COURSE TECHNOLOGY
CENGAGE Learning™

Principles of Information Systems, Ninth Edition

Chapter 4

Software: Systems and Application Software

Principles and Learning Objectives

- Systems and application software are critical in helping individuals and organizations achieve their goals
  - Identify and briefly describe the functions of the two basic kinds of software
  - Outline the role of the operating system and identify the features of several popular operating systems

Principles and Learning Objectives (continued)

- Organizations should not develop proprietary application software unless doing so will meet a compelling business need that can provide a competitive advantage
  - Discuss how application software can support personal, workgroup, and enterprise business objectives
  - Identify three basic approaches to developing application software and discuss the pros and cons of each

Principles and Learning Objectives (continued)

- Organizations should choose a programming language whose functional characteristics are appropriate for the task at hand, considering the skills and experience of the programming staff
  - Outline the overall evolution and importance of programming languages and clearly differentiate among the generations of programming languages

Principles and Learning Objectives (continued)

- The software industry continues to undergo constant change; users need to be aware of recent trends and issues to be effective in their business and personal life
  - Identify several key software issues and trends that have an impact on organizations and individuals

Why Learn About Software?

- Software is indispensable for any computer system and the people using it
- Systems software
  - Input data from a keyboard, make calculations, print results, etc.
- Applications software
  - Key to helping you achieve your career goals and enrich your life
  - Stock trading, scientific, accounting, tax, gaming, etc.

An Overview of Software

- Computer programs
  - Sequences of instructions for the computer
- Documentation
  - Describes program functions

Systems Software

- Set of programs that coordinates the activities and functions of hardware and programs
- Computer system platform
  - Combination of a hardware configuration and systems software

Application Software

- Helps users solve particular problems
- In most cases, resides on the computer's hard disk
- Can be stored on CDs, DVDs, and flash or keychain storage devices

Supporting Individual, Group, and Organizational Goals

- Sphere of influence
  - Scope of problems and opportunities addressed by a particular organization
- Personal sphere of influence
  - Serve the needs of an individual user
- Personal productivity software
  - Help users improve their personal effectiveness
- Workgroup
  - When two or more people work together to achieve a common goal

Supporting Individual, Group, and Organizational Goals (continued)

- Workgroup sphere of influence
  - Helps workgroup attain its common goals
- Enterprise sphere of influence
  - Support the firm in its interaction with its environment

Supporting Individual, Group, and Organizational Goals (continued)

Software	Personal	Workgroup	Enterprise
Systems software	Personal computer and workstation operating systems	Network operating systems	Midrange computer and mainframe operating systems
Application software	Word processing, spreadsheet, database, graphics	Electronic mail, group scheduling, shared work, collaboration	General ledger, order entry, payroll, human resources

Table 4.1

Software Supporting Individuals, Workgroups, and Enterprises

Systems Software

- Systems software
  - Controls operations of computer hardware
  - Supports application programs' problem-solving capabilities
- Types of systems software
  - Operating systems
  - Utility programs
  - Middleware

Operating Systems

- Set of programs that controls computer hardware and acts as an interface with application programs
- Kernel
  - Ties all components of the OS together and regulates other programs

Operating Systems (continued)

- Combinations of OSs, computers, and users
  - Single computer with a single user
  - Single computer with multiple users
  - Multiple computers
  - Special-purpose computers

Operating Systems (continued)

- Activities performed by the operating system
  - Perform common computer hardware functions
  - Provide a user interface and input/output management
  - Provide a degree of hardware independence
  - Manage system memory

Operating Systems (continued)

- Activities performed by the operating system
  - Manage processing tasks
  - Provide networking capability
  - Control access to system resources
  - Manage files

Operating Systems (continued)

