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MIDOCEAN
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Principles of Management Information Systems

MGM331

Lecture 4
Software and Mobile Applications

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Chapter 4

- In this chapter, you will learn about system software which includes operating systems, utilities, and application software.
- The operating system is sometimes called the “soul of the computer,” and without it, you would be unable to enter data into your computer, perform meaningful work, or display results.
- You use application software to help you accomplish tasks that enable you to accomplish tasks efficiently and effectively.
- Sales representatives use software on their smartphones and tablet computers to enter sales orders and help their customers get what they want.

Chapter 4

- Stock and bond traders use software to make split-second decisions involving millions of dollars.
- Scientists use software to analyze the threat of climate change.
- Regardless of your job, you will likely use software to help you advance in your career and earn higher wages.
- You can also use software to help you prepare your personal income taxes, keep a budget, and stay in contact with friends and family online.
- Software can truly advance your career and enrich your life..

Chapter 4

As you study this chapter, consider the following:

- How is application software tied to or limited by advances in hardware and operating systems?
- How can organizations ensure that their employees use appropriate software to support their work tasks and meet the goals of the enterprise?

- Software is valuable in helping individuals, workgroups, and entire enterprises achieve their goals.
- Organizations typically use off-the-shelf application software to meet common business needs the unique business needs and provide a competitive advantage.
- The software industry continues to undergo constant change; computer users need to be aware of recent trends and issues in the software industry to be effective in their business and personal life.

Learning Objectives

- ✓ Identify and briefly describe the functions of two basic kinds of software.
- ✓ Define the term “sphere of influence,” and describe how it can be used to classify software.
- ✓ Define the basic functions performed by the operating system.
- ✓ Identify current operating systems that are used for personal, workgroup, and enterprise computing.
- ✓ Discuss how application software can support personal business objectives.
- ✓ Identify programming languages commonly in use today.
- ✓ Identify several key software issues and trends that have an impact on organizations and individuals.

Chapter 4: Software and Mobile Applications

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Linux

Mac OS

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Software Issues and Trends

Software Bugs

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An Overview of Software

- Software consists of computer programs that control the workings of computer hardware.
- Software can be divided into two types: systems software and application software.
- *System software* includes operating systems and utilities that coordinate the activities and functions of the hardware and other programs throughout the computer system.
- *Application software* consists of programs that help users solve particular computing problems.

An Overview of Software

- The effective use of software can have a profound impact on individuals and organizations.
- It can make the difference between profits and losses and between financial health and bankruptcy.
- As Figure 4.1 shows, companies recognize this impact; globally, spending on software now exceeds other IT expenditures, including spending on computer hardware.

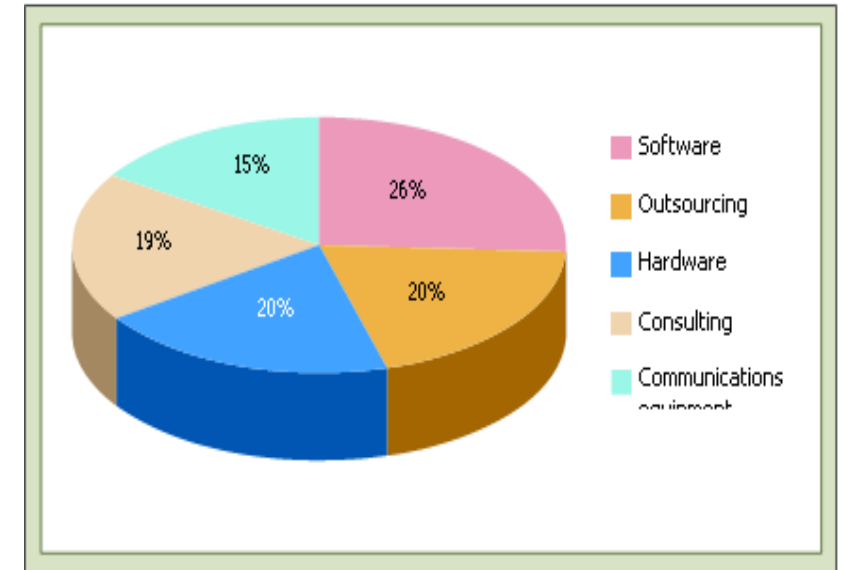


FIGURE 4.1

Software expenditures exceed spending on hardware

Since the 1950s, businesses have substantially increased their expenditures on software compared with hardware.

