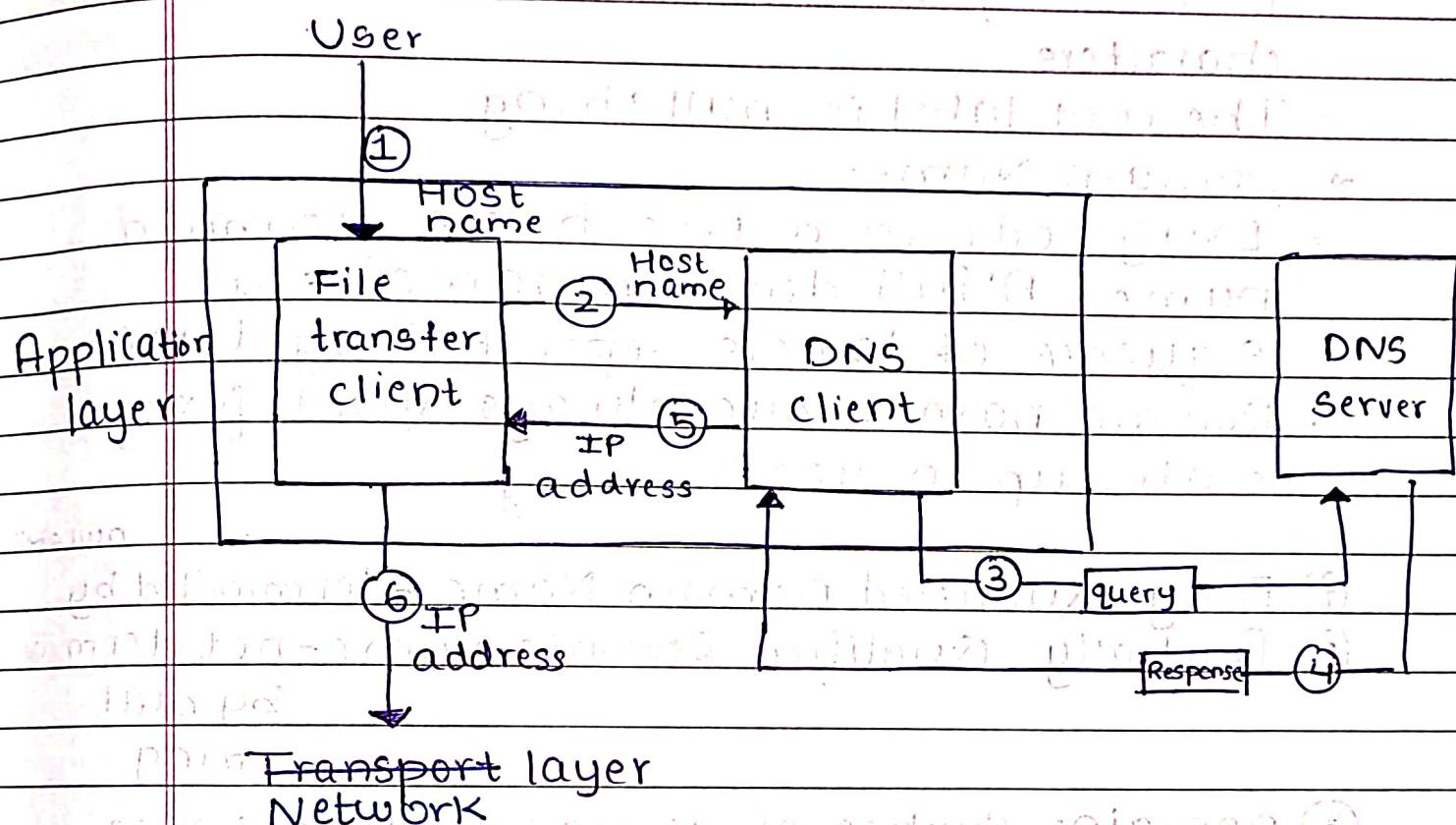


# Application Layer

## \* Domain Name System (DNS)

- DNS is a client/server application program used to help other application programs and to map a host name in the application layer to an IP address in the network layer.



## \* Flatname Space

- All the domain names connected with only root server, it creates flatname spaces.
- There is no structure in flat name space.

## \* Hierarchical namespace.

- In hierarchical name space, every name is made up of several parts.
- The first part can define the nature of organization, the second part defines name of organization and third part defines departments in organization, if any and so on.

### \* Domain Name Space

- In this space, the names are defined in an inverted tree structure with the root at the top.

### \* Label

- Each node in the tree has a label, which is a string with a maximum of 63 characters.
- The root label is null string.

### \* Domain Name

- Every node in a tree has a domain name. A full domain name is a sequence of labels separated by dots (.)
- Domain names are always read from mode up to root.

① Fully Qualified Domain Name - terminated by null string

② Partially Qualified Domain Name - not terminated by null string

③ Domain: Subtree of domain name space

\* DNS defines Two types of server.