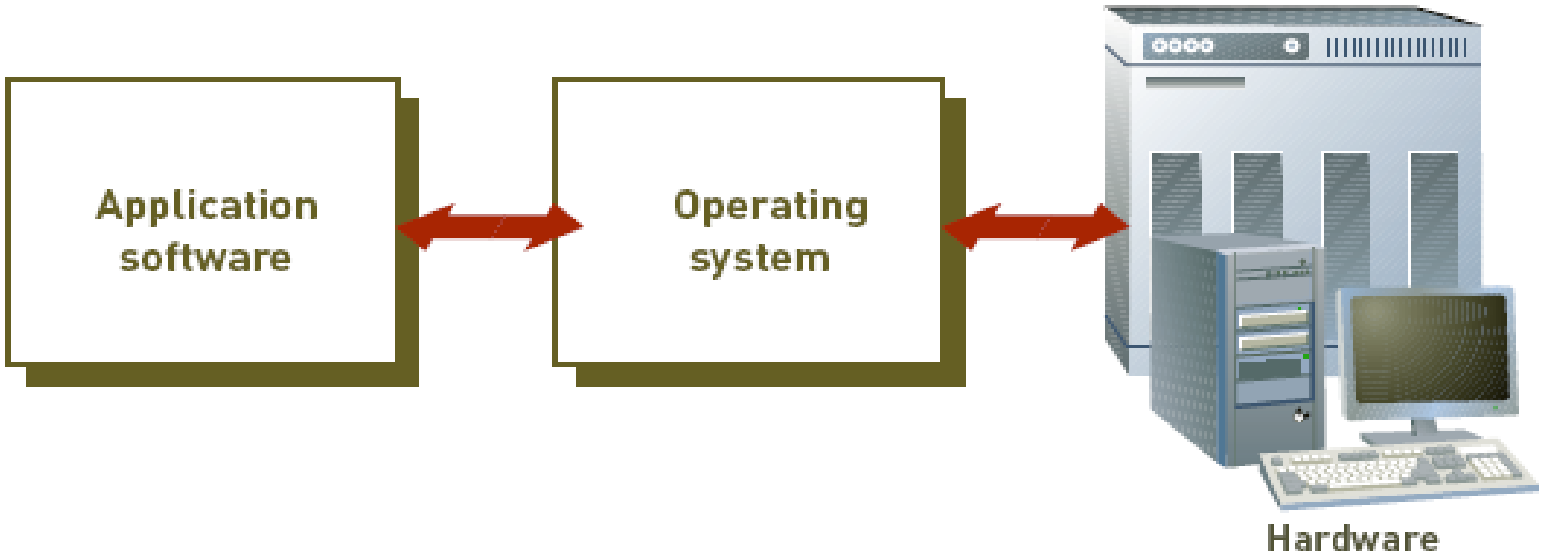

Figure 4.2

The Role of Operating Systems

The role of the operating system is to act as an interface or buffer between application software and hardware.

Operating Systems (continued)

- Common hardware functions
  - Get input from keyboard or some other input device
  - Retrieve data from disks
  - Store data on disks
  - Display information on a monitor or printer

Operating Systems (continued)

- User interface and input/output management
  - User interface
    - Allows individuals to access and command the computer system
  - Command-based user interface
    - Requires that text commands be given to the computer to perform basic activities
  - Graphical user interface (GUI)
    - Uses icons and menus displayed on screen to send commands to the computer system

Operating Systems (continued)

- Hardware independence
  - Application program interface (API)
    - Allows applications to make use of the operating system
- Memory management
  - Allows computer to execute program instructions effectively and to speed processing

Operating Systems (continued)

