

Technology and Issues

- _____ **1** The Basics of Working in Windows 95
- _____ **2** Types of Storage Media and Storage Methods
- _____ **3** Proper Care of Hardware and Software
- _____ **4** Issues and Ethics

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After working through this chapter, you will be able to:

Work with Windows 95 desktop elements and windows, and manage your files and folders.

Understand the two major storage technologies in use today, and be able to select the appropriate media for your needs.

Understand what is dangerous to your computer, and know the preventive maintenance you should supply.

Recognize the legal and ethical issues about computing and information systems and be sufficiently knowledgeable to make your own informed ethical decisions.

OVERVIEW

There are two versions of Visual Basic in use today, versions 3 and 4. If you have version 4, you will need to use Windows 95 rather than Windows 3.1. Before you can program in Visual Basic version 4, you must be able to create, move, copy, rename, and delete files and folders using Windows 95. This appendix covers these procedures and other basics of working with Windows 95. If you own a computer or one day will purchase one, you also need to know how to choose the appropriate storage, and how to take care of your computer. This appendix describes the major types of storage and proper care. And, lastly, a computer user should be aware of the legal and ethical issues surrounding computing, because you will encounter them early on, and have to learn to deal with them. So, some of those major issues are discussed here.

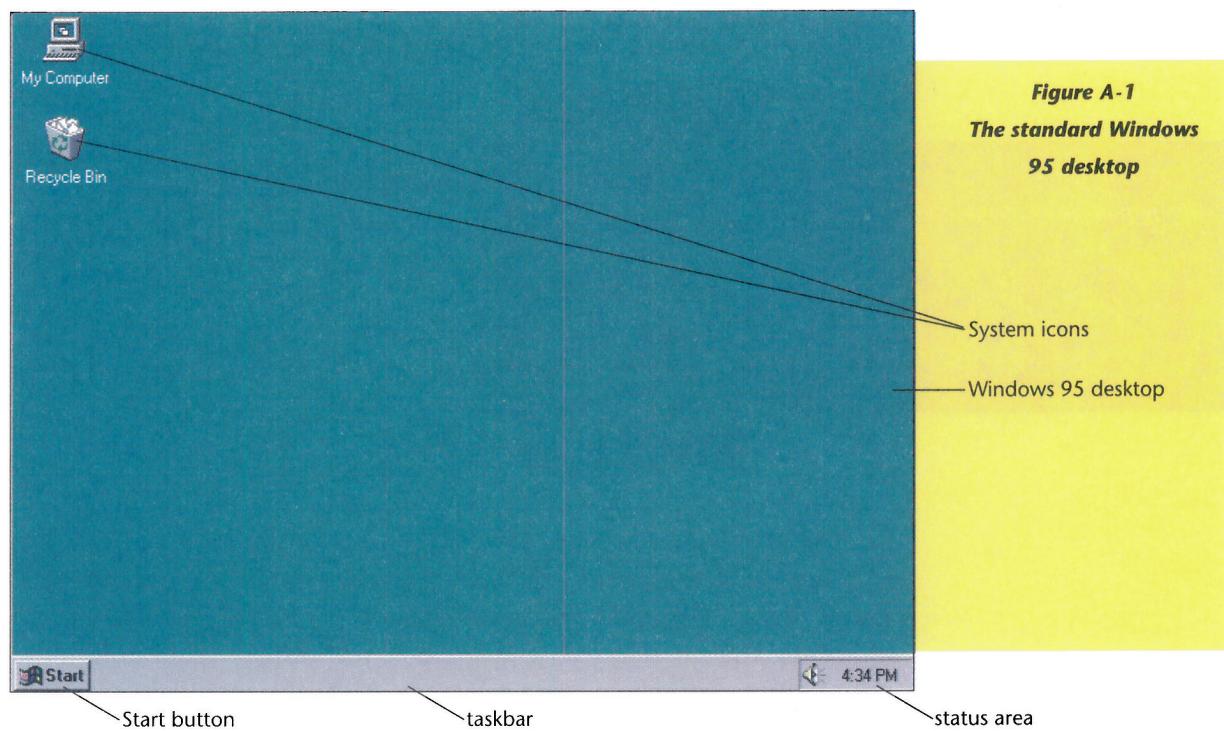
The Basics of Working in Windows 95

Windows 95 is Microsoft's upgrade to Windows 3.1, a graphical user interface (GUI) used to make communicating with the computer easier. Windows 95 represents a major step forward in computer design because it is now a 32-bit operating system as well as the graphical interface. If you are interested in comparing the two programs, review Chapter 1, Section 3.

In this section you will learn how to start a Windows 95 computer, understand the purpose of the desktop elements, use and control program and document windows, view and manage your information stored on the computer—folders and files—and run an application program.

Starting Windows 95 and Using the Desktop

When you start a Windows 95 computer, a title screen displays for a few moments and then Windows 95 is active on your screen and should resemble Figure A-1.

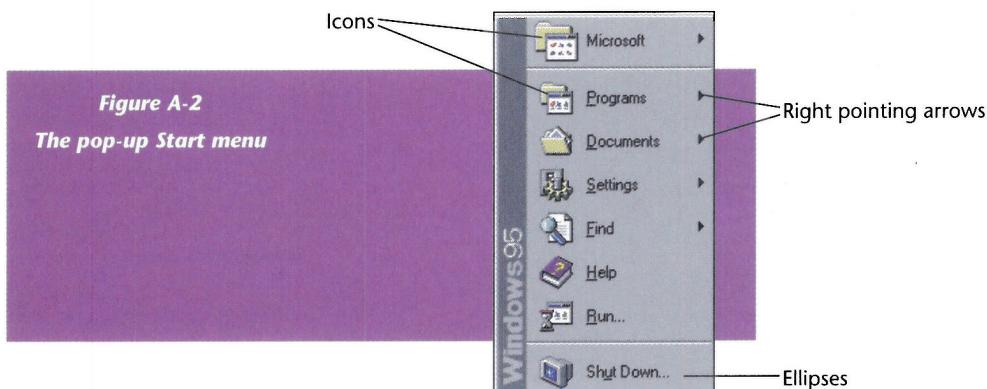


This screen is called the Windows 95 desktop, and is the background for all your computer work. Figure A-1 shows the standard Windows 95 setup with the taskbar at the bottom of the screen displaying the Start button on the far left and the status area on the far right. Two icons, graphical representations of objects that can be selected and opened, labeled My Computer and Recycle Bin are at the top left of the desktop. In general, you communicate with the computer using the mouse pointer to either click on icons such as these, or to make selections from menus and interact with dialog boxes.

Clicking the mouse means pressing and releasing the left mouse button. Double-clicking means rapidly pressing the left mouse button twice. Dragging the mouse means pressing and holding the left button and moving the mouse.

THE TASKBAR AND START MENU

The Start button on the left side of the taskbar is for displaying the selection of programs you can run. The status area on the right of the taskbar displays the current time, and can be used to change Date and Time values. When you click on the Start button, the pop-up Start menu appears as shown in Figure A-2.



The Start menu displays menu options showing their icons on the left, and the option name, followed by other symbols when applicable. For example, the menu option Shut Down is followed by ellipses (...) indicating that, if selected, a dialog box will display requesting more information concerning your selection. Also, the menu options Programs, Documents, Settings, and Find are followed by right pointing arrows indicating that, if selected, they will expand to show additional choices. Figure A-3 shows the series of menus and submenus that display when Programs, Accessories, and Notepad have been selected.

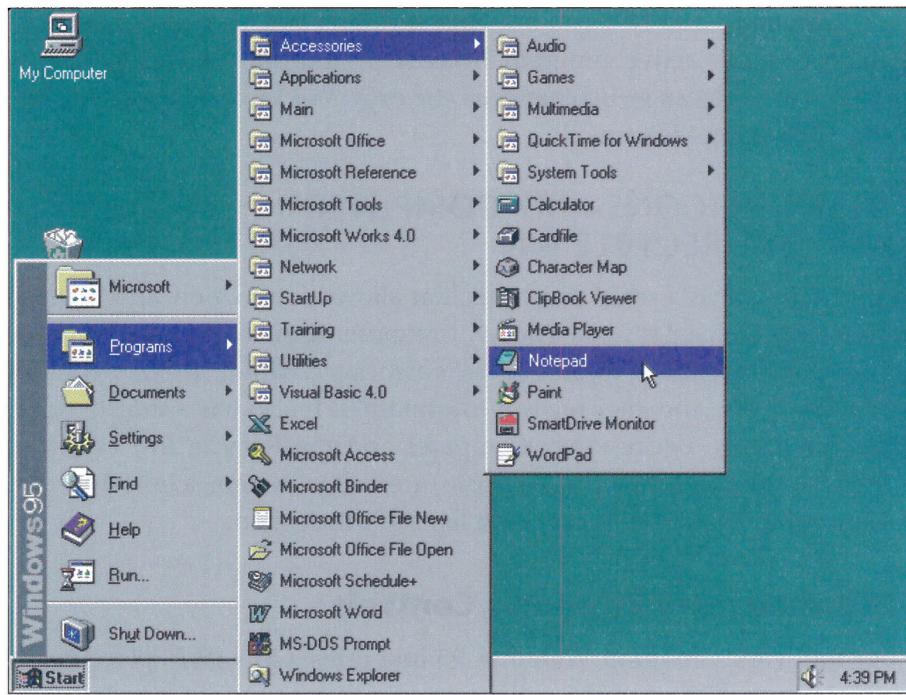


Figure A-3
The Start menu and submenus when Program, Accessories, and Notepad are selected

With Windows 95, several programs can be running at the same time, but only one can be active at a time. When programs are running, a button with their icon and name is displayed in the blank space on the taskbar as shown in Figure A-4.

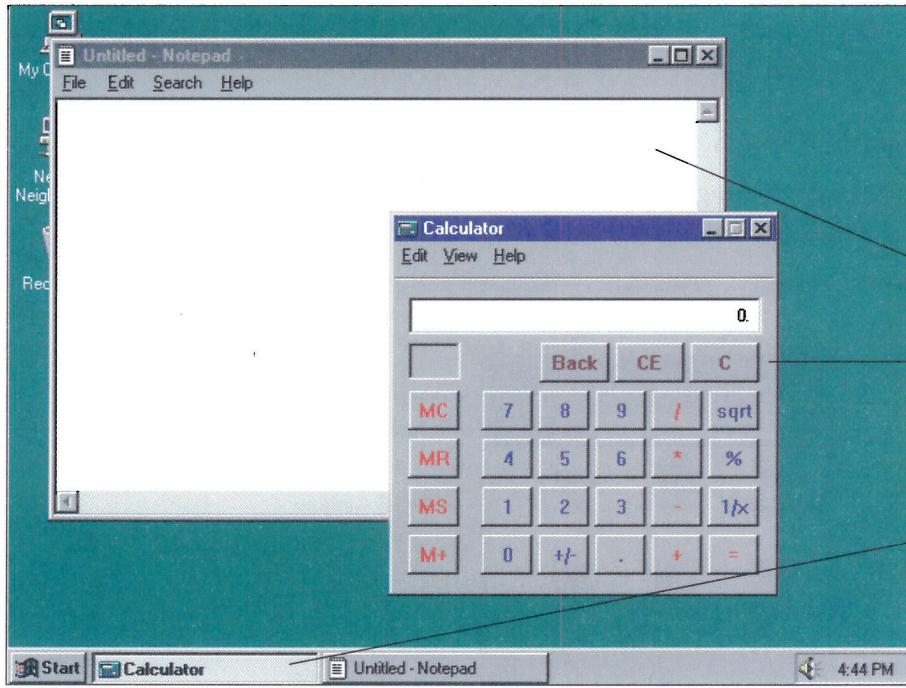


Figure A-4
Windows 95 desktop with two programs running

Calculator and Notepad are both running, and you know that Calculator is the active program because its button on the toolbar is depressed. You can switch between the programs by clicking on the buttons. Try doing that now.

