



# **COMPUTER SOFTWARE**

# **INTRODUCTION TO SOFTWARE**

The usefulness of computer hardware depends on available.

- **Software is the detailed instructions that control the operation of a computer system.**
- It can be defined as a set of instructions that tell the hardware how to work.
- **Software is a collection of programs that control the working of the computer hardware.**
- **A program** is a set of instruction arranged in a logical way that a computer can run
- Hardware is tangible whereas software is intangible, i.e. it cannot be touched

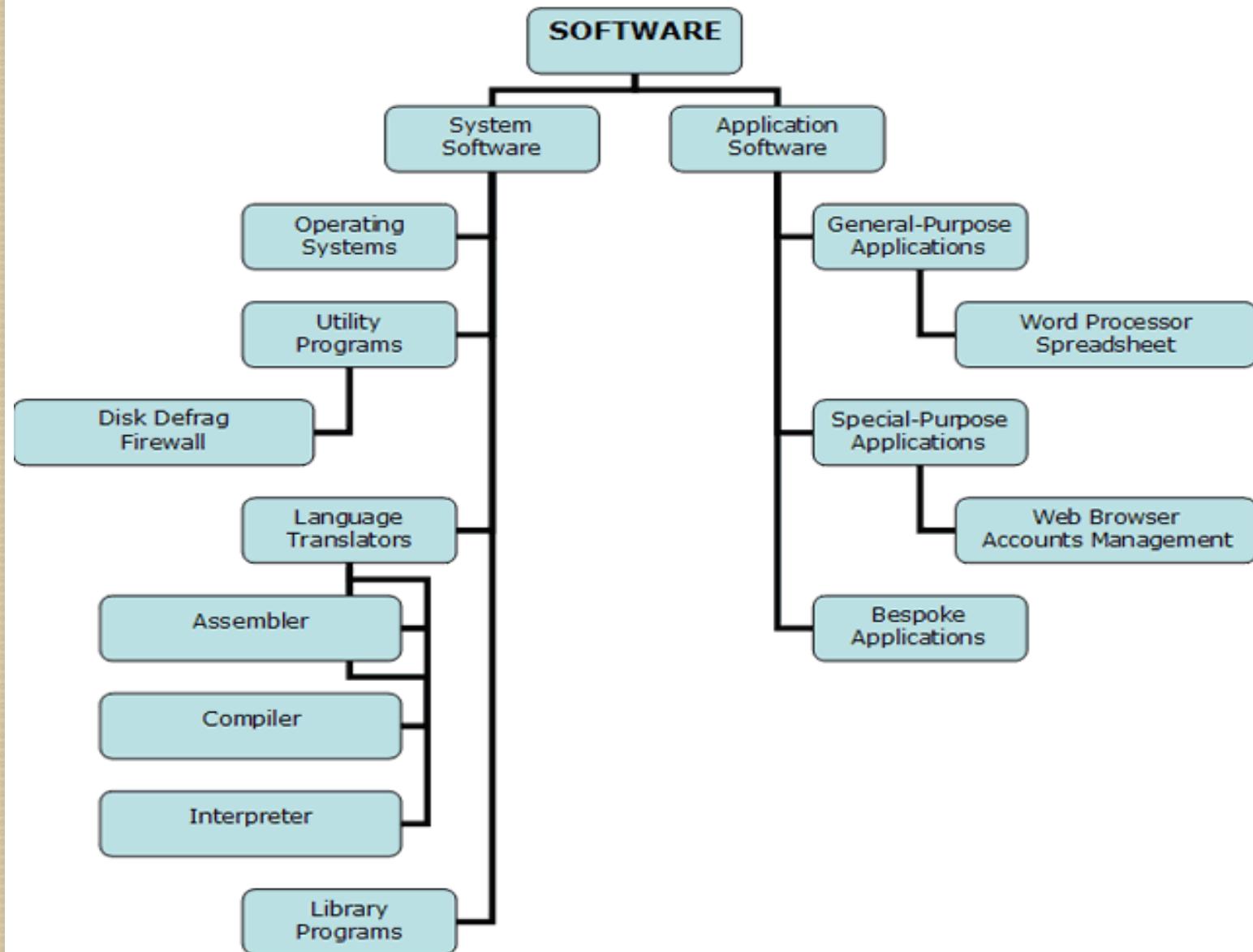
# **CHARACTERISTIC OF GOOD SOFTWARE**

- 1).** Good software should provide the required functionality.
- 2).** Good software should be usable even by the inexperienced users.
- 3).** Good software should be reliable and dependable.
- 4).** Good software should function efficiently.
- 5).** Good software should have a "life-time" at least measured in years.
- 6).** Good software should provide an appropriate user interface
- 7).** Good software should be accompanied by complete documentation
- 8).** Good software should be "easily" maintained

# **FUNCTIONS OF SOFTWARE**

- Manage the computer resources of the organizations.
- Provide tools for people to take advantage of these resources.
- Act as an intermediary between organizations and stored data and information.

