

## OBJECTIVES

This chapter helps you to prepare for the Operating Systems Technologies module of the A+ Certification examination by covering the following objectives within the “Domain 1.0: Operating System Fundamentals” section.

**1.3 Demonstrate the ability to use command-line functions and utilities to manage the operating system, including the proper syntax and switches.**

**Command-line functions and utilities include**

- COMMAND/CMD
- DIR
- ATTRIB
- VER
- MEM
- SCANDISK
- DEFRAG
- EDIT
- XCOPY
- COPY
- FORMAT
- FDISK
- SETVER
- SCANREG
- MD/CD/RD
- DEL/REN
- DELTREE
- TYPE
- ECHO
- SET
- PING



# CHAPTER 3

## Using Command-Line Functions

## OBJECTIVES

Computer technicians must be familiar with the functions and structures of operating systems that they may encounter in the field. The major operating systems associated with personal computers are Windows 9x/Me and Windows NT/2000/XP.

Both operating system lines provide an MS-DOS–like command-line interface that works independently from their GUIs. As a technician, you will often need to use this interface to isolate and correct problems associated with the operating system.

## OUTLINE

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## STUDY STRATEGIES

To prepare for the Operating System Fundamentals objective of the Operating Systems Technologies exam:

- **Use all the traditional study tools we've placed in the chapter**—Pay attention to the Objectives, Challenges, and end-of-chapter questions and use them to learn the material.
- **Use the pedagogy in this chapter to focus on the exam-specific material**—We've included lots of features geared expressly to the A+ exam. The Exam Tips scattered throughout the chapter are placed there to point to known exam-related materials. The same is true of the embedded Challenge items.
- **Key in on Exam Tips in the chapter**—While reading through the chapter, make sure to concentrate on the following test-related items:
  - Be able to access the command prompt interface in Windows 9x/Me and Windows 2000/XP.
  - Know which file types can be executed directly from the command-line prompt.
  - Memorize the different MS-DOS file attributes and be able to use the various attribute switch settings.
  - Memorize the Microsoft command-line wildcard characters and be able to use their variations.

## INTRODUCTION

For most computer users, MS-DOS and the command line are dead and never considered. However, these users never call repair technicians when everything is working properly. Instead, they call us when the machine is broken and not cooperating. In many cases, there is no GUI available and no mouse functionality for the technician to use. In addition, the Windows GUI is often a major part of the problem. To circumvent this problem and gain access to the system to begin repairing it, the technician must frequently work from a command prompt environment.

Both Windows operating system lines provide an MS-DOS-like command-line interface that works independently from their GUIs. Technicians often need to use this interface to isolate and correct problems associated with the operating system.

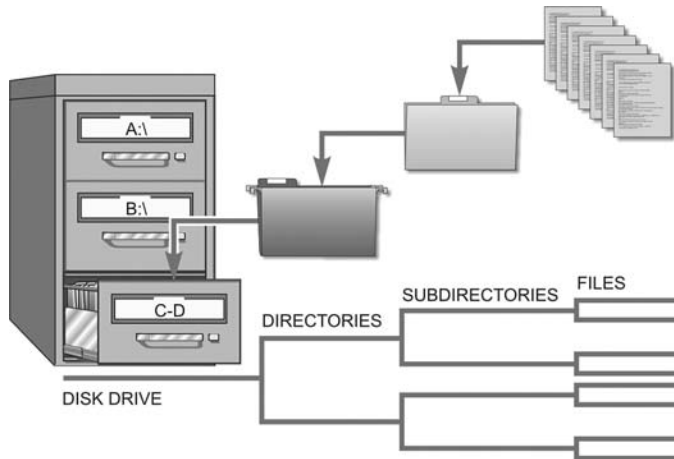
## DISK OPERATING SYSTEM ORGANIZATION

To operate in a command-line environment, the technician must understand how disks are organized into directory structures. Disk operating systems are typically organized into structures similar to a common office filing cabinet, like the one depicted in Figure 3.1. Think of the computer's disk-drive subsystem as the filing cabinet structure. This example has three drawers that can be opened. Think of these drawers as disk drives labeled A, B, and C/D. Inside each drawer are hanging folders that can hold different types of items. Think of these as directories (although Microsoft refers to them as *folders* in their Windows products).