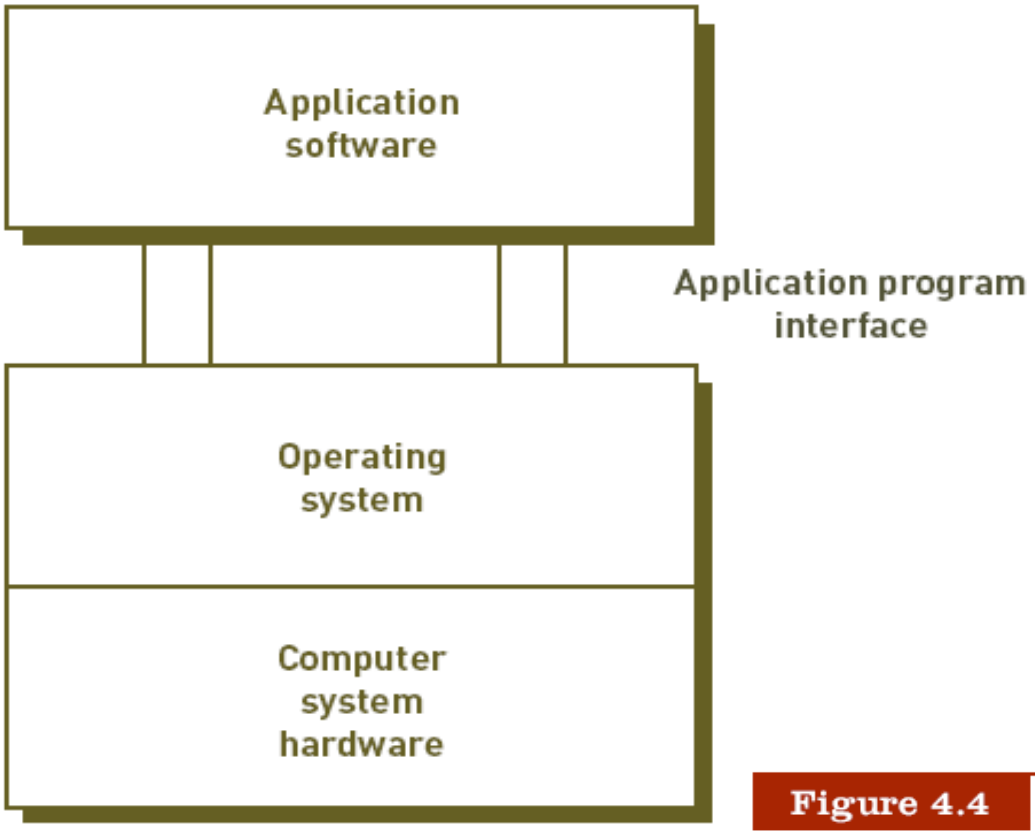

Figure 4.4

Application Program Interface Links Application Software to the Operating System

Operating Systems (continued)

- Processing tasks
  - Multitasking
    - More than one program can run at the same time
  - Time-sharing
    - Allows more than one person to use a computer system at the same time
  - Scalability
    - Ability of the computer to handle an increasing number of concurrent users smoothly

Operating Systems (continued)

- Networking capability
  - Allows computers in a network to send and receive data and share computing resources
- Access to system resources and security
  - Protection against unauthorized access
  - Logins and passwords
- File management
  - Ensures that files in secondary storage are available when needed and that they are protected from access by unauthorized users

Current Operating Systems

- Microsoft PC operating systems
- Apple Computer Operating Systems
- Linux

Current Operating Systems (continued)

Personal	Workgroup	Enterprise
Microsoft Windows Vista, Windows XP, Windows Mobile, Windows Automotive, and Windows Embedded	Microsoft Windows Server 2003 and Server 2008	Microsoft Windows Server 2003 and Server 2008
Mac OS X	Mac OS X Server	
UNIX	UNIX	UNIX
Solaris	Solaris	Solaris
Linux	Linux	Linux
Red Hat Linux	Red Hat Linux	Red Hat Linux
Palm OS	Netware	
	IBM i5/OS and z/OS	IBM i5/OS and z/OS
	HP-UX 11i	HP-UX 11i

Table 4.2

Popular Operating Systems Cross All Three Spheres of Influence

Workgroup Operating Systems

- Windows Server
- UNIX
- NetWare
- Red Hat Linux
- Mac OS X Server

Enterprise Operating Systems

- z/OS
  - IBM's first 64-bit enterprise OS
- HP-UX and Linux
  - ***HP-UX****:* robust UNIX-based OS from Hewlett-Packard

Operating Systems for Small Computers, Embedded Computers, and Special-Purpose Devices

- Palm OS
- Windows Embedded
- Windows Mobile

Utility Programs

- Hardware utilities
- Security Utilities
- File-compression utilities
- Spam and pop-up blocker utilities

Utility Programs (continued)

- Network and Internet utilities
- Server and mainframe utilities
- Other utilities
  - Manages and protects corporate documents
  - Helps people with visual disabilities use the Internet
  - Monitors employees
  - Searches for files and documents

Utility Programs (continued)

Personal	Workgroup	Enterprise
Software to compress data so that it takes less hard disk space	Software to provide detailed reports of work-group computer activity and status of user accounts	Software to archive contents of a database by copying data from disk to tape
Screen saver	Software that manages an uninterruptible power supply to do a controlled shutdown of the workgroup computer in the event of a loss of power	Software that compares the content of one file with another and identifies any differences
Antivirus and antispyware software	Software that reports unsuccessful user logon attempts	Software that reports the status of a particular computer job

Table 4.3

Examples of Utility Programs

Middleware

- Software that allows different systems to communicate and exchange data
- Can also be used as an interface between the Internet and older legacy systems
- Service-oriented architecture (SOA)
  - Uses modular application services to allow users to interact with systems, and systems to interact with each other

Application Software

- Application programs
  - Interact with systems software
  - Help you perform common tasks, such as:
    - Creating and formatting text documents
    - Performing calculations
    - Managing information

Overview of Application Software

- Proprietary software
  - One-of-a-kind program for a specific application, usually developed and owned by a single company
- Off-the-shelf software
  - Existing software program that is purchased
- Application service provider (ASP)
  - Company that can provide software, support, and computer hardware on which to run the software from the user's facilities over a network

Overview of Application Software (continued)

