figure 1B . 15). An operating system is essential for any computer; because it acts as an interpreter between the hardware, application programs, and the user. When a program wants the hardware to do something, it communicates through the operating system. Similarly, when you want the hardware to do something (such as copying or printing a file),

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your request is handled by the operating system. A network operating system allows computers to communicate and share data across a network while controlling network operations and overseeing the network's security. A utility is a program that makes the computer system easier to use or performs highly specialized functions (see Figure 1B. 16). Utilities are used to manage disks, troubleshoot hardware problems, and perform other tasks that the operating system itself may not be able to do. » » FIGURE 1B. 14 DVD players are now standard on many PCs and are found in many home entertainment centers. Application Software Application software tells the computer how to accomplish specific tasks, such as word processing or drawing, for the user.

Thousands of applications are available for many purposes and for people of all ages. Some of the major categories of these applications include » » Word processing software for creating text-based documents such as newsletters or brochures (see Figure 1B. 17). Spreadsheets for creating numeric-based documents such as budgets or balance sheets. FIGURE 1B. 15 Windows is the most popular of all PC operating systems, running on about 90 percent of all personal computers. Introducing Computer Systems 33 Urheberrechtlich geschütztes Material » » Database management software for building and manipulating large sets of data, such as the names, addresses, and phone numbers in a telephone directory.

Presentation programs for creating and presenting electronic slide shows (see Figure 1B. 18). Graphics programs for designing illustrations or manipulating photographs, movies, or animation. Multimedia authoring applications for building digital movies that incorporate sound, video, anim

ation, and interactive features. Entertainment and education software, many of which are interactive multimedia events. » » » » FIGURE 1B. 16 » Web design tools and Web browsers, and other Internet applications such as newsreaders and e-mail programs. » Games, some of which are for a single player and many of which can be played by several people over a network or the Internet.

There are hundreds of utility programs available for personal computers. This one, called Partition Magic, helps you manage your hard disk to get the most from it. Computer Data You have already seen that, to a computer, data is any piece of information or fact that, taken by itself, may not make sense to a person. For example, you might think of the letters of the alphabet as data. Taken individually, they do not mean a lot. But when grouped into words and sentences, they make sense; that is, they become information (see Figure 1B. 19). Similarly, basic geometric shapes may not have much meaning by themselves, but when they are grouped into a blueprint or a chart, they become useful information.

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 R E 1 B . 1 ? Word processing software is designed (or creating documents that consist primarily of text, but also lets you add graphics and sounds to your documents. It also provides layout features that let you create brochures, newsletters, Web pages, and more.

34 Chapter 1 M i 3 — « I H w  
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ATTOOCTBATLAW 1002 AIMMBSB8ZT sunu;, iL4nw C i A Urheberrechtlich geschötzttes M FIGURE 1B. 18 :: T oil rtyt Sj ; fca f Presentation software is mostoften used torcreating sales presentations, aXtvxjgh I can be effectivetorany typeol electronicside show. « H i n ^ X iM ; . i W h; i; : ' V! J i 1 jwufinm :. ^ | H o? drnfi! ^Viis,-S\* The Keyboard The Mouse Variants of the Mouse Ergonomics and Input Devices Lesson 2B: Inputting D ata In O ther W ays » » » Devices for the Hand Optical Input Devices Audiovisual Input Devices LESSON v m Overview: T he K eyboard an d M ouse

If you think of the CPU as a computer's brain, then you might think of the input devices as its sensory organs—the eyes, ears, and fingers. From the user's point of view, input devices are just as important as the CPU, perhaps even more important. After you buy and set up the com\* putcr, you may take the CPU for granted because you interact directly with input devices and only indirectly with the CPU. But your ability to use input devices is critical to your overall success with the whole system. An input device docs exactly what its name suggests: it enables you to enter information and commands into the computer. The most com\* monly used input devices arc the keyboard and the mouse.

If you buy a new personal computer today, it w ill include a keyboard and mouse un less you specify otherwise. Other types of input devices arc available as well, such as variations of the mouse and specialized "alternative" input devices such as microphones and scanners. This lesson introduces you to the keyboard and the mouse. You w ill learn the importance of these devices, the way the computer accepts input from them, and the many tasks they enable you to perform on your PC. Using the

Keyboard and Mouse OBJECTIVES :: > Identity the five key groups on a ; • standard computer keyboard. > Name six special\*purpose keys found on all standard computer keyboards. » List the steps a computer follows when accepting input from a keyboard. Describe the purpose of a mouse and the rote it plays in computing. » Identify the five essential techniques for using a mouse. » Identify three common variants of the mouse. » Describe five steps you can take to avoid repetitivestressinjuries from computer use.

Urheberrechtlich g eschütztes Material The Keyboard O N L I N E For mote information on computer-based keyboard tutooals, vs\* <http://wvrw.mhho.com/petemortoa> The keyboard was one of the first peripherals to be used with computers, and it is still the primary input device for entering text and numbers. A standard keyboard includes about 100 keys; each key sends a different signal to the CPU.

