Seg 7.   # Application Layer

- Application Layer is the topmost layer in the OSI. model and responsible for providing network services directly to end user or application.

        (Provides Service directly for Application)

key function.

- Network Service → file transfer, email, web browsing

- Application Support ⇒ Support App. Protocol (HTTP, FTP, DNS) that allow Application to exchange data over network.

- recives data from presentation Layer.

- ensure data format

- manage resource allocation.

Application Layer protocol.

HTTP → used for web fetching, web browsing

SMTP → " " email transmission

FTP → Transfering file across network.

DNS → resolve domin name to Ip Adren.

Client Server Paradigm.

It is a network communication model where tasks are divided between 2 main entities.

Client : request services, resources or information from server : presenting user interface ()

- Communication with server.
- Can be Software on hardware device.

Eo → Web browser requesting webpage.

Server : provides service, resources, data to clients

- Listen for incoming client req.
- Send back response
- Manages resource line, databases, files etc.
- Multiple client at a time handled

Eo → Web server hosting webside

Key Characteristics of the Client Server Model.

- Separation of Concerns:
  - Client focus on the user interface.
  - Server manages data & resources.

- request response model: client sends req server reply with response. use protocol HTTP & FTP

Centralization : ensure better Security, control
data Consistency :

Scalability : Servers handle multiple clients at a time

Example of client server Architecture:

web Application

Client - web browser
Server - hosting the website

process → browser sends an HTTP request to the server
The server retrieves the webpage and sends it back
The browser display the content to the user -

Peer to peer (p2p) paradigm

It is a decentralized network model where every participant called peer. Can act as both client and a server
- No central server control the network.
- Share the sources directly.

Key features:

Decentralization: all peers contribute and access resource equally.

Resource Sharing: peers can share files, storage

Scalibility: Network grows as new peer, join. adding more resources.

Direct Comunication: peers exchange data directly.

Ex → file sharing, gaming, cryptocurrency network
Distributed computing.

Standard Client-Server Protocols

It is a widely used Communication protocols that define how clients interact with servers.

HTTP (Hypertext transfer Protocol)

- HTTP is used for ~~transmitting~~ transfering Hypertext webpage and resources over the www.

How it works: Client sends an HTTP req to a web server which responds with data (HTTP HTML)

HTTPS (Secure) → এর Secure of encrypted হয় than আরো নিরাপদ করে।

FTP (File transfer Protocol)

Transfer file between client and Server

client upload, download manage files on server.

Enhanced version FTPS (with SSL) [Secure]

POP3 (Post office protocol)

retrives email from the server to the client

Client connet FTP server sends commands for uploading, downloading or manage file.

Imap (Internel message Access protocol)

accem and manages email stored on a mail server

Allow synconization across multiple screens

device without removing emails from server

SMTP (Simple Mail transfer Protocol.

client who wants to send the mail open a tcp connetion to the SMTP server and then sends mail accross the connetion.

HTTPs : // www . D2R . com : 8080 /path /to /resource ? Name = # fragment

protocol — Subdomain — Domin name — port — path — Query

.ac.bd
Subdomain

port:
Client - server
Communication build up

path:
excat location
On server

E-mail

Internet user send mail to other user in any part of world. It's not only text but also send vedio, audio. It

Workis

Sending an Email

- client sends the email to an MTA (mail transfer Agent) using SMTP

- MTA identifies the recievers domain and uses DNS to Locate the reciven mail service

Receiving An email:

- Reciever Server Recive and stores the email in their mailbox.
- email client retrieves the messge using IMAP

Accessing the email:

- Reciever Logs via an email client or web browser to read the msg.