Software Sphere of Influence

- Every organization relies on the contributions of individuals and groups across the enterprise to achieve its business objectives.
- One useful way of classifying the many potential uses of information systems is to identify the scope of the problems and opportunities that the software addresses.
- This scope is called the sphere of influence. For most companies, the spheres of influence are personal, workgroup, and enterprise.
- Table 4.1 shows how various kinds of software support these three spheres.

Software Type	Personal	Workgroup	Enterprise
Systems software	Smartphone, tablet, personal computer, and workstation operating systems	Network operating systems	Server and mainframe operating systems
Application software	Word-processing, spreadsheet, database, and graphics programs	Email, group-scheduling, shared-work, and collaboration applications	General-ledger, order entry, payroll, and human resources applications

Software Sphere of Influence

- *Personal sphere of influence*: The sphere of influence that serves the needs of an individual user.
- *Workgroup sphere of influence*: The sphere of influence that helps workgroup members attain their common goals.
- *Enterprise sphere of influence*: The sphere of influence that serves the needs of an organization in its interactions with its environment.

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Systems Software

- The primary role of system software is to control the operations of computer hardware.
- System software also supports the problem-solving capabilities of application programs.
- System software can be divided into two types: operating systems, utility programs.

Operating Systems

- An *operating system* (OS) is a set of programs that controls a computer's hardware and acts as an interface with application software.
- An operating system can control one or more computers, or it can allow multiple users to interact with one computer.
- The various combinations of OSs, computers, and users include the following:

Operating Systems

- **Single computer with a single user:** This system is commonly used in personal computers, tablets, and smartphones that support one user at a time.
- Examples Windows, Mac OS, and Google Android.
- **Single computer with multiple simultaneous users:** This type of system is used in larger server or mainframe computers that support hundreds or thousands of people, all using the computer at the same time.
- Examples of OSs that support this kind of system include UNIX, z/OS, and HP-UX.

- **Multiple computers with multiple users:** This type of system is used in computer networks, including home networks with several computers attached as well as large computer networks with hundreds of computers attached, supporting many users, who may be located around the world.
- Network server OSs include Red Hat Enterprise Linux Server, Windows Server, and Mac OS X Server.

- **Special-purpose computers:** This type of system is typical of a number of computers with specialized functions, such as those that control sophisticated military aircraft, digital cameras, or home appliances.
- Examples of OSs designed for these purposes include Windows Embedded, Symbian, and some distributions of Linux.

Functions Performed by the Operating System

The programs that make up the OS perform activities, including the following:

