PART – 1

Client-server Architecture

In a client-server architecture, there is an always-on host, called the server, which services requests from many other hosts, called clients. An example is the Web application for which an always-on Web server services requests from browsers running on client hosts. When a Web server receives a request for an object from a client host, it responds by sending the requested object to the client host. Because the server has a fixed, well-known address, and because the server is always on, a client can always contact the server by sending a packet to the server's IP address. Some of the better-known applications with a client-server architecture include the Web, FTP, Telnet, and e-mail.

P2P Architecture

In a P2P architecture, there is minimal (or no) reliance on dedicated servers in data centers. Instead the application exploits direct communication between pairs of intermittently connected hosts, called peers. The peers are not owned by the service provider, but are instead desktops and laptops controlled by users, with most of the peers residing in homes, universities, and offices. Because the peers communicate without passing through a dedicated server, the architecture is called peer-to-peer. One of the most compelling features of P2P architectures is their self-scalability. P2P architectures are also cost effective, since they normally don't require significant server infrastructure and server band-width.

TCP Service

The TCP service model includes a connection-oriented service and a reliable data transfer service.

Connection-oriented service. TCP has the client and server exchange transport-layer control information with each other before the application-level messages begin to flow. This so-called handshaking procedure alerts the client and server, allowing them to prepare for an onslaught of packets. After the handshaking phase, a TCP connection is said to exist between the sockets of the two processes. The connection is a full-duplex connection in that the two processes can send messages to each other over the connection at the same time. When the application finishes sending messages, it must tear down the connection.

Reliable data transfer service. The communicating processes can rely on TCP to deliver all data sent without error and in the proper order. When one side of the application passes a stream of bytes into a socket, it can count on TCP to deliver the same stream of bytes to the receiving socket, with no missing or duplicate bytes.

TCP also includes a congestion-control mechanism, a service for the general welfare of the Internet rather than for the direct benefit of the communicating processes.

Physical Layer

The physical layer coordinates the functions required to carry a bit stream over a physical medium. It deals with the mechanical and electrical specifications of the interface and transmission media It also defines the procedures and functions that physical devices and interfaces have to perform for transmission to occur.

The physical layer is also concerned with the following:

- **Physical characteristics of interfaces and media**. The physical layer defines the characteristics of the interface between the devices and the transmission media.
- **Representation of bits**. The physical layer data consists of a stream of bits with no interpretation. To be transmitted, bits must be encoded into signals-electrical or optical. The physical layer defines the type of encoding.
- **Data rate**. The transmission rate the number of bits sent each second.
- **Synchronization of bits**. The sender and receiver must not only use the same bit rate but must also be synchronized at the bit level. In other words, the sender and the receiver clocks must be synchronized.
- **Line configuration**. The physical layer is concerned with the connection of devices to the media. In a point-to-point configuration, two devices are connected together through a dedicated link. In a multipoint configuration, a link is shared between several devices.
- **Physical topology**. The physical topology defines how devices are connected to make a network. Devices can be connected using a mesh topology, a star topology, a ring topology, or a bus topology.
- **Transmission mode**. The physical layer also defines the direction of transmission between two devices: simplex, half-duplex, or full-duplex. In the simplex mode, only one device can send; the other can only receive. The simplex mode is a one-way communication. In the half-duplex mode, two devices can send and receive, but not at the same time. In a full-duplex (or simply duplex) mode, two devices can send and receive at the same time.