

# COMPUTER SOFTWARE

**Software** is a set of programs that instructs the computer about the tasks to be performed. Software tells the computer how the tasks are to be performed or hardware carries out these tasks. Different sets of software can be loaded on the same hardware to perform different kinds of tasks. For example, a user can use the same computer hardware for writing a report or for running a payroll program.

## TYPES OF SOFTWARE

Software can be broadly classified into two categories:

1. System Software, and
2. Application Software.

System software provides the basic functions that are performed by the computer. It is necessary for the functioning of a computer. Application software is used by the users to perform specific tasks. The user may choose the appropriate application software, for performing a specific task, which provides the desired functionality. The system software interacts with hardware at one end and with application software at the other end. The application software interacts with the system software and the users of the computer.

### 1. SYSTEM SOFTWARE

System software provides basic functionality to the computer. System software is required for the working of computer itself. The user of computer does not need to be aware about the functioning of system software, while using the computer. For example, when you buy a computer, the system software would also include different device drivers. When you request for using any of the devices, the corresponding device driver software interacts with the hardware device to perform the specified request. If the appropriate device driver for any device, say a particular model of a printer, is installed on the computer, the user does not need to know about the device driver, while printing on this printer.

The purposes of system software are:

- ✓ Provide basic functionality to the computer,
- ✓ Control computer hardware, and
- ✓ Act as an interface between user, application software and computer hardware.

On the basis of their functionality, system software may be broadly divided into two categories.

- ✓ **System software for the management and functionality of**

**computer** relates to the functioning of different components of the computer, like, processor, input and



Figure 1: Software Hierarchy

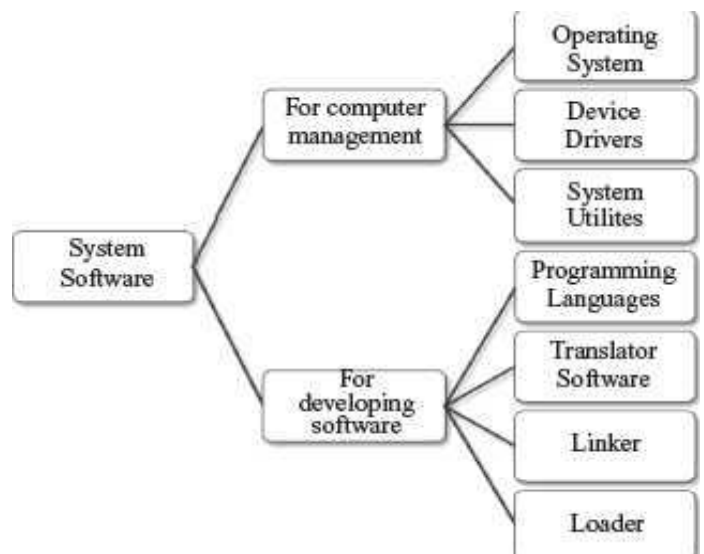


Figure 2: Classes of System Software

output devices etc. System software is required for managing the operations performed by the components of the computer and the devices attached to the computer. It provides support for various services, as requested by the application software. Operating system, device drivers, and system utilities software constitute the system software for management of computer and its resources.

- ✓ **System software for the development of application and other software** provide services required for the development and execution of application and other software. System software provides the software tools required for the development of application software. The programming language software, translator software, loader, and linker are also categorized as system software, and are required for the application software development.

## **1. System Software for Management and Functionality of Computer**

### **i. Operating System(OS)**

Operating System (OS) is an important part of a computer. OS intermediates between the user of a computer and the computer hardware. Different kinds of application software use specific hardware resources of a computer like CPU, I/O devices and memory, as needed by the application software. OS controls and coordinates the use of hardware among the different application software and the users. It provides an interface that is convenient for the user to use, and facilitates efficient operations of the computer system resources.

Operating system is a program that controls the execution of application programs and acts as an interface between the user of a computer and the computer hardware. Operating system is the program running at all times on the computer.

Goals of using OS:

- ✓ To Control/execute user/application programs.
- ✓ To make the computer system convenient to use.
- ✓ Easily to solve user problems.
- ✓ Use the computer hardware in an efficient manner.

### **FUNCTIONS OF OS**

Operating system is large and complex software consisting of several components. Each component of the operating system has its own set of defined inputs and outputs. Different components of OS perform specific tasks to provide the overall functionality of the operating system.