DESKTOP ICONS—MY COMPUTER AND THE RECYCLE BIN

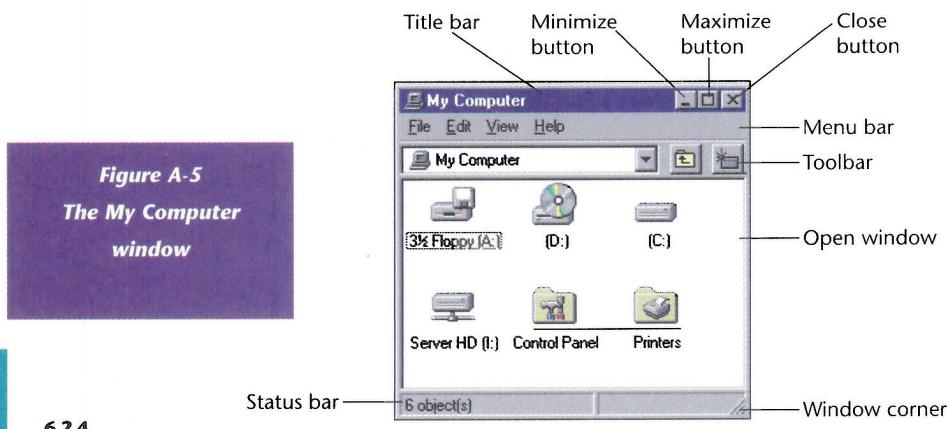
My Computer is a set of programs that allows you to view and manage your private, local system. The My Computer icon is a shortcut or quick way to activate the programs or tasks associated with it. The Recycle Bin lets you delete and later recover information. It also has a shortcut icon for fast access. Because My Computer and the Recycle Bin help you manage your computer, their icons are called system icons. You will learn more about the Recycle Bin later in this section.

Windows and Windows Controls

All the work you do in Windows 95 and other GUIs takes place inside of windows. For example, when you run a program, its windows are open, when you write a letter the document window is open, and when you write a Visual Basic program, various windows are open. Because windows are your interface with the computer, you must be familiar with their standard elements, and know how to use them. Windows are not static on your monitor's screen. You can make them bigger and smaller, and drag them around on your desktop, so you will learn how to do that too.

ELEMENTS OF WINDOWS

Double-clicking the My Computer icon opens its window, so you can have access to its contents as shown in Figure A-5.



At the top of the window is the title bar showing the name of the program or document that is open, in this case, My Computer. Windows are like programs, in that several can be open at the same time, but only one window can be active at any given time. A window is active—ready to accept your input from the mouse or keyboard—when its title bar is dark. Any other open windows on the desktop will have dimmed title bars, indicating that they are inactive—temporarily out of use. You make an inactive window active by clicking anywhere in the window.

On the right side of the title bar are buttons that allow you to minimize, maximize, and close the window. You use these buttons to accomplish the following tasks:

- ➊ To keep the program running, but reduce its window to a button on the taskbar, click the Minimize button.
- ➋ To expand the window to fill the entire screen, click the Maximize button.
- ➌ To stop running the program and remove it from the desktop, click the Close button.

The menu bar is immediately below the title bar. Clicking a menu name displays a drop-down menu giving you access to commands that will execute a particular process or action, such as those in the Edit menu in Figure A-6.

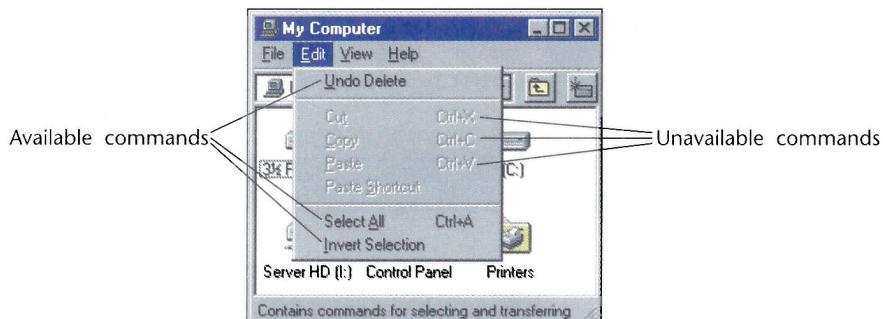


Figure A-6
The Edit drop-down menu

Menu commands are not all available in every context. When they are available, the commands are dark, like the Undo Delete, Select All and Invert Selection commands in Figure A-6, and unavailable menu commands are dimmed, like the Cut, Copy, Paste, and Paste Special commands.

The toolbar is located just below the menu bar. It is composed of shortcut icons or buttons to activate many of the commands found on the drop-down menus. To use the toolbar buttons, just double-click on their icons.

The large, white background area just below the toolbar is the actual open window where your work is done. On the window in Figure A-5, four Drive icons are displayed as well as two folders.

The bottom frame of the window is the status bar. Messages such as the number of objects displayed, as shown in Figure A-5, or the meaning of a command, appear on the status bar. This information can be very helpful in understanding how Windows 95 works, so remember to check it as you do your work. The right side of the status bar is called the window corner, and is a convenient place to size the window.

SIZING AND MOVING WINDOWS

To resize a window, position the mouse pointer over an edge or window corner. When the pointer changes into a horizontal, double-headed arrow as in Figure A-7, press and hold down the left mouse button, and drag the window's outer line as shown in Figure A-8 until it is the size you want; then release the mouse button.

Figure A-7
Window ready to
be sized

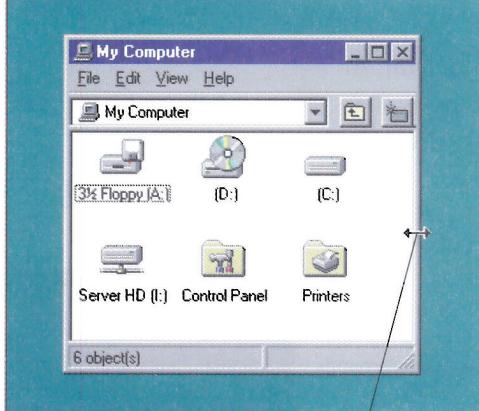
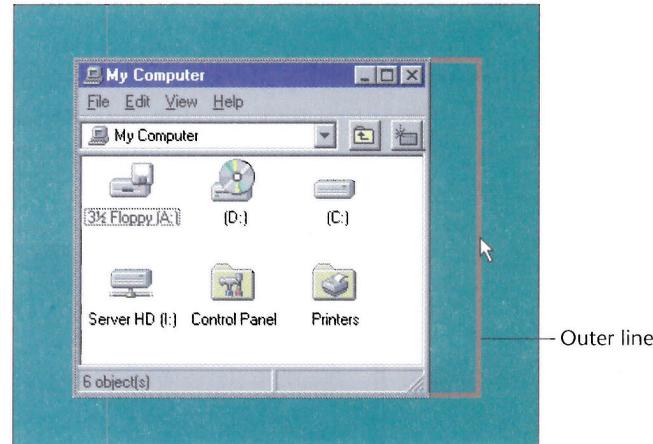
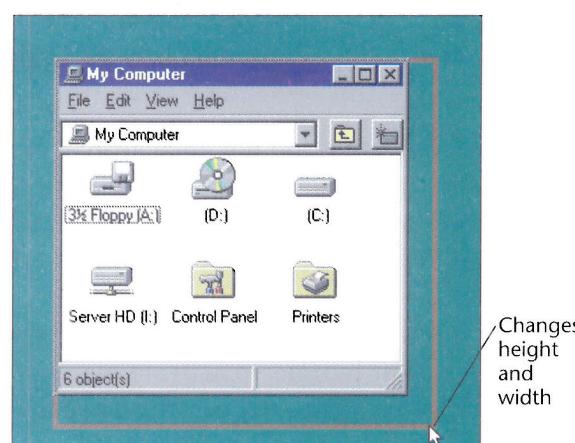


Figure A-8
Dragging the border of
a window



Dragging a corner rather than an edge allows you to change the height and width of the window at the same time as shown in Figure A-9; dragging an edge changes only one dimension or the other.

Figure A-9
Dragging the corner
of a window



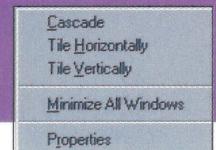
Often you will need to move a window out of the way in order to see your work. To move a window, just click on and drag the title bar of the window to the desired location.

There will be occasions when you need to see information from several windows at the same time. You can position and size individual windows using the techniques you just learned, but it is faster to use the arrangement commands built into Windows 95: cascade, tile horizontal, and tile vertical. To use these commands, point to an empty part of the desktop taskbar and click the right mouse button. The taskbar shortcut menu as shown in Figure A-10 is displayed.

Then select Cascade, Tile Horizontally, or Tile Vertically to show the different arrangements. Go ahead and open the Control Panel, and try the three arrangements now.

Figure A-10
The taskbar shortcut

menu



Exploring Folders and Files

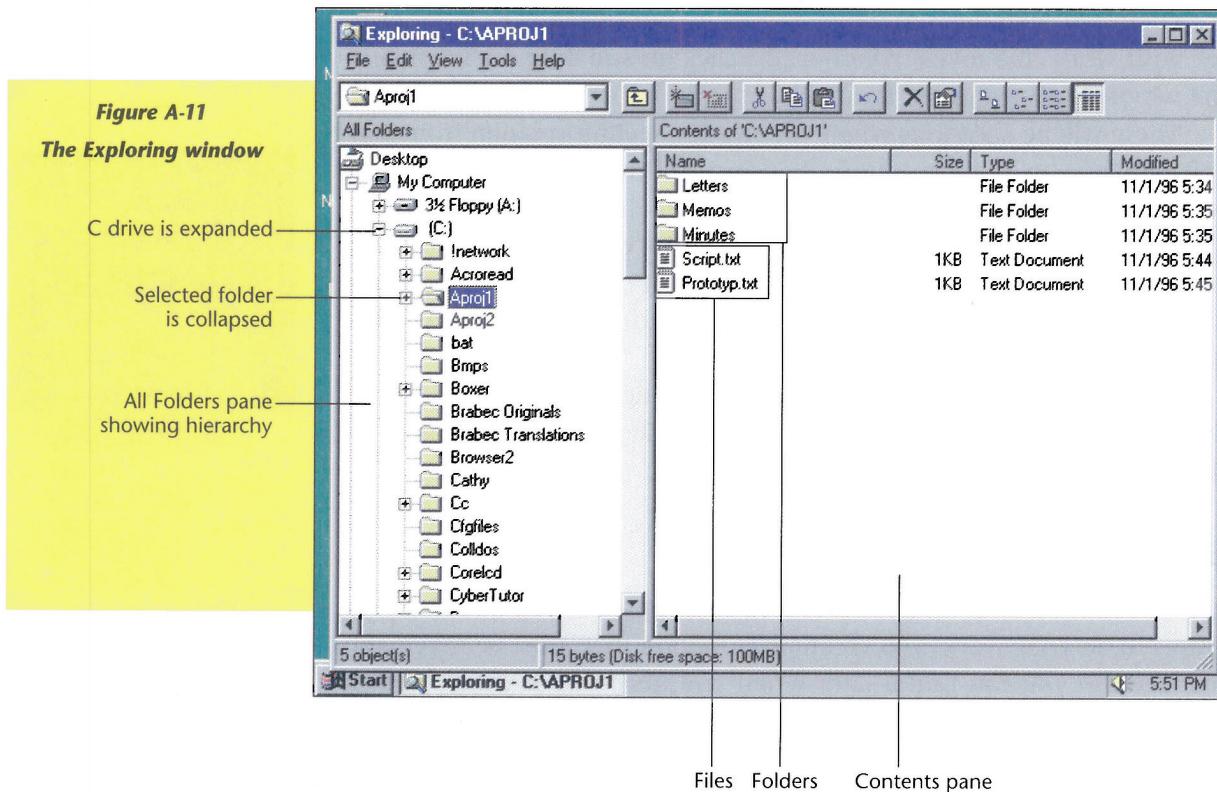
Information is the computer's most important product. As you use programs to do your work, you create information that must be saved and managed so you can find it later when you need it. For example, you create documents with word processing programs and you create programs with Visual Basic, and most likely you will use them again and again. Windows 95 provides a tool, the Windows Explorer, for you to use to view and manage this information.

