Introduction to Computer CC111

Week 04

Storage Devices & System vs. Application Software

Overview

1. Examine the characteristics common among all storage systems.
2. Discuss the primary storage for most personal computers—the hard drive.
3. Discuss how optical discs work and the various types that are available today.
4. Discuss flash memory storage systems.
5. Discuss network and online/cloud storage, smart cards, holographic storage, and storage systems used with large computer systems.
6. Evaluate storage alternatives for a typical personal computer.

Overview

- Understand the difference between system software and application software.

- Explain the different functions of an operating system and discuss some ways that operating systems enhance processing efficiency.

- Today's most widely used operating systems for personal computers and servers.

- Characteristics of application software in general

Storage System Characteristics

- Storage Media and Storage Devices
  - Medium
    - Hardware where data is stored
    - DVD disc, flash memory card, etc.
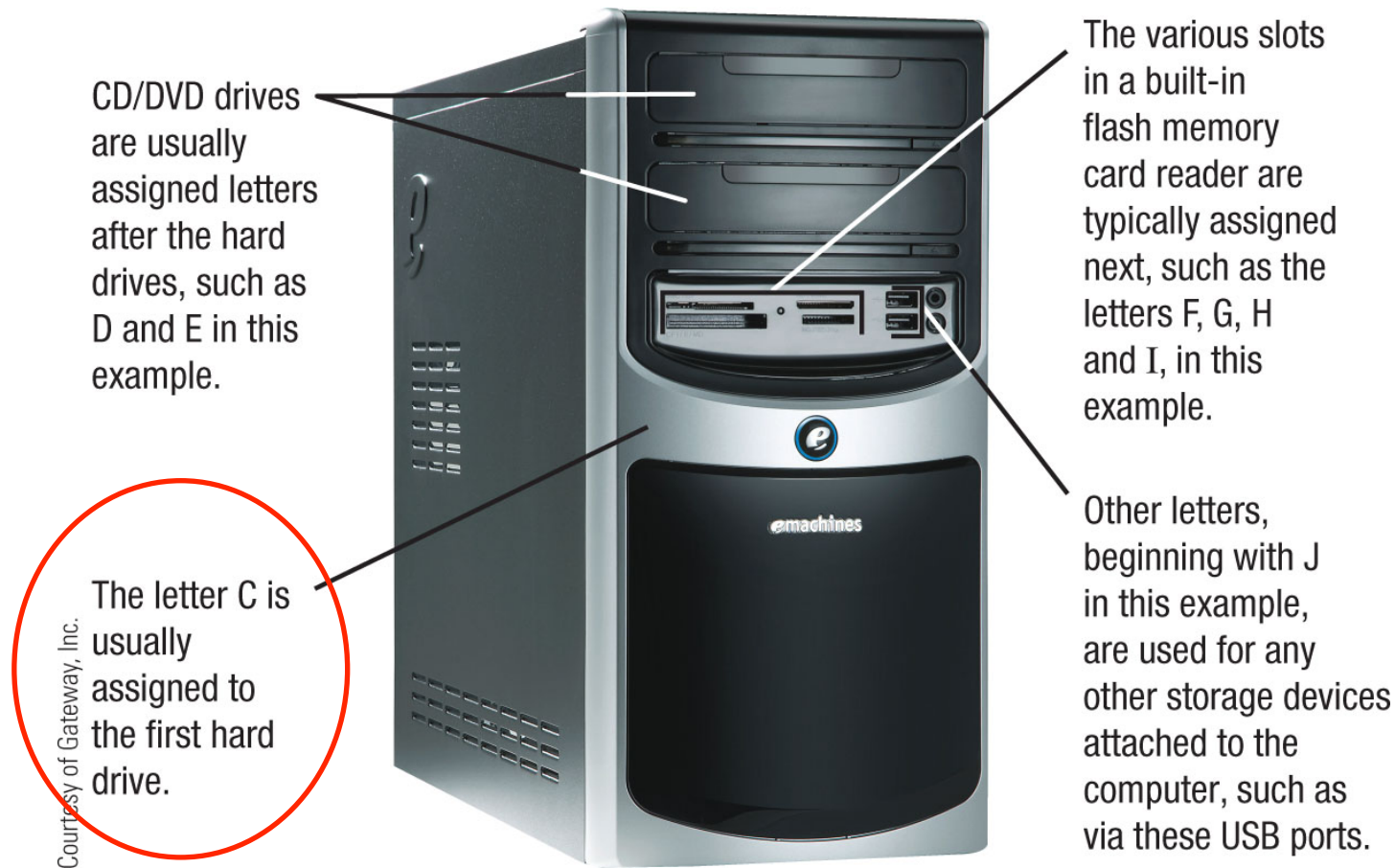
  - Device
    - DVD drive, flash memory card reader, etc.
    - Medium is inserted into device to be used

  - Can be internal, external, or remote

Storage System Characteristics

CD/DVD drives are usually assigned letters after the hard drives, such as D and E in this example.

The various slots in a built-in flash memory card reader are typically assigned next, such as the letters F, G, H and I, in this example.

The letter C is usually assigned to the first hard drive.

Other letters, beginning with J in this example, are used for any other storage devices attached to the computer, such as via these USB ports.

Courtesy of Gateway, Inc.
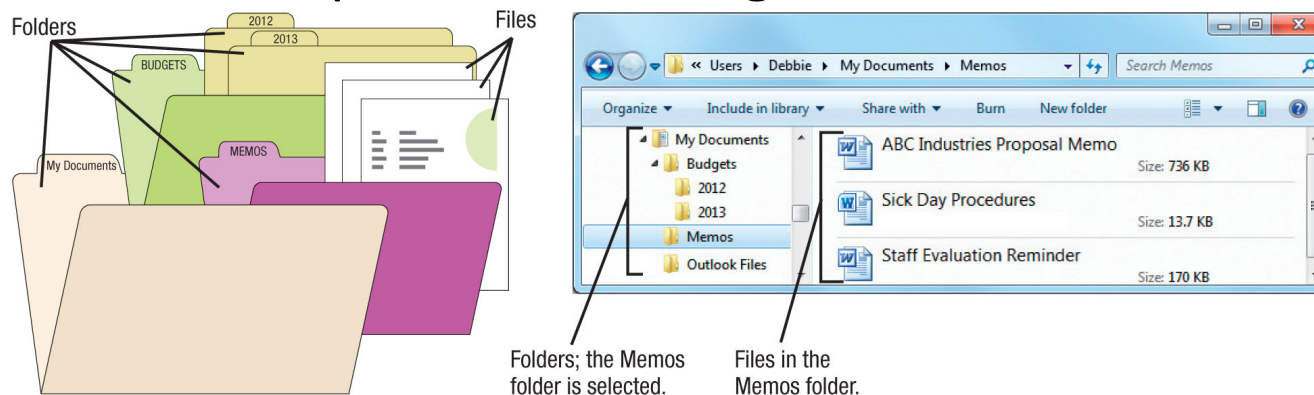
Storage System Characteristics

- Volatility
  - Storage devices are nonvolatile
- Random vs. Sequential Access
  - Random access (direct access) allows data to be retrieved from any location on the storage medium
  - Most storage devices use random access
  - Sequential access means retrieval of data can occur only in the order in which it was physically stored on the storage medium
    - Magnetic tape drive

