Course Code : BCS-011

Course Title : Computer Basics and PC Software

Assignment Number : BCA (I)-011/Assignment/2012

Maximum Marks : 100

Last Date of Submission : 15th October, 2012/15th April, 2013
Note: This assignment has three questions of 80 marks (each section of a question carries same marks). Answer all the questions. Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation. Please give precise answers. The word limit for each part is 200 words.

Question 1: (Covers Block 1) (7×4=28 Marks)

a) What is a Microprocessor? In what generation of computer, the first microprocessor was developed. List the features of some of the latest Microprocessors for desktop computers and laptop computers

Solution : Fourth generation computers started around 1971 by using large scale of integration (LSI) in the construction of computing elements. LSI circuits built on a single silicon chip called microprocessors. A microprocessor contains all the circuits required to perform arithmetic, logic and control functions on a single chip. Because of microprocessors, the fourth generation includes more data processing capacity than equivalent-sized third generation computers.
Some of the latest Microprocessors for desktop computers and laptop computers as:

Processor class	Model	Category	CPU speed (GHz)	Maximum overclock speed (GHz)	GPU speed (MHz)
Core i7 series	Core i7-620M	Desktop replacement/gaming	2.66	3.33	500-766
	Core i7-640LM	Ultrathins	2.13	2.93	266-566
	Core i7-620LM		2.0	2.8	266-566
	Core i7-640UM	Ultraportables	1.2	2.26	166-500
	Core i7-620UM		1.06	2.13	166-500
Core i5	Core i5-540M	Mid-size machines	2.53	3.06	500-766
	Core i5-520M		2.4	2.93	500-766
	Core i5-430M		2.26	2.53	500-766
	Core i5-520UM	Ultrathins	1.06	1.86	166-500
Core i3	Core i3-350M	Budget laptops	2.26	Nil	500-667
	Core i3-330M		2.13	Nil	500-677

b) What are the different functional units in a computer? Explain the purpose of each Unit. Also explain the significance of the von Neumann Architecture.
Ans Different functional unit in a computer are

1. **Input:** This is the process of entering data and programs in to the computer system. Since computer is an electronic machine like any other machine which takes as inputs raw data and performs some processing giving out processed data, the input unit takes data from user to the computer in an organized manner for processing. Information and programs are entered into the computer through input devices such as the keyboard, disks, or through other computers via network connections or modems connected to the internet.

2. **Storage:** The process of saving data and instructions permanently is known as storage. Data has to be fed into the system before the actual processing starts. It is because the processing speed of Central Processing Unit (CPU) is so fast that the data has to be provided to CPU with the same speed. Therefore the data is first stored in the storage unit for faster access and processing. This storage unit or the primary

storage of the computer system is designed to do the above functionality. It provides space for storing data and instructions. The storage unit performs the following major functions:

(a) All data and instructions are stored here before and after processing.

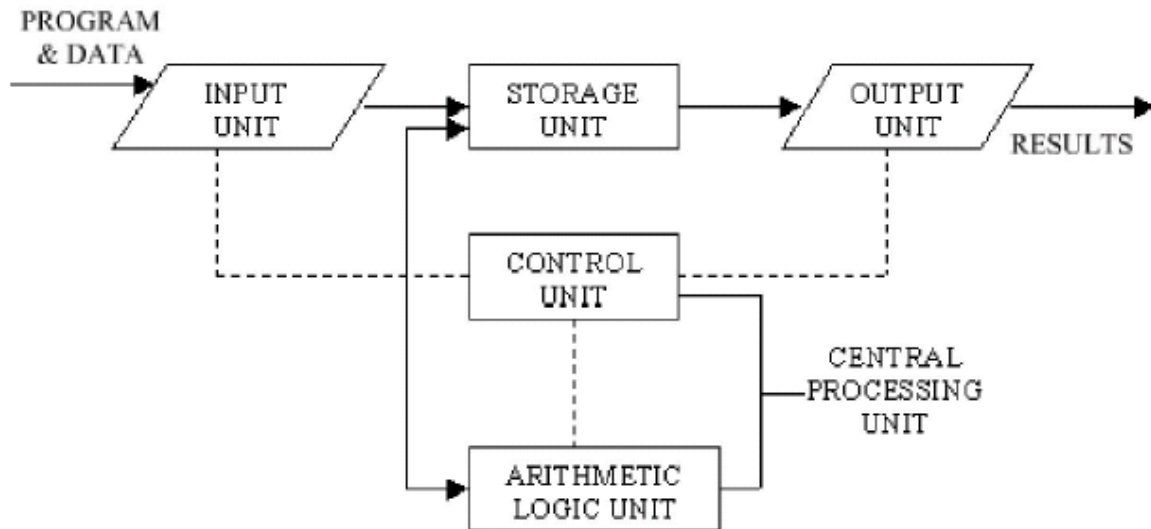**(b)** Intermediate results of processing are also stored here.

Figure 1.3 : Basic Computer Operations

3 Processing: The task of performing operations like arithmetic and logical operations is called processing. The CPU or central processing unit takes data and instructions from the storage unit and makes all sorts of calculations based on the instructions given and the type of data provided. It is then sent back to the storage unit. The coprocessor or the arithmetic-logic unit does arithmetic and logical operations. The RAM temporarily stores information

4 Output: This is the process of producing results from the data for getting useful information. Output devices display information on the screen (monitor) or the printer and sends information to other computers. They also display messages about what errors may have occurred and brings up message or dialog box asking for more information to be input. Again the output is also stored inside the computer for further processing.
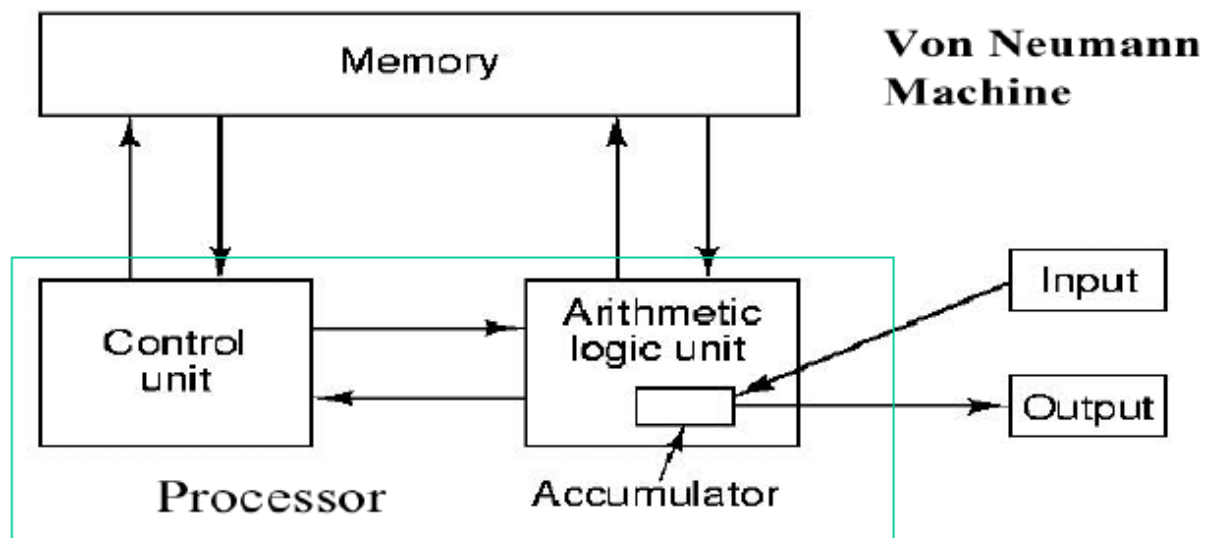
Von Neumann Architecture

Figure 1.7 : Von Neumann architecture

Mathematician John Von Neumann conceived a computer architecture which forms the core of nearly every computer system in use today. This architecture is known as Von Neumann architecture. It is a design model for the modern computers which has central processing unit (CPU) and the concept of memory used for storing both data and instructions. This model implements the stored program concept in which the data and the instructions both are stored in the memory. All computers share the same basic architecture which have memory, an I/O system, arithmetic logic unit (ALU) and control unit (CU).

c) Convert the following numbers as stated

(i) Decimal 36.25 to binary

(ii) Decimal 3999 to hexadecimal

(iii) Octal 567 to hexadecimal

(iv) Octal 667 to decimal

Ans (i)

Operation	Quotient	Remainder
36/2	18	0
18/2	9	0
9/2	4	1
4/2	2	0

| | 2/2 | 1 | 0 |

Thus (36)$_{10}$ = 00100

Operation	Resulting Integer part	Resulting Fraction part
.25*2	0	.50
.50*2	1	0

Thus (.25)10 = 01

Thus (36.25)10 = 00100.01

(ii) 0 1 2 3 4 5 6 7 8 9 A B C D E F

3999= F9F

(iii) 567 octal = 177 hexadecimal

(iV) 667 octal = 439 decimal

d) What is the role of primary and secondary memory in a computer? Why does a computer have memory hierarchy? Explain the memory hierarchy with the help of a diagram.

