

Introduction to Software

The software is a series of instructions or a special program that performs a particular task and is recorded in some form on a computer disk. Simply, the software is an abstract collection of instructions for computers to perform specific tasks. It is called differently a program or software program. Computer software has two major categories. It is typically classified into system software and application software.

A] System Software

System software is a program that manages and supports the computer resources and operations of a computer system while it executes various tasks such as processing data and information, controlling hardware components, and allowing users to use application software. That is, systems software functions as a *bridge* between computer system hardware and the application software. System software is made up of many control programs, including the operating system, communications software and database manager. There are many kinds of computers these days. Some of them are easier to learn than others. Some of them perform better than others. These differences may come from different systems software.

Three Kinds of Programs

Systems software consists of three kinds of programs. The system management programs, system support programs, and system development programs are they. These are explained briefly.

i. System Management Programs

These are programs that manage the application software, computer hardware, and data resources of the computer system. These programs include operating systems, operating environment programs, database management programs, and telecommunications monitor programs. Among these, the most important system management programs are operating systems. The operating systems are needed to study more details. There are two reasons. First, users need to know their functions first. For the second, there are many kinds of operating systems available today.

Telecommunications monitor programs are additions of the operating systems of microcomputers. These programs provide the extra logic for the computer system to control a class of communications devices.

ii. System Support Programs

These are the programs that help the operations and management of a computer system. They provide a variety of support services to let the computer hardware and other system programs run

efficiently. The major system support programs are system utility programs, system performance monitor programs, and system security monitor programs (virus checking programs).

There are many system utility programmes which include but not limited to:

- Antivirus
- Back up facility
- Disk cleaners
- File compression and decompression software
- File recovery software
- Disk defragmenters
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iii. System Development Programs

These are programs that help users develop information system programs and prepare user programs for computer processing. These programs may analyze and design systems and program itself. The main system development programs are programming language translators, programming environment programs, computer-aided software engineering packages.

Discussion: Operating Systems

An operating system is a collection of integrated computer programs that provide recurring services to other programs or to the user of a computer. These services consist of disk and file management, memory management, and device management. In other words, it manages CPU operations, input/output activities, storage resources, diverse support services, and controls various devices. Operating system is the most important program for computer system. Without an operating system, every computer program would have to contain instructions telling the hardware each step the hardware should take to do its job, such as storing a file on a disk. Because the operating system contains these instructions, any program can call on the operating system when a service is needed.

Need to Study Operating System?

There are many different computer systems and several available operating systems. Thus, users must know what each operating system can do and cannot do to meet their necessity. Today, many operating systems are used for general use or sometimes for specific use. Then, which one is best for a specific purpose? The reason that users need to study operating system is here. The predominant microcomputer operating system for IBM and IBM-compatibles so far was DOS (Disk Operating System). It has different versions including MS-DOS, PC-DOS and others. DOS is

very popular and wide spread, but it has some limitations. Users need to learn DOS although it may fade out in a few years and has some weakness, because it will be used for the next several years. The other popular operating system was the Apple Macintosh operating system. As more powerful microcomputers become commonplace, more advanced operating systems are needed. Microcomputer users are beginning to demand more powerful operating system that can run powerful microcomputers more efficiently. Today's very powerful microcomputers are demanding more complex and refined operating system that can do multifunctions. They also ask an easier user interface than old operating systems did. Now, there are more than six popular operating systems, leading to the lack of a standard. The other reason that operating system should be learned is here.

How the Operating System Uses Memory

Here explains in case of *DOS*. When a personal computer is turned on, it searches specific locations on the disk drives for operating system files. If the PC finds the files, it loads the first of them into memory. A set of operating system files then takes over, loading the rest of the main files into memory in a specific order. Because the operating system is in a sense, loading itself or lifting itself by its own bootstraps, this operation is called the boot-up.

