What You Will Learn

- List the two major components of system software.
- Explain why a computer needs an operating system.
- List the five basic functions of an operating system.
- Explain what happens when you turn on a computer.
What You Will Learn

List the three major types of user interfaces.
Discuss the strengths and weaknesses of the most popular operating systems.
List the seven system utilities that are considered to be essential.
Discuss data backup procedures.

What You Will Learn

Understand troubleshooting techniques and determine probable solutions to any operating system problems you may encounter.

System Software
The Operating System

- **System software** consists of all the programs that enable the computer and its peripheral devices to function smoothly.
- System software is divided into two main categories:
  - The operating system (OS)
  - System utility programs

Management of the resources of a computer are performed by the computer’s operating system (OS).
- The coordination of the functions of a computer’s hardware is the prime responsibility of the operating system.

The five basic functions carried out by the operating system are:
- Starting the computer
- Managing applications
- Managing memory
- Handling input and output device messages
- Providing a user interface for communication
The first function of the operating system, starting the computer, involves six steps.

The first step in starting a computer is loading the BIOS (Basic Input/Output System) instructions into memory, which provides the computer with the ability to accept keyboard input and show information on the monitor.

The second step in starting a computer is conducting the power-on self-test (POST) to confirm that both the computer and its peripheral devices are working properly. A beep will sound, an error message will appear on the monitor, and the computer will stop should any part of the POST fail.
The third step in starting a computer is loading the operating system.
- The BIOS looks for the operating system after the successful completion of the POST.
- When the BIOS finds the operating system, the operating system’s kernel, the central portion of the operating system, is loaded into memory.
- The operating system then starts the process of loading the system configuration information.

The fourth step in starting a computer is system configuration.
- The registry, a database, stores the information relating to software and peripheral configuration, background graphics, and mouse settings.
- The operating system checks that drivers, utility programs required for the proper functioning of peripheral devices, are installed.

The fifth step in starting a computer is loading system utilities.
- System utilities, such as antivirus software and speaker volume control, are loaded after all system hardware is identified and configured by the operating system.
The Operating System

- The sixth step in starting a computer is authenticating users.
  - After the operating system is loaded, the user may be asked for an authentication/login, a user name and password, to prove that he or she is authorized.

The Operating System

- The operating system’s second function is managing applications.
  - Single-task operating systems from the past were only able to run one application at a time.
  - Today’s multitasking operating systems permit more than one application to be used at a time.

The Operating System

- When multitasking, users perceive active and inactive applications as the foreground application and background application, respectively.
  - Preemptive multitasking prevents application monopolization of the CPU.
The operating system’s third function is managing memory. The operating system attempts to allocate memory, RAM, to each program being run without interference. Through the use of virtual memory, where a portion of the hard disk is used as an extension of RAM, additional memory is available.

Pages, set amounts of data or program instructions, are temporarily stored in a swap file, a special hard disk file, when RAM is full. The process of transferring files between RAM and the hard disk is known as paging.
The operating system’s fourth function is managing input and output.
- The operating system uses drivers, programs containing information regarding specific computer input and output devices, to communicate with those devices.
- Interrupts, signals created by input and output devices, notify the operating system when an action has been taken.

The operating system’s fifth function is providing a user interface.
- The user interface allows the user to:
  - Start application programs
  - Manage storage devices
  - Safely shut down the computer properly
The Operating System

There are three types of user interfaces:
- Graphical user interface (GUI)
- Menu-driven user interface
- Command-line user interface

The graphically user interface uses graphics called icons, small images that represent various computer resources, to initiate actions.

These icons appear on the desktop, the work area that is created once the operating system has been loaded into memory.

The menu-driven user interface provides text-based menus, which display appropriate user options that are available.

The command-line user interface forces the user to type commands line by line to instruct the operating system about the desired action(s) to be taken.
Exploring Popular Operating Systems

- Operating systems are usually already installed on a computer when you purchase it.
- The most commonly supplied operating system is Microsoft Windows.

Microsoft Windows Vista, the replacement for Windows XP, is intended for both home and professional use.

Microsoft Windows Server 2008 is intended for use in the corporate environment to support client/server systems.
- Microsoft Windows Server 2008 provides benefits in the areas of security, enhanced Web server capabilities, administration, and virtualization.
Exploring Popular Operating Systems

- **Microsoft Windows Mobile** provides a user interface in a simplified Windows format for handheld devices such as smartphones and PDAs.

- The **Mac OS** used on Macintosh personal computers is favored by its users for the operating system’s security, stability, and simplicity.

- **UNIX** was developed to work in a secure computer network, but unfortunately, its many versions are not compatible and can be hard to use.

- **Linux** is a powerful **open source** operating system that is freely available to any user.

- **MS-DOS (DOS)**, a disk operating system, is a command-line user interface operating system that is not user friendly.
System Utilities: Housekeeping Tools

- **System utilities (utility programs)** are system software programs that are essential to effective management of the computer system.
- **System utilities** include software that performs such tasks as backing up files, providing antivirus protection, and compressing files.

Backup software duplicates data found on the hard disk to a backup device.
- **Full backups** include all files and data.
- **Incremental backups** include only those files changed or added since the previous backup.

Antivirus software provides protection from computer viruses.
- The two most popular antivirus programs are:
  - Norton AntiVirus
  - McAfee VirusScan Plus

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System Utilities:
Housekeeping Tools

- The utility software used to organize and manage data on your disk is called the **file manager**.
- The file manager enables you to:
  - Copy files
  - Determine how and where files are stored
  - Delete files

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System Utilities:
Housekeeping Tools

- **Disk scanning programs** find and resolve problems that result from disk file storage.
- **Disk cleanup utilities** remove unnecessary files, which results in saving space.
- **Disk defragmentation programs** reorganize stored data in a more efficient manner.

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System Utilities:
Housekeeping Tools

- **File compression utilities**: Decrease the size of files, resulting in faster downloads.
  - Create **archives** by storing files in a special format.
System Utilities:
Housekeeping Tools

- **Windows Update**, an operating system update service provided by Microsoft, enables users to keep their operating system current with external modifications.

System Utilities:
Housekeeping Tools

- Troubleshooting tips
  - Keep a **boot disk (emergency disk)** to load the operating system during times of emergency.
  - Use Microsoft’s **Help and Support** feature, provided with Microsoft Windows, for assistance.

What You’ve Learned

- System software is made up of two main parts: the operating system and system utilities.
- Computers need software to work. The operating system coordinates the functions of hardware and supports the application software.
What You’ve Learned

- The operating system has five functions: starting the computer, managing applications, managing memory, handling messages from input and output devices, and providing an interface for communication.

What You’ve Learned

- A six-step process occurs each time you start or restart a computer.
- There are three types of user interfaces: graphical user interfaces (GUIs), menu-driven user interfaces, and command-line user interfaces.

What You’ve Learned

- For personal computers, Microsoft Windows and Mac OS X are the two major operating systems.
- System utilities include such programs as backup software, file managers, and file compression utilities.
What You’ve Learned

- Backup procedures should include a full backup, followed by periodic incremental backups.
- Troubleshooting skills are required when you use a computer. Do only what you feel comfortable doing, then enlist the help of a professional.