

CHAPTER 2

Computer Software

Computer software, or just software, is a collection of computer programs and related data that provide the instructions for telling a computer what to do and how to do it. In other words, software is a conceptual entity which is a set of computer programs, procedures, and associated documentation concerned with the operation of a data processing system. We can also say software refers to one or more computer programs and data held in the storage of the computer for some purposes. In other words software is a set of programs, procedures, algorithms and its documentation. Program software performs the function of the program it implements, either by directly providing instructions to the computer hardware or by serving as input to another piece of software. In contrast to hardware, software "cannot be touched".

Computer software is classified in two parts:

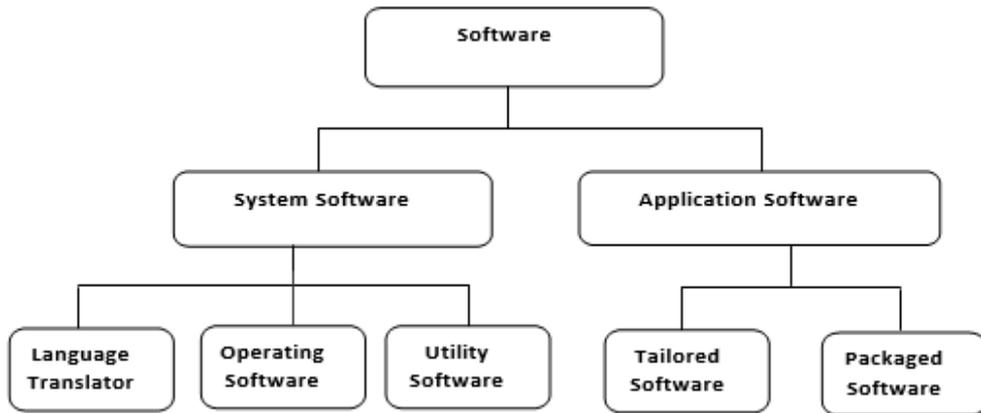


Figure: Software Classification

System software:

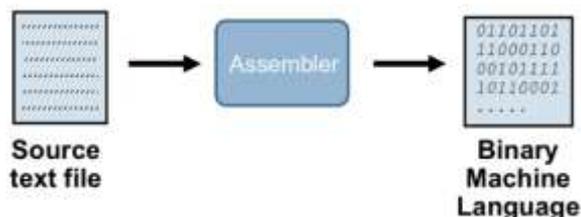
System software consists of many programs for controlling much Input/output operation. An Operating system is example of system software. System software is further classified in three parts

- 1. Language Translator:** Computers are digital devices. All types of commands, data and instructions required to be converted into machine code which is the combination of 0's and 1's. So, we give instructions to the computer in a language which is similar to English and easier for us to understand. The computer translates these instructions into the machine language with the help of language translators. A language translator is a special type of computer software that has the capacity of translating the source code or program codes into machine codes

Language translators are of three types.

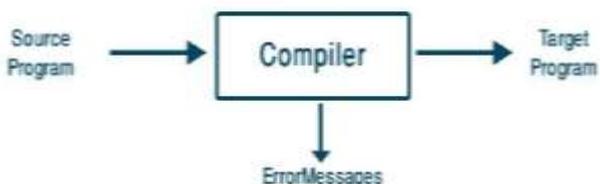
Assembler:

An assembler is software that converts programs written in assembly language (**source code**) into machine language (**object code**).the resulting program can be executed only when assembly process is completed.



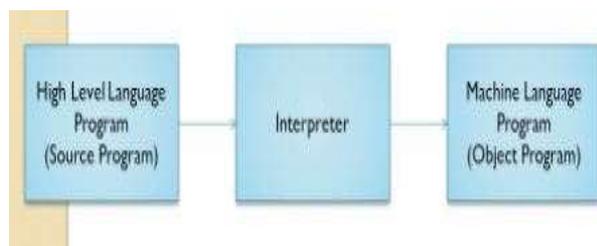
Compiler:

A compiler is software that converts programs written in high level language (source code) into machine code (object code) in a single operation. The machine language code is called the object code and can be saved and either run (executed) immediately or later. Some of the most widely used compiled languages are COBOL, C, C++, FORTRAN, etc.