At the lowest part of memory, the operating system loads a table of interrupt vectors. When the operating system receives special codes called interrupts, it uses the table to detect where in memory it can find matching instructions. *DOS* also uses a small area just above the interruption table to hold the BIOS data called 'flags' that record the state of various system conditions. The same area also acts as a buffer to store keystrokes that come in faster than the system can process them. A large expanse of memory just above the BIOS flags and keyboard buffer is used for device drivers, utility programs, and application programs. When *DOS* reads the *CONFIG.SYS* and *AUTOEXEC.BAT* files, it looks for command lines to load drivers or memory-resident programs. Memory-resident programs are those that continue to be active even when application programs are running. When it finds such a command line, *DOS* normally puts the driver or program at the start of this large memory area. Device drivers usually remain loaded until the PC is turned off. Memory-resident programs can be unloaded if no other programs are loaded after them.

i. Operating System Functions

An operating system executes many functions to operate computer system efficiently. Among them, four essential functions are the followings.

- **Resource Management:** An operating system manages a collection of computer hardware resources by using a variety of programs. It manages computer system resources, including its CPU, primary memory, *virtual memory*, secondary storage devices, input/output peripherals, and other devices.
- **Task Management:** The function of the operating system that controls the running of many tasks. It manages one program or many programs within a computer system simultaneously. That is, this function of operating system manages the completion of users' tasks. A task management program in an operating system provides each task and interrupts the CPU operations to manage tasks efficiently. Task management may involve a *multitasking* capability.
- **File management:** This is a function that manages data files. An operating system contains file management programs that provide the ability to create, delete, enter, change, ask, and access of files of data. They also produce reports on a file.
- **User Interface:** It is a function of an operating system that allows users to interact with a computer. A user interface program may include a combination of menus, screen design, keyboard commands. A well-designed user interface is essential for an operating system to be popular. Because of the function, users can load programs, access files, and accomplish other tasks.

NB:

Virtual Memory

This is a technique for an operating system to manage memory. An operating system simulates significantly larger memory capability than the real memory capacity of its actual primary storage unit. It allows computers to process larger programs than the physical memory circuit would allow.

Multitasking

This refers the capability of operating systems that runs several computing tasks in one computer at the same time. This is controlled by the task management program in an operating system. It's also called multiprogramming and multithreading.

Popular Operating Systems

The most popular microcomputer operating systems are DOS, Windows 3.x, Windows 95, OS/2, Windows NT, and Macintosh System. UNIX is a popular operating system that is available for

microcomputers, minicomputers, and mainframe computer systems. The following will show the details:

- *DOS*
- *Windows 3.x*
- *Windows 95*
- *OS/2*
- *Windows NT*
- *Macintosh Operating System*
- *UNIX*

B] Application Software

- Application software consists of Programs that direct computers to perform specific information processing activities for end users. These programs are called *application* packages because they direct the processing required for a particular use, or *application*, which users want to accomplish. Thousands of application packages are available because there are thousands of different jobs end users want computers to do.

Kinds of Application Software

Application software includes a variety of programs that can be subdivided into general-purpose and application-specific categories.

General-Purpose Application Programs

- General-purpose applications packages are programs that perform common information processing jobs for end users. For example, word processing programs, electronic spreadsheet programs, database management programs, graphics programs, communications programs, and integrated packages are popular with microcomputer users for home, education, business, scientific, and many other general purposes.
- They are also known as *productivity packages*, because they significantly increase the productivity of end users. This packaged software is also called *off-the-shelf software packages*, because these products are packaged and available for sale. Many features are common to most packaged programs.

Application-Specific Software

Many application programs are available to support specific applications of end users.

Business Application Programs: Programs that accomplish the information processing tasks of

important business functions or industry requirements. *Scientific Application Programs*: Programs that perform information processing tasks for the natural, physical, social, and behavioral sciences, engineering and all other areas involved in scientific research, experimentation, and development. There are so many other application areas such as education, music, art, medicine, etc.

Application Software Trends

- The trend in computer application software is toward multipurpose, expert-assisted packages with natural language and graphical user interfaces. There are two major trends:

Off-The-Shelf Software Packages

- There is a trend away from custom-designed one-of-a-kind programs developed by the professional programmers or end users of an organization. Instead, the trend is toward the use of the "off-the-shelf" software package acquired by end users from software vendors. This trend accelerated with the development of *inexpensive* and *easy-to-use* productivity software packages for microcomputers, and it continues to grow.

