Objectives Overview

- Define system software and identify the two types of system software
- Describe the functions of an operating system
- Summarize the startup process on a personal computer
- Summarize the features of several stand-alone operating systems
- Briefly describe various server operating systems
- Summarize the features of several embedded operating systems
- Explain the purpose of several utility programs

See Page 397 for Detailed Objectives

Discovering Computers 2011: Living in a Digital World
Chapter 8
System Software

- **System software** consists of the programs that control or maintain the operations of the computer and its devices.
An operating system (OS) is a set of programs containing instructions that work together to coordinate all the activities among computer hardware resources.
Figure 8-1

The diagram illustrates various operating system functions:

- **Start and shut down the computer**
- **Administer security**
- **Control a network**
- **Provide user interface**
- **Manage programs**
- **Update automatically**
- **Provide file management and other utilities**
- **Monitor performance**
- **Establish an Internet connection**
- **Coordinate tasks and configure devices**

Each function is represented by a graphic showing a specific aspect of operating system operation.
Operating System Functions

• The process of starting or restarting a computer is called **booting**

**Cold boot**
- Turning on a computer that has been powered off completely

**Warm boot**
- Using the operating system to restart a computer
Operating System Functions

How a PC Boots

Step 1
The power supply sends a signal to the components in the system unit.

Step 2
The processor finds the ROM chip(s) that contains the BIOS (basic input/output system).

Step 3
The BIOS performs the POST (power-on self test), which checks components, such as the mouse, keyboard, and adapter cards.

Step 4
The results of the POST are compared with data in a CMOS chip.

Step 5
The BIOS may look for the system files on a USB flash drive or on an optical disc drive or may look directly on drive C (hard disk).

Step 6
The system files and the kernel of the operating system load into memory (RAM) from storage (i.e., hard disk).

Step 7
The operating system loads configuration information, may request user information, starts several background processes, and displays the desktop on the screen.

Click to view Web Link, click Chapter 8, Click Web Link from left navigation, then click Windows Registry below Chapter 8
Operating System Functions

A boot drive is the drive from which your computer starts.

- You can boot from a boot disk.
- A recovery disk contains a few system files that will start the computer.
Operating System Functions

• An operating system includes various shut down options

Sleep mode saves any open documents and programs to RAM, turns off all unneeded functions, and then places the computer in a low-power state.

Hibernate saves any open documents and programs to a hard disk before removing power from the computer.
Operating System Functions

- A user interface controls how you enter data and instructions and how information is displayed on the screen.
- With a graphical user interface (GUI), you interact with menus and visual images.
Operating System Functions

• With a command-line interface, a user uses the keyboard to enter data and instructions

```
bash-2.05b$ ping -q -c1 en.wikipedia.org
PING rr.chtpa.wikimedia.org (207.142.131.247) 56(84) bytes of data.
--- rr.chtpa.wikimedia.org ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 112.076/112.076/112.076/0.000 ms
bash-2.05b$ grep -i /dev/sda1 /etc/fstab | cut --fields=-3
/dev/sda1 /mnt/usbkey
/dev/sda2 /mnt/ipod
bash-2.05b$ date
Wed May 25 11:36:56 PDT
bash-2.05b$ lsmod
Module Size Used by
joydev 8256 0
ipw2200 175112 0
ieee80211 44228 1 ipw2200
ieee80211_crypt 4872 2 ipw2200,ieee80211
c1000 84468 0
bash-2.05b$ 
```
Operating System Functions

• How an operating system handles programs directly affects your productivity

- Single user and multiuser
- Single tasking and multitasking
- Foreground and background
- Preemptive multitasking
- Multiprocessing
Operating System Functions
Operating System Functions

- **Memory management** optimizes the use of RAM
- **Virtual memory** is a portion of a storage medium functioning as additional RAM
The operating system determines the order in which tasks are processed.
Operating System Functions

A **driver** is a small program that tells the operating system how to communicate with a specific device.