Ans Primary memory also called main memory is normally the Random Access Memory (RAM) of the computer. It is the memory that the Central Processing Unit (CPU) can access directly. All data and program instructions are stored and retrieved by the CPU from the primary memory in small block normally from 1 to 8 bytes at a time. The CPU cannot store or retrieve anything from the permanent storage locations such as hard drives, jump drives, diskettes, etc. Therefore data on permanent storage is retrieved from the storage device in large blocks, normally 512 to 65536 bytes at a time, and written to the primary memory where it is then used by the CPU. When it is time to save the data or programs from the primary memory to a permanent storage location it is written again in large blocks to the device. The Role of secondary storage is the long-term retention of data in a computer system. Unlike primary storage, or what we refer to as memory, secondary storage is non-volatile and not cleared when the computer is powered off and back on. Secondary storage is cheaper than primary storage but is also slower in both read and writes access. Primary storage is faster but doesn't store data persistently, instead loading data from the slower secondary storage into primary in order to make efficient use of it. Unlike primary storage, secondary storage also doesn't directly access the computer's CPU.

Memory is required to store the data or any information. but the usual computers have very less memory space in them. So to increase the performance of your computer and to access it on a faster rate we need memory hierarchy.
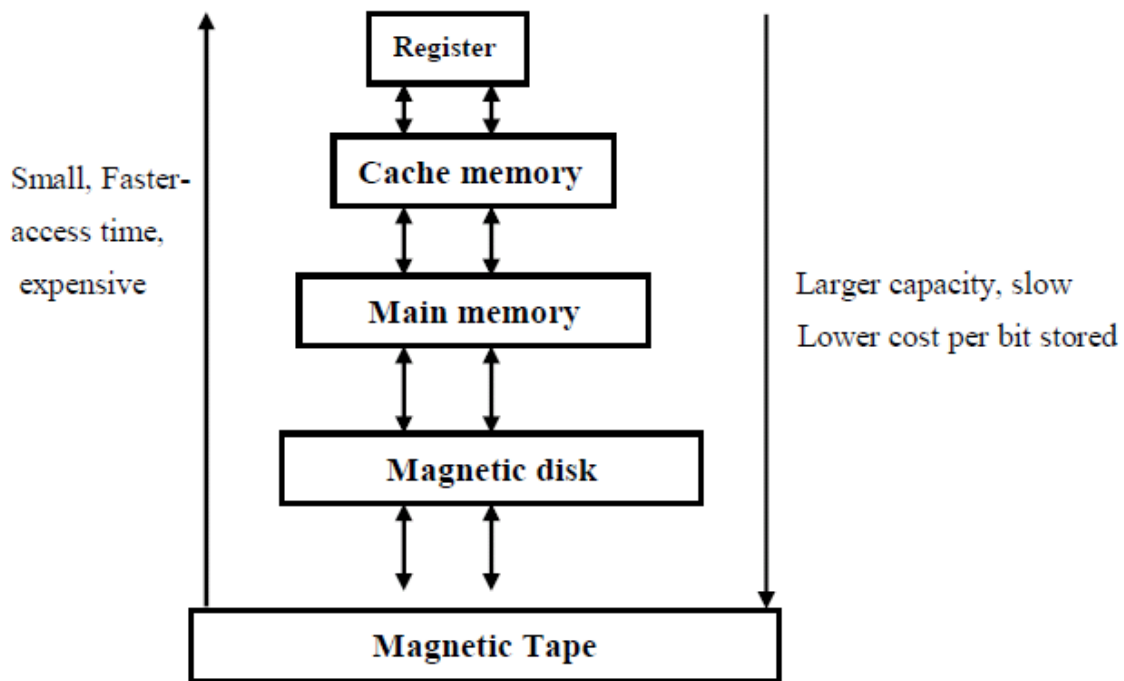
The Memory Hierarchy

A block diagram of storage hierarchy, as shown in Figure includes:

☐ CPU (register)

☐ Cache memory

☐ Main memory

☐ Secondary storage, and

☐ Mass storage

As we move up the storage hierarchy, we encountered memory elements having faster access time, less capacity and higher cost per bit stored. When we move down, we have a larger storage capacity, slower access time and lower cost per bit stored. Thus, CPU storage components generally have the fastest access time, the smallest storage capacity and the highest cost per bit stored. The cache memory which is placed in between the CPU and the main memory is a very high speed semiconductor memory used to enhance the speed of main memory. The main (primary) memory falls next in the memory hierarchy list. Secondary storage media such as hard-disk/magnetic disk memories make up the level of hierarchy just below the main memory. Secondary storage devices are at the bottom of the memory hierarchy. Secondary storage devices such as magnetic tapes are used for archival storage. They are very cost effective and so are used for mass storage of data, when fast access time is not required.

e) What are the different secondary storage devices for a computer system? Give their features, advantages and disadvantages. How is the access time defined for Magnetic disks? Explain with the help of an example.

Ans :The different secondary storage devices for a computer system as:

Medium	Capacity	Advantages	Disadvantages	Primary Uses	Storage mechanism
Hard Disk	Variable	Usually integrated into the PC • very robust	• Slower computer performance when disk is full	• To store data and files • To store software	Magnetic
Pen Drive	1 GB-256 GB	Portable Large storage capacity Smaller, faster and reliable	Most USB flash drives do not include a write-protect mechanism. Due to its small size they can easily be misplaced or lost.	• To store data and files. For transferring data and files between computers	
CD-ROM/ CD-R/CD-RW	650-700 MB	Portable & Medium storage capacity • Inexpensive • Some types (CD-RW) can be reused i.e. rewritable disk. • Can be used in certain models of DVD players	Some older computers cannot read CD-RW media • CD-R discs are 'write once', which means once data is copied to it, new or additional data cannot be added	To store files and software • To store archive material from hard disks • To store scanned files such as exam papers • To store applications from the Internet	Optical

DVD-ROM DVD±R DVD±R W	4.7GB to 8.5GB	• Large storage capacity • Some types (DVD±RW) can be reused or rewritable. • Can be used in certain models of DVD players.	• Not all computers can read DVD±R or DVD±RW disks. DVD±R discs are 'write once', which means once data is copied to it, new or additional data cannot be added	Same as.. CD-ROM/ CD-R/CD-RW	Optical
Magnetic tape	20GB to 2TB +	• Very Large storage capacity • Disks are durable, robust and rewriteable • Inexpensive	• Data cannot be accessed immediately • Requires tape drive and third party software • Tape drives for large capacity tapes can be very expensive	• To store files • Ideal for large scale daily and weekly backup operations, particularly for servers.	Magnetic

The process of accessing data involves three steps:

☐ Seek time: The time taken by read/write heads are positioned on the specific track number. Typical seek times of modern disks may range between 8 to 12 milliseconds.

☐ Latency time: The time taken by head to wait for the required. The average latency of modern disks ranges from 4.2 to 6.7 ms.

☐ Data transfer rate: The rate at which the data is read from or written to the disk is known as data transfer rate. It is measured in kilobits per second (kbps). Some of the latest hard disks have a data transfer rate of 66 MB per second.

The data transfer rate depends upon the rotational speed of the disk. If the disk has a rotational speed of 6000 rpm (rotations per minute), having 125 sectors and 512 bytes per sector, then the data transfer rate per revolution will be: 125 x 512×6000/60 = 6,4000,00 bytes /second or 6.4 MB/second. The combined time (seek time, latency, and data transfer time) is known as the access time of the magnetic disk. Specifically, it can be described as the period of time that elapses between a request for information from disk or memory, and the information arriving at the requesting device. RAM may have an access time of 80 nanoseconds or less, while hard disk access time could be 12-19 milliseconds.

f) List the features of the following:

(i) SCSI port
(ii) Touch Screens
(iii) Bar Code Reader
(iv) LED monitor

Ans(i) SCSI-Small Computer System Interface Port allows data to be transmitted in a daisy chain to up to 7 devices at a speed higher (32 bits at a time) than those possible with serial and parallel ports. It is a fast data transmitting device and is used to connect HDD, CD ROM drives and scanners with the computer system.

