

SOFTWARE

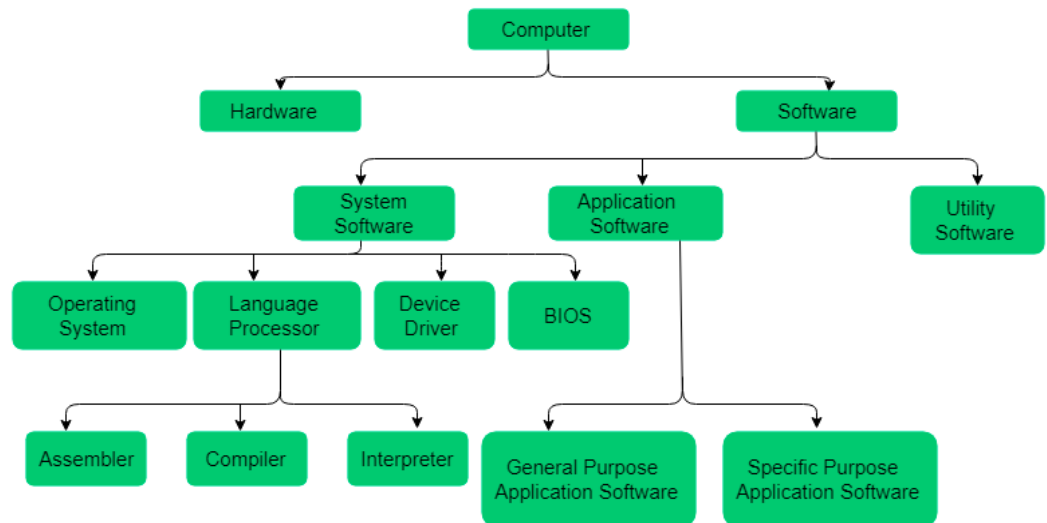
Computer Software refers to the instructions, or programs, that tell the hardware what to do.

Programs set of instructions that a computer uses to perform specific task such as word processing accounting or data management also called an application.

1. Utility software

Utility software includes all systems and programs on a computer system that maintain its functionality. A computer's utility software includes components that assist the operating system to optimize, maintain, organize and manage how it functions in all situations. This type of software also supports the computer's infrastructure, which differs from application software that performs

tasks to benefit the user. When performing its functions or being replaced, utility software may require the approval of a user with elevated privileges on the computer. When manufacturers produce a computer, they typically install an operating system and a set of utility programs that support it. This portion of the utility software is often considered to be part of the operating system, although the user can install other utility programs or replace existing software. for example : Antivirus software, Compression tools



2. Application software

is a program or group of programs designed for end users. also it is programs that direct the computer to carry out specific tasks. Often, multiple programs are integrated to create an application. For example:

- To write error free documents, Word Processors are used such as OpenOffice.org Writer, MSWord etc.
- For calculations, Spreadsheets are used such as OpenOffice.org Spreadsheet, Ms Excel etc.
- For making presentations, Presentation Softwares are used such as OpenOffice.org Impress, MS PowerPoint etc.
- For designing images, Desktop publishing softwares are used such as Gimp, Adobe Photoshop, Corel Draw, Picasa etc.

Some application softwares are created to address specific needs of a group of specialized users and are, therefore, known as **tailored or customized** software to perform the required tasks in a specific manner. For example: 'Tally' or a 'QuickBooks' are softwares used to address a small businessman's accounting needs, but it can also serve a large multinational company.

3. System Software

refers to the instructions, or programs, that tell the hardware what to do. A word processing program that you can use to write letters on your computer is a type of software. Also, the operating system (OS) is software that manages the computer and the devices connected to it. and so on as we will see below:

A. BIOS (Basic Input Output System): is a software that is built into computers and that is run when the computer first turn on. among other things this software starts the operating system and support transfer information between hard ware devices. BIOS is part of your computer's hardware and is separate from Windows. What is CMOS? **Complementary metal-oxide semiconductor, or CMOS**, typically refers to a battery-powered memory chip in your computer that stores startup information. Your computer's basic input/output system (BIOS) uses this information when starting your computer.

