Computer Software

What is computer software ?

Computer software is a collection of computer programs and related data that provides the instructions for telling a computer what to do and how to do it.

It’s also important to note that software unlike hardware can not be touched.

Types of Software

1. System Software
2. Application Software

System Software

System software is computer software designed to operate and control the computer hardware and to provide a platform for running application software.

System Software includes the Operating System and all the utilities that enable the computer to function.

Categories of system software:

- Operating Systems
- Utility Software
- Programming languages

1. Operating System

- An operating system is a generalized program that manages and coordinates all the activities taking place within a computer system.
- It controls and monitors the execution of all other programs that reside in the computer such as application programs and other system software.
- It is also referred to as the engine of the computer.
- An O.S relies on ***device drivers*** to communicate with each device on the computer.

A device driver is a small program that tells the O.S how to communicate with devices that are attached onto a computer such as mouse, keyboard, printer, CD drives, scanner etc

Examples of OS

- Windows 10
- Windows 8.1
- Windows 8
- Windows 7
- Windows Vista
- Windows Server 2003
- Linux
- Mac OS X
- SunOS etc.

Functions of the OS

Initial starter: after switching on the computer the operating system will perform the function of starting/ booting the computer.

Opening/closing files: it calls up program files and data files from the external storage into internal memory before processing command and check file levels.

Maintenance of files and directories/folders: O.S creates a file structure on the hard disk drive to allow data to be stored.

- **Memory management:** the O.S is responsible for locating programs and data file memory locations. The O.S locates an application and loads into the RAM of a computer, removes it when no longer needed.
- **Security:** it controls system security and monitor the use of passwords in this way unauthorized users are blocked from accessing the computer resources.
- **Provides a user interface,** e.g. command line, graphical user interface (GUI)

Computer user interface,

- The user interface is the part of the software with which the user interacts with the computer system.
- The two main computer user interfaces provided by the most operating systems are graphical user interface (GUI) and command line user interface.

Graphical user interface (GUI) operating systems

A graphical user interface (GUI) is a type of user interface that allows users to interact with programs by manipulating graphics, along with a keyboard and pointing devices such as a mouse, to provide an easy-to-use interface to a program.

Advantages of a GUI operating System

- GUIs provide users with immediate, visual feedback about the effect of each action. For example, when a user deletes an icon representing a file, the icon immediately disappears.
- Different applications usually have similar interface

- No need to type and memorise commands any command language .
- GUI enables a user to create shortcuts, tasks, or other similar actions to complete a task or run a program.

Disadvantages of a GUI as compared to CLI

- Requires more memory and faster processor.
- Occupies more disk space to hold all the files for different functions
- Command line instructions execute faster than GUI instructions.

Command-line user interface (CLI) OS

- The command line is a user interface (CLI) where a user interacts with a computer by typing commands at command prompt.
- The computer reads the commands from the command line and then executes them.

Advantages of CLI

- It is very fast in executing commands since it has no graphics
- The user has full control of every feature on the command line interface.
- Take up a little memory and normally does not need a very fast processor.
- Many commands can be grouped into a batch file to automate repetitive tasks

Disadvantages of CLI

- Command language has to be learnt and memorised
- CLIs cannot show images.

2. Utility Software

Utility software is system software designed to help analyze, configure, optimize or maintain a computer

- Utility software usually focuses on how the computer hardware, operating system, application software and data storage operates.

Examples:

Antivirus utility: An antivirus utility is a program that prevents, detects and removes viruses from a computer's memory or storage devices.

Screen saver; is a utility that causes the monitor's screen to display a moving image or blank screen if no keyboard or mouse activity occurs for a specified time period.

Backup utility; is a utility that allows a user to copy, or backup, selected files or the entire hard disk onto another disk or tape.

Uninstaller is a utility that removes an application, as well as any associated entries in the system files.

Disk defragmenter is a utility that reorganizes the files and unused space on a computer's hard disk so data can be accessed more quickly and programs can run faster

Disk scanner is a utility that detects and corrects both physical and logical problems on a hard disk and searches for and removes unwanted files.

Diagnostic utility compiles technical information about a computer's hardware and certain system software programs and then prepares a report outlining any identified problems.

File viewer is a utility that displays and copies the contents of a file.

File compression utility reduces, or compresses the size of a file.

A data recovery utility is used to resurrect or "Undelete" a file or information that has been accidentally deleted.

Disk partitions can divide an individual drive into multiple logical drives, each with its own file system which can be mounted by the os

3. Programming language

- These are artificial languages designed to communicate instructions to the computer
- Programming languages can be used to create programs that control the behaviors of the computer

Classification of programming languages

i. Machine languages
ii. Assembler languages
iii. High level languages
iv. Fourth generation languages

i. Machine language

- This is a language written in binary form (represented as “0”s and “1”s) in a computer. The machine language code is extremely difficult for humans to read and write and therefore prone to errors.

ii. Assembler language

- This is a language which consists of mnemonic symbols (English like words) used e.g. GET, PRINTF, IF, INT etc. to represent the binary digit of “0”s and “1”s of machine language
- Assembler languages are used to develop operating system
- Since computers only understand machine language, then all assembler languages need to be translated into machine language before execution by the computer.

Note: machine and assembler languages are low level languages because they are not very meaningful to the programmers

iii. High level language

- This consists of statements or sequence of text including words, numbers and punctuations.
- The language is split into two components of syntax (form) and semantics (meaning)
- The **syntax** of the language describes the possible combination of symbols that form syntactically correct program and **semantics** of the language describes the meaning given to a combination of symbols.
- High level languages are usually used to develop application software

Note: All source codes written in high level languages are translated into machine language before execution is done.

