NEW PERSPECTIVES

Chapter 4
Operating Systems and File Management
Computer Concepts 2014

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4 Chapter Contents

- ➤ Section A: Operating System Basics
- ➤ Section B: Today's Operating Systems
- ➤ Section C: File Basics
- ➤ Section D: File Management
- ➤ Section E: Backup Security

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4 FastPoll True/False Questions
Answer A for True and B for False

- ➤ 040100 An operating system manages a computer's resources such as the processor, RAM, and storage space.
- ➤ 040200 Multithreading provides process and memory management services that allow two or more tasks, jobs, or programs to run simultaneously.
- ➤ 040300 GUI stands for "graphic usability icons."
- ➤ 040400 A bootstrap program is a popular type of application software.
- ➤ 040500 During a computing session, the operating system is executed from RAM.

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4 FastPoll True/False Questions
Answer A for True and B for False

- ➤ 040600 The Windows kernel is the same as the Mac OS kernel.
- ➤ 040700 Macs featured a graphical user interface before PCs.
- ➤ 040800 Boot Camp is a dual boot utility for Macs.
- ➤ 040900 Mac files have a data fork and a resource fork.
- ➤ 041000 Fedora, Ubuntu, and openSUSE are Linux distributions.
- ➤ 041100 A disk partition is basically a folder.

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4 FastPoll True/False Questions
Answer A for True and B for False

- ➤ 041200 A file specification is also called a path.
- ➤ 041300 Windows File Explorer is a file management utility.
- ➤ 041400 Hard disks, CDs, and DVDs are formatted into tracks and sectors.
- ➤ 041500 Time Machine is synchronization software used for backup on Macs.
- ➤ 041600 To repopulate a new hard disk from an incremental backup, you have to first restore a full backup.
- ➤ 041700 A boot disk contains a complete copy of your computer's hard disk as it existed when the computer was new.

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4 Section A: Operating System Basics

- ➤ Operating System Tasks
- ➤ The Boot Process
- ➤ User Interfaces

4 Question

- 042100 A computer handles many tasks simultaneously. Which one of the following refers to the processor's ability to handle multiple tasks, rather than the operating system's ability to do so?
  - A. Multi-core
  - B. Multitasking
  - C. Multithreading
  - D. Multiprocessing

4 Operating System Tasks

- An operating system is a type of system software that acts as the master controller for all activities that take place within a computer system

FIGURE 4-1
Windows (left) is preinstalled on IBM-compatible computers manufactured by companies such as Dell and Hewlett-Packard. Mac OS (middle) is preinstalled on Apple Macintosh computers. Linux (right) is an open source operating system that's available as a free download.

4 Operating System Tasks

FIGURE 4-2
A command to print a document is relayed through various levels of software, including the operating system that a document must be sent to the printer.

FIGURE 4-3
Operating System Tasks

4 Operating System Tasks

- **Multitasking** provides process and memory management services that allow two or more tasks, jobs, or programs to run simultaneously
- Within a single program, **multithreading** allows multiple parts, or threads, to run simultaneously
- A **multiprocessing** capability supports a division of labor among all the processing units
- A **memory leak** is when an application requests memory but never releases it
  - Can cause an application not to function properly

4 Operating System Tasks

- Operating System Categories
  - Single-user operating system
  - Multiuser operating system
  - Server operating system
  - Desktop operating system
  - Mobile operating system

4 The Boot Process

- During the boot process, the operating system kernel is loaded into RAM
  - The kernel provides essential operating system services
- Your computer's small bootstrap program is built into special ROM circuitry housed in the computer's system unit
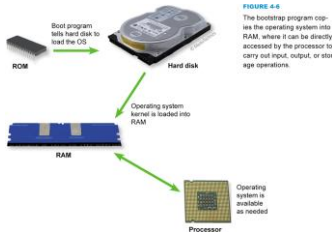
8/22/2013

4 The Boot Process

FIGURE 4-6
The bootstrap program copies the operating system into RAM, where it can be directly accessed by the processor to carry out input, output, or storage operations.