# CLASSIFICATION OF COMPUTER SOFTWARE



## **CLASSIFICATION OF COMPUTER SOFTWARE**

- Computer software is mainly based on purpose the software serves. This can be broadly classified into two categories i.e. **Systems** and **Application software**
- **System software** refers to programs that control the operations of a computer and its devices.
- System software also serves as the interface between the user, the application software and hardware. There are three categories of systems software.

Three categories of system software are;

1. **Operating system,**
2. **Programming languages**
3. **Utility programs.**

# THE OPERATING SYSTEM

- An **operating system** (OS) is a set of programs containing instructions that co-ordinate all the activities among computer hardware devices.
- The operating system so much relies on the **device driver** to communicate with each hardware device.

NB. **A device driver** is a small program that tells the OS how to communicate with the device.

# **Functions of operating systems**

**To provide basic working environment/user interface on a computer.**

**To control the use of peripherals (both input and output).**

**To control the loading and running of application programs.**

**To manage allocation of memory**

**To manage booting process of a computer.**

**To manage files**

**To protect hardware and software.**

**To manage the process of connecting devices to work with a computer (configuring devices)**

**To manage the processor e.g. multitasking and time sharing.**

## **TYPES OF OPERATING SYSTEM SOFTWARE**

There are different types of operating systems. These are as follows:

**Real-time Operating System:** It is a multitasking operating system that aims at executing real-time applications.

**Distributed Operating System:** An operating system that manages a group of independent computers and makes them appear to be a single computer is known as a distributed operating system.

**Embedded System:** The operating systems designed for being used in embedded computer systems are known as embedded operating systems.

# **TYPES OF OPERATING SYSTEM SOFTWARE**

**Single-user, single task:** This is designed to manage the computer so that one user can effectively do one thing at a time.

**Single-user, multi-tasking:** This allows a single user have several programs in operation at the same time.

**Multi-user operating system:** enables two or more users to run a program simultaneously.

**Multitasking operating system:** allows a single user to work on two or more applications that reside in memory at the same time.

**Multiprocessing operating system:** can support two or more CPUs running programs at the same time.

# **USER INTERFACES**

This is the environment given by the OS to control how a user enters data and instructions and how information is displayed. There are two types of user interfaces;

## **I. Command line interface (CLI)**

This is the type of an interface in which users enter data and instructions by typing key words or pressing special keys.

### **Advantages a CLI**

- Takes little memory space
- Does not require very fast processors.
- Operations are fast since command are entered using the keyboard.
- Many commands can be sent together as a batch file for repetitive tasks.

## **Disadvantages of CLI**

Commands have to be learnt and memorised.

It is not user friendly

The interface may vary from one application to the other.

## **Graphical user interface.**

This is a type of interface in which users use menus and visual images (icon) to enter command into the computer.

## **Advantages of a GUI**

It is user friendly

No need to type or memorize any command language

The interface is similar for any application.

## **Disadvantages of a GUI**

Requires more memory

Requires very fast processors.

It is difficult to automate functions for expert users.

Occupies more disk space to hold the files for all the different applications

## **Basic Components of a GUI**

- **Pointer:** A symbol that appears on the display screen and that you move to select objects and commands.
- **Pointing device:** A device, such as a mouse or trackball, that enables you to select objects on the display screen.
- **Icons:** Small pictures that represent commands, files, or windows. By moving the pointer to the icon and pressing a mouse button, you can execute a command or convert the icon into a window.

- **Desktop:** The area on the display screen where icons are grouped is often referred to as the desktop because the icons are intended to represent real objects on a real desktop.
- **Menus:** Most graphical user interfaces let you execute commands by selecting a choice from a menu.