Ans (ii) Touch screens are monitors / electronic visual display screens which detect where they are being touched. The user makes selections by directly touching the screen, rather than moving a cursor to the point on
the screen with a mouse or joystick Now days touch screens are being used in ATM machines for making it user friendly and Kiosk machines are used for guiding the travelers about their travel plans. Touch screens are also used in many of the modern cell phones.

Ans (iii) A barcode reader is an electronic device which is used to read printed barcodes. Barcodes represent alphanumeric data which is a combination of vertical lines (bars) that vary in width and length. It is a fast and effective way to input data. A Barcode reader uses a laser beam to read the series of thick and thin lines which represent the bar code number.
The bar code is 13 digits long and it has four main divisions. The First two digits of a bar code represent the country, the second part represents the manufacturer's code (five digits) the third part represents the product code (five digits) and the last digit is a check digit.

Ans (iv) Light Emitting Diodes (LED) is the latest technology which is being used now a days for making high definition TV screens and monitors. It is a semi-conductor light source. In this technology diodes are used to light up the screen instead of liquid crystal Diodes. LED is known as light emitting diode. It is an electronic device that lights up when electricity is passed through it. LEDs are usually red. They are good for displaying images because they can be relatively small, and they do not burn out. However, they require more power than LCD monitors. LED is light weight monitors and is used in laptop computers and in TV. The Life of LED monitors is three times than that of LCD monitors and they have less warm up time than that of CRT or LCD monitors. These monitors require less space on the desk, less power consumption and have flicker free screen.

g) Explain the features of a Workstation and a tablet PC? What is the purpose of mother board on a computer?

Ans:

  A workstation is a high-performance computer which is used for scientific and technical tasks such as computer graphics, scientific simulation, computer-aided-design (CAD), image processing, engineering calculations etc. It is generally used in such applications which require a moderate amount of computing power. Hence, the configuration of workstation used to be high. UNIX and Windows NT are the most common Operating System for workstations. Workstations are generally single user system however

they can be connected together to form a LAN. In the context of networking, workstations are sometime referred to as any computer/terminal attached to a LAN. In networked workstation, system administrator tracks and controls the activities of the user. The term *workstation* is also used for high capacity mainframe computer terminal or a PC connected to a network and working in client server mode. Workstations have superior processing and storage capabilities than a normal PC, especially with respect to providing multitasking capability.

Tablet PC

A tablet PC is similar to a personal computer. It is a portable device which has a touch screen for inputting of the data. A tablet computer can connect to the internet and local computer network through wireless. In general terms, tablet PC refers to a slate shaped mobile computer device, equipped with global positioning system (GPS) System, and a touch screen to operate the computer. It is generally equipped with office suits such as word; excel etc, web browsers, computer games and other similar applications that generally can be run on a PC. Tablet PC can also use handwriting recognition and virtual keyboards for input of data. In, tablet PCs Microsoft windows; Linux and Apple operating system are used. There are many brands of Tablet PC available in Indian market and abroad including Acer, Lenovo, Panasonic, and Toshiba etc.

Motherboard holds some of the most important components of the computer system. It acts as a base for these components. It is also known as system board, main board etc. In a typical computer microprocessor, main memory and other components are connected to the motherboard. Motherboard also provides connectors for several other devices.

Some major components of a motherboard are:

 ATX Power Connector

 AGP Slot

 CD-in header

 PCI Slots

 USB Headers

Question 2: (Covers Block 2) (7×4=28 Marks)

a) Explain the concept of 3 tier client server architecture with the help of a diagram. How is this architecture different than that of N-Tier architecture? How can cloud computing be related to client server architecture.

Ans: Three-tiered architecture: A new generation of client/server implementation takes a step further and adds a middle tier in between client and server to achieve ―3-tier‖ architecture. The 3-tier architecture attempts to overcome some of the limitations of 2-tier schemes by separating presentation (user interface), processing (business functionality) and data into separate distinct entities. This leads to enhanced network

performance and improved extensibility of business systems. Still, it has been found that three-tier methodology lacks some critical features such as reusability (Ability of a computer program to be used repeatedly with little or no modifications in many different applications) of application logic code and scalability. There may arise a situation whereby a collection of application logic code cannot be reused and also they do not communicate with one another. Thus, there came a need for a viable architecture that mainly facilitates reusability of business logic as reusability phenomena has been found to reduce the cost of software development and the time to market and its quality is assured.
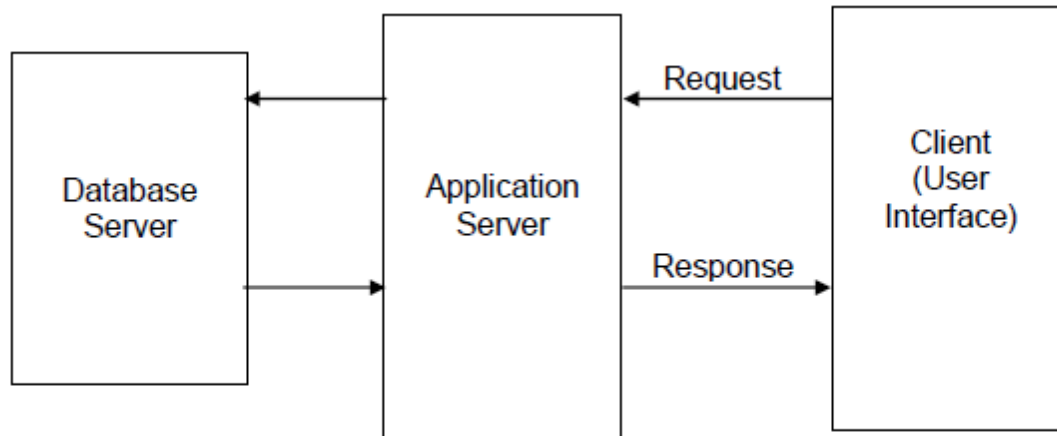
Three Tier Client Server Architecture

Software Evolution N-tiered architecture: The 3-tier architecture can be extended to N-tiers when the middle tier provides connections to various types of services, integrating and coupling them to the client, and to each other. Partitioning the application logic among various hosts can also create an N-tiered system. Encapsulation of distributed functionality in such a manner provides significant advantages such as reusability, and thus reliability (Ability of a computer program to perform its intended functions and operations for the specified period of time, in the specified system's environment, without experiencing any failure).
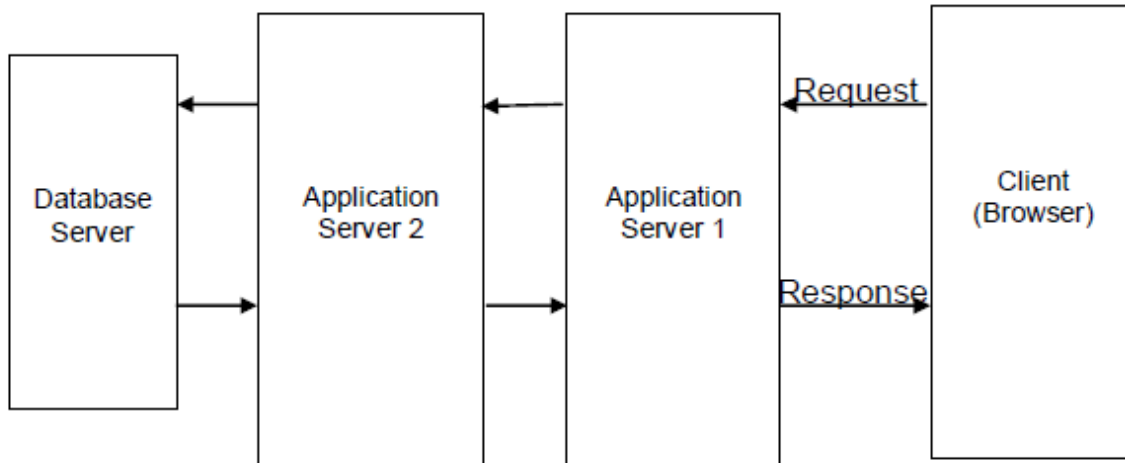
Database
N-Tiered Client Server Architecture

Cloud Computing As the technology has evolved from Mainframe-based large proprietary (Computer Programs that are exclusive property of their developers or publishers, and cannot be copied or distributed without complying with their licensing agreements) systems to Client-Server architecture based open systems to Open Source software based solutions, software vendor's business has also evolved over the period of time. Cloud-based software services typically mean that the consumer does not own the hardware and software, but still gets the desired service. It is an IT delivery model that offers large-scale, shared infrastructure and computing resources as a service through self-service pay-per use access. Although it leverages recently developed technology, cloud computing is a business, not a technical trend.

b) List the features of any two programming paradigms. How Object Oriented Programming Languages are different than Procedural Programming Languages?