WINDOWS EXPLORER

To start the Windows Explorer, click the Start button, click Programs, then click on Windows Explorer. The program opens and displays its Exploring window as shown in Figure A-11 on the next page.

Like the other windows you've seen, the Exploring window has the standard title, menu, toolbar, and status bars. However, to facilitate viewing both the storage structure and the actual units of information, this window is divided into two panes called All Folders and Contents.

Folders are the computer's containers that store other folders and documents of various types. You use folders to organize the information, so it is easier to find. The left pane of the Exploring window, All Folders, shows a tree or outline of icons and folders that represent the hierarchical organization of storage media, such as hard and floppy disks. A plus sign (+) next to a folder or icon indicates that it contains more folders (subfolders) and it can be expanded to show them. A minus sign (-) indicates that it is already expanded and it can be collapsed to hide the subfolders that are currently visible in this pane. For example, in Figure A-11, the C: drive is expanded, all its subfolders are



visible, and the Aproj1 folder is collapsed. Just click the plus or minus symbols to expand or collapse the structure.

Files are the computer's name for the individual units of information that you will create, such as programs and documents. The right pane of the Exploring window, Contents, shows the subfolders and files of the object selected in the All Folders pane. For example, in Figure A-11, the selected folder Aproj1 contains three folders, Letters, Memos, and Minutes and two files, Script.txt and Prototyp.txt.

The Contents pane is currently displayed in Detail mode, but you can customize the mode with the View menu commands: Large icons, Small icons, List, and Detail. Go ahead and experiment with that now.

WORKING WITH FOLDERS

A newly formatted disk does not contain any folders. Without folders for organization, finding the files you want would be hard to do. To create a new folder, you must:

- Identify the location desired for the new folder, for example the desktop, the C: drive, the 3½ Floppy A: drive, or another folder.

- ① Select New then Folder from the File menu.
- ② Give the new folder a name.

The folders and files used for this exercise are on your Template Disk, so to do this exercise, insert the disk and click on its drive designator A: or B:.

To create a new folder within the Aproj1 folder,

- 1 Open the Windows Explorer if it is not already open.
- 2 Click the Aproj1 folder in the All Folders pane to identify where you want the new folder to be placed.
- 3 From the File menu select the New command and the Folder option as shown in Figure A-12.

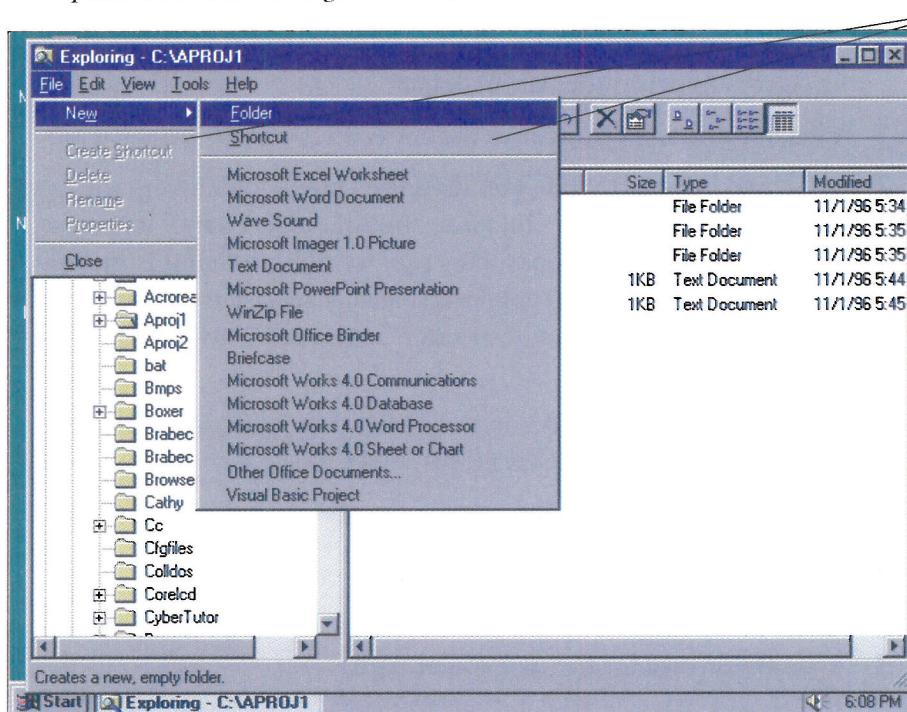


Figure A-12

Creating a new folder

Contents of 'C:\APROJ1'			
Name	Size	Type	Modified
Letters		File Folder	11/1/96 5:34
Memos		File Folder	11/1/96 5:35
Minutes		File Folder	11/1/96 5:35
Script.txt	1KB	Text Document	11/1/96 5:44
Prototyp.txt	1KB	Text Document	11/1/96 5:45
New Folder		File Folder	11/1/96 6:09

Figure A-13

Naming a new folder

- 4 The new folder appears in the Contents pane and is highlighted so you can give it a name as shown in Figure A-13.
- 5 Now type the name **Misc** for the new folder.

Type new name here

After creating folders, you can move, copy, rename, or delete, them. Folder manipulation commands affect not only the folder itself, but also all the files and subfolders it contains.

To move the subfolder called Letters in the Aproj1 folder to the Aproj2 folder,

- 1 Click on the Aproj1 folder in the All Folders pane.
- 2 Click and drag the Letters folder from the Contents pane to the Aproj2 folder in the All Folders pane. When the Aproj2 folder is selected, release the mouse button. Check to verify that the Letters folder is no longer in the Aproj1 folder.
- 3 Click on the Aproj2 folder in the All Folders pane to see that the Letters folder was moved.

To copy, rather than move, the subfolder called Letters that is now in the Aproj2 folder to the Aproj1 folder,

- 1 Click on the Aproj2 folder in the All Folders pane.
- 2 Press and hold Ctrl while you drag the Letters folder from the Contents pane to the Aproj1 folder in the All Folders pane. As you drag, the pointer develops a plus sign to indicate that it is in copy mode. When the Aproj1 folder is selected, release the mouse button. Check to see that the Letters folder is still in the Aproj2 folder.
- 3 Click on the Aproj1 folder in the All Folders pane to see that a copy of the Letters folder is in this folder too.

To rename the Misc folder,

- 1 Click on the Misc folder.
- 2 Select Rename from the File menu.
- 3 Type **Otherdoc** for the new folder name.

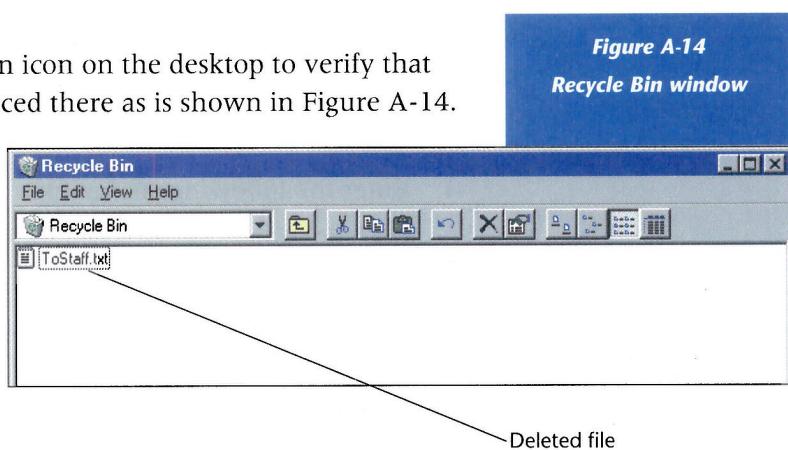
When you delete a folder from the C: drive, Windows 95 removes the folder and its files from its original location and places the files in a holding area called the Recycle Bin on the desktop. At this point you can remove objects permanently from storage or change your mind and restore them to their original locations.

To delete the Memos folder that holds one file, ToStaff.txt, from the Aproj1 folder,

- 1 Click on the Aproj1 folder in the All Folders pane.
- 2 Click on the Memos folder in the Contents pane.

- 3** Press Delete and answer Yes to the dialog box query "Are you sure you want to remove the folder 'Memos' and move all its contents to the Recycle Bin?"
- 4** Double-click on the Recycle Bin icon on the desktop to verify that the file ToStaff.txt has been placed there as is shown in Figure A-14.

Now you can erase the file permanently or restore the file and folder to their original location. To do so, click on the file, ToStaff.txt. Then open the File menu and make your selection. Then close the Recycle Bin.



WORKING WITH FILES

You move, copy, rename, and delete files in much the same way that you do with folders. But first you must create a file, and you do that with application programs.

Running an Application

Running a program from Windows 95 is easy. To experiment, you will work with Notepad, a small program provided with Windows 95 that allows you to create and edit unformatted text. Program code is unformatted text similar to what you will enter here, and Notepad's editing commands are similar to those you will use when you are entering or editing text in Visual Basic.

To start Notepad,

- 1** Click on the taskbar's Start button.
- 2** Click on Programs then Accessories from the submenu.
- 3** Click on Notepad.

The Notepad window opens as shown in Figure A-15.

The Notepad window has title, menu, and status bars, like the other windows you

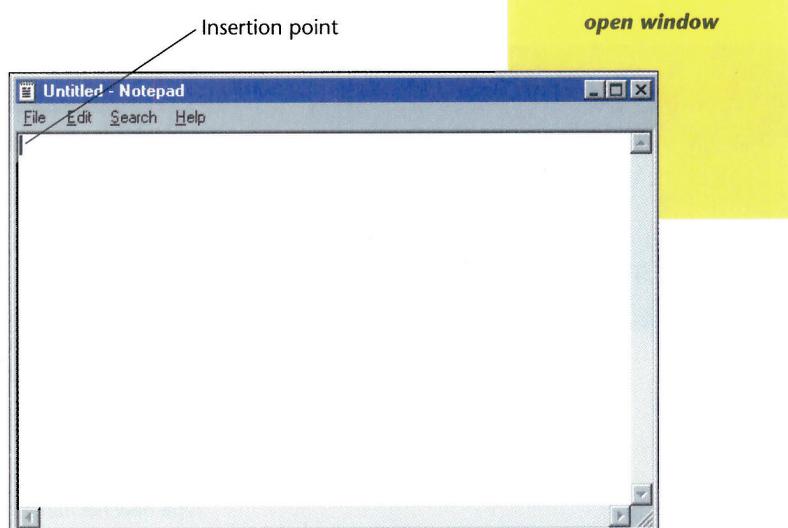


Figure A-15
The Notepad
open window

have seen, but because it is such a small program it does not provide the toolbar feature.

NAVIGATING IN A TEXT FILE

The insertion point (blinking vertical line) in the document window shows where the next text you type will appear.

- 1 Enter the following paragraph.

The Notepad is a simple text editor. One major difference between a text editor and word processor is "word wrap." In a word processor, when the typist reaches the end of a line, the words automatically appear on the next line. To switch to the next line in a text editor, the Enter key must be pressed.

- 2 Select Word Wrap from the Edit menu and observe what happens.

