



Viva College of Diploma Engineering & Technology

Approved By A.I.C.T.E.(New Delhi)& D.T.E. Maharashtra State Affiliated to MSBTE, Mumbai
At Bolinj, Virar(W), Taluka Vasai, District: Thane, Pin: 401303

**A
Micro Project
on
Network Architecture**

Submitted in partial fulfillment of the requirement for the award of

Diploma of Engineering

in

Computer Engineering

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24. Swarupa Golatkar
25. Riya Dhapale

under the guidance of

PRATIK GURAV

Department of Computer Engineering

2022-23

CERTIFICATE



VIVA COLLEGE OF DIPLOMA ENGINEERING & TECHNOLOGY

VIRAR (W)

2022-23

This is to certify that the micro project entitled "Network Architecture" has been submitted by under the guidance of Pratik Gurav in partial fulfillment of the requirement for the award of Diploma of Engineering in Computer Engineering from Maharashtra State Board of Technical Education.

“Network Architecture”

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Project Guide
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PART-A PLAN

1.0 Brief Introduction

Network architecture is the design of a computer network. It is a framework for the specification of a network's physical components and their functional organization and configuration, its operational principles and procedures, as well as communication protocols used.

In telecommunication, the specification of a network architecture may also include a detailed description of products and services delivered via a communications network, as well as detailed rate and billing structures under which services are compensated.

The network architecture of the Internet is predominantly expressed by its use of the Internet protocol suite, rather than a specific model for interconnecting networks or nodes in the network, or the usage of specific types of hardware links.

2.0 AIM of Micro-Project

- 1.** To Study the Network Architecture.
- 2.** How it Works.
- 3.** What are its applications.
- 4.** What are its advantages and disadvantages.

3.0 Action Plan

Sr. No	Details of Activity	Planned start Date	Planned Finish Date	Name of Responsible Team Members
1	Project Selection			Tanay Shinde, Priti Pawar, Amisha Patil, Swarupa Golatkar, Riya Dhapale
2	Identifying Project Outcomes			Tanay Shinde, Priti Pawar, Amisha Patil, Swarupa Golatkar, Riya Dhapale
3	Identifying Resources required			Tanay Shinde, Priti Pawar, Amisha Patil, Swarupa Golatkar, Riya Dhapale
4	Algorithm & implementation			Tanay Shinde, Priti Pawar, Amisha Patil, Swarupa Golatkar, Riya Dhapale
5	Final Outcome			Tanay Shinde, Priti Pawar, Amisha Patil, Swarupa Golatkar, Riya Dhapale
6	Documentation			Tanay Shinde, Priti Pawar, Amisha Patil, Swarupa Golatkar, Riya Dhapale
7	Seminar and viva-vose			Tanay Shinde, Priti Pawar, Amisha Patil, Swarupa Golatkar, Riya Dhapale
8	Final submission of Microproject			Tanay Shinde, Priti Pawar, Amisha Patil, Swarupa Golatkar, Riya Dhapale

4.0 Resources Required

Sr. No	Name of Resource	Specification	Remarks
1	Computer system	11th Gen Intel(R) Core (TM) i5- 1155G7 @ 2.50GHz 2.50 GHz RAM:16GB	

PART-B OUTCOME

1.0 Brief Description

Computer Network are usually developed to fulfil needs of their clients and users. Network architecture generally refers to design of computer network or communications network. It simply describes allocation task between all of computers in network. It is simply way in which all network devices and services are organized and managed to connect clients like laptops, tablets, servers, etc. and also how tasks are allocated to computer. It also facilitates system-level functionality even robustness, extensibility, and evolvability.

It is basically defined and described as physical and logical design of software, hardware, protocols, and media of data transmission.

Network architecture is classified into two categories :

Peer-To-Peer network

Peer-To-Peer network is a network in which all the computers are linked together with equal privilege and responsibilities for processing the data. Peer-To-Peer network is useful for small environments, usually up to 10 computers. Peer-To-Peer network has no dedicated server. Special permissions are assigned to each computer for sharing the resources, but this can lead to a problem if the computer with the resource is down.