Ans: Non-structured Design Paradigm
Non-structured programming is historically earliest programming paradigm. A non structured program usually consists of sequentially ordered statements, usually one in each line. The lines are usually numbered or labeled to allow the flow of execution to jump to any line in program. There is no concept of procedures in non structured program; hence there are no independent reusable units in this programming paradigm. The program flow in non-structured programming would be as follows:
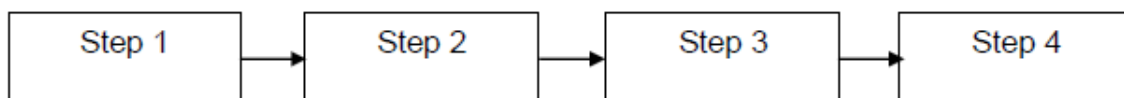

Program flow in Sequential Non Structured Programming

Example of code in non structured programming is:

```
        INTEGER i
        i=12
1       GOTO 10
2       CONTINUE
        i = i - 1
        IF (i = 0) GOTO 99
10      PRINT*, "Line 10"
        GOTO 2
99      CONTINUE
```

Structured and Modular Design Paradigm Structured design paradigm introduced the concept of selection and repetition of statements in code execution along with the line by line execution. It allowed writing of procedures and functions. These are the terms used for a block of code that is written to perform a single task. Procedures and functions were the beginning of compartmentalization and hence reusability of program code. Procedures and functions which were for similar purpose were grouped together to get a module. A big software application consisted of multiple modules, each performing a particular task.
Structural design allowed modules to be reused in the form of code libraries.
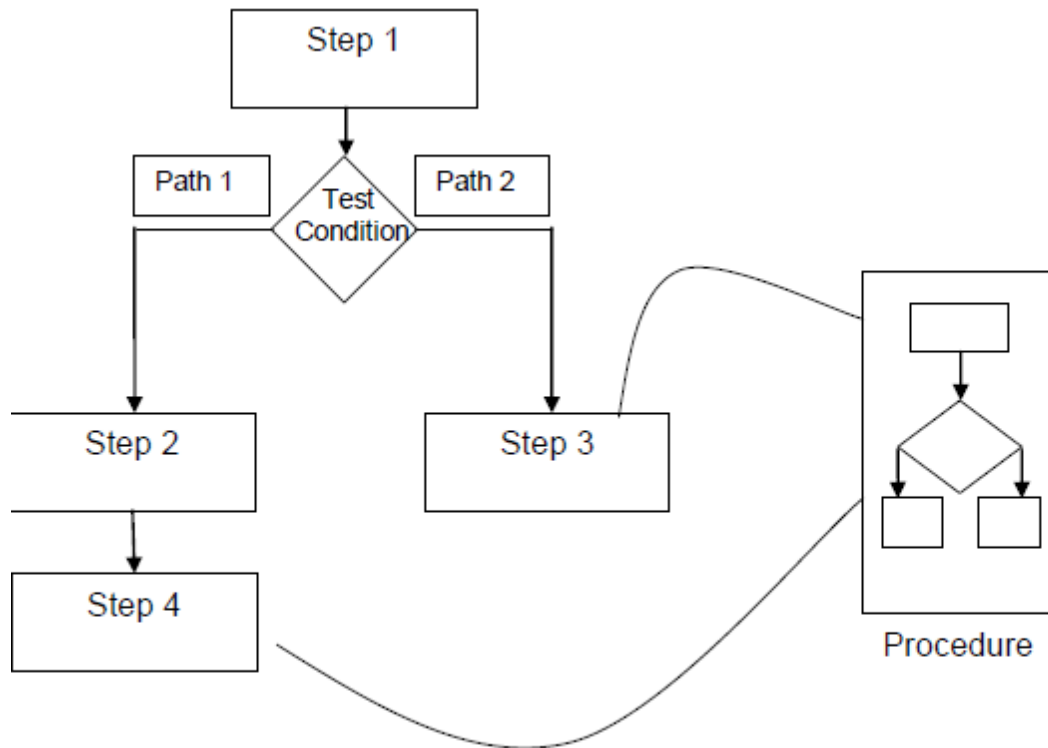
Structured Programming with Procedure

Object Orientation Languages (OOL) is concerned to develop an application based on real time while **Procedural Programing Languages** (PPL) are more concerned with the processing of procedures and functions.

In OOL, more emphasis is given on data rather than procedures, while the programs are divided into Objects and the data is encapsulated (Hidden) from the external environment, providing more security to data which is not applicable or rather possible in PPL. In PPL, its possible to expose Data and/or variables to the external entities which is STRICTLY restricted IN OOL.

In OOL, the Objects communicate with each other via Functions while there is no communication in PPL rather its simply a passing values to the Arguments to the Functions and / or procedures.

OOL follows Bottom Up Approach of Program Execution while in PPL its Top Down approach.

OOL concepts includes Inheritance, Encapsulation and Data Abstraction, Late Binding, Polymorphism, Multithreading, and Message Passing while PPL is simply a programming in a traditional way of calling functions and returning values.

Below is the list of OOL languages :- JAVA, VB.NET, C#.NET

Below is the list of PPL languages :- C, VB, Perl, Basic, FORTRAN.

c) Explain the features of software that are used for programming. Give at least one example for each type.

Ans: Programming Software

Programming software usually provides tools to assist a programmer in writing computer programs, and software using different programming languages in a more convenient way. It shields the application software programmer from the often complex details of the particular computer being used. Programming Software includes the following:

a) Compilers

A compile is a program that translates the code written in a high-level programming language (called the source code) to the code in lower level language (the object code). The compiler translates each source code instruction into a set of, rather than one object code instruction. Generally, the object code is the machine language code. When a compiler compiles a program, the source program does not get executed during the process, it only gets converted to the form that can be executed by the computer. Example, C is a lousy language to write a compiler.

Compiler

Source Code	Lexical Analyzer	Syntax Analyzer	Semantic Analyzer	Code Generator	Object Code

Compiler
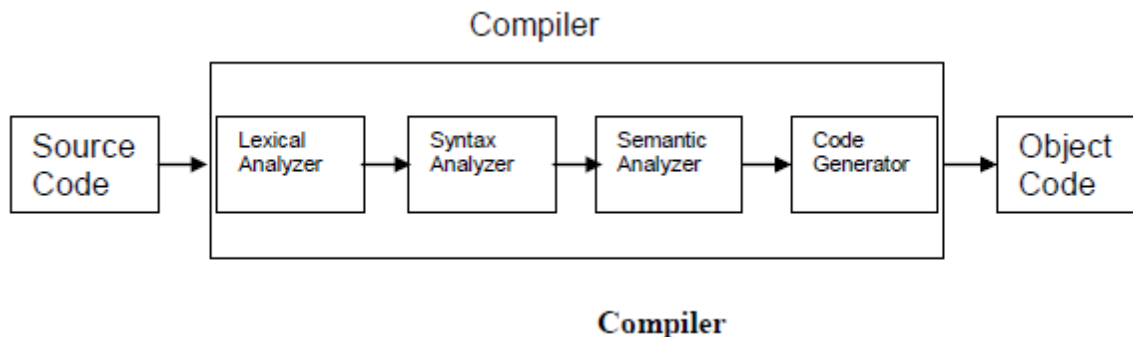
b) Debuggers
A debugger or debugging tool is a computer program that is used to test and debug other programs (the target program).
Typically, debuggers offer functions such as running a program step by step (single-stepping) or breaking (pausing the program to examine the current state) at some event or specified instruction by means of a breakpoint, and tracking the values of some variables. Some debuggers have the ability to modify the state of the program while it is running, rather than merely to observe it. It may also be possible to continue execution at a different location in the program to bypass a crash or logical error.

c) Interpreters Interpreter is another translation program. It takes the source code instruction, one at a time, translates and executes it. e.g Basic , Prolog, Perl are languages that are typically interpreted.