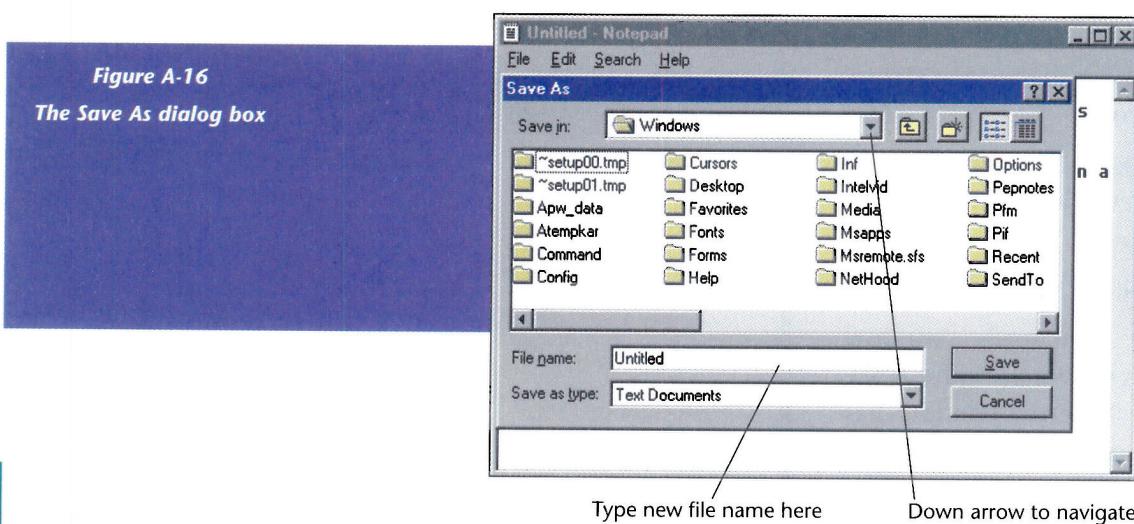
Editing text works exactly the same as it does with Notepad in Windows 3.1. So if you need to review how to do it, follow the directions on pages 20–23 down to the heading "Saving a File." Then return here to finish. The Clipboard in Windows 95 is viewed by selecting the Start button, then Accessories, then Clipboard Viewer.

SAVING A FILE

To keep the text you have typed in the Notepad window, you must save it as a file. To save the information,

- 1 Select Save As from the File menu.

The Save As dialog box opens, as shown in Figure A-16.



- 2** Navigate to the Aproj1 folder by clicking the Save in: down arrow and scrolling up or down until you find it. Then double-click on Aproj1.
- 3** Double-click in the File name: text box and type the name **Sample**, then press Save.

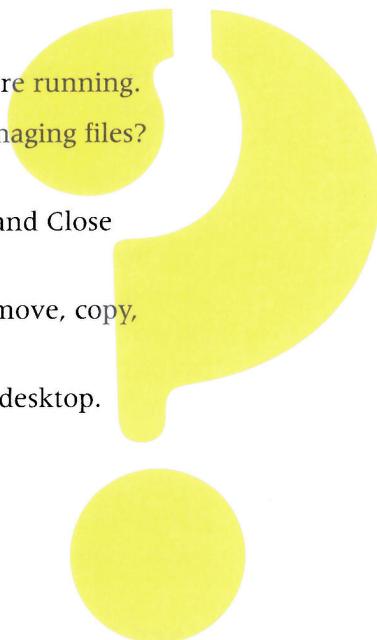
MOVING, COPYING, RENAMING, AND DELETING A FILE

Open Windows Explorer again and experiment with moving, copying, renaming, and deleting the Sample file you just created. Follow the same instructions as you used for folders.

Move file	Drag file to a new folder
Copy file	Hold Ctrl and drag file to a new folder
Rename file	Click on file and select File, Rename, and type the new name
Delete file	Click and press Delete

QUESTIONS

1. Describe how you switch between programs that are running.
2. What is the tool that Windows 95 provides for managing files? What are its various parts and their uses?
3. Describe the purpose of the Minimize, Maximize, and Close buttons on the window's Title bar.
4. How do you make a new folder, and how do you move, copy, rename, and delete folders and files?
5. Describe how to resize and move windows on the desktop.



2*Section*

Types of Storage Media and Storage Methods

Two main technologies are used to store data today: magnetic and optical storage. The primary types of magnetic storage are floppy disks, hard disks, magnetic tape, and cartridge drives. The primary types of optical storage are CD-ROM and CD-ROM Recordable. In this section, we will review these major types of storage and their uses.

Magnetic Disks-Floppy Drives

Most microcomputers of the early 1970s stored programs and data on tapes in cassette tape recorders. Every computer had one, and the circuitry to transform the 0s and 1s of computer data into sounds suitable for recording was simple and inexpensive.

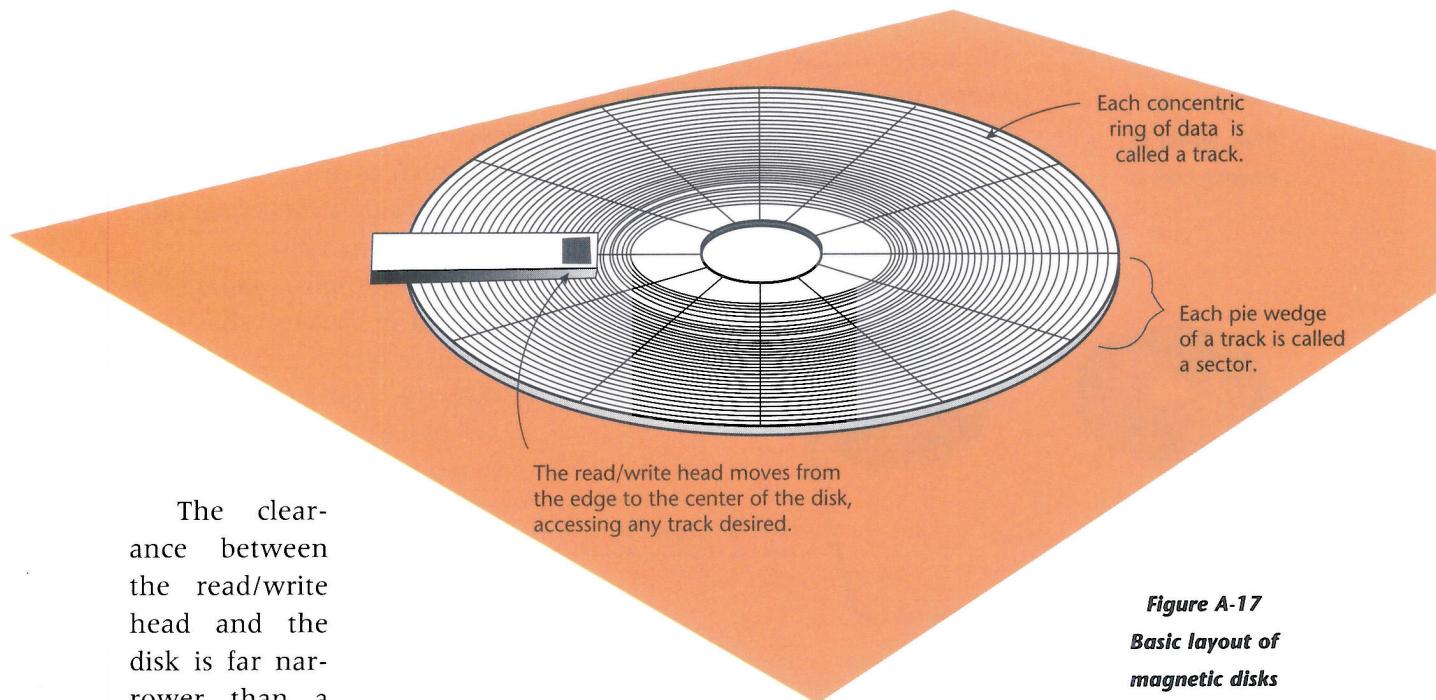
Unfortunately, loading and storing information took a long time, and was prone to failure. Those who could afford it added a floppy drive to their systems. A floppy disk, the storage media of a floppy drive, is a plastic disk coated with the same magnetically sensitive material found on a cassette tape. Data is stored by aligning magnetic fields on the material in different directions. One direction represents 1s, and the other direction, 0s.

Disks are more efficient than tapes because they are direct-access devices. That is, the computer can directly access any part of the disk immediately to read or write information, rather than having to run past previous material (see Tape Drives below) before arriving at the desired information. Disks store information in a set of concentric ring patterns, called tracks, which are divided like pie wedges into sectors. As the disk spins in the drive, the drive's read/write head can move directly to any sector to read or write data.

The standard floppy drive today is 3.5" in diameter and holds 1.44 megabytes (MB) of data or programs. It still uses the same magnetic principles of data storage used by the first floppy drives. Now, virtually every computer comes with one of these drives.

Hard Drives

In addition to the floppy drive, every computer sold today comes with a hard drive. A hard drive uses a rigid magnetic disk to store data and programs in the same way that a floppy disk does, with concentric tracks divided into sectors. A rigid disk can store much more data than a floppy disk can because its magnetic material is much denser.



The clearance between the read/write head and the disk is far narrower than a single strand of hair, a particle

of dust, or even a fingerprint. Hard drives are assembled in rooms far cleaner than hospital operating rooms. If it was exposed to a normal atmosphere, the disk assembly would be contaminated with dust and other air particles.

Today, typical hard drives hold 1 to 4 gigabytes (GB) of programs and data. A drive of this size could store all the information contained in a set of encyclopedias, including text, pictures, and sounds, several times over.

Figure A-17
Basic layout of
magnetic disks

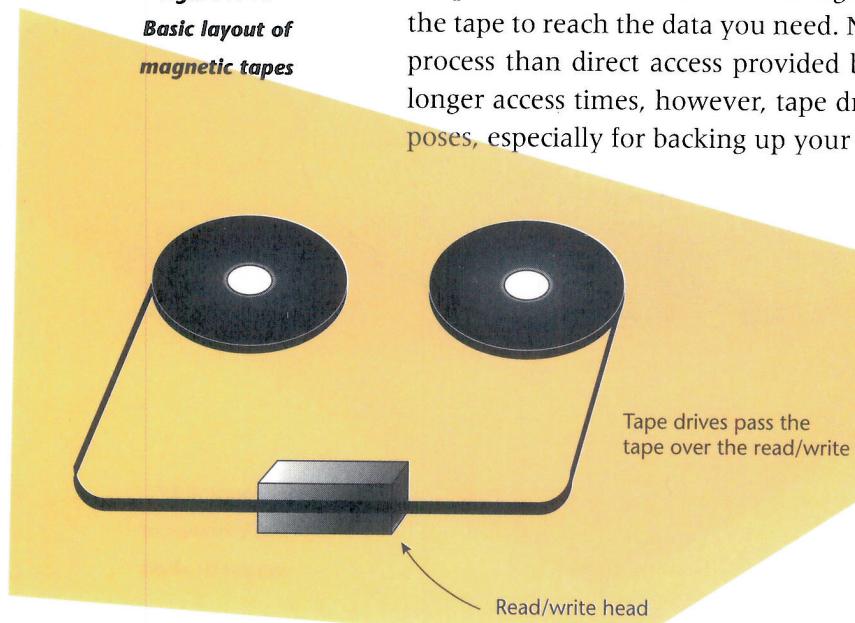
Cartridge Drives

Cartridge drives attempt to combine the speed and capacity of a hard disk with the portability of a floppy disk. There are many different types of devices in this category. Currently, the most common are SyQuest and Zip drives. Most work similarly to a floppy disk, with a disk in a plastic case that is inserted into and removed from the drive. Typical storage capacities range all the way from 44 MB to 1 GB of data.

Tape Drives

Tape was one of the first widely used media for mass storage. The media itself is a long strip of plastic coated with magnetic material, so the tape drive has to write data on it sequentially—one character after another.

Figure A-18
Basic layout of
magnetic tapes



This means that when you want to access a specific set of information on a tape, the drive has to scan through all the data from the beginning of the tape to reach the data you need. Needless to say, this is a much slower process than direct access provided by media such as disks. Despite the longer access times, however, tape drives are well suited for certain purposes, especially for backing up your system's entire hard disk.