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4 User Interfaces

➢ The combination of hardware and software that helps people and computers communicate with each other

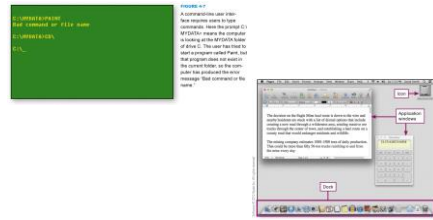Chapter 4: Operating Systems and File Management 14

4 User Interfaces

➢Basic control elements of a GUI
  ➢ Desktop
  ➢ Taskbar or dock
  ➢ Application window
  ➢ Start screen
  ➢ Icon
  ➢ Tile
  ➢ Button
  ➢ Toolbar
  ➢ Menu
  ➢ Menu bar
  ➢ Ribbon
  ➢ Submenu
  ➢ Dialog box

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4 User Interfaces

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4 User Interfaces

FIGURE 4-10
Icons (left) and Tiles (right)

FIGURE 4-11
Buttons can be arranged on a taskbar (top) or on a toolbar (bottom).

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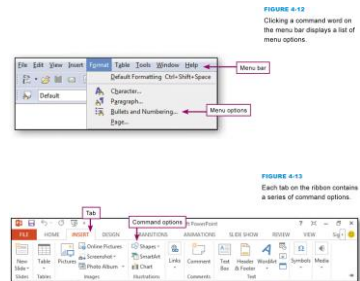
4 User Interfaces

FIGURE 4-12
Clicking a command word on the menu bar displays a list of menu options.

FIGURE 4-13
Each tab on the ribbon contains a series of command options.

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4 User Interfaces

➢ Menus, submenus, and dialog boxes

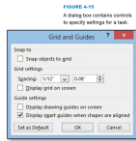FIGURE 4-14
Menu options with a ▶ symbol lead to submenus.

FIGURE 4-15
A dialog box contains controls to specify settings for a task.

4 Section B: Today's Operating Systems

➢ Microsoft Windows
➢ Mac OS
➢ iOS
➢ Android
➢ UNIX and Linux
➢ BlackBerry OS

4 Question

➢ 042200 Today's popular operating systems include Windows, Mac OS, Linux, Android, and iOS. Each has strengths and weaknesses that are important to understand. Which of the following statements is correct?
  ➢ A. iOS is built on the Windows kernel, so it is ideal for smartphones because it has good resistance to malware.
  ➢ B. If you don't like the user interface for Windows but want to run the vast variety of Windows software, you can install Linux.
  ➢ C. Linux and Mac OS have a reputation for being more stable than Windows.
  ➢ D. Windows includes software called Boot Camp that allows PCs to boot into different operating systems, such as Mac OS, Linux, iOS, and Android.

4 Microsoft Windows

FIGURE 4-16
Microsoft Windows is the world's most popular operating system. The Start screen is displayed on startup. Clicking a tile launches an application. To redisplay the Start screen, press the Windows key on the keyboard or the Start button on a Windows smartphone or tablet. ● Tour the Windows desktop and find out how to set up live tiles.

4 Mac OS

FIGURE 4-21
You can tell when you're using Mac OS by the Apple logo that appears on the menu bar. ● Tour the Mac OS desktop and compare it to the Windows desktop.
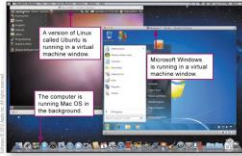
4 Mac OS

FIGURE 4-23
On a Macintosh computer with Boot Camp, you can boot into Mac OS X or into Windows. ● See how it works!

4 Mac OS

- ➤ Popular virtual machine software such as VMware and Parallels Desktop can run on most computers with Intel microprocessors, including Intel Macs, PCs, and generic Linux computers

FIGURE 4-24

On a Mac with virtual Windows and Linux, switching from one operating system to another is as simple as selecting a window. When switched to the Windows work area, you can run games, business software, and other applications designed for the Windows OS. By clicking the Linux work area, you could run Linux applications from its vast collection of open source software. After returning to the Mac OS X desktop, you could run your collection of high-end graphics and multimedia iLife software designed exclusively for the Macintosh.

4 iOS

- ➤ iOS is an operating system for the Apple iPhone, and was derived from the Mac OS X code

FIGURE 4-25
iPhones, iPod Touches, and iPads use the iOS operating system.
🔘 See how it works!