Client/Server Network

Client/Server network is a network model designed for the end users called clients, to access the resources such as songs, video, etc. from a central computer known as Server. The central controller is known as a server while all other computers in the network are called clients. A server performs all the major operations such as security and network management. A server is responsible for managing all the resources such as files, directories, printer, etc. All the clients communicate with each other through a server. For example, if client1 wants to send some data to client 2, then it first sends the request to the server for the permission. The server sends the response to the client 1 to initiate its communication with the client 2.

2.0 AIM of Micro-Project

1. To Study the Network Architecture.
2. How it Works.
3. What are its applications.
4. What are its advantages and disadvantages.

3.0 Course Outcomes (CO)

- a. Analyze the functioning of data communication and computer networks
- b. Select relevant transmission medium and switches techniques as per need
- c. Configure various networking devices

4.0 Actual Procedure Followed

Network architecture

- We studied the Bluetooth architecture by noting down how it Works.
- We studied the applications and devices used for Bluetooth transmission.
- After studying all these details we collected the necessary information.
- Then formulated the contents according to the format required.

5.0 Resources Used

Sr. No	Name of Resource	Specification	Remarks
1	Computer system	11th Gen Intel(R) Core (TM) i5 - 1135G7 @ 2.40GHz 2.42 GHz RAM:08GB	

6.0 Outputs of Micro-Projects

Network architecture refers to a network's structural and logical layout. It describes how the network devices are connected and the rules that govern data transfer between them. There are many ways to approach network architecture design, which depend on the purpose and size of the network. Wide area networks (WAN), for example, refer to a group of interconnected networks often spanning large distances. Its network architecture will be vastly different from that of a local area network (LAN) of a smaller office branch.

Network architecture can also facilitate security, becoming increasingly important as more user devices connect to the network. The design and protocols of the network need to support quick and efficient user recognition and authorization. Most network architectures adopt the Open Systems Interconnection Model or OSI. This conceptual model separates the network tasks into seven logical layers, from lowest to highest abstraction. The Physical layer, for instance, deals with the wire and cable connections of the network. The highest layer, the Application layer, involves APIs that deal with application-specific functions like chat and file sharing. The OSI model makes it easier to troubleshoot the network by isolating problem areas from each other.

OSI Model:

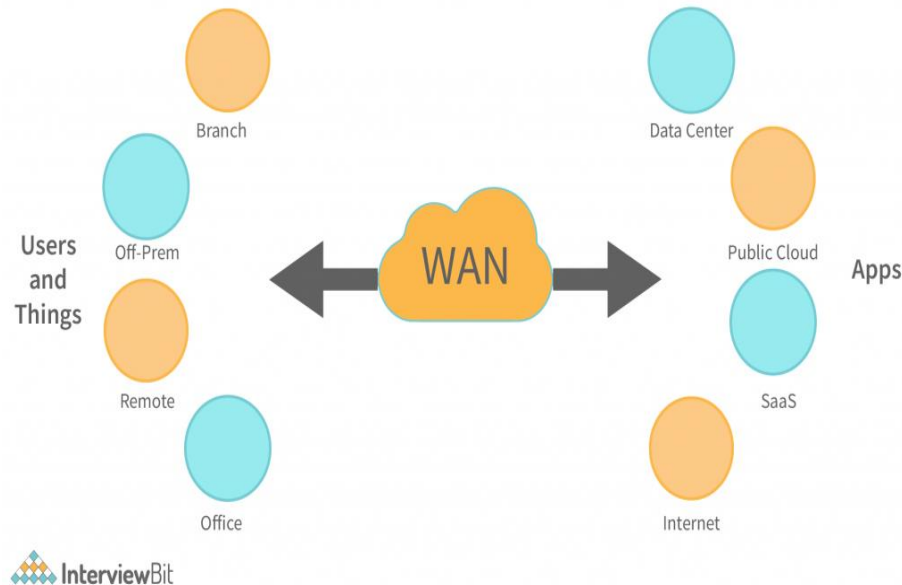
The Open Systems Interconnection model (OSI model) defines and codifies the concept of layered network architecture. Abstraction layers are used to subdivide a communications system further into smaller manageable parts. A layer is a collection of similar functions that provide services to the layer above it and receives services from the layer below it. On each layer, an instance provides services to the instances at the layer above and requests services from the layer below.