If you have not used a computer keyboard or a typewriter, you w ill learn quickly that you can use a computer much more effectively if you know how to type. The skill of typing, or keyboarding, is the ability to enter text and numbers with skill and accuracy. Certainly, you can use a computer without having good typing skills. Some people claim that when computers can interpret handwriting and speech with 100 percent accuracy, typing w ill become unnecessary. But for now and the foreseeable future, keyboarding remains the most common way to enter text and other data into a computer:

The Standard Keyboard Layout O N L I N E For more miormaiion on computer keyboards and keyboard manufacturers, visit <http://www.mhhc.com/petemortal> Keyboards come in many styles.

The various models differ in size, shape, and feel; except for a few special-purpose keys, most keyboards are laid out almost identically. Among IBM-compatible computers, the most common keyboard layout is the IBM Enhanced Keyboard. It has about 100 keys arranged in five groups, as shown in Figure 2A. 1. (The term IBM-compatible computer refers to any PC based on the first personal computers, which were made by IBM. Today, an IBM-compatible PC is any PC other than a Macintosh computer.)

**Alphanumeric Keys** The alphanumeric keys—the area of the keyboard that looks like a typewriter's keys—are arranged the same way on almost every keyboard.

Sometimes this common arrangement is called the QWERTY (pronounced KWERT-tee) layout because the first six keys on the top row of letters are Q, W, E, R, T, and Y. Along with the keys that produce letters and numbers, the alphanumeric key group includes four keys having specific functions. The tab, CAPS LOCK, backspace, and enter keys are described in Figure 2A. 2.

**FIGURE 2A. 1** Most IBM-compatible PCs use a keyboard like this one. Many keyboards feature a number of specialized keys, and keyboards can vary in size and shape. But nearly all standard PC keyboards include the keys shown here.

**The Modifier Keys** The SHIFT, ALT (Alternate), and CTRL (Control) keys are called modifier keys because they modify the input of other keys.

In other words, if you hold down a modifier key while pressing another key, then you are changing the second key's function. In most applications, the modifier keys are used to perform actions that are not possible with the alphanumeric keys alone. For example, in a word processing program you can press

baosmce to " backover" an Incorrect character anddelete it Thecaps lock keylets you" lock\* the alphabetkeys sotheyproduceonly capital letters. The ehter key letsyou finalize dataentry inm typesof appBcatkmprogram any s. Ybualso can usewtw tocboosecom ands m andoptionsin m program and at any s various places in anoperatingsystem's Interface. FIGURE 2A . 2 nput in some way. For example, if you press the Jtkcy, you input a small letter/. ' But if you hold down the sh u t key while pressing the J key, you input a capital /. M odifier keys arc extremely useful bccausc they give all other keys multiple ca pabilities. Figure 2A. 3 describes the modifier keys and their uses. Functionsofthe tab, catsloo. v o s ta , andtwin keys The Numeric Keypad The numeric keypad is usually located on the right side of the keyboard, as shown in Figure 2A. 1. The numeric keypad looks like a calculator's keypad, with its 10 digits and mathematical operators (+, -, \*, and Whenpressedalong with analphanumerickey, smft forcesthe /).

The numeric keypad also features a NUM computerto outputa capital letterorsymbol sun is also a LOCK key, which forces the numeric keys to in m ocifierkey in someprogram forexam youcan presssnft s; ple, put numbers. When NUM LOCK is deactivated, alongwtthcursor-m ovem keys toselect textforediting. ent the numeric keypad's keys perform cursormovement control and other functions. The Function Keys The function keys, which are labeled F I, f I, and so on (as shown in Figure 2A. 1), are usu ally arranged in a row along the top of the key board. They allow you to input commands without typing long strings of characters or navigating menus or dialog boxes. Each func tion key's purpose depends on the program you are using.

For example, in most programs, F1 is the help key. When you press it, a special window appears to display information about = On

The **Ctrl** (control) key produces different results depending on the program you are using. In many Windows-based programs, **Ctrl**-key combinations provide shortcuts for many commands. For example, the **Ctrl+N** combination enables you to open a new file. The **Ctrl+J** (**Ctrl+M**) key operates like the **Ctrl** key, but produces a different set of results. In Windows programs, **Ctrl**-key combinations enable you to navigate menus and dialog boxes without using the mouse. FIGURE 2A.3 Functions of the Shift, Enter, and Tab Keys. Interacting with Your Computer 51 the program you are using. Most IBM-compatible keyboards have 12 function keys. Many programs use function keys along with modifier keys to give the function keys more capabilities. The Cursor-Movement Keys

Most standard keyboards also include a set of cursor-movement keys, which let you move around the screen without using a mouse. In many programs and operating systems, a mark on the screen indicates where the characters you type will be entered. This mark, called the cursor or insertion point, appears on the screen as a blinking vertical line, a small box, or some other symbol to show your place in a document or command line. Figure 2A.4 describes the cursor-movement keys and Figure 2A.5 shows an insertion point in a document window. Special-Purpose Keys In addition to the five groups of keys described earlier, all IBM-compatible keyboards feature six special-purpose keys, each of which performs a unique function. Figure 2A.6 describes these special-purpose keys. Since 1996, nearly all IBM-compatible keyboards have included two additional special-purpose keys designed to

work with the Windows operating systems (see Figure 2A. 7): » start . This key, which features the Windows logo (and is sometimes called the Windows logo key), opens the Windows Start menu on most computers. Pressing this key is the same as clicking the Start button on the Windows taskbar. s h o r t c u t . This key, which features an image o f a menu, opens an on-screen shortcut menu in Windows-based application programs. » One of the latest trends in keyboard technology is the addition of Internet and multimedia controls.