4 Android

- ➤ Android is a mobile operating system that is a popular platform for tablet computers, smartphones, and ebook readers

4 UNIX and Linux

- ➤ The UNIX operating system was developed in 1969 at AT&T's Bell Labs
  - ➤ Dependable in multiuser environments
- ➤ Linux is an operating system distributed along with its source code under the terms of a GPL (General Public License)
  - ➤ A Linux distribution is a download that contains the Linux kernel, system utilities, graphical user interface, applications, and an installation routine

4 UNIX and Linux

FIGURE 4-27
Linux users can choose from several graphical interfaces. Pictured here is the popular Ubuntu graphical desktop.
🔘 With your interactive eBook, you can tour Linux and compare it to using Windows and Mac OS.
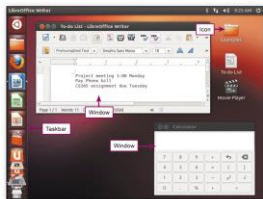
4 BlackBerry OS

- ➤ BlackBerry OS is a proprietary operating system produced by RIM
- ➤ Key feature is the ability to work with corporate e-mail software systems produced by Microsoft and IBM
- ➤ RIM pioneered push technology, in which notifications are automatically sent to a device

FIGURE 4-28
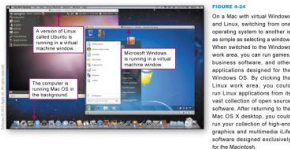BlackBerry devices are known for push technology.

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4 Section C: File Basics

➢ File Names and Extensions
➢ File Directories and Folders
➢ File Formats

4 Question

➢ 042300 Suppose a friend sends you a file called Twain.dll. From the file name, what can you deduce?

  ➢A. That it is a word processing document, probably about Mark Twain.

  ➢B. That you should be able to open it using Microsoft Word.

  ➢C. That the file extension makes it a virus.

  ➢D. That it is a support program file, perhaps part of the device driver for your scanner.

4 File Names and Extensions

➢ You must adhere to file-naming conventions when saving files

  ➢ Case sensitivity
  ➢ Maximum length
  ➢ Spaces allowed
  ➢ Numbers allowed
  ➢ Characters not allowed
  ➢ File names not allowed

➢ File extensions provide clues to the file contents

FIGURE 4-24
On a Mac with virtual Windows and Linux, switching from one operating system to another is as simple as selecting a window. When switched to the Windows work area, you can run games, business software, and other applications designed for the Windows OS. By clicking the Linux work area, you could run Linux applications from its vast collection of open source software. After returning to the Mac OS X desktop, you could run your collection of high-end graphics and multimedia iLife software designed exclusively for the Macintosh.
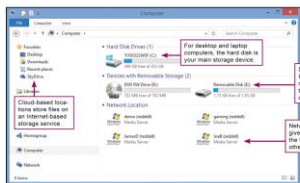
4 File Directories and Folders

➢ To designate a file's location, you must first specify the device where the file is stored
  ➢ The main hard disk usually is referred to as drive C
  ➢ Macs do not use drive letters

➢ A disk partition is a section of hard disk drive that is treated as a separate storage unit
  ➢ Partitions can be assigned drive letters
  ➢ Partitions are not the same as folders

4 File Directories and Folders

FIGURE 4-30
Files can be stored on local devices, on a network, or in the cloud. Before storing files on a network, you might need permission. To store files using a cloud-based service, such as Microsoft's SkyDrive, you'll have to sign up for an account.

4 File Directories and Folders

➢ Every storage device has a directory containing a list of its files
  ➢ Root directory
  ➢ Subdirectory
    ➢ Depicted as folders

➢ A computer's file location is defined by a file specification, or path

FIGURE 4-31
A file specification provides the name and location of a file.