The key functions of OS are:

- ✓ It provides an environment in which users and application software can do work.
- ✓ It manages different resources of the computer like the CPU time, memory space, file storage, I/O devices etc. During the use of computer by other programs or users, operating system manages various resources and allocates them whenever required, efficiently.

- ✓ It controls the execution of different programs to prevent occurrence of error.
- ✓ It provides a convenient interface to the user in the form of commands and graphical interface, which facilitates the use of computer.

**Process Management:**-The process management activities handled by the OS are:

- ✓ Control access to shared resources like file, memory, I/O and CPU,
- ✓ Control execution of applications,
- ✓ Create, execute and delete a process (system process or user process),
- ✓ Cancel or resume a process
- ✓ Schedule a process, and
- ✓ Synchronization, communication and deadlock handling for processes.

**File Management:**-The file management tasks include:

- ✓ Create and delete both files and directories,
- ✓ Provide access to files,
- ✓ Allocate space for files,
- ✓ Keep back-up of files, and
- ✓ Secure files.

**Protection and Security:**-OS protects the resources of the system. User authentication, file attributes like read, write, encryption, and back-up of data are used by OS to provide basic protection.

**User Interface or Command Interpreter:**-Operating system provides an interface between the computer user and the computer hardware. The user interface is a set of commands or a graphical user interface via which the user interacts with the applications and the hardware.

## **TYPES OF OS**

OS are classified into different types depending on their capability of processing:

- ✓ Single user and single tasking
- ✓ Single user and Multitasking
- ✓ Multiuser
- ✓ Multiprocessing
- ✓ Real time
- ✓ Embedded.

**Memory Management:**-The activities of memory management handled by OS are:

- ✓ allocate memory,
- ✓ Free memory,
- ✓ Re-allocate memory to a program when a used block is freed, and
- ✓ Keep track of memory usage.

**Device Management:**-The device management tasks handled by OS are:

- ✓ Open, close and write device drivers, and
- ✓ Communicate, control and monitor the device driver.

## **Single User and Single Task OS**

It is used by single user for a standalone single computer for performing a single task. Operating system for Personal Computers (PC) are single user OS. For example, if the user is editing a document, then a document cannot be printed on the printer simultaneously. Single user OS are simple operating system designed to manage one task at a time. MS-DOS is an example of single user OS.

## **Single User and Multitasking OS**

It allows execution of more than one task or process concurrently. The processor time is divided among different tasks. This OS types are also called **time sharing OS**. The processor switches rapidly between processes. For examples, the user can listen to music on the computer while writing an article using word processor software. The user can switch between the applications and also transfer data between them. Windows 95 and all later versions of Windows are examples of multitasking OS.

## **Multiuser OS**

It is used in computer networks that allow same data and applications to be accessed by multiple users at the same time. The users can also communicate with each other. Linux, UNIX, Windows server, Windows 7, and later Windows family OSs are examples of multiuser OS.

## **Multiprocessing OS**

Multiprocessing OS have two or more processors for a single running process. Processing takes place in parallel and it is also called **parallel processing OS**. Each processor works on different parts of the same task, or, on two or more different tasks. Since execution takes place in parallel, they are used for high speed execution, and to increase the power of computer. Linux, UNIX, Windows server, Windows 7, and later Windows family OSs are examples of multiprocessing OS.

## **Real Time OS**

They are designed to respond to an event within a predetermined time. These operating systems are used to control processes. Processing is done within a time constraint. OS monitors the events that affect the execution of process and respond accordingly. They are used to respond to queries in areas like medical imaging system, industrial control systems etc. Lynx OS is an example of real time OS.

## **Embedded OS**

It is embedded in a device in the ROM. They are specific to a device and are less resource intensive. They are used in appliances like microwaves, washing machines, traffic control systems etc.

### **ii. Device Driver**

A device driver acts as a translator between the hardware and the software that uses the devices. In other words; it intermediates between the device and the software, in order to use the device. Some devices that are commonly connected to the computer are: keyboard, mouse, hard disk, printer, speakers, microphone, joystick, webcam, scanner, digital camera, and monitor. For proper working of a device, its corresponding device driver must be installed on the computer. For example, when we give a command to read data from the hard disk, the command is sent to the hard disk drive driver and is translated to a form that the hard disk can understand. The device driver software is typically supplied by the respective device manufacturers.