Interpreter
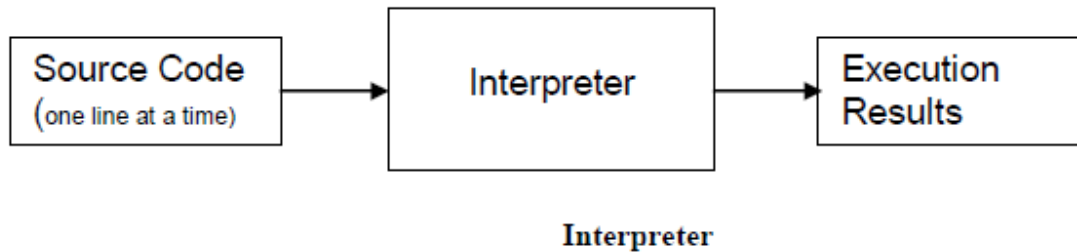
d) Text editors
A text editor is a type of program used for editing plain text files.
Many text editors for software developers include source code syntax highlighting and automatic completion to make programs easier to read and write. Common text editors in Windows environment are Notepad and Text pad.

d) What is the need of Operating System in a Computer? Explain the facilities provided by an operating system to its users. Also explain the services that are offered by the Operating System

Ans: An operating system is an essential software component of a computer system. The basic objectives of an operating system are to make the computer system convenient to use and to utilize computer hardware in an efficient manner. We can define an operating system as a large collection of software, which manages the resources of the computer system, such as **memory, processor, file system** and **input/output devices.** It keeps track of the status of each resource and decides which will have control over computer resources, for how long and when. In doing so, it provides two basic types of services:
1. It accepts requests from users and from the user's programs and executes their commands.

2. It optimally manages the hardware resources of the computer which may include CPU, main memory, hard disks, I/O devices, network interface card, etc.
The relationship between the various components of a computer system is shown schematically in Figure
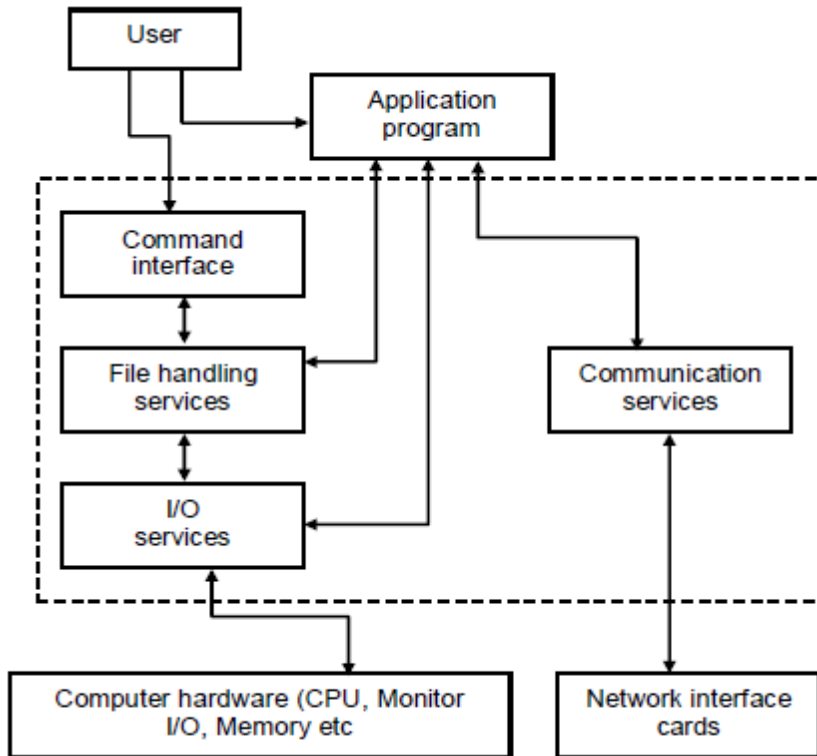
The **Operating System** of a computer is a large program which manages the overall operation of the computer system. On a simple one-user computer the Operating System will:

1. Provide an interface to allow the user to communicate with the computer. This interface may be a text-oriented interface where the user types commands in response to a prompt from the computer or may be a mouse-driven Windows operating system.

2. Control the various peripherals e.g. Keyboard, Video Display Unit (VDU), Printer etc. using special programs called Device Drivers.

3. Manage the user's files, keeping track of their positions on disk, updating them after user makes changes to them etc. An important facility that the Operating System must supply in this respect is an **Editor** which allows users to edit their files.

4. Provide system facilities, e.g. **Compilers** to translate from high-level programming languages used by the user to the internal machine language the computer uses

Following are the five services provided by an operating systems to the convenience of the users.

Program Execution
The purpose of a computer systems is to allow the user to execute programs. So the operating systems provides an environment where the user can conveniently run programs. The user does not have to worry about the memory allocation or multitasking or anything. These things are taken care of by the operating systems.

Running a program involves the allocating and deallocating memory, CPU scheduling in case of multiprocess. These functions cannot be given to the user-level programs. So user-level programs cannot help the user to run programs independently without the help from operating systems.

I/O Operations

Each program requires an input and produces output. This involves the use of I/O. The operating systems hides the user the details of underlying hardware for the I/O. All the user sees is that the I/O has been performed without any details. So the operating systems by providing I/O makes it convenient for the users to run programs.

For efficiently and protection users cannot control I/O so this service cannot be provided by user-level programs.

File System Manipulation

The output of a program may need to be written into new files or input taken from some files. The operating systems provides this service. The user does not have to worry about secondary storage management. User gives a command for reading or writing to a file and sees his her task accomplished. Thus operating systems makes it easier for user programs to accomplished their task. This service involves secondary storage management. The speed of I/O that depends on secondary storage management is critical to the speed of many programs and hence I think it is best relegated to the operating systems to manage it than giving individual users the control of it. It is not difficult for the user-level programs to provide these services but for above mentioned reasons it is best if this service s left with operating system.

Communications

There are instances where processes need to communicate with each other to exchange information. It may be between processes running on the same computer or running on the different computers. By providing this service the operating system relieves the user of the worry of passing messages between processes. In case where the messages need to be passed to processes on the other computers through a network it can be done by the user programs. The user program may be customized to the specifics of the hardware through which the message transits and provides the service interface to the operating system.

Error Detection

An error is one part of the system may cause malfunctioning of the complete system. To avoid such a situation the operating system constantly monitors the system for detecting the errors. This relieves the user of the worry of errors propagating to various part of the system and causing malfunctioning. This service cannot allowed to be handled by user programs because it involves monitoring and in cases altering area of memory or deallocation of memory for a faulty process. Or may be relinquishing the CPU of a process that goes into an infinite loop. These tasks are too critical to be handed over to the user programs. A user program if given these privileges can interfere with the correct (normal) operation of the operating systems.

e) What are the different elements of a Programming Language? Explain each with the help of an example.

Ans Elements of a programming language are:

(i) Variable

(ii) Constant

(iii) Data type

(iv) Array

(v) Expression

Variable: As referencing memory by its physical address is very tedious, variable names are used. A variable is a symbolic name given to a memory location. Once a variable is assigned to a memory location, the programmer can refer to that location by variable name instead of its address. Variable is the connection between a name and a value.

Constant: constants are identifiers that are used for values, which cannot be changed. In other words constants are symbols used to refer to quantities which do not change throughout the life of a program. No assignment can be done to a constant.

Data Type: Anything that is processed by a computer is called data. There are different types of data that can be given to the computer for processing. A data type is a classification identifying the typeof data. It determines the

☐ Possible values for that type,

☐ Operations that can be performed on values of that type,

☐ The way values of that type can be stored in memory,

Array: In programming, when large amount of related data needs to be processed and each data element is stored with different a variable name, it becomes very difficult to manage and manipulate. To deal with such situations, the concept of array is used. An array is a set of elements of same data type that can be individually referenced by an index. Usually these are placed in contiguous memory locations. Generally two types of array are used:

☐ One dimensional array

☐ Two dimensional array

☐

Expression : An expression is a combination of variables, constants and operators written according to the syntax of the programming language. In the C programming language every expression evaluates to a value i.e., every expression results in some value of a certain type that can be assigned to a variable. Every computer language specifies how operators are evaluated in a given expression. An expression may contain

☐ arithmetic operator:

• relational operator

□ logical operator

f) Explain the purpose and facilities provided by the following software:

(i) Project Management Software

(ii) Utility Software

(iii) Database System

(iv) Email Software

Ans (i) Project management software covers many types of software, including scheduling, cost control and budget management, resource allocation, Timesheet management, collaboration software, communication, quality management and documentation or administration systems. These are used to deal with the complexity of large projects. The different project management activities which can be performed using the Project Management Software are:

1. **Scheduling**

2. **Calculating critical path**

3. **Providing information**

4. **Timesheet Management**

(ii) Utility programs help manage, maintain and control computer resources. These programs are available to help you with the day-to-day chores associated with personal computing and to keep your system running at peak performance.
Some of utility programs are discussed below:

1. Anti-virus software Computer viruses are software programs that are deliberately designed to interfere with computer operation; record, corrupt, or delete data; or spread themselves to other computers and throughout the Internet. Virus Scanning Software are utility programs designed to protect your computer from computer viruses, worms and trojan horses

2. Backup utilities Backup refers to making copies of data so that these additional copies may be used to restore the original after a data loss event. All types of data could be backed up like pictures, word documents, files, executables or an entire database.