The hanging folders are associated with directories (directories are represented by folders in graphical interfaces such as Windows). These folders may contain different types of items or other individual folders. Think of these individual folders as subdirectories. For organizational purposes, each hanging folder and each individual folder must have a unique label on it.

Inside each hanging folder or individual folder are the items being stored. In a real filing cabinet, these items in the folders are usually

documents of different types. However, pictures and tapes and other items related to the folders can also be stored in them.



**FIGURE 3.1**

Disk operating system organization.

The items inside the folders can be additional folders (subfolders), or they can be files. Disk-based systems manage blocks of related data by giving it a filename and treating the block as a single unit. Recall that a file is simply a block of logically related data, given a single name, and treated as a single unit. Like the contents of folders, files can be programs, documents, drawings or other illustrations, sound files, and so on.

To find an item in the cabinet, you simply need to know which drawer, hanging folder, and folder it is located in. This concept can be translated directly to the computer system. To locate a particular file, you simply need to know which drive, directory, and subdirectory it is located in.

## Files and Filenames

As mentioned earlier, disk-based systems manage data blocks by giving them *filenames*. To locate a particular file, you must know which drive, directory, and subdirectory it is located in. In Microsoft operating systems, the path to any file in the system can be written as a direction to the computer so it will know where the file is located. The format for specifying a path on a local machine is as follows:

```
C:\directory name\subdirectory name\filename
```

## NOTE

Filename extensions are not actually required for most files; however, they become helpful in sorting between files in a congested system. You should be aware that the operating system reserves some three-letter combinations, such as `.COM` and `.SYS`, for its own use.

If the file is located on another machine that you can access across a network, you need to use a Universal Naming Convention (UNC) path to the machine and the shared folder and then include the filename as follows:

```
\\computername\sharename\filename
```

Under the old MS-DOS operating systems, a basic filename of up to eight characters was permitted. The filename could also have an extension of up to three characters. The extension was separated from the main portion of the filename by a period and was normally used to identify the type of file.

## ACCESSING THE COMMAND PROMPT

Sometimes you need to reduce the operation of the PC to its most basic components. These times are normally associated with the system being broke. In many cases, whatever is broken affects the graphical nature of the Windows operating systems. Therefore, the graphical portions of the operating system are usually the first things to go when the system breaks down.

Access to this interface is provided through different paths in the different operating systems. Therefore, you must know how to reach the interface in each operating system. As you learned in Chapter 1, “Microsoft Windows Operating Systems,” to access the MS-DOS emulator in Windows 9x or Windows NT 4.0, you need to select the Run option from the Start menu and type `COMMAND` in the Run dialog box. To access this function in Windows 2000 or Windows XP, enter `CMD` (or `COMMAND`) in the dialog box to produce the command-line prompt.

## EXAM TIP

Know how to access the command prompt interface in Windows 9x/Me and Windows 2000/XP.

## WORKING FROM THE COMMAND LINE

As you can see in Figure 3.2, working from the command line is quite different than working with a GUI. In the figure, you are working in the `\Temp` directory, which is located directly under the root directory of the `C:\` partition on the hard disk drive. In this particular example, the contents of directory have been displayed to show which files are listed there and what their qualities are. These qualities include file size, time last updated, and description. The display

also summarizes the number of files listed in the directory, the number of bytes used and the amount of free space on the partition.

From the command prompt, you can enter and execute all

```

MS-DOS Prompt
Auto
C:\TEMP>dir /p

Volume in drive C has no label
Volume Serial Number is 15FE-1163
Directory of C:\TEMP

.                <DIR>                03-20-00   3:16p  .
..               <DIR>                03-20-00   3:16p  ..
044801C.DOC      253,440  07-15-03   9:38a  044801C.DOC
IC100D^1.PCX    840,912  02-21-01   1:13p  IC100D0800.pcx
0E201030.PCX    200,067  01-12-99  12:34p  0E201030.pcx
MICRO680.PCX    215,597  04-27-01   1:51p  MICRO680.pcx
MICRO680.PCX    147,368  11-13-00   9:43a  Micro680.pcx
MICRO718.PCX    130,217  05-10-01  12:43p  MICRO718.pcx
MR1019.PCX      304,257  11-16-00   8:00p  MR1019.pcx
IC100D^7.PCX     17,271  06-30-03   5:21p  IC100D0831.pcx
NETWORK1.DOC    180,736  08-07-03   5:44p  Network+ Glossary.doc
WIRELE^1.DOC    153,600  08-07-03   6:10p  Wireless Glossary.doc

10 File(s)      2,443,465 bytes
2 dir(s)        3,721.27 MB free

C:\TEMP>