# Examples of GUI Operating Systems

- Microsoft Windows:

Windows 7 Desktop



# Windows 10



# Android OS



# Macintosh OS



# Linux OS



# Factors to consider when Choosing an operating

- Hardware specifications of the computer
- Processor type and memory of the computer
- Application software intended for use on the computer
- Ease of installation and use of the OS
- The cost of the OS against the budget
- The network and data security provided by OS
- Number of processors and users supported by the OS
- Available documentations

# Exercise I

- I. Define the following terms in relation to computing
  - i. **Software**.....
  - ii. **User interface**.....
2. Write the following terms in full
  - i. **CLI**.....
  - ii. **GUI**.....
3. Give the difference between **CLI** and **GUI**

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.....
4. List the **two** types of software

.....

## **Exercise 2**

(a) Explain the following term as used in computing:-

(i) System software: .....

Examples: .....

(b) Outline four functions of an operating system software.

.....

.....

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.....

(c) List any five operating systems that you know.

.....

.....

# **UTILITY PROGRAMS**

- **Utility programs** are special programs used to enhance performance of the computer system.
- They help to manage, maintain and control computer resources. These programs include: **File viewers, File compression utility, backup utilities, antivirus, screen savers, etc**

## **FUNCTIONS OF UTILITY PROGRAMS**

- Scan and fix computer viruses.
- Help in file back up.
- Compress files of disks.
- Partition disks into individual logical drives.
- Perform tasks on files (move files, delete files, etc)
- Diagnose computer problems.

# **COMMON UTILITY PROGRAMS**

Personal computers come loaded with utility programs designed to help resolve issues and maintain optimum performance. These utilities are easily accessed through “Advanced Settings.”

# **Data Back Up**

- Backing up data is the process of creating copies of your data and keeping them in a separate and secure place.

## **Back up software**

This is a software designed to duplicate important data in the event of a hard drive failure, user error, disaster or accident. Backup software help to back up your data automatically.

