

Software

1. What is Software; describe the various types of software in brief? (Nov 2012)

Software: It is a set of instructions, which is known as program, combined together to perform a specific task is called as Software.

Types of Software: There are basically three types of software

System software

Application software

General – Purpose software

System Software:

- i. System software is a computer software designed to operate the computer hardware and to provide and maintain platform for running the application software
- ii. Therefore, system software can be defined as a set of one or more programs that control the operation of a computer system.
- iii. It is an essential part of the computer system
- iv. It comprises of those program that control and support the computer system and its data processing applications.
- v. It includes the following
 - (a) Programming Languages
 - (b) Operating system
 - (c) Device drivers
 - (d) Utility programs
 - (e) Language translators

Application Software:

- i. Application software is a subclass of the computer software which employs the capabilities of the computer directly to a task that the user wishes to perform.
- ii. The program usually solves a particular application or problem that is unique to the organization
- iii. Examples of application software are Payroll, General accounting, and Inventory Control etc.

General-Purpose Software:

- i. This software provides a framework for a great number of scientific, business and personal applications.
- ii. Spreadsheet, Computer Aided Design (CAD) and Word Processing software etc fall into this category.
- iii. Most of General-Purpose Software comes as a package
- iv. The software is accompanied by user oriented documentation such as reference manuals, keyboard templates and so on

2. Distinguish between hardware and software? (May2006 4M, May 2009 4M)

Hardware	Software
1. Physical components of a computer system are called hardware	Collection of programs designed for specific needs is called Software
2. Input devices, processing unit, output devices and auxiliary storage devices are different categories of hardware	Software can be divided into three types - application software, system software and general-purpose software
3. keyboard, mouse, printer, CPU, RAM are some of the examples of hardware	Financial Accounting software, Operating system, MS-Word etc are some of the examples of software
4. Hardware is manufactured/assembled by hardware manufacturing companies/hardware vendors	Software is developed by software development firms
5. Hardware is independent of software	Software cannot be developed or used without hardware i.e. software is dependent on hardware
6. Hardware repair required hardware engineer	Software development/ modification requires software professionals like system programmer or application programmer
7. It is bulky and requires more storage space	Software can be copied on CD/DVD, which is lightweight and transportable
8. Hardware is supported by uninterrupted power supply (UPS)	Software operation required requisite hardware

3. What is Middleware?

Middleware: Middleware is the term sometimes used to describe the programming that mediates between system and application software or between two different kinds of application software.

Example: Sending a remote work request from one application in a computer that has one kind of operating system to an application in a computer with a different operating system.

4. What is a programming language?

- i. Programming languages are vocabulary and set of grammatical rules used in writing the program to direct the processing steps to be carried out by the computer.
- ii. Programming language refers to high level languages like C, C++, COBOL, FORTRAN, Ada and PASCAL etc
- iii. Each program has a unique set of keywords and a special syntax for organizing program instructions
- iv. Programming languages are part of the software or programming aid provided by the manufacturer.
- v. Programming languages hierarchically be divided as follows
 - (a) Machine language or First generation language
 - (b) Assembler language or Second generation language
 - (c) Compiler language or Third generation language
 - (d) Fourth generation language
 - (e) Fifth generation language

5. What is a Machine Language or First Generation Language; discuss its advantages and disadvantages? (May2012)

Machine Language or First generation language:

- i. Machine language is the computer language, the only language which a computer can understand without translation.
- ii. Each computer has its own machine language; it is developed based on the internal engineering architect of the equipment. Programs in the machine language are developed and provided to the user by the computer manufacturer.
- iii. Programs written on machine language can be used only on the computer for which the language has been written

Advantages: The only advantage of using machine language is that programs run very fast as it does not require any translation program to run on CPU.

Disadvantages:

- i. It is difficult to write program on machine language as the programmer has to know hardware details of the computer
- ii. Programmer has to remember many codes to write a program which may result in program errors
- iii. It is difficult to debug the program

6. What is Assembler Language or Second generation language; discuss its advantages and disadvantages?

Assembler Language or Second Generation Language:

- i. Assembler language is also known as Symbolic language as they employ symbols for both arithmetic and logical operations and address location
- ii. Computer manufacturer provides the user with a special program called **Assembler** which translates Symbolic language to equivalent Machine language for the computer to understand

Advantages:

- i. It is easier to understand and saves a lot of time of the programmer
- ii. Easy to correct errors and modify the program instructions
- iii. It has the same efficiency as the machine language, because it is one-to-one translator from Assembler language to Machine Language

Disadvantages:

- i. Major disadvantage of machine language is that it is machine oriented i.e. programs written for one computer may not run on another computer with different hardware configuration
- ii. Programs written in Assembler language are bigger than programs written in machine language
- iii. Because of the symbolic notation program are often difficult to write, read and maintain as compared to programs in machine language
- iv. Programs in Assembler language cannot be written for generalised business application software such as payroll, account receivables and billing etc

7. Describe the various features of Third Generation language and Fourth Generation Language?

(Or) Differentiate between 3GLs and 4GLs (May 2008, May2012)

Third Generation Language (3GL)	Fourth Generation Language (4GL)
1. Intended to use by the professional programmer	May be used by the end user as well as a professional programmer
2. Require specification of how to perform the task	Require specification of what task to perform (system determines how to perform the task)
3. Require that all alternatives be specified	Have default alternatives built in ; user need not specify these alternatives
4. Require large number of procedural instructions	Require far fewer instructions (in most cases less than one-tenth)
5. Code may be difficult to read, understand and maintain	Code is easy to understand and maintain because of English-like commands
6. Language developed originally for Batch Operation	Language developed primarily for online use
7. Can be difficult to learn	Many features can be learned quickly
8. Difficult to debug	Errors are easier to detect because of shorter programs, more structured code and use of defaults and English like commands
9. Typically File oriented	Typically Database oriented