Microsoft's Internet Keyboard and MultiMedia Keyboard, for example, feature buttons that you can program to perform any number of tasks. For example, you can use the buttons to launch a Web browser, check e-mail. Depending onme program, you maybe able to press nomcto movethe cursorto the beginning ofa line and br> to moveto the endof a line. The mccu and hm o o w keys let you " flip" p \* through a document, screen by screen, Hto turning the pages of a book. Press m et w to lump to the previous screen; press m gedonn to jump to the next \_\_\_ | The arrow keys move the insertion point up or down a single line, or left or right one character space. FIGURE 2A . 4 The aisor-movement keys. FIGURE 2A . Thecursor, orinsertionpoW, shews wherethenextletter typedwit appear. 52 Chapter 2 The cursor, o r insertion point, in a document eberrechtlich M The(softkey's functiondependsonyour programoroperatingenvironment Typically, the csckeyis usedto" backup" onelevel in a multilevel environm ent. ThenmT scREBtkey sRom the user10 s capture whatever b shownon thescreen as anim Thiskeydoes notwork with al age. program s. In som programs, scrou. lockcauses the e cursorto remainstationary onthescreen, andthe document'scontentsm aroundlt. ove



This key doesn't function at all in some programs. In some programs, the mouse key can be used to stop a command in progress. The **Esc** key is used to stop a command in progress. The **Esc** key is used to stop a command in progress. The **Esc** key is used to stop a command in progress.

The **Enter** key batches some programs from "Send to Insert mode" (in which text is inserted into the document at the cursor) to "Overtype mode" (in which new text is typed over existing text), and vice versa. The **Del** key removes one character at a time at the cursor's location, and erases characters to the right of the cursor. The **Backspace** key is used to delete characters to the left of the cursor. The **Home** key moves the cursor to the beginning of the line, and the **End** key moves the cursor to the end of the line. The **Page Up** and **Page Down** keys move the cursor up and down one page at a time. The **Print Screen** key copies the current screen to the clipboard. The **Windows** key is used to open the Start menu. The **Alt** key is used to access the application menu. The **Ctrl** key is used to access the command menu. The **Shift** key is used to access the function keys. The **Fn** key is used to access the function keys. The **Num Lock** key is used to toggle the numeric keypad. The **Num Lock** key is used to toggle the numeric keypad. The **Num Lock** key is used to toggle the numeric keypad.

You might think the keyboard simply sends the letter of a pressed key to the computer—after all, that is what appears to happen. Actually, the process of accepting input from the keyboard is more complex, as shown in Figure 2A.9. When you press a key, a tiny chip called the keyboard controller notes that a key has been pressed. The keyboard controller places a code into part of its memory. Interacting with Your Computer 53 **Figure 2A.8** called the keyboard buffer, to indicate which key was pressed. (A buffer is a temporary storage area that holds data until it can be processed.) The keyboard controller then sends a signal to the computer's system software, notifying it that something has happened

at the keyboard. When a key is pressed on the keyboard, the system software receives the signal, it determines the appropriate response. When a keystroke has occurred, the system software responds to memory location in the keyboard controller by reading the scan code from the keyboard buffer. The keyboard controller then passes that scan code to the CPU. The system software then passes that scan code to the keyboard controller. The keyboard buffer can store many keystrokes at one time.

This request to the CPU capability is necessary because some time elapses between the pressing of a key and the computer's reading of that key from the keyboard buffer. With the key input is recorded from the keyboard strokes stored in a buffer, the program can react to them when it is convenient. Of course, this all happens very quickly. Unless the computer is very busy handling multiple tasks, you notice no delay between pressing keys and seeing the letters on your screen. In some computers, the keyboard controller handles input from the computer's keyboard and mouse and stores the settings for both devices.

One keyboard setting, the repeat rate, determines how long you must hold down an alphanumeric key before the keyboard will repeat the character and how rapidly the character is retyped while you press the key. You can set the repeat rate to suit your typing speed. (You will learn how to check your keyboard's repeat rate in the lab exercises at the end of this chapter.)

internet and multimedia features are The Mouse A personal computer that was purchased in the early 1980s probably included a keyboard as the only input device. Today, every new PC includes a pointing device as standard equipment, as shown in Figure 2A. 10. Full-size PCs usually include a mouse as the pointing device.

A mouse is an input device that you can move around on a flat surface (usually on a desk or keyboard tray) and controls the pointer. The pointer (also called the mouse pointer) is an on-screen object, usually an arrow, that is used to select text; access menus; and interact with programs, files, or data that appear on the screen. Figure 2A. 11 shows an example of a pointer in a program window. FIGURE 2A. 10 Most modern personal computers are equipped with a mouse. 54 Chapter 2 The mechanical mouse is the most common type of pointing device. A mechanical mouse contains a small rubber ball that protrudes through a hole in the bottom of the mouse's case (see Figure 2A. 12). The ball rolls inside the case when you move the mouse around on a flat surface.

