System Software: Operating Systems and Utility Programs

Chapter 7

101 COMP - 3

# System Software and Application Software

- System software: Background programs that control a computer system
  - Acts as a mediator between application programs and the computer system's hardware, as well as between the PC and the user
- Application software: Programs that allow a user to perform specific tasks on a computer
  - Word processing, playing a game, preparing taxes, browsing the Web, and so forth.

The Operating System

- Operating system: A collection of programs that manage and coordinate the activities taking place within a computer system.
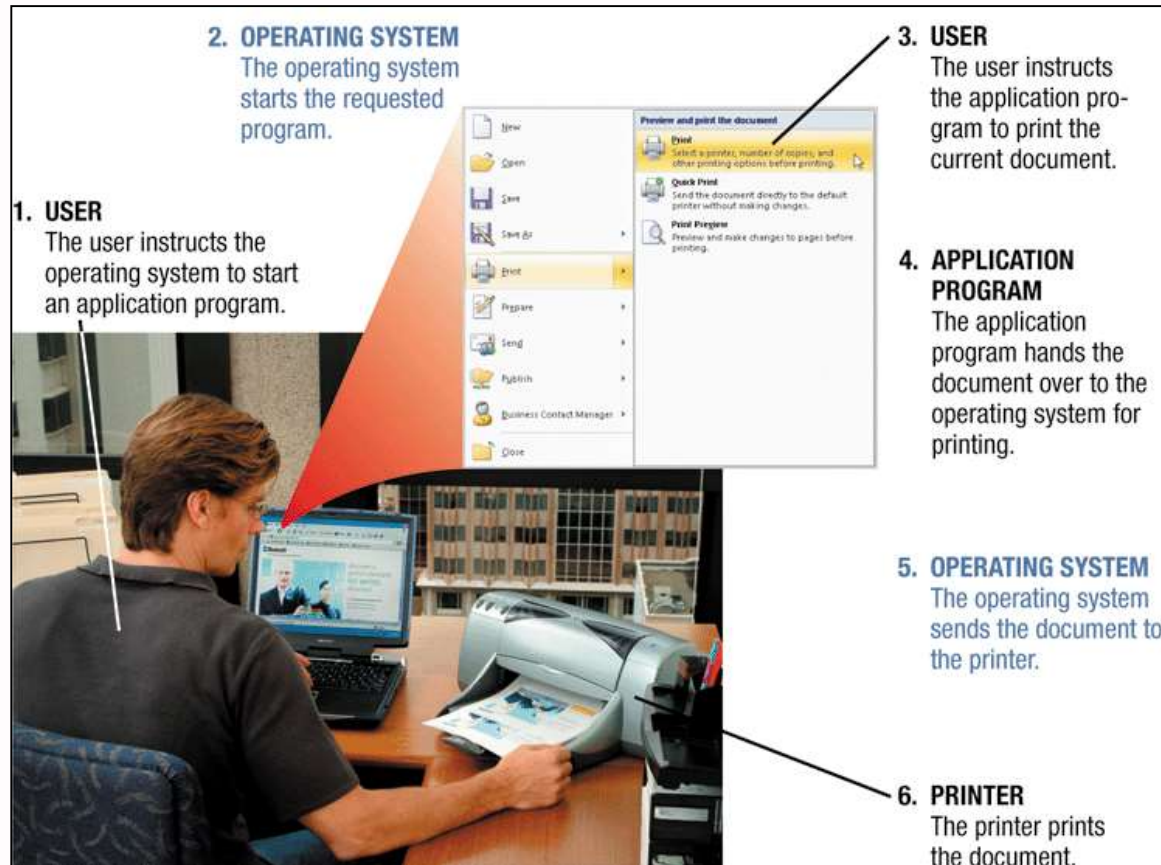
Functions of an Operating System