Storage System Characteristics

- Logical vs. Physical Representation
  - File
    - Anything stored on a storage medium, such as a program, document, digital image, or song
  - Filename
    - Name given to a file by the user
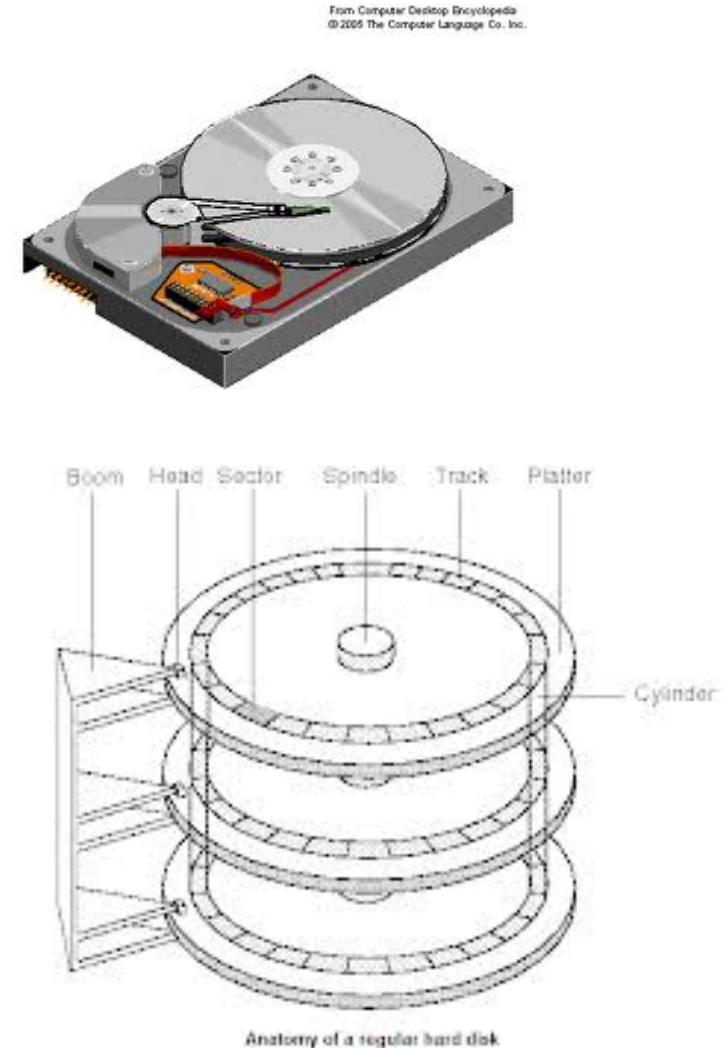 - Folder
    - Named place on a storage medium

Folders

Files

2012
2013
BUDGETS
MEMOS
My Documents

Folders; the Memos folder is selected.

Files in the Memos folder.

© Cengage Learning; Courtesy of Microsoft

Storage System Characteristics

- – Logical file representation
  - Individuals view a document stored as one complete unit in a particular folder on a particular drive
- – Physical file representation
  - Computers access a particular document stored on a storage medium using its physical location or locations
- Types of Storage Technology Used
  - Magnetic (conventional hard drives)
  - Optical (optical discs)
  - Electrons (flash memory media)

Hard Drives

- Hard Drive
  - Used to store most programs and data
  - Can be internal or external
  - Can be encrypted
- Magnetic Hard Drives
  - One or more permanently sealed metal magnetic disks with an access mechanism and read/write heads
  - Read/write heads magnetize particles to represent the data's 0s and 1s

From Computer Desktop Encyclopedia
© 2005 The Computer Language Co. Inc.

Boom Head Sector Spindle Track Platter

Cylinder

Anatomy of a regular hard disk

Hard Drives

2.5-INCH HARD DRIVE LOCATED INSIDE A NOTEBOOK COMPUTER

MOUNTING SHAFT
The mounting shaft spins the hard disks at a speed of several thousand revolutions per minute while the computer is turned on.

READ/WRITE HEADS
There is a read/write head for each hard disk surface, and they move in and out over the disks together.

HARD DISKS
There are usually several hard disk surfaces on which to store data. Most hard drives store data on both sides of each disk.

SEALED DRIVE
The hard disks and the drive mechanism are hermetically sealed inside a case to keep them free from contamination.

ACCESS MECHANISM
The access mechanism moves the read/write heads in and out together between the hard disk surfaces to access required data.
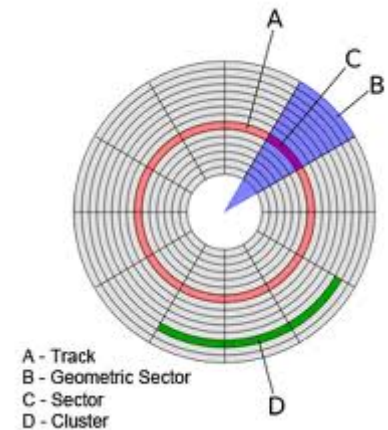
INSIDE A 3.5-INCH HARD DRIVE

Courtesy of Hitachi Global Storage Technologies; Courtesy Western Digital

Hard Drives

— Hard disks are divided into

- Tracks
  - Concentric path on disk where data is recorded
- Sectors
  - A small piece of the track
- Clusters
  - One or more sectors; smallest addressable area of a disk
- Cylinders
  - Collection of tracks located in the same location on a set of hard disk surfaces

A - Track
B - Geometric Sector
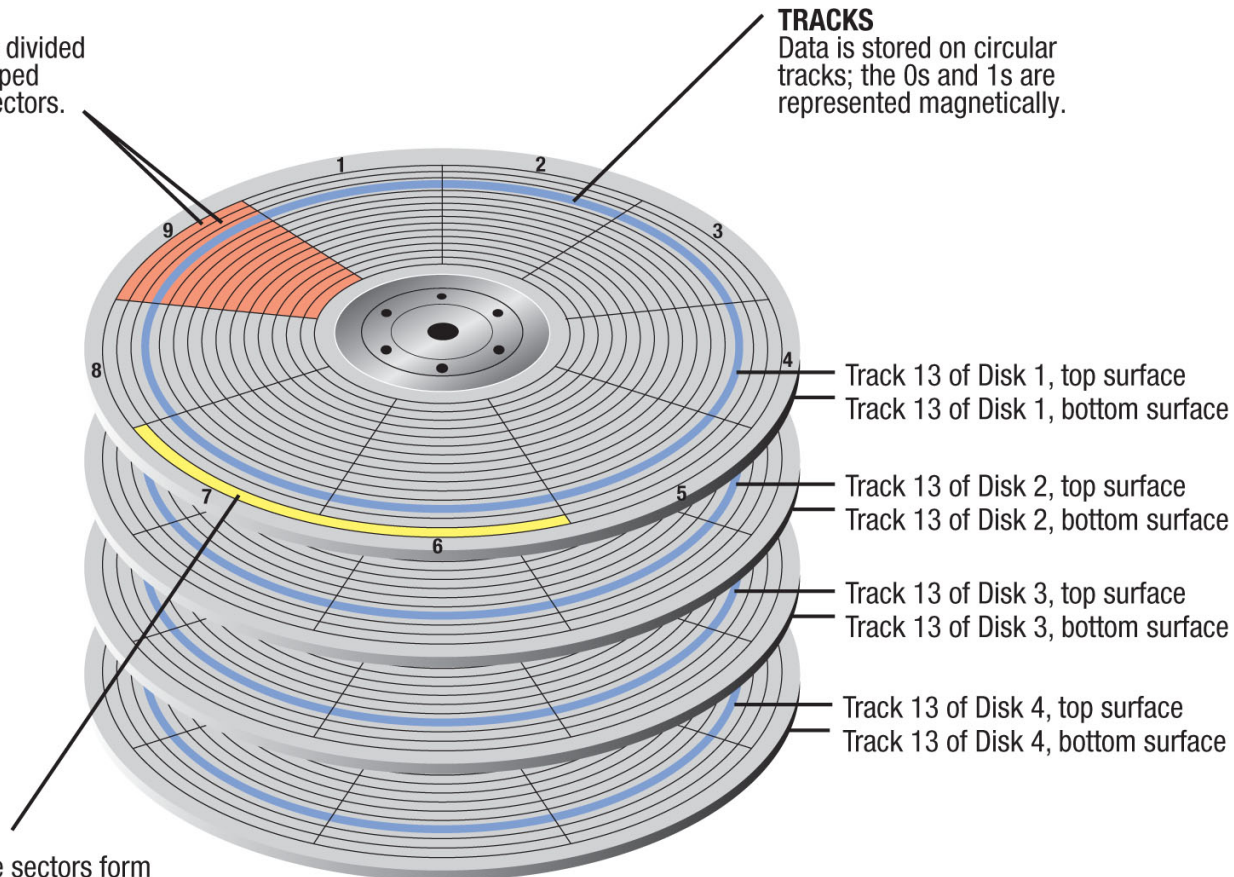C - Sector
D - Cluster

Hard Drives

SECTORS
Each disk is divided into pie-shaped groups of sectors.