Inside the mouse, rollers and sensors send signals to the computer, telling it the distance, direction, and speed of the ball's motions (see Figure 2A. 13). The computer uses this data to position the mouse pointer on the screen. Another popular type of mouse, the optical mouse, is nonmechanical. This type of mouse emits a beam of light from its underside; it uses the light's reflection to judge the distance, direction, and speed of its travel (see Figure 2A. 14). The mouse offers two main benefits. First, the mouse lets you position the cursor anywhere on the screen quickly without using the cursor-movement keys. You simply move the pointer to the on-screen

position you want and press the mouse button; the cursor appears at that location.

Second, instead of forcing you to type or issue commands from the keyboard, the mouse and mouse-based operating systems let you choose commands from easy-to-use menus and dialog boxes (see Figure 2A. 15). The result is a much more intuitive way to use computers. Instead of remembering obscure command names, users can figure out rather easily where commands and options are located. FIGURE 2A. 11 An example of a pointer as it might appear on a computer screen. For more information on mice and mouse manufacturers, visit <http://www.mhhe.com/petemorton>. FIGURE 2A. 12 The parts of a mechanical mouse, seen from the top. For more information on optical mice, visit <http://www.mhhe.com/petemorton>. When the mouse moves, the rolling mouse ball spins the rollers. The rollers are connected to the system software, which controls the pointer. FIGURE 2A. 13 How the mouse controls the pointer. Interacting with Your Computer 55 1 Urheberrechtlich geschützt: FIGURE 2A. 14 The underside of an optical mouse. If you use a drawing program, you can use the mouse to create graphics such as lines, curves, and freehand shapes on the screen. The mouse has helped establish the computer as a versatile tool for graphic designers, starting with what has since become a revolution in the graphic design field. Using the Mouse For more information on mouse techniques, visit <http://www.mhhe.com/petemorton>

You use a mouse to move the pointer to a location on the screen, a process called pointing. Everything you do with a mouse is accomplished by com

binning pointing with these techniques: » Clicking » Double-clicking » Dragging » Right-clicking :: FIGURE 2A. 15 Using the mouse to choose a command from a menu. r\*e Cdt ym ? e« xh ? o fcsownarks Ctrl+N ( New U\*vn)4lCirr SVQctow N&" \*l Ofwn Web Location... CtrHSMt+l Qpen Fie... 0 SM CblfO Qrl+W OrM-S CdtPaga Send Page... OrU€ Q rffP Print P is WoifcCffine \_

» fe t Q jW } 1 Pointing means pushing the mouse across your desk. On the screen, the pointer moves in relation to the mouse (see Figure 2A. 16).

Push the mouse forward, and the pointer moves up. Push the mouse to the left, and the pointer moves to the left. To point to an object or location on the screen, you simply use the mouse to place the pointer on top of the object or location. The mice that come with IBM-compatible computers usually have two buttons, but techniques such as clicking, double-clicking, and dragging are usually carried out with the left mouse button (see Figure 2A. 17). In multi-button mice, one button must be designated :: FIGURE 2A. 16 Using the mouse to control the on-screen pointer. The pointer moves in relation to the mouse's movements. 56 Chapter 2 Urheberrechtlich geschütztes Material the " primary" button, referred to as the mouse button. In Windows and many Windows programs, the left mouse button is usually the primary right mouse button. Some mice can have three or more buttons. The buttons' uses are determined by the computer's operating system, application software, and mouse-control software. To click an item with the mouse, you move the pointer to the item on the screen. When the pointer touches the object, quickly press and release the primary mouse button once " d c k " {see Figure 2A. 18). Clicking— or single-clicking, as it is also called— is the most

important mouse action. To select any object on the screen, such as a menu, command, or button, you click it.

Double-clicking an item means pointing to the item with the mouse pointer and then pressing and releasing the mouse button twice in rapid succession (see Figure 2A. 19). Double-clicking is primarily used with desktop objects such as icons. For example, you can double-click a program's icon to launch the program. Dragging an item means positioning the mouse pointer over the item, pressing the primary mouse button, and holding it down as you move the mouse. As you move the pointer, the item is "dragged" along with it across the screen (see Figure 2A. 20). You can then drop the item in a new position on the screen. This technique is also called drag-and-drop editing, or just drag and drop. Dragging is a very handy tool.

In a wordprocessing program, for example, you can drag text from one location to another in a document. In a file-management program, you can drag a document's icon and drop it onto a printer's icon to print the document. Windows and many Windows programs support right-clicking, which means pointing to an item on the screen, then pressing and releasing the right mouse button (see Figure 2A. 21). Right-clicking usually opens a shortcut menu that contains commands and options that pertain to the item to which you are pointing.