**Plug and Play** automatically configures new devices as you install them.

Click to view Web Link, click Chapter 8, Click Web Link from left navigation, then click Plug and Play below Chapter 8.
Operating System Functions

- Operating systems typically provide a means to establish Internet connections.
Operating System Functions

• A **performance monitor** is a program that assesses and reports information about various computer resources and devices.
Operating System Functions

- Operating systems often provide users with the capability of:

  - Managing files
  - Searching for files
  - Viewing images
  - Securing a computer
  - Uninstalling programs
  - Cleaning up disks
  - Defragmenting disks
  - Diagnosing problems
  - Backing up files and disks
  - Setting up screen savers
Operating System Functions

- **Automatic update** automatically provides updates to the program
Operating System Functions

• Some operating systems are designed to work with a server on a network

• A server operating system organizes and coordinates how multiple users access and share resources on a network

• A network administrator uses the server operating system to:
  – Add and remove users, computers, and other devices
  – Install software and administer network security
Operating System Functions

• Each user has a user account
  – A user name, or user ID, identifies a specific user
  – A password is a private combination of characters associated with the user name
# Types of Operating Systems

## Categories of Operating Systems

<table>
<thead>
<tr>
<th>Category</th>
<th>Operating System Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stand-alone</td>
<td>• DOS</td>
</tr>
<tr>
<td></td>
<td>• Early Windows versions (Windows 3.x, Windows 95,</td>
</tr>
<tr>
<td></td>
<td>Professional, Windows Millennium Edition, Windows XP,</td>
</tr>
<tr>
<td></td>
<td>Windows Vista)</td>
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<tr>
<td></td>
<td>• Windows 7</td>
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<tr>
<td></td>
<td>• Mac OS X</td>
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<td></td>
<td>• UNIX</td>
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<tr>
<td></td>
<td>• Linux</td>
</tr>
<tr>
<td>Server</td>
<td>• Early Windows Server versions (Windows NT Server,</td>
</tr>
<tr>
<td></td>
<td>• Windows Server 2008</td>
</tr>
<tr>
<td></td>
<td>• UNIX</td>
</tr>
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<td></td>
<td>• Linux</td>
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<tr>
<td></td>
<td>• Solaris</td>
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<tr>
<td></td>
<td>• NetWare</td>
</tr>
<tr>
<td>Embedded</td>
<td>• Windows Embedded CE</td>
</tr>
<tr>
<td></td>
<td>• Windows Mobile</td>
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<tr>
<td></td>
<td>• Palm OS</td>
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<tr>
<td></td>
<td>• iPhone OS</td>
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<td></td>
<td>• BlackBerry</td>
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<td></td>
<td>• Google Android</td>
</tr>
<tr>
<td></td>
<td>• Embedded Linux</td>
</tr>
<tr>
<td></td>
<td>• Symbian OS</td>
</tr>
</tbody>
</table>
Stand-Alone Operating Systems

- A **stand-alone operating system** is a complete operating system that works on a desktop computer, notebook computer, or mobile computing device.

- **Windows 7**
- **Mac OS X**
- **UNIX**
- **Linux**
Stand-Alone Operating Systems

- **Windows 7** is Microsoft’s fastest, most efficient operating system to date and is available in multiple editions:

  - Windows 7 Starter
  - Windows 7 Home Premium
  - Windows 7 Ultimate
  - Windows 7 Professional

Click to view Web Link, click Chapter 8, Click Web Link from left navigation, then click Windows 7 below Chapter 8.
Stand-Alone Operating Systems

• Windows 7 provides programs such as:

  - Windows Firewall
  - Windows DVD Maker
  - Windows Media Player
  - Desktop Gadget Gallery
Stand-Alone Operating Systems
### Additional Windows 7 Features

#### Reliability and Performance
- Low-powered Sleep state allows you to resume work quickly when you return to the computer
- Programs start faster with Windows SuperFetch technology
- Automatically detects and fine-tunes performance problems
- Built-in hardware diagnostics detect and repair problems automatically
- Automatically recovers from failures, including restoring an unbootable computer to a usable state

#### Security
- User Account Control allows administrators to restrict permissions
- Protects users from dangerous Web sites
- Improved firewall and *Windows Defender* protects your computer from external threats
- Parental controls allow parents to monitor and control computer usage

#### Information Management
- Improved and redesigned windows help users locate files by showing thumbnails that preview content
- Use Search to locate files based on file name or any other property saved with the file
- Coordinate your schedule with others’ schedules in *Windows Calendar*
- Use the *Snipping Tool* to copy screen elements to a file on your computer
- Easily share files with other users

#### Appearance and Navigation
- Easy-to-navigate user interface with translucent windows
- Display a preview of windows open in a particular program when you point to that program button on the taskbar
- Windows Snap and Aero Shake make it easier to manage the appearance of open windows
- Jump Lists make it easier to open recent files quickly in their respective program
- *Windows Touch* supports computers with multi-touch technology