TRACKS
Data is stored on circular tracks; the 0s and 1s are represented magnetically.

Track 13 of Disk 1, top surface
Track 13 of Disk 1, bottom surface

Track 13 of Disk 2, top surface
Track 13 of Disk 2, bottom surface

Track 13 of Disk 3, top surface
Track 13 of Disk 3, bottom surface

Track 13 of Disk 4, top surface
Track 13 of Disk 4, bottom surface

CYLINDER
A cylinder consists of a vertical stack of tracks, the same relative track on each disk surface.

CLUSTERS
One or more sectors form a cluster, the smallest storage area on a disk.
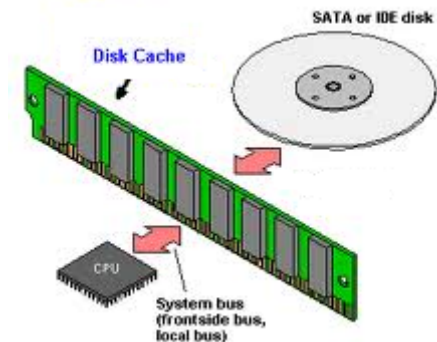
Hard Drives

- Solid State Drives (SSDs)
  - Use flash memory technology
  - Use less power and have no moving parts
  - Particularly appropriate for portable computers and mobile devices

Courtesy Transcend Information USA

Data is stored in flash memory chips located inside the drive; unlike magnetic drives, there are no moving parts.
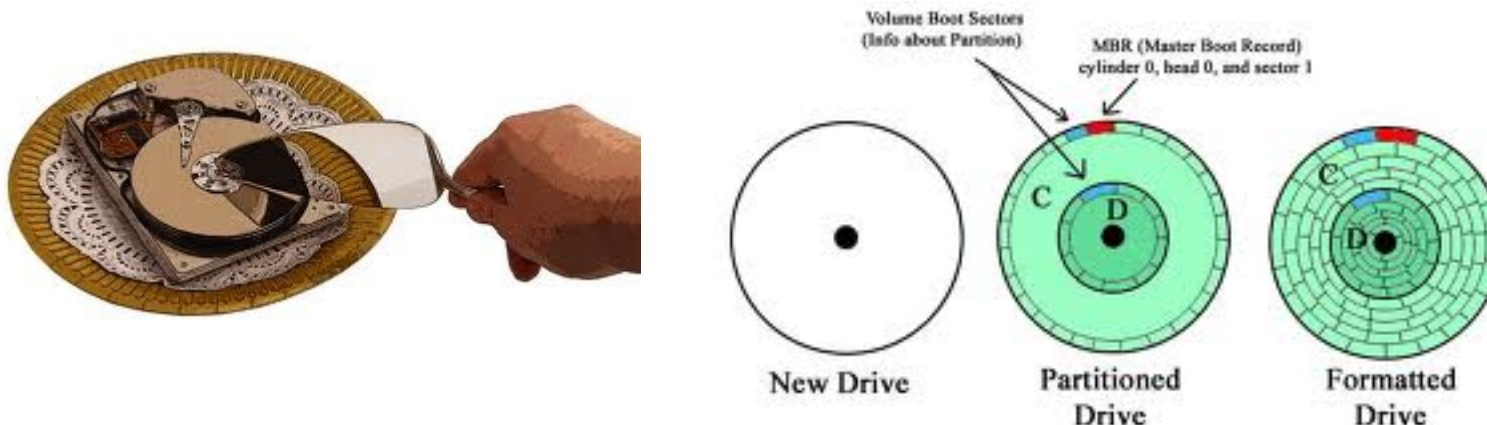
Hard Drives

- Hard Drive Speed, Disk Caching, and Hybrid Hard Drives
  - Disk access time
    - Total time that it takes for a hard drive to read or write data
    - Consists of seek time, rotational delay, and data movement time
      - SSDs don't require seek time or rotational delays
  - Disk cache
    - Memory used in conjunction with a magnetic hard drive to improve system performance
    - Can be a dedicated part of RAM or memory chips on a circuit board inside the hard drive case

Hard Drives

- Hard Drive Partitioning and File Systems
  - Partitioning
    - Divides the physical capacity of a single drive logically into separate areas, called partitions
    - Referred to as logical drives
    - Increase efficiency (smaller drives use smaller clusters)

Volume Boot Sectors
(Info about Partition)

MBR (Master Boot Record)
cylinder 0, head 0, and sector 1

New Drive

Partitioned Drive
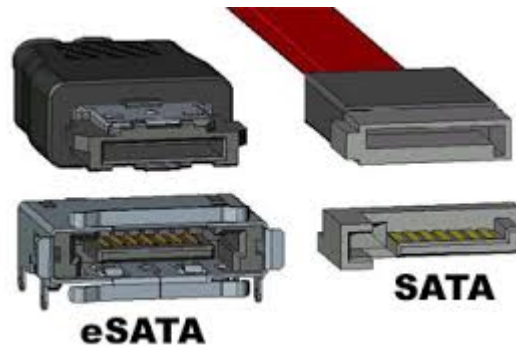
Formatted Drive

Hard Drives

- Hard Drive Interface Standards
  - Determine how a drive connects to the computer
  - Common standards
    - Parallel ATA (PATA) - older, slower standard

    - Serial ATA (SATA)
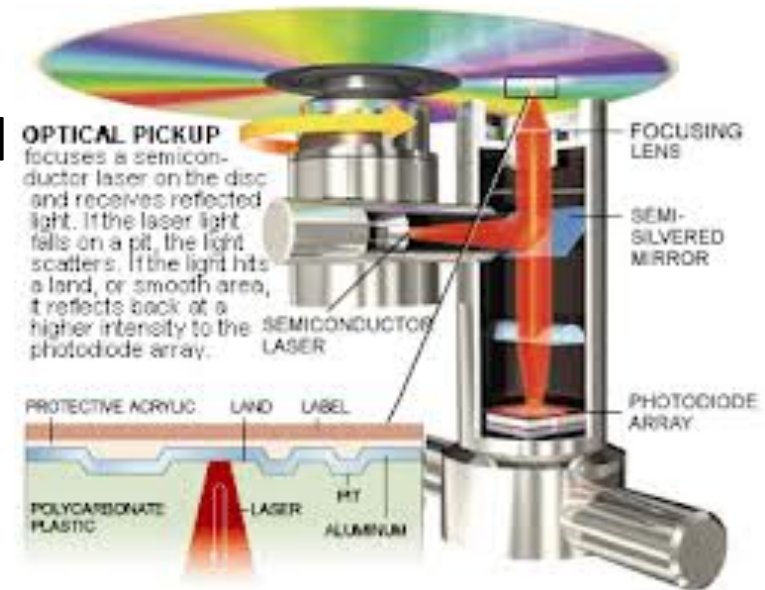
- eSATA

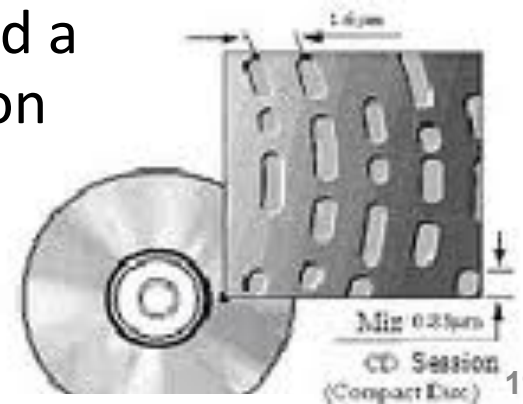- SCSI and the newer serial attached SCSI (SAS)

Optical Disks and Drives

- Optical Disc Characteristics
  - A type of storage read from and written to using laser beams

  - Divided into sectors like magnetic discs but use a single spiral track (groove)

  - Have a relatively large capacity and are durable

  - Used for backup purposes and for storing and transporting music, photos, video, etc.