### **REASONS FOR BACKING UP DATA**

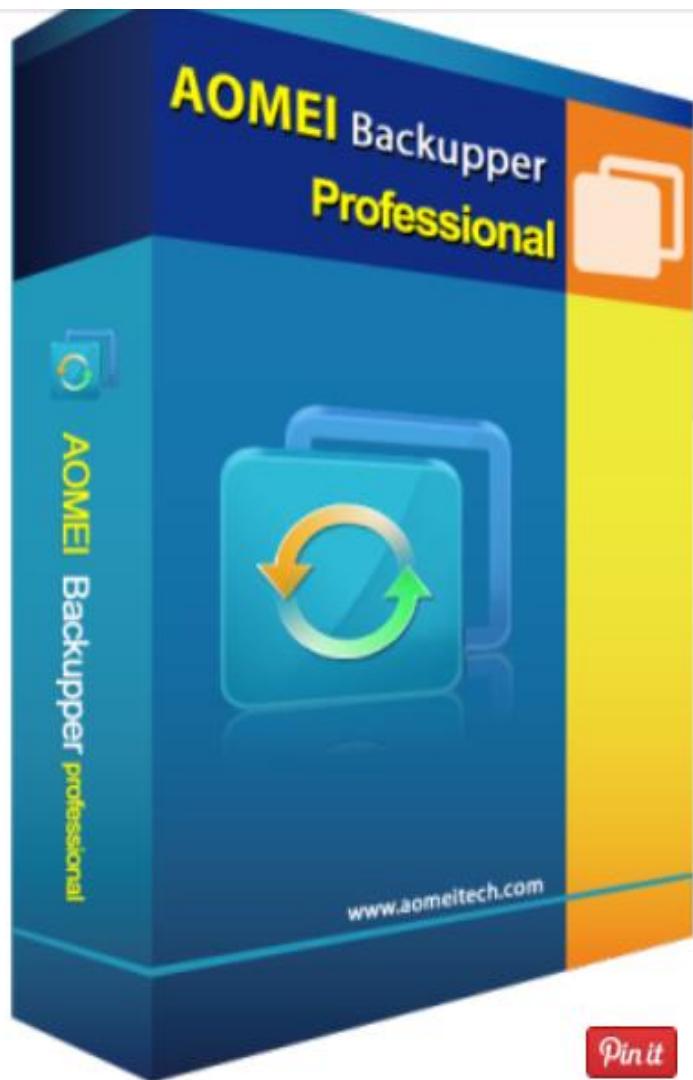
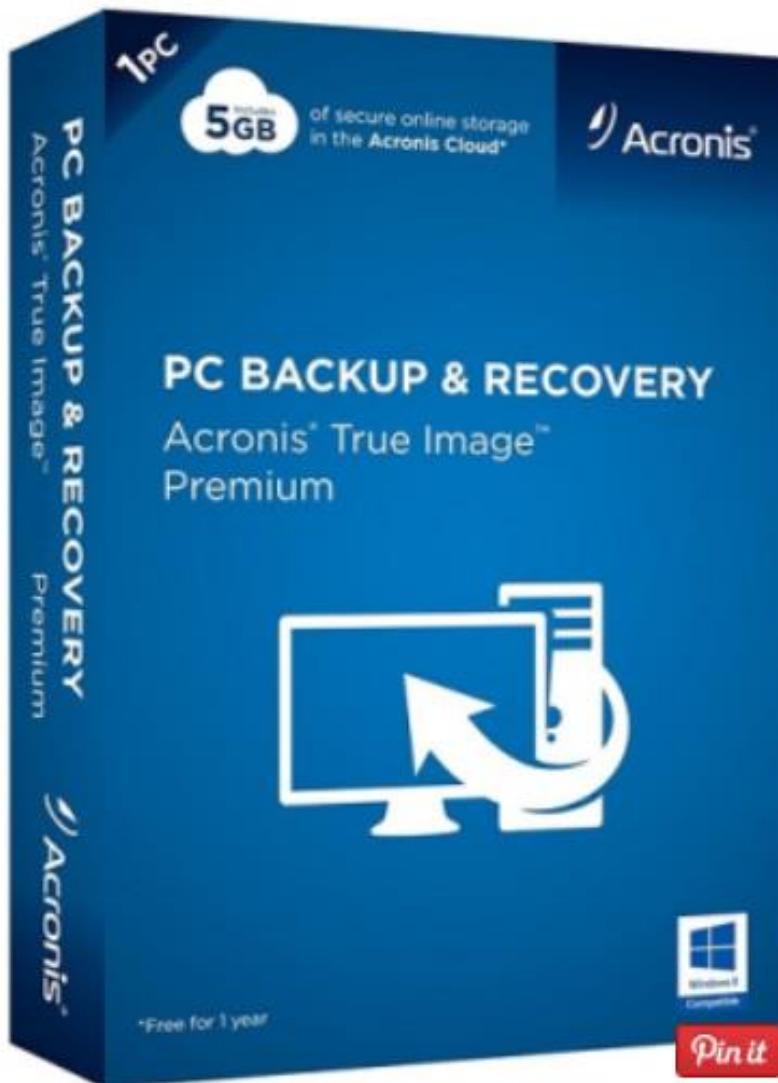
- ❖ In case your laptop or personal computer gets lost or stolen

