Long Questions

1. Explain the CPU and its working principle.

The CPU is the heart of the entire computer system. It performs computations, executes instructions and transfer information to all the parts of a computer. The functions of the processor are listed below:

- It controls the main memory for storing intermediate data and instructions.
- It controls the sequence of operations.
- It gives commands to all parts of the computer system and hence controls all the components.
- It carries out processing i.e. computations on data.

Central Processing Unit (CPU) consists of main memory, control unit and arithmetic and logic unit. It performs operations on data input and returns the result to the output devices. The control unit fetches instructions from main storage, interprets them, and issues the necessary signals to the components. It controls all the hardware operations. The ALU performs all the arithmetic and logic operations. The main memory holds the program instructions for the program to be executed, the input date to be processed and the intermediate results of any processing. Ram is an example of Main memory.

An instruction is fetched from primary storage by the Control Unit; The Control Unit decodes the instruction; The ALU receives the data and the instruction and performs the calculation or comparison; the result is stored in primary storage which is sent to the proper output device.

Control Unit:

- Access program instructions
- Decode (interpret) instructions
- Control flow of data throughout system
- Data flows through paths called buses

Arithmetic-Logic Unit:

- Perform computations on data
- Perform comparisons on data

Registers:

- High speed storage areas
- Hold data and instructions

Primary Storage (Main Memory):

- Stores instructions from programs
- Stores data to be processed

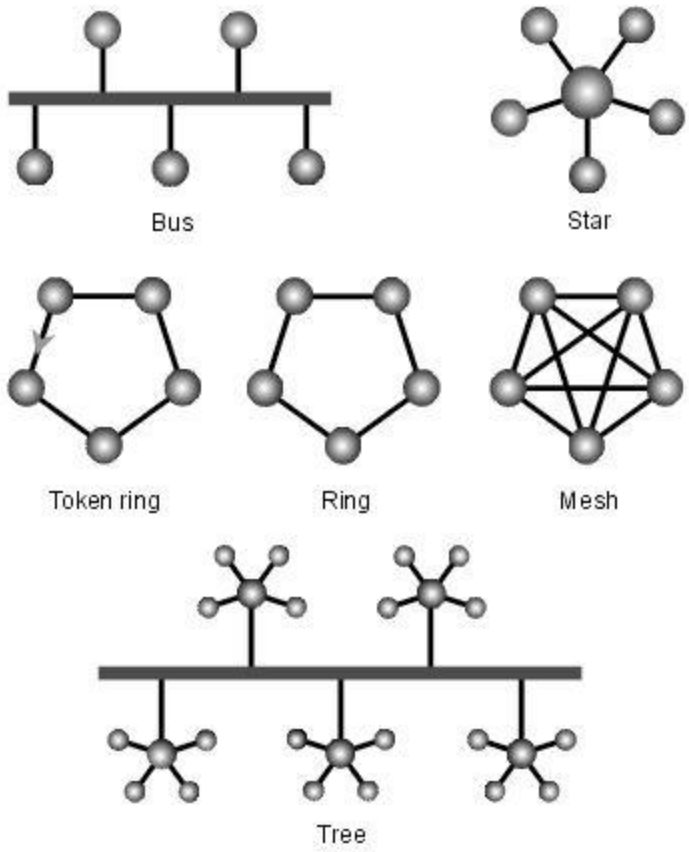
2. Explain how a distributed data processing system works.

Distributed data processing is a computer-networking method in which multiple computers across different locations share computer-processing capability. This is in contrast to a single, centralized server managing and providing processing capability to all connected systems. Computers that comprise the distributed data-processing network are located at different locations but interconnected by means of wireless or satellite links.

Single computers are limited in their performance and efficiency. An easy way to increase performance is by adding another computer to a network. Distributed data processing works on this principle and holds that a job gets done faster if multiple machines are handling it in parallel, or synchronously. Complicated statistical problems, for example, are broken into modules and allocated to different machines where they are processed simultaneously. This significantly reduces processing time and improves performance.

Individual computers that comprise a distributed network are present at different geographical locations. For example, an organizational-distributed network comprising of three computers can have each machine in a different branch. The three machines are interconnected via the Internet and are able to process data in parallel, even while at different locations. This makes distributed data-processing networks more flexible. The system is flexible also in terms of increasing or decreasing processing power. For example, adding more nodes or computers to the network increases processing power and overall system capability, while reducing computers from the network decreases processing power

3. Explain the network topology. What are the different types of network topologies?



In communication networks, a topology is a usually schematic description of the arrangement of a network, including its nodes and connecting lines. There are two ways of defining network geometry: the physical topology and the logical (or signal) topology.