OPTICAL PICKUP focuses a semiconductor laser on the disc and receives reflected light. If the laser light falls on a pit, the light scatters. If the light hits a land, or smooth area, it reflects back at a higher intensity to the photodiode array.

FOCUSING LENS

SEMI-SILVERED MIRROR

SEMICONDUCTOR LASER

PHOTODIODE ARRAY

PROTECTIVE ACRYLIC   LAND   LABEL

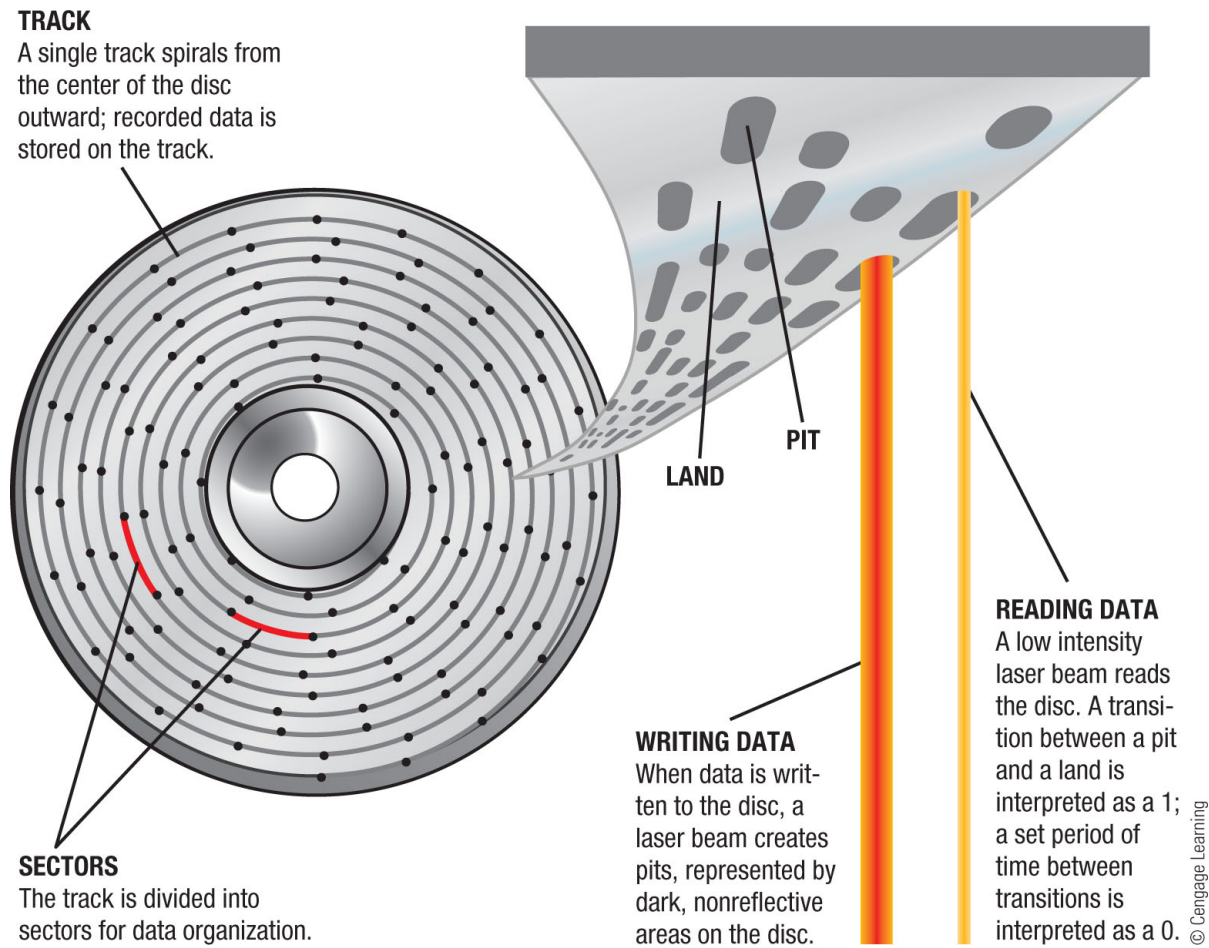POLYCARBONATE PLASTIC   LASER   PIT   ALUMINUM

Optical Discs and Drives

– Representing Data on an Optical Disc

- Read-only optical disc
  - Surface of disc is molded or stamped
- Recordable or rewritable disc
  - Optical drive is used and the reflectivity of the disc is changed using a laser to represent the data
- Data is stored in 0s and 1s
  - Pits and lands are used to represent 1s and 0s
  - The transition between a pit and a land represents a 1; no transition represents a 0

Optical Discs and Drives

TRACK
A single track spirals from the center of the disc outward; recorded data is stored on the track.

SECTORS
The track is divided into sectors for data organization.

LAND

PIT

WRITING DATA
When data is written to the disc, a laser beam creates pits, represented by dark, nonreflective areas on the disc.

READING DATA
A low intensity laser beam reads the disc. A transition between a pit and a land is interpreted as a 1; a set period of time between transitions is interpreted as a 0.

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Optical Discs and Drives

– Optical Drives

- Three categories of discs: CD, or Blu-Ray Disc (BD)

- Can be read-only, recordable rewritable

- Can support single or dual layer discs

- Recording data onto disc is called burning

- Can be internal or external drives

  – External drives typically USB

Flash Memory Storage Systems

- Flash Memory
  - Non-volatile memory chips used for storage by the computer or the user
  - Used in SSDs, hybrid hard drives, and USB flash drives
- Embedded Flash Memory
  - Flash memory chips embedded into products, such as

Portable digital media players	Digital cameras	GPS devices
Handheld gaming devices	Mobile phones	Sunglasses
Wristwatches	Tablet computers	Smartphones

Flash Memory Storage Systems

- Flash Memory Cards and Readers
  - Flash memory card
    - A small card containing one or more flash memory chips, controller chips, and metal contacts to connect the card to the device or reader with which it is being used

FLASH MEMORY CARD READERS
Can be built-in or external and usually support several different types of flash memory media; external readers such as this one typically connect to a computer via a USB port.

COMPACTFLASH (CF) CARDS

MEMORY STICKS

SECURE DIGITAL (SD) CARDS

XD PICTURE CARDS

Courtesy of Kingston Technology Company, Inc.

Courtesy of Kingston Technology Company, Inc.

Courtesy of Sony Electronics Inc.

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Courtesy of Olympus

Other Types of Storage Systems

- Network Storage and Online/Cloud Storage Systems
  - Remote storage
    - Using a storage device not directly connected to the computer being used
    - Accessed through the internet or through a network
  - Network storage
    - Via a local network

Other Types of Storage Systems

– Network attached storage (NAS)

- Connected directly to a network

- High performance storage for computers connected to a network

NETWORK ATTACHED STORAGE (NAS) DEVICES
This NAS device holds 4 TB of data and provides
storage for all computers on the network

Other Types of Storage Systems

- Online storage or cloud storage
  - Accessed via the Internet
    - Via Web sites (Flickr, Facebook, Google Docs, etc.)
    - Via online storage sites (Box.net, SkyDrive, etc.)
    - Growing in importance because more and more applications are web-based
    - Increasing being used for back up purposes
    - Many web sites providing online storage offer it free

Evaluating Your Storage Alternatives

- Product Characteristics to Consider:
  - Speed
  - Compatibility
  - Storage capacity
  - Portability
- Most Users Require:
  - Hard drive
  - Recordable or rewritable optical drive
  - Flash memory card reader
  - USB port(s)

System Software vs. Application Software

- System Software
  - The operating system and utility programs that control a computer system and allow you to use your computer
    - Enables the boot process, launches applications, transfers files, controls hardware configuration, manages files on the hard drive, and protects from unauthorized use
- Application Software
  - Programs that allow a user to perform specific tasks on a computer
    - Word processing, playing games, preparing taxes, browsing the Web, listening to music, etc.