A wheel mouse has a small wheel nestled among its buttons (see Figure 2A. 22). You can use the wheel for various purposes, one of which is scrolling through long documents. Not all applications and operating systems support the use of the wheel.

ona tw obuttonmouse. FIGURE 2A. 18 Clicking a mouse. FIGURE 2A. 19 DoUbie-dlcWnga mouse. FIG URE 2A. 20 Bragging with a mouse. FIG URE 2A. 21 RiQht-dictonga mouse. Interacting with Your Computer 57 U rheberrechtlich g esch u tz tes al Nor Mouse Button Configurations m IN E For m tatom ore atJononthecare andusageofrrtce. visit <http://www.mhhe.com/pctemorton> FIGURE 2A. 22 Avrfieel mouse.

The mouse usually sits to the right of the keyboard (for right-handed people), and the user maneuvers the mouse with the right hand, pressing the left button with the right forefinger. For this reason, the left mouse button is sometimes called the primary mouse button. If you are left-handed, you can configure the right mouse button as the primary button (as shown in Figure 2A. 23). This configuration lets you place the mouse to the left of the keyboard, control the mouse with your left hand, and use your left fore\* finger for most mouse actions. Newer mice enable you to configure buttons to perform different tasks than clicking. You might configure a button to delete selected text, for ex ample, or to open a program that lets you search for files.

Such settings may lim it the usefulness of the mouse but can be helpful if you need to perform a certain task many times. m 3 MW^waau^MOUI Variants of the Mouse Although the mouse is a handy tool, some people do : MMbi not like using a mouse or have difficulty maneuvering 1(0\* one. For others, a mouse W D i W tfW w : requires too much desktop jo\* space—a real problem when you are not working at a desk! Uw aji | tM For these reasons and others, hardware makers have developed devices that Cm \* k 1 m \* 1 « duplicate the mouse's func tionality but interact with the user in different

ways. The primary goals for these "mouse variants" are to provide ease of use while taking up less space than a mouse.

They all remain stationary and can even be built into the keyboard.

**Trackballs** A trackball is a pointing device that works like an upside-down mouse. You rest your index finger or thumb on an exposed ball, then place your other fingers on the buttons. To move the pointer around the screen, you roll the ball with your index finger or thumb. Because you do not move the whole device, a trackball requires less space than a mouse. Trackballs gained popularity with the advent of laptop computers, which typically are used on laps or on small work surfaces that have no room for a mouse. Trackballs come in different models, as shown in Figure 2A. 24.

Some track balls are large and heavy with a ball about the same size as a cue ball. Others are much smaller. Most trackballs feature two buttons, although three-button models are also available.

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Chapter 2 Urheberrechtlich geschütztes Material  
 SELF-CHECK :: Circle the correct answer for each question.

- The most common keyboard layout has about this many keys.
  - 10
  - 25
  - 100
  - 110
- Which special keyboard key has a picture of the Windows logo on it?
  - Keyboard
  - Mouse
  - Scanner
  - Trackball

Trackball units also are available in right- and left-handed models. Trackpads

The trackpad (also called a touchpad) is a stationary pointing device that many people find less tiring to use than a mouse or trackball. The movement of a finger across a small touch-sensitive surface is translated into pointer movement on the computer screen. The touch-sensitive surface may be only a few centimeters wide and a few centimeters high.

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1. 5 or 2 inches square, so the finger never has to move far. The trackpad's size also makes it suitable for a notebook computer. Some notebook models feature a built-in trackpad rather than a mouse or trackball (see Figure 2A. 25). Like mice, trackpads usually are separate from the keyboard in desktop computers and are attached to the computer through a cord.

Some special keyboards feature built-in trackpads. This feature keeps the pad handy and frees a port that would otherwise be used by the trackpad. Trackpads include two or three buttons that perform the same functions as mouse buttons. Some trackpads are also "strike sensitive," meaning you can tap the pad with your fingertip instead of using its buttons. FIGURE 2A. 24 Trackballs come in many shapes and any sizes. Form information on one online trackball and integrated pointing devices. visit <http://www.mhhe.com/petemorton> Pointers in the Keyboard Many portable computers now feature a small joystick positioned near the middle of the keyboard, typically between the G and H keys.

The joystick is controlled with either fore finger, and it controls the movement of the pointer on screen. Because users do not have to take their hands off the keyboard to use this device, they can save a great deal of time and effort. Two buttons that perform the same function as mouse buttons are just beneath the space bar and are pressed with the thumb. Several generic terms have emerged for this device; many manufacturers refer to it as an integrated FIGURE 2A. 25 Trackpad Some notebook computers and desktop keyboards feature a built-in trackpad Interacting with Your Computer 59 M , I Pmdunthvily Tip Saving Time With Keyboard Shortcuts

In the 1980s, as programmers began packing more features into PC software, they also developed ways for users to issue an ever-increasing number of commands. Software packages came with long lists of commands, all of which had to be entered at the keyboard. (This was before the mouse came into common use.) As a result, the computer keyboard rapidly became a valuable tool. Programmers began devising keyboard shortcuts that allow users to issue commands quickly by typing a short combination of keystrokes. Keyboard shortcuts involve using a modifier key (such as `alt` or `ctrl`.) along with one or more alphanumeric or function keys. To print a document in many applications, for example the user can press `ctrl+p`.