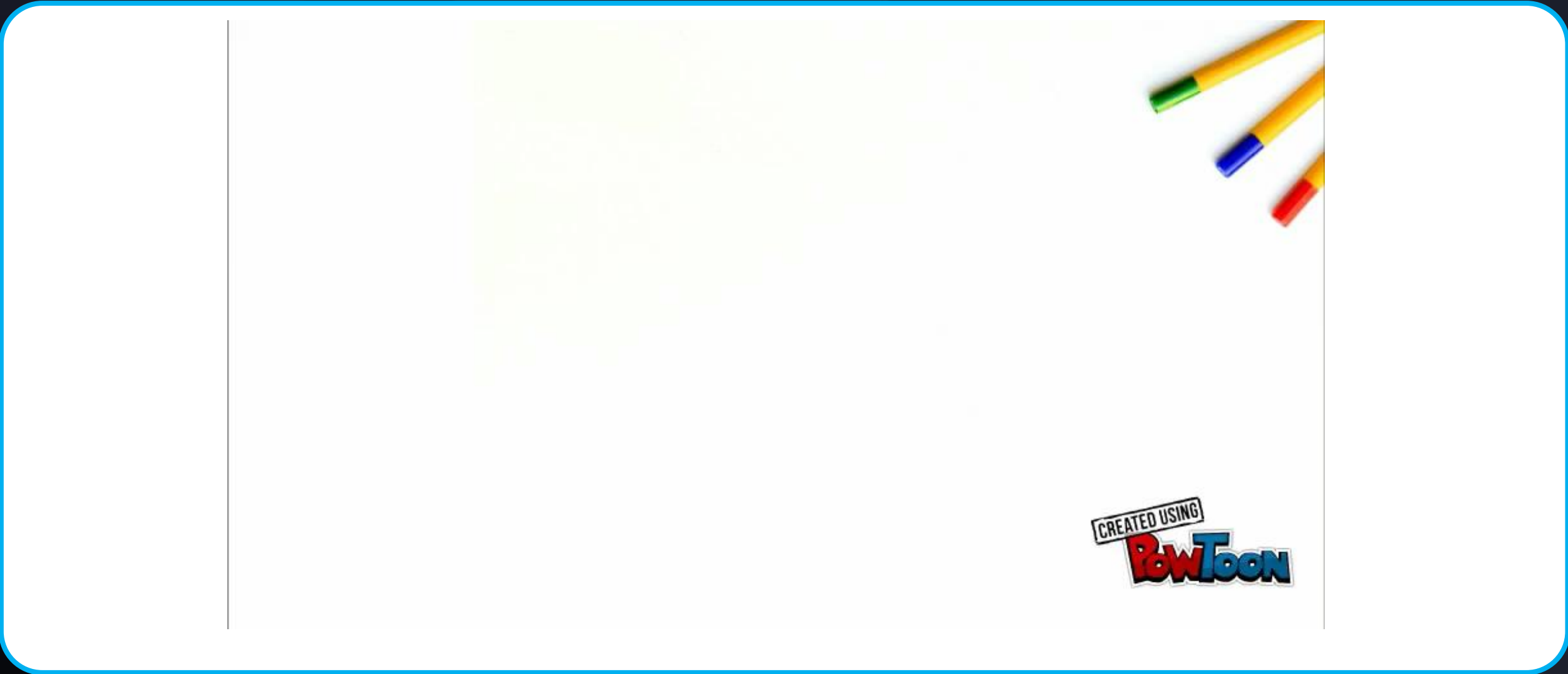
- Control common computer hardware functions
- Provide a user interface
- Provide a degree of hardware independence
- Manage system memory
- Manage processing tasks
- Provide networking capability
- Control access to system resources
- Manage files

Functions Performed by the Operating System

Control common computer hardware functions

- Get input from the keyboard or another input device
- Retrieve data from disks
- Store data on disks
- Display information on a monitor or printer

User Interface



Functions Performed by the Operating System

- **Hardware independence** refers to the ability of a software program to run on any platform, without concern for the specific underlying hardware.
- **Memory Management** controls how memory is accessed, maximizing the use of available memory and storage to provide optimum efficiency.
- **Manage processing tasks**: using Multiuser, Multiprocessing, and Multitasking to increase the amount of processing that can be accomplished in a given amount of time