8. Discuss about Fifth Generation Language? (Nov 2012)

Fifth Generation Language:

- It is a programming language that aims at solving the problem using the constraints given to the program, rather than using an algorithm written by a programmer
- Most constraint-based languages, logic programming languages and some declarative languages are fifth generation languages
- Fifth generation language are designed to make the computer solve the problem without the intervention of the programmer
- They are mainly used in Artificial Intelligence Research, Fizzy logics and Neural Networks.
- Computer aided design with graphics makes it easy for the user to use these languages and generate new applications
- Examples of Fifth Generation languages are Prolog, OPS5 and Mercury are the popular Fifth Generation Languages

9. Describe Object Oriented Language or programming (OOP/OOL), discuss its advantages? (Nov 2006, Nov 2010)

Object Oriented Language or Programming (OOP/OOL)

- With traditional programming approaches, developing a new program means writing entirely a new code. In case of complex program, developing it from scratch and achieving a reasonable quality level becomes a formidable task
- The solution of these problems is a new way of developing programs using Object Oriented programming
- An object is a predefined set of program codes that after having been written and tested; will always behave the same way so that it can be used for other applications.
- In OOP, an object is written for each specific task and saved in library so that anyone can use it. Most common specific task which all programs consist are saving or retrieving data or calculations
- In OOP, objects are selected by pointing to a representative icon, small amount of code is necessary for finishing the program is written and then linking these objects together creates a new program

Advantages:

- It is easy to use
- It allows graphical user interface
- It enables faster development of program
- Programs produced are more reliable
- When an object is updated, all programs using that object are uploaded automatically

10. What is an Operating system, enlist its basic functions? (May1998, May 1999, May 2002, May 2007 5M, May 2008 5M Nov 2008, Nov 2010)

Operating System: The Operating system may be defined as an integrated system of programs which supervises the operation of the CPU, controls the input/output functions of the computer system, translates the programming languages into the machine languages and provides various support services.

Functions: There are six basic functions that an operating system can perform. These are

- i. **Schedule jobs:** Operating system can determine the sequence in which jobs are executed, using priorities established by the organization
- ii. **Manage hardware and software resources:** Operating system cause the user's application program to be executed by loading it into primary storage and then cause the various hardware units to perform as specified by the application
- iii. **Maintain system security:** They may require users to enter password – a group of characters that identifies users as being authorized to have access to the system
- iv. **Enable Multiple User Resource Sharing:** They can handle the scheduling and execution of the application programs for many users at the same time, a feature called multiprogramming
- v. **Handle Interrupts:** An interrupt is a technique used by the operating system to temporarily suspend the processing of one program in order to allow another program to be executed. Interrupts are issued when a program requests an operation that does not require the CPU, such as input or output, or when the program exceeds some predetermined time limit
- vi. **Maintain Usage Records:** Operating systems can keep track of the amount of time used by each user system unit- the CPU, secondary storage, and input and output devices

11. What are the various types of Operating system?

There are various types of operating system are as follows

1) Microsoft Disk Operating system (MS-DOS):

- i) MS DOS is a non graphical command line operating system created for IBM compatible computers that was first introduced in August 1981 and was last updated in 1994 when MS-DOS 6.22 was released
- ii) MS-DOS is a single user operating system that runs one program at a time and is limited to working with one MB of memory, 640 KB of which is usable for the application software
- iii) MS-DOS requires user to type commands instead of using Mouse
- iv) Both IBM and Microsoft release their versions of DOS, Microsoft under the name MS-DOS and IBM under the name PC-DOS

2) OS/2:

- i) In 1987 IBM and Microsoft announced a new PC OS called OS/2 (Operating System Two)
- ii) However, OS/2 was not very successful because of its two main drawback
 - a) Considerable hardware demand
 - b) OS/2 was not supporting many existing PC applications
- iii) The initial lack of interest in the original OS/2 resulted in considerable strain on the IBM-Microsoft alliance.
- iv) IBM and Microsoft chose separate ways where in Microsoft abandoned OS/2 to IBM and concentrated on MS-DOS and Windows

3) Microsoft Windows: (May 1998, May2003, May 2005)

- i) It is an Operating System developed by Microsoft Inc. First time it was launched in 1983 later on almost for every year it was modified and upgraded. Different versions of MS Windows are Windows 3, Windows 95/98, Windows NT, Windows 2000, Windows XP, Windows Vista and now the current version is Windows 7.0
- ii) Microsoft Windows is one of the most popular operating system; its success is often attributed because of Graphical User Interface (GUI) feature.
- iii) In this system we click on the icon with the mouse instead on writing command as in MS-DOS
- iv) Microsoft Windows has the following features
 - a) Simple and user friendly
 - b) No need to write the command
 - c) Screen quite animated and attractive, it uses Graphic User Interface (GUI)
 - d) It has the multitasking feature because of that more than one program can be executed concurrently
 - e) Designed for easy access to network resources

- f) Allows a developer to produce software applications to run on Windows without the need to notify the Microsoft

4) **Unix OS:**

- i) Unix is an operating system originally developed in the year 1969 by a group of AT&T employees at Labs
- ii) Generally Unix is seen as an Operating system on Workstations or a network server
- iii) Unix Systems formed the backbone of the early internet, and they continue to play an important part in keeping the internet functioning
- iv) Unix was designed to be portable, multi-tasking and multi user in a time sharing configuration
- v) Unix was characterized by various concepts
 - a) The use of plain text for storing data
 - b) A hierarchical file system
 - c) Treating devices and certain typed of inter-process communication (IPC) as files
 - d) And the use of large number of software tools
- vi) Unix was self contained software system, the system is composed of several components that are normally packed together