#### Communications and the Internet
- Enhanced Internet Explorer
- Free access to *Windows Live Essentials*, which includes programs such as *Windows Live Messenger* for instant messaging, *Windows Live Photo Gallery* for photo editing and sharing, *Windows Live Mail* for e-mail, *Windows Live Writer* for blogging, and *Windows Live Movie Maker* for video editing and sharing
- Consistent and secure wireless network connections
- Speech recognition allows you to interact with the computer by voice
Stand-Alone Operating Systems

• The **Macintosh operating system** has set the standard for operating system ease of use
• Latest version is **Mac OS X**
**Stand-Alone Operating Systems**

**UNIX** is a multitasking operating system developed in the early 1970s.

**Linux** is an open-source, popular, multitasking UNIX-type operating system.
Server Operating Systems

Windows Server 2008

UNIX

Linux

Solaris

NetWare
Server Operating Systems

• **Windows Server 2008** is an upgrade to Windows Server 2003
  – Part of the **Windows Server 2008 family**
  – Multiple editions

• Most editions include Hyper-V, a virtualization technology
  – Virtualization is the practice of sharing or pooling computing resources
Embedded Operating Systems

- An embedded operating system resides on a ROM chip on a mobile device or consumer electronic device.
Embedded Operating Systems

Click to view Web Link, click Chapter 8, Click Web Link from left navigation, then click iPhone OS below Chapter 8.

Click to view Web Link, click Chapter 8, Click Web Link from left navigation, then click Blackberry below Chapter 8.

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Chapter 8
Utility Programs

• A utility program is a type of system software that allows a user to perform maintenance-type tasks.
Utility Programs

- A file manager is a utility that performs functions related to file management
  - Displaying a list of files
  - Organizing files in folders
  - Copying, renaming, deleting, moving, and sorting files and folders
  - Creating shortcuts
Utility Programs

• A **search utility** is a program that attempts to locate a file on your computer based on criteria you specify.
Utility Programs

- An **image viewer** allows users to display, copy, and print the contents of a graphics file.
- An **uninstaller** removes a program, as well as any associated entries in the system files.
Utility Programs

- A disk cleanup utility searches for and removes unnecessary files
  - Downloaded program files
  - Temporary Internet files
  - Deleted files
  - Unused program files
Utility Programs

- A **disk defragmenter** reorganizes the files and unused space on a computer’s hard disk so that the operating system accesses data more quickly and programs run faster
  - Defragmenting
Utility Programs

- A **backup utility** allows users to copy files to another storage medium.
- A **restore utility** reverses the process and returns backed up files to their original form.
Utility Programs

- A **screen saver** causes a display device’s screen to show a moving image or blank screen if no activity occurs for a specified time.

- A **personal firewall** detects and protects a personal computer from unauthorized intrusions.
### Utility Programs

A **virus** describes a potentially damaging computer program that affects a computer negatively.

A **worm** copies itself repeatedly in memory or over a network.

A **Trojan horse** hides within or looks like a legitimate program.

An **antivirus program** protects a computer against viruses.
Utility Programs

Signs of Virus Infection

- An unusual message or image is displayed on the computer screen
- An unusual sound or music plays randomly
- The available memory is less than what should be available
- A program or file suddenly is missing
- An unknown program or file mysteriously appears

- The size of a file changes without explanation
- A file becomes corrupted
- A program or file does not work properly
- System properties change
- The computer operates much slower than usual
Utility Programs

Spyware is a program placed on a computer without the user’s knowledge that secretly collects information about the user.

- A **spyware remover** detects and deletes spyware and other similar programs.

Adware displays an online advertisement in a banner or pop-up window.

- An **adware remover** is a program that detects and deletes adware.
Utility Programs

- Filters are programs that remove or block certain items from being displayed

- Web filters
- Anti-spam programs
- Phishing filters
- Pop-up blockers
Utility Programs

• A file compression utility shrinks the size of a file(s)
  – Compressing files frees up room on the storage media
  – Two types of compression
    • Lossy
    • Lossless

• Compressed files sometimes are called zipped files
  – Can be uncompressed
Utility Programs

- A media player allows you to view images and animation, listen to audio, and watch video files on your computer.
Utility Programs

- Disc burning software writes text, graphics, audio, and video files on a recordable or rewritable optical disc.
Utility Programs

- A personal computer maintenance utility identifies and fixes operating system problems, detects and repairs disk problems, and includes the capability of improving a computer’s performance.
Summary

Definition of an operating system

Functions common to most operating systems

Variety of stand-alone operating systems, server operating systems, and embedded operating systems

Several utility programs