Chapter 8: System Software for Computer Operations and Management

Overview

This chapter introduces students to system software – a necessary part of working with computers. System software works in the background to provide instructions to control operations, manage the network and databases, and maintain system security. Students will most likely be familiar with various Windows operating systems. Relate the information to that system where possible to make it easier to understand.

Lecture Notes

A. Operating System

This is the most important system software; it manages the operations of the CPU, controls the input, output, and storage resources, and controls computer tasks.

1. **Starting the System** is also referred to as booting the system. The boot process instructions are stored in ROM; operating system programs required for standard processing are loaded into RAM. At that point, the operating system takes control of the system.

2. A **User Interface** is used when someone is interacting with a computer system controlled by an operating system.

    a. A command-driven interface requires the user to enter commands and press Enter to submit the command for execution.

    b. A menu-driven interface presents a menu of options for the user to click on using an input device (mouse, roller ball, etc.).

    c. A graphical user interface uses icons, bars, buttons, boxes, and images to provide options for the user to click on; system software is hidden from the user.

3. **Interrelated Operations** include resource management, process management, and task management.

    a. The operating system manages resources like the computer, network, storage resources, and input/output peripherals.
        - Computer resources
        - Virtual memory

    b. The operating system controls the processing of all jobs. Multi-tasking and multiprogramming allow running more than one program at a time; multithreading executes more than one task at a time in a single application.

    c. Task management includes keeping track of each computer job, who is using the system, what programs have been executed, and unauthorized attempts at access.

4. **Types of Operating Systems** must be analyzed to determine what is right for your system.

a. Microcomputer systems include Windows (leading series), Mac OS (Macintosh), UNIX, Linux, and OS/2.

b. Server operating systems provide reliability, backup, network management, directory services, and security required for department operations. They include UNIX, Linux, Windows, Novel.

c. Mid-range and mainframe operating systems include operating systems for enterprise-wide computing. Systems must manage complex operations, allow access to large databases, provide online support, and security.

d. Supercomputer operating systems include Cray Unicos or IBM's AIX.

e. Mobile device operating systems are used on handheld computers and mobile telephones; they include Windows, Palm OS, and Embedded Linux.

5. **Navigation in a GUI Environment** is very simple; it is currently the most common type of system software for business. *Review these parts, though most students are probably familiar with them. If further explanation is necessary, use a computer to show students the various elements.*

a. The desktop area displays a taskbar and program/file icons; point and click to open items.

b. A shortcut is a link to an item stored on the computer or network; links can appear as an icon on the desktop or as an item on a menu.

c. Input operations include click, double-click, right-click, and drag using the input device (mouse, etc.).

d. A window is an overlay on the desktop that includes a title bar, menu bar, and toolbar.

e. Help is accessible from a menu.

B. Utilities and Language Translators

1. **Utility Programs** are used for routine, repetitive tasks; they are common to all computer system software.

a. Desktop utilities are available from the taskbar, computer directory, and recycle bin; these utilities are used regularly in a GUI environment.

b. The menu bar and toolbar provide utilities to manage files and folders and for customizing the desktop and windows; the toolbars provide access to most-used functions from the menu.

c. Disk defragmentation utilities increase the speed of access and retrieval from a disk by rewriting parts of a file to contiguous sectors on a disk. Files become fragmented over time; it isn't caused by anything the user does.

d. Disk formatting removes information from the disk and prepares it for the operating system. *Remind students that this erases any files that are currently on the disk*.

2. **Language Translators** are system programs that translate a program's language into machine language so that it can be processed; they are translated in one of two ways:

a. A compiler is a translator that changes the programming code into machine code.

b. An interpreter is a special compiler that translates and executes each program statement one at a time.

C. System Support Programs

They are required for a network enterprise.

1. **Performance Monitors** watch and adjust the usage and performance of the system to keep it running efficiently. Technicians check output to perform maintenance as necessary; users can check the system using diagnostics in the control panel.

2. **Network Management** is necessary because of the reliance on intranets, extranets, LANs, WANs, and the Internet.

   a. Network software is used to manage network activities.

   b. Software functions that are managed include checking input and output, assigning priorities to requests, and detecting and correcting transmission errors.

   c. Network programs include various versions of Windows, Novel NetWare, and IBM software.

3. **Database Management** is required for mass data management using a mainframe or mid-range computer.

   a. DBMS software consists of a set of programs for creating, using, and maintaining databases within the organization. Most organizations have many databases.

   b. The software integrates collections of files and data so multiple people have access to it. The DBMS simplifies processing through query displays and reports.

   c. Types of databases vary, but they reduce program-data dependence and data redundancy while improving data integrity.

      - In a hierarchical DBMS, data are organized into a treelike structure; the top of the structure is called the root and all other data elements are called segments.
      - A network DBMS supports the need for a many-to-many data relationship.
      - A relational DBMS is the most popular model today; data are organized in simple two-dimensional tables.
      - A centralized database is common for a client/server network; a distributed database stores the data in more than one physical location.
      - The object-oriented DBMS stores data and procedures as objects that are retrieved and shared.

- Online analytical processing (OLABP) is also known as multidimensional data analysis because it enables the end-user to view the same data from multiple perspectives.
- A data warehouse integrates current and historical transaction data from the multiple LANs and storage area network.

4. **Security Monitors** control the use of hardware, software, and data resources. They maintain statistics on system use and unauthorized access.

5. **Middleware for Application Servers** translates the different operating system protocols and manages the exchange of information between the two environments.

Additional Resources for Students

Recommended readings (no texts should be more than two years old):

- Fuller, Floyd and William Manning. *Computers and Information Processing*.
- Long, Larry and Nancy Long. *Introduction to Computers and Information Systems*. Prentice-Hall, Inc.
- Meyer, Marilyn and Roberta Baber. *Computers in Your Future*.
- Norton, Peter. *Introduction to Computers*.
- O'Leary, Timothy J. and Linda L. O'Leary. *Computing Essentials*. McGraw-Hill.
- Shelly, Gary and Thomas Cashman. *Learning to Use: Microcomputer Applications*. Boyd and Fraser Publishing Co.
- Tilton, R., J. Jackson, and S. Rigby. *The Electronic Office: Procedures and Administration*. South-Western Publishing Co.

Current issues of periodicals or business publications are also an excellent resource. Some of the following periodicals have an accompanying Web site.

Current Periodical	***Web Address***
Gregg Reference Manual	
IAAP Complete Office Handbook	http://www.iaap-hq.org/products/handbook.htm
Modern Office Technology	
Network Computing	http://www.networkcomputing.com/
OfficePro	http://www.iaap-hq.org/officepro/toc.htm
PC Computing	

PC Magazine	http://www.pcmag.com
The Office	
Windows Magazine	http://www.winmag.com

Additionally, the following Web sites may provide up-to-date information:

Computer World	http://www.computerworld.com
C-Net	http://news.com.com/
Wired	http://www.wired.com/
ZDNet	http://www.zdnet.com/zdnn/