The Operating System

- Operating System

  - A collection of programs that manage and coordinate the activities taking place within a computer system

  - Acts as an intermediary between the user and the computer and between the application programs and system hardware

The Operating System cont...

- **Functions of an Operating System**

   1) Interfacing with Users (typically via a GUI)

   2) Booting the Computer
   - Loads essential part of operating system (kernel) into memory
   - Determines hardware connected to computer

   3) Configuring Devices
   - Device drivers are often needed
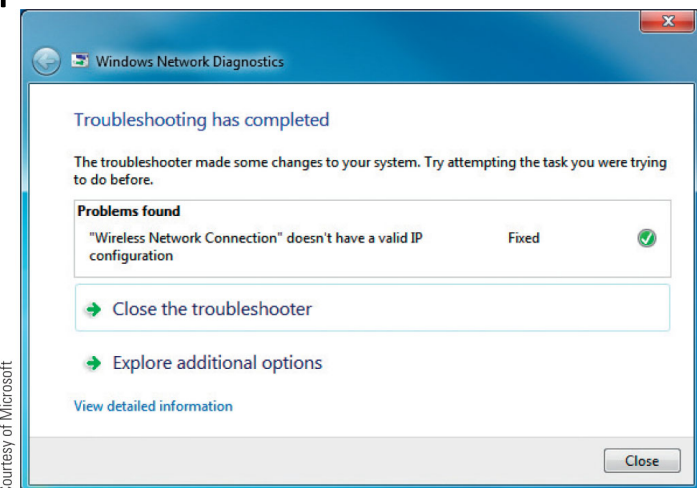   - Plug and Play devices are recognized automatically

The Operating System cont...

4) Managing Network Connections

- Manages wired connections to home or office network
- Manages wireless connections at home, school, work, or on the go

5) Managing and Monitoring Resources and Jobs

- Makes resources available to devices
- Monitors for problems and attempts to correct those that arise
- Schedules jobs
  - Jobs to be printed
  - Files to be retrieved from |hard drive

Windows Network Diagnostics

Troubleshooting has completed

The troubleshooter made some changes to your system. Try attempting the task you were trying to do before.

Problems found

| "Wireless Network Connection" doesn't have a valid IP configuration | Fixed | ✅ |

➜ Close the troubleshooter

➜ Explore additional options

View detailed information
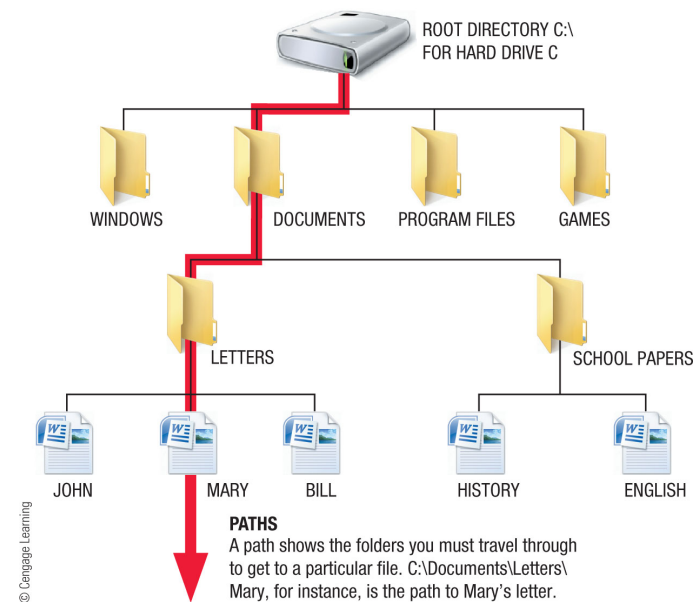
Close

Courtesy of Microsoft

The Operating System cont...

6) File Management
- Keeps track of stored files on computer so they can be retrieved when needed
  - Files usually viewed in a hierarchical format

7) Security
- Passwords
- Biometric characteristics
- Firewalls

ROOT DIRECTORY C:\ FOR HARD DRIVE C

WINDOWS   DOCUMENTS   PROGRAM FILES   GAMES

LETTERS   SCHOOL PAPERS

JOHN   MARY   BILL   HISTORY   ENGLISH

PATHS
A path shows the folders you must travel through to get to a particular file. C:\Documents\Letters\ Mary, for instance, is the path to Mary's letter.

© Cengage Learning

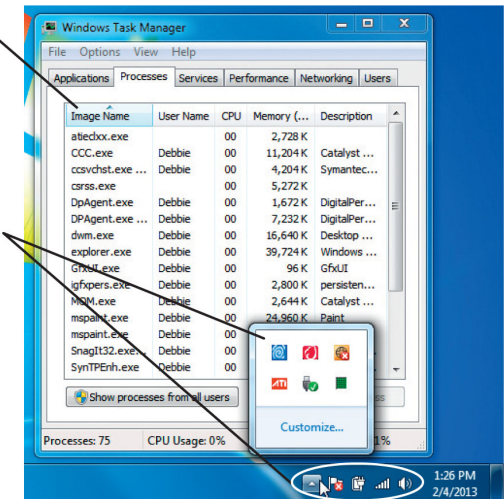# The Operating System cont...

- **Processing Techniques for Increased Efficiency**

  1) Multitasking

    - The ability of an operating system to have more than one program (task) open at one time

      – CPU rotates between tasks

      – Switching is done quickly

      – Appears as though all programs executing at the same time

TASK MANAGER
These programs are running, even before any application programs are launched by the user.

NOTIFICATION AREA ICONS
These programs were launched during the boot process and will show in the notification area unless they are closed by the user (right-click an icon to see if you can close that program).

Courtesy of Microsoft

The Operating System cont…

2) Multiprocessing

- Each CPU (or core) typically works on a different job
- Used with personal computers with multi-core processors
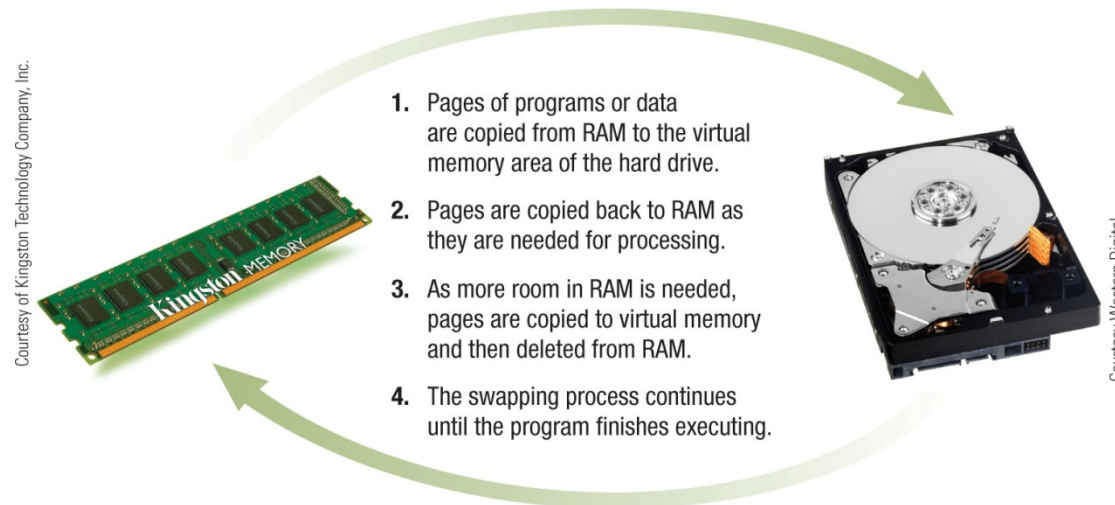
3) Parallel Processing