B. Device Driver

A device driver is a software program without a user interface (UI) that manages hardware components or peripherals attached to a computer and enables them to function with the computer smoothly. They work in a highly privileged environment because they need low-level access to hardware operations to function. They enable the computer's operating system (OS) to interface with the hardware for which they were developed. And through a computer bus that links the device to the computer, the drivers and the device communicate.

Device drivers must receive advice from the operating system to access and execute device instructions. After completing the job, they transmit the hardware device's output or message to the operating system. Devices such as modems, routers, speakers, keyboards, and printers require device drivers to operate.

C. Languages processor software include:

1. Low Level Language: this language include:

A. Machine Language

In the earliest days of computers, the only programming languages available were machine languages. Each computer has its own machine language which is made of streams of 0's and 1's. The instructions in machine language must be in streams of 0's and 1's. This is also referred as binary digits. These are so named as the machine can directly understood the programs

Advantages:

1) High speed execution 2) The computer can understood instructions immediately 3) No translation is needed.

Disadvantages:

1) Machine dependent 2) Programming is very difficult 3) Difficult to understand 4) Difficult to write bug free programs 5) Difficult to isolate an error

Example Addition of two numbers

$$\begin{array}{r} 2 \quad 0010 \\ + 3 \quad 0011 \\ \hline 5 \quad 0101 \end{array}$$

B. Symbolic Languages (or) Assembly Language

Over the years computer languages have evolved from machine languages to natural languages. As previously mentioned, a program can have thousands or even millions of binary instructions, and writing such a program would be very tedious and time consuming. Programming in machine language would also be very difficult because putting a 0 or a 1 in the wrong place will cause an error.

Although a computer's CPU only understands machine language, it is impractical for people to write programs in machine language. For this reason, assembly language was created in the early days of computing as an alternative to machine language. Instead of using binary numbers for instructions, assembly language uses short words that are known as mnemonics. For example, in assembly language, the mnemonic add typically means to add numbers, mul typically means to multiply numbers, and mov typically means to move a value to a location in memory. When a programmer uses assembly language to write a program, he or she can write short mnemonics instead of binary numbers.

Assembly language programs cannot be executed by the CPU, however. The CPU only understands machine language, so a special program known as an assembler is used to translate an assembly language program to a machine language program.

Advantages:

1) Easy to understand and use 2) Easy to modify and isolate error 3) High efficiency 4) More control on hardware

Disadvantages:

1) Machine Dependent Language 2) Requires translator 3) Difficult to learn and write programs 4) Slow development time 5) Less efficient

Example:

```
2 PUSH 2,A
3 PUSH 3,B
+ ADD A,B
5 PRINT C
9
```

From Machine Language to Assembly Language

Assembly language
program

```
mov eax, Z
add eax, 2
mov Y, eax

and so forth...
```



Assembler



Machine language
program

```
10100001
10111000
10011110

and so forth...
```

2. High Level Language: the data and instruction using symbols and numbers and words written in language similar to human language. Each language has its specific grammar. Example of these language: BASIC, FORTRAN, COBOL, PASCAL, PL/1, ADA, RPG, LISP, FORTH, SNOBOL, APL, ALGOL, LOGO.

3. Translation Programs: these programs transfer high level language or assembly language to machine language, these programs include:

A. Assembler: program transfer the program written in assembly language to machine language.

B. Compiler: program transfer high level language programs to machine language program, the program written in high level language named **Source Program**, after transfer it to machine language by compiler is named **Object Program**. when using compiler in transfer operation, cannot execute the program unless compiler all program sentences end.

C. Interpreter: program written in machine language and store in ROM memory, it is work similar to compiler but differ from it where is compiler program sentences immediately.

D. Operating System

An Operating System (OS) is an interface between a computer user and computer hardware. An operating system is a software which performs all the basic tasks like file management, memory management, process management, handling input and output, and controlling peripheral devices such as disk drives and printers. Some popular Operating Systems include Linux Operating System, Windows Operating System, VMS, OS/400, AIX, z/OS, etc.

