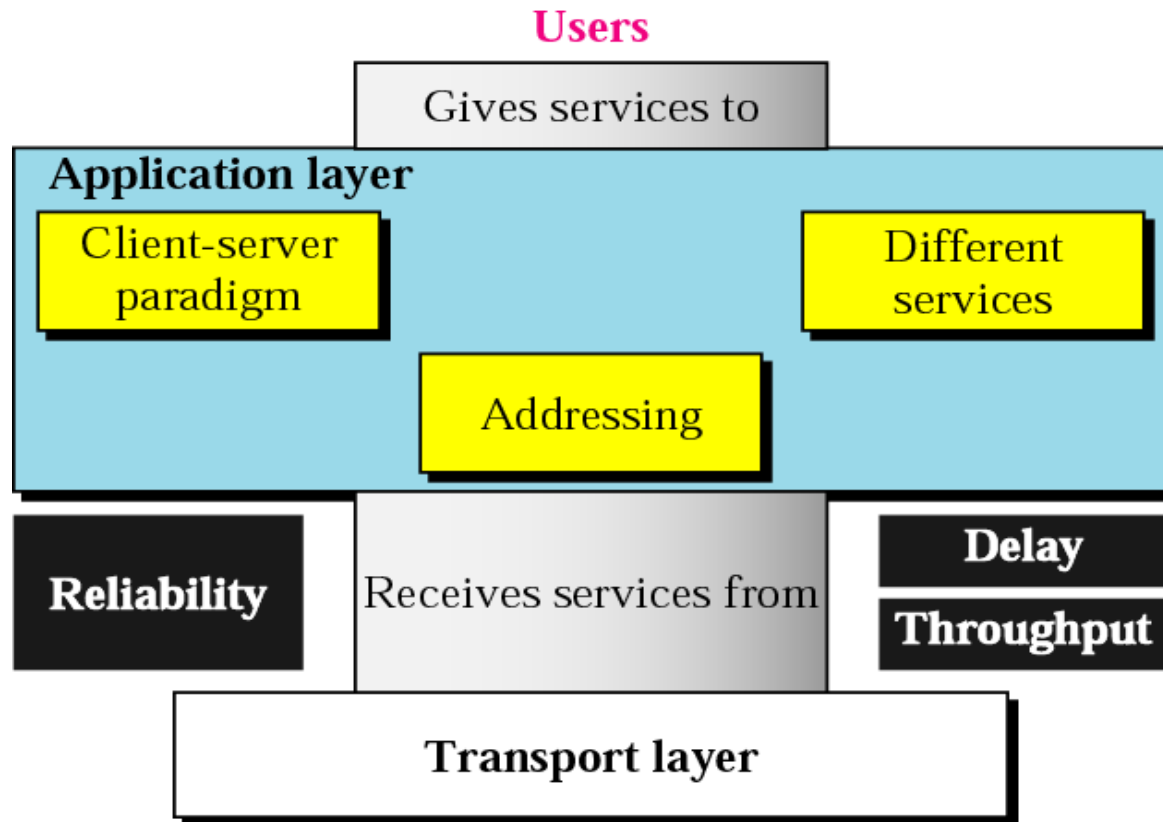


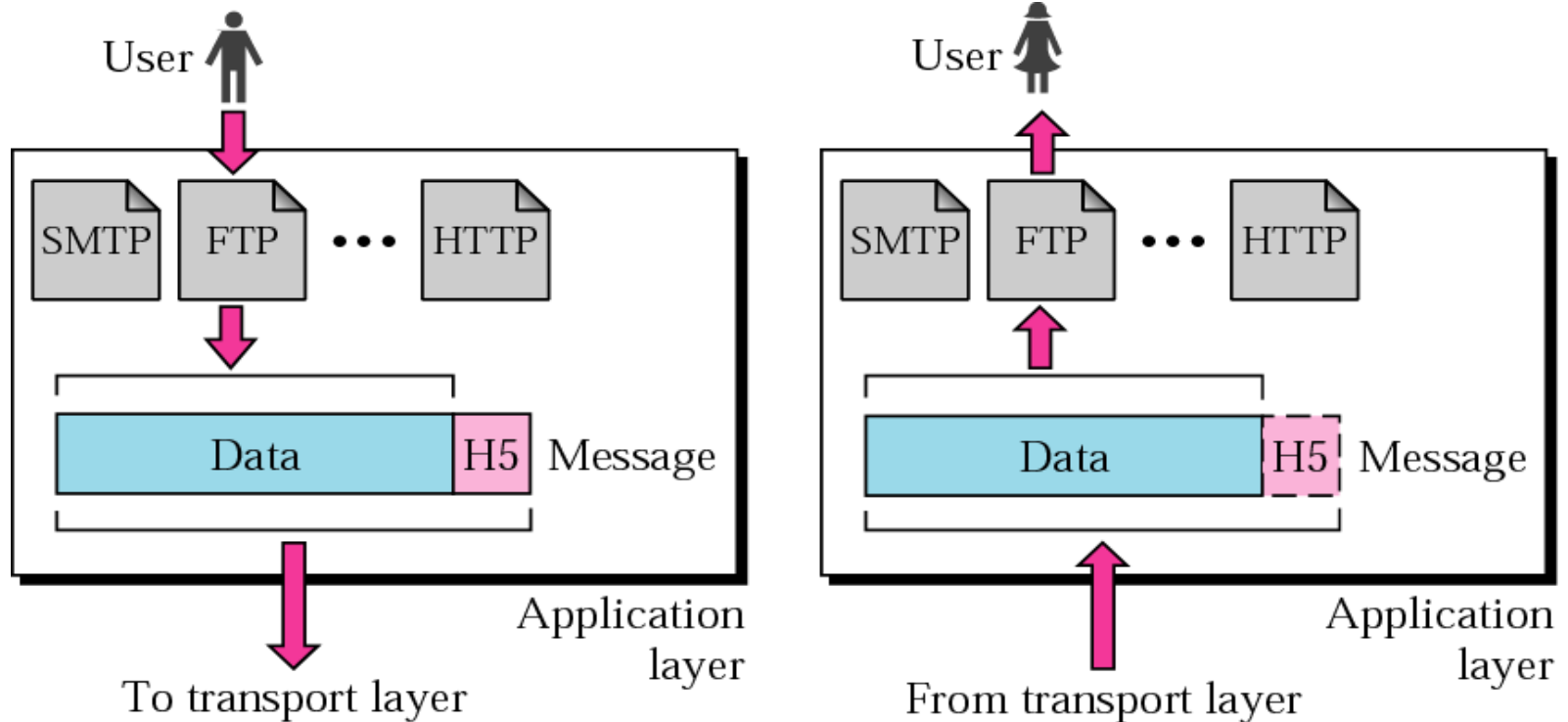
# Application Layer : Duties ??