① Primary Servers.

- ⇒ • A primary server is a server that stores a file about the zone for which it is an authority.
- It is responsible for creating, maintaining and updating the zone file. Stores zone on local disk.

② Secondary Servers.

⇒ • A secondary server <sup>is a server</sup> that transfers all information from the primary server.

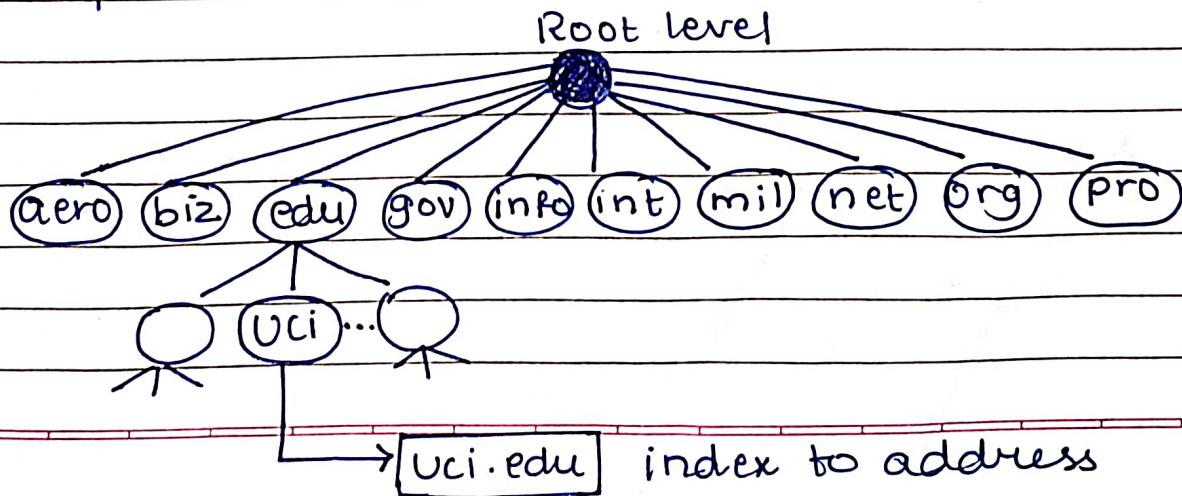
• When secondary server downloads information from primary , it is called zone transfer.

\* DNS in Internet

• 3 sections

① generic domains,

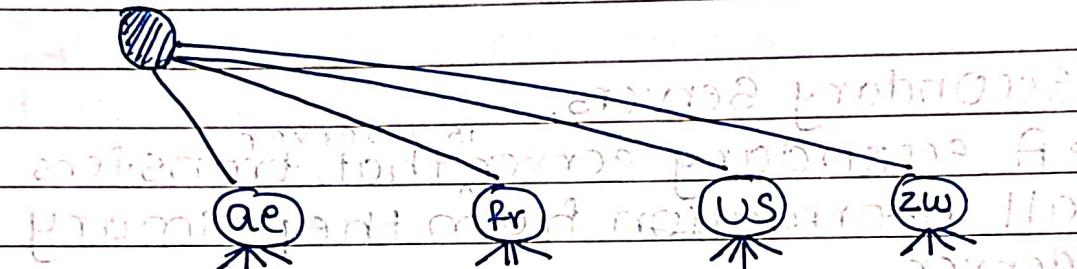
⇒ Defines & registered hosts according to their generic behaviour. Each node in the tree defines a domain, which is an index to the domain name-space database.



## (ii) Country domains

- Uses two-character country abbreviations (e.g. US for United States).
- The address uci.ca.us can be translated to University of California, Irvine, in the State of California in United States.

Root level



index to uci.ca.us  
addresses.

← uci

points to standard country domains.

## (iii) Inverse domains [not used]

## ★ Electronic Mail [E-mail]

- Three components of email

### (I) User agent

→ Provides service to the user to make the process of sending and receiving a message easier.

- Two types of user agent:

#### (a) Command driven

• Accepts one character from keyboard to perform tasks

#### (b) GUI

• Allows the user to interact with the software by using keyboard and mouse.

### (II) Message Transfer Agent (MTA)

- Actual mail transfer is done through

• MTA is a standard protocol based on SMTP.

• To send a mail, a system must have client MTA and to receive mail must have a server MTA.