3. Diagnostic programs A diagnostic program is a program written for the purpose of locating problems with the software, hardware, or both, or a network of systems. A diagnostic program provides solutions to the user to solve issues.

4. File view programs File view utilities let you see the contents of a wide variety of documents even when you don't have the application on your system

5. **Computer performance enhancement utilities** A number of utilities are available to improve the overall performance of the computer system by letting you speed up your system or increase storage space. These utilities range from those that come packaged with the operating system or can be purchased separately.

(iii) **Database Software** can be used to store, maintain, manipulate and organize a large set of data. For example, it can be used to maintain address, phone number directory, client directory, etc. Oracle is an example of database software.

(Iv) Emailing software like MS Outlook , Outlook Express etc, not only provides emailing facility but also used for scheduling appointments, maintaining contacts, setting task reminders, sending attachments with emails etc.

Question 3: (Covers Block 3) (6×4=24 Marks)

(a) What are the different types of Guided and Unguided channels? Explain the characteristics of any one channel in each of the category. Also describe any two networking devices.

Ans The data transmission has to be done over a transmission channel or media. It can be classified as:

a) Guided Channels

b) Unguided Channels

Guided Media
Guided media provide a physical connection between two devices. A signal traveling through guided media is directed and contained within the physical limits of the medium. There are several different Guided media, however we define only the most popular as given below:

a) Twisted pair cable

b) Optic Fiber cable

Twisted pair cable
Twisted pair cable is still the most common transmission media. A twisted pair cable consists of two conductors which are normally made of copper. Each conductor has its own plastic insulation typically 1 mm thick. These cables are twisted together. The wires are twisted in a helical form, similar to a DNA molecule. Twisting is done to reduce crosstalk. Twisted Pairs (Figure 1.3) are very effective for relatively short distances (a few hundred feet), but can be used for up to a few kilometers. A twisted pair has a bandwidth to distance ratio of about 1 MHz per kilometer. The performance of the twisted pair can be substantially improved by adding a metallic shield around the wires. Shielded wires are much more resistant to thermal noise and crosstalk effects. Twisted pairs are used for long distance connections e.g. telephone lines which are usually organized as larger cable containing numerous twisted pairs.

Twisted pair cabling comes in several varieties, two of which are very important: Category 3 and Category 5. Category 5 has more twists per centimeter resulting in less crosstalk and a better quality signal

Unguided Media

Unguided media is used for transmitting the signal without any physical media. It transports electromagnetic waves and is often called wireless communication. Signals are broadcast through air and received by all who have devices to receive them. It can be categorized as follows:

a) Radio waves

b) Micro waves

c) Infrared

Infrared

Infrared signals range between 300 Giga-Hertz to 400 Tera-Hertz. These can be used for short range communication. High range infrared rays cannot be used for long range communication as it cannot penetrate walls. This also helps in avoiding interference. Infrared signals are generated and received using optical transceivers. Infrared systems represent a cheap alternative to most other methods, because there is no cabling involved and the necessary equipment is relatively cheap. Data rates similar to those of twisted pairs are easily possible. However, applications are limited because of distance limitations (of about one kilometer). One recent use of infra-red has been for interfacing hand-held and portable computing devices to Local Area Networks as shown in Figure 1.6. It cannot be used outside building as rays of sun contain infrared which leads to interference in communication. Infrared having wide bandwidth can be used to transmit digital data with a very high data rate. Infrared signals can be used for communication between keyboards, mouse and printers.

Two networking devices are:-

1. **Repeaters** When a signal travels a network cable (or any other medium of transmission), they lose strength, degrade and become distorted in a process that is called attenuation A repeater is a device that electrically amplifies the signal it receives and re-broadcasts it (Figure 1.17). They are used when the total length of your network cable exceeds the standards set for the type of cable being used. A good example of the use of repeaters would be in a local area network using a star topology with unshielded twisted-pair cabling. If a cable is long enough, the attenuation will finally make a signal unrecognizable by the receiver.
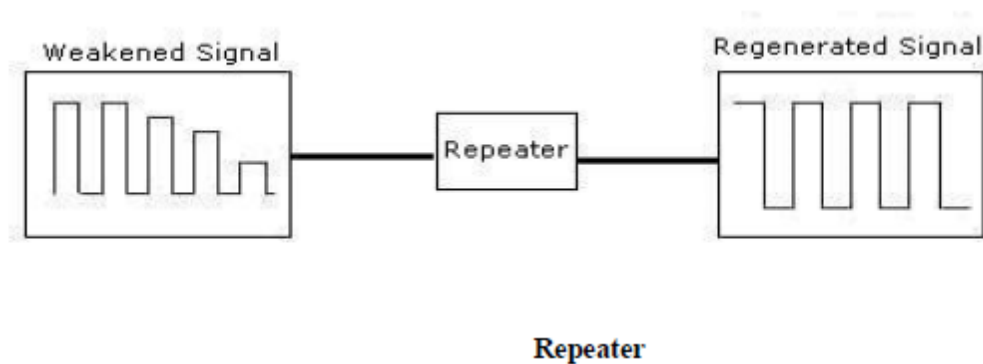
Repeater

2. **Bridge** Like a repeater, a bridge can join several LANs. However, a bridge can also divide a network to isolate traffic problems. For example, if the volume of traffic from one or two computers or a single department is flooding the network with data and slowing down entire operation, a bridge can isolate those computers or that department. A bridge (Figure 1.18) is used to connect two segment i.e., segment 1 (LAN 1) and segment 2 (LAN 2). Each segment can have several computer attached to it.

Bridge
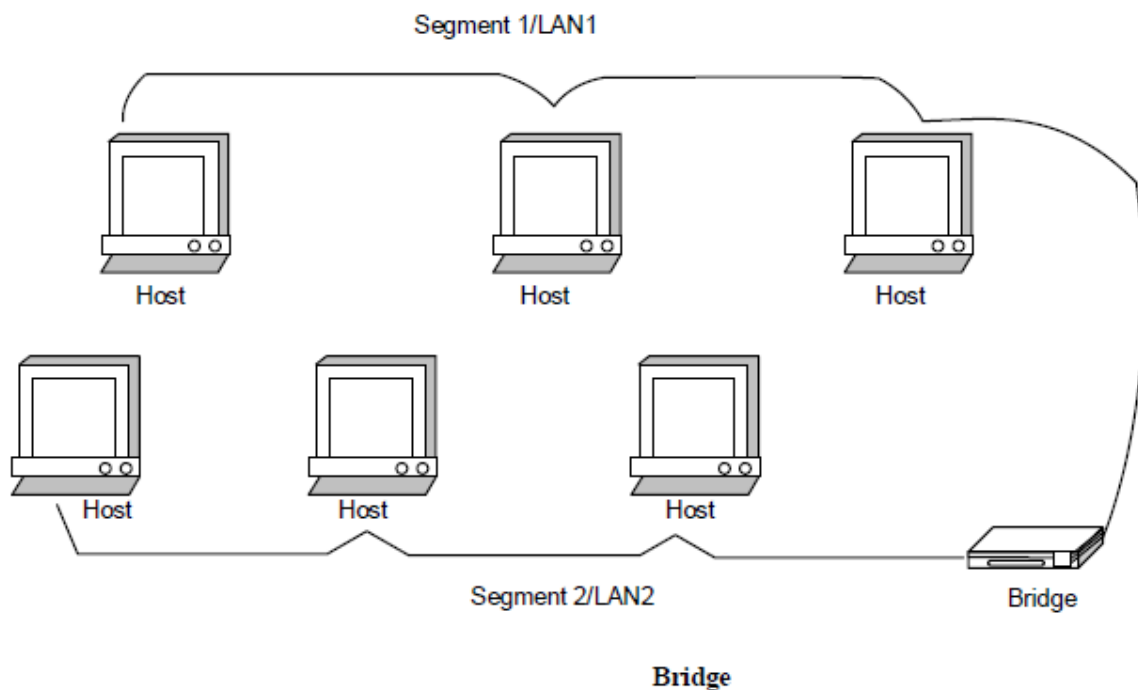
(b) You are asked to design a network for a Multi-national organization which has multiple offices around the world. Each office has a space of 500 meter square. What are the different types of networks (LAN, MAN, WAN) that you will suggest for the Organization? Give basic characteristics of these proposed networks.

Ans I will use LAN Network because LAN is generally limited to specific geographical area less than 2 Km., supporting high speed networks.

Characteristics of LAN

It connects computers in a single building, block or campus, i.e. they work in a restricted geographical area.

 LANs are private networks, not subject to tariffs or other regulatory controls. For the Wireless LANs there are additional regulations in several countries.