5) **Mac OS:**

- i) It is a Graphical User Interface based operating systems developed by Apple Inc. for their Macintosh line of computer systems. It is completely a Graphical OS which lacks command line
- ii) Earlier versions of the Mac OS were compatible only with Motorola 68000-based Macintoshes, later Apple introduced computers with PowerPC hardware and accordingly OS was upgraded to support this architecture as well
- iii) Mac OS is noted for its ease of use and its co-operative multi tasking and criticized for its limited memory management, lack of protected memory and susceptibility to conflicts among operating system “extensions” that provide additional functionality or support for a device
- iv) Apple developed the server edition called Mac OS X Server includes work group management and administration software tools that provide simplified access to key network services, including a mail transfer agent, a Samba server, an LDAP server, a domain name server, and others

6) **Linux OS:**

- i) Linux is the generic name for a UNIX –like operating system that can be used on a wide range of devices from supercomputers to wristwatches.
- ii) The Linux Kernel is released under an open source licence, so anyone can read and modify its code. It has been modified to run on a large variety of electronics
- iii) Linux has been widely adopted for use in servers and embedded systems (such as cell phones)
- iv) Linux superseded UNIX in most places, and is used on the 10 most powerful supercomputers in the world

12. Write the flavours of Windows Operating system in brief

Microsoft Windows operating system has been developed for both home users as well as professional IT users. Home versions generally have greater multimedia support and less functionality in networking and security where as professional versions are inferior in multimedia support and better in networking and security

- a) **Windows 95:** Windows 95, a 32 bit OS was released in August 1995. The significance of 32 bit OS is measured in terms of the internal memory a user can directly access as compared to 16 bit OS

Features of Windows 95:

- i) Multitasking: It provides a multitasking environment allowing the user to run multiple programs or execute multiple tasks concurrently. It also enables faster data/file access as well as improvement in printing delivery
- ii) One Click Access: One click access refers to the fact that users didn't have to double click on the mouse to activate an application.
- iii) Network ready: OS is designed for easy access to network resources. It facilitates gateways to e-mail, fax facilities and access to internet via Microsoft Network.
- iv) Other Friendly features:
 - a) Employ long file names
 - b) Easy navigation routes
 - c) Plug and play technology enabling users to connect various peripheral devices or add-ons with minimum fuss

- d) Windows 95 is backward compatible enabling users to migrate from previous systems/applications
- b) **Windows NT:** Windows New Technology (NT) is what is known as an industry standard mission critical OS. As a 32 bit processor OS Windows NT represents the preferred platform for Intel's more powerful Pentium range of processors.

Critical Features:

- i) A stable multitasking environment
 - ii) Enhances security services
 - iii) Increased memory
 - iv) Network utilities
 - v) Portability: NT can operate on microprocessors other than those designed for PC
 - vi) They are more expensive than other windows OS and makes greater demands
- c) **Windows 2000:**
- i) It was released on February 2000 for use on personal computers, business desktops, laptops and servers
 - ii) It was successor of Windows NT 4.0 and is the final release of MS Windows to display the "Windows NT" designation
 - iii) Windows Me was designed for home use while Windows 2000 was designed for business
- d) **Windows XP:** This OS was released in August 2001; the name XP is short for "eXPerience". This version is built on the Windows NT kernel that also retained the consumer-oriented usability of Windows 95 and its successors. New version came in two distinct editions, Home and Professional.

Features of Windows XP:

- i) Faster start-up
 - ii) More user friendly interface, including the framework for developing themes for the desktop environment
 - iii) Fast user switching, which allows the user to save the current state and open applications of their desktop and allow another user to log on without losing that information
 - iv) The Clear type, font rendering mechanism, which is designed to improve text readability on LCD and similar monitors
 - v) Remote Desktop functionality, which allows the users to connect to a computer running Windows XP pro from across a network or the internet and access their applications files, printers and devices
 - vi) Support for most DSL modems and IEEE 802.11 connections, as well as networking over FireWire, and Bluetooth.
- e) **Windows Vista:** It was released in 2007, with new features from a redesigned shell and user interface to significant technical changes, with a particular focus on security features

Features of Windows Vista:

- i) Updated graphical interface and visual style dubbed Aero
 - ii) Redesigned search function
 - iii) Multimedia tools including Windows DVD Maker
 - iv) Redesigned networking, audio, print, and display sub-systems
 - v) Increased communication between machines on a home network, using peer-to-peer technology to simplify sharing files and media between computers and devices.
 - vi) It includes version 3.0 of the NET Framework, allowing software developers to write applications without traditional Windows APIs
- f) **Windows 7.0:** It is the latest release of Microsoft Windows in Oct 2009, a series of operating systems produced by Microsoft for use on personal computers, including home and business desktops, laptops, notebooks, tablet PCs and media centre PCs

13. Discuss the features of Operating System?

The various features of Operating system are

- i) **Multiprogramming (Nov 2008 1M):** It is defined as execution of two or more programs that all reside in primary storage. Since CPU can execute only one instruction at a time, it cannot simultaneously execute instructions from two or more programs. However, it can execute instruction from one program then from second program and so on. This type of processing is referred to as concurrent execution. It is very useful as most of the time, CPU remains idle waiting for input/output devices to complete their job, as Input/output devices are very slow. When input/output devices are working for one program, CPU executes instructions of

second program. Thus, multiprogramming is a technique which helps in utilizing a computer system more effectively.