The physical topology of a network is the actual geometric layout of workstations. There are several common physical topologies, as described below and as shown in the illustration.

In the bus network topology, every workstation is connected to a main cable called the bus. Therefore, in

effect, each workstation is directly connected to every other workstation in the network. In the star network topology, there is a central computer or server to which all the workstations are directly connected. Every workstation is indirectly connected to every other through the central computer. In the ring network topology, the workstations are connected in a closed loop configuration. Adjacent pairs of workstations are directly connected. Other pairs of workstations are indirectly connected, the data passing through one or more intermediate nodes. If a Token Ring protocol is used in a star or ring topology, the signal travels in only one direction, carried by a so-called token from node to node. The mesh network topology employs either of two schemes, called full mesh and partial mesh. In the full mesh topology, each workstation is connected directly to each of the others. In the partial mesh topology, some workstations are connected to all the others, and some are connected only to those other nodes with which they exchange the most data. The tree network topology uses two or more star networks connected together. The central computers of the star networks are connected to a main bus. Thus, a tree network is a bus network of star networks.

Logical (or signal) topology refers to the nature of the paths the signals follow from node to node. In many instances, the logical topology is the same as the physical topology. But this is not always the case. For example, some networks are physically laid out in a star configuration, but they operate logically as bus or ring networks.

Short Questions

4. What are the different kinds of output devices?

An output device is any piece of computer hardware equipment used to communicate the results of data processing carried out by an information processing system to the outside world. Outputs are the signals or data sent by the system to the outside. Examples of output devices:

- Monitor: CRT monitors, LCD monitors
- Printers: Impact printers (Dot-matrix Printer, Daisy-wheel Printer), Non-Impact printer (Ink-jet printer, Laser Printer, LCD and LED Printers)
- Plotter: Plotter is a device that draws pictures on paper based on commands from a computer. Plotters differ from printers in that they draw lines using a pen. In general, plotters are more expansive than printers.
- Sound Cards and Speakers.

5. What is application software?

Software is a collection of set of programs, which are used to execute all kinds of specific instruction. It consists of a number of machine instructions, array in a specific order to perform a particular task. Software is used to describe all the programs and its associated documents which run on a computer. Software means computer instructions or data. Anything that can be stored electronically is software. Firmware is software (programs or data) that has been permanently written onto read-only memory (ROM). All software falls into two general types or categories: System Software and Application Software. *Application software* includes database programs, word processors, and spreadsheets.

6. What is the advantage of graphical user interface (GUI)?

Today's software applications and products provide users with intuitive, graphical and easy-to-use interfaces. Now the users do not have to remember the cryptic system commands or shortcut keys that were a must in the character based era. Now almost any tasks can be accomplished by a mouse click. For example, in a DOS environment, to copy a file one needs to know the command for copying files, its exact syntax and so on, whereas in the Windows environment, you just have to drag the files you want to copy from the source to destination.

7. What do you mean by multitasking?

Multitasking is the ability to execute more than one task at the same time, a task being a program. The terms multitasking and multiprocessing are often used interchangeably, although multiprocessing implies that more than one CPU is involved. In multitasking, only one CPU is involved, but it switches from one program to another so quickly that it gives the appearance of executing all of the programs at the same time. There are two basic types of multitasking: *preemptive* and *cooperative.* In preemptive multitasking, the operating system parcels out CPU time slices to each program. In cooperative multitasking, each program can control the CPU for as long as it needs it. If a program is not using the CPU, however, it can allow another program to use it temporarily. OS/2, Windows 95, Windows NT, the Amiga operating system and UNIX use preemptive multitasking, whereas Microsoft Windows 3.x and the MultiFinder (for Macintosh computers) use cooperative multitasking.

8. Differentiate between compilers and interpreters.

Compiler is a program that translates source code into object code. The compiler takes the entire piece of source code and collects and recognizes the instructions. In contrast, the interpreter analyzes and executes each line of source code in succession, without looking at the entire program. The advantage of interpreters is that they can execute a program immediately but a compiler requires some time before an executable program emerges. However, programs produced by compilers run much faster than the same programs executed by an interpreter.