Following are some of important functions of an operating System.

1. Memory Management
2. Processor Management
3. Device Management
4. File Management
5. Security
6. Control over system performance
7. Job accounting
8. Error detecting aids
9. Coordination between other software and users

1. Memory Management

Memory management refers to management of Primary Memory or Main Memory. Main memory is a large array of words or bytes where each word or byte has its own address.

Main memory provides a fast storage that can be accessed directly by the CPU. For a program to be executed, it must in the main memory. An Operating System does the following activities for memory management:

- Keeps tracks of primary memory, i.e., what part of it are in use by whom, what part are not in use.
- In multiprogramming, the OS decides which process will get memory when and how much.
- Allocates the memory when a process requests it to do so.
- De-allocates the memory when a process no longer needs it or has been terminated.

2. Processor Management

In multiprogramming environment, the OS decides which process gets the processor when and for how much time. This function is called **process scheduling**. An Operating System does the following activities for processor management:

- Keeps tracks of processor and status of process. The program responsible for this task is known as **traffic controller**.
- Allocates the processor (CPU) to a process.
- De-allocates processor when a process is no longer required.

3. Device Management

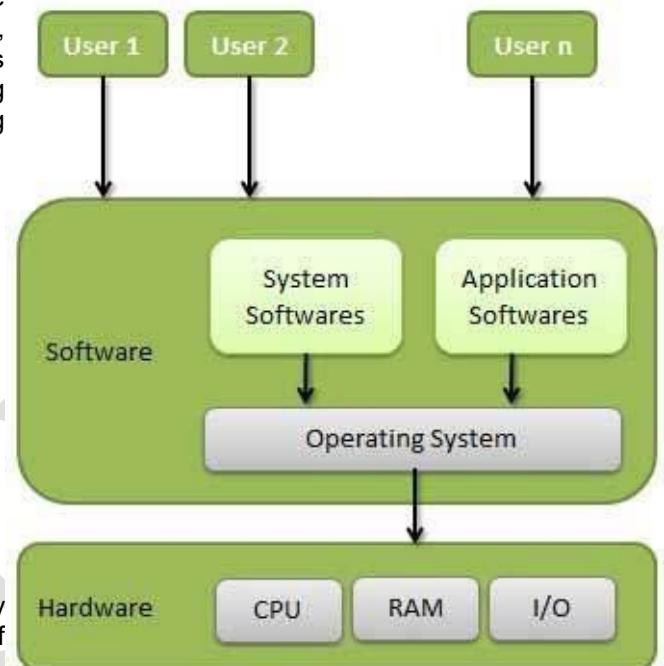
An Operating System manages device communication via their respective drivers. It does the following activities for device management:

- Keeps tracks of all devices. The program responsible for this task is known as the **I/O controller**.
- Decides which process gets the device when and for how much time.
- Allocates the device in the most efficient way.
- De-allocates devices.

4. File Management

A file system is normally organized into directories for easy navigation and usage. These directories may contain files and other directions. An Operating System does the following activities for file management:

- Keeps track of information, location, uses, status etc. The collective facilities are often known as **file system**.



- Decides who gets the resources.
- Allocates the resources.
- De-allocates the resources.

5. **Security** -- By means of password and similar other techniques, it prevents unauthorized access to programs and data.

6. **Control over system performance** -- Recording delays between request for a service and response from the system.

7. **Job accounting** -- Keeping track of time and resources used by various jobs and users.

8. **Error detecting aids** -- Production of dumps, traces, error messages, and other debugging and error detecting aids.

9. **Coordination between other software and users** -- Coordination and assignment of compilers, interpreters, assemblers and other software to the various users of the computer systems.