- **Nonprocedural, Natural Languages**

There is a major trend away from technical, machine-specific programming languages using binary-based or symbolic codes and from procedural languages, which use English-like statements and mathematical expressions to specify the sequence of instructions a computer must perform.

Instead, the trend is toward nonprocedural, natural languages that are closer to human conversation. This trend has accelerated with the creation of easy-to-use, nonprocedural *fourth-generation languages* (4GL). It continues to grow as developments in graphics and artificial intelligence produce natural language and *graphical interfaces* that make software packages easier to use.

C] Popular Applications Software

Application software classification

Application software falls into two general categories; horizontal applications and vertical applications. Horizontal applications are the most popular and widespread in departments or companies. Vertical applications are niche products, designed for a particular type of business or division in a company.

There are many types of application software:

An application suite consists of multiple applications bundled together. They usually have related functions, features and user interfaces, and may be able to interact with each other, e.g. open each other's files. Business applications often come in suites, e.g. Microsoft Office, OpenOffice.org and iWork, which bundle together a word processor, a spreadsheet, etc.; but suites exist for other purposes, e.g. graphics or music.

Enterprise software addresses the needs of organization processes and data flow, often in a large distributed environment. (Examples include financial systems, customer relationship management (CRM) systems and supply-chain management software). Departmental Software is a sub-type of enterprise software with a focus on smaller organizations or groups within a large organization. Examples include travel expense management and IT Helpdesk)

Enterprise infrastructure software provides common capabilities needed to support enterprise software systems. (Examples include databases, email servers, and systems for managing networks and security.)

Information worker software lets users create and manage information, often for individual projects within a department, in contrast to enterprise management. Examples include time management, resource management, documentation tools, analytical, and collaborative. Word processors, spreadsheets, email and blog clients, personal information system, and individual media editors may aid in multiple information worker tasks.

Content access software is used primarily to access content without editing, but may include software that allows for content editing. Such software addresses the needs of individuals and groups to consume digital entertainment and published digital content. (Examples include media players, web browsers, and help browsers.)

Educational software is related to content access software, but has the content and/or features adapted for use in by educators or students. For example, it may deliver evaluations (tests), track progress through material, or include collaborative capabilities.

Simulation software simulates physical or abstract systems for either research, training or entertainment purposes.

Media development software generates print and electronic media for others to consume, most often in a commercial or educational setting. This includes graphic-art software, desktop

publishing software, multimedia development software, HTML editors, digital-animation editors, digital audio and video composition, and many others.[2]

Product engineering software is used in developing hardware and software products. This includes computer-aided design (CAD), computer-aided engineering (CAE), computer language editing and compiling tools, integrated development environments, and application programmer interfaces.

b. Brief description of some application packages

i. Word Processing Packages

Word processing software is used to create, manipulate, and print documents. Documents can be any kind of text material. Some examples of documents are letters, memos, term papers, reports, and contracts.

The beauty of the computer word processor is that users can make any changes or corrections before printing out the document. Even after usersr document is printed out, users can easily go back and make changes. Users can then print it out again. Popular word processing packages include WordPerfect, MS-Word, and MacWrite. These word processing packages allow users to do the following interesting features:

Word Wrap/Enter Key: One outstanding word processing feature is a word wrap. A word processor decides for Users and automatically moves the cursor to the next line. As users keep typing, the words "wrap around" to the next line. To begin a new paragraph or leave a blank line, users press the Enter key.

Search/Replace: A search command allows users to find any wcircleord or number that users know exists in usersr document. When users search, the cursor will move to the first place where the item appears. The replace command automatically replaces the word users search for with another word. The search and replace commands are useful for finding and fixing errors.

Block/Move: The portion of text users wish to move is a block. Users mark the block by giving commands that produce highlighting, a band of light over the area. The task of moving the block is called a block move. The block command may also be used to delete text or to copy chunks of text into another document.

Margins: Margins may be justified to right, left or full (right and left at the same time) in the most word processing packages. That is, they may be evened up to the right, left or both side simultaneously.