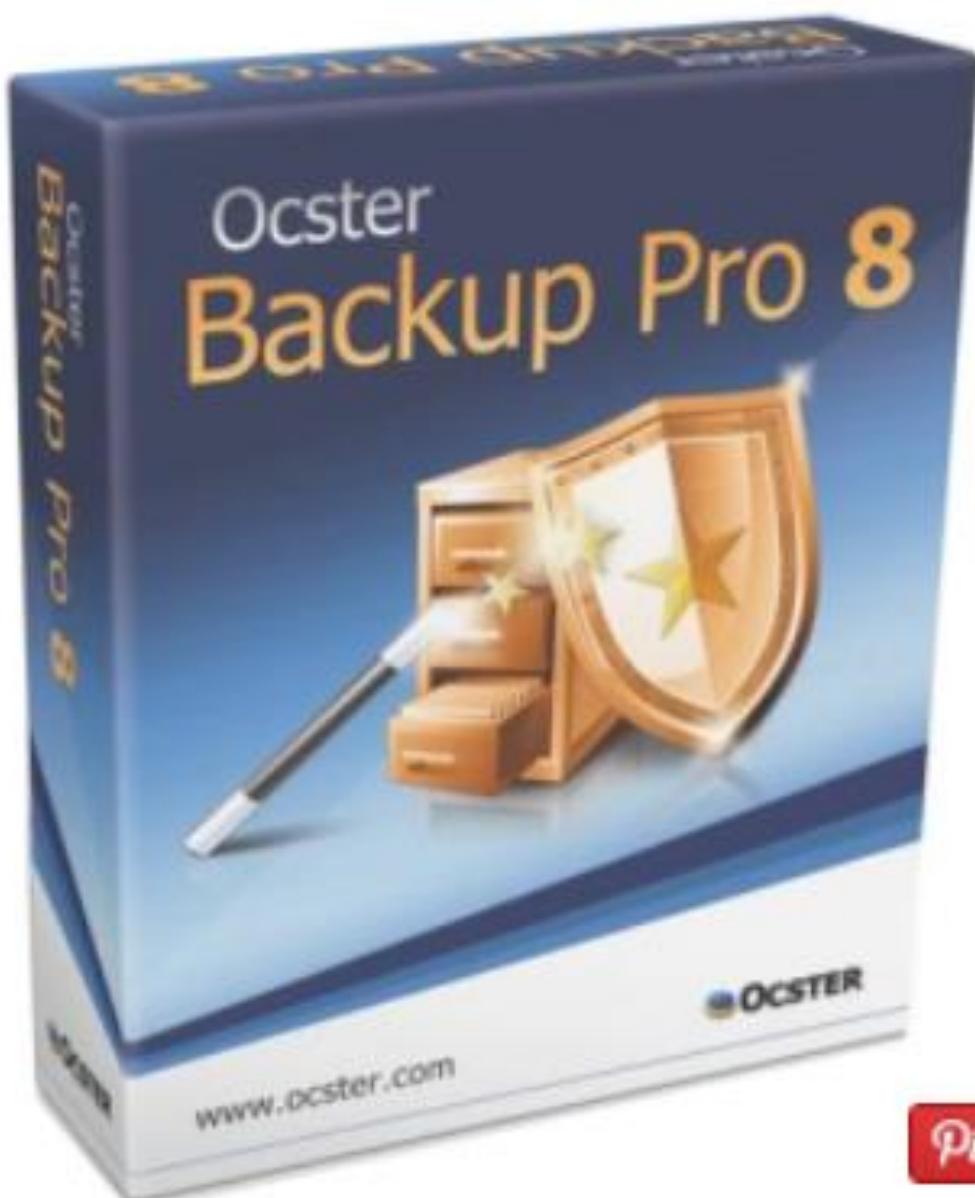
- ❖ In case of hard disk failure. Hard disks do break down from time to time. The hard disk is where data is stored permanently on the computer system.
- ❖ We back up data due to virus attacks. Without backup files, you may never see that information again.
- ❖ Electrical power failures.

# **Ways to ensure efficient back up of data**

1. Making regular backups
2. Backing up work on removable storage (secondary) media
3. Keeping backup media in a different location from that of the computer
4. Setting up of automatic backup intervals

# Some commercial Back up software





Pin it

## ❖ **System Restore**

"System Restore" resets the computer to an earlier setup. For example, let's say a computer begins functioning poorly after a new software program is installed, and the problem persists even after removing the program. "System Restore" sets the machine to a state prior to the installation of the program, often solving the issue.

## ❖ **Disc Defragmenter**

"Disc Defragmenter", also called "defrag," enhances computer performance by consolidating file fragments. Locating requested files affects a computer's speed, and by consolidating incomplete files, "defrag" makes the process faster.

## ❖ **Scheduled Tasks**

"Scheduled Tasks" accesses a wizard, setting selected programs to run automatically at a chosen time and frequency. For example, if a software program backs up files, the Schedule Tasks function can schedule that program to run daily at 3 a.m.

## ❖ **Hardware Diagnostics**

Under the Device Manager you can see hardware that is working improperly, because it will have a warning icon next to it. Right-click that device and choose to troubleshoot. This will bring up the device troubleshooting utility that will often try to update the driver or fix an existing driver.

## ❖ **Disk partitions**

Divides an individual drive into multiple logical drives.

## ❖ **Disk space analyzers**

To get the size for each folder/sub folders and files in folder or drive. Showing the distribution of the used space.

- ❖ **Screen savers:** These are designed to prevent phosphor burn-in on LCD and plasma computer monitors.
- ❖ **Sorting utility:** For organizing files and folders on a storage media.
- ❖ **Data Recovery:** Enables the user to get back all the data that might have been deleted or lost by a virus from the computer.
- ❖ **Debuggers:** helps to find out the error in computer program and fix it.
- ❖ **Uninstall utility:** It enables the user to remove an application program and its associated attributes from the system.