- Uses SMTP (simple mail transfer protocol)

### (III) Message access agent (MAA)

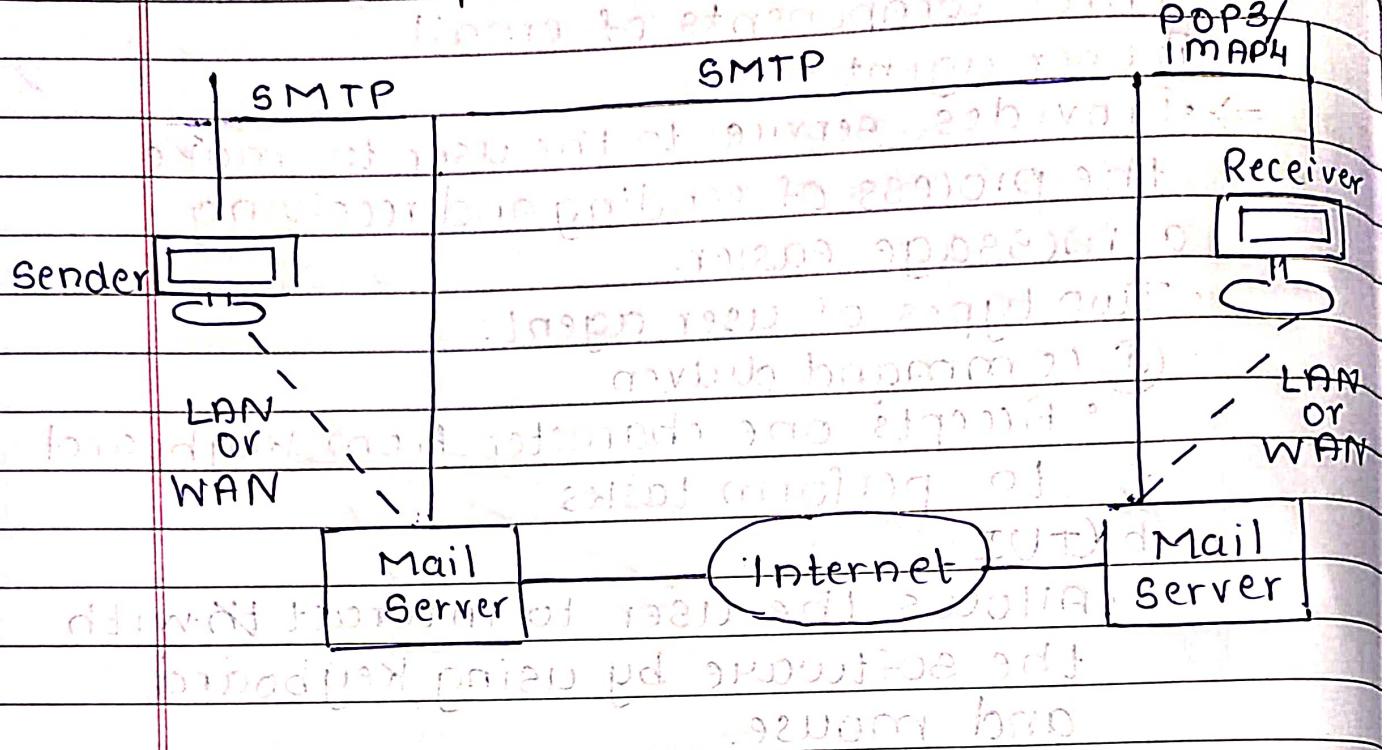
• Here SMTP is not involved because it is a push protocol.

• Here we need pull protocol.

• The client must pull messages from server.

• Uses ~~MAA~~, POP3 & IMAP4

## ★ SMTP [Simple Mail Transfer Protocol]



- Protocol that defines the communication between MTA client and MTA server is called SMTP.
- SMTP is used twice, between the sender and sender's mail server and between two mail servers.

## POP3

- Simple protocol that only allows downloading messages from the mailbox to the computer
- Uses port 110
- All mails must be downloaded for reading
- Once downloaded can be accessed without internet
- User cannot search, create, delete or rename emails on the mail server.
- Speed is fast
- Easy to setup and use.

## IMAP4

- Advanced and more powerful protocol
- Uses port 143.
- All mails need not to be downloaded.
- Active internet connection is required to access the emails on the server.
- User can search, create, delete or rename mail on the mail server.
- Speed is slow.
- Complicated to setup and use.

Compatibility problem between client and server must be solved by

Page No.	
Date	

### \* 3 attributes of communication.

#### ① File type

- FTP can transfer one of the following types across data connection namely ASCII file, EBCDIC file or image file.

① ASCII file is default format for transferring text files.

② If one of the two machines use EBCDIC encoding, the EBCDIC files can be transferred using EBCDIC encoding.

③ The image file is the default format for transferring binary files.

#### ② Data Structure.

FTP allows three different data structure of file namely, File structure, Record structure and Page structure.

① File Structure :- File has no structure

it is continuous stream of bytes.

② Record Structure :- File is divided into records.

③ Page Structure :- File is divided into pages, each page having Page number and Page header.

#### ③ Transmission mode

① Stream mode → default mode, FTP to TCP as continuous

② Block mode → FTP to TCP in blocks

③ Compressed mode → if file is big it can be compressed using run-length encoding.