C:\Music\Reggae\Marley One Love.mp3
Drive letter | Primary folder | Secondary folder | File name | File extension
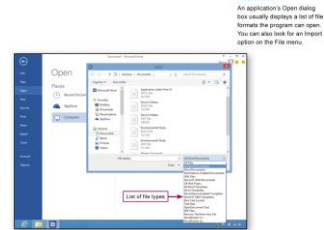
4 File Formats

➢ A file format refers to the organization and layout of data that is stored in a file
➢ The format of a file usually includes a header, data, and possibly an end-of-file marker
  ➢ A file header is a section of data at the beginning of a file that contains information about a file
➢ A file extension does not really define the format of a file

4 File Formats

➢ A software application can open files that exist in its native file format, plus several additional file formats

4 File Formats
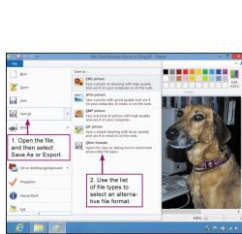
4 Section D: File Management

➢ Application-based File Management
➢ File Management Metaphors
➢ File Explorer
➢ File Management Tips
➢ Physical File Storage

4 Question

➢ 042400 Before donating your computer to a charitable organization, you can make sure your personal data cannot be accessed from the hard disk by:
  ➢ A. Deleting any files that contain personal data.
  ➢ B. Deleting files containing personal data and then emptying the Recycle Bin or Trash.
  ➢ C. Deleting all the files and folders on your computer's hard disk.
  ➢ D. Deleting all files and folders and then using file shredder software.

4 Application-Based File Management

➢ Applications generally provide a way to open files and save them in a specific folder on a designated storage device
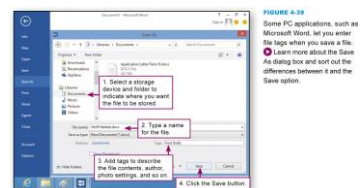
4 Application-Based File Management

FIGURE 4-40
Save vs. Save As in Windows

Save or Save As When saving a file for the first time, you can use Save or Save As.
Save When you've revised a file and want to save just the newly revised file with the same name and on the same storage device, use Save.
Save as When you've revised a file and want to save the original version in addition to the newly revised version, use Save As, give the file a different name, and/or select a different storage location.

FIGURE 4-42
Command Options for Saving Files Under Mac OS
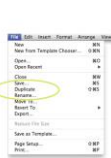
Save Use this option when saving a file for the first time or after you've revised a file and want to save the revisions.
Duplicate Use this option when you want to save a copy of a file, such as when you've revised a document but want to keep the original version in addition to the revised version.
Rename Use this option along with the Duplicate option to give your revised version a different name than the original.

4 File Management Metaphors

➢ A file management utility helps you manage files in your operating system
➢ Storage metaphors help you visualize and mentally organize the files on your disks and other storage devices
  ➢ Logical storage models
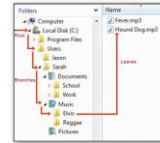
4 File Explorer

FIGURE 4-46
File Explorer makes it easy to drill down through the levels of the directory hierarchy to locate a folder or file.
Learn how to navigate through the hierarchy of folders by watching the tour for this figure in your interactive eBook.

The left pane displays your computer's hierarchy of storage devices and folders.

The ◢ icon can be used to collapse a device or folder to hide levels of the hierarchy.

The ▷ icon can be used to expand a device or folder to display the next level of the hierarchy.

The right pane displays the folders and files contained in the device or folder that is currently open in the left pane.

Any folder, device, or system object can be opened by clicking it.

4 File Explorer

➢ File Explorer helps you manipulate files and folders in the following ways:
  ➢ Rename
  ➢ Copy
  ➢ Move
  ➢ Delete
➢ Windows offers a set of preconfigured personal folders, such as My Documents and My Music, for storing your personal data files

FIGURE 4-47
Windows supplies a set of pre-configured personal folders and a corresponding set of Public folders.
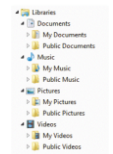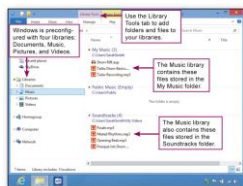
4 File Explorer

FIGURE 4-48
A library is not a "real" location; it is more like an index in a book because it points to the location of a file.
Find out how to use libraries to organize files for your projects.

Use the Library Tools tab to add folders and files to your libraries.