Today, most tapes are housed in cassettes that contain two reels for transporting the tape, and look similar to an audio cassette. The tapes come in various sizes and capacities ranging from 40 MB to 40 GB. There are three common formats used in tape drives for personal computers: quarter-inch cartridge (QIC), which uses tape one-quarter-inch wide and stores

anywhere from 40 MB to 8 GB, depending on the cartridge; 8mm digital audio tape (DAT), which stores anywhere from 1 GB to 8 GB; and half-inch digital linear tape (DLT), which stores up to 40 GB.

Optical Disks—CD-ROM

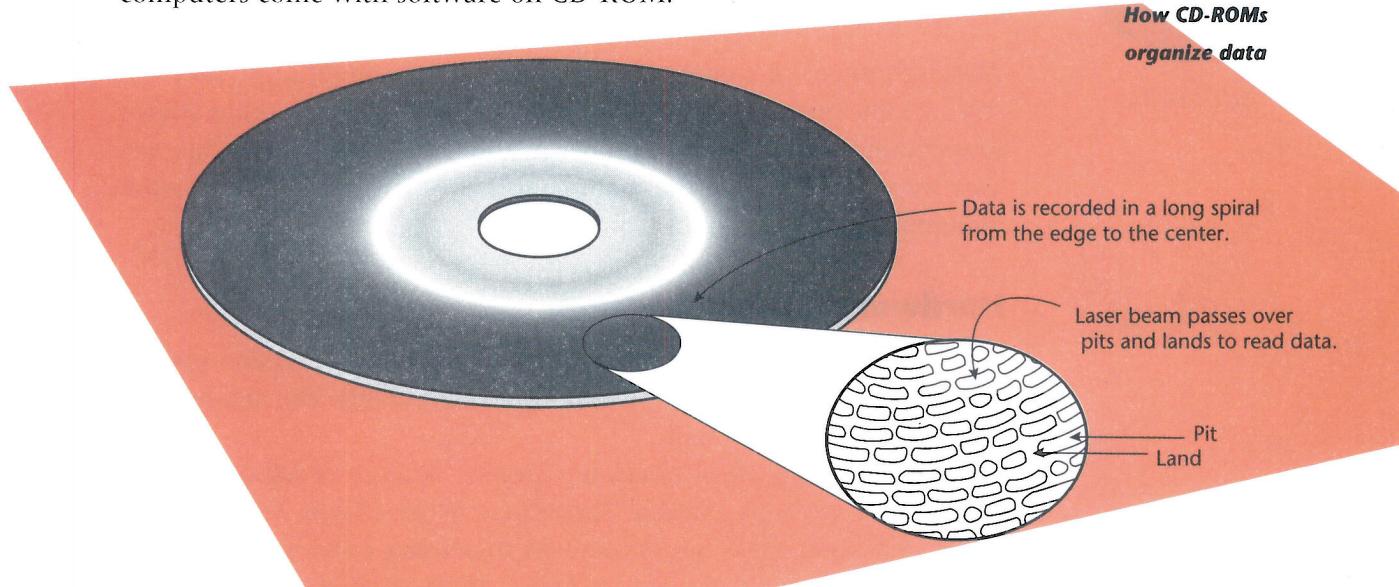
CD stands for compact disk. ROM stands for read-only memory. Today, a CD-ROM is a common piece of computer equipment. It holds a great deal of data (650 MB) and the storage media, the disk, is removable, portable, and inexpensive.

Like your compact disk player, a CD-ROM uses a laser to read the data from a CD. Data is recorded as a series of 0s and 1s by burning pits into the reflective surface of the disk. The data is stored in a long spiral, as on a vinyl record, in a series of pits (nonreflective spots) and lands (reflective spots). When the laser shines on a pit, the light is scattered. When the laser shines on the land, the light is reflected to a sensor. The pattern of pits and lands thus makes a flashing pattern of reflected laser light that duplicates the pattern of 1s and 0s in the original data.

CD-ROMs can store music, pictures, videos, and text. Once a master is made, copies can be manufactured for about one dollar each. This large storage capacity and low duplication cost, makes the CD-ROM an excellent choice for distributing programs and data. An additional advantage is that the disks last a very long time, with minimal care,

making it easy to restore programs if needed. Today, therefore, many computers come with software on CD-ROM.

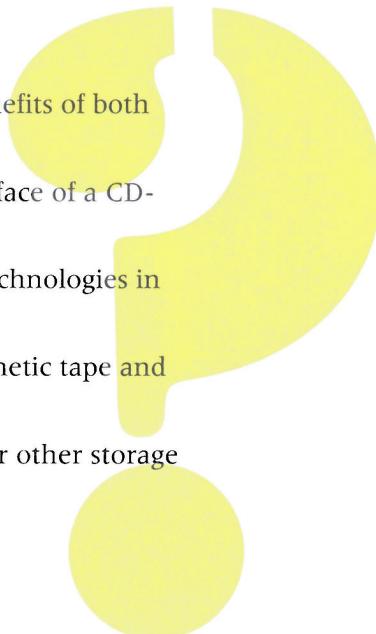
Figure A-19
How CD-ROMs
organize data



CD-ROM Recordable (CD-ROM-R) is a newer technology that allows users to create their own CDs. This is a dream come true for users who need to *archive* (store for long-term access) large amounts of data. For example, NASA uses CD-ROM-R to store images and data from space missions. CD-ROM-R uses a laser to burn away a dye on the surface of the disk, revealing a reflective layer of gold beneath the dye. CD-ROM-R disks can be read in any CD-ROM drive.

QUESTIONS

1. Describe how a removable hard disk offers the benefits of both diskettes and hard disks.
2. Describe the functions of lands and pits on the surface of a CD-ROM.
3. Name and describe briefly the two main storage technologies in use today.
4. For what purpose would you choose to use a magnetic tape and why?
5. What is the biggest advantage of the CD-ROM over other storage devices?



3

Section

Proper Care of Hardware and Software

Although prices of computers have gone down significantly, they are still a sizable investment. Just like your automobile or any other sizable investment, computers need proper maintenance and care. In this section we will investigate the main concerns of hardware and software maintenance.

Hardware Concerns—Heat

Is it true that you can pop microwavable popcorn on a Pentium processor? Probably not, but don't touch a microchip while the computer is on—it's hot enough to hurt.

Heat is the enemy of electronic circuits. When a circuit gets hot, it runs slower or stops running altogether. As processors have become larger and faster, heat has become an increasing problem in personal computers. To make processors faster, their components are made smaller and smaller, and they are placed closer together. Since all the components give off heat, and since there are more of them packed closer together, the more powerful microprocessors become, the more heat they generate.

Heat is removed from computers with air vents, fans, and heat sinks that dissipate heat by exposing it to a lot of air. Since the movement of air to remove heat is so important, never install a computer where it cannot "breathe," and make sure the air vents in the case are free of obstruction and clean.

You may need to add a fan (or a second fan) to your computer. Fans that fit directly on the processor are available, as are fans that are built into a board that you insert into an expansion slot.

Hardware Concerns—Dust

Excess heat can be caused by too much dust in a computer. Computers run on and on, sometimes for years. All that time, fans are moving air through the case. Along with all that air comes a lot of dust. It packs in around the components of circuit boards like a blanket, making it impossible for excess heat to dissipate.

Dust also damages the electrical contacts that make a keyboard work. Keyboards are also susceptible to damage from hair or spilled drinks.

The preventive maintenance for these types of problems is to vacuum the inside and outside of your computer periodically. Pay special

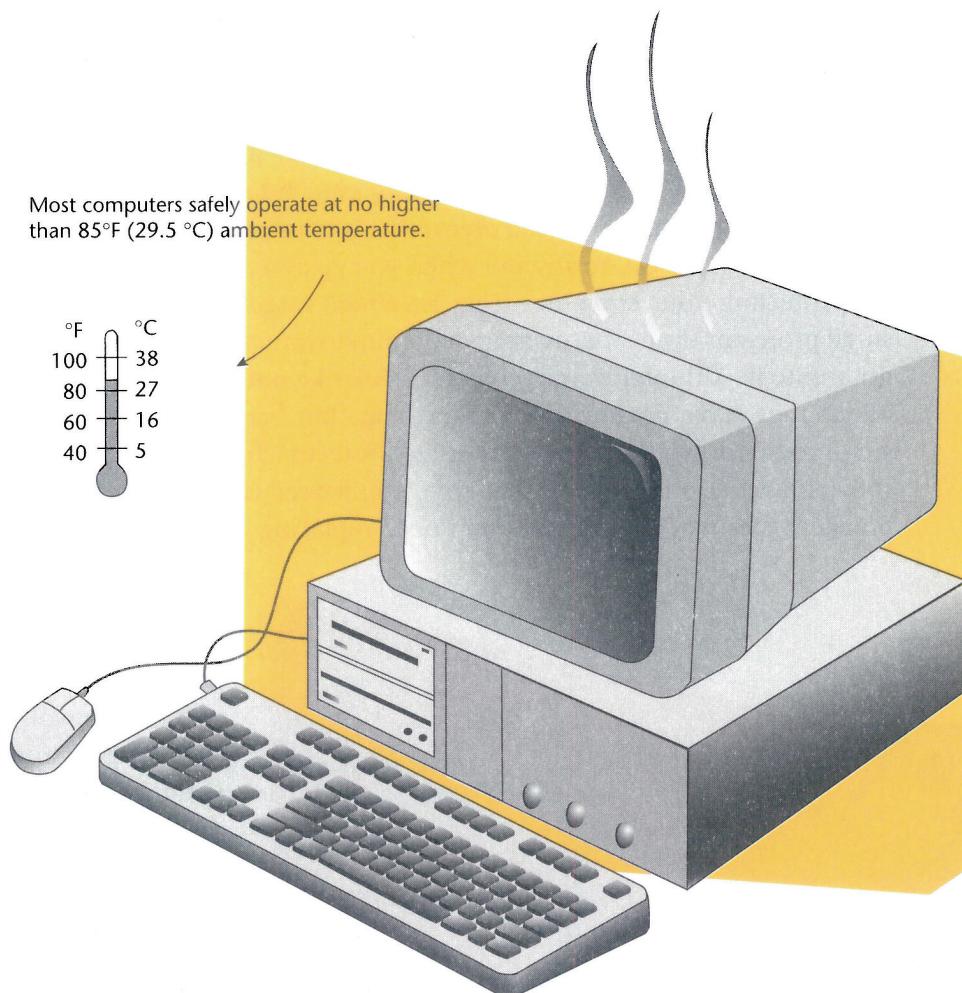


Figure A-20
Proper ventilation helps prevent heat problems.

attention to the air vents, which are often clogged with dust. Your computer store can sell you a vacuum designed for computers, but a normal vacuum with a dusting attachment works fine. Be very careful when vacuuming around components; any impact can damage the circuits. If you're at all unsure of how to vacuum it, or if your computer's warranty would be voided by opening the case, bring your computer to a service center to have the inside cleaned.