Interpreter:

An interpreter is software that converts programs written in high level language to machine language code. It converts one instruction at a time. If there is any error in any line, it is reported to the user and the program is stopped. The most frequently used interpreted language is BASIC. It requires less memory.



Differentiate between compiler and interpreter.

SN	Compiler	Interpreter
1	It translates entire program into machine language at once.	It translates one statement of a program at a time into machine language.
2	Syntax errors are not known until compilation is at the end.	Syntax errors are known at each line, while writing the program.
3	It is larger than interpreter.	It is smaller than interpreter.
4	Debugging process is complex in compiler.	Debugging process is easier in interpreter.
5	Compiler generates executable code.	Interpreter does not generate executable code, each statement is interpreted and then only executed.
6	It is appropriate for developing heavy weight and large application.	It is appropriate for developing light weight and small application.

7	Example: C, C++, Pascal, FORTRAN, etc.	Examples: QBASIC, GWBASIC, PERL, etc.
---	--	---------------------------------------

2. **Operating system:** An operating system is the system software which is used to operate the computer. An operating system manages computer resources very efficiently, takes care of scheduling of multiple jobs for execution and manages the flow of data, instructions between input/output unit and the main memory. Windows, UNIX, Linux, Macintosh etc. are few widely used operating systems.
3. **Utilities:** Utility program are the programs which are often used by application program. These utility programs are created by the manufacturer. Ex. Text Editors, Sorting, Formatting etc.

Application Software:

Application software is written to enable the computer to solve a specific data processing task. It is used for solving our various works. A program written for specific purpose could be termed as Application software. Example- Word processor, Database management systems software, accounting software's etc.

Application software can be sub-divided into:

- i. **Packaged Software:** Packaged software is that software which is generalized set of programs designed and developed for general purpose. Example: MS office package, Database, Web development Tools etc.
- ii. **Tailored software:** It is software designed to meet the specific requirements of an Organization or individuals. Example: e-payment software, Hotel reservation software, Airline Reservation system etc.

Difference between System Software and Application Software

SN	Application software	System Software
1	Application software is computer software designed to help the user to perform specific tasks.	System software is computer software designed to operate the computer hardware and to provide a platform for running application software.
2	It is specific purpose software.	It is general-purpose software.
3	Application Software performs in a environment which created by System/ Operating System	System Software Create his own environment to run itself and run other application.
4	It executes as and when required.	It executes all the time in computer.
5	Application is not essential for a computer.	System software is essential for a computer
6	The number of application software is much more than system software.	The number of system software is less than application software.
7	Example: MS office package, Banking software, Google chrome etc.	Example: device driver, compiler, interpreter, OS etc.

Program Vs. Software

Program	Software Development
<ul style="list-style-type: none"> • A program is code by a single programmer • A program has no SDLC • A program contain maximum 1 thousands lines of code • A program is developed without the help of software engineering. • A program is normally used by a single user 	<ul style="list-style-type: none"> • But software are developed by multiple or a team of programmers • But a software has a SDLC • But a software contain thousands or millions of lines of code • But a software is developed with the help of Software engineering. • But a software is used by millions of users.