Function keys also became important. The `F1` key, for example, became the universal way to access online help. IBM-compatible computer keyboards originally had 10 function keys; eventually the number of function keys was expanded to 12. Another common type of keyboard shortcut involves pressing the `alt` key to access a program's menu system. When running any Windows program, you can press `alt` to activate the menu bar, and then press a highlighted letter in a menu's name to open that menu. Still a keyboard can hold only so many keys, and the lists of keyboard shortcuts became unmanageable. A single program could use dozens of "hotkeys," as these shortcuts were called. If you used several programs, you had to learn different shortcuts for each program.

Finally, the Common User Access (CUA) standard led to the standardization of many commonly used hotkeys across different programs and environments. With this standard for commonly used hotkeys, users have fewer hotkeys to remember. Despite such standards, pointing devices (such

as the mouse) came along none too soon for hotkey-weary computer users. Microsoft Windows and the Macintosh operating system gained popularity because of their easy-to-use, mouse-oriented graphical interfaces. By operating the mouse, users could make selections visually from menus and dialog boxes. Emphasis rapidly began shifting away from the keyboard to the screen; today, many users do not know the purpose of their function keys! pointing device, while others call it a 3-D point stick.

On the IBM ThinkPad line of notebook computers, the pointing device is called the TrackPoint (see Figure 2A. 26). Ergonomics and Input Devices Any office worker will tell you that working at a desk all day can be extremely uncomfortable (see Figure 2A. 27). Sitting all day and using a computer can be even worse. Not only does the user's body ache from being in a chair too long, but hand and wrist injuries can result from using a keyboard and mouse for long periods. Eyes can become strained from staring at a monitor for hours. Such injuries can be extreme, threatening the user's general health and ability to work. Much is being done to make computers easier, safer, and more comfortable to use.

Ergonomics, which is the study of the physical relationship between people and their tools—such as computers— addresses these issues. Now more than ever before, people recognize the importance of having ergonomically correct computer furniture and using proper posture and techniques while working with computers. (The term ergonomically correct means that a tool or a workplace is designed to work properly with the human body, and thus reduces the risk of strain and injuries. ) TrackPoint : FIG U RE 2A. 26 IBM's ThinkPad computers feature the TrackPoint pointing device, and smtar

donees are found in many other portable PCs. 60 Chapter 2 Press **Ctrl+A** To Toggle bold character formatting on or off for the selected or inserted text; make letters bold or unbold Toggle italic character formatting on or off for the selected or inserted text; make letters italic Toggle underline character formatting on or off for the selected or inserted text; underline letters Decrease font size for the selected or inserted text Increase font size for the selected or inserted text Remove paragraph formatting for the selected paragraph or paragraphs Remove character formatting for the selected text Copy the selected text or object Cut the selected text or object Paste text or an object Undo the last action Redo the last action **Ctrl+H** Pointing, however, can slow you down. As menus and dialog boxes become increasingly crowded, commands can be hard to find and their locations can be as difficult to remember as keyboard shortcuts. Many computer users overcome these problems by using a combination of keyboard shortcuts and a pointing device. You use one hand to issue many basic shortcuts (such as **Ctrl+F** and **Ctrl+S**) or to launch macros. A macro is a series of commands that a program memorizes for you. Macros enable you to issue an entire set of commands in just a few keystrokes.

Using these techniques minimizes keystrokes and leaves a hand free to use a pointing device. The following table lists some of the shortcut keys available in Microsoft Word. **Ctrl+H** **Ctrl+>** **Shift+<** **Ctrl+<** **Ctrl+>** **Ctrl+O** **Ctrl+Spacebar** **Ctrl+K** **Ctrl+X** **Ctrl+Y** **Ctrl+Z** **Ctrl+Y** Repetitive Stress Injuries The field of ergonomics did not receive much attention until a certain class of injuries began appearing among clerical workers who spend most of their time entering data on computer keyboards. These ailments are called repetitive

stress injuries (RSIs) or repetitive strain injuries and result from continuously using the body in ways it was not designed to work.

One type of RSI that is especially well documented among computer users is carpal tunnel syndrome, a wrist or hand injury caused by using a keyboard for long periods of time. W C IW E For more information on ergonomics and avok&ig computer-related injuries, v a i <http://www.mhhe.com/jpetemorton> FIGURE 2A. 27 Experience shows that office work can pose specific health risks. Interacting with Your Computer 61 Urheberrechtlich geschulztes M Transverse Cross Section of Normal W rit! Flexor Tendons and Sheath . " :™ . Inflamed Inflamed tendon sheath presses against median nerve carpal?. : : \* Bones FIGURE 2A . 2 8 Carpal tunnel syndrome affects the nerves running through the carpal tunnel of the wrist. The carpal tunnel is a passageway in the wrist through which nerves pass (see Figure 2A. 28).

In carpal tunnel syndrome, tendons in the tunnel become inflamed because the victim has held his or her wrists stiffly for long periods, as people tend to do at a keyboard. When the tendons become inflamed, they press against the nerves, causing tingling, numbness, pain, or the inability to use the hands. Carpal tunnel syndrome is the best-known repetitive stress injury. It can become so debilitating that victims can miss weeks or months of work. In extreme cases, surgery is required. Avoiding Keyboard-Related Injuries If you use a computer frequently, you can avoid RSIs by adopting a few good work habits, and by making sure that your hardware and workspace are set up in an ergonomically friendly way. At Issue Computer Voting— Is It a Good Thing?