- ii) **Foreground/background processing:** Partitioning allows separate “job streams” to be set up for high-priority tasks (called a foreground partition) and one for low-priority tasks (called a background partition). With foreground/background processing, foreground jobs are usually handled first. When no foreground task waits processing, the computer goes to the background partition and starts processing tasks there. As other foreground tasks come into the job queue, the computer leaves the background partition and resumes working in the foreground.
- iii) **Multi-tasking:** It refers to the operating systems ability to execute two or more of a single user’s tasks concurrently. Multitasking operating system are often contrasted with single-user operating systems. Single-user operating systems have traditionally been the most common type of operating system for microcomputers. These only allow the user to work on one task at a time. For microcomputers, multi tasking operating systems provide single users with multiprogramming capabilities. This is often accomplished through foreground/background processing.
- iv) **Virtual Memory: (May 2000 5M)**
 - a) It is a technique that allows the execution of a process, even though the logical address space requirement of the process is greater than physical available main memory. The technique works by dividing a program on the disk into fixed length or into logical, variable segments. Virtual memory thus extends primary storage by treating disk storage as a logical extension of the main memory.
 - b) By allowing programs to be broken up to smaller parts, and by allowing only certain parts to be in main memory at any one time, virtual memory enables computers to get by with less main memory than usual.
 - c) Virtual memory helps in efficient main memory utilization. Virtual memory makes the task of programming much easier, because the programmer no longer needs to worry about the amount of physical or main memory available.
- v) **Multiprocessing (or parallel processing) (May 2008 1M):** It refers to the use of two or more central processing units, linked together, to perform coordinated work simultaneously. Instructions are executed simultaneously because the available CPUs can execute different instructions of the same program or of different programs at any given time. Multiprocessing offers data-processing capabilities that are not present when only one CPU is used. Many complex operations can be performed at the same time. CPU can function on complementary units to provide data and control for one another. Multiprocessing is used for nations major control applications such as rail road control, traffic control, or airways etc.
- vi) **Time-sharing:** Time-sharing is a methodology created to satisfy the processing needs of multiprogramming and batch operating system. In time sharing systems, the execution time is divided into small slots called “time slice”. Each process is processed for a time slice and then the other process is taken for processing by the processor. This process goes on till all the jobs are processed. The process of shifting microprocessor from processing of one job to the other is so rapid that the user can’t even notice it. In these systems the processes that are waiting for processor time are placed in a special memory area called “ready queue”. When a process has some input/output requirements, it is shifted from this area.
- vii) **Multi-threading:** It is an application typically, implemented as a separate process with several threads to control. In some situations a single application may be required to perform several similar tasks, for e.g. a web server accepts client requests for web pages, images, sounds etc. Therefore in such situations it is efficient to have one process that contains multiple threads to serve the same purpose. The server would create a separate thread that would listen for client requests when a request is made rather than creating another process it would create another thread to service the request. To get the advantages like responsiveness, resource sharing economy and utilization of multiprocessor architectures multithreading concept can be used.

14. Distinguish between multi programming and multi tasking (May 2008 4M)

Write from the above answer together

15. Define overlaying? (Nov 2002 1M, Nov 2008 1M)

Overlaying: Updating of Master file on the basis of transaction file takes place with the help of a technique known as overlaying. In this technique, original master file is overwritten by updated master record.

Or

Overlaying refers to a technique used to transfer segments of program from auxiliary storage into internal storage for execution, so that two or more segments occupy the same storage locations at different times.

16. Buffering

Buffering enables the processor to execute another instruction while input or output is taking place rather than being idle while transfer was completed.

17. Device drivers

- i. Device drivers are small files that act as an interface between hardware in a computer system and the operating system (OS). Hardware requires device drivers so that an OS can “see” the devices and handle them effectively and efficiently.
- ii. A driver typically communicates with the device through the computer bus or communications subsystem to which the hardware connects.
- iii. When a calling program invokes a routine in the driver, the driver issues commands to the device. Once the device sends data back to the driver, the driver may invoke routines in the original calling program.
- iv. Common components that require drivers include keyboards, mice, controllers, graphics cards, audio hardware, Ethernet hardware, card readers etc.

18. What is Utility programs or service programs, mention the various tasks performed by the utility programs?

Utility programs: Utility programs are systems programs that perform general system support tasks. These programs are offered by the manufacturer to perform tasks that are common to all data processing installations. Some of them may either be programs in their own right or subordinates to be assembled / compiled in the application programs.

Tasks performed by Utility programs:

- i) Sorting and storing data
- ii) Checking or scanning the data stored on the hard disk for security reason
- iii) Making a copy of all the information stored on a disk, and restore either the entire disk
- iv) Performing routine data management tasks, such as deleting, renaming, moving, copying, merging, generating and modifying data sets
- v) Providing encryption and decryption of data
- vi) Analyzing the computers network connectivity, configure network settings, check data transfer or log events
- vii) Partitioning of drive into multiple logical drives, each with its own file system which can be mounted by the operating system and treated as an individual drive
- viii) Converting data from one recording medium to another, viz., floppy disk to hard disk, tape to printer etc
- ix) Dumping of data to disk or tape
- x) Tracing the operation of program

19. What are the types of Utility Programs?

There are **basically** three types of Utility programs, they are

- a) **Sort Utilities:** Sort Utility programs are those programs that sort data. For example, we have a file of student records, we could sort the file by name, and then within name by date-of-birth. Here we could declare name as primary sort key and date-of-birth as secondary sort key. In market many sorting packages are available that enables the user to identify 12 or more sort keys. Sort utilities are often found in mainframe and minicomputer environments. In the Micro-computing world, it is typical for sort routines to be bundled into application packages for example, sort utilities found in spreadsheet and database management software.
- b) **Spooling Software (May 2003 1M, Jun 2009 1M):** The purpose of the spooling software is to compensate for the speed differences between the computer and its peripheral devices. Spooling system is usually encountered in large systems and network computing environments. These programs take the results of computer programs and move them from primary memory to disk. The area on the disk where the program results are sent is commonly called the Output spooling area. Thus, the output device can be left to interact primarily with the disk unit, not the CPU. Spooling utilities can also be used on input side, so that programs and data to be processed are temporarily stored in an input spooling area on disk
- c) **Text editors:** Text editors are programs that allow text in a file to be created and modified. These utilities are probably most useful to professional programmers, who constantly face the problems of cutting and pasting programs together, changing data files by eliminating certain data fields, changing the order of certain data fields, and changing the format of data. Although text editors resemble Word processor they are not the same. Text editors lack the extensive text-formatting and document-printing capabilities found on most word processor.