### **iii. System Utilities**

System utility software is required for the maintenance of computer. System utilities are used for supporting and enhancing the programs and the data in computer. Some system utilities may come embedded with OS and others may be added later on. Some examples of system utilities are:

- ✓ **Anti-virus:** utility to scan computer for viruses.
- ✓ **Data Compression:** utility to compress the files.
- ✓ **Cryptographic:** utility to encrypt and decrypt files.
- ✓ **Disk Compression:** utility to compress contents of a disk for increasing the capacity of a disk.
- ✓ **Disk Partitioning:** to divide a single drive into multiple logical drives. Each drive is then treated as an individual drive and has its own file system.
- ✓ **Disk Cleaners:** to find files that has not been used for a long time. It helps the user to decide what to delete when the hard disk is full.
- ✓ **Backup:** Utility to make a copy of all information stored on the disk. It also restores the backed up contents in case of disk failure.
- ✓ **System Profiling:** Utility provides detailed information about the software installed on the computer and the hardware attached to it.
- ✓ **Network Managers:** to check the computer network and to log events.

## 2. System Software for Development of Application and Other Software (Programming Languages)

A Programming Language consists of a set of vocabulary and grammatical rules, to express the computations and tasks that the computer has to perform. Programming languages are used to write a program, which controls the behavior of computer, codify the algorithms precisely, or enables the human computer interface. Each language has a unique set of keywords (words that it understands) and a special syntax for organizing program instructions. The programming language should be understood, both by the programmer (who is writing the program) and the computer. A computer understands the language of 0s and 1s, while the programmer is more comfortable with English-like language. Programming Language usually refers to high-level languages like COBOL, BASIC, FORTRAN, C, C++, Java, C#, Visual Basic, Java Script, F#, Payton, PHP etc. Programming languages fall into three categories.

- ✓ **Machine Language:** is what the computer can understand but it is difficult for the programmer to understand. A program written in machine language is a collection of binary digits or bits that the computer reads and interprets. It is a system of instructions and data executed directly by the computers CPU. It is also referred to as machine code or object code. It is written as strings of 0s and 1s.
- ✓ **Assembly Language:** falls between machine language and high-level language. They allow the programmer to substitute names for numbers. A program written in assembly language uses symbolic representation of machine codes needed to program a particular processor (CPU) or processor family. This representation is usually defined by the CPU manufacturer, and is based on abbreviations (called mnemonics) that help the programmer remember individual instructions, registers, etc.
- ✓ **High-level Language:** is easier to understand and use for the programmer but difficult for the computer. A program in a high-level language is written in English-like language. Such languages hide the details of CPU operations and are easily portable across computers. A high-level language makes the process of developing a program simpler and more understandable with respect to assembly and machine level languages.

### 2. APPLICATION SOFTWARE

The software that a user uses for accomplishing a specific task is the application software. Application software may be a single program or a set of programs. A set of programs that are written for a specific purpose and provide the required functionality is called software

package. Application software is written for different kinds of applications such as graphics, word processors, media players, database applications, telecommunication, accounting purposes etc.

Some examples of application software packages are:

- ✓ **Word Processing Software:** For writing letter, reports, documents etc. (e.g. MS-WORD, word press).
- ✓ **Image Processing Software:** For assisting in drawing and manipulating graphics (e.g. Adobe Photoshop).
- ✓ **Accounting Software:** For assisting in accounting information, salary, tax returns (Tally software, Peachtree accounting etc.)
- ✓ **Spreadsheet Software:** Used for creating budget, tables etc. (e.g. MS-Excel).
- ✓ **Presentation Software:** To make presentations, slide shows (e.g. MS-PowerPoint)
- ✓ **Suite of Software having Word Processor, Spreadsheet and Presentation Software:** Some examples are MS-Office, Google Docs, Sun Open office, Apple iWork.
- ✓ **CAD/CAM Software:** To assist in architectural design. (e.g. AutoCAD, Autodesk, Arch CAD)
- ✓ **Geographic Information Systems:** It captures, stores, analyzes, manages, and presents data, images and maps that are linked to different locations. (e.g. Arc GIS)
- ✓ **Web Browser Software:** To access the World Wide Web to search documents, sounds, images etc. (e.g. Internet Explorer, Netscape Communicator, Chrome, Mozilla Fir fox, UC, Baidu, etc.)