1



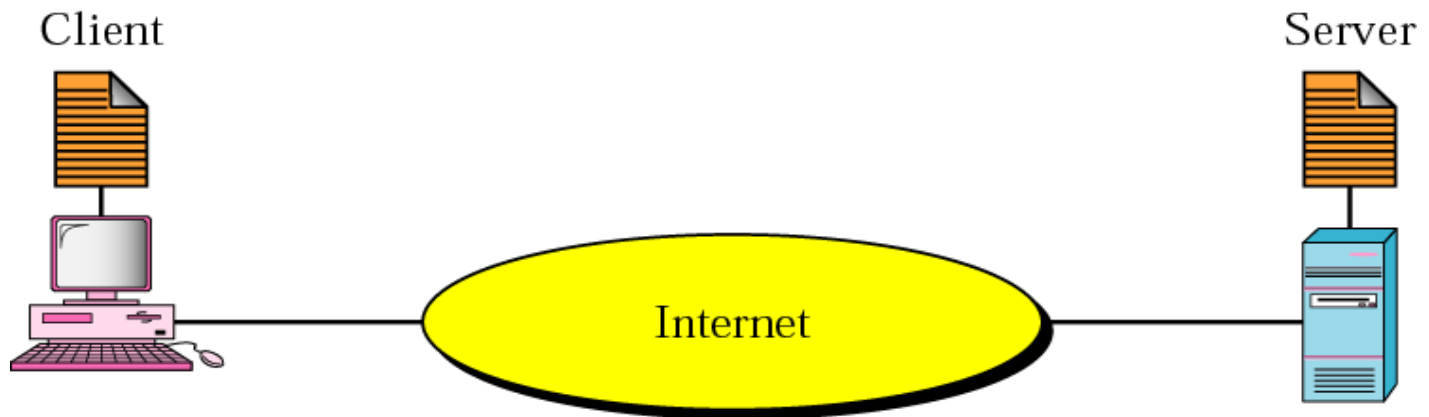
# Application Layer : Application Services

2



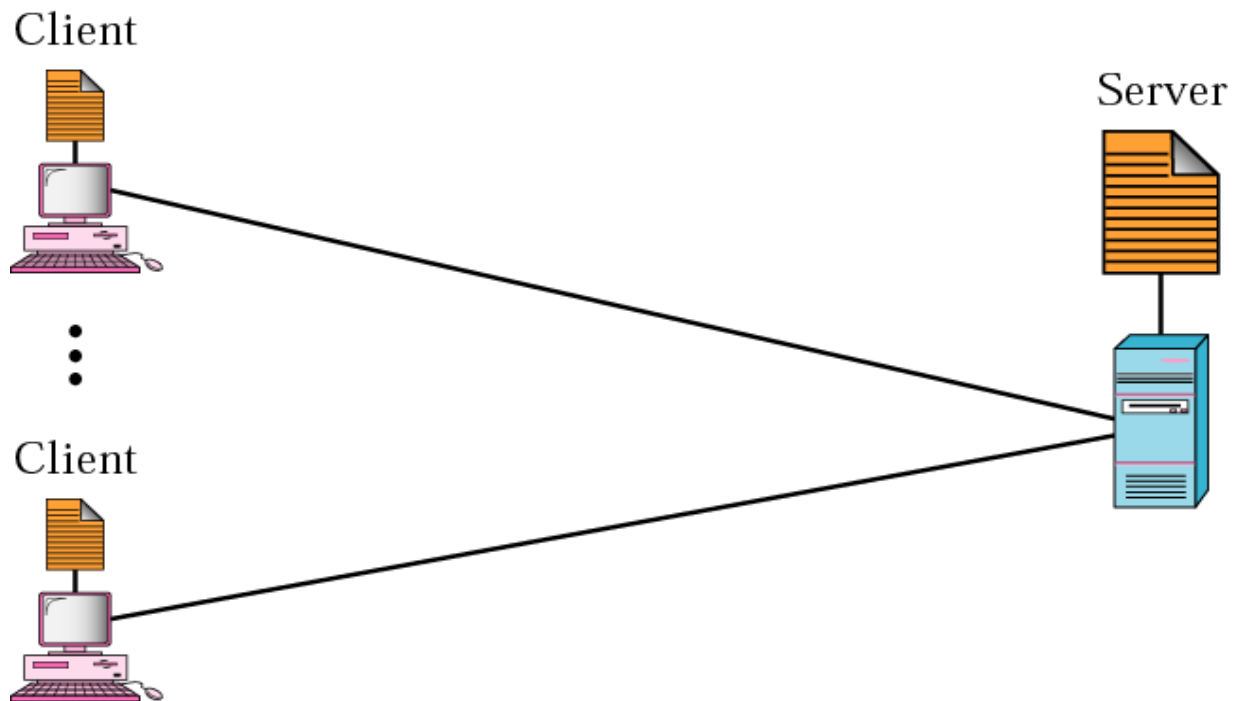
# Client Server Model : Generic Diagram

3



# Client Server Relationship

4



# DNS : Domain Name System

5

- Hierarchical Naming System Built on a Distributed Database.
- Responsible to Translate Human Address into IP Address.
- Example => How To Verify ??

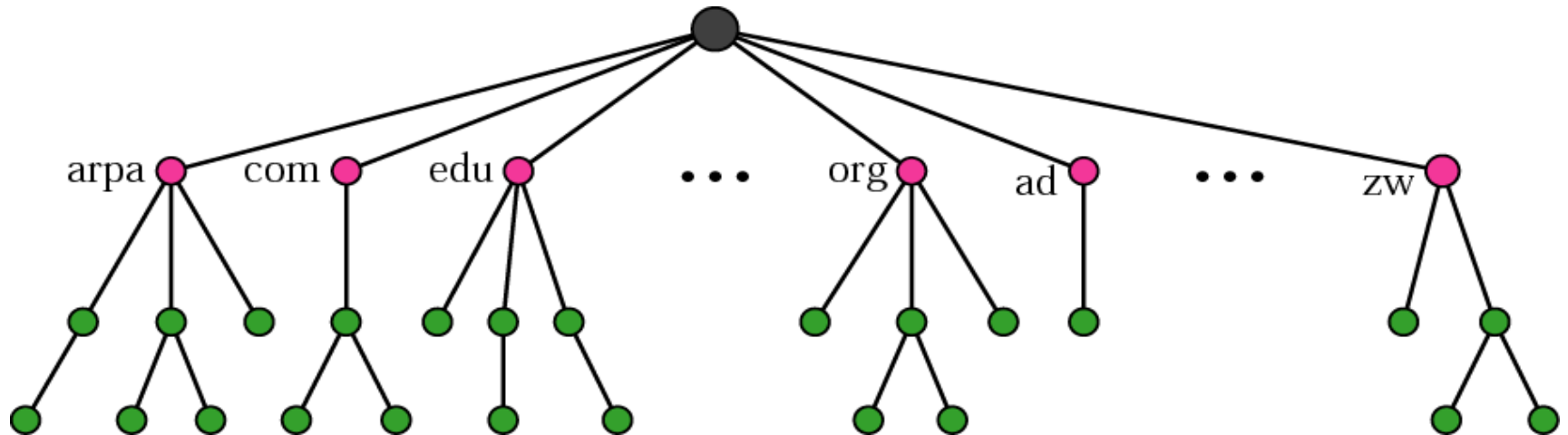
```
C:\Users\Kumar>nslookup www.google.com.np
Server: ns1.wlink.com.np
Address: 202.79.32.4

Non-authoritative answer:
Name: www.l.google.com
Address: 209.85.231.104
Aliases: www.google.com.np
         www.google.com

C:\Users\Kumar>
```