Centering/Emphasizing: Headings of a document may be centered. Words or phrases may be typed underlined or boldface (extra dark lettering) for emphasis.

Spelling Checker: A spelling- checker program can check spelling errors in a document automatically.

Thesaurus: This programs enable users to quickly find the right word or an alternative word by presenting users with an on-screen thesaurus.

Mail Merge: This feature allows users to merge different names and addresses so that users can mail out the same form letter to different people.

Desktop Publishing: Today's advanced word processing programs can perform desktop publishing capabilities. This feature enables users to mix text and graphics to produce newsletters and other publications of nearly professional quality.

Outliner: Sometimes called idea processors. It helps users organize and outline usersr thoughts before users prepare a document or develop a presentation.

Grammar/Style Checker: These programs can be used to identify and correct grammar and punctuation errors.

Importing: Most of the programs have an importing feature. Files may be retrieved from nontext programs such as spreadsheets and graphics and added to the word processing program.

ii. Spreadsheet Packages

A spreadsheet is an electronic worksheet used to organize and manipulate numbers and display options for what-if analysis. The electronic spreadsheet has rows and columns stored in the computer's memory and displayed on its video screen.

Electronic spreadsheets allow users to try out various what-if kinds of possibilities. That is a powerful feature. Users can manipulate numbers by using stored formulas and calculate different outcomes.

A spreadsheet has several parts. The worksheet area of the spreadsheet has column headings across the top and row headings down the left-hand side. The intersection of a column and row is called a cell. The cell holds a unit of information. The position of a cell is called the cell address. A cell pointer (spreadsheet cursor) indicates where data is to be entered or changed in the spreadsheet.

Popular electronic spreadsheet packages include Lotus 1-2-3, Quattro Pro, and Excel. Some common features of spreadsheet programs are as follows:

Format: Column and row headings are known as labels. Usually a label is a word or symbol. A number in a cell is called a value. A label can be centered in the cell or positioned to the left or right. A value can be displayed to show decimal places, dollars, or percent (%). The number of decimal positions (if any) can be altered, and the width of columns can be changed.

Formulas: The major benefit of spreadsheets is that users can manipulate data by using formulas. They make connections between numbers in particular cells.

Recalculation: Recalculation is the most important feature of spreadsheets. If users change one or more numbers in usersr spreadsheet, all related formulas will recalculate automatically. By manipulating the values, users can use spreadsheet formulas to explore usersr options.

Windows: The screen-sized area of a spreadsheet that users can view is called a window or a page. Only about 20 rows and 8 columns of a spreadsheet are visible on the video display screen at one time. The total size of the spreadsheet can be much larger.

Graphic Data Display: Most spreadsheets allow users to present their data in graphic form. That is, users can display numerical information as pie charts or bar charts.

3-D Graphics: Most spreadsheet programs even permit users to display data in graphs and charts that have a three-dimensional look.

Graphics on Worksheet: A new feature gives users the ability to place graphical elements such as lines, arrows, and boxes directly onto the worksheet. Users can create charts and graphs directly on the worksheet.

Consolidation Feature: Data may be consolidated from several small worksheets into one large worksheet. Thus, users can work with small worksheets, which are more manageable, and summarize the data on a large worksheet.

Dynamic File Links: Some software offers dynamic file links, which allow users to link cells in one worksheet file to cells in other worksheet files. Whenever a change occurs in one file, the linked cells in the other files are automatically updated.

iii. Database Management Packages

A database is a large collection of data entered a computer system and stored for future use. The computerized information in the database is organized so that the parts that have something in common can be retrieved easily. Most DBMS packages can perform four primary tasks:

Database Development: Define and organize the content, relationships, and structure of the data needed to build a database.

Database Interrogation: Access the data in a database for information retrieval and report generation. A user can selectively retrieve and display information and produce printed reports and documents.

Database Maintenance: Add, delete, update, correct, and protect the data in a database.

Application Development: Develop prototypes of data entry screens, queries, forms, reports, and labels for a proposed application.

