

Introduction to Information and Communication Technologies

Chapter 6

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Agenda

- Basic Concepts of Operating System
- Operating System Functions
- Operating System Types

OPERATING SYSTEMS

- An **Operating System (OS)** is a set of programs containing instructions that coordinate all the activities among computer hardware resources.
- Most operating systems perform similar functions that include starting a computer, providing a user interface, managing programs, managing memory, scheduling jobs, configuring devices, establishing an Internet connection, monitoring performance, and providing file management utilities. Some operating systems also allow users to control a network and administer security.
- In most cases, the operating system is installed and resides on the computer's hard disk. On handheld computers and many mobile devices, however, the operating system may reside on a ROM chip.

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OPERATING SYSTEM FUNCTIONS

- **Bootting** is the process of starting or restarting a computer. When turning on a computer that has been powered off completely, you are performing a **cold boot**.
- A **warm boot**, by contrast, is the process of using the operating system to restart a computer. With Windows Vista, for example, you can perform a warm boot.
- Each time you boot a computer, the kernel and other frequently used operating system instructions are loaded, or copied, from the hard disk (storage) into the computer's memory (RAM).
- The **kernel** is the core of an operating system that manages memory and devices, maintains the computer's clock, starts applications, and assigns the computer's resources, such as devices, programs, data, and information. The kernel is memory resident, which means it remains in memory while the computer is running.
- Other parts of the operating system are nonresident, that is, these instructions remain on the hard disk until they are needed.

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OPERATING SYSTEM FUNCTIONS

- **User interface** controls how you enter data and instructions and how information is displayed on the screen. Two types of user interfaces are command-line and graphical.
- **Command-line Interface** To configure devices, manage system resources, and troubleshoot network connections, network administrators and other advanced users work with a command line interface. In a **command-line interface**, a user types commands or presses special keys on the keyboard to enter data and instructions. Command-line interfaces often are difficult to use because they require exact spelling, grammar, and punctuation.
- **Graphical User Interface** Most users today work with a graphical user interface. With a **graphical user interface (GUI)**, you interact with menus and visual images such as buttons and other graphical objects to issue commands. Many current GUI operating systems incorporate features similar to those of a Web browser. Windows Vista offers two different GUIs, depending on your hardware configuration.

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OPERATING SYSTEM FUNCTIONS

- **Manage Programs:-** Some operating systems support a single user and only one running program at a time. Others support thousands of users running multiple programs. How an operating system handles programs directly affects your productivity.
- A single user/single tasking operating system allows only one user to run one program at a time. PDAs, smart phones, and other small computing devices often use a single user/single tasking operating system.
- A single user/multitasking operating system allows a single user to work on two or more programs that reside in memory at the same time. Users today typically run multiple programs concurrently. It is common to have an e-mail program and Web browser open at all times, while working with application programs such as word processing or graphics.

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OPERATING SYSTEM FUNCTIONS

- **Managing Memory:-** The purpose of **memory management** is to optimize the use of random access memory (RAM).
- The operating system allocates, or assigns, data and instructions to an area of memory while they are being processed. Then, it carefully monitors the contents of memory. Finally, the operating system releases these items from being monitored in memory when the processor no longer requires them.
- **Virtual memory** is a concept in which the operating system allocates a portion of a storage medium, usually the hard disk, to function as additional RAM. As you interact with a program, part of it may be in physical RAM, while the rest of the program is on the hard disk as virtual memory. Because virtual memory is slower than RAM, users may notice the computer slowing down while it uses virtual memory.
- The operating system uses an area of the hard disk for virtual memory, in which it swaps (exchanges) data, information, and instructions between memory and storage. The technique of swapping items between memory and storage is called paging.

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OPERATING SYSTEM FUNCTIONS

- **Scheduling Jobs:-** The operating system determines the order in which jobs are processed. A **job** is an operation the processor manages. Jobs include receiving data from an input device, processing instructions, sending information to an output device, and transferring items from storage to memory and from memory to storage. A multiuser operating system does not always process jobs on a first-come, first-served basis.
- Sometimes, one user may have a higher priority than other users. In this case, the operating system adjusts the schedule of jobs.
- Sometimes, a device already may be busy processing one job when it receives a second job. This occurs because the processor operates at a much faster rate of speed than peripheral devices. For example, if the processor sends five print jobs to a printer, the printer can print only one document at a time and store as many documents as its memory can handle.
- While waiting for devices to become idle, the operating system places items in buffers. A **buffer** is a segment of memory or storage in which items are placed while waiting to be transferred from an input device or to an output device.

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OPERATING SYSTEM FUNCTIONS

- **Configuring Devices:-** A **driver** is a small program that tells the operating system how to communicate with a specific device. Each device on a computer, such as the mouse, keyboard, monitor, printer, and scanner, has its own specialized set of commands and thus requires its own specific driver. When you boot a computer, the operating system loads each device's driver.
- If you attach a new device to a computer, such as a printer or scanner, its driver must be installed before you can use the device. For many devices, the computer's operating system includes the necessary drivers. If it does not, you can install the drivers from the CD provided with the purchased device.
- Today, many devices and operating systems support Plug and Play. **Plug and Play** means the operating system automatically configures new devices as you install them.