Windows is preconfig-ured with four libraries: Documents, Music, Pictures, and Videos.

The Music library contains these files stored in the My Music folder.

The Music library also contains these files stored in the Soundtracks folder.

4 File Management Tips

➢ Use descriptive names
➢ Maintain file extensions
➢ Group similar files
➢ Organize your folders from the top down
➢ Consider using default folders
➢ Use Public folders for files you want to share
➢ Do not mix data files and program files

4 File Management Tips

- Don't store files in the root directory
- Access files from the hard disk
- Follow copyright rules
- Delete or archive files you no longer need
- Be aware of storage locations
- Back up

4 Physical File Storage

- The physical storage model describes what happens on the disks and in the circuits
  - Storage media must be formatted before it can store files
    - The formatting process divides the disk into tracks and sectors
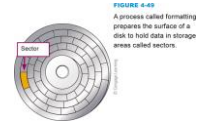
FIGURE 4-49
A process called formatting prepares the surface of a disk to hold data in storage areas called sectors.

4 Physical File Storage

FIGURE 4-50
CDs and DVDs can be created using mastering or packet-writing techniques. Mastering creates discs that can be used more reliably on a wide variety of computers and standalone players. Packet writing is more flexible for discs that you plan to use only on your own computer.

4 Physical File Storage

- The file system keeps track of the names and locations of files
  - NTFS
    - Master File Table (MFT)

FIGURE 4-51
Each colored cluster on the disk contains part of a file. Bio.txt is stored in contiguous clusters. Jordan.wks is stored in noncontiguous clusters. A computer locates and displays the Jordan.wks file by looking for its name in the Master File Table.

4 Physical File Storage

- Deleting a file changes the status of that file's clusters to empty and removes the file name from the index file
  - The file's data is still there
  - File shredder software overwrites "empty" sectors with random 1s and 0s
- Files in the Windows Recycle Bin and similar utilities can be undeleted

4 Physical File Storage

- Fragmented files are stored in noncontiguous clusters and decrease performance
- Defragmentation utilities rearrange files so that they are stored in contiguous clusters

FIGURE 4-52
Defragmenting a disk helps your computer operate more efficiently. Consider using a defragmentation utility at least once a month to keep your computer running in top form. Your interactive eBook shows you how to defragment your computer's hard disk and how to find out how much space is available for storing files.

On the fragmented disk (left), the purple, orange, and blue files are stored in noncontiguous clusters.

When the disk is defragmented (right), the sectors of data for each file are moved to contiguous clusters.

Fragmented disk   Defragmented disk

4 Section E: Backup Security

- ➢ Backup Basics
- ➢ File Copies
- ➢ Synchronization
- ➢ Windows Backup
- ➢ Backup Software
- ➢ Virtual Machines
- ➢ Tablet and Smartphone Backup

4 Question

- ➢ 042500 Copying important data files from your computer's hard disk to an optical disk or flash drive is a simple way to back up data. It is not a total backup solution, however. Why not?
  - ➢ A. You cannot restore these files to a new hard disk without the activation codes.
  - ➢ B. The backup is bootable, but it won't start your computer if the hard disk fails.
  - ➢ C. You have not backed up your programs or your personal settings.
  - ➢ D. You have not backed up the restore points needed to reconfigure the Windows Registry for a new hard disk.

4 Backup Basics

- ➢ A backup stores the files needed to recover data that's been wiped out by operator error, viruses, or hardware failures
- ➢ Your backup schedule depends on how much data you can afford to lose
- ➢ You should test your backup by trying to restore one file
- ➢ The backup device you select depends on the value of your data, your current equipment, and your budget
  - ➢ Online backup services

4 Backup Basics

FIGURE 4-53
The device that holds your backups depends on what you want to back up.

4 File Copies

- ➢ Unique files are difficult to reproduce
- ➢ Manually copying and pasting requires you to select the files and destination device each time

FIGURE 4-54
Back up these files in addition to your documents, graphics, and music files.

4 Synchronization

- ➢ Synchronization compares the content of files on two devices and makes them the same
- ➢ A program called Time Machine supplied with Mac OS X is a good example of synchronization software
  - ➢ Synchronizes every hour

4 Synchronization

FIGURE 4-55
Time Machine saves hourly backups for the past 24 hours, daily backups for the past month, and weekly backups for data older than a month. When the backup device runs out of space, Time Machine deletes the oldest weekly backup.