- Interfacing with users (typically via a GUI)
- Booting the computer
- Configuring devices
  - Device drivers are often needed
  - Plug and Play devices are recognized automatically
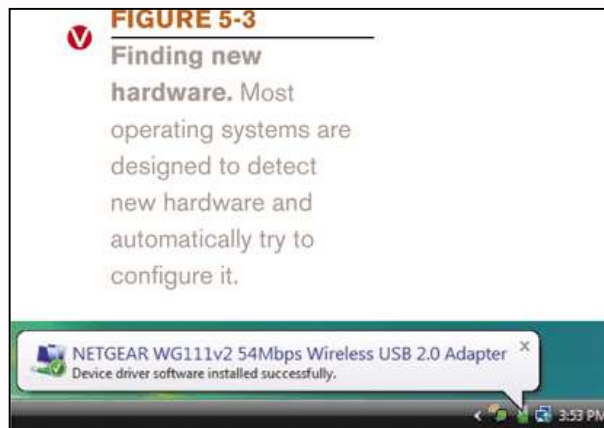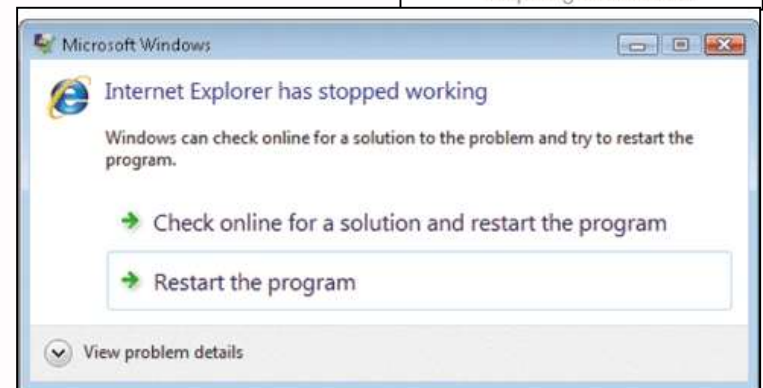- Managing resources and jobs
- File management
- Security

FIGURE 5-4

Program malfunctions. When a problem occurs, most operating systems attempt to close only the program or task causing the problem, rather than requiring a full reboot.

FIGURE 5-3

Finding new hardware. Most operating systems are designed to detect new hardware and automatically try to configure it.

NETGEAR WG111v2 54Mbps Wireless USB 2.0 Adapter
Device driver software installed successfully.

3:53 PM

Microsoft Windows

Internet Explorer has stopped working

Windows can check online for a solution to the problem and try to restart the program.

→ Check online for a solution and restart the program

→ Restart the program

View problem details

Differences Among Operating Systems

- Command line vs. graphical user interface (GUI)
  - Most operating systems use GUI today

COMMAND LINE INTERFACE
Commands are entered using the keyboard.

GRAPHICAL USER INTERFACE
Icons, buttons, menus, and other objects are selected with the mouse to issue commands to the PC.

FIGURE 5-10
Command line vs. graphical user interfaces.

Differences Among Operating Systems

- Personal vs. server operating system
  - Personal operating system: designed to be installed on a single PC
  - Server operating system: designed to be installed on a network server
    - Client PCs still use a personal operating system
    - Server operating system controls access to network resources
  - Many operating systems come in both versions
- Mobile and embedded operating systems also exist.

Server Operating Systems

2. The client software provides a shell around your desktop operating system. The shell program enables you to communicate with the server operating system, which is located on a network computer called a file server.
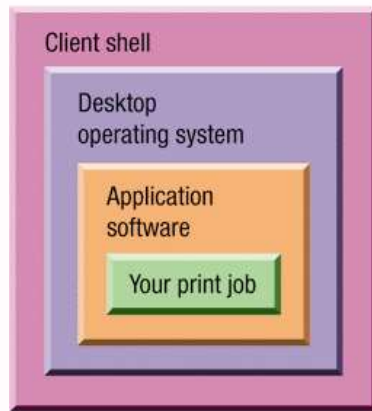
3. When you request a network activity, such as printing a document using a network printer, your application program passes the job to your desktop operating system, which sends it to the client shell, which sends it on to the server operating system, which is located on the network server.

4. The server operating system then sends your job to a computer known as a print server, which lines up your job in its print queue and prints the job when its turn comes.

Client shell

Desktop operating system

Application software

Your print job

Network file server running a server operating system

Your print job

Network print server

Your print job

Your print job

Desktop PC running Windows and client software for the server operating system being used

4. Your print job

3. Job C

2. Job B

1. Job A

1. When you log on to the network, you gain access to network resources, such as application programs, shared data files, and printers. Once logged on, you can access files, print documents, and more.

Network printer
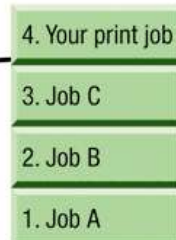
Print queue

FIGURE 5-12
How a server operating system works.

Differences Among Operating Systems

- Types of processors supported

  – Desktop, mobile, server, etc.

  – 32-bit or 64-bit PCs

    • 64-bit PCs can address more RAM

- Support for other technologies

  – New types of buses

  – Virtualization

  – Power-saving features

  – Sometimes support is discontinued, such as for older ports and buses

Operating Systems for Desktop PCs and Servers

- Most PCs today run Windows, Mac OS, or Linux

- DOS: Older operating system
  - PC-DOS: Created originally for IBM microcomputers
  - MS-DOS: used with IBM-compatible PCs
  - DOS traditionally used a command-line interface
  - Can enter DOS commands at the Windows Command Prompt

DOS

COMMAND PROMPT
Using the Windows command prompt window, users can issue DOS commands to their computers.

⚠ **FIGURE 5-13**

DOS. Even though DOS has become technologically obsolete, some PCs still use it.