- CPUs or cores typically works together to complete one job more quickly
- Used with servers and mainframes

In either case, tasks are performed simultaneously

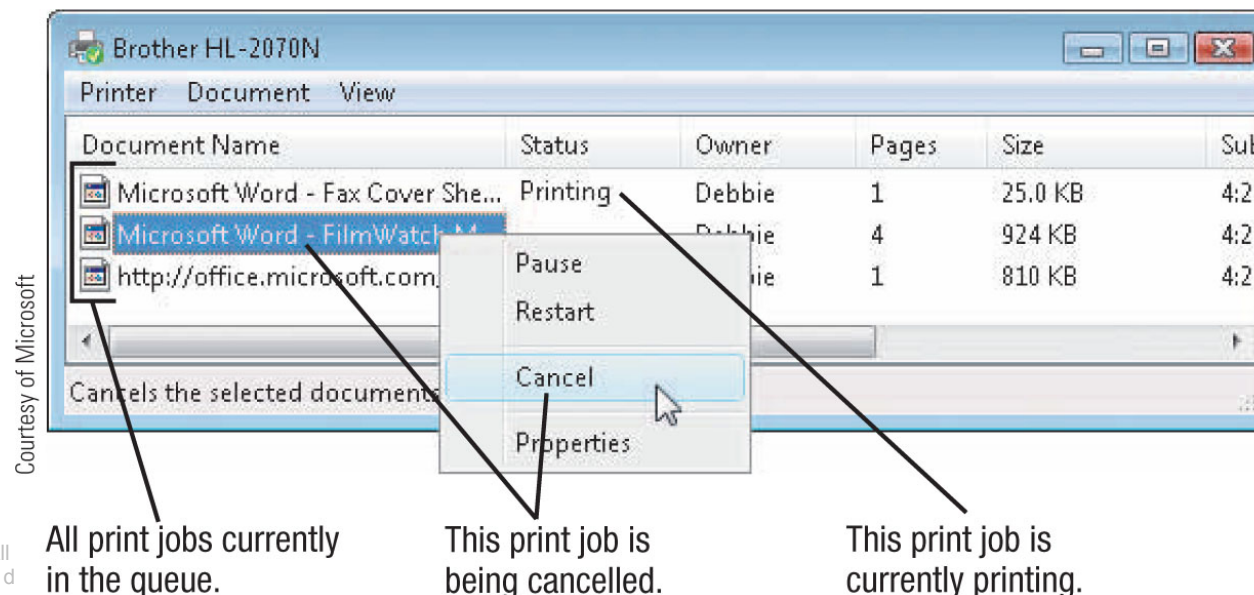# The Operating System cont…

4) Memory Management

- Optimizing the use of main memory (RAM)

- Virtual memory

  – Memory-management technique that uses hard drive space as additional RAM

1. Pages of programs or data are copied from RAM to the virtual memory area of the hard drive.

2. Pages are copied back to RAM as they are needed for processing.

3. As more room in RAM is needed, pages are copied to virtual memory and then deleted from RAM.

4. The swapping process continues until the program finishes executing.

Courtesy of Kingston Technology Company, Inc.

Courtesy Western Digital

The Operating System cont...

5) Buffering and Spooling
- Used with printers and other peripheral devices
- Buffer
  - Area in RAM or on the hard drive designated to hold input and output on their way in or out of the system
- Spooling
  - Placing items in a buffer so they can be retrieved by the appropriate device when needed

Courtesy of Microsoft

All print jobs currently in the queue.

This print job is being cancelled.

This print job is currently printing.

The Operating System cont...

- **<u>Differences Among Operating Systems</u>**
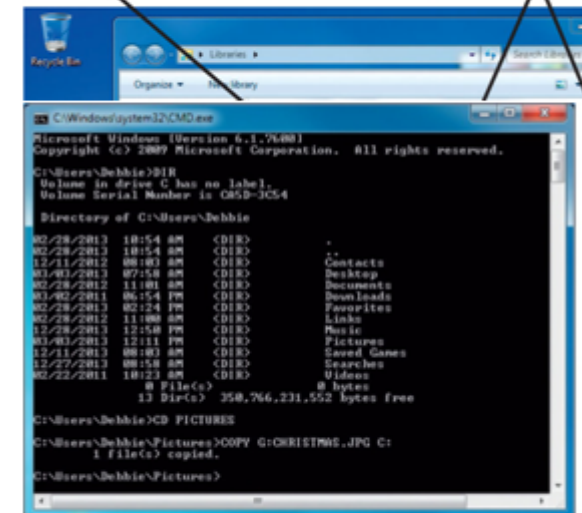 - Command Line Interface
    - Requires user to communicate instructions to computer via typed commands
  - Graphical User Interface
    - Graphics based interface
    - Most operating systems today use GUI

LIBRARIES
Help users find related documents.

AERO INTERFACE
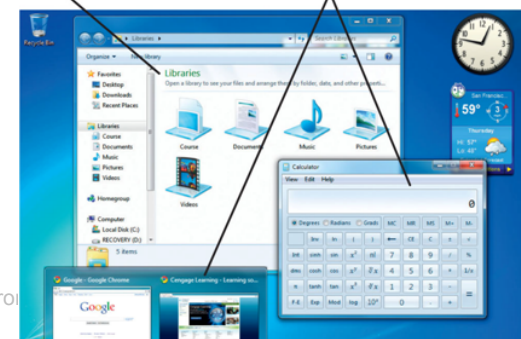Windows are still tra (such as Live Thumb

COMMAND LINE INTERFACE
Commands are entered using the keyboard.

Help users find related documents.

Windows are still transparent and 3D options (such as Live Thumbnails) are active.
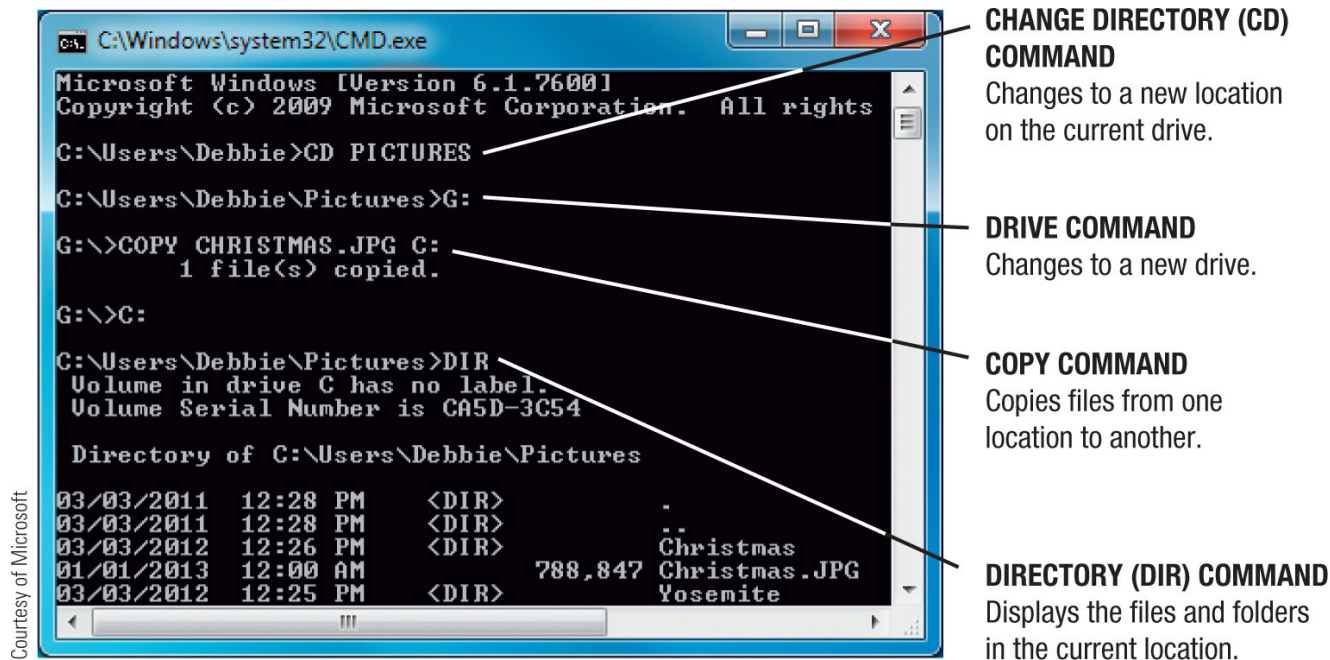
The Operating System cont...