```

FIGURE 3.2

The command prompt.

command-line functions. You also can start application programs from this prompt. These files can be discerned by their filename extensions. Files with `.COM`, `.EXE`, or `.BAT` extensions can be started directly from the prompt. The `.COM` and `.EXE` file extensions are reserved by Microsoft operating systems and can be generated only by programs that can correctly configure them. `.BAT` files are simply ASCII text files that have been generated using command-line functions. Because they contain operating system commands mixed with `.COM` and `.EXE` files, Microsoft operating systems can execute `.BAT` files from the command line.

Programs with other types of extensions must be associated with one of these three file types to be operated. You can operate application software packages such as graphical user interfaces, word processors, business packages, data communications packages, and user programming languages (such as Visual Basic and DEBUG). As an example, the core component of a word processor could be a file called `WORDPRO.EXE`. Document files produced by word processors are normally given filename extensions of `.DOC` (for document) or `.TXT` (for text file).

To view one of the documents electronically, you first need to run the executable file and then use its features to load, format, and display the document. For example, Adobe Acrobat files normally have the extension `.PDF` assigned to them. To execute a file with this extension, you need to run the Acrobat application and then use it to load and display different `.PDF` files for use.

EXAM TIP

Know which file types can be executed directly from the command-line prompt.

## NOTE

In all Microsoft command-line environments, commands are not case sensitive.

Common MS-DOS command switches include /P for page, /W for wide format, and /S for system. Different switches are used to modify different command functions. You can obtain definitions for switches that can be added to a given command by typing /? after the command.

You can also enter operating system batch commands on the command line to perform different functions. These commands can be grouped into drive-level commands, directory-level commands, and file-level commands. The format for using command-line statements in a Microsoft command-line environment is

```
COMMAND (space) SOURCE location (space) DESTINATION location
COMMAND (space) location
COMMAND
```

The first example illustrates how to enter MS-DOS operations that involve a source and a final destination, such as moving a file from one place to another.

The second example illustrates how to specify single-location operations, such as formatting a disk in a particular disk drive. The final example applies to commands that occur in a *default location*, such as obtaining a listing of the files on the current disk drive.

You can modify the performance of various commands by placing one or more software switches at the end of the basic command. A switch is added to the command by adding a space, a forward slash (/), and a single letter:

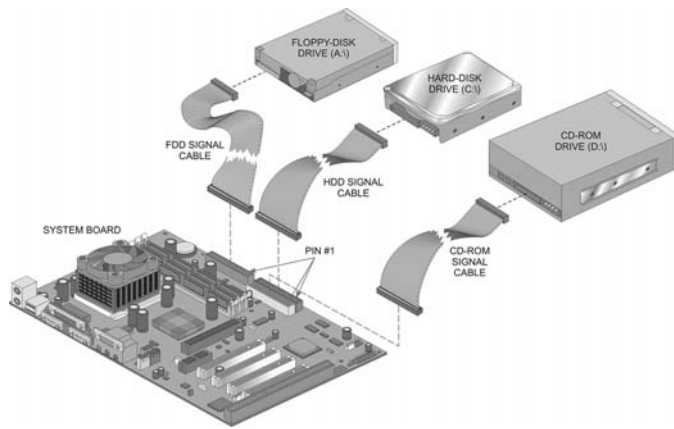
```
COMMAND (space) option /switch
```

## Drives and Disks

To operate in a command-line environment, you must understand how disks are organized into directory structures. You must also know the rules for creating, accessing, and using files from the command line.

Figure 3.3 illustrates how the various disk drives are seen by a typical, standalone system. Microsoft operating systems reserve the letters A: and B: for the first and second floppy drives. Multiple hard-disk drive units can be installed in the system, along with the floppy drives and CD-ROM/DVD drives. The Microsoft operating systems recognize a single hard-disk unit in the system as drive C:. Disk-management utilities can be used to partition a single physical hard-disk drive into two or more volumes that the system recognizes as logical drives C:, D:., and so on.

Conversely, a second hard-disk drive can be added to the system and set up as logical drive D:. It may also be partitioned into smaller logical drives that the system recognizes as drives E:, F:., and so on.