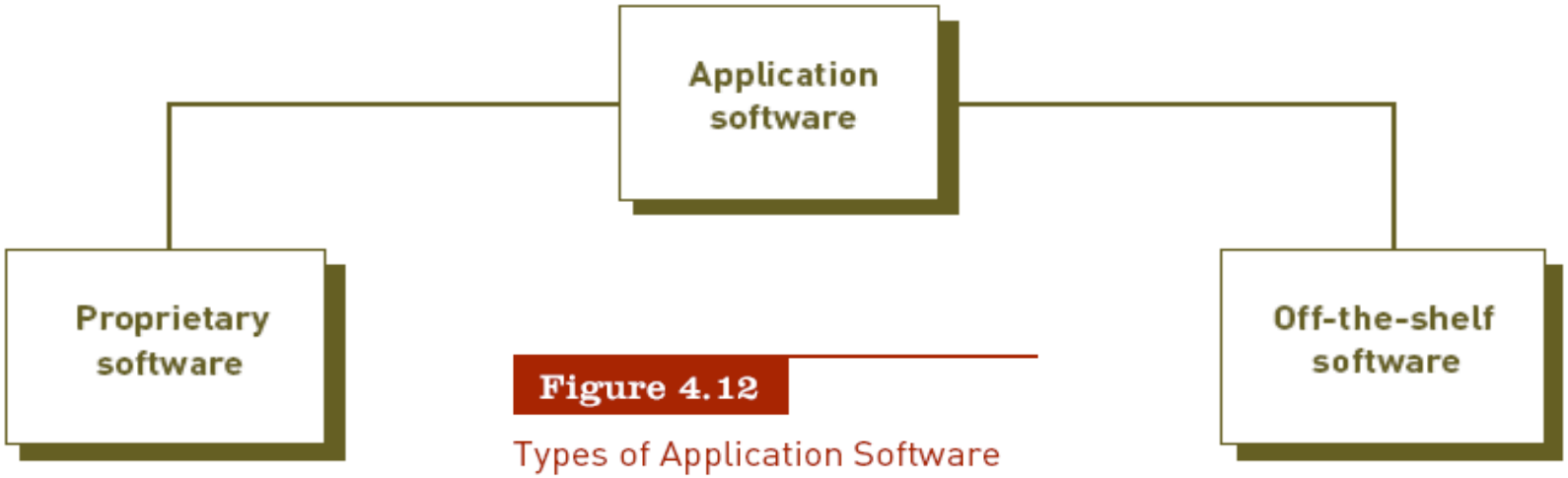

Figure 4.12

Types of Application Software

Some off-the-shelf software can be customized to suit user needs.

Personal Application Software

- Word processing
- Spreadsheet analysis
- Database applications
- Graphics program
- Personal information managers
- Software suites and integrated software packages
- Other personal application software

Workgroup Application Software

- Support teamwork, whether people are in the same location or dispersed around the world
- Groupware
  - Software that helps groups of people work together more efficiently and effectively

Enterprise Application Software

- Software that benefits an entire organization
- Enterprise resource planning (ERP) software
  - Set of integrated programs that manage a company's vital business operations for an entire multisite, global organization

Application Software for Information, Decision Support, and Specialized Purposes

- Available in every industry
  - Specialized application software for information, decision support, and other purposes

Programming Languages

- Sets of keywords, symbols, and a system of rules for constructing statements
  - By which humans can communicate instructions to be executed by a computer
- Program code
  - Set of instructions that signal the CPU to perform circuit-switching operations
- Syntax
  - Set of rules associated with a programming language

The Evolution of Programming Languages

- Visual, object-oriented, and artificial intelligence languages
  - Easier for nonprogrammers to use than older generation languages
- Visual languages
  - Use a graphical or visual interface for program development
- Compiler
  - Software program that converts programmer's source code into machine-language instructions

The Evolution of Programming Languages (continued)

Generation	Language	Approximate Development Date	Sample Statement or Action
First	Machine language	1940s	00010101
Second	Assembly language	1950s	MVC
Third	High-level language	1960s	READ SALES
Fourth	Query and database languages	1970s	PRINT EMPLOYEE NUMBER IF GROSS PAY>1000
Beyond Fourth	Natural and intelligent languages	1980s	IF gross pay is greater than 40, THEN pay the employee overtime pay

Table 4.9

The Evolution of Programming Languages

The Evolution of Programming Languages (continued)