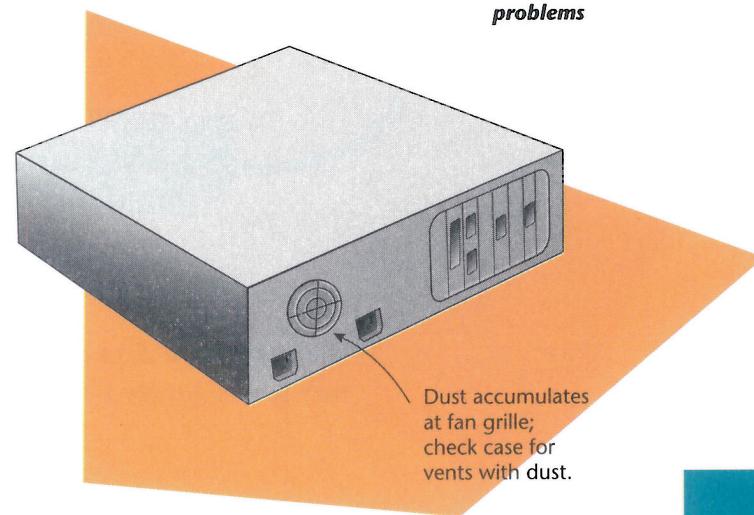


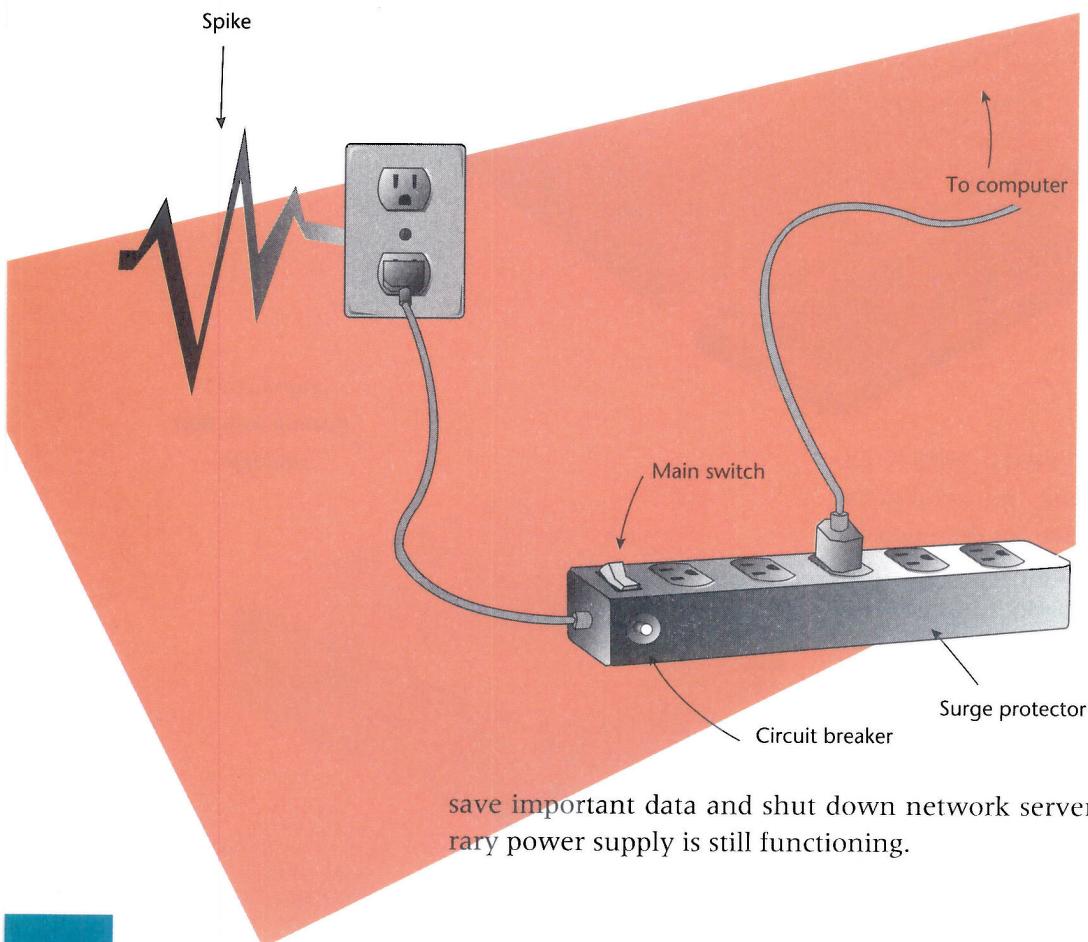
Figure A-21
Dealing with dust problems

Hardware Concerns—Voltage

Voltage spikes, where the line voltage coming into your house jumps to several hundred volts, are real and happen often enough to be a serious concern. When lightning hits a transformer on a telephone pole, a momentary surge of power can come into your house, and can destroy unprotected equipment. A good precaution is to unplug electronic equipment during electrical storms and when you go away on a vacation.

Protecting your computer from a voltage surge is easy. Just buy a surge protector from a hardware or computer store, and plug your computer into it. Although surge protectors look like normal power strips or plugs, they have circuitry built into them that breaks the circuit if a surge comes down the line. Some surge protectors burn out on the first spike, however; so if yours is that type, you'll need to replace it. Circuit-breaker types work better and don't need replacing.

Figure A-22
A surge protector
protects your computer
from voltage spikes.



An Uninterruptable Power Supply (UPS) protects a computer from voltage surges and voltage drops. Additionally, it can provide temporary power if the main power supply goes out. Because network servers that are shut down unexpectedly can lose important data, many network installations are protected with a UPS. Some UPSs automatically

Hardware Concerns—Physical Damage

Since an ordinary pencil stuck into a drive might cost you \$100 to fix, your computer should be protected from children, animals, and yourself. For example, don't balance your computer on a makeshift table or on the very edge of a desk. Most computers probably wouldn't survive a three-foot drop.

A laptop is not a briefcase, so don't toss it in the back seat of a car or under a chair. These types of jolts can cause mechanical parts to be knocked out of alignment or circuits to break.

For the same reason, computers should not be transported upside down or subjected to sharp bumps. Both boards and chips can be knocked loose from their connections.

Here are a few other practical precautions: don't roll your mouse through crumbs or liquids, keep your screen clean, and place the power cord where no one can trip over it.

Because loose connections are so commonplace, if something isn't working, the first thing to do is to check the connections. Check cable connections, and check to see that add-on boards are properly seated in their slots. Don't force anything, however, and don't run your computer with the cover off.

Protecting Software

Do you like to sharpen pencils with an electric pencil sharpener? Pencil sharpeners are likely to be found on or near desks. They have electric motors and like any electric motor, they work by creating a magnetic field. Magnetic fields can erase data on disks or tapes stored next to them.

For this reason, don't store your floppy disks where they might be exposed to a magnetic field. Besides pencil sharpeners, fans and speakers also produce magnetic fields. Speakers produced for computer use are shielded, but regular audio speakers can produce a magnetic field strong enough to damage data on disks. Television sets also generate strong magnetic fields.

Floppy disks, especially those containing your application software, should be stored in boxes away from any equipment that uses electricity or magnetism.

Backing up Software

"The dog ate my homework" has never been a believable excuse for not having finished homework. Far more likely today is: "My computer lost the file." Too many computer users assume that computer disasters happen only to others. In fact, all computer data is in peril.

Backing up your data is one important line of defense. “Backing up” means to make an additional copy of important files and store those copies in a safe place. Most computers have hundreds of megabytes of programs and files on a single hard drive. If the drive fails, all the data and programs may be lost.

You can use any file-copying utility to back up files. For example, just copying important data files to floppy disks and storing the disks in a safe place ensures you will not lose important work. Special backup utility programs, however, compress the data as it is being stored. Compression has the advantage of reducing the amount of disk space required to store the data. MS-DOS and Windows both have backup utility programs. More sophisticated backup programs also store the structure of files and folders on your disk and even the computer’s system settings, allowing you to completely restore the state of the machine before the drive failed.

The best media to back up your data on are tape drives or cartridge drives. Tape drives are inexpensive and easy to use, but they are slow compared to hard drives. When making a backup, however, speed is usually not very important. The other good choice for backup is a cartridge drive. Depending on the type of cartridge drive you use, you can back up your entire hard disk quickly using a few cartridges or even only one. Trying to back up your hard drive to floppy disk, in contrast, is a test of patience and endurance. How many 1.44 MB floppies does it take to back up a 1.3 GB hard drive?

No matter what media you choose for backup, remember to check your results. One company made daily and weekly backups for years. When the data on their hard drive was accidentally lost, they didn’t worry. But when they went to restore their system from tape, they found all the tapes were empty. They hadn’t recorded a thing for all those years.

Hard Drive Maintenance

After some use, the files on a hard drive become fragmented. This means that one part of a file is in one location while another part of the file is in another place on the drive. This slows the computer down when you are saving or loading files, because it must constantly shift its position to read or write parts of the file.

Modern operating systems and third-party software vendors provide utilities for “defragmenting” your hard drive. Defragmentation analyzes the hard disk to find all the pieces of data files, then rearranges them so all the pieces of each file are stored together in sequence. This means the

drive mechanism no longer has to skip around the surface of the disk to find all the pieces of a file and performance therefore improves. The MS-DOS program DEFrag is a simple utility for optimizing your hard disk's performance. Norton Utilities' SpeedDisk is the best-known third-party utility.

QUESTIONS

1. List three preventive maintenance actions you should take to increase the life of your computer, and discuss why.
2. List three precautions you should take to safeguard your software, and discuss why.
3. Describe how defragmentation slows down your computer.
4. What solutions are available for defragmenting your hard drive, and how do they work?

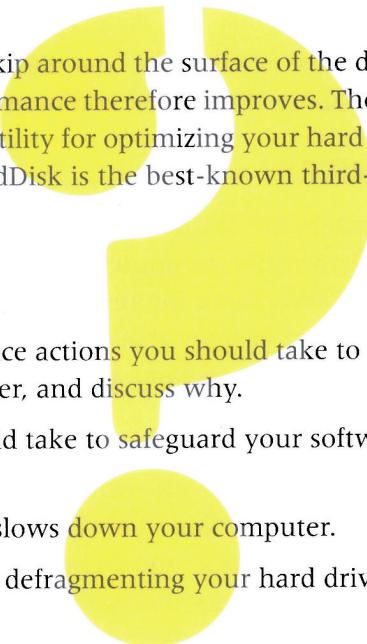
Issues and Ethics

The computer and data communications field offers opportunity, to be sure. But it also poses certain threats—piracy to software manufacturers, data security to businesses, and privacy to individuals. In this section we will look at the issues of computer crime, privacy, responsible use, etiquette and netiquette, and ergonomics.

Computer Crime

Computer security starts at home with keeping your machine and your data physically secure. Don't leave your laptop unattended, and don't leave data disks unsecured. It's a good idea at home or work to have your PC and all its major components secured with locks and/or security cables.

Everyone understands that stealing a computer is a crime, but not everyone understands that copying a program or data can also be a crime. There is a mindset prevalent among computer criminals that since the targets of their crimes are large institutions, such as corporations and the government, those institutions can absorb any damage; and that much of the theft does no real harm anyway. The fallacy of this kind of thinking is that large organizations are made up of individuals and they serve the needs of individuals. Breaking into and/or damaging a large organization's computers or stealing software often affects



4

Section

individuals, whether the computer criminal intends that or not. Following are some of the more common types of computer crime.

HACKERS

Computers are fascinating all by themselves, but when they are connected to other computers through a network or phone line, they become even more interesting. Just as some people will open a medicine cabinet or diary that they shouldn't, some want to see into every file, run every program, and explore every network. These people are called hackers.

The term *hacker* applies to a wide range of people. Those who talk of the "hacker ethic"—the principle of examining everything and damaging nothing—are fairly harmless. They like to pry into every corner of a system or network, and examine files and run programs. They try to penetrate networks and systems by bypassing security systems or stealing (or guessing) passwords.

The purpose of their activity is to satisfy curiosity and to prove their superiority to those who would deny them access. Hackers in this group seldom damage or delete programs or data, but they often leave calling cards that announce their penetration.

MALICIOUS MISCHIEF

Some hackers go one step farther. They don't talk much about the "hacker ethic," and they have little respect for others' property. If they penetrate your system, they won't hesitate to destroy data and erase files. One hacker of this type penetrated a company's computer and noticed that they backed up their files at the same time every month. He waited until just before the backup was due to be performed and then destroyed the company's data files. It took weeks for the company to rebuild its files from source documents.

These hackers often trick computer systems into giving them privileges they shouldn't have. Many systems welcome guests, but limit their access. Clever hackers can often find a way around the limitations and make themselves into "supervisors" or "superusers." This allows them to access every file on the computer. For example, they can authorize new accounts or destroy existing ones. This kind of hacker is a nightmare to system administrators.

