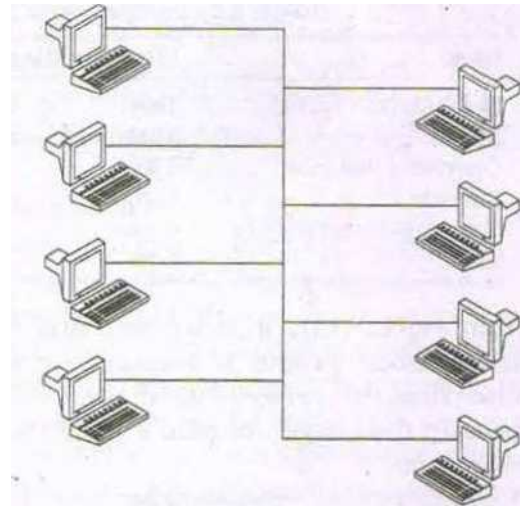## Computer Network

Network Topologies

Topology is the method in which networks are physically connected together. Topology determines the complexity of connecting computers and, therefore, the cost of network cable installation. Cable installation can often be a major cost factor for network systems. Topology also determines the strategy for physically expanding the network in future. There are following types of topologies.

- Bus
- Ring
- Star
- Tree
- Mesh

1. Bus Topology

In linear bus topology, all computers are connected by a single length of cable with a terminator at each end. The bus topology is the simplest and most widely used LAN design. It is a passive topology which means only one computer at a time can send a message. Hence, the number of computers attached to a bus network can significantly affect the speed of the network. A computer must wait until the bus is free before it can transmit. Each node is connected to two others except the machines at either end of the cable, which are connected only to one other node. Ethernet 10Base2 (also known as thin net) is an inexpensive network based on the bus topology.

The network operating system keeps track of a unique electronic address for each node, and also manages the flow of data based on this addressing scheme. This topology has the advantage of not requiring every computer to be up and running in order for the network to function. But because a single cable is dedicated to all the information traffic, performance can be slow at times. This topology is often found in client/server systems, where one of the machines on the network is designated as a file server, meaning that it is dedicated solely to the distribution of data files, and is not usually used for information processing.

Advantages of the Bus Topology

- Tire bus topology' is simple, reliable, easy to use and understand in small-sized LANs.
- The bus requires the least amount of cable to connect the computers together and is, therefore, less expensive than other cabling arrangements.
- It is easy to extend a bus. Two cables can be joined into one long cable with a connector, making a longer cable and allowing more computers to join the network.

Disadvantages of the Bus Topology

- Heavy network traffic can slow down a bus considerably. This is because any computer can transmit at any time, and computers on most bus networks do not coordinate with each other to reserve time slots to transmit. A bus network with many computers can spend a lot of its bandwidth (capacity for transmitting information)

with the computers interrupting each other instead of communicating. Tire problem only gets worse as more computers are added to the network.

- It is difficult to troubleshoot a bus. A cable break or malfunctioning computer anywhere between two computers can cause them not to be able to communicate with each other. Cable break or loose connector can also cause reflections and bring down the whole network, causing all network activity to stop.

2. Ring Topology

This layout is similar to the linear bus, except that the nodes are connected in a circle using cable segments. In this layout, each node is physically connected to only two other nodes. Each node passes information along to the next one, until it arrives at its intended destination. Since each computer re-transmits what it receives, a ring is an active network and is not subject to signal loss problems which a bus topology experiences. There is no termination because there is no end to the ring.

Computers connected in a ring or circular topology Performance on this type of topology is faster because each portion of the cabling system handles only the data flow between two machines. This type of topology can be found in peer-to-peer networks, in which each machine manages both information processing and the distribution of data files.

Fiber Distributed Data Interface (FDDI) is a fast fiber optic network based on the ring topology.
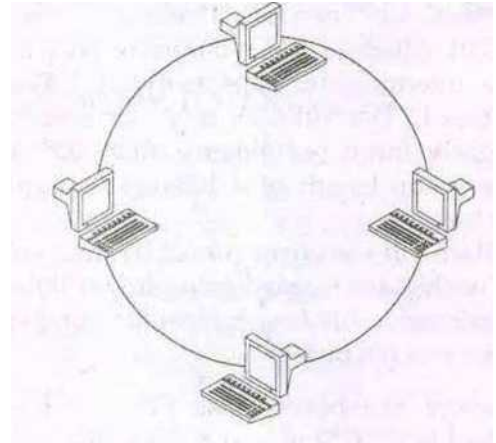
Advantages of Ring Topology

- Because every computer is given equal access to the token, no one computer can monopolize the network.
- The fair sharing of the network allows the network to degrade gracefully. It continues to function in a slower manner rather than fail entirely.

Disadvantages of Ring Topology

- Failure of one computer on the ring affects the whole network.
- It is difficult to troubleshoot a ring network.
- Adding or removing computers disrupt the network.

Exercise:
1: What is Bus topology?
2: Write the advantage and disadvantage of bus topology.
3: What is Ring topology?
4: Write the advantage and disadvantage of ring topology.