 LANs operate at relatively high speed when compared to the typical WAN (.2 to 100 MB /sec).

 There are different types of Media Access Control methods in a LAN, the prominent ones are Bus based Ethernet, Token ring.

Advantages of LAN

 It allows sharing of expensive resources such as Laser printers, software and mass storage devices among a number of computers.

 LAN allows for high-speed exchange of essential information.

 It contributes to increased productivity. A LAN installation should be studied closely in the context of its proposed contribution to the long range interest of the organization

(c) Define the terms URL, DNS, IP address and TCP/IP. Explain how they are related with each other with the help of an example. Also find the IP address and subnet mask for the computer you are using.

Ans A URL is a unique identifier for a resource on Internet. Abbreviation of **U**niform **R**esource **L**ocator (URL) it is the global address of documents and other resources on the World Wide Web.

The first part of the URL is called a *protocol identifier* and it indicates what protocol to use, and the second part is called a *resource name* and it specifies the IP address or the domain name where the resource is located. The protocol identifier and the resource name are separated by a colon and two forward slashes.

Short for **D**omain **N**ame **S**ystem (or **S**ervice or **S**erver), an Internet service that translates *domain names* into IP addresses. Because domain names are alphabetic, they're easier to remember. The Internet however, is really based on IP addresses. Every time you use a domain name, therefore, a DNS service must translate the name into the corresponding IP address. For example, the domain name *www.example.com* might translate to *198.105.232.4*.

The DNS system is, in fact, its own network. If one DNS server doesn't know how to translate a particular domain name, it asks another one, and so on, until the correct IP address is returned

A stack of protocols called TCP/IP (Transmission Control Protocol/Internet Protocol) implements different rules to handle the data communication from source machine to destination machine. For sending a message from source machine to destination machine, TCP divides the message data into little data packets. It also adds special information e.g., the packet position, error correction code etc., to make sure that packets at the destination can be reassembled correctly and without any damage to data. The role of IP here is to put destination-addressing information on such packets. On Internet it is not necessary that all the
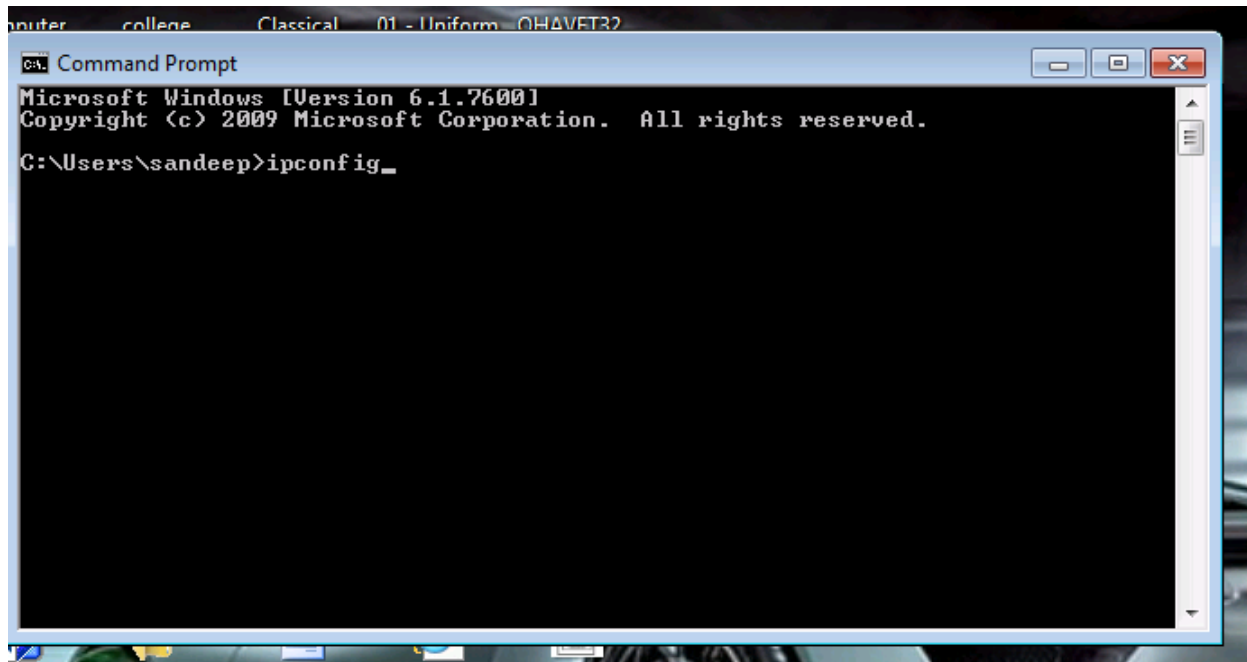
packets will follow the same path from source to destination A special machine called routers tries to, load balance various paths that exist on networks. Other special machine called gateways allows different electronic networks to talk to Internet that uses TCP/IP.

An IP address is an identifier for a computer or device on a TCP/IP network. Networks using the TCP/IP protocol route messages based on the IP address of the destination.

To find the IP address and subnet mask:-

Go to *Start > All Programs > Accessories > Command Prompt*.

In the Command Prompt window, type *ipconfig* and press *Enter*. This will bring up your IP address, DNS address, and other information about your internet connection.

Find your IP address among the information provided. It will be identified as "IP Address," "IPv4 Address," or something similar and is usually the second number provided.
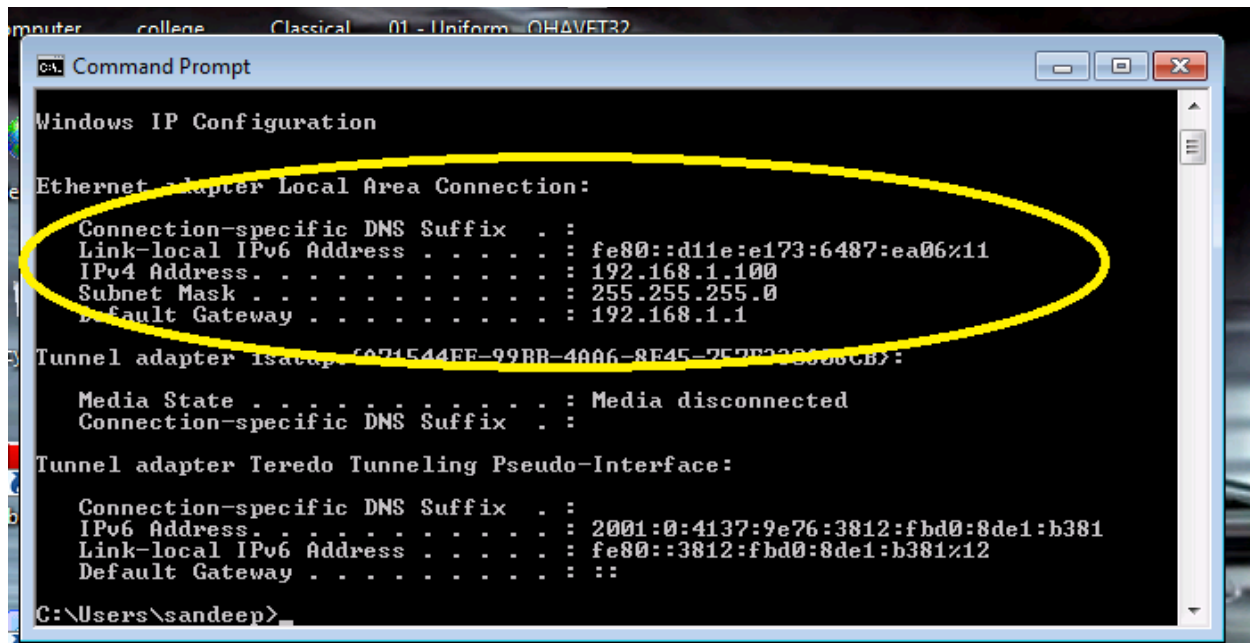
(d) What is the role of a Browser? How a browser does communicate with the web server? Explain with the help of an example. Explain the features supported by a good search engine.

Ans: A server contains the content of a website. A web browser is used by someone to connect to the server and retrieve a copy of the website from the server for viewing.

As stated earlier, a web browser is an application that allows you to interact with various web sites on the Internet. You can run a browser from your Windows Desktop.

When you type in the address of a web site, for example, *http://www.ignou.ac.in* in the address bar of your web browser, the web browser performs the following actions:

☐ Your web browser knows that you want to access a web site (http:// indicates that). But, where is this website? The web browser requests the nearest **Domain name system (DNS) server** to resolve the IP address of the intended web site *www.ignou.ac.in*

☐ The name server may take the help of other name servers in case it is not able to resolve the IP address, otherwise it will generate an error message.