Functions Performed by the Operating System

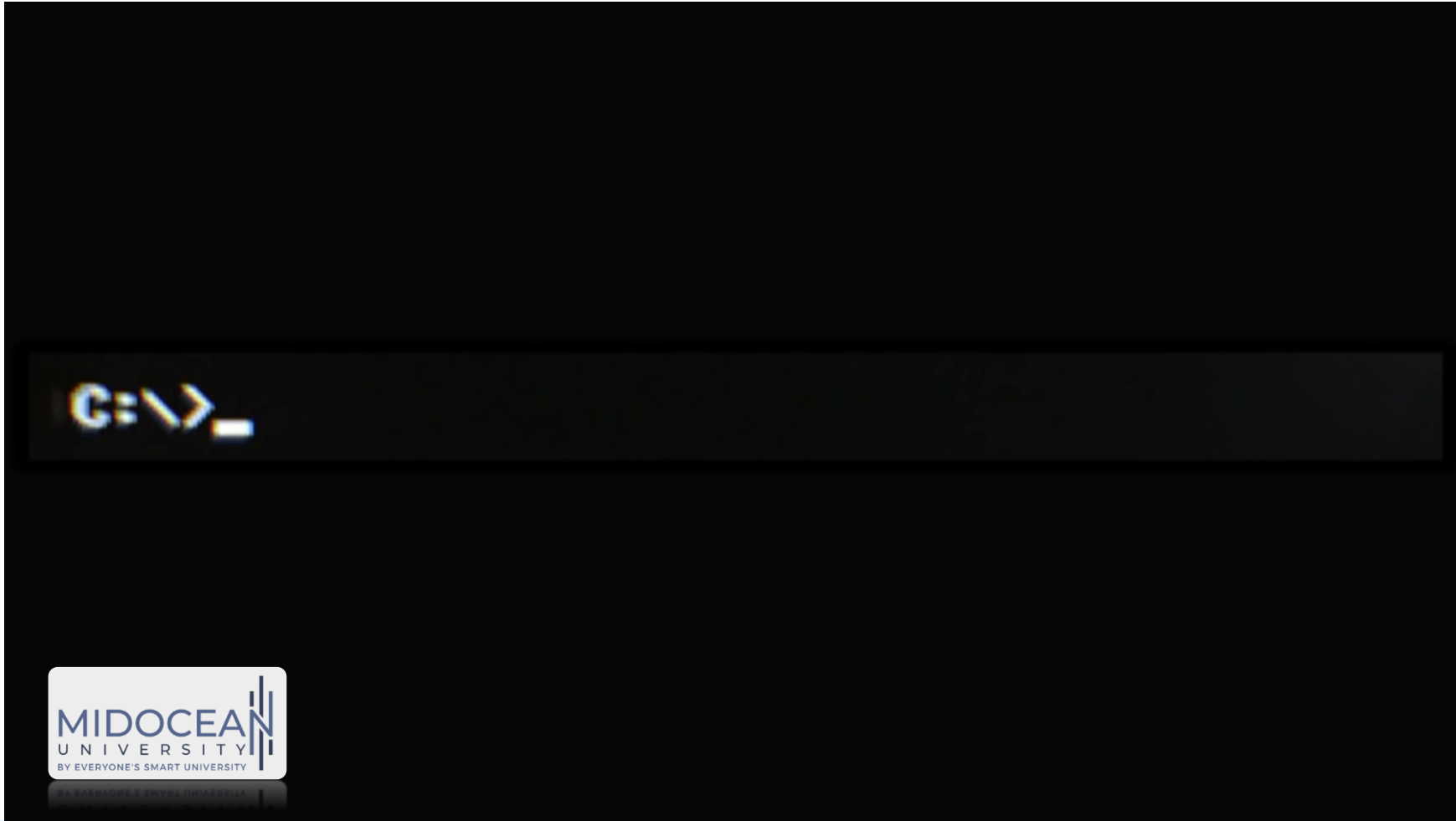
- ***Networking Capability:*** computers can join together in a network to send and receive data and share computing resources.
- ***Access to System Resources and Security*** the OS requires users to enter an identification code, and may also control what system resources a user may access.
- ***File Management*** to ensure that files in secondary storage are available when needed and that they are protected from access by unauthorized users.

Current Operating Systems

- Today's operating systems incorporate sophisticated features and impressive graphic effects. Table 4.2 classifies a few current operating systems by sphere of influence.

Personal	Workgroup	Enterprise
Microsoft Windows	Microsoft Windows Server	Microsoft Windows Server
Mac OS X, iOS	Mac OS X Server	
Linux	Linux	Linux
Google Android, Chrome OS	UNIX	UNIX
HP webOS	IBM i and z/OS	IBM i and z/OS

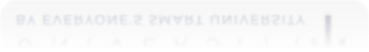
Windows



Apple Computer Operating Systems

- In July 2001, Mac OS X was released as an entirely new operating system for the Mac.
- Based on the UNIX operating system, Mac OS X included a new user interface with luminous and semitransparent elements, such as buttons, scroll bars, and windows along with fluid animation to enhance the user's experience.
- Most recent version: macOS 13 Ventura

- Linux is an OS developed in 1991, and its source code is freely available to everyone.
- It is, therefore, called an open source operating system.
- Individuals and organizations can use the open-source Linux code to create their own distribution (flavor) of Linux.
- A distribution consists of the Linux kernel (the core of the operating system)—which controls the hardware, manages files, separates processes, and performs other basic functions—along with other software.



Google: Android and Chrome

- Over the years, Google has extended its reach beyond its popular search engine (Google) to offer application software (Google Docs), email services (Gmail), a mobile operating system (Android), Web browser (Chrome), and, more recently, a PC operating system Chrome OS.
- The various releases of the Android operating system have been given tasty names such as Gingerbread, Jelly Bean, and Ice Cream Sandwich.
- Android has surpassed 1 billion users across all devices—with 80 percent of mobile phones worldwide operating on Android.

