Chapter 8
Types of Utility Programs and Operating Systems

Discovering
Computers 2012
Your Interactive Guide to the Digital World
## Objectives Overview

<table>
<thead>
<tr>
<th>Define system software and identify the two types of system software</th>
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</thead>
<tbody>
<tr>
<td>Describe the functions of an operating system</td>
</tr>
<tr>
<td>Summarize the startup process on a personal computer</td>
</tr>
<tr>
<td>Summarize the features of several stand-alone operating systems</td>
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<tr>
<td>Briefly describe various server operating systems</td>
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<tr>
<td>Summarize the features of several embedded operating systems</td>
</tr>
<tr>
<td>Explain the purpose of several utility programs</td>
</tr>
</tbody>
</table>

See Page 397 for Detailed Objectives

Discovering Computers 2012: Chapter 8
System Software

- **System software** consists of the programs that control or maintain the operations of the computer and its devices.
Operating Systems

- An operating system (OS) is a set of programs containing instructions that work together to coordinate all the activities among computer hardware resources.

  - Start and shut down a computer
  - Provide a user interface
  - Manage programs
  - Manage memory
  - Coordinate tasks
  - Configure devices
  - Establish an Internet connection
  - Monitor performance
  - Provide utilities
  - Automatically update
  - Control a network
  - Administer security
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.
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.

![Command Prompt Example]

- `bash-2.05b$ ping -q -c1 en.wikipedia.org`  
  PING rr.cht.pa.wikimedia.org (207.142.131.247) 56(84) bytes of data.

- `--- rr.cht.pa.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/sda /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 44220 1 ipw2200
ieee80211_crypt 4872 2 ipw2200,ieee80211
e1000 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
Operating System Functions

- 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.
Operating System Functions

- Operating systems typically provide a means to establish Internet connections

![Set Up a Connection or Network dialog box](image)
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:

<table>
<thead>
<tr>
<th>Function</th>
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<tbody>
<tr>
<td>Managing files</td>
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<tr>
<td>Searching for files</td>
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<tr>
<td>Viewing images</td>
</tr>
<tr>
<td>Securing a computer</td>
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<tr>
<td>Uninstalling programs</td>
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<tr>
<td>Cleaning up disks</td>
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<tr>
<td>Defragmenting disks</td>
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<tr>
<td>Diagnosing problems</td>
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<tr>
<td>Backing up files and disks</td>
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<tr>
<td>Setting up screen savers</td>
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</table>
Operating System Functions

- **Automatic update** automatically provides updates to the program

![Windows Update screen](image)
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>
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</table>
| **Stand-alone** | • DOS  
  • Windows 7  
  • Mac OS X  
  • UNIX  
  • Linux |
  • Windows Server 2008  
  • UNIX  
  • Linux  
  • Solaris  
  • NetWare |
| **Embedded** | • Windows Embedded CE  
  • Windows Phone 7  
  • Palm OS  
  • iPhone OS  
  • BlackBerry  
  • Google Android  
  • Embedded Linux  
  • Symbian OS |
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.

![Operating Systems Grid]

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

- Windows Embedded CE
- Windows Phone 7
- Palm OS
- iPhone OS
- BlackBerry
- Google Android
- Embedded Linux
- Symbian OS
Embedded Operating Systems

Pages 419 – 420
Figures 8-22 – 8-26

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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

![Search Utility Example](image-url)
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

<table>
<thead>
<tr>
<th>A <strong>virus</strong> describes a potentially damaging computer program that affects a computer negatively</th>
</tr>
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<tbody>
<tr>
<td>A <strong>worm</strong> copies itself repeatedly in memory or over a network</td>
</tr>
<tr>
<td>A <strong>Trojan horse</strong> hides within or looks like a legitimate program</td>
</tr>
<tr>
<td>An <strong>antivirus program</strong> protects a computer against viruses</td>
</tr>
</tbody>
</table>
Video: Free Online Antivirus

CLICK TO START

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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**

<table>
<thead>
<tr>
<th>Spyware is a program placed on a computer without the user’s knowledge that secretly collects information about the user</th>
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<tr>
<td><strong>• A spyware remover</strong> detects and deletes spyware and other similar programs</td>
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<tr>
<th>Adware displays an online advertisement in a banner or pop-up window</th>
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<tbody>
<tr>
<td><strong>• An adware remover</strong> is a program that detects and deletes adware</td>
</tr>
</tbody>
</table>
Utility Programs

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

**Web filtering software** | **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