A database management package or database management system (DBMS) is a software package used to set up, or structure, a database. It is also used to retrieve information from a database. The top part of the figure is a menu. The entire list of member names and addresses is called a file. Each line of information about one member is called a record. Each column of information within a record is called a field.

Popular database management programs include dBASE, Paradox, and FoxPro. Database management packages have different features, depending on their sophistication. A principal feature of database management software for microcomputers are as follows:

Retrieve/Display: A basic feature of all database programs is the capability to locate records in the file quickly. The program can search each record for a match in a particular field to whatever data users specify. The records can then be displayed on the screen for viewing, updating, or editing.

Sort: Database management packages make it easy to change the order of records in a file. Normally, records are entered the database in the order they occur. There are many ways users can quickly rearrange the records in the file, such as by employees' last name or by their social security number.

Calculate/Format: Many database programs contain built-in math formulas. In the office, for example, users can use this feature to find the highest or lowest commissions earned. Users can calculate the average of the commissions earned by the sales force in one part of the country. This information can be organized as a table and printed out in a report format.

Customized Data-Entry Forms: A person new to the database program may find some descriptions for fields confusing. For example, a field name may appear as "CUSTNUM" for "customer number." However, the form on the screen may be customized so that the expression "Enter the customer number" appears for "CUSTOM." Fields may also be rearranged on the screen, and boxes and lines may be added.

Professional-Looking Reports: A custom-report option enables users to design the elements users want in a report. Examples are the descriptions appearing above columns and the fields users wish to include. Users can even add graphic elements, such as a box or line, so that the printed report has a professional appearance.

Program Control Languages: Most people using a database management program can accomplish everything they need to do by making choices from the menus. Many database management programs include a programming control language so that advanced users can create sophisticated applications.

Database Management Systems

Filing is tedious job, and finding a piece of information once filed can be more tedious. Filing also takes up valuable office space. No one likes to see an office totally cluttered up with a welter of filing cabinets brimming with paper. A computer can help you store more information far more efficiently than any physical filing system, no matter how well cross-indexed that system might be.

The application software that allows users to efficiently store information in an ordered manner for timely and quick retrieval is called a Database. A DBMS enables you to create lists of your information in a computer, analyze them, add new information, and delete old information etc.

With a database you could, for example have everyone of your customers listed in the computer, together with their credit status, the amount of money they spend, details of the last transaction, even their spouses' names etc. Databases can also be created for other operations like personnel records, library records etc. The databases will help you sort through your records and compile lists based on any criteria you like to establish.

Uses for a database package

- a) Record keeping
- b) Creating and managing databases
- c) Manipulating data in database, a file or a record

Application areas

- a) hospitals
- b) schools, colleges and universities
- c) industries
- d) government offices
- e) Home
- f) Banks and other financial institutions
- g) Law enforcement agencies such as Law courts

Features of database system

- a) enhancement of data security
- b) facilitates data manipulation e.g by use of queries, macros etc
- c) Data sorting and summarizing by use of reports, forms etc
- d) Filtering of data which meet specified criteria.

e) Querying of records in a table

Advantages of using database management systems

1. Redundancies and inconsistencies can be reduced
2. Flexibility of the system is improved
3. Cost of developing and maintaining systems is lower
4. Standards can be enforced
5. Security can be improved
6. Integrity can be improved
7. faster data retrieval

In general, Database software can be classified as:

- **Pc-based**

These are software designed for individual users or small businesses, and therefore do not have stringent security features and elaborate and recovery procedures. They generally allow users to create database files, enter data, organize that data in various ways and create reports.

Examples: FoxPro, Dbase, Ms-Access, Paradox

- **Corporate Based**

These are software designed for big corporations, which have massive amount of data. Issues such as security, Data integrity, Audit trails, Backup and Recovery are critical. Any loss of information would be disastrous, and it is the function of the database management software to ensure that this does not occur.

Examples: Oracle, Informix, Ingress, Progress, Sybase, SQL Server etc.

Microsoft Access

It is one of the application software from Microsoft Corporation which does the database management tasks. It comes under the Microsoft office suite.