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OPERATING SYSTEM FUNCTIONS

- **Monitoring Performance:-** Operating systems typically contain a performance monitor. A **performance monitor** is a program that assesses and reports information about various computer resources and devices.
- **Administering Security:-** The network administrator uses the network OS to establish permissions to resources. These permissions define who can access certain resources and when they can access those resources. For each user, the network administrator establishes a user account, which enables a user to access, or **log on** to, a computer or a network. Each user account typically consists of a user name and password

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Operating System Types

The three basic categories of operating systems that exist today are stand-alone, network, and embedded. The table in lists names of operating systems in each category. The following pages discuss the operating systems listed in the table.

CATEGORIES OF OPERATING SYSTEMS

Category	Operating System Name
Stand-alone	<ul style="list-style-type: none"> • DOS • Early Windows versions (Windows 3.x, Windows 95, Windows NT Workstation, Windows 98, Windows 2000 Professional, Windows Millennium Edition) • Windows XP • Windows Vista • Mac OS X • UNIX • Linux
Network	<ul style="list-style-type: none"> • Early Windows Server versions (Windows NT Server, Windows 2000 Server) • Windows Server 2003 • UNIX • Linux • Solaris • NetWare
Embedded	<ul style="list-style-type: none"> • Windows CE • Windows Mobile • Palm OS • Embedded Linux • Symbian OS

OS Types

- A **stand-alone operating system** is a complete operating system that works on a desktop computer, notebook computer, or mobile computing device. Some stand-alone operating systems are called client operating systems because they also work in conjunction with a network operating system.
- **Windows XP:-** In the mid-1980s, Microsoft developed its first version of Windows, which provided a graphical user interface (GUI). Since then, Microsoft continually has updated its Windows operating system, incorporating innovative features and functions with each new version. **Windows XP** is a fast, reliable Windows operating system, providing quicker startup, better performance, increased security, and a simpler visual look than previous Windows versions

OS Types

- **Windows Vista**, the successor to Windows XP, is Microsoft's fastest, most reliable and efficient operating system that offering quicker application start up, built-in diagnostics, automatic recovery, improved security, and enhanced searching and organizing capabilities.
- Later on Windows 7, Windows 8 and Windows 10 introduced in this line up.
- **Mac OS X:-** Since it was released with Macintosh computers in 1984, Apple's **Macintosh operating system** has set the standard for operating system ease of use and has been the model for most of the new GUIs developed for non-Macintosh systems. The latest version, **Mac OS X**, is a multitasking operating system available only for computers manufactured by Apple.

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OS Types

- **UNIX** (pronounced YOU-nix) is a multitasking operating system. Several versions of this operating system exist, each slightly different. Although some versions of UNIX have a command-line interface, most versions of UNIX offer a graphical user interface.
- Today, a version of UNIX is available for most computers of all sizes. Power users often work with UNIX because of its flexibility and power.
- **Linux** is one of the faster growing operating systems. **Linux** (pronounced LINN-uks) is a popular, multitasking UNIX-type operating system. In addition to the basic operating system, Linux also includes many free programming languages and utility programs.
- Linux is not proprietary software like the operating systems discussed thus far. Instead, Linux is open source software, which means its code is available to the public for use, modification, and redistribution. Some versions of Linux are command-line, Others are GUI.

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OS Types

- A **network operating system** is an operating system that is designed specifically to support a network.
- A network operating system typically resides on a server. The client computers on the network rely on the server(s) for resources. Many of the client operating systems discussed in the previous section work in conjunction with a network operating system.
- Examples of network operating systems include Windows Server 2003, UNIX, Linux, Solaris, and NetWare.
- **Windows Server 2003** is an upgrade to Windows 2000 Server, which was an upgrade to Windows NT Server.
- **UNIX and Linux** often are called multipurpose operating systems because they are both stand-alone and network operating systems.
- **Solaris**, a version of UNIX developed by Sun Microsystems, is a network operating system designed specifically for e-commerce applications.
- **Novell's Netware** is a network operating system designed for client/server networks.

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OS Types

- The operating system on most PDAs and small devices, called an **embedded operating system**, resides on a ROM chip. Popular embedded operating systems include IOS, Android, Windows CE, Windows Mobile, Palm OS, BlackBerry, embedded Linux, and Symbian OS.
- **Windows CE** is a scaled-down Windows operating system designed for use on communications, entertainment, and computing devices with limited functionality. Examples of devices that use Windows CE include Voice over IP devices, point-of-sale terminals, navigation systems, media players, ticket machines, and computerized sewing machines.
- **Windows Mobile**, an operating system based on Windows CE, works on specific types of devices. Windows Mobile-based devices include PDAs, called the Pocket PC, and smart phones. With the Windows Mobile operating system and a Pocket PC or smart phone, users have access to the basic PIM (personal information manager) functions such as contact lists, schedules, tasks, calendars, and notes.
- **Palm OS**, which is a competing operating system to Windows Mobile, runs on PDAs and smart phones. With Palm OS and a compatible PDA, users manage schedules and contacts, telephone messages, project notes, reminders, tasks and address lists, and important dates and appointments.

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