Operating Systems for Mobile Phones

- iPhone OS: Designed for Apple Mobile phones and mobile devices.
- BlackBerry Operating System: Designed for BlackBerry devices.
- Symbian OS: Designed for use with smart phones.



Workgroup Operating Systems

- Microsoft designed **Windows Server** to perform a host of tasks that are vital for Web sites and corporate Web applications.
- **UNIX** is a powerful OS originally developed by AT&T for minicomputers, which were larger than PCs and smaller than mainframes.
- **Red Hat Linux** an operating system that is very efficient at serving Web pages and can manage a cluster of several servers.
- **Mac OS X Server** is the first modern server OS from Apple Computer designed to collaborate, develop software, host Web sites and wikis, configure Mac and iOS devices, and remotely access a network. Smartphone users running iOS can open, edit, and save documents on OS X Server.

Utility Programs

- **Utility programs** perform a variety of tasks typically related to system maintenance or problem correction.
- **Hardware Utilities:** can be used to check the status of all parts of the PC, including hard disks, memory, modems, speakers, and printers.
- **Security Utilities:** Antivirus and anti-malware utilities can be used to constantly monitor and protect a computer. If a virus or other malware is found, it can often be removed.
- **File-Compression Utilities:** can reduce the amount of disk space required to store a file or reduce the time it takes to transfer a file over the Internet
- **Network and Internet Utilities:** monitor hardware and network performance and trigger an alert when a server is crashing or a network problem occurs.

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Application Software

- The primary function of application software is to apply the power of a computer system to enable people, workgroups, and entire enterprises to solve problems and perform specific tasks.
- Millions of software applications have been created to perform a variety of functions on a wide range of operating systems and device types.
- The following are some of the dozens of categories of applications:

Business	Genealogy	Personal information manager
Communications	Language	Photography
Computer-aided design	Legal	Science
Desktop publishing	Library	Simulation
Educational	Multimedia	Video
Entertainment	Music	Video games

Overview of Application Software

- *Proprietary software* is one-of-a-kind software designed for a specific application and owned by the company, organization, or person that uses it.
- Proprietary software can give a company a competitive advantage by providing services or solving problems in a unique manner better than methods used by a competitor.
- *Off-the-shelf software* is produced by software vendors to address needs that are common across businesses, organizations, or individuals.

Personal Application Software

- **Word processing applications** for checking spelling, creating tables, inserting formulas, and creating graphics.
- **Spreadsheet applications** manipulating and analyzing number, alphanumeric data, and other features include statistical analysis tools, built-in formulas, chart and graphics creation tools.
- **Database applications** storing, organizing, and retrieving a large amount of data and produce reports and documents. used to keep track of a tax records, the items in your apartment, and expenses.
- **Presentation Graphics Program** develop attractive graphs, illustrations, and drawings that help communicate important information.

Programming Languages

- Both system and application software are written in **coding** lines called **programming languages**.
- The primary function of a *programming language* is to provide instructions to the computer system so that it can perform a processing activity.
- Information systems professionals work with different programming languages, which are sets of keywords, commands, symbols, and rules for constructing statements that people can use to communicate instructions to a computer.

Programming Languages

- Programming involves translating what a user wants to accomplish into a code that the computer can understand and execute.
- Line of code typically contains a single instruction such as, “Retrieve the data in memory address X.”
- The instruction is then decoded during the instruction phase of the machine cycle.

Programming Languages

- Like writing a report or a paper in English, writing a computer program in a programming language requires the programmer to follow a set of rules.
- Each programming language uses symbols, keywords, and commands that have special meanings and usage.
- Each language also has its own set of rules, called the syntax of the language.

Programming Languages

- The language syntax dictates how the symbols, keywords, and commands should be combined into statements capable of conveying meaningful instructions to the CPU.
- Rules such as “statements must terminate with a semicolon,” and “variable names must begin with a letter,” are examples of a language’s syntax.

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Software Issues and Trends

- **Software Bugs:** is a defect in a computer program that keeps it from performing as its users expect it to perform.
- **Copyrights and Licenses:** Most companies protect the source code of their software from competitors by law using copyright or licensing provisions. Users are given unlimited use of software on one or two computers. In other cases, users pay based on usage.
- **Freeware** is software that is made available to the public for free. Software developers might give away their product for several reasons. Some want to build customer interest and name recognition. Others simply don't need the money and want to make a valuable donation to society.