**FIGURE 3.3**  
The system's disk drives.

Shared drives and printers from remote computers can be *mapped* to the local machine so that they function as though they were installed in the local machine. From the command line, this is done using the NET USE command. Using this command involves entering the command along with a number of switches to define the process. The format for mapping to a shared drive using NET USE is

```
NET USE [drive] [\\Computer\Directory] [password]
```

where [drive] is the drive letter you want your computer to assign to the remote drive and [\\Computer\Directory] is the UNC path to the desired shared folder. If the folder has been password-protected, you must also enter the password as part of the command. You can use an asterisk in the [drive] position to simply assign the next available drive letter from the local machine.

Likewise, the format for mapping to a remote printer is

```
NET USE [port] [\\Computer\printer] [password]
```

where [port] is the name of the local printer port you want to assign for the remote printer to be identified with and [\\Computer\Printer] is the UNC path to the designated shared printer. If the folder has been password-protected, you must also enter the password as part of the command.

Some command-line operations can be simplified by permitting the system to choose the location for the command to be carried out through the use of default settings (special predetermined settings that are automatically used by the system when no specific directions are given to change the setting). The operating system

NOTE

Figure 3.3 shows a CD-ROM drive as drive D: because this has become the most common PC drive configuration. In the case of networked systems, logical drive letters may be extended to define up to drive Z. These drives are actually hard drives located in remote computers. The operating system in the local machine treats them as additional logical drives (for example, F:, G:, and so on). Under Windows 2000/XP, logical drives can be given names, and the 26-drive limit imposed by the alphabet is eliminated.

remembers these settings and uses them when the operator does not specify a particular location for events to happen. The default setting in your system is the A: drive. In systems with two or more drives, it is imperative that the user specifies exactly where the specified action is to occur.

## Drive-Level Command Operations

The following command-line functions pertain to drive-level operations. They must be typed at the command prompt, and they carry out the instruction along with any drive modifiers given.

- **FORMAT**—This command prepares a new disk for use with an operating system. Actual data locations are marked on the disk for the tracks and sectors, and bad sectors are marked. In addition, a file directory is established on the disk. New disks must be formatted before they can be used.

`C:\>FORMAT A:` creates the tracks, sectors, and file system structure on the specified disk (in this case, the A: floppy drive).

`C:\>FORMAT A:/S` causes three system files (boot files—`IO.SYS`, `MSDOS.SYS`, and `COMMAND.COM`) to be copied into the root directory of the disk after it has been formatted.

- **SETVER**—This command sets the OS version number that the system reports to an application. Programs designed for previous OS versions may not operate correctly under newer versions unless the version has been set correctly.

`C:> SETVER C:` causes all the files on the C: drive to be listed in the operating system version table.

- **VER**—If the current operating system version is not known, typing `VER` at the command prompt displays this information onscreen. These commands are particularly useful in networking operations where multiple computers are connected together to share information. In these applications, several versions of the operating system may exist on different machines attached to the network.

## Directory-Level Functions

In hard-drive-based systems, it is common to organize related programs and data into areas called *directories*. This makes them easier

to find and work with, because modern hard drives can hold large amounts of information. Microsoft directories can hold up to 512 directory or filename entries.

The following commands are used for directory-based operations. The format for using them is identical to that for the disk-related commands discussed earlier.

- **DIR**—The Directory command provides a listing of the files on the disk that is in the drive indicated by the drive specifier.

`C:\>DIR` or `DIR B:` lists the contents of the drive. (If `DIR` is used without any drive specifier, the contents of the drive indicated by the prompt are displayed.) The command may also be used with switches to alter the way in which the directory is displayed.

The `C:\>DIR/W` command displays the entire directory at one time across the width of the display, whereas the `C:\>DIR/P` command displays the contents of the directory one page at a time.

- **MKDIR** or **MD**—This command creates a new directory in an indicated spot in the directory tree structure.

`C:\>MD C:\DOS\XXX` creates a new subdirectory named `XXX` in the path that includes the root directory (`C:\`) and the `DOS` directory.

- **CHDIR** or **CD**—This command changes the location of the active directory to a position specified with the command.

`C:\>CD C:\DOS` changes the working directory from the `C:` root directory to the `C:\>DOS` directory.

- **RMDIR** or **RD**—The Remove Directory command erases the directory specified in the command. You cannot remove a directory until it is empty, and you cannot remove a directory if it is currently active.