- ❖ **Registry cleaners:** Clean and optimize the Windows registry by removing old registry keys that are no longer in use.
- ❖ **System monitors:** For monitoring resources and performance in a computer system.
- ❖ **Disk storage utilities:** Ensures that data is stored and files arranged in order of ascending. It also helps the computer to re-arrange data files.
- ❖ **System Profilers:** Provide detailed information about the software installed and hardware attached to the computer.

# **DIFFERENCES BETWEEN OPERATING SYSTEMS AND UTILITY PROGRAMS.**

## **OPERATING SYSTEM**

An operating system contains instructions that coordinate all the activities among computer hardware resources.

An operating system is very important; computers cannot be used or started without an operating system.

Linux, Mac OSX, Unix, Windows XP

## **UTILITY PROGRAM**

A utility program performs maintenance-type tasks, usually related to managing a computer, its devices or its programs.

A utility program helps managing a computer easier; computers can still be used or started without it.

Antivirus, diagnostic utility, file manager, screen saver, image viewer, personal firewall, uninstaller, disk scanner, disk defragmenter and backup utility.

# **APPLICATION SOFTWARE**

- These are programs designed to meet user-specific needs.
- The primary function of application software is to apply the computer to users solve problems and accomplish specific tasks.
- Application software, such as word processing, spreadsheets, e-mail, database, and Web browser, can help you perform tasks such as creating documents, analyzing finances, sending messages, organizing data, and viewing pages on the World Wide Web respectively.

## **CLASSIFICATION OF APPLICATION SOFTWARE**

Application software can be classified into 2, that is **Off- the shelf software** and **Custom written/Bespoke/In-house developed software.**

### **I. Off- the shelf software**

This is software designed and packaged for sale. A user will find it readily available in shops for sale.

Off-the -shelf is further subdivided into 2:-

- i. General purpose software
- ii. Special purpose software.

# **General purpose application software**

- **General purpose** application software is a type of software that can be used for a variety of tasks.
- It is not limited to one particular function. For example a word processor could be classed as general purpose software as it would allow a user to write a novel, create a restaurant menu or even make a poster.

# **Special purpose application software**

**Special purpose** application software is a type of software created to execute one specific task.

For example a camera application on your phone will only allow you to take and share pictures.

Another example would be a chess game, it would only allow you to play chess, web browsers, calculators, media players, calendar programs etc.

# **Advantages /reasons of using off-the-shelf software**

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

## Bespoke/Customized Application Software

Bespoke application software is tailor made for a specific user and purpose. For example a factory may require software to run a robot to make cars, however, it is the only factory making that car in the world, so the software required would have to be specially build for the task. Other examples might include software for hospitals and medical equipment, software being written inside banks and other financial institutions.

# **Advantages Customized /Bespoke Application Software**

- I.** The company will get the exact software they need.
- 2.** The software will work exactly how they want it to work.
- 3.** The software will only have the features that they specifically need in their business.

## **The Main Disadvantages of Customized/Bespoke Application Software Include;**

1. It costs a lot of money to develop such a software
2. It may take some time to develop the software, when off-the-shelf software could be brought straight away
3. The company may need to develop a team of people such as business analysts, programmers, testers etc.
4. Unlike off-the-shelf software, there is unlikely to be any internet forums or websites to help users. For example popular spreadsheet applications have dozens of online help sites run by users and professionals
5. The software is more likely to be buggy as it probably won't have thousands of clients using and testing it.

# Differences between System software and Application software.

System Software		Application Software
Enables the computer to function properly.	Usage	Enables users to work efficiently with documentation such as letters, accounting reports and presentations.
Compulsory – each computer must have a system software to function.	Need	Optional – depends on usage and needs. Without an application software, the computer is still able to function.
Each computer only needs one system software.	Number of software	Each computer can have more than one application software.
Independent – system software can function without an application software.	Dependency	Dependent – application software cannot work without system software.
Provides the environment in which the applications run.	Function	Provides the environment to enable users to accomplish specific tasks.

## Some terminologies used in computer software:

### **Firmware**

- Is a software program or set of instructions programmed on a hardware device. It provides instructions on how that device should operate.
- Unlike normal software, **firmware** cannot be changed or deleted by an end-user without the aid of special programs and remains on that device regardless if it's on or off.

# **Software License**

- A software license is a legal instrument that governs how the software can be used and distributed. When you download or install software, you are asked to agree to the terms of a license before you proceed with the installation.
- A license does not mean you have to pay for the software because even free software is licensed.