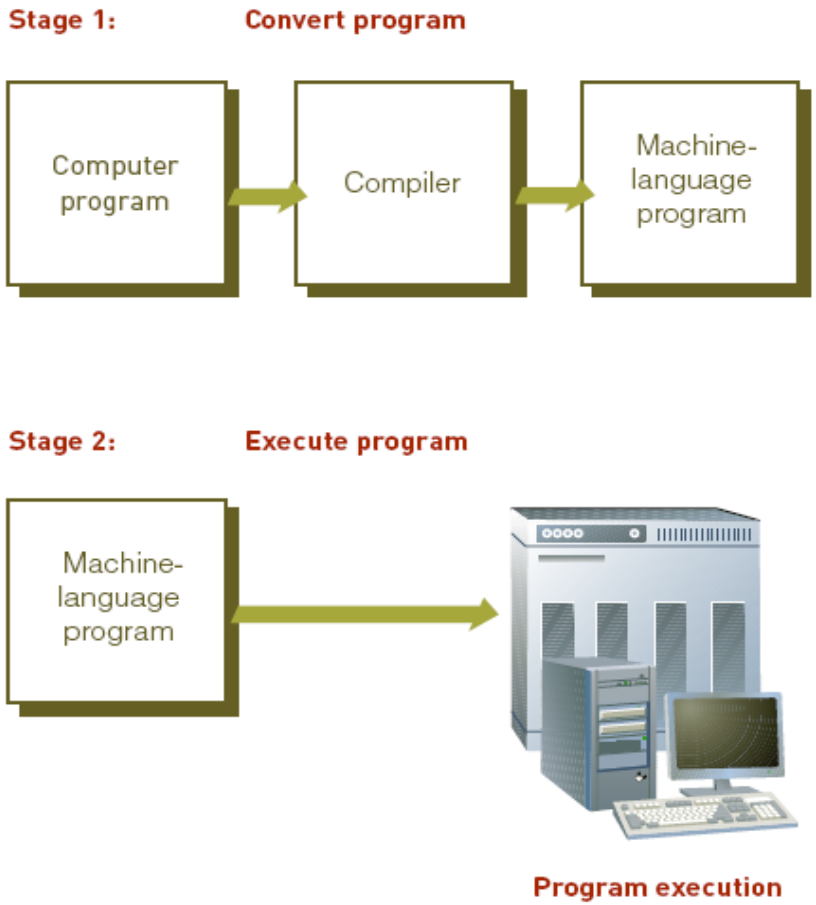

Figure 4.22

How a Compiler Works

A compiler translates a complete program into a complete set of binary instructions (Stage 1). After this is done, the CPU can execute the converted program in its entirety (Stage 2).

Software Issues and Trends

- Software bugs
  - Defect in program that keeps it from performing as it should
- Tips for reducing impact of software bugs
  - Register all software
  - Check read-me files for work-arounds
  - Access support area of the manufacturer's Web site for patches
  - Install latest software updates

Copyrights and Licenses

- Most software products are protected by law using copyright or licensing provisions
  - In some cases, you are given unlimited use of software on one or two computers
  - In other cases, you pay for your usage - if you use the software more, you pay more
- Some software now requires that you *register* or *activate* it before it can be fully used

Open-Source Software

- Software freely available to anyone in a form that can be easily modified
- More reliable and secure than commercial software
- Can contain hidden costs, particularly for user support or solving problems with the software

Open-Source Software (continued)

Software Type	Example
Operating system	Linux
Application software	Open Office
Database software	MySQL
Internet browser	Firefox
Photo editing	Gimp
Project management	OpenProj
Personal accounting	Grisbi
E-mail	Thunderbird

Table 4.11

Examples of Open-Source Software

Shareware, Freeware, and Public Domain Software

- Shareware and freeware
  - Software that is very inexpensive or free, but whose source code cannot be modified
- Public domain software
  - Not protected by copyright laws and can be freely copied and used

Software Upgrades

- Software companies revise their programs and sell new versions periodically
- Revised software may or may not offer any major additional capabilities
- Revised software can contain bugs or errors
- Software upgrades usually cost much less than the original purchase price

Global Software Support

- Vendors face the challenge of providing adequate support for their software customers in all locations of the world
- Trend
  - Outsourcing global support to one or more third-party distributors

Summary

- Main categories of software
  - Systems software and application software
- Operating system (OS)
  - Set of computer programs that controls the computer hardware to support users' computing needs
- Three approaches to developing application software
  - Build proprietary application software
  - Buy existing programs off the shelf
  - Use a combination of customized and off-the-shelf application software

Summary (continued)

- Application service provider (ASP)
  - Can provide software, support, and computer hardware on which to run the software from the user's facilities over a network
- Important software issues and trends
  - Software bugs, software licensing and copyrighting
  - Open-source software, shareware and freeware
  - Multiorganizational software development
  - Software upgrades and global software support