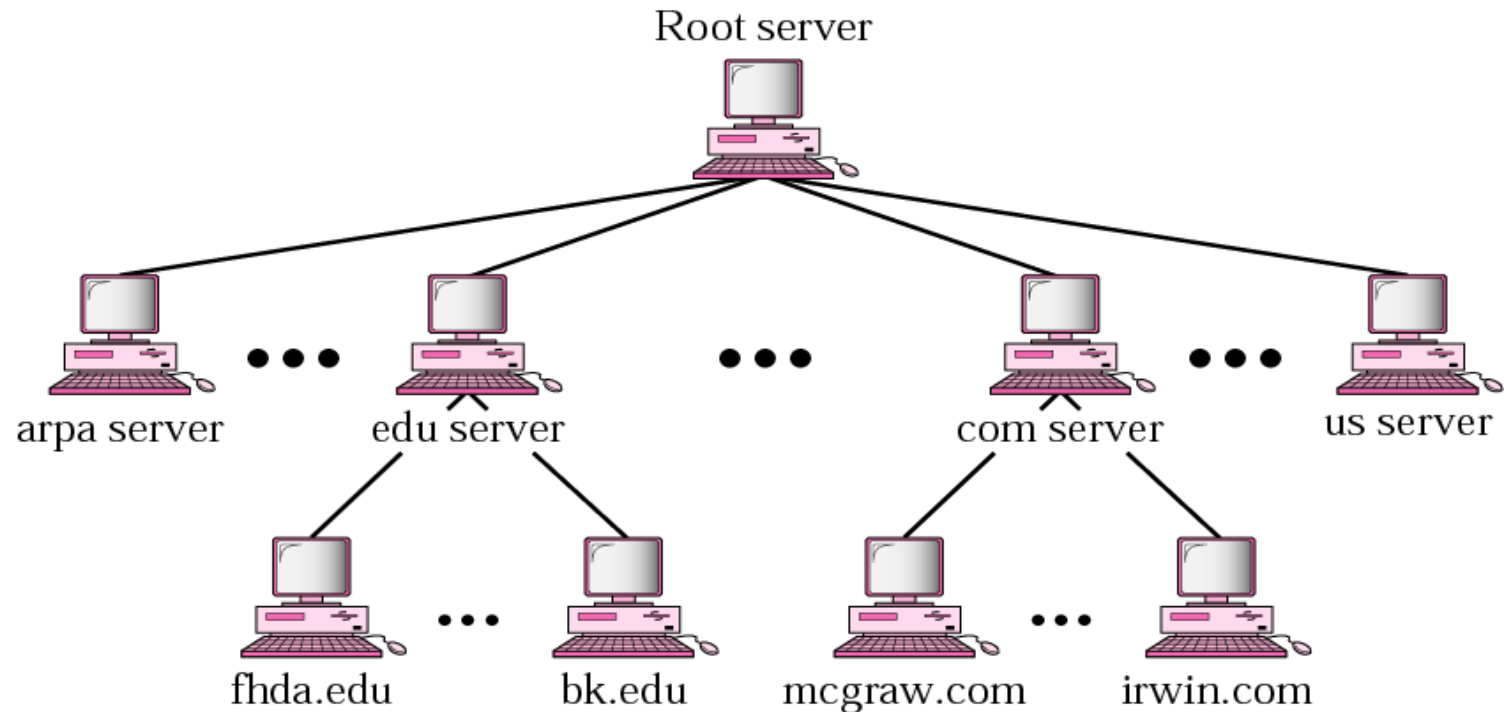
# Domain Name System : Hierarchical Naming

6



# Domain Name System : Hierarchy of Name Servers

7



# Domain Name System : Types

8

- Root Name Servers
  - ✓ Contracts Authoritative Name Server if Mapping Not Found.
  - ✓ Gets Mapping.
  - ✓ Returns Mapping to Local Name Server.
  
- Top Level Domain Servers
  - ✓ Responsible for com, org, net.
  - ✓ All top level Country domains like us, uk, fr, np, in.
  
- Authoritative Domain Servers
  - ✓ Organization's DNS Servers.