20. Describe the various other commonly used Utility programs for microcomputer OS?

- i) **Disk Copy program:** This program allows a user to copy the entire contents of one diskette to another diskette. It is generally used to make a backup or archive copy of a data diskette or an application program. The disk copy program can also be used to transfer data stores from one size or capacity diskette to another.
- ii) **File copy program:** This program allows a user to copy just one file or a group of files, rather than the entire contents of the diskette, to be copied to another diskette.
- iii) **Disk formatting program:** This program allows a user to prepare a new/ blank diskette to receive data from the computer system. The data cannot be stored on the computer system until it is formatted or initialized. The formatting process writes the sectors on the diskette so that the operating system is able to place data in these locations.
- iv) **File deletion program:** It allows a user to delete a file stored on a diskette.
- v) **File viewing program:** This program is used to view the contents of a file on the display screen of the microcomputer
- vi) **Directory program:** The program allows the user to view the names of the data and program files which are stored on a disk/diskette. It will not only list the files, but also will show the amount of kilobytes of memory these files occupy, the time and day they were last modified and the amount of unused storage space available on the disk/diskette.
- vii) **Debugging program:** These programs are usually written and provided by the manufacturers. They assist in program debugging. They usually trace the processing of the program being debugged.

21. Microsoft Diagnostics (MSD)

It is the software developed by the Microsoft, to assist in the diagnostics of 1990's era computers. The primary use of this tool was to provide information about the user's software and hardware and then print the gathered information, usually to be used by support technicians in resolving user troubleshooting.

22. What are language translators? Describe in brief each of the language translators

Language Translators: (May 2006 5M) A language translator or language processor is general term used for any assembler, compiler or other routine that accepts statements in one language and produces equivalent statements in another language. The language processor reads the source language statements one at a time and prepares a number of machine instructions to perform the operations specified or implied by each source statement.

Types of Language Translators: The three most widely used types of language translators are

- i) **Compiler:** A system software that translates the entire program into machine language before the program is executed. The program submitted for execution is called the **source program (or source module)**. The source program then translates the program into machine language, producing an **object program (or object module)**. After generating an object program, it is then linked with other subprograms of object module with the help of a program called **linkage editor**. The resultant program is called the **load program** which the computer actually executes.
- ii) **Interpreters (May 2008):** It is system software which translates program into machine language one line at a time as they are being run. Each statement is translated into machine language just before it is executed. Interpreter provides error message in case of any logical and syntactical error while converting source code to object code.
- iii) **Assemblers:** It is system software which is used to translate assembly language program to object code. A program written in assembly language consists of a series of instructions called mnemonics that correspond to a stream of executable instructions, when translated by an assembler, which can be loaded into memory and executed. A utility program called an assembler is used to translate assembly language statements into the target computer's machine code. The assembler performs a one-to-one mapping from mnemonic statements, in which a single statement generally results in many machine instructions.

23. Distinguish between a compiler and Interpreter (May 2004 4M, May 1997 5M, May 2009)

Compiler	Interpreter
1) A compiler translates the entire program into machine language before the program is executed.	An interpreter translates the program a line at a time as it is being run. Each statement is translated into machine language just before it is executed.
2) Programs can be executed more swiftly since they are translated before execution.	Program execution is slow as translation is done while executing.
3) Machine language programs can be saved on disk for future use.	Machine language programs are produced while executing, hence they cannot be saved.

4) It is hard to debug programs since the error messages are received only after complete compilation and it is difficult to locate errors from those messages.	Debugging programs is easier as interpreter stops on the line in which error is encountered. It can exactly show the statement which triggered the error.
5) It goes through compile, link-edit and execution stages which are time consuming.	Direct machine code is produced. Hence, they are usually easier and faster to use.
6) A compiler for a 3GL requires more storage space in primary memory.	An interpreter for a 3GL does not require much storage space in primary memory.
7) Compilers are basically utilized by mainframes	Interpreters are usually used by personal or small business computers.
8) A compiler forms a part of the system software which is stored on backing storage.	An interpreter is stored on a ROM chip; hence it is more firmware than software.

24. What is general purpose software and describe the types of general purpose software?

General Purpose Software: [Page no 1](#)

Types of General purpose software: There are basically three types of software commercial, shareware and open source software. Some software is also release into the public domain without licence.

- i) **Commercial:** Software comes pre-packaged and is available from software stores and through internet.
- ii) **Shareware:** (May 2009 1M) Shareware is a software developed by individual and small companies that cannot afford to market their software worldwide or by a company that wants to release a demonstration version of their commercial product. Shareware software is often is disabled in some way and has a notice attached to explain the legal requirements for using the product.
- iii) **Open source software:** It is software created by generous programmers and released into the public domain for public use. The company or the individual that develops the software retains ownership of the program but the software can be used freely. A copyright notice should remain with the software product. These software are generally developed and upgraded by those individuals and companies who believe in the Open source software

25. Word processor?

- i) A word processor (more formally a document preparation system) is a computer application used for the production (including composition, editing, formatting and possibly printing) of any sort of printable material.
- ii) Word processors are descended from early text formatting tools. Word processing was one of the earliest applications for the personal computer in office productivity.
- iii) Powerful versions of word processor consists of one or more programs that can produce any arbitrary combination of images, graphics and text, the latter handled with type-setting capability
- iv) Examples of word processor, Microsoft word is the most widely used word processing system. WordPerfect is one of the commercial word processing applications available in market. KWord and Open Office's Writer are few open source software that are gaining popularity

26. Text editor?

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27. Distinguish between Text editor and Word Processor (June 2009)

Text Editor: Text editors can edit plain text only without any formatting features. To change the line, the user must press ENTER key. They are good for short documents or email text bodies, HTML web pages and programs. They are designed to manipulate non-document instructions in computer programs or data. They lack the text formatting and document printing capabilities. The most common text editor is Notepad.