9. What do you mean by HTTP and how does it work?

HTTP, the Hypertext Transfer Protocol, is the application-level protocol that is used to transfer data on the Web. HTTP comprises the rules by which Web browsers and servers exchange information. Although most people think of HTTP only in the context of the World-Wide Web, it can be, and is, used for other purposes, such as distributed object management systems.

HTTP is a request-response protocol. For example, a Web browser initiates a request to a server, typically by opening a TCP/IP connection. The request itself comprises a request line, a set of request headers, and an entity. The server sends a response that comprises a status line, a set of response headers, and an entity. The entity in the request or response can be thought of simply as the payload, which may be binary data. The other items are readable ASCII characters. When the response has been completed, either the browser or the server may terminate the TCP/IP connection, or the browser can send another request.

10. What are the components of data warehouse?

The primary components of data warehouse are as follows:

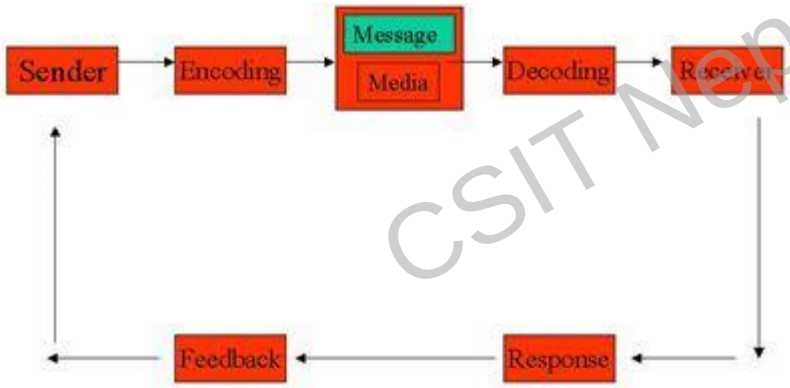
- *Data sources:* It refers to any electronic repository of information where data is passed from these systems to the data warehouse either on a transaction by transaction basis for real-time data warehouses or on a regular cycle.
- *Data transformation:* This layer receives data from the data sources, cleans and standardizes it, and loads it into the data repository.
- *Reporting:* The data in the data warehouse must be available to all the users if the data warehouse is to be useful.
- *Metadata:* Metadata or "data about data", is used to inform users of the data warehouse about its status and the information held within the data warehouse.
- *Operations:* Data warehouse operations comprises of the processes of loading, manipulating and extracting data from the data warehouse. Operations also cover user management, security, and capacity management.
- *Optional components:* In addition, the following components also exist in some data warehouses: dependent data marts, logical data marts, and operational data store.

11. Explain the different types of computer network.

Computer networks are of many different types such as Personal area network (PAN), Local area network (LAN), Metropolitan area network (MAN), Campus area network (CAN), Storage area network (SAN) and Wide area network (WAN). The computer networks which are designed for personal use are known as PAN. A PAN network is typically on an area of 20 to 30 feet. When we need the facility of network to be used on a really small commercial area or in small computer labs, we prefer LAN. LANs are capable of higher data transfer within small geographical area. LAN usually operates at a speed of Giga Bit. CAN is larger network than LAN. CAN is usually established in university campus to establish a connection among different computer labs, library, registration office and different academic units. MAN is usually a middle way to LAN and WAN. It is established by the various interconnections between WAN and LAN. MAN is spread over an area of around 5 to almost 50 km. MAN has many applications, it is most commonly used in banks, online reservation systems and in many military based services. If we make a complex network of many LANs we will end up making a wide area network. Wide area network is commonly known as internet. The applications and availability of internet can be now seen in every building of commercial or other nature.

12. Describe the communication process.

Communication is a process of exchanging verbal and non-verbal messages. It is a continuous process. Pre-requisite of communication is a message. This message must be conveyed through some medium to the recipient. It is essential that this



message must be understood by the recipient in same terms as intended by the sender. He must respond within a time frame. Thus, communication is a two way process and is incomplete without a feedback from the recipient to the sender on how well the message is understood by him.

13. What are the major disadvantages of distributed data processing?

The major disadvantages of distributed data processing are listed here below:

- Technical problems of connecting dissimilar machines
- Need for sophisticated communication systems
- Lack of professional support
- Data integrity and security problems
- Not all situations are suitable for distributed computing
- A lot of extra programming is required to set up a distributed system since distributed system will be connected through network and in case of network failure none of the systems will work.
- The information need to be passed between the networks. And it can be tracked and can be used for illegal purpose.