DOS COMMANDS
Shown here are some typical DOS commands.

COMMAND	DESCRIPTION	EXAMPLE	EXPLANATION
COPY	Copies individual files	**COPY TODO.DOCX F:**	Copies the file TODO.DOCX located in the current directory on the current storage medium to the F drive.
DIR	Displays the names of files on a storage medium	**DIR F:**	Displays the names of the files stored on the storage medium located in the F drive.
DEL	Deletes individual files	**DEL F: HOMEWORK.DOCX**	Deletes the file HOMEWORK.DOCX from the storage medium located in the F drive.
REN	Renames individual files	**REN SAM.JPG BILL.JPG**	Changes the name of the file SAM.JPG located in the current directory on the current storage medium to BILL.JPG.
CD	Changes to a new directory	**CD HOMEWORK**	Changes the current directory to HOMEWORK, located one level down from the current location on the current storage medium.
FORMAT	Prepares a storage medium for use, erasing what was there before	**FORMAT F:**	Formats the storage medium located in the F drive.

Windows

- Windows: The primary PC operating system developed by Microsoft Corporation

  – Windows 1.0 through Windows 3.x: Operating environments for DOS, not full-fledged operating systems

  – Windows 95 and Windows 98: Used a similar GUI to the one used with Windows 3.x

  – Windows 98 Second Edition (SE): Update to Windows 98, released in 1999; still an installed base of older PCs running Windows 98 SE

  – Windows NT (New Technology): first 32-bit version of Windows designed for high-end workstations and servers

Windows

- Windows, cont.
  - Windows Me (Millennium Edition): designed for home PCs, improved home networking and a shared Internet connection
  - Windows 2000: replaced Windows NT; was geared towards high-end business workstations and servers, support for wireless devices
  - Windows XP: Replaced both Windows 2000 and Windows Me
    - Based on Windows NT technology
    - More stable and powerful than earlier versions of Windows
    - Newest features related to multimedia and communications

Windows

- Windows Vista: Most recent version of Windows
  - Features the Aero visual interface
    - Transparency and animations
    - Live Thumbnails
  - The Vista Start menu is more streamlined
  - Built-in security features
  - Improved networking ands multimedia
  - Additional features
    - Sidebar, Instant Search, etc.
  - Hardware requirements for Vista have increased over earlier versions of Windows
  - Four editions (Home Basic, Home Premium, Business, and Ultimate)

Windows Vista

NEW PROGRAMS
Include multimedia, security, and collaboration programs.

AERO INTERFACE
Features translucent, glass-like windows and 3D effects.

SIDEBAR
Contains the user's selected gadgets.

WINDOWS
Contain programs, icons, documents, and so forth.

TASKBAR TOOLBAR
Used to launch programs.

START MENU
Includes a search box to search for documents, programs, and Web sites.

SEARCHES
Can be saved for later use.

ICONS
Represent programs, folders, documents, and other items that can be opened with the mouse.

FIGURE 5-14
Windows Vista.

Windows

- Windows Server: Server version of Windows
  - Windows Server 2008: Most recent version
  - Includes a variety of services
    - Web platform
    - Support for virtualization
    - New security tools
    - Streamlined management tools

- Windows Home Server: New operating system based on Windows Server
  - Provides services for a home network
  - Provides access to shared files
  - Can back up all devices on the network automatically

Mac OS

- Mac OS: Proprietary operating system for computers made by Apple Corporation

  - Based on the UNIX operating system; originally set the standard for graphical user interfaces

  - Mac OS X Leopard: Most recent personal version

  - Mac OS X Server: Most recent server version

  - Includes

    - Support for 64-bit processors

    - Safari Web browser

    - New features like Time Machine, Stacks, Quick Look, Boot Camp, etc.

Mac OS

QUICK LOOK
Shows previews of files without opening them.

STACK
Contains a collection of documents stored on the dock by the user.

WINDOWS
Contain programs, icons, documents, and so forth.

ICONS
Represent programs, folders, documents, or other items that can be opened with the mouse.

DOCK
Contains the user's Stacks and commonly used icons.

FIGURE 5-16
Mac OS X Leopard.

UNIX

- UNIX: Operating system developed in the late 1960s for midrange servers and mainframes
  - Many variations of UNIX are in use today
  - Multiuser, multitasking operating system
  - More expensive, requires a higher level of PC knowledge, and tends to be harder to install, maintain, and upgrade than most other operating systems
  - "UNIX" initially referred to the original UNIX operating system, now refers to a group of similar operating systems based on UNIX
 - Single UNIX Specification: A standardized UNIX environment

Linux

- Linux: Version (flavor) of UNIX available without charge over the Internet

  - Increasingly being used with PCs, 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

  - Strong support from mainstream companies, such as Sun, IBM, HP, and Novell

  - Used on PCs, mainframes, and consumer appliances

  - Growing integration between Linux and other operating systems is a recent development

Linux

FIGURE 5-17

Linux. Linux is a rapidly growing alternative to Windows and Mac OS.