# **Software copyright**

- It is a law used by proprietary (commercial) software companies to prevent the unauthorized copying of their software.

# **SOFTWARE PIRACY**

This is the act of illegally using, copying or distributing software without ownership or legal rights.

**Types of software piracy include:**

- **Soft lifting:** Borrowing and installing a copy of a software application from a colleague.
- **Client-server overuse:** Installing more copies of the software than you have licenses for.
- **Hard-disk loading:** Installing and selling unauthorized copies of software on refurbished or new computers.

- **Counterfeiting:** Duplicating and selling copyrighted programs.
- **Online piracy:** Typically involves downloading illegal software from peer-to-peer network, Internet auction or blog.

### **Packaged software:**

- Is commercial software, which is copyrighted and designed to meet the needs of a wide variety of users.

# **SOFTWARE SUITES**

A software suite, also known as application suite or productivity suite, **is a software package that has several applications that work well together because they have related functions, features and user interfaces, and are able to interact with each other.**

Business applications often come in suites, e.g. Microsoft Office, OpenOffice.org, and iWork, which bundle together a word processor application, a spreadsheet application, presentation graphics, database and e-mail applications, etc.

# **Advantages of software suites**

- It is easy to transfer data from one component of the application to another.
- An integrated software takes up less disk space than individual packages.
- The user can move faster from one application to the next.
- It is usually easier to learn how to use the applications in a software suite because the user interface for choosing commands is similar for all applications.

- A software suite tends to be more powerful and versatile than individual applications.
- A software suite is less likely to crash and contains fewer errors (bugs), since it has been widely tried and tested.
- The producers of software suites often offer after-sales services (e.g. online help facilities); users can also get support from user groups and magazines.

# SOFTWARE ACQUISITION

Computer software can be acquired in three main ways:- freeware, shareware, and commercial software

- **Freeware** : this refers to free software but with copyright restrictions. (*does not require any payment from the user.*)
  - a) **Public domain software** :This is free software with no restrictions.
- **Shareware**: It refers to a type of software that is given to the users to use freely for a certain period(trial), but when that period ends a user must pay in order to continue using the software.
- **Commercial software**: Refers to software that requires payment before it can be used. Commercial software programs typically come in a physical box, which is what you see displayed in retail stores, while others are available as downloads over the Internet.

# **OPEN SOURCE SOFTWARE**

**Open source software is:**

- i. Software provided for use, modification and redistribution.
- ii. Software that any programmer can download from the Internet for free and modify with suggested improvements. The only qualification is that changes can't be copyrighted,

**Why is it popular?** Because any programmer can make improvements which can result in better quality software.

**Examples:** Linux

# **ADVANTAGES OF OPEN SOURCE SOFTWARE**

- The source codes are available to users and they have the rights to modify them. This will allow improvements to the software without having to invest large sum of money in research and development.
- The modified and improved source codes can be freely redistributed.
- The open source software is created according to industry demands but allows for upgrades to take place freely when the need arises. Therefore, if bugs in the codes are found, they can be fixed by anyone interested and capable.
- The software can be used in any way and for any legal purposes. There is no restriction in a unilateral way on how the software could be used.

# **DISADVANTAGES OF OPEN SOURCE SOFTWARE**

- The codes are too complicated for beginner to understand.
- There is no particular official monitoring the works of a programmer improving the codes. This is because anyone is free to use, modify or even distribute the codes.
- Since nobody in particular is responsible for the codes, there is no exact knowledge and assurance on when the codes are going to be fixed if there are bugs in it. Thus, users will have to use the problematic software until someone rectifies the problem.

# **PROPRIETARY SOFTWARE**

Proprietary software is also called closed source software. The closed source software or proprietary software offers a stable system with support if the software fails or malfunctions.

## **ADVANTAGES OF USING PROPRIETARY SOFTWARE**

- The software offers a stable system support if it fails or malfunction.
- The software is safe and guaranteed to be safe from dubious threats like programming bugs and viruses thus providing ease of mind for the user.
- The software is easier to install and used as the production is planned and extensive research is carried out to ensure users purchase only the best.
- Furthermore, free updates and latest information on the software are usually provided to the user.

# **DISADVANTAGES OF USING PROPRIETARY SOFTWARE**

- Users need to spend a long time downloading and installing security patches to fix bugs announced by the manufacturer.
- Any improvements would usually require a cost, which is often expensive.
- Users are not allowed to describe and share the software as they are licensed.
- Customizing the software is impossible because when users buy proprietary software, they will not receive the code as the code is the manufacturer's trade secret.