7 Layers of OSI Model:

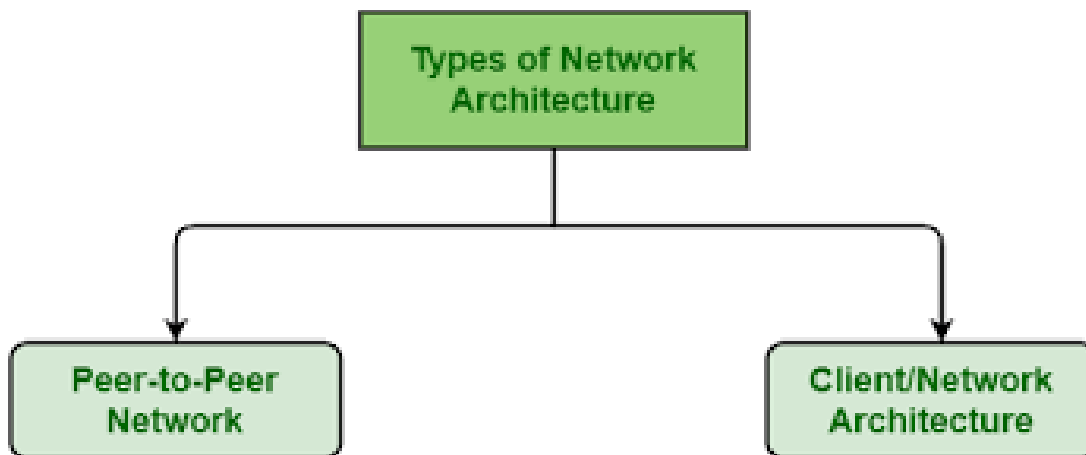
1. Physical Layer
2. Data-Link Layer
3. Network Layer
4. Transport Layer
5. Session Layer
6. Presentation Layer
7. Application Layer

Network Architecture Design :

Building blocks for any digital network architecture must be optimized in order for the architecture to be successful. These include:

**Network Architecture defines two types of networks:**

1. Peer to Peer Network
2. Client Server Network



Peer to Peer Network :

Definition: A peer-to-peer network is one in which two or more PCs share files and access to devices such as printers without requiring a separate server computer or server software.

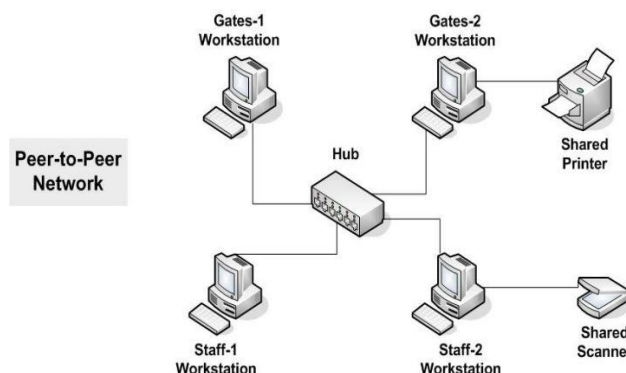
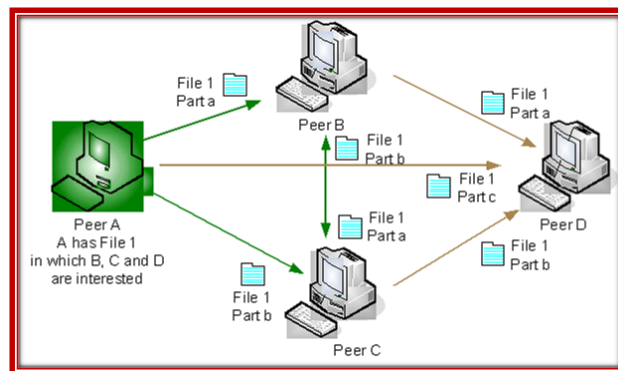
Peer to Peer network projects use a decentralized model in which each machine, referred to as a peer, functions as a client with its own layer of server functionality. Peer-to-peer (P2P) is an alternative network model to that provided by traditional client server architecture.

Characteristics of Peer to Peer network:

- 1) Nodes are autonomous.
- 2) Nodes have widely varying capabilities.
- 3) network is dynamic.
- 4) Nodes collaborate directly with each other.
- 5) Clients are also server and routers.