`C:\>RD C:\DOS\forms` removes the `DOS` subdirectory `forms`, provided it is empty.

- **PROMPT**—This command changes the appearance of the command prompt.

`C:\>PROMPT $P$G` causes the form of the prompt to change from simply `C:` to `C:\` and causes the complete path from the main

directory to the current directory to be displayed at the DOS prompt (for example, `C:\>DOS`).

- **TREE**—The command lists all the directory and subdirectory names on a specified disk.

`C:\>TREE C:` displays a graphical representation of the organization of the C: hard drive.

- **DELTREE**—This command removes a selected directory and all the files and subdirectories below it.

`C:\>DELTREE C:\DOS\DRIVER\MOUSE` deletes the subdirectory `MOUSE` and any subdirectories it may have.

---

### CHALLENGE #1

A remote customer calls you for assistance with his troubleshooting efforts. His computer does not boot up to the hard drive, so he has started the system using a boot floppy. After he started the system, he changed the active directory to the root directory of the C:\ drive. When he performed a `DIR` command to view the contents of the drive, the information scrolled off the top of the screen so fast that he could not use it. What should you tell the customer to do?

Refer to the “Challenge Solutions” section at the end of this chapter for the resolution to the challenge.

---

## File-Level Commands

The following commands are used to carry out file-level operations. The format for using them is identical to the disk- and directory-related commands discussed earlier. However, the command must include the filename and its extension at the end of the directory path. Depending on the operation, the complete path may be required, or a default to the currently active drive will be assumed.

- **COPY**—The file copy command copies a specified file from one place (disk or directory) to another.

`C:\>COPY A:filename.ext B:` is used if the file is to have the same name in its new location; the second filename specifier can be omitted.

```
C:\>COPY A:filename.ext B:filename.ext
```

 copies a file to its new location with a new name.

- **XCOPY**—This command copies all the files in a directory, along with any subdirectories and their files. It is particularly useful in copying files and directories between disks with different formats (for example, from a 1.2MB disk to a 1.44MB disk).

```
C:\>XCOPY A: B: /S
```

 copies all the files and directories from the disk in drive A: (except hidden and system files) to the disk in drive B:. The `/S` switch instructs the `XCOPY` command to copy directories and subdirectories.

- **DEL** or **ERASE**—Either of these commands allows you to remove unwanted files from the disk when typed at the DOS prompt. Following are examples of each:

```
C:\>DEL filename.ext  
C:\>ERASE B:filename.ext
```

A great deal of care should be taken when using this command. If a file is erased accidentally, it may not be retrievable.

- **REN**—This command enables you to change the name or extension of a filename. Following are examples:

```
C:\>REN A:filename.ext newname.ext
```

 does not change the contents of the file, only its name. The original filename (but not the file) is deleted.

```
C:\>COPY A:filename.ext B:newname.ext
```

 copies the file to a new location with a new name and enables you to retain the original file and filename.

- **ATTRIB**—This command changes file attributes such as Read-only (+R or -R), Archive (+A or -A), System (+S or -S), and Hidden (+H or -H). The plus (+) and minus (-) signs are used to add or subtract the attribute from the file.

```
C:\>ATTRIB +R C:\DOS\memos.doc
```

 sets the file `MEMOS.DOC` as a read-only file.

*Read-only attributes* protect the file from accidentally being overwritten by users. Similarly, one of the main reasons for giving a file a *Hidden attribute* is to prevent it from accidentally being erased. The *System attribute* is reserved for use by the operating system and marks the file as a system file.

Memorize the different MS-DOS file attributes and be able to use the various attribute switch settings.

- **FC**—File compare command that will compare the contents of two files or two sets of files and produces a difference report. The syntax for the command is

```
C:\>FC C:\path\filename1.ext \otherpath\filename2.ext"
```

- **Type**—The Type command can be used to display the contents of a text file on the screen. The syntax for using Type is

```
Type c:\filename
```

If the contents of the file are long, you will need to modify the command by adding the more pipe to the command as follows

```
Type c:\filename.ext |more
```

---

### CHALLENGE #2

After taking your advice, the customer who called you in the previous challenge item has been able to view the contents of his C:\ drive. He is using Windows 98 SE on his machine, and he suspects that one of his system files is not letting him boot to his hard drive. He is looking for the `IO.SYS` and `MSDOS.SYS` files but cannot find them in the root directory where they belong. What can you tell the customer about this problem?