- **Types of Operating Systems**
  - Personal (Desktop) Operating Systems
    - Designed to be installed on a single computer
  - Server (Network) Operating Systems
    - Designed to be installed on a network server
    - Client computers still use a personal operating system
    - Server operating system controls access to network resources
  - Mobile and embedded operating systems also exist

Operating Systems for Personal Computers and Servers

1) DOS (Disk Operating System)

- DOS traditionally used a command-line interface

- Dominant operating system in the 1980s and early 1990s

- Can enter DOS commands in Windows

CHANGE DIRECTORY (CD) COMMAND
Changes to a new location on the current drive.

DRIVE COMMAND
Changes to a new drive.

COPY COMMAND
Copies files from one location to another.

DIRECTORY (DIR) COMMAND
Displays the files and folders in the current location.

Courtesy of Microsoft

Operating Systems for Personal Computers and Servers cont…

2) Windows

- The predominant personal operating system developed by Microsoft Corporation

- Windows 1.0 through Windows XP

  - Windows 1.0 released in 1985

    - Windows 1.0 through *Windows 3.x* were operating environments for DOS

    - Graphical shell wrapped around DOS

    - Designed to make using DOS easier

Operating Systems for Personal Computers and Servers cont…

- Windows 95, Windows 98, and Windows ME
  - Designed for personal computers
- Windows NT (New Technology)
  - First 32-bit version of Windows designed for high-end workstations and servers
  - Replaced by Windows 2000
- Windows XP
  - Replaced Windows
  - Support for new hardware, networking and the internet, multimedia, and pen input were included
  - Microsoft will provide support until 2014

Operating Systems for Personal Computers and Servers cont…

- Windows Vista
  - Replaced Windows 2000
  - Uses an Aero interface
    - Transparent windows
    - Dynamic elements such as *Live Thumbnails* of task bar buttons and a *Flip 3d* feature
  - Additional features
    - Sidebar, Instant Search
    - Built-in security
    - Much improved networking, collaboration, and synchronization tools
  - Hardware requirements for Vista have increased over earlier versions of Windows

Operating Systems for Personal Computers and Servers cont…

- Windows 7
  - Newest version of Windows released Oct. 2009
    - 32-bit and 64-bit versions in four editions
    - Home Premium (primary version for home users)
    - Professional (primary version for businesses)
    - Starts up and responds faster than Vista

- Windows Server and Windows Home Server
  - Windows Server is a server version of Windows

- Windows Home Server
  - Provides services for a home network

Operating Systems for Personal Computers and Servers cont…

3) Mac OS
- Proprietary operating system for computers made by Apple Corporation
- Based on the UNIX operating system

4) UNIX
- Is a Multiuser, multitasking operating system
- Requires a higher level of technical knowledge; tends to be harder to install, maintain, and upgrade

5) Linux
- Is increasingly being used with personal computers, servers, mainframes, and supercomputers
- Is open-source software; has been collaboratively modified by volunteer programmers all over the world
- Originally used a command line interface, most recent versions use a GUI

Operating Systems for Mobile Phones and Other Devices

6) Mobile and Embedded Versions of Windows

- Windows Phone 7
  - Newest version of Windows designed for mobile phones
  - Designed primarily for touch input
  - Contains apps such as mobile versions of Internet Explorer and Microsoft Word, Excel, and PowerPoint
- Windows Embedded
  - Designed primarily for consumer and industrial devices that are not personal computers
    - Cash registers, digital photo frames, GPS devices, ATM machines, medical devices, and robots

Operating Systems for Mobile Phones and Other Devices cont…

- Android
  - Linux-based operating system created with current mobile device capabilities in mind
    - Can create applications that take full advantage of all the features a mobile device has to offer

- iOS
  - Designed for Apple Mobile phones and mobile devices

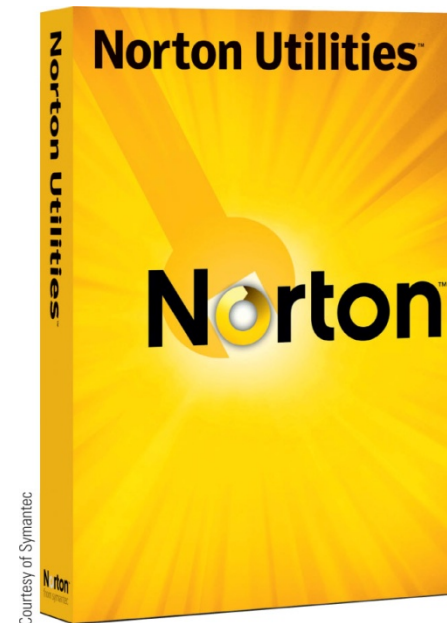# Operating Systems for Mobile Phones and Other Devices cont…

- BlackBerry OS and Blackberry Tablet OS
  - Designed for BlackBerry devices

- HP webOS
  - Designed for Palm devices

- Symbian OS
  - Use to be the most widely used mobile operating system
  - Use is now declining and is expected to continue

Utility Programs

- **Utility Program**
  - Software that performs a specific task, usually related to managing or maintaining the computer system

  - Many utilities are built into operating systems (for finding files, viewing images, backing up files, etc.)

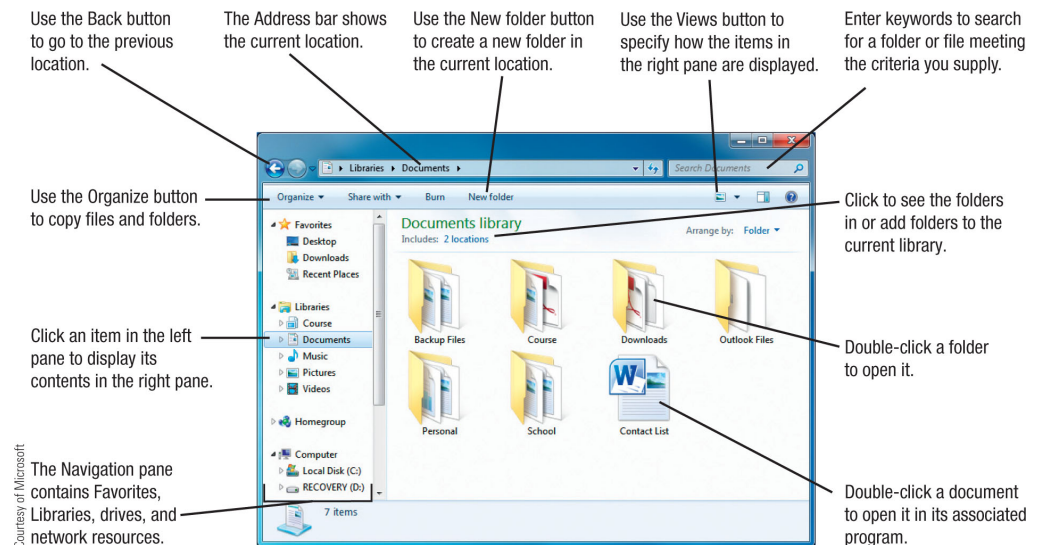 - Utilities are also available as stand-alone products

Utility Programs cont...