SN	Program	Software
1	A program is a set of instructions written in a programming language to perform a particular function. Many programs combine together to form software.	A software refers to a collection of several programs and other procedures and documentation.
2	A program is a set of instructions for performing a task	A software is made up of several computer programs.
3	A program is written for self use and convenience.	A s/w is developed for a third party for the sake of money
4	A program is only consisted of coding.	A s/w consisted of not of coding, but also program, documentation and manuals
5	A program is a set of instructions written by an individual in a programming language to perform a particular task,	Software is a set of program that is basically known as coding of software ,for a group of user and written by a group to execute a big task in a less time.
6	A program is simply a list of instructions for the computer to execute	A Software is a program or set of programs that reside in main memory

7	A program is an instance of an algorithm written in some programming language such as java, C++	A software is a collection of individual programs well packaged to run on a computer.
8	A program is a finite set of instructions, which must produce the output that is expected of it.	A software is a set of programs which interact with each other, in order to accomplish a common goal.

Computer Virus and Antivirus

Computer Virus

A computer virus is a computer program that can replicate itself and spread from one computer to another. The term "virus" is also commonly but erroneously used to refer to other types of malware, including but not limited to adware and spyware programs that do not have the reproductive ability. A true virus can spread from one computer to another (in some form of executable code) when its host is taken to the target computer; for instance because a user sent it over a network or the Internet, or carried it on a removable medium such as a floppy disk, CD, DVD, or USB drive.

Viruses can increase their chances of spreading to other computers by infecting files on a network file system or a file system that is accessed by another computer.

Types of Viruses

Not all computer viruses behave, replicate, or infect the same way. There are several different categories of viruses and malware. Below I list and discuss some of the most common types of computer viruses.

Trojan horse:

A Trojan horse program has the appearance of having a useful and desired function. While it may advertise its activity after launching, this information is not apparent to the user beforehand. Secretly the program performs other, undesired functions. A Trojan horse neither replicates nor copies itself, but causes damage or compromises the security of the computer. A Trojan horse must be sent by someone or carried by another program and may arrive in the form of a joke program or software of some sort. The malicious functionality of a Trojan Horse may be anything undesirable for a computer user, including data destruction or compromising a system by providing a means for another computer to gain access, thus bypassing normal access controls.

Worms:

A worm is a program that makes and facilitates the distribution of copies of itself; for example, from one disk drive to another, or by copying itself using email or another transport mechanism. The worm may do damage and compromise the security of the computer. It may arrive via exploitation of system vulnerability or by clicking on an infected e-mail.

Boot sector Virus:

A virus which attaches itself to the first part of the hard disk that is read by the computer upon boot up. These are normally spread by pen drive.

Macro Virus: Macro viruses are viruses that use another application's macro programming

language to distribute themselves. They infect documents such as MS Word or MS Excel and are typically spread to other similar documents.

Memory Resident Viruses:

Memory Resident Viruses reside in a computer's volatile memory (RAM). They are initiated from a virus which runs on the computer and they stay in memory after its initiating program closes.

Root kit Virus:

A root kit virus is an undetectable virus which attempts to allow someone to gain control of a computer system. The term root kit comes from the Linux administrator root user. These viruses are usually installed by Trojans and are normally disguised as operating system files.

Polymorphic Viruses:

A polymorphic virus not only replicates itself by creating multiple files of itself, but it also changes its digital signature every time it replicates. This makes it difficult for less sophisticated antivirus software to detect.

Logic Bombs/Time Bombs:

These are viruses which are programmed to initiate at a specific date or when a specific event occurs. Some examples are a virus which deletes your photos on Halloween, or a virus which deletes a database table if a certain employee gets fired.

Antivirus

Antivirus software is a software utility that detects, prevents, and removes viruses, worms, and other malware from a computer. Most anti-virus programs include an auto-update feature that permits the program to download profiles for new viruses, enabling the system to check for new threats. Antivirus programs are essential utilities for any computer but the choice of which one is very important. One AV program might find a certain virus or worm while another cannot, or vice-versa. Anti-virus software is also known as an anti-virus program or a vaccine.

Antivirus or **anti-virus** software, sometimes known as **anti-malware** software, is computer software used to prevent, detect and remove malicious software. Some commonly used Antivirus software's are: Bit Defender, Kaspersky, NOD32, Avira, panda etc.