Refer to the "Challenge Solutions" section at the end of this chapter for the resolution to the challenge.

---

## COMMAND-LINE SHORTCUTS

When you use filenames in command-line operations, the filename appears at the end of the directory path in the source and destination locations. The \* notation is called a *wildcard* and allows operations to be performed with only partial source or destination information. For example, the command `DIR Chapter.*` would return a listing of all the files in the current directory that have the filename `chapter`, along with tier extensions. Likewise, entering `DIR *.SYS` produces a listing of all the `.SYS` files in the directory.

Using the notation as `*.*` tells the software to perform the designated command on any file found on the disk using any filename and extension.

### EXAM TIP

Memorize the Microsoft command-line wildcard characters and be able to use their variations.

A question mark (?) can be used as a wildcard to represent a single character in a filename or extension. Multiple question marks can be used to represent multiple characters in a filename or extension.

## COMMAND-LINE UTILITIES

Because technicians must frequently work from the command line, many of the tools you use must also be available from the command prompt. Many of the repair operations used to get the system back up and running (so that it can use the graphical interface) involve disk-drive-related problems. The following list describes most of the major tools associated with maintaining and repairing the system's hard-disk drives. They are covered in greater detail, along with the remaining disk-drive-related tools, in Chapter 4, "Managing Disks, Directories, and Files."

- **SCANDISK**—This hard-disk-checking utility inspects the data on a specified disk for errors and corruption. It is used to find and possibly repair cluster chains that make up files that have become disconnected from each other.
- **DEFRAG**—This disk-drive utility organizes disjointed information on hard-disk drives into more efficient patterns to speed up the access and read times associated with finding and reading data from the drive.
- **FDISK**—This MS-DOS/Windows 9x disk-partitioning utility is used to establish logical structures on a hard-disk drive.

Other available *operating system tools* enable administrators and technicians to manage files and memory usage in the PC system. Three such tools are

- **EDIT**—This command opens the operating system's default MS-DOS text editor package. This editor can be used to alter and repair text-based files including `CONFIG.SYS`, `AUTOEXEC.BAT`, and various `.INI` files.
- **SCANREG**—This Windows 98/Me Registry Checker utility scans, fixes, backs up, and restores Registry files (`SCANREG` was not available in Windows 95).
- **MEM**—This command-line utility is used to display the amount of used and free memory in a system.

Command-line functions can be combined into *batch programs* (as they are in the `AUTOEXEC.BAT` program described in earlier chapters) to carry out different operations:

- `ECHO`—This batch-processing command can be used to display character string messages on the screen.
- `SET`—This batch-processing command can be used to set two different character strings as equal to each other.

## NOTE

The preceding command-line utilities are specified in the CompTIA A+ Operating System Technologies objective 1.3. They are a small representation of all the command-line utilities and tools available through the Windows operating systems. All these command-line utilities are covered in greater detail in the following chapters.

Other command-line utilities are available for network troubleshooting purposes. As a matter of fact, the various Windows operating system versions contain a suite of TCP/IP troubleshooting utilities that are executed from the command prompt. The most widely used TCP/IP commands are

- `PING`—This TCP/IP networking utility is used to verify network connections between computers.
- `Tracert`—The `Tracert` utility is another very important network troubleshooting tool that is used from the command prompt. It provides route information for packets of information being sent across a network.

These are only two of several TCP/IP utilities covered in detail in Chapter 11, “Networking with Windows.”

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### CHALLENGE #3

The customer from the previous challenges in this chapter thinks that there may be some corrupt files on the hard drive preventing it from booting up. He has called you back to see whether there is some troubleshooting tool that he can use to check out the disk drive and possibly repair any corruption problems present. He thinks that there is, but he is not sure as to what it is or how to use it. What advice should you give him?

Refer to the “Challenge Solutions” section at the end of this chapter for the resolution to the challenge.

---

## CHAPTER SUMMARY

This chapter was dedicated to defining the command-line environment in Microsoft operating systems. This concept is important for technicians because the majority of the troubleshooting and repair work that technicians perform must be done using the command prompt.

The chapter also described methods of managing files and running utilities in a command-line-based system, as well as navigating through the operating system from a command line. In the process, it also presented procedures for accessing and retrieving information.

The chapter concluded with a presentation of different types of utilities that can be executed from the command line in a Windows operating system.