The dispute over electronic voting is as heated as a debate between presidential candidates. The risks versus the benefits are discussed, investigated, and argued. But what are the facts that lie beneath the fuss? The key function of an electronic voting system is to obtain voter preferences and report them—reliably and accurately. Some assert that electronic systems are safer than other methods of voting because they implement security checks and audit trails, and are tougher to tamper with than paper ballots. One of the most widely used electronic voting systems, Diebold Election Systems ([http://www.diebold.com/dieboldes/accuvote\\_ts.htm](http://www.diebold.com/dieboldes/accuvote_ts.htm)), boasts some 33,000 voting stations in locations across the United States. Diebold's AccuVote-TS system is a voter-activated interactive touch screen system using an intelligent Voter Card as the voter interface. The interface allows voters to view and cast their votes by touching target areas on an electronically generated ballot pad. Each unit provides a direct-entry computerized voting station that automatically records and stores ballot information and results. While classified as a direct record entry (ORE) device, the AccuVote-TS system has additional capabilities. The tabulator is a multifunctional interface that counts and tabulates the ballots at precincts on election day and communicates with the host computer at Election Central for accurate and timely jurisdictionwide results. However, electronic voting systems have generated concern because their work is not readily accessible for inspection; what goes on behind the screen is a mystery to the general public and therefore causes uneasiness. With computer voting, voter records are intangibly stored on a hard drive, with voting results recorded in electronic memory. Indeed, a July 2003 analysis of the Diebold

touch screen by computer researchers from Johns Hopkins and Rice universities (found at <http://www.newscientist.com>) showed that the software was riddled with errors and open to fraud. However, even with the possibility of fraud, electronic 62 Chapter 2 Urheberrechtlich geschützt When setting up your computing workspace, make it a priority to choose a comfortable, ergonomically designed chair (see Figure 2A. 29). Your office chair should » » » Allow you to adjust its height. Provide good lower-back support. Have adjustable armrests. Your desk also should be well-suited to computer use, like the one shown in Figure 2A. 30. The desk should hold your keyboard and mouse at the proper height, so that your hands are at the same height as your elbows (or a few inches lower) when you hold them over the keyboard.

Here are some other tips that can help you avoid RSIs while working with your keyboard and mouse: » Use an Ergonomic Keyboard. Traditional, flat keyboards are not well-suited to the shape of human hands. An ergonomic keyboard allows you to hold your hands in a more natural position (with wrists straight, rather than angled outward) while typing (see Figure 2A. 31). » Use a Padded Wrist Support. If you type a lot, a wrist support can be helpful by allowing you to rest your hands comfortably when you are not actually typing. Remember; however, that FIGURE 2A. 29 An ergonomically designed computer chair and desk. FIGURE 2A. 30 A properly designed computer desk features a U-shaped keyboard tray to hold keyboard and mouse. systems may still be safer than prior methods of voting because they implement redundant security checks and audits and may be more difficult to tamper with because of the size and nature of their tabulating

components. Another argument in favor of paper ballots, or at least paper receipts, is that in order to verify an election, all you need to do is gather up the ballots and tabulate them a second (or third, as the case may be) time. However, auditing paper ballot systems is not always as easy as it sounds. Ballots, particularly punch-cards, sometimes provide ambiguous results, as seen in a recent presidential election. They are easily forged and they must be physically handled and transported, which provides the opportunity for substitution or loss.

Whether computerized or traditional, no election system is infallible, and in truth, perhaps it doesn't need to be. As some have said, every safe has the capability to be cracked. The same is true for voting systems. The issue is not whether they are 100 percent secure, but whether they present adequate safeguards to give us faith in the integrity of our elections.

Interacting with Your Computer 63 » » » » you should never rest your wrists on anything—even a comfortable wrist support—while you type. Use the support only when your fingers are not moving over the keyboard. Keep Your Wrists Straight. When typing, your hands should be in a straight line with your forearms, when viewed either from above or from the side (see Figure 2A. 32).

Keeping the wrists bent in either direction can cause muscle fatigue. Sit Up Straight. Avoid slouching as you type, and keep your feet flat on the floor in front of you. Avoid crossing your legs in front of you or under your chair for long periods. Learn to Type. You will use the keyboard more efficiently and naturally if you know how to type. If you "hunt and peek," you are more likely to slouch and keep your head down while looking at the keyboard. This





the way people use took. This study leads to better product designs and techniques that help people avoid injuries at work. » Ergonomically designed keyboards are available to help users prevent repetitive stress injuries to the wrists and hands. Key Terms :: alphanumeric key, 60 buffer, 54 carpal tunnel syndrome, 61 click, 57 cursor, 52 cursor-movement key, 52 double-clicking, 57 drag and drop, 57 drag-and-drop editing, 57 dragging, 57 ergonomics, 60 function key. 51 insertion point 52 integrated pointing device. 9 keyboard buffer, 54 keyboard controller, 53 keyboarding, 50 mechanical mouse, 55 modifier key, 50 numeric keypad, 51 optical mouse, 55 pointer, 54 pointing, 56 pointing device. 54 repeat rate, 54 repetitive stress injury (RSI), 61 right-clicking, 57 trackpad, 59 TrackPoint 60 wheel mouse, 57 Interacting with Your Computer 65 Urheberrechtlich geschützt | tLg\$g @ 8 0 Key Term Quiz : i Review Complete each statement by writing one of the terms listed under Key Terms in each blank. 1. In computer use, the skill of typing is often referred to as 2. IBM -compatible PCs have 10 or 12 \_\_\_\_\_ keys. . 3. In many programs, an on-screen symbol called a(n) \_\_\_\_\_ or a(n) \_\_\_\_\_ shows you where you are in a document 4.