# Assignment

I.

**Explain the following term:-**

i. Off-the-shelf software

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**Example.....**

ii. Custom written software

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**Example.....**

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(b) (i) What is a utility program

.....  
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(ii) State any four functions of utility programs

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.....

**2. (a) Explain the following terms as used in computing:-**

**(i) System software**

.....  
.....

**Examples.....**

**(ii) Application software**

.....  
.....  
.....

**Examples.....**

**(b) Outline four functions of an operating system software**

.....  
.....  
.....

**(c) List any five operating systems that you know**

.....  
.....

### 3 (a) Differentiate between:-

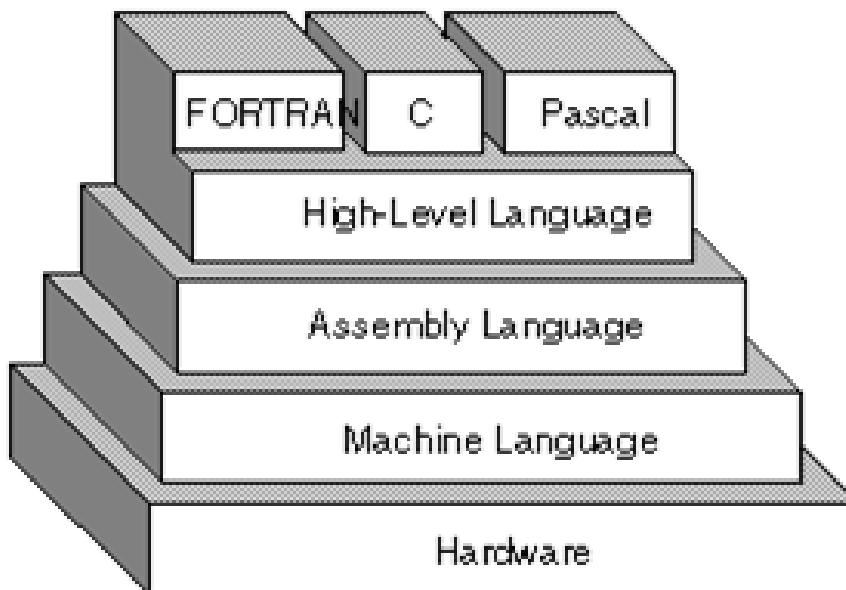
- (i) Single-user single-task operating system and Single-user multi-task operating system
- (ii) Shareware and Freeware
- (iii) Open source and proprietary/closed source software
- (iv) In-house developed and off-the-shelf
- (v) General purpose and Special purpose software
- (vi) Utility software and operating system.
- (vii) Public domain and Freeware

4. The system software that manages and controls computer hardware and software resources is referred to as

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# PROGRAMMING LANGUAGES

A **programming language** is a vocabulary and set of grammatical rules for instructing a computer to perform specific tasks. This is usually categorized into **low-level** (Assembler and machine) and **high level** (e.g. FORTRAN, C and PASCAL)languages



# Low-Level Languages

Low-level languages are designed to operate and handle the entire hardware and instructions set architecture of a computer directly.

- Programs and applications written in low-level language are directly executable on the computing hardware without any interpretation or translation.  
**For example;** developing new operating systems or writing firmware codes for micro-controllers.
- **Machine language** is a collection of binary digits or bits that the computer reads and interprets.
- **Assembly language** implements a symbolic representation of the machine code needed to program a given CPU architecture.

- **High-Level Language (HLL)**
- High-level language is any programming language that enables development of a program in much simpler programming context and is generally independent of the computer's hardware architecture.
- High level languages are designed to be used by the human operator or the programmer. They are referred to as "closer to humans." In other words, their programming style and context is easier to learn and implement, and the entire code generally focuses on the specific program to be created.

# **FACTORS TO CONSIDER BEFORE BUYING A COMPUTER PROGRAM**

- Cost of software against buyer's budget.
- Usability of the program.
- Requirements of available hardware.
- Type of program needed.
- Needs of the organization.
- Personnel to use the program.
- Functionalities of the program.
- Free from computer bugs.
- Software support and call centers.
- Type and quality of software developer.

# **EXERCISE**

# COMPUTER SOFTWARE

*The End*