# Domain Name Space : Root Name Servers

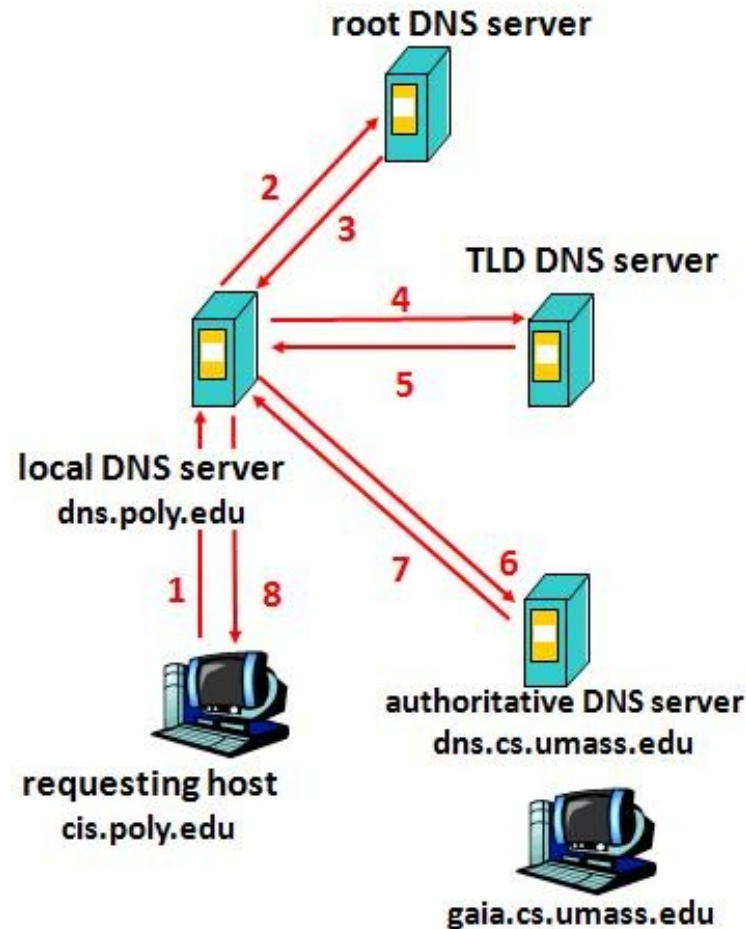
9



13 Root Name Servers Worldwide

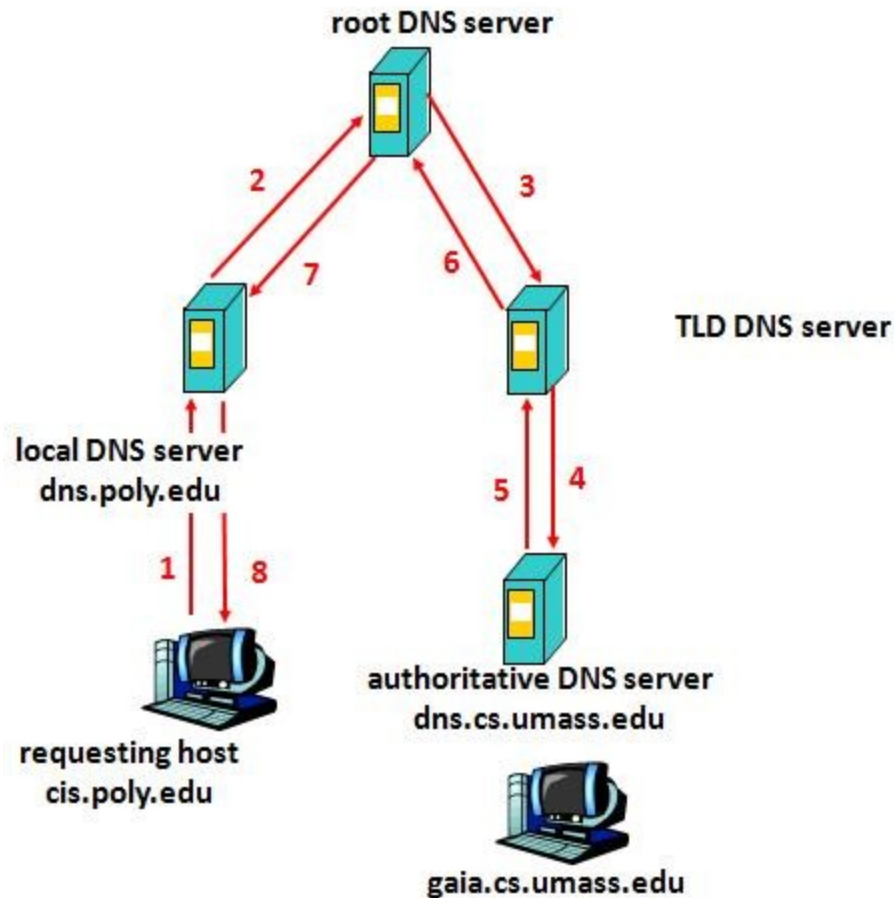
# DNS Name Resolution : Iterated Query

10



# DNS Name Resolution : Recursive Query

11



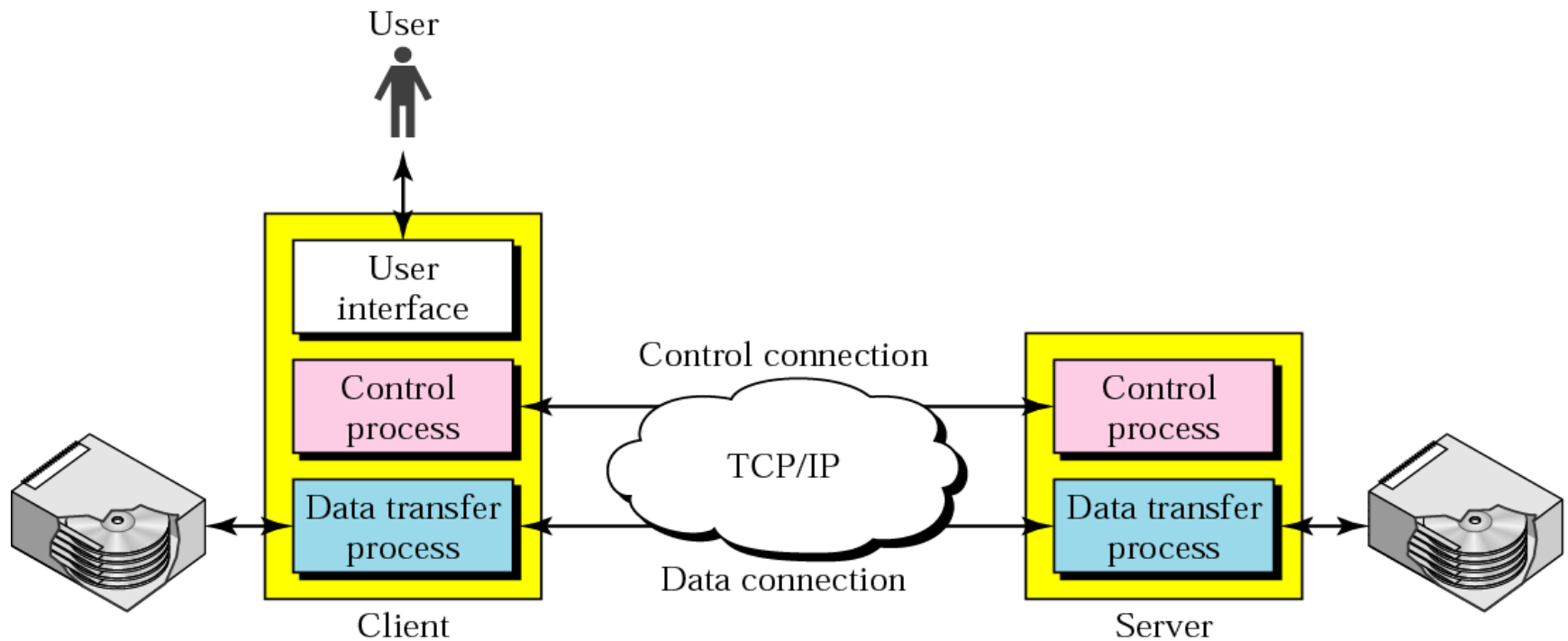
# FTP : File Transfer Protocol

12

- Protocol used to Copy File from One Host to Another.
- It uses the Services of TCP.
- It needs Two TCP Connections.
- The Well Known Port 21 is used for Control Connection.
- The Well Known Port 20 is used for Data Connection.