Operating systems are there from the very first computer generation and they keep evolving with time., we will discuss some of the important types of operating systems which are most commonly used.

| File type | Extension |
|-----------------------|-----------------|
| Executable file | exe |
| Operating system file | sys |
| Text file | Doc / txt / Rtf |
| Picture file | Bmp/ jpg |
| Commands file | com |
| Program file | Prg |
| Backage file | Bat |
| Drawing file | Dwg/Gif |
| Help file | Hlp |
| Voice file | Mp3/wav |

Operating System Types:

1. **Single user Operating System:** by these systems can execute on program in one using one personal computer, MS.DOS example of this kind of operating system.
2. **Multi Tasking Operating Systems for Single User:** by these systems the user can use the personal computer to execute different types of programs in the same time, WINDOWS example of this kind of operating system.
3. **Multi user Operating Systems:** these operating system apply on many types of computers linked together, by these systems different users can use many computers in the same time, such as UNIX operating system.

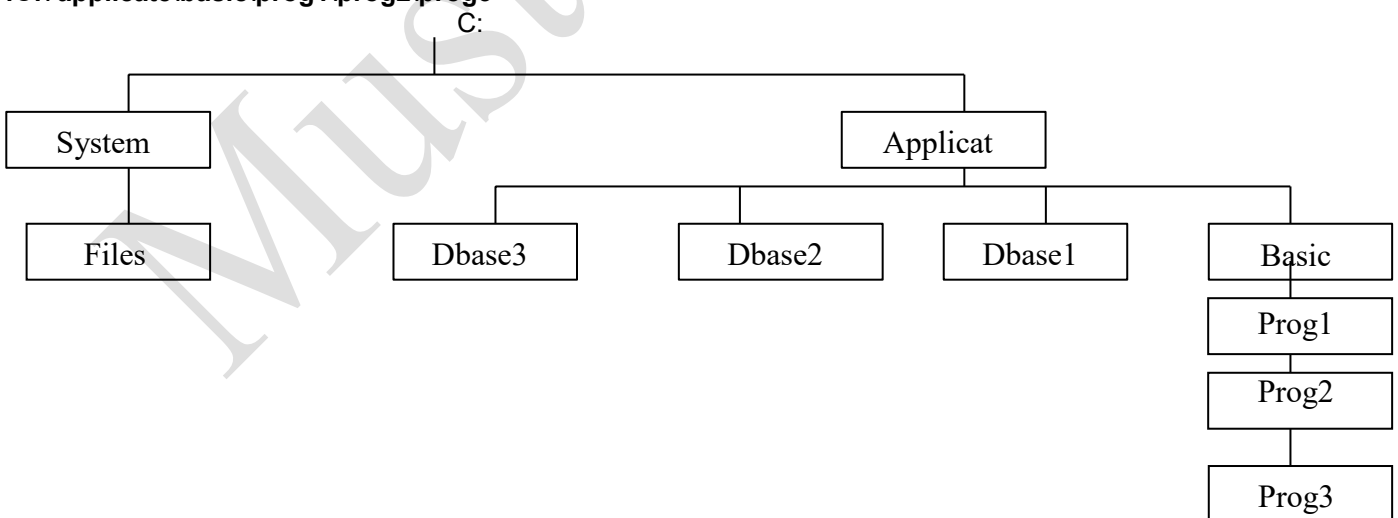
Files Organization

File: a collection of information that is stored on a computer under a single name. a file can be a text document, a picture, a program and so on. Files typically have a three letter file name extension that helps to indicate type. following file types and their extensions.

Location: any disk drive, folder ,or other place in which you can store files or folders. Programs will commonly ask you to choose a location to save files.

Path: a sequence of folders(directories) that leads to a specific file or folder .a backslash is used to separate each folder in the path. for Example:

to access the file prog3 the path as following
:C:\ applicate\basic\prog1\prog2\prog3



FAT32:a system used to store files on computer drive.FAT32 is based on file allocate table(FAT)file system ,but it uses 32-bit values for storing files instead of 16 –bit values used by original FAT file system.FAT32 uses drive space more efficiently than FAT and support volumes up to 2 terabyte (TB) in size.

NTFS: file system for formatting computer hard disks, so can store information. NTFS provides several improvements over earlier file allocation table (FAT) file, including file and folder permissions, encryption and file compression.