4 Windows Backup

➢ Windows 8 includes a synchronization utility called File History

FIGURE 4-56
Microsoft Windows 8 includes the File History utility to back up important files. ⦿ Discover how to activate it.

4 Windows Backup

➢ A full system backup includes a copy of every file stored on your computer's hard drive
➢ A boot disk is a removable storage medium containing the operating system files needed to boot your computer without accessing the hard disk
➢ A recovery disk is a bootable CD, DVD, or other media that contains a complete copy of your computer's hard disk as it existed when the computer was new

4 Windows Backup

➢ A recovery partition is located on the computer's hard disk and contains the necessary files to restore a computer to its original state
➢ The Windows Registry is an important group of files used by the Windows operating sytsem to store configuration information about all the devices and software installed on a computer system
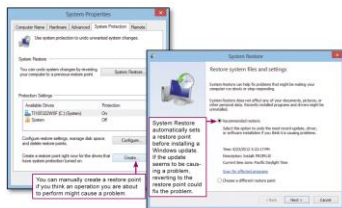➢ A restore point is a snapshot of your computer settings

4 Windows Backup

FIGURE 4-57
Restore points can be set by accessing the Control Panel and then searching for 'Restore Point.' ⦿ Use this figure in your interactive eBook to learn how to work with restore points.

4 Backup Software

➢ Backup software is a set of utility programs designed to back up and restore some or all of the files on a computer's primary storage device
➢ A backup made by copying all the files to a backup device is called a full backup
➢ A differential backup makes a backup of only those files that were added or changed since your last full backup session
➢ An incremental backup makes a backup of the files that were added or changed since the last backup—not necessarily the files that changed from the last full backup
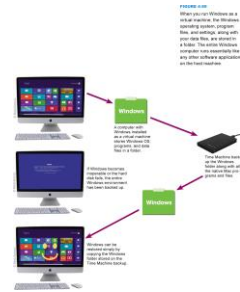
4 Backup Software

- Restoring a computer usually entails several steps
- A bare-metal restore restores the computer in a single step
- A disk image is a bit-by-bit copy of the data from all sectors of a disk

FIGURE 4-58
Disk imaging software, such as Acronis True Image, creates a bit-by-bit copy of all the data on your computer's hard disk that can be used to restore all operating system, program, and data files.
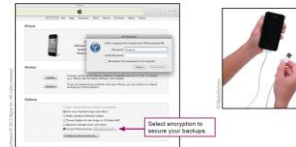
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4 Virtual Machines

FIGURE 4-59
When you run Windows as a virtual machine, the Windows operating system, program files, and settings, along with your data files, are stored in a folder. The entire Windows computer runs essentially like any other software application on the host machine.

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4 Tablet and Smartphone Backup

- Handheld devices are usually backed up by synching them to a desktop or laptop computer
- Synching is usually initiated by tethering your handheld device to a full-size computer using a USB cable
- iPhones, iPods, and iPads synch with iTunes software, and you have the option to encrypt the backup to prevent your data from exposure if your computer falls victim to an unauthorized intrusion
- Many Android devices include backup software, usually accessible from the Settings icon

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4 Tablet and Smartphone Backup

FIGURE 4-60
iTunes creates a backup of the data stored on your iPad, iPod, or iPhone.

Select encryption to secure your backups

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4 What Do You Think?

- 043100 Should a computer virus distribution sentence carry the same penalty as manslaughter?
  - A. Yes   B. No   C. Not sure
- 043200 Should it be a crime to steal a copy of computer data while leaving the original data in place and unaltered?
  - A. Yes   B. No   C. Not sure
- 043300 Should hackers be sent to jail if they cannot pay restitution to companies and individuals who lost money as the result of a prank?
  - A. Yes   B. No   C. Not sure
- 043400 Do you think that a hacker would make a good consultant on computer security?
  - A. Yes   B. No   C. Not sure

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NEW PERSPECTIVES

Chapter 4 Complete

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