Word Processor: Word processors edit text and allow embedded formatting for words, paragraphs and whole documents. They also support word wrap, margins and different typefaces in the same document. They are specifically designed to prepare such document material as letters and reports. They offer document printing capabilities also. The most common word processor is MS-Word.

28. Distinguish between batch/offline processing and interactive/online/real time processing (May 1998 5M, May 1999 5M, May 2000 5M, Nov 2004 4M, Nov 2006 5M)

S No	Batch Processing/offline processing	Interactive/Online/ real time processing
1	In this type of processing transactions are accumulated in a batch and then submitted to the computer for processing	In this case, as soon as transaction occurs, it is entered into the computer for processing
2	There is time lag between the entry of transactions into the computer and reflections of their effect in data files	There is no time lag between entry of data and updating of related files
3	Response is not immediate and user has to wait	Response is immediate and user need not wait for the

	for a long time to get the results	results
4	Magnetic tape is used as a storage media which is cheapest storage media	Magnetic disk is used as storage media
5	Sequential file organization is used in this type of processing	Direct file organization is used in this processing
6	It requires simple programming, hence programming cost is less	It requires complex programming, hence programming cost is high
7	Record count, financial total, hash total and batch total are various terms related to Batch Processing	No such terms exist in this processing
8	Cost per transaction processing is less, hence this processing is cost efficient	Cost per transaction processing is high but results are obtained immediately; hence this processing is effective
9	Payroll system and accounting information system (AIS) are examples of Batch processing	Inventory control system, Banking system, Railway/Airlines Reservation system are examples of Interactive processing

29. Distinguish between online and real time processing (May 2000 5M, Nov 2004 4M, Nov 2007 4M)

Online Systems: Online processing refers to processing of individual transactions as they occur from their point of origin as opposed to accumulating them into batches. This is made possible by such direct access devices as Magnetic disk and number of terminals connected to, and controlled by a central processor. In this way, various departments in a company can be connected to the processor by cables. If operating companies are a number of miles away from the processor then they are linked by means of telegraph, telephone lines or even through satellite. This type of processing provides multi access to information files by terminal users and also enables them to update files with transactions data.

Real-time systems: The term real time refers to the technique of updating files with transaction data immediately after the event to which it relates occurs. Real-time systems are basically on-line systems with one specialty in inquiry processing. The response of the system to the inquiry itself is used to control the activity. An on-line production data collection system that simply accepts input and utilizes it for payroll and costing purposes cannot be termed real-time, but if, on the other hand, the system is designed to provide immediate information to monitor the production processes, it is a real-time system.

30. Shareware? (May 2009 1M)

Shareware is software developed by individual and small companies that cannot afford to market their software World-Wide or by a company that wants to release a demonstration version of its commercial product.

31. GUI? (May 2008 1M)

GUI stands for Graphical User Interface. It provides a user-friendly graphics oriented environment. Using GUI, the user can interact with operating system and other software packages by selecting options from menus that are temporarily super-imposed over whatever is currently on the screen. Mouse is used to position the graphics cursor over the appropriate icons. GUI has effectively eliminated the need for users to memorize and enter cumbersome commands.

32. Firmware (June 2009 1M)

Firmware or micro-programs refer to a series of special program instructions. These programs deal with very low-level machine operations and thus essentially substitute for additional hardware. They are held in the CPU in a special control storage device.

33. Voice synthesizer (May 2000 5M)

- It is a hardware device which is attached to the parallel port of the computer.
- It is used to convert text to voice
- It is an output device
- It is much helpful for blind persons who cannot see the text on VDU
- It is costly device

34. Need of Diagnostic Routine in System Software? (Nov 2004 1M, Nov 2008 4M)

Diagnostic Routines: It is system software which is a part of OS. These programs are usually written and provided by the computer manufactures. They assist in program debugging. They usually trace the processing of the program being debugged. MS Diagnostic program is one such program and it answers the query like:

- What type of processor the computer has?
- Is there a math coprocessor in the computer?
- Who is the BIOS manufacturer?
- What is the total amount of conventional memory in the computer?
- What type of key board is attached to the computer?
- What is the display type?
- What type of mouse is attached to the computer?

The diagnostic routines are however also often treated as a category of the utility or service program.

35. Boot Record? (May 2008 1M)

Boot record is a small program that runs when the computer system is switched on. It determines whether the disk has the basic components, which are necessary to run the operating system successfully. If it determines that the required files are present, it transfers the control to one of the operating system programs that continue the process of starting up. It also describes the disk characteristics such as number of sectors per track and number of bytes per sector.

36. Structured query language (SQL) (May 2006 Pe2 1M, May 2008 1M)

It refers to a set of commands for creating, updating and accessing data from a data base. It also aids the manager to make ad hoc queries from the database

37. Formatting? (May 2006 Pe2 1M)

The process of creating tracks and sectors on the storage media is called formatting. By this process, each location of the storage media is assigned a physical address for reading/writing the data.