A(n) is a temporary storage area that holds data until the CPU is ready for it. 5. In addition to pointing, the four primary mouse techniques are \_\_\_\_\_ and \_\_\_\_\_ 6. You use a mouse (or one of its variants) to position a(n) \_\_\_\_\_ 7. In many Windows applications, you can open a shortcut menu by \_\_\_\_\_ on the screen. \_\_\_\_\_ the mouse. 8. Many laptop computers feature a small joystick between the c and k keys, which is called a(n) \_\_\_\_\_ 9. is the study of the way people work with tools. 10. \_\_\_\_\_ is a common type of

repetitive stress injury among computer users. Multiple Choice is Circle the word or phrase that best completes each statement. 1.

Some people claim that when computers can interpret handwriting and speech with 100 percent accuracy, this will become unnecessary. a. mice a. special-purpose keys b. typing b. function keys c. pointing device c. typing keys ..... - - layout. d. special-purpose keys d. alphanumeric keys d. QWERTY d. iadsmce 2. These keys make up the part of the keyboard that looks like a typewriter's keys, 3. The common keyboard arrangement is called the a. QWERTY b. QEWTYR 4. Which of the following is not a modifier key? a. shift b. cm c. ait 5. In most programs, you can press this key to get help, a. csc a. keyboard a. C C S b. r l b. keyboard buffer b. f1 c . alt c . keyboard controller C. SM CEBAR d . no d. keyboard CPU d.

S O T U H RCT 6. When you press a key, this device notifies the system software, 7. In many Windows applications, you can use this key as an alternative to the right mouse button. c. QYWERT 66 Chapter 2 Urheberrechtlich geschütztes Material | 8. This type of mouse uses reflected light to measure its movements. c. mechanical a. optical b. laser 9. In a multi-button mouse, one button must be designated as the c. primary a. first b. left 10. You can\_\_ a. point to a program's icon to launch the program. b. double-click C. right-click button. d. user d. drag Review d. wheel Review

Questions :: In your own words, briefly answer the following questions. 1.

Host standard keyboards include five major groups of keys. List them. 2. Why are most standard keyboards called " QWERTY" keyboards? 3. What does the ctrl key do? 4. What is the purpose of the start key, which appears on many IBM-compatible keyboards? 5. What happens when you press a key

on the computer's keyboard? 6. What is the purpose of the mouse pointer? 7. How does a mechanical mouse work? 8. Describe two benefits of using a mouse. 9. What does the term dragging mean and how do you do it? 10. Describe the cause and effect of carpal tunnel syndrome. Lesson Labs :: Complete the following exercises as directed by your instructor. 1. Test your typing skills in Notepad.

Click the start button, point to All Programs, click Accessories, and then click Notepad to open the Notepad text-editing program. Notepad opens in a window. Have a classmate time you as you type a paragraph of text. The paragraph should be at least five lines long and should make sense. (For example, you could type a paragraph of text from any page in this book. ) Do not stop to correct mistakes; keep typing until you are finished typing the selection. 2. Inspect your system's mouse settings. (Do not change any settings without your instructor's permission. ) Use the following steps: a. Click the start button to open the Start menu; then click Control Panel.

The Control Panel window opens. b. Double-click the Mouse icon to open the Mouse Properties dialog box. Click the tabs in this dialog box and inspect your settings. c. Experiment with the Pointer Speed and Show Pointer Trails tools. How do they affect your mouse's performance. When you are finished, click Cancel Interacting with Your Computer 67 M U R B Overview: Options for Every Need and P referen c e Although the keyboard and the mouse are the input devices that people use most often, there are many other ways to input data into a computer. Sometimes the tool is simply a matter of choice. Some users just prefer the feel of a trackball over a mouse.

In many cases, however, an ordinary input device may not be the best choice. In a dusty factory or warehouse, for example, a standard keyboard or mouse can be damaged if it becomes clogged with dirt. Grocery checkout lines would slow down dramatically if cashiers had to manually input product codes and prices. In these environments, specialized input devices tolerate extreme conditions and reduce the risk of input errors. Alternative input devices are important parts of some specialpurpose computers. Tapping a handheld computer's screen with a pen is a much faster way to input commands than typing on a miniature keyboard. On the other hand, a specialized device can give new purpose to a standard system.

If you want to play action-packed games on your home PC, for example, you will have more fun if you use a joystick or game controller than a standard keyboard or mouse. This lesson examines several categories of alternative input devices and discusses the special uses of each. You may be surprised at how of