Terms used in Ms Access

- **Data:** streams of raw facts e.g employee name, age etc
- **Information:** processed data that is meaningful to the end recipient e.g. gross salary, closing stock, net pay etc
- **Entity:** an object about which information may be stored. e.g a student entity, patient, employee etc
- **Field:** facts, attributes or characteristics that distinguish an entity from another.
- **Illustration:**

Student entity:

Fields/attributes: student ID, student name, age, course etc

Employee entity:

Fields: employee name, age, address, basic pay etc

- **Primary key :** also known as key field. This is a unique identifier of a particular record in a file. E.g in a student entity, the student ID should be the key field.
- **Record:** a collection of several but related fields describing a particular entity.
- **File:** a collection of related records e.g a student file, a patient file, a customer file etc.
- **Database:** collection of related information or files
- An **object** is a item in the database such as a table, query, form, or macro.
- A **table** is a grouping of related data organized in fields (columns) and records (rows) on a datasheet. By using a common field in two tables, the data can be combined. Many tables can be stored in a single database.
- A **Query** is a question asked about the database table. Can be of different types eg Select queries, Action Queries, Cross tab queries etc
- A **Form** is database object which displays table record one at a time. Can also be used to add or edit existing records in the table.
- A **Report** is a database object used to display records from a table or a query in a summarized format.

- **Macros:** a set of repetitively used commands or actions stored together for easier reference.
- iv. Graphics Packages

A graphics program can display numeric data in a visual format for analytical or presentation purposes. Any other types of presentation graphics displays are possible. Draw and Input graphics packages support freehand drawing, while desktop publishing programs provide predrawn clip art graphics for insertion into documents. Popular business graphics packages are Harvard Graphics, Freelance, Corel Draw, and etc.

There are two types of graphics programs. Analytical graphics programs are used to analyze data. Presentation graphics programs are used to create attractive finished graphs for presentations or reports.

Analytical Graphics: Analytical graphics make numerical data much easier to grasp than when it is as rows and columns of numbers. Graphics may take the form of bar charts, line graphs, and pie charts. The bar chart gives an instant visual profile of the some figures. The line graph shows a visual profile in another way. The pie chart shows the proportion of some figures as slices of pie. High-low graph shows a range, such as house prices.

Most analytical graphics programs come as part of spreadsheet programs, such as Lotus 1-2-3 and Quattro-Pro. They are helpful in displaying economic trends, sales figures, and the like for easy analysis. Analytical graphics may be viewed on a monitor or printed out.

Presentation Graphics: Users can use presentation graphics to communicate a message or to persuade other people, such as supervisors or clients. Thus, presentation graphics are used by marketing or sales people, for example.

Presentation graphics look more sophisticated than analytical graphics, using color, titles, a three- dimensional look, and other features a graphic artist might use. High-end presentation graphics packages even include animation capabilities. These packages allow users to create and edit animated graphics on usersr microcomputer.

v. Communications Packages

Communications software packages for microcomputers are also viewed as general-purpose application packages. These packages can connect a microcomputer equipped with a modem to a public and private network. Communications software enables a microcomputer to send and receive data over a telephone or other communications line.

Communications programs are used by all kinds of people inside and outside business. Examples are students doing research papers, travelers making plane reservations, consumers buying products, investors getting stock quotations, and economists getting government statistical data.

Communications programs give microcomputers a powerful feature, which is connectivity. Connections with microcomputers open a world of services. Popular communications software includes ProComm, Smartcom, and Crosstalk. Some common features of microcomputer communications programs are as follows:

Data Banks: With a communications program, users can access enormous computerized databases - data banks of information. Some of these, such as Dialog, resemble huge electronic encyclopedias.

Message Exchanges: Communications programs enable users to leave and receive messages on electronic bulletin boards or to use electronic-mail services. Electronic bulletin boards exist for people interested in swapping all kinds of software or information. Many organizations now have electronic mailboxes. For instance, users can transmit a report users have created on usersr word processor to a faraway company executive or to a college instructor.

Financial Services: With communications programs, users can look up airline reservations and stock quotations. Users can order discount merchandise and even do home banking and bill paying