HACKER CRIMINALS

There are those who call themselves hackers, but their real objective is to rip off the systems they penetrate. Many have specific objectives that

they relentlessly pursue. Credit card numbers and phone access codes are favorite targets because they are easily converted into goods and services.

COMPUTER ESPIONAGE

One major purpose of computer networks is to give people access to information. For example, computer networks are indispensable to researchers who need to keep up with the latest work in their field, or who want to communicate with colleagues throughout the world. Because of easy access, computers from both universities and military installations attract hackers looking for classified or otherwise sensitive information. Furthermore, it's difficult to facilitate access to systems for researchers and to restrict access for hackers.

Corporate espionage is also conducted through computer networks. Also, companies that give employees access to information through the Internet or other networks potentially are also giving access to hackers or to corporate spies.

HOW SYSTEMS ARE PENETRATED

There are a variety of ways that security systems are defeated. Some people have a hard time remembering their passwords, so they write their password on the computer or on another easily accessible place on their desk. Some system administrators naively assign a user's first name as a password. Some err in the other direction by making a password a random series of characters. A random password is usually so hard to remember that the user almost always writes it down. Some users change their passwords to the names of their children or pets, and those passwords are usually easy to guess.

If it isn't that easy, hackers are frequently willing to work hard to find out the information that can help them penetrate a system. They may call an employer posing as someone who needs information about users, pass out questionnaires to users pretending to take a survey or do a study, or even go through a person's garbage to get the desired information.

Sometimes the computer system itself allows a hacker in. Many systems are built with a "back door," a secret way of accessing the system. These are similar to the "back doors" familiar to video game players: secret parts of the program that provide extra weapons or unlimited health to some of the characters in the game. Some systems have passwords used by field technicians for servicing the computer. Almost all systems come with predefined passwords for the system administrator,

and some administrators never change these generic passwords. The system's operating system may even contain flaws that allow unauthorized users access. Even when the flaws are highly publicized and easily fixed, some systems are never updated.

VIRUSES

A virus that affects human health inserts its DNA into human cells and takes over the cells' biochemical production. Then the cells start producing virus cells that, in turn, infect more human cells. A computer virus is a program that infects a computer system. It enters the system in a number of different ways. The user can intentionally, but unwittingly, bring the virus program into his or her system, thinking it is something else. Viruses can masquerade as utility programs or get-rich-quick messages. Viruses can enter a system as e-mail or as part of a document template or spreadsheet, and viruses can send themselves to your computer through a network or over a modem connection.

Once the virus is active in your system, it will attempt to do one or more of the following:

1. It will let you know you are infected. It may print a message on your screen. Or the characters on the screen might start falling to the bottom of the screen like letters falling off a sign. One virus sends an ambulance across the bottom of the screen. Another fills the screen with bouncing balls. Viruses with these kinds of effects as their primary goal are fairly harmless, but they are certainly annoying because they must be cleaned from every disk.
2. A malicious virus will try to destroy your system software. One virus fills the hard drive with nonsense characters. Many viruses run the format program to clean everything off the hard drive. Some viruses damage the boot sector and keep the drive from booting when the computer is reset. Others just lock up your system.
3. Replication is another primary goal of most viruses. Most viruses try to infect as many disks and machines as possible. Some copy themselves to every disk when a disk access is performed. A network virus tries to send itself to network machines. One Internet virus once brought thousands of machines all over the country to a halt, because it sent itself through the network over and over until the network traffic slowed to a grinding halt.

No present-day cure can permanently solve the problem, because virus authors constantly become more inventive as they try to bring systems down and leave their mark on the world.

GETTING RID OF VIRUSES

Viruses are a serious problem because as many as 50 percent of all corporate computer users have become infected, and it costs thousands of dollars to clean viruses from company computers. Every system should be protected by an up-to-date antivirus program such as the one in Figure A-23, because as fast as creative vandals make new viruses, computer scientists create cures. A good antivirus company is constantly issuing new releases with the latest cures. For a licensed user, updates cost little or nothing. Some antivirus programs are available on the World Wide Web and can be downloaded on a trial basis.

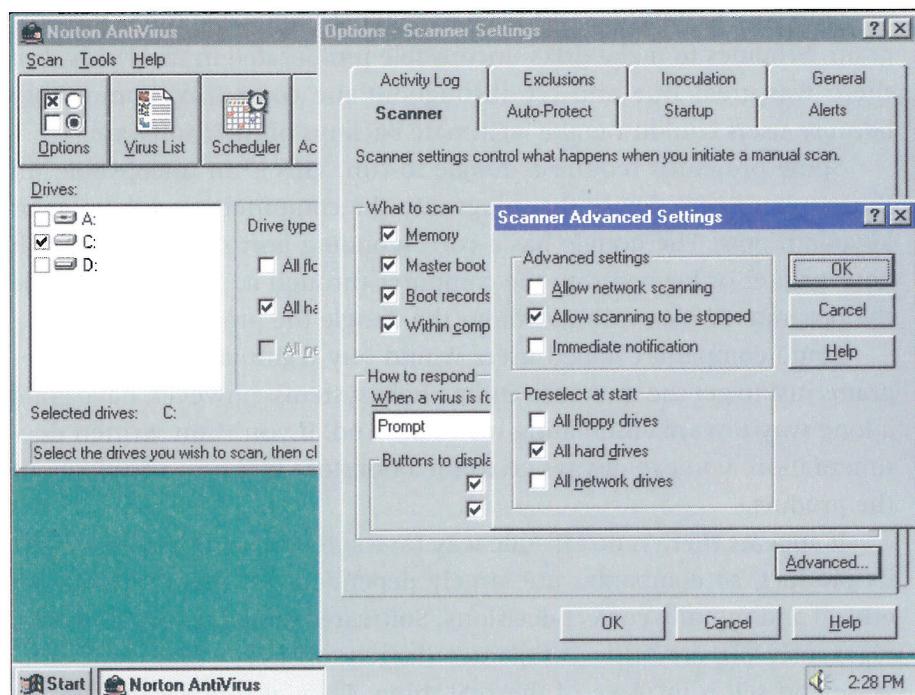


Figure A-23
Norton AntiVirus is
one of the most
popular programs
for eradicating viruses

It's easy to download a virus without being aware of it, so your antivirus program should run automatically as part of your start up procedure. The program can be installed in the Autoexec.bat file to run whenever the computer is turned on. Unfortunately, there is a price to pay for this protection. The time it takes to check your memory and files is relatively brief, but it is annoying. This causes many to turn off virus protection with predictable results—infestation.

SOFTWARE PIRACY

In 1995, in China alone, it is estimated that one to two billion dollars was lost to software piracy. Software piracy is stealing programs. Sometimes it involves direct copying of software, right down to the manuals and the packaging box. Other times, programs are reversed engineered; their code is reconstituted like frozen orange juice from executable files. Either way, software piracy costs billions of dollars a year. On a smaller scale, people make illegal copies of programs and share them with friends or post them on bulletin boards. Some companies and even schools (both of whom should know better) depend on cloning illegal copies of software to reduce their software costs.

One way to eliminate piracy is to make it impossible to copy a program. Schemes to make disks uncopyable proliferated in the 1980s, but there was great hue and cry throughout the computing community because users couldn't make legitimate backups of their software.

Some programs require a dongle to run. This is an uncopyable (in theory) hardware device that plugs into the computer's parallel port or keyboard port. The dongle has a corresponding port so you can attach your printer or keyboard to the computer through it. It contains a code the program needs to run. Without the dongle the program won't run.

Some companies hoped users would buy legitimate copies of programs just to get the manuals. Online help systems, however, have gone a long way toward eliminating manuals. And, if you want written documentation, you can always go to the bookstore and buy a book about the product.

It appears there is no fail-safe way for a software company to protect its product, so companies are largely dependent on users making the ethical and morally correct decisions. Software companies do, however, vigorously pursue other companies (largely offshore) that clone software and sell it in place of the real thing. They also prosecute blatant cases of program copying in businesses and schools. Bulletin boards that specialize in pirated programs are shut down and machines are often confiscated.

The only solution is to choose to pay for the programs you use. With legal copies, you get manuals, updates, and the right to purchase technical support.

Privacy

We have a right to privacy. Right?

That all depends on what you mean.

Well, at least my e-mail and documents are private, aren't they?

In many businesses, e-mail and documents are not private. If your documents are stored on the corporate system's network servers, the corporation may feel they have the right to examine them. In some states, telephone conversations are also subject to monitoring.

Cell phones and computers that communicate with cellular modems are not secure. For very little money, a cellular scanner can be purchased or built. This allows the user to monitor cellular phone calls. Security codes, passwords, credit card numbers—anything transferred with a cellular phone or modem is potentially accessible.

Information on computer networks may be accessible to people outside the network. If the network has an Internet connection, your data is vulnerable to anyone who can penetrate the system's firewall—a software program that is supposed to keep outsiders out of your system. Unfortunately, even the best firewalls can be breached.

Sometimes, it is the users themselves who break security. A user might establish an Internet connection that bypasses network security, or unwittingly download a browser plug-in that transmits sensitive data outside the network.

As information bounces through the Internet from computer to computer, it can be intercepted and read by anyone who tries hard enough. So, as you can see, whether or not we have a right to privacy, there is no (or very little) privacy on the Internet or in corporate computers.

ENCRYPTION

One way to ensure some privacy is to encrypt your data. Pretty Good Privacy (PGP) is a program available on the Internet that encodes data so it cannot be read except by those who have the key. Many other encryption programs are available but as this is written, none are built into any Web browser.

COMPUTER RECORDS

Your name and information about you and your family are on dozens of lists, and some of these lists are for sale. Some are meant to be secure, but, as we have seen, they are not. Computers that provide credit data to companies doing credit checks on customers are on-line. That means they are vulnerable to attack.

There's no good way to ensure that personal information about you and your family will not be available to someone who really wants to access it.

Responsible Use

It may be hard to resist looking at someone's files, or reading someone's e-mail, but it just isn't right to do it. Every human being has a right to be treated with dignity and respect, in cyberspace and out. Everyone should be treated the way you would wish to be treated. This means respecting other people's privacy.

Even without having to make an effort to defeat security measures, information on many systems is accessible. Those who use computers depend on other users to make ethical decisions, good decisions about what's right and what's wrong.

It may seem fun and harmless to read someone else's files, but it can potentially put both of you in a difficult situation. Even if reading someone's files is merely sport, you still need to choose not to do it.

COMPANY TIME

Solitaire on the company computer? Is it OK to play games while you're being paid for your time? It's easy to rationalize. One person spends 20 minutes reading the newspaper, why shouldn't you spend a few minutes playing a computer game? You may need to use the Internet daily to keep current in your field or to communicate with a colleague; why not spend some time doing some recreational cruising? Doesn't the company expect it?

Even if the company does turn a blind eye to occasional recreational use of its computers, it does steal time and resources from the company, and your time is worth something to the firm. You are paid to provide a service, not to cruise the Web. In addition, cruising the Web can be addictive. You may find yourself spending more and more time doing it, so your productivity suffers.

There's no question that it's wrong to bring home 100 plastic bags from the janitor's closet to use in your garbage cans at home, so why is it any different to download your employer's software to use at home? If you work at home, your employer should provide you with a legal copy of the software for home use. Or you should know up front that acquiring a legal copy of a particular piece of software is a job requirement. You should not download software from a company computer to use at home.

Etiquette and Netiquette

Networks are for communication. Often the communication is from file to human, or human to file. Sometimes the communication is from human to human. Whenever communication is from human to human,

questions of etiquette come into focus. Etiquette is how you treat other people. It is concerned with courtesy.

USENET

One part of the Internet is the Usenet. It is thousands of bulletin boards, called *newsgroups*, where users post and read notes. Each newsgroup has a topic, and notes are posted pertaining to each topic.