38. Spread sheet program?

- i) A spreadsheet is a computer application that generally stimulates accounting and financial information on the worksheet.
- ii) It displays multiple cells that together mark up a grid consisting of rows and columns, each cell containing alphanumeric text, numeric values or formulas.
- iii) Spreadsheets are frequently used of financial information because of their ability to re-calculate the entire sheet automatically after a change to single cell is made.
- iv) **VisiCalc** is usually considered the first electronic spreadsheet used in Apple II computer, Lotus 1-2-3 was the leading spreadsheet when DOS was dominant operating system. Now Excel is the widely used spreadsheet program on Windows and Macintosh platforms.

39. Database Management system? (May 2007 1M)

A database management system (DBMS) is a system or software designed to manage a database, and run operations on the data requested by numerous clients. Typical examples of DBMS use include accounting, human resources and customer support systems. DBMS have more recently emerged as a fairly standard part of any company back office.

40. Internet Browser?

- i) An Internet Browser or a web browser is a software application that enables a user to display and interact with text, images and other information typically located on a web page at a website on the World Wide Web or a local network
- ii) Web browsers allows a user to quickly and easily access information provided on many web pages at many websites by traversing these links
- iii) Web browsers available for personal computer include Microsoft Internet Explorer, Mozilla Firefox, Apple Safari, Netscape and Opera.
- iv) Web browsers can also be used to access information provided by web servers in private networks or content in file systems.

41. Electronic Mail?

- i) Electronic mail abbreviated as email, is a method of composing, sending, storing, and receiving messages over electronic communication systems.
- ii) The term email applied both to the internet email system based on the Simple Mail Transfer Protocol (SMTP) and to intranet systems allowing users within one company to email each other.

42. Enterprise Resource planning system (ERPs)?

(Or)

“ERP can perform certain tasks of an organization in well-structured manner”. Describe in brief

Enterprise Resource Systems (ERPs):

- i) ERP integrates all data and processes of an organization into a single unified system. A typical ERP system will use multiple components of computer software and hardware to achieve the integration.
- ii) A key ingredient of most ERP systems is the use of single, unified database to store data for the various system modules.
- iii) The term ERP originally implied systems designed to plan the utilization of enterprise-wide resources. ERP systems typically attempt to cover all basic functions of an organization, regardless of the organizations business or charter.
- iv) Business, non-profit organizations, governments, and other large entities utilize ERP systems.

Benefits of an ERP system:

- i) A totally integrated system
- ii) Ability to streamline different processes and workflows
- iii) Ability to easily share data across various departments in an organization
- iv) Easy access and workflow
- v) All aspects of an organization can work in harmony instead of every single system needing to be compatible with each other. It increases productivity and efficiency at all levels of organization's activities
- vi) Better tracking and forecasting
- vii) Lower costs
- viii) Improved customer service

43. What are Decision Support Systems? Describe various characteristics of a DSS? (Nov 2009 5M)

Decision Support System: Decision support system (DSS) is a specific class of computerized information system that supports business and organizational decision-making activities. A properly designed DSS is an interactive software-based system intended to help decision maker to compile useful information from raw data, documents, personal knowledge, and/or business models to identify and solve problems and make decisions. A DSS may present information graphically and may include an expert system or artificial intelligence. DSS have also achieved broad use in accounting and auditing today.

Characteristics of DSS are mentioned below:

- i) DSS support management decision making: These enhance decision quality. While the system might not point to a particular decision, it is the user who ultimately makes the final choice.
- ii) DSS solve relatively unstructured programs: The unstructured problems with lesser well-defined questions do not have easy solution procedures and therefore need some managerial judgement. Such problems can be handled and addressed with the help of appropriate DSS.
- iii) DSS are friendly computer interface: A friendly computer interface is also a characteristic of DSS. As the managers and other decision makers using DSS are not necessarily good programmers, such systems must be easy to use. The communication between the user and the DSS is made easy through nonprocedural modelling language.
- iv) DSS should quickly respond to the changing needs of the decision makers: As managers have to plan for future activities, they rely heavily on assumptions. Any DSS should address the decision making for a variety of assumptions. A key characteristic of many systems is that it allows users to ask what-if questions and examine the results of these questions.

44. What is Decision Support System (DSS)? Explain its various components? (May 2006 5M, Nov 2007 4M, Nov 2008 5M)

Decision Support System: Refer Q.No. 29

Components of Decision Support System: A decision support system has four basic components, they are as below

- i) The users: The user of a Decision Support System (DSS) is a manager with an unstructured or semi structured problem to solve. In fact, user does not require a computer background to use a DSS for problem solving. He must have thorough understanding of the problem and the factors to be considered in finding a solution.
- ii) Database: DSS includes one or more databases. These databases contain both routine and non-routine data from both internal and external sources. The data from external sources include data about economic condition, market demand for goods and services and industry competition, whereas internal data includes data from the financial and managerial accounting system, marketing, production and personnel department.
- iii) Planning language: Two types of planning languages are commonly used in DSS.
 - a) General Purpose: These languages allow user to perform many routine tasks viz., retrieving various data from a database or performing statistical analysis, budgeting, forecasting and worksheet oriented problem. The languages used in most of the spread sheets are the good examples
 - b) Special purpose: Special purpose planning languages are statistical languages viz., SAS SPSS and Mini Tab. These languages perform statistical and mathematical operations.
- iv) Model Base: The model base is the brain of the decision support system because it performs data manipulation and computations with the data provided to it by the user and database. Model base is custom developed model that does some types of mathematical programming and financial computation. The analysis provided by the routines in the model base is the key to supporting the user's decision.

