Chapter 10
Computer Software

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Learning Objectives

In this chapter you will learn about:

- § Term "Software" and its relationship with "Hardware"
- § Various types of software and their examples
- § Relationship among hardware, system software, application software, and users of a computer system
- § Different ways of acquiring software
- § Various steps involved in software development
- § Firmware
- § Middleware

Software

- § *Hardware* refers to the physical devices of a computer system.
- § *Software* refers to a collection of programs
- § *Program* is a sequence of instructions written in a language that can be understood by a computer
- § *Software package* is a group of programs that solve a specific problem or perform a specific type of job

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Relationship Between Hardware and Software

§ Both hardware and software are necessary for a computer to do useful job. They are complementary to each other

§ Same hardware can be loaded with different software to make a computer system perform different types of jobs

§ Except for *upgrades*, hardware is normally a one-time expense, whereas software is a continuing expense

§ Upgrades refer to renewing or changing components like increasing the main memory, or hard disk capacities, or adding speakers, modems, etc.

Types of Software

Most software can be divided into two major categories:

§ *System software* are designed to control the operation and extend the processing capability of a computer system

§ *Application software* are designed to solve a specific problem or to do a specific task

System Software

§ Make the operation of a computer system more effective and efficient

§ Help hardware components work together and provide support for the development and execution of application software

§ Programs included in a system software package are called *system programs* and programmers who prepare them are called *system programmers*

§ Examples of system software are operating systems, programming language translators, utility programs, and communications software

Application Software

§ Solve a specific problem or do a specific task

§ Programs included in an application software package are called *application programs* and the programmers who prepare them are called *application programmers*

§ Examples of application software are word processing, inventory management, preparation of tax returns, banking, etc.

Logical System Architecture

HARDWARE
(Physical devices/components of the computer system)

SYSTEM SOFTWARE
(Software that constitute the operating and programming environment of the computer system)

APPLICATION SOFTWARE
(Software that do a specific task or solve a specific problem)

USERS
(Normally interact with the system via the user interface provided by the application software)

Relationship among hardware, system software, application software, and users of a computer system.

Ways of Acquiring Software

§ Buying pre-written software

§ Ordering customized software

§ Developing customized software

§ Downloading public-domain software

Each of these ways of acquiring software has its own

advantages and limitations

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Advantages and Limitations of Buying Pre-written Software

§ Usually costs less

§ Planned activity can be stared almost immediately

§ Often, operating efficiency and the capability to meet specific needs of user more effectively in not as good for pre-written software packages as for in-house developed software packages

Advantages & Limitations of Ordering Customized Software

§ User need not maintain its own software development team, which is an expensive affair

§ User needs to always depend on the vendor for carrying out the changes and the vendor may separately charge for every request for change

Advantages & Limitations of Developing Customized Software

§ Easier to carry out changes in the software, if it is developed in-house

§ Developing software in-house means a major commitment of time, money, and resources

§ In-house software development team needs to be maintained and managed

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Advantage & Limitations of Downloading Public-domain Software

§ Available for free or as shareware, and are usually accompanied with source code

§ Usually community-supported as author does not support users directly

§ Can be downloaded and used immediately

§ They may not be properly tested before release

§ Open Source Software (OSS) are becoming popular due to:

  § Allows any user to download, view, modify, and redistribute

  § User can fix bugs or change software to suit needs

  § Copyright is protected for both original and subsequent authors

§ Not all open source software are free and vise-verse

Software Development Steps

Developing a software and putting it to use is a complex process and involves following steps:

§ Analyzing the problem at hand and planning the program(s) to solve the problem

§ Coding the program(s)

§ Testing, debugging, and documenting the program(s)

§ Implementing the program(s)

§ Evaluating and maintaining the program(s)

Firmware

§ Firmware is software substituted for hardware and stored in read-only memory

§ Firmware technology has enabled production of various types of smart machines having microprocessor chips with embedded software

Middleware

- § Basic idea is to have a *separate software layer* to:
  - § Act as "glue" between client and server parts of application
  - § Provide programming abstraction
  - § Mask heterogeneity of underlying network, hardware, and OS
- § Encourages *three-tier* software architecture against two-tier popularized by Server-Client architecture

Key Words/Phrases

- § Application programmers
- § Application programs
- § Application software
- § Computer program
- § Customized software
- § Database
- § Education software
- § End-to-end solution
- § Entertainment software
- § Firmware
- § Graphics software
- § Hardware
- § Middleware
- § Open Source Software
- § Personal assistance software
- § Pre-written software
- § Public-domain software
- § Shareware
- § Software
- § Software package
- § Spreadsheet
- § System programmers
- § System programs
- § System software
- § Turnkey solution
- § User-supported software
- § Utilities
- § Word-processing