# FTP : File Transfer Protocol

13



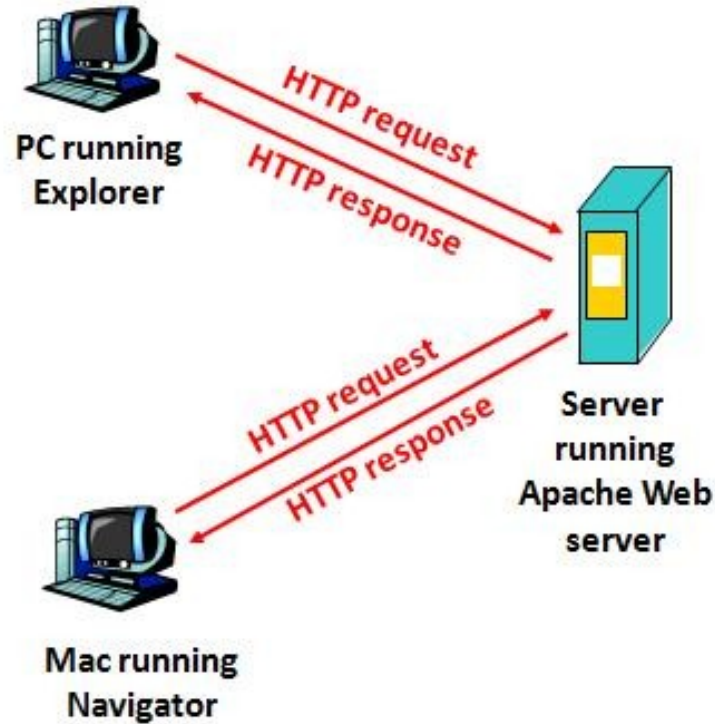
# HTTP : Hyper Text Transfer Protocol

14

- Foundation of Data Communication For World Wide Web.
- HTTP Functions as Request/Response Protocol in Client Server Computing Model.
- Web Browser : Client
- Web Server : Apache Web Server
- HTTP is "Stateless" => No Information of Past Client Requests.
- HTTP Connections => Non Persistent and Persistent.