Research on p2p network:

- 1) Small, autonomous devices collaborating
- 2) High bandwidth residential and wireless access
- 3) Besides file sharing
- 4) Online communities gaining importance
- 5) Online gaming



Peer to Peer Network Model :

Hybrid P2P Networks: Administrative functions are done by hybrid P2P with central server. This central server is needed to find a specific file and transfer to the clients. All the files available are collected and stored in this hybrid P2P. Napster is the best hybrid P2P.

Pure P2P Networks: Unlike hybrid P2P pure P2P doesn't need any central server. Every peer can act either as a client or server. Gnutella and free net is the well known P2P network.

Protocols of P2P: File sharing is done effectively by several protocols. File transfer protocol (FTP) is used to share and distribute files. Bit torrent is used to reduce traffics. It is also a file sharing protocol which eliminates traffic in both P2P and internet Transmission Control Protocol (TCP) and User Datagram Protocol (UDP) . Routing information is stored by TCP and lookup process is done by UDP in Peer to Peer Projects.

Advantages of Peer to Peer network :

- 1.To overcome the problems faced in data transfer and storage in data-intensive.
- 2.Improve network performance.
- 3.Cost of data-intensive workflows.
- 4.Policy service for data management that can improve the performance of data intensive
- 5.Peer to peer system for distributed data sharing.
- 6.Check Content authentication.
- 7.To improve quality security issues.
- 8.Audio and Video File Sharing.
- 9.Content Delivery Network.
- 10.Creating autonomous web portals.
- 11.Software Distribution and File sharing via file Sharing Networks.
- 12.Creating autonomous web portals.

Disadvantages of Peer to Peer Computing :

- 1.It is difficult to backup the data as it is stored in different computer systems and there is no central server.
- 2.It is difficult to provide overall security in the peer to peer network as each system is independent and contains its own data.

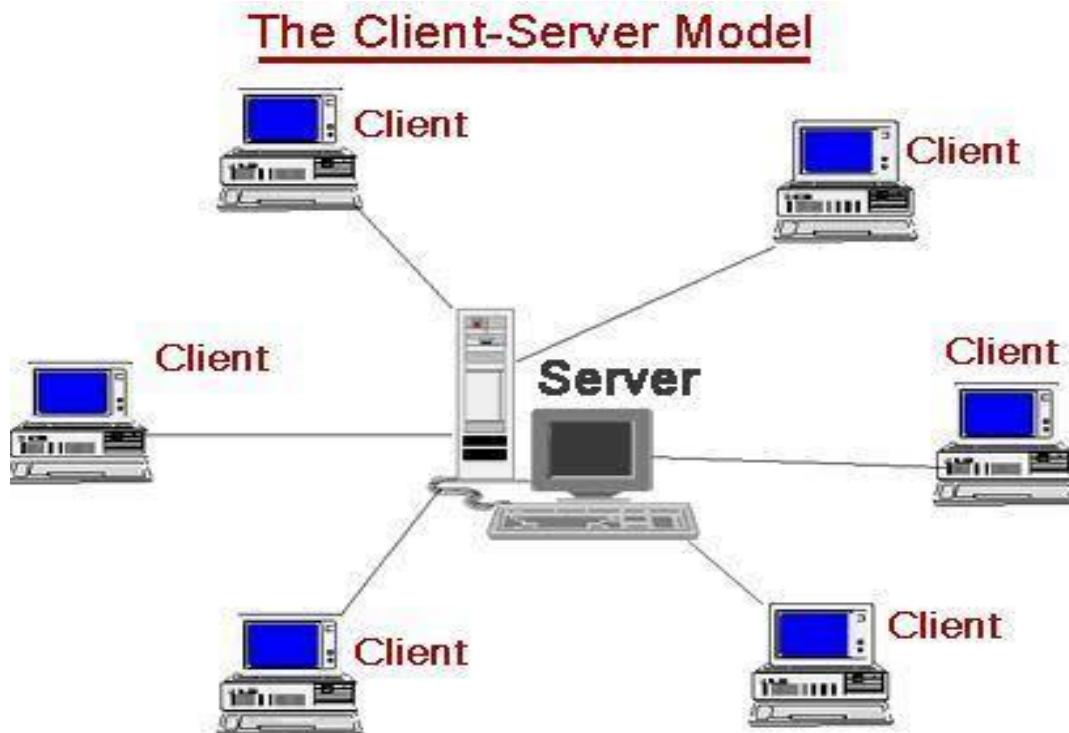
Applications of Peer to Peer Architecture:

1. Easy file sharing
2. Efficient instant messaging
3. Smooth voice communication
4. Secure search and communication network
5. Used for peer casting for multi casting stream in content delivery
6. High performance computing

Client Server Network :

A client-server network is a form of internet network that consists of a single central computer functioning as a server and directing several other computers, referred to as clients. Clients can access shared files and information kept on the serving machine by connecting to the server. Furthermore, client-server networks are similar to peer-to-peer networks in principle, with the distinction that only the server may begin a transaction. The client-server model describes how a server gives one or more clients access to resources and services. Mail servers, web servers, and file servers are examples of servers. Client devices, including desktops, laptops, tablets, and mobile devices, have access to the resources on each of these servers. Clients and servers often have a one-to-many connection, which means that a single server can supply resources to several clients at the same time.

When a client requests a connection with a server, the server has the option of accepting or rejecting the request. If the connection is accepted, the server builds and maintains a protocol-specific connection with the client. To send a message, for instance, an email client may demand an SMTP connection to a mail server. The mail server's SMTP program will then request authentication information, such as the email address and password. The server will deliver the email to the designated recipient if the credentials match an account on the mail server.



A client-server network is a communications architecture in which clients receive resources and services from a dedicated host over a local area network (LAN) or a wide-area network (WAN), such as the Internet. A dedicated server called a daemon may be used to wait for client requests, at which point a network connection is established and maintained until the client request is completed.

Client-to-server (north-south traffic) and server-to-server (east-west traffic) traffic are the two types of network traffic. E-mail, data sharing, printing, and the World Wide Web are all popular network services. A key advantage of the client-server network is the central administration of applications and data. A client-server network facilitates data transmission while protecting the sent data. Using the network is a smart solution for businesses looking for quicker and more secure data transfer.

Types of Server:

1. File Servers
2. Printer Servers
3. Application Servers
4. Message Servers
5. Database Servers

Advantages of Client Server network :

1. Centralization
2. Scalability
3. Easy Management
4. Accessibility
5. Data Security
6. It is very secure.
7. Gives better performance.
8. It has centralized backup.
9. It is very reliable.

Disadvantages of Client Server network :

1. Network Traffic Congestion
2. High Cost
3. Robustness
4. Maintenance Difficulty
5. Unacquirable Resources
6. It requires professional administration.
7. It is more hardware and software intensive.
8. It requires expensive dedicated software.

Applications Of Client Server:

1. E-mail clients
2. Web browsers
3. FTP(file transfer) clients

Difference between Client-Server and Peer-to-Peer Network:

S.NO	Client-Server Network	Peer-to-Peer Network
1.	In Client-Server Network, Clients and server are differentiated, Specific server and clients are present.	In Peer-to-Peer Network, Clients and server are not differentiated.
2.	Client-Server Network focuses on information sharing.	While Peer-to-Peer Network focuses on connectivity.
3.	In Client-Server Network, Centralized server is used to store the data.	While in Peer-to-Peer Network, Each peer has its own data.
4.	In Client-Server Network, Server respond the services which is request by Client.	While in Peer-to-Peer Network, Each and every node can do both request and respond for the services.
5.	Client-Server Network are costlier than Peer-to-Peer Network.	While Peer-to-Peer Network are less costlier than Client-Server Network.
6.	Client-Server Network are more stable than Peer-to-Peer Network.	While Peer-to-Peer Network are less stable if number of peer is increase.
7.	Client-Server Network is used for both small and large networks.	While Peer-to-Peer Network is generally suited for small networks with fewer than 10 computers.

7.0 Skill Developed

The purpose of a network architecture is to provide a framework for organizing and managing the network infrastructure. In addition to providing a structure for managing the network infrastructure, the architecture should also provide for the efficient and effective use of the network resources. The most important aspect of a network architecture is its structure. The structure should be organized in such a way that it provides for the efficient and effective use of the network resources.

Thus, we gathered information and studied about Network Architecture.