45. Explain the use of Decision Support system in Accounting?

Decision support system in Accounting: Decision Support System is widely used as part of an organization's AIS. Many are developed in-house using either a general type of decision support program or a spreadsheet program to solve specific problems. Below are several illustrations

- i) Cost Accounting System: The health care industry is well known for its cost complexity. Cost accounting applications help health care organizations calculate product costs for individual procedures or services. Decision support systems can accumulate these product costs to calculate total costs per patient.
- ii) Capital Budgeting system: Decision makers need to supplement analytical techniques, such as net present value and internal rate of return, with decision support tools that consider some benefits of new technology not captured in strict financial analysis. AutoMan is a decision support technology which allows decision makers to consider financial, non financial, quantitative and qualitative factors in their decision making processes.
- iii) Budget Variance Analysis System: Financial institutions rely heavily on their budgeting systems for controlling costs and evaluating managerial performance. Use of decision support system generates monthly variance reports for division comptroller's, it enables each comptroller to graph, view, analyze, and annotate budget variances, as well as create budget projections using the forecasting tools provided in the system. It also helps the controllers to create and control budgets for the cost-centre managers reporting to them.

46. Artificial Intelligence, types of artificial intelligence?

Artificial Intelligence (AI): "AI is the study and design of intelligent agents where an intelligent agent is a system that perceives its environment and takes actions that maximizes its chances of success. It is the science and engineering of making intelligent machines"

(AI) is software that tries to emulate aspects of human behaviour, such as reasoning, communicating, seeing and hearing. AI software can use its accumulated knowledge to reason and learn from experiences thereby modifies its subsequent reasoning.

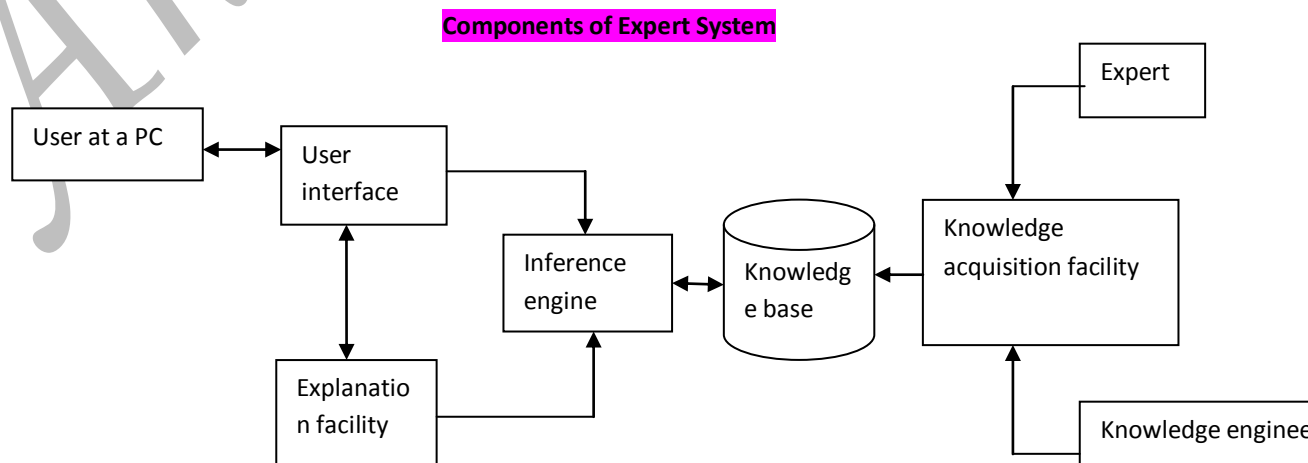
Types of AI: There are several types of AI including natural language, voice and visual recognition, robotics, neural networks, and expert systems. Natural language and voice & visual recognition both focus on enabling computers to interact more easily and naturally with users. Robotics focuses on teaching machines to replace human labour. Both neural networks and expert systems aim to improve decision-making.

47. Define an Expert system. Describe the components of an Expert System (May 2007 5M, June 2009)

Expert System: An expert system (ES) is a computerized information system that allows non-experts to make decisions comparable to those of an expert. Expert systems are used for complex or ill-structured tasks that require experience and specialized knowledge in narrow, specific subject areas.

Components of an Expert system are: (Shown in figure below)

- i) Knowledge base: This includes the data, knowledge, relationships, rules of thumb (heuristics), and decision rules used by experts to solve a particular type of problem.
- ii) Inference engine: This program contains the logic and reasoning mechanisms that simulate the expert logic process and deliver advice. It uses data obtained from both the knowledge base and the user to make associations and inferences, form its conclusions, and recommend a course of action.



- iii) User interface: This program allows the user to design, create, update, use, and communicate with the expert system.

- iv) Explanation Facility: This facility provides the user with an explanation of the logic the ES used to arrive at its conclusion.
- v) Knowledge acquisition facility: Building a knowledge base, referred to as knowledge engineering, involves both a human expert and a knowledge engineer. The knowledge engineer is responsible for extracting an individual's expertise and using the knowledge acquisition facility to enter it into the knowledge base.

48. Discuss the various advantages and disadvantages of Expert System?

Advantages offered by expert system are:

- i) They provide a cost effective alternative to human experts.
- ii) They can outperform a single expert because their knowledge is representative of numerous experts. They are faster and more consistent and do not get distracted, overworked or stressed out.
- iii) They produce better quality and more consistent decisions. Expert systems assist users in identifying potential decision making problems, which increases the probability that sound decisions will be made.
- iv) They can increase productivity
- v) They preserve the expertise of an expert leaving the organization

Disadvantages offered by expert system are:

- i) Development can be costly and time-consuming. Some large systems required up to 15 years and millions of dollars to develop
- ii) It can be difficult to obtain knowledge from experts who have difficulty specifying exactly how they make decisions
- iii) Designers have not been able to program what humans consider common sense into current systems. Consequently, rule-based systems break down when presented with situations they are not programmed to handle
- iv) Until recently developers encountered scepticism from business due to the poor quality of the early expert systems and the high expectations of the users.