DNS (Domain Name System)

It is the phonebook of Internet. Human access Information online through domain name like daraz.com, espn.com.
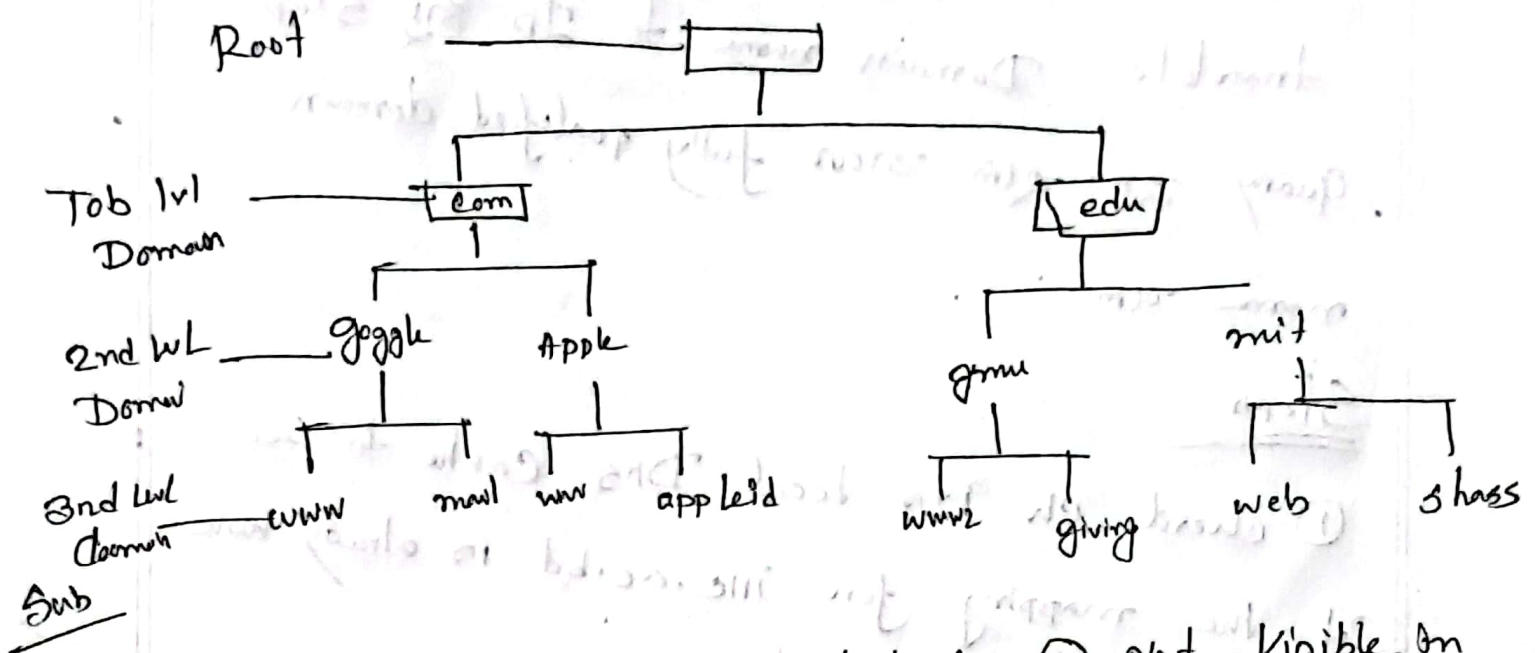
DNS translate Domain name to Ip address

So browser can load Internet resoureor.

```
Domain_name   Time to Live   Clan   type   Value
```

→ Domain Resource Record format)

* Hierarchal Structure of DNS figure

Root

Top lvl Domain — com   edu

2nd lvl Domain — goggle   Apple   gmu   mit

3rd lvl doamain — cuww   mail www app leid   www2   giving   web   shass
Sub

Root domain : It represented by ⊙ Not visible on the domain name and is the starting point for DNS

TLD   Top level :. generic and Country code 2 type top lvl
       . org, . net, gov, etc

SLD   2nd lvl : here actual domin names which wan register such as Emon.com

       Subdomain : It is used for formatting hieranchial. Structure , like www. emon . com

Resolving DNS Query : iiue.ac.bd .

translate Domain name to IP কিংযে step
query হয়. হলেন তাকে fully qualified domain
name বলে .

Steps

① client ch গ্রে local DNS cache to see
যে the mapping for iiie.ac.bd is alrady here
যে not found proceed

② then the client resolver st the DNS
resolver process.

③ resolver queries a root DNS ৳(.bd)

④ " " ask TLD server for ac.bd name
server

⑤ ~~facing to~~ then the authoritative server
provides the IP which cached future use

⑥ Application use the IP connect server