☐ Assuming that there is an entry for the web site, the name server will return the resolved IP address of the Web server of the website *http://www.ignou.ac.in*

☐ The browser then requests TCP/IP protocol to establish a connection with the web server whose IP address has been resolved in the previous step and get the home page of the web site (generally named as index.html). In addition, to the HTML text file, the browser may also request download of the related image files, audio files, video files, XML files, Flash files, Java applets etc. with Hypertext Markup Language (HTML).

• A web browser then receives webpage and related files from the server then displays the webpage as desired.

When the desired webpage loads into your browser you will see the text comes in, the pictures arrives, the animation gets loaded and so on. You will notice that some text is underlined and in different colour — it is **hypertex**t, if you link multimedia elements like graphics, sound, and video then it is called **Hypermedia.** The contents of these links are hosted on some web server. These links are called **hyperlinks**. Usually, by clicking hyperlink you will move from one location to another location within the same document or in another document or some other website. This process of clicking hypertext links, loading one page after another, is called "**browsing**" or "**surfing the web**".

(e) What are the features supported by a E-learning system? Explain the features of MOODLE that can be used for learning. Can Wiki be used for learning? Justify your answer.

Ans E-learning is one of the most used terms on the Internet that describes any form of learning that is facilitated academically by the electronic means. Such means may be in the form of multimedia rich contents, web based lectures and web based tutorials or training programmes. In general, E-learning is strongly supported electronically by the administrative, academic and assessment processes. Some of the activities that may be done using such electronic form using web sites include providing multimedia based contents, providing assignments, conducting on line tests, lectures or discussions through web conferencing, feedback on students work, student progress report to faculty etc. Some of the major advantages of E-learning are:

☐ It allows creation and fast update of online contents.

☐ You may use the contents at your own pace and convenience.

☐ E-learning also provides a possibility of standardization of contents that can be changed much faster.

☐ It has the potential of providing new learning opportunities.

☐ It has the possibility of student's interaction.

☐ Flexibility of programme/course management such as student may choose courses of their choices.

☐ Allows creative development of new courses in specific areas.

☐ E-learning brings people together and allows sharing their experience and thoughts.

☐ You can do an e-learning programme from anywhere in a much easier way.

☐ It allows expanding boundaries and gain knowledge without having to leave home.

☐ Overall, in general e-learning allows saving of resources.

Some of the key requirements for a good e-learning system are:

☐ A successful e-learning system depends on good student interaction, self-motivation of individuals.

☐ A student has to study in an effective manner. This is essential as there is no teacher to motivate or drive the student

Modular Object-Oriented Dynamic Learning Environment (**MOODLE)**

MOODLE is a free and open-source e-learning software platform. It provides feature for Learners and content management. In the past decade, it has become very popular for the delivery of e-learning content and student management. You can get access to information related to Moodle for the website *http://www.moodle.org* (Please refer to Figure). Alternatively, you may download the Moodle software and create your own server having Moodle

To access the MOODLE and learn about it from the Moodle website, you may need to create an account. The process of creation of an account with Moodle is somewhat similar to what you do for creating any Internet based account like email account. The popularity of MOODLE may be attributed primarily to the fact that it is free and it allows dynamic content creation facilities. It has a number of tools available for managing a number of students online. In addition to content management, MOODLE provides a number of tools for building interaction among the learning community. Thus, allowing collaboration and peer to peer learning in the learning communities. The best way to learn MOODLE is read tutorial on MOODLE from the MOODLE website. The main content page for this website is shown in Figure .
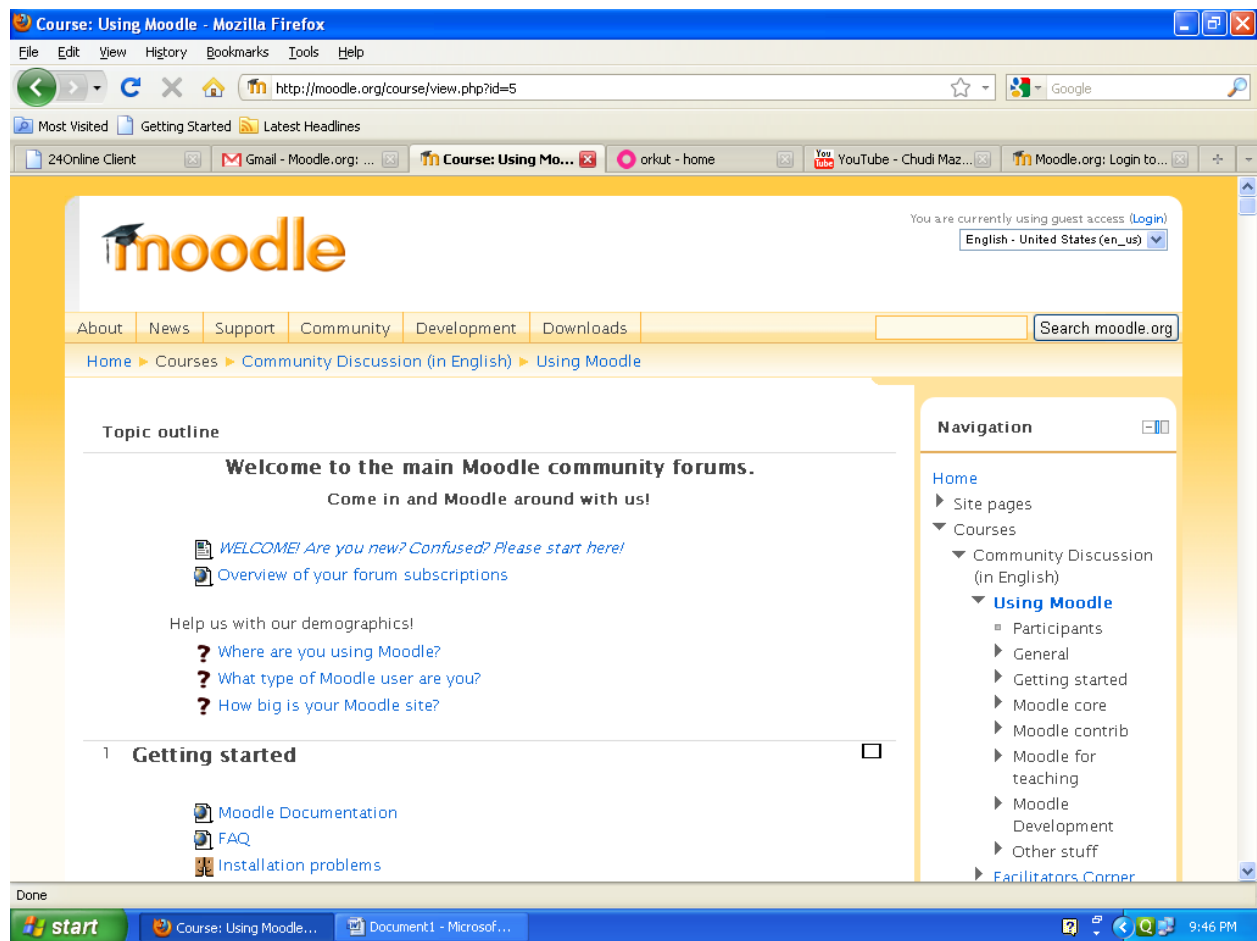
Finally, please note that these days there are several standards which have been developed for standardization of learning contents. MOODLE supports most of these standards.

(f) Explain the following terms in the context of Internet:

(i) Security threats on Internet

(ii) Blog

Ans (i) A security threat is a theoretical happening that may not occur but should be considered as part of your virtualization security architecture and design. For example, the threat always exists that your systems will become the target of a denial of service attack. A threat may or may not have a method to mitigate the possibility of attack. Within virtualization security is a constant threat of **information leakage** about the virtual environment. Information leakage is defined as the information an unprivileged user can see or access that the user should not be able to view or otherwise access. Information leakage could potentially lead to discovering otherwise classified or important information about the security, configuration, use, or any other information about the host in question. This information can also possibly be used to craft attacks specific to the host.

(ii) Blog is a website where entries are written as information or news on a particular subject. You may choose any subject for writing a blog like food, health, or information about IGNOU dates etc. A blog may combine text, images, or other media components; however, most blogs are textual. They may also provide links toother web pages or blogs. In addition, blog allows you to leave comments in an interactive format. Blogging is becoming increasingly popular among students as it allows you publish and keep record of your ideas over time. In addition, you may get some useful comments on your ideas may be from your teacher or your peer group or other people. A blog need not be restricted to a single author; it can merge different kinds of ideas, including fellow students, teachers, and subject specialists. An example: *http://edu.blogs.com*