ICONS
Represent programs, folders, documents, or other items that can be opened with the mouse.
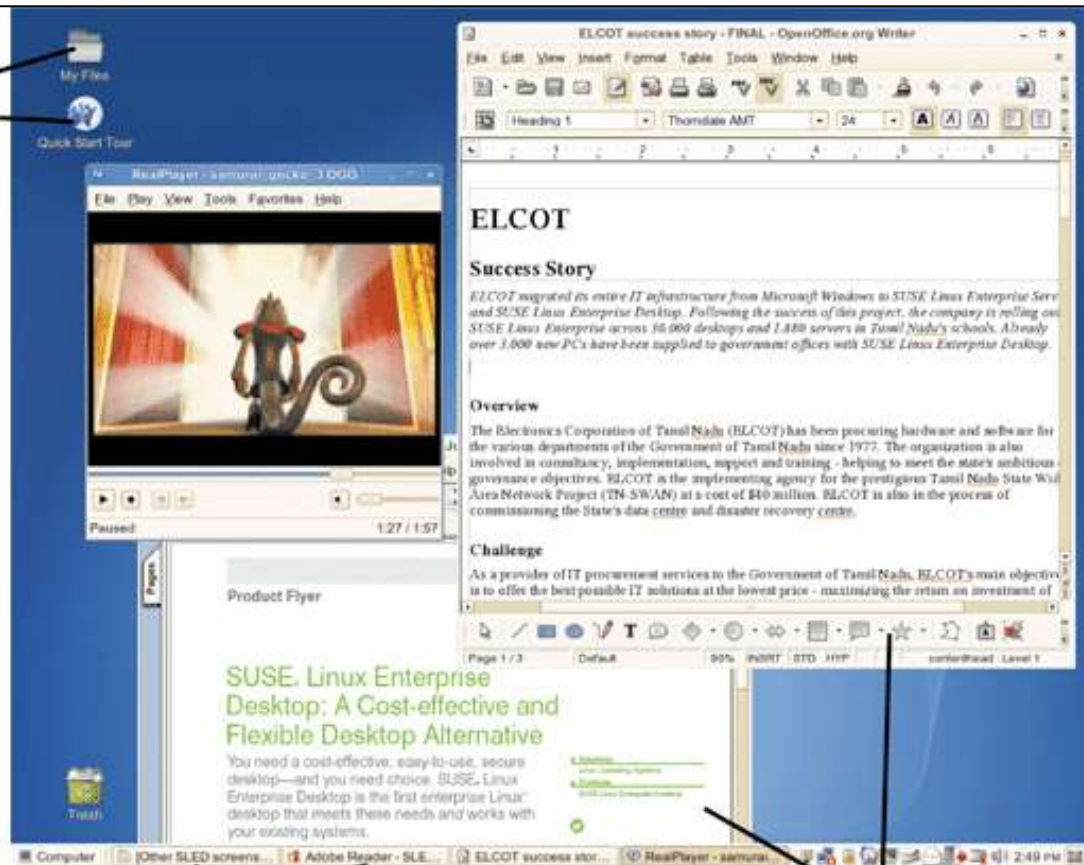
MULTITASKING
Buttons can be used to switch between open windows.

WINDOWS
Contain programs, icons, documents, and so forth.

Netware and Solaris

- NetWare: Widely used operating system for PC-based networks
  - Developed by Novell
  - Competes directly with the server versions of Windows, Mac OS, and Linux
  - Newest version (NetWare 6.5) incorporates Open Enterprise Server

- Solaris: UNIX-based operating system developed by Sun Microsystems for Sun computers
  - Can run on desktop systems and servers, as well as on some supercomputers
  - Latest version—*Solaris 10*—is designed to run across a variety of platforms in a safe, efficient, and stable manner

Operating Systems for Handheld PCs and Mobile Devices

- Windows Embedded: Designed for nonpersonal computer devices, such as cash registers and consumer electronic devices

  – Windows Automotive and Microsoft Auto for cars

- Windows Mobile: Designed for handheld PCs, smart phones, and other mobile devices

- Palm OS: Designed for Palm handheld PCs

- BlackBerry Operating System: Designed for BlackBerry devices

- Embedded Linux: Designed for handheld PCs, mobile phones, GPS devices, and other mobile devices

- Symbian OS: Designed for use with smart phones

Operating Systems for Handheld PCs and Mobile Devices

WINDOWS MOBILE 6.0

PALM OS

FIGURE 5-18
Mobile operating systems

OPENMOKO (LINUX-BASED)

SYMBIAN

Utility Programs

- Utility program: Type of 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 and as security suites