Software Issues and Trends

- The term “*free software*” implies that the software is not only freeware, but also open source.
- *Open-source software* is distributed, typically for free, with the source code also available so that it can be studied, changed, and improved by its users. Over time, open-source software evolves in response to the combined contributions of its users.
- *Software Upgrades* are an important source of increased revenue for software manufacturers. Deciding whether to upgrade to a new version of software can be a challenge for corporations and people with a large investment in software.

Summary

- ❖ Software is valuable in helping individuals, workgroups, and entire enterprises achieve their goals.
- ❖ Software consists of programs that control the workings of the computer hardware.
- ❖ Software can be divided into two types: systems software, which consists of operating systems, utilities, and application software, which consists of programs that help users solve particular computing problems.
- ❖ One useful way of classifying the many potential uses of information systems is to identify the scope of problems and opportunities addressed by a particular organization or its sphere of influence.
- ❖ For most companies, the spheres of influence are personal, workgroup, and enterprise.

Summary

- ❖ The operating system controls how you enter data into your computer, perform meaningful work, and display results.
- ❖ An operating system is a set of programs that controls a computer's hardware and acts as an interface with application software.
- ❖ There are various combinations of operating systems and computers, and users, including single computer with a single user, single computer with multiple simultaneous users, multiple computers with multiple users, and special purpose computers.

Summary

- ❖ The operating system performs functions including controlling common hardware functions, providing a user interface and input/output management, providing a degree of hardware independence, managing system memory, managing processing tasks, providing networking capability, controlling access to system resources, and managing files.
- ❖ Operating systems use multitasking and multiprocessing to increase the amount of processing that can be accomplished in a given amount of time.
- ❖ With multitasking, users can run more than one application at a time.
- ❖ Multiprocessing supports running a program on more than one CPU.

Summary

- ❖ Over the years, many OSs have been developed for the individual sphere of influence including Microsoft Windows, the Mac OS X, Linux, and Google Android and Chrome.
- ❖ Microsoft Windows Server, UNIX, Red Hat Linux, Mac OS X Server, and HP-UX are operating systems used for workgroups.
- ❖ Smartphones now employ full personal computer operating systems such as the Google Android, Apple iOS, and Microsoft Windows Phone.

Summary

- ❖ Utility programs can perform many useful tasks, typically related to system resource maintenance and management, and often come installed on computers along with the OS.
- ❖ This type of software is used to merge and sort sets of data, keep track of computer jobs being run, compress files of data, protect against harmful computer viruses, monitor hardware and network performance, and perform dozens of other important tasks.

Summary

- ❖ Organizations typically use off-the-shelf application software to meet common business needs and proprietary application software to meet unique business needs and provide a competitive advantage.
- ❖ Proprietary software is one-of-a-kind software designed for a specific application and owned by the company, organization, or person that uses it.

Summary

- ❖ Off-the-shelf-software is produced by software vendors to address needs that are common across businesses, organizations, or individuals.
- ❖ Personal application software includes general-purpose programs that enable users to improve their personal effectiveness, increasing the quality and amount of work that can be done.
- ❖ Word-processing, spreadsheet analysis, database, presentation graphics, and personal information management applications are examples of this type of software.

Summary

- ❖ All software applications are written in coding lines called programming languages, which are sets of keywords, commands, symbols, and rules for constructing statements to provide instructions to a computer to perform some processing activity.
- ❖ The software industry continues to undergo constant change; computer users need to be aware of recent trends and issues in the software industry to be effective in their business and personal life.
- ❖ Software bugs, software copyrights and licensing, freeware and open-source software, software upgrades are all important software issues and trends.

Summary

- ❖ A software bug is a defect in a computer program that keeps it from performing in the manner intended. Software bugs are common, even in key pieces of business software.
- ❖ Most companies protect the source code of their software from competitors as well as customers. As a result, most software products are protected by law using copyright or licensing provisions

Summary

- ❖ Freeware is software that is made available to the public for free.
- ❖ Open source software is freeware that also has its source code available so that others may modify it.
- ❖ Open-source software development and maintenance is a collaborative process, with developers around the world using the Internet to download the software, communicate about it, and submit new versions of it.
- ❖ Software upgrades are an important source of increased revenue for software manufacturers and can provide useful new functionality and improved quality for software users.

Reference