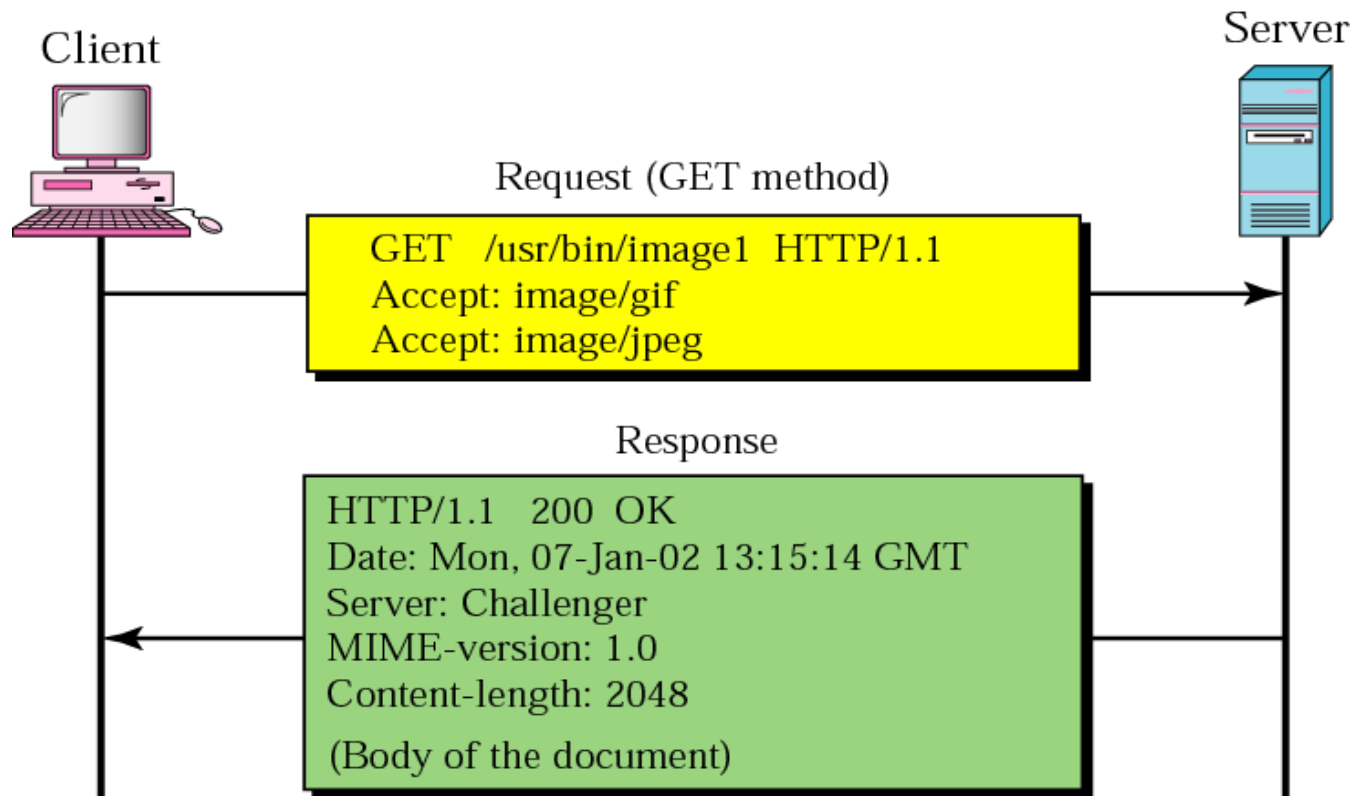
# HTTP : Request/Response Protocol

15



# HTTP : Request/Response Example

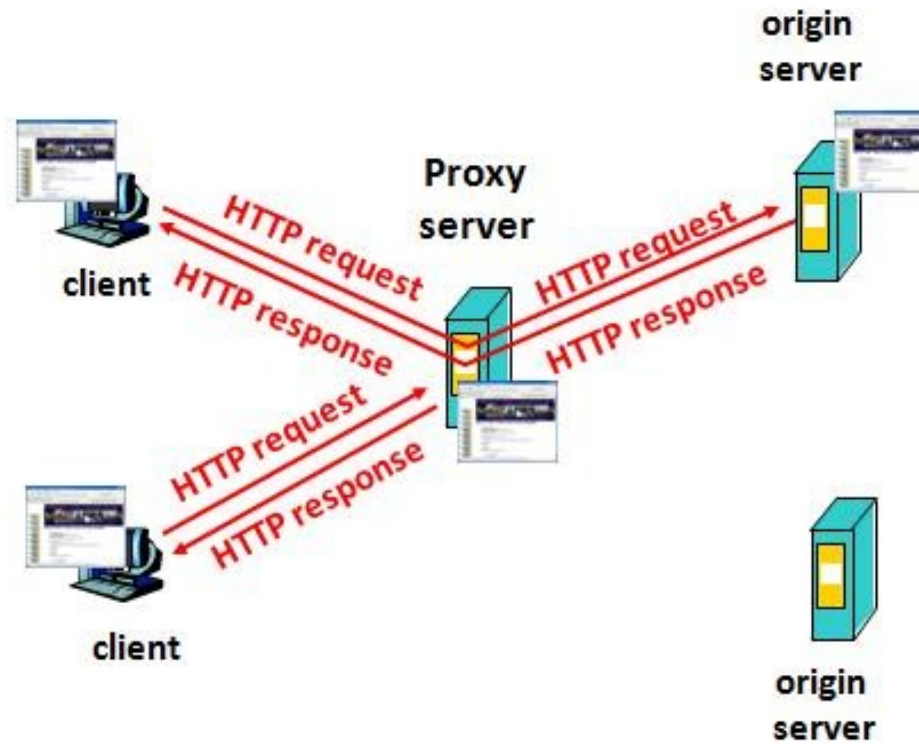
16





# Proxy Server : Web Caching

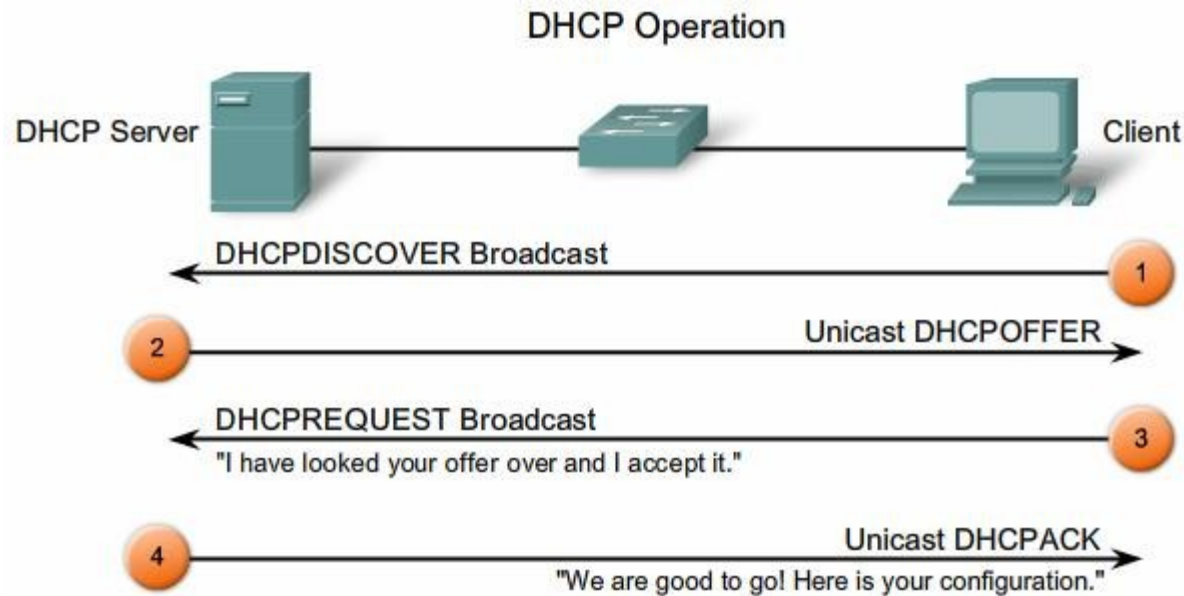
17



Satisfy Client Request without Involving Origin Server

# DHCP : Dynamic Host Configuration Protocol

18



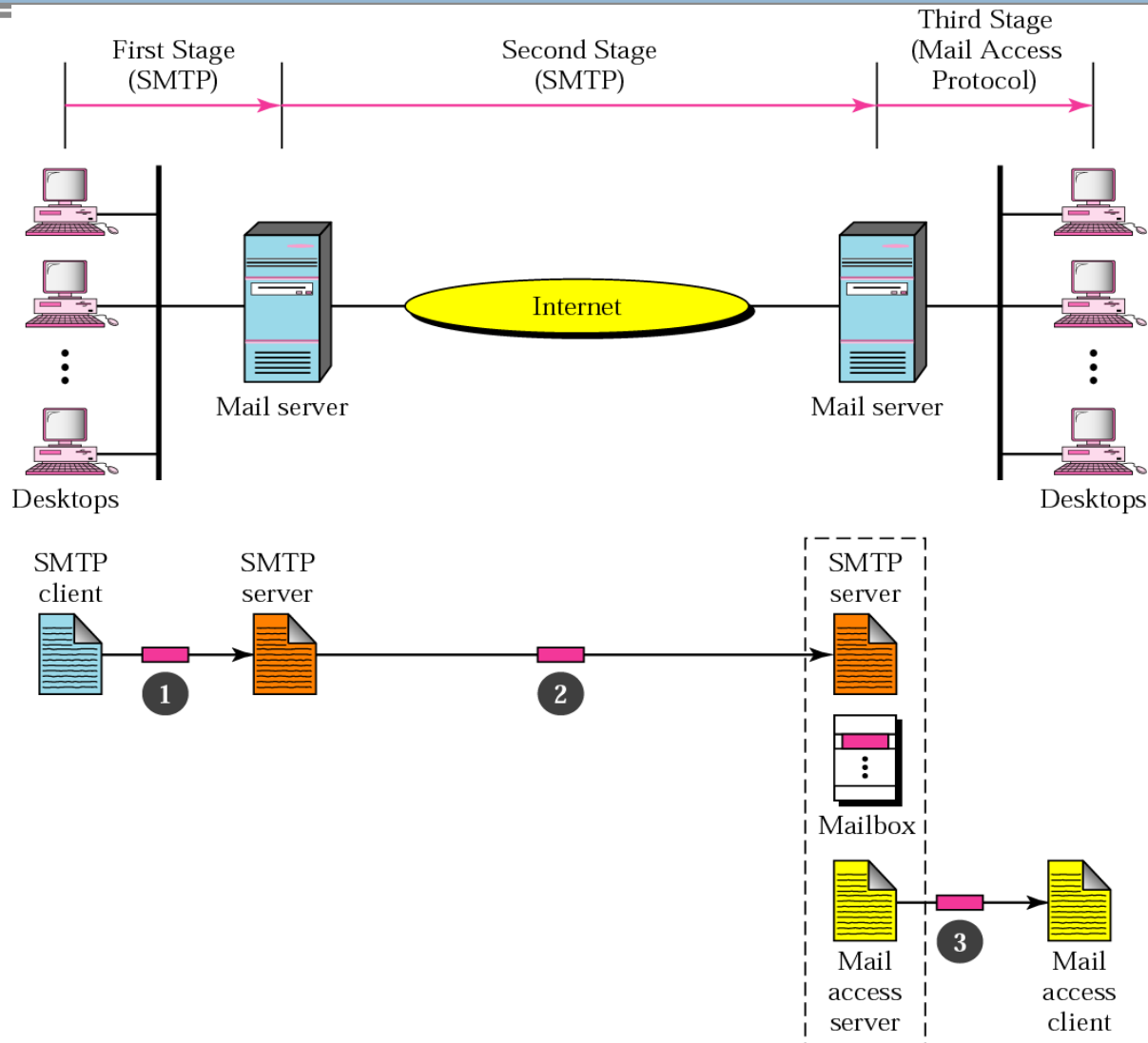
# SMTP : Simple Mail Transfer Protocol

19

- Internet Standard for Electronic Mail Transmission.
- It is Specified for Outgoing Mail Transport.
- Uses TCP Port No 25.
- For Receiving Messages Clients Use IMAP or POP.
  - ✓ IMAP : Internet Message Access Protocol
  - ✓ POP : Post Office Protocol

# SMTP : Example

20



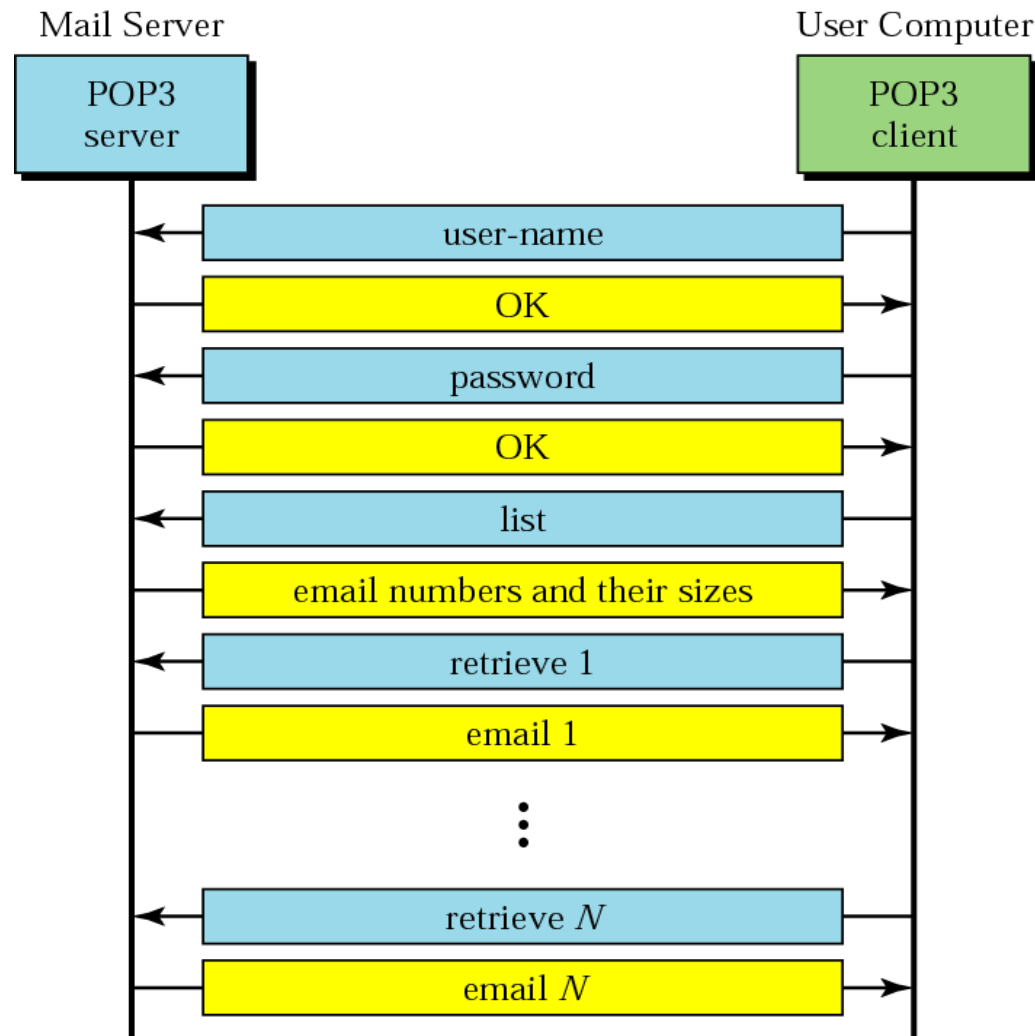
# POP : Post Office Protocol

21

- Application Layer Protocol used by Email Clients to retrieve Email From Remote Server.
- POP Version 3 is referred as POP3.
- A POP3 Servers Listens on Well Know Port 110.
- Encryption Communication for POP3 Using SSL.
- It uses Well Known TCP Port 995 (Eg. Google Gmail).

# POP3 : Post Office Protocol Version 3 (Steps)

22



# IMAP : Internet Message Access Protocol

23

- It is one of the Prevalent Application Layer Protocol for Email Retrieval.
- All Modern Email Clients and Servers Supports IMAP.
- An IMAP Server Listens at Port 143.
- IMAP4 is referred as IMAP Version 4.
- Multiple Clients can Simultaneously connect to Same Mailbox.
- It allows Connected and Disconnected Mode of Operation.
- Multiple Mailboxes on the Server.

# Tools For Client Server:

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## □ Web Servers and Clients

- ✓ Apache Tomcat
- ✓ Microsoft IIS
- ✓ Oracle Web Tier
  
- ✓ Internet Explorer
- ✓ Google Chrome
- ✓ Mozilla Firefox

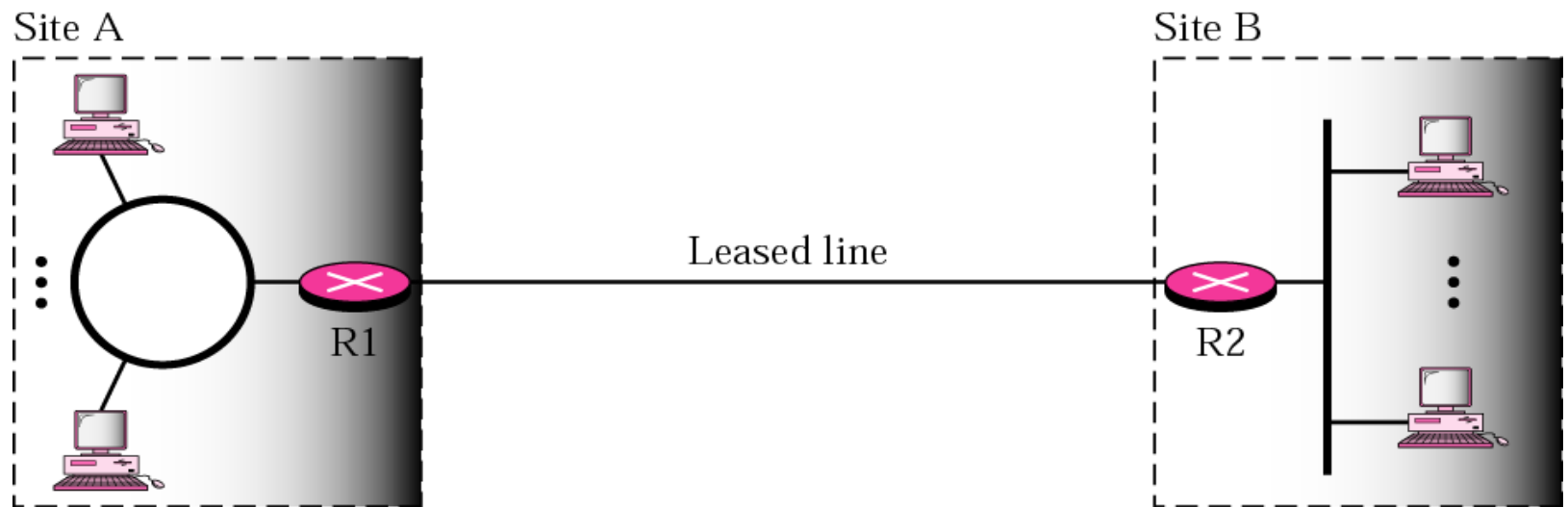
## □ Email Servers and Clients

- ✓ Microsoft Exchange Server
- ✓ Horde
- ✓ WorldClient
  
- ✓ Microsoft Outlook Express
- ✓ Thunderbird



# Private Networks

25



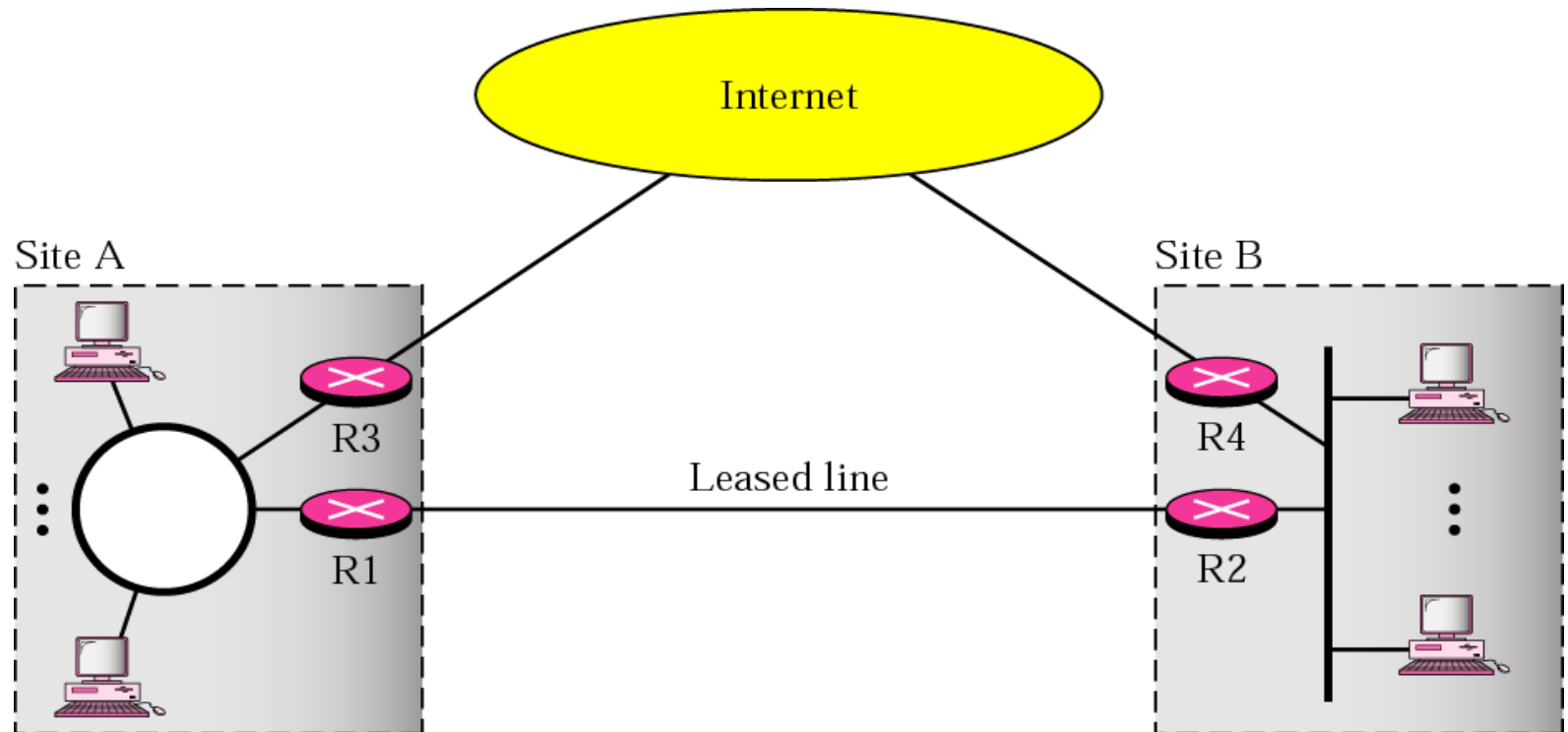
# Hybrid Networks : What it is ??

26

- Two Links => Private and Public
- Private Link => Leased Line or Optical Fiber
- Private Link for Intranet
- Public Link for Internet.
- All Intraorganization data are routed through the Private Link.
- All Interorganization data are routed through the Public Link.

# Hybrid Networks

27