At this point, review the objectives listed at the beginning of the chapter to be certain that you understand each point and can perform each task listed there. Afterward, answer the review questions that follow to verify your knowledge of the information.

### KEY TERMS

- ATTRIB
- COMMAND/CMD
- COPY
- DEFRAG
- DEL/REN
- DELTREE
- DIR
- ECHO
- EDIT
- FDISK
- FORMAT
- MD/CD/RD
- MEM
- PING
- SCANDISK
- SCANREG
- SET
- SETVER
- TYPE
- VER
- XCOPY

## APPLY YOUR KNOWLEDGE

### Review Questions

- What is an appropriate command to access the command prompt environment in Windows NT and Windows 2000?
  - CMD
  - COMMAND
  - GO
  - RUN
- Which of these file types cannot be executed directly from the command-line prompt in Windows 2000?
  - .SYS
  - .COM
  - .EXE
  - .BAT
- Which DOS wildcard characters tell the software to perform the designated command on any file found on the disk using any filename and extension?
  - ##
  - .\*
  - ??
  - ++
- What command is used to view hidden system files?
  - `attrib -r -s -h c:\*.sys`
  - `attrib +r +s +h c:\*.sys`
  - `fa -r -s -h c:\*.sys`
  - `fa +r +s +h c:\*.sys`
- Which command-line function can be used to display the directory structure of the disk?
  - DIR
  - CHDIR
  - DIR/ALL
  - TREE
- What is the maximum number of directories or files that can be held by another directory?
  - 32
  - 64
  - 256
  - 512
- Which MS-DOS file attribute is reserved for use by the operating system?
  - Read-only
  - Archive
  - System
  - Hidden
- Which MS-DOS file attribute is used to define the user's ability to edit that file?
  - Read-only
  - Archive
  - System
  - Hidden
- Which MS-DOS file attribute is used to define whether a file can be viewed in Windows Explorer?
  - Read-only
  - Archive
  - System
  - Hidden

## APPLY YOUR KNOWLEDGE

- A. Read-only
- B. Archive
- C. System
- D. Hidden

## Answers and Explanations

1. **A.** To access the DOS emulator, select the Run option from the Start menu, type the command `CMD` or `COMMAND` into the dialog box, and click on the OK button. `COMMAND` is an older Windows 9x version of the utility that is not fully compatible with Windows NT/2000/XP.
2. **A.** Files with `.COM`, `.EXE`, or `.BAT` extensions can be started directly from the command prompt.
3. **B.** Using the notation `*.*` tells the software to perform the designated command on any file found on the disk using any filename and extension. The `*` notation is called a wildcard and allows operations to be performed with only partial source or destination information.
4. **A.** You can use the DOS Attribute command to view the hidden system files (that is, type `Attrib -r -s -h c:\*.SYS` at the command prompt to make them visible and to remove their read-only and system status).
5. **D.** The `TREE` command lists all the directory and subdirectory names on a specified disk.
6. **D.** Microsoft directories can hold up to 512 directory or filename entries.
7. **C.** The System attribute (`+s`, `-s`) is reserved for use by the operating system and marks the file as a system file.
8. **A.** The Read-only attribute protects the file from being improperly edited or accidentally overwritten.
9. **D.** The Hidden attribute protects the file from being viewed in Windows Explorer. This is intended to prevent the accidental erasure of these files.

## Challenge Solutions

1. You should tell the customer to use the `/P` switch with the `DIR` command to display the contents of the drive one screen at a time.
2. The customer cannot see these files because they are system files and are hidden by default. He needs to execute the `ATTRIB` command from the command line to remove the hidden attribute (that is, `C:\>ATTRIB -H C:\IO.SYS`).
3. The ScanDisk utility can be used to check the disk for corruption and cross-linked files or bad allocation units. This utility should be on the customer's boot disk. If so, he can run it to check the C: drive by typing `scandisk c:` from the `A:\` prompt.

## APPLY YOUR KNOWLEDGE

### Suggested Readings and Resources

1. DOS Command-Line Navigation

<http://www.tnd.com/camosun/elex130/dostutor1.html>

2. DOS Filenames

[http://ou800doc.caldera.com/DOS\\_others/DOS\\_filenames.html](http://ou800doc.caldera.com/DOS_others/DOS_filenames.html)

3. DOS Commands

<http://www.computerhope.com/msdos.htm>

4. Wildcard Characters

<http://unixhelp.ed.ac.uk/tasks/defining.html>