- **File Management Programs**
  - Enable the user to perform file management tasks, such as:
    - Looking at the contents of a storage medium
    - Copying, moving, and renaming files and folders
    - Deleting files and folders
    - File management program in Windows is Windows Explorer

Use the Back button to go to the previous location.

The Address bar shows the current location.

Use the New folder button to create a new folder in the current location.

Use the Views button to specify how the items in the right pane are displayed.

Enter keywords to search for a folder or file meeting the criteria you supply.

Use the Organize button to copy files and folders.

Click to see the folders in or add folders to the current library.

Click an item in the left pane to display its contents in the right pane.

Double-click a folder to open it.

The Navigation pane contains Favorites, Libraries, drives, and network resources.

Double-click a document to open it in its associated program.

Courtesy of Microsoft

Utility Programs cont…

- **Search Tools**
  - Designed to search for documents and other files on the user's hard drive
  - Are often integrated into file management programs
  - Third-party search tools are also available

- **Diagnostic and Disk Management Programs**
  - Diagnostic programs evaluate your system and make recommendations for fixing any errors found
  - Disk management programs diagnose and repair problems related to your hard drive

Utility Programs cont...

- **<u>Uninstall and Cleanup Utilities</u>**
  - Uninstall utilities remove programs from your hard drive without leaving bits and pieces behind
  - Important to properly uninstall programs, not just delete them
  - Clean up utilities delete temporary files
    - Recycle Bin
    - Temporary Internet files
    - Temporary installation files

Utility Programs cont…

- **File compression programs**
  reduce the size of files so they take up less storage space on a storage medium or can be transmitted faster over the Internet

- **Backup and Recovery Utilities**
  - Make the backup and restoration process easier
  - Creating a backup means making a duplicate copy of data and/or other computer content

Utility Programs cont…

- **<u>Antivirus, Antispyware, Firewalls, and Other Security Programs</u>**
  - Security Concerns
    – Viruses, spyware, identity theft, phishing schemes
  - Security programs protect computers and users and it is essential that all computer users protect themselves and their computers
    – Antivirus programs
    – Antispyware programs
    – Firewalls
    – Many are included in Windows and other operating systems

Software Applications

The Basics of Application Software

- Software Ownership Rights
  - Specify the allowable use of the program
  - Software license
    - Specifies the conditions under which a buyer of the software can use it
  - Commercial Software
    - Copyrighted software that is developed and sold for profit
    - Typically comes with a single-user license

The Basics of Application Software cont...

- Shareware
  - Copyrighted software distributed on the honor system
  - Consumers should either pay for it or uninstall it after the trial period
- Freeware
  - Copyrighted software programs that are given away by the author for others to use free of charge
- Public Domain Software
  - Software that is not copyrighted and ownership rights have been donated to the public domain
- Open Source Software
  - Programs with source code made available to the general public

The Basics of Application Software cont...

TYPE OF SOFTWARE	EXAMPLES
Commercial software	Microsoft Office (office suite) Norton AntiVirus (antivirus program) Adobe Photoshop (image editing program) World of Warcraft (game)
Shareware	WinZip (file compression program) Video Edit Magic (video editing program) Image Shrinker (image optimizer) Deluxe Ski Jump 3 (game)
Freeware	Internet Explorer (Web browser) OpenOffice.org (office suite) QuickTime Player (media player) Yahoo! Messenger (messaging program)
Public domain software	Lynx (text-based Web browser) Quake 3 (game)

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The Basics of Application Software

Desktop vs. Mobile Software

– Mobile phones and mobile devices typically require mobile software called apps

- Specifically designed for a specific type of device
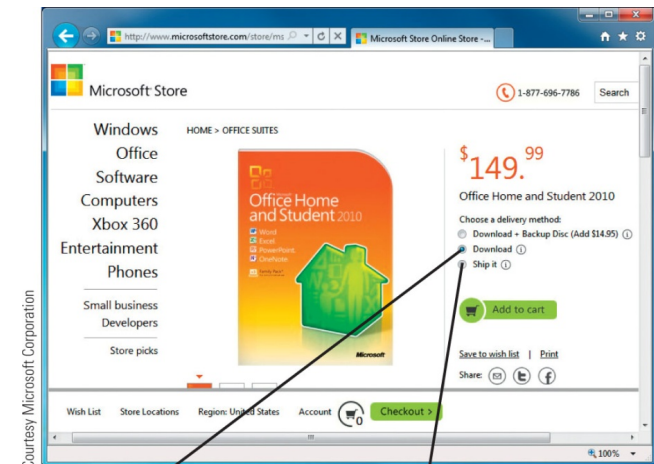- Wide range of software available

Courtesy DataViz, Inc.

Courtesy T-Mobile USA

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The Basics of Application Software

Installed vs. Web-Based Software

- Installed Software

  - Must be installed on the computer before it can be run

  - Can be purchased in physical form

  - Can be downloaded from the Internet

Downloaded version will be downloaded to the buyer's computer.

Packaged version will be shipped to the buyer.

Courtesy Microsoft Corporation

The Basics of Application Software

Installed vs. Web-Based Software

- **Web-based Software**
  - Is delivered on-demand via the Web
  - Advantages
    - Files can be accessed from any computer with an Internet connection
    - Ease of implementation
    - Improved collaboration capabilities
    - Always working with the most current version of software
  - Potential Disadvantages
    - Online applications tend to run more slowly
    - Have file size limits
    - Cost may eventually exceed the cost of purchasing a similar installed version of the software

The Basics of Application Software

Installed vs. Web-Based Software

- **Software Suites**
    - Collection of software programs bundled together and sold as a single software package
    - Office suites are used by most businesses/individuals
        - Word processing software
        - Spreadsheet software
        - Database software
        - Presentation graphics software
        - Additional productivity tools like calendars, messaging programs, or collaboration tools
    - Cost is lower than buying each program separately

The Basics of Application Software

Common Software Commands

– Toolbars, Menus, Keyboard Shortcuts, and the Ribbon

  • Provide access to most commands in application programs

COMMAND	COMMAND BUTTON	KEYBOARD SHORTCUT	DESCRIPTION
Open		Ctrl+O	Opens a saved document from a storage medium, usually for editing or printing.
Save		Ctrl+S	Saves the current version of the document to a storage medium.
Print		Ctrl+P	Prints the current version of the document onto paper.
Cut		Ctrl+X	Moves the selected item to the Clipboard.
Copy		Ctrl+C	Copies the selected item to the Clipboard.
Paste		Ctrl+V	Pastes the contents of the Clipboard to the current location.
Undo		Ctrl+Z	Undoes the last change to the document.
Close		Alt+F4	Closes the document. Any changes made to the document are lost if the document wasn't saved first.

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The Basics of Application Software

Common Software Commands

- Ribbon used in Microsoft Office 2007 and later
  - Commands are organized into groups located on tabs
  - Contextual tabs appear on the Ribbon as needed and contain special commands

FILE TAB
Contains common document commands, such as Save and Print.

QUICK ACCESS TOOLBAR
Contains command buttons for frequently used commands; can be modified by the user.

TABS
Organize related groups of commands; the Home tab is currently selected.

GALLERY
Displays sets of options that can be selected for a particular feature; this is the Styles gallery.

COMMAND BUTTONS
Issue a command or display a list of related commands.

GROUPS
Related commands on the Ribbon are organized into groups; these are the Font and Paragraph groups.

DIALOG BOX LAUNCHER
Opens a dialog box or task pane for that group.

MORE BUTTON
Opens a gallery to display more options.

HELP BUTTON
Launches the Office Help system.

Courtesy of Microsoft