Before a user posts a note, however, he or she is expected to do some *lurking*. Lurking is reading without posting. Lurking helps ensure that when you do post, your posting will not incur the wrath of the readers of that newsgroup. By reading some of the typical postings, you can get a sense of what kind of information is expected to be posted.

One of the first things a user should read is the FAQ file. *FAQ* stands for frequently asked questions. Most well-run newsgroups have a FAQ regularly posted. With thousands of readers, the same questions occur frequently, so the frequently asked questions are collected in FAQ files. New users are supposed to read these files before they post. You can search the newsgroup with your browser's news reader to find the FAQ and read it.

If a posted message is perceived as stupid or frivolous, the user may be *flamed* and possibly *spammed* if the offense is seen as particularly gross. Flaming is sending angry or abusive e-mail. Spamming is arranging for dozens or even hundreds of messages to be e-mailed to a user just so they have to spend time deleting or reading them.

CHAT ROOMS AND ANONYMITY

Chat rooms are where people gather electronically to exchange talk in *real time*. Real time means the messages are not posted to be read later, but are sent to everyone in the chat room as they are entered. Your identity is shielded by using a *handle*, which is the name you go by but is not necessarily your name. If you see pdp1134, the name of an old Digital minicomputer, in a chat room, it is probably me. But, you probably won't see me; I find most chat rooms pretty boring.

Anonymity does give a user a chance to break every rule of etiquette. Some chat rooms are monitored but for the most part anything goes. Far more disturbing is the hatred and racism that swirls through the Usenet. Under the protection of free speech and the cloak of anonymity, people get away with saying appalling things. The Internet is about the free exchange of ideas. Some things, though, should not be said.

ADVERTISING

When the Internet was funded by grants from the National Science Foundation, there were rules against advertising. Today the Net is

expected to pay its own way in the world. Advertising has become an unavoidable part of the Net.

Some Net companies give free services in exchange for sending advertising. More than one place will let you set up an e-mail account just as long as you let them send you their advertising.

Some companies foolishly offend Internet users by sending bulk e-mail—advertising that is not directed to interested customers, but to everyone. These companies should know that such practices just incite anger. A much better way to advertise on the Net is to make information available only to those who are interested in receiving it. Classified ads and job ads are collected in a number of places. People looking for work, or to find a worker, can visit Internet sites dedicated to helping employers get together with prospective employees.

Ergonomics

Ergonomics is the study of the “fit” between people and machines. For us, it is specifically concerned with the comfort and health of computer users.

HEALTH ISSUES

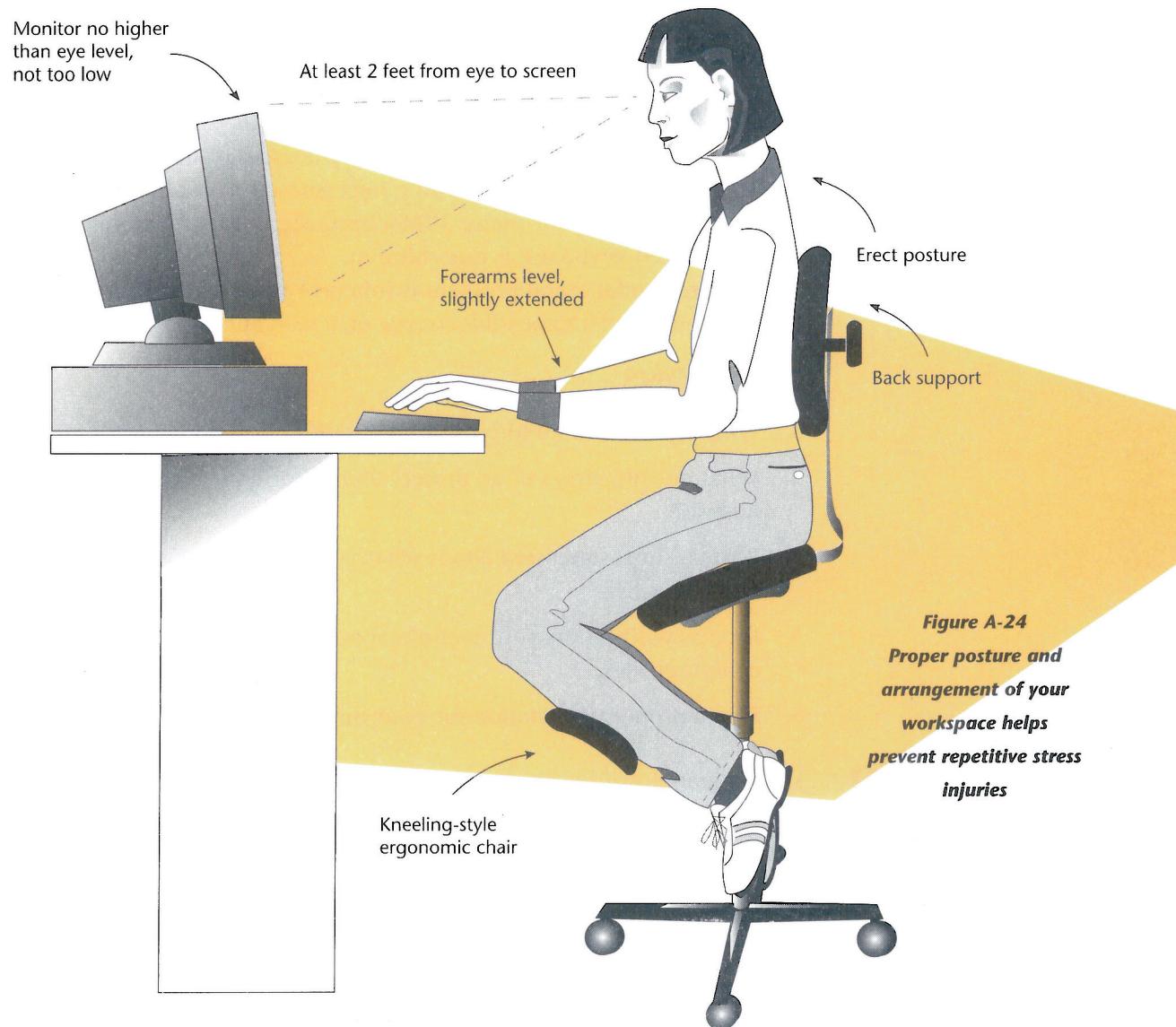
One controversial issue is that of electromagnetic radiation, EMF. The monitor of your desktop computer works by spraying electrons at a phosphor-coated piece of glass. Unfortunately, your monitor may not be doing a very good job of screening that radiation from your body.

Studies in Europe have shown the increased incidence of certain diseases that could result from EMF. Not all accept these findings. Still, it cannot be a bad idea to limit the amount of radiation to which you are subjected. If you sit in front of a monitor for eight or more hours a day, you want to err on the conservative side.

Repetitive stress injuries are another issue. Repetitive stress injuries occur in workers, athletes, and anyone else who repeats the same action over and over again with little variation. Some repetitive stress injuries are quite debilitating. Preventing these injuries depends on arranging your work environment to reduce the stress as shown in Figure A-24. The kinds of things to address are: height of the desk, height and angle of the viewing screen, the keyboard, the chair in which you sit.

Carpal tunnel syndrome affects the nerves where they pass through a tunnel in your wrist. If you hold your hand cocked at an angle to type, these nerves can become irritated. At first you experience numbness, then pain radiating up through the arm. Eventually, the numbness does not go away, because the nerves become permanently damaged.

To fix the problem, you must deal with the cause. That means changing your position or your work routine. Ergonomic keyboards



with keys at a more comfortable and logical angle are available. Workstation desks can be adjusted so the heights and angles of keyboards and monitors are optimized. Proper posture and a good chair may be more important than all the rest.

NOTEBOOK ERGONOMICS

The whole idea of a notebook computer is its portability. In the early days of computing, a “portable” computer was one designed to be carried from place to place. They usually had full-sized keyboards, small, hard-to-read monitors, and weighed 20 or more pounds. The only bright spot in this picture was the full-sized keyboards.

Modern laptop computers are lighter and have better displays, but a number of other ergonomic concerns are still relevant. Today, computing is largely mouse-dependent. Laptop manufacturers have tried a number of different mouse substitutes. Track-balls, tiny joysticks, and touchpads have all been used with varying degrees of success.

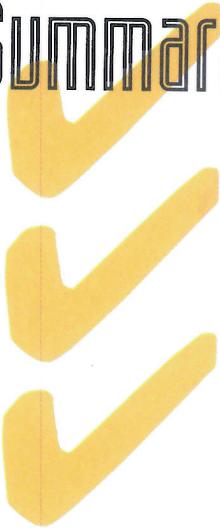
The smallness of the computer necessitated a smaller keyboard, which was a disaster for many. IBM's butterfly keyboard, which opens into a full sized keyboard, is one solution.

A more fundamental problem is inherent in the very nature of the laptop—some find it impossible to type on a machine sitting in one's lap.

QUESTIONS

1. What should you do to protect your computer from getting a virus?
2. What do companies do to protect their information from theft or misuse?
3. Write a short statement about what you think about copying software illegally.
4. Discuss with others your feelings about the privacy of your computer files.
5. Plan a proper workstation for your new computer.

Summary



With a graphical user interface such as Windows 95, you communicate with the computer using the mouse pointer to either click on icons, or make selections from menus. Almost all the work you do is in windows, either program windows or document windows, and with modern-day systems more than one window or program can be open at the same time, but only one can be active at one time. You can move, size, minimize, maximize, close, or switch between windows with the click of a mouse.

Information is the computer's most important product. As you use programs to do your work, you create information that needs to be saved and managed so you can find it when you need it. For example, you create documents with word processing programs and you create programs with Visual Basic, and most likely you will use them again and again. Windows 95 provides a tool, the Windows Explorer, for you to use to view and manage this information.

Using the Windows Explorer, you can create, move, copy, rename, and delete folders for organizing your files, and you can move, copy, rename, and delete files.

Two main technologies are used to store data today: magnetic and optical storage. The primary types of magnetic storage are floppy disks,

hard disks, magnetic tape, and cartridge drives. The primary types of optical storage are CD-ROM and CD-ROM Recordable.

Today, almost all computers come with floppy disk drives and hard disk drives. Both of these organize information in concentric circles making it quick and easy to retrieve any of the data. The hard disk is used to store your programs and files. The floppy disk is removable, so it is used to transport information from one computer to another. The floppy disk's capacity, however, is small, only 1.4 MB. For this reason the greater capacity cartridge drives, Syquest and Zip drives, are very popular.

Tape drives store information in a sequential manner, so they are slower to retrieve information at the end of a tape. For this reason they are mostly used for backup purposes.

CD-ROMs organize information in a long spiral from the edge to the center, and laser beams read the data. CD-ROMs have longer shelf life and are inexpensive to duplicate in large quantities; therefore, they are very popular with software manufacturers for distributing their software.

Just like your automobile or any other sizable investment, computers need proper maintenance and care. Besides physical damage, dangers to your hardware are heat, dust, and voltage spikes. So, provide proper ventilation, keep your computer clean, and plug your computer into a surge protector.

Backing up your programs and data is an important defense against losing your software and data if your computer experiences a power outage.

Along with the benefits computers provide to society, they also pose certain threats—piracy to software manufacturers, data security to businesses, and privacy to the individual.

Computer crime ranges from malicious mischief to computer espionage and theft. A computer virus is a program that infects a computer system. A virus can also range from being just a nuisance to completely erasing all the data from your hard drive. Every system should be protected by an up-to-date antivirus program.

Information on computer networks—intranet and Internet—may not be very secure, and there is no good way to ensure its privacy. Those who use computers depend on other users to make ethical, good decisions about what is right and what is wrong.

Repetitive stress injuries occur in workers and others who repeat the same action over and over again. Preventing these injuries depends on arranging your work environment to reduce the stress. Your monitor should be no higher than eye level, you should sit at least two feet from the screen, you should sit erect with proper back support, and your forearms should be level and slightly extended.

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