Examples of high level languages

- BASIC (Beginners All purposes Symbolic Instruction Code)
- COBOL (Common Business Oriented Language)
- FORTRAN (Formula Translation)
- PASCAL
- Visual BASIC
- C and C++
- Java etc

SOURCE CODE TO MACHINE CODE TRANSLATORS

1. A **compiler:** translates source code into machine binary code called object code. Some programming languages such as BASIC do not use a compiler but an interpreter.
2. An **interpreter** translates each source code statement one at a time or line by line, unit by unit into machine code and executes it.
3. An **assembler** is similar to compiler, but it is used to translate only assembly language into machine code.

Advantages of high level languages

- They are machine independent
- Are user friendly and problem oriented
- They are easier to learn, write, correct and revise

APPLICATION SOFTWARE

Application software is a set of instructions designed to carry out a specific task as desired by the user. Application software dependents on system software to execute its operations

Application software can be classified as ;

- ✓ **Generic** - general purpose software that is not written for any particular type of business. E.g. word processors, spreadsheets etc.
- ✓ **Integrated/suite**- a collection of software that has a common set of commands/icons. They tend to be cheaper than purchasing each application separately.

- **off-the-shelf or Specific**- software written for a defined purpose. E.g. Tally Accounting software-this that can be bought by anyone.
- **Custom-made or Bespoke** - bespoke software is written when a company requires a piece of software to perform a very specific task or function and there's no existing software that does what they need. It can be very expensive. E.g. Uganda National ID registration Software

Advantages of off-the-shelf

- It is really cheap, especially when compared to custom-made
- It is easily available from most computer shops
- It will have been thoroughly tested so there won't be any serious problems or bugs
- There will be lots of user support i.e. books, user guides, online help and discussion forums on the internet

Advantages of custom-made software

- The company will get the exact software/system that they need
- The software will work exactly how they want it to work
- The software will only have the features that they specifically need in their business

Disadvantages of custom-made software

- It takes a long time to develop such a system i.e. months or years
- It costs a great deal of money to develop such a system
- The company may need to employ a team of people such as business analysts, programmers, testers etc.
- Unlike off-the-shelf software, there is unlikely to be any internet forums or websites to help users.

Common examples of Application software include

Word Processors: Word processing is a tool that helps user in creating, editing, and printing documents. Examples: WordPerfect and Microsoft Word

Spreadsheets: The spreadsheet packages are designed to use numbers and formulas to do calculations with ease. E.g. Microsoft Excel and Lotus 123.

Graphic Presentations: The presentation programs can make giving presentations and using Slide Shows easier. E.g. Microsoft PowerPoint, Harvard Graphics etc.

Database Management System (DBMS):

A DBMS is a software tool that allows multiple users to store, access, and process data into useful information. Examples: Microsoft Access, dBASE, Oracle.

Desktop publishing:

Is a software that helps users in creating Certificates, posters, business cards. E.g. Microsoft Publisher, Adobe InDesign

Web design application:

is a computer program used to create, edit, and update web pages and websites. Examples: iWeb, Microsoft FrontPage, Adobe Dreamweaver

Software is available in the market in four forms i.e. commercial, shareware, open source and freeware

- Commercial/Proprietary software (also called **non-free software**) is software with restrictions on using, copying and modifying as enforced by the proprietor. Restrictions on use, modification and copying is achieved by either legal or technical means and sometimes both. Examples: Microsoft products, CAD, Antivirus etc.

- **Shareware:** refers to copyrighted commercial software which is provided (initially) free of charge to users, who are allowed and encouraged to use, make and share copies of the software throughout the trial period and gives you ample time to test out the software before you actually buys it. E.g. Adobe Acrobat, Nero,
- **Freeware:** is copyrighted computer software which is made available for use free of charge for an unlimited time (forever). E.g. Winzip, solitaire,

- Open source software are programs often open for anyone to contribute to and the end products of open source projects are commonly released for public use free of charge.

The company or individual that develops the software retains ownership of the program. There is usually a copyright notice that must remain with the software product. E.g. Linux, Netscape, Apache, etc.

Other Application software categories:

- **Adware** *(*advertising-supported software), is any software package which automatically renders advertisements in order to generate revenue for its author.
- **Demoware (**demonstration version of software). There are generally two types demoware: that which is crippled, and that which has a trial period.
  - **Crippleware:** means that "vital features of the program such as printing or the ability to save files are disabled until the user purchases a registration key".

- **Trialware** is software with a built-in time limit. The user can try out the fully featured program until the trial period is up, and then most trialware reverts to a reduced-functionality or non-functional mode, unless the user pays the license fee and receives a registration code to unlock the program. The rationale behind trialware is to give potential users the opportunity to try out the program to judge its usefulness before purchasing a license.

Donationware is a licensing model that supplies fully operational unrestricted software to the user and requests an optional donation be paid to the programmer or a third-party beneficiary (usually a non-profit). The amount of the donation may also be stipulated by the author, or it may be left to the discretion of the user, based on individual perceptions of the software's value. Since donationware comes fully operational it is a type of freeware.

- **Nagware** is a type of shareware that persistently reminds (nags) the user to purchase a licence. It usually does this by popping up a message when the user starts the program, or intermittently while the user is using the application.
- **Freemium** works by offering a product or service free of charge (typically digital offerings such as software, content, games, web services or other) while charging a premium for advanced features, functionality, or related products and services.