Computer Communication and Networks

(Lecture-02)

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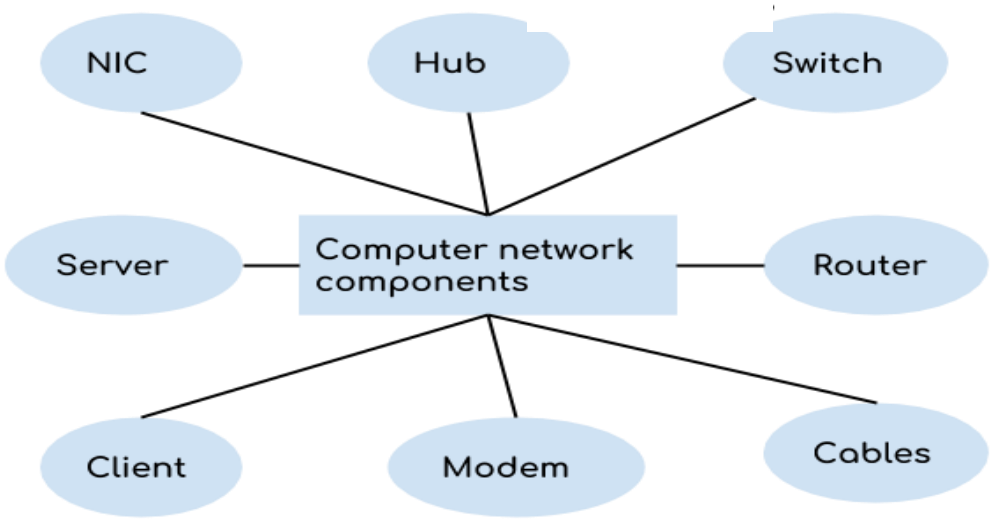
Computer Network Components

A computer network is build up from several components. These components together makes it possible to transfer data from one device to another and makes smooth communication between two different devices.

Basic components of a computer network



Server: Servers are computers that runs operating system and hold data that can be shared over a computer network.

Client: A client is a computer that is connected to other computers in the network and can receive data sent by other computers.

Transmission Media: All computers in a computer network are connected with each other through a transmission media such as wires, optical fiber cables, coaxial cables etc.

Network Interface card: Each system or computer in a computer network must have a card called network interface card (NIC). The main purpose of NIC is to format the data, send the data and receive the data at the receiving node.

Hub: Hub acts as a device that connects all the computer in a network to each other. Any request that comes from a client computer first received by Hub and then hub transmit this request over a network so that the correct server receives and respond to it.

Switch: Switch is similar to hub however instead of broadcasting a incoming data request it uses the physical device address in the incoming request to transfer the request to correct server computer.

Router: Router joins multiple computer networks to each other. For example let's say a company runs 100 computers over a local area network (LAN) and another company runs another LAN of 150 computers. These both LANs can be connected with each other through a internet connection which is provided by the router.

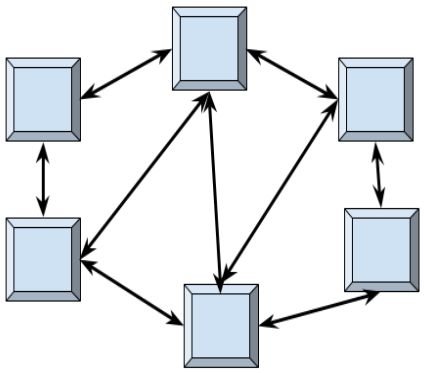
LAN cable: A wire that is used to connect more than one computers or other devices such as printers and scanner to each other.

What is Computer Network Architecture?

A Computer Architecture is a design in which all computers in a computer network are organized. A architecture defines how the computers should get connected to get the maximum advantages of a computer network such as better response time, security, scalability etc. The two most popular computer architectures are P2P (Peer to Peer) and Client-Server architecture.

Peer to Peer Architecture

In peer to peer architecture all the computers in a computer network are connected with every computer in the network. Every computer in the network use the same resources as other computers. There is no central computer that acts as a server rather all computers acts as a server for the data that is stored in them.



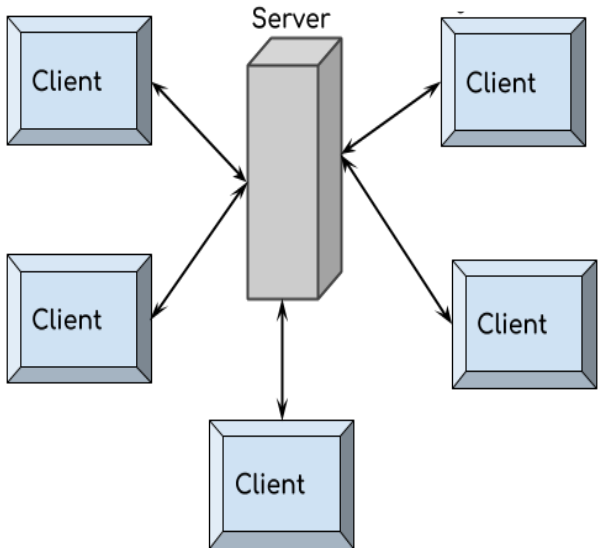
Advantages of a Peer to Peer Architecture

1. Less costly as there is no central server that has to take the backup.
2. In case of a computer failure all other computers in the network are not affected and they will continue to work as same as before the failure.
3. Installation of peer to peer architecture is quite easy as each computer manages itself.

Disadvantages of a Peer to Peer Architecture

1. Each computer has to take the backup rather than a central computer and the security measures are to be taken by all the computers separately.
2. Scalability is a issue in a peer to Peer Architecture as connecting each computer to every computer is a headache on a very large network.

Client Server Architecture



In Client Server architecture a central computer acts as a hub and serves all the requests from client computers. All the shared data is stored in the server computer which is shared with the client computer when a request is made by the client computer

All the communication takes place through the server computer, for example if a client computer wants to share the data with other client computer then it has to send the data to server first and then the server will send the data to other client.

Advantages of Client Server Architecture

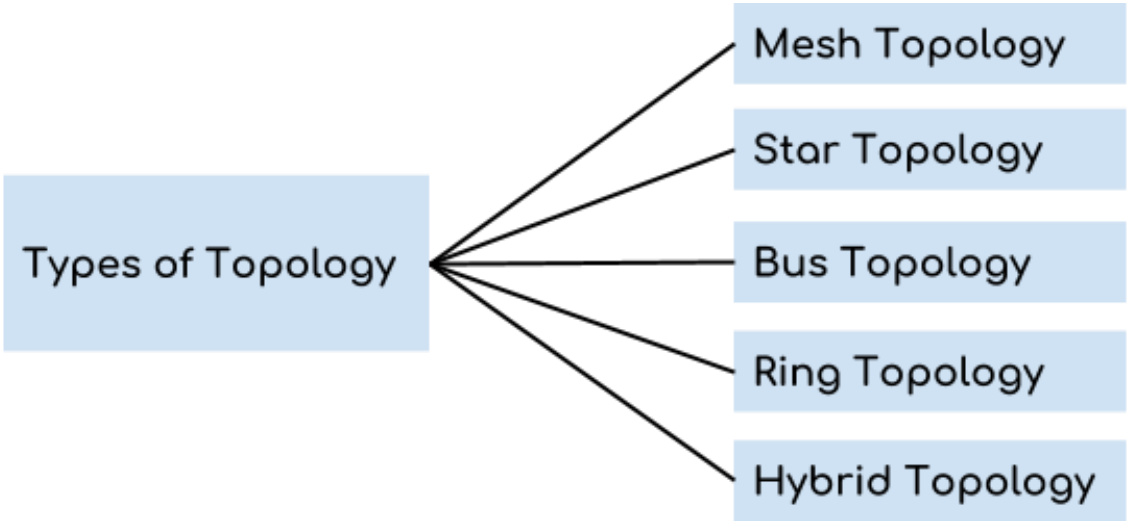
1. Data backup is easy and cost effective as there is no need to manage the backup on each computer.
2. Performance is better as the response time is greatly improves because the server is more powerful computer than the other computers in the network.
3. Security is better as unauthorized access are denied by server computer and all the data goes through the server.
4. Scalability is not an issue in this Architecture as large number of computers can be connected with server.

Disadvantages of Client Server Architecture

1. In case of server failure entire network is down.
2. Server maintenance cost is high as the server is the main component in this Architecture
3. Cost is high as the server needs more resources to handle that many client requests and to be able to hold large amount of data.

Computer Network Topology

Geometric representation of how the computers are connected to each other is known as topology. There are five types of topology – Mesh, Star, Bus, Ring and Hybrid.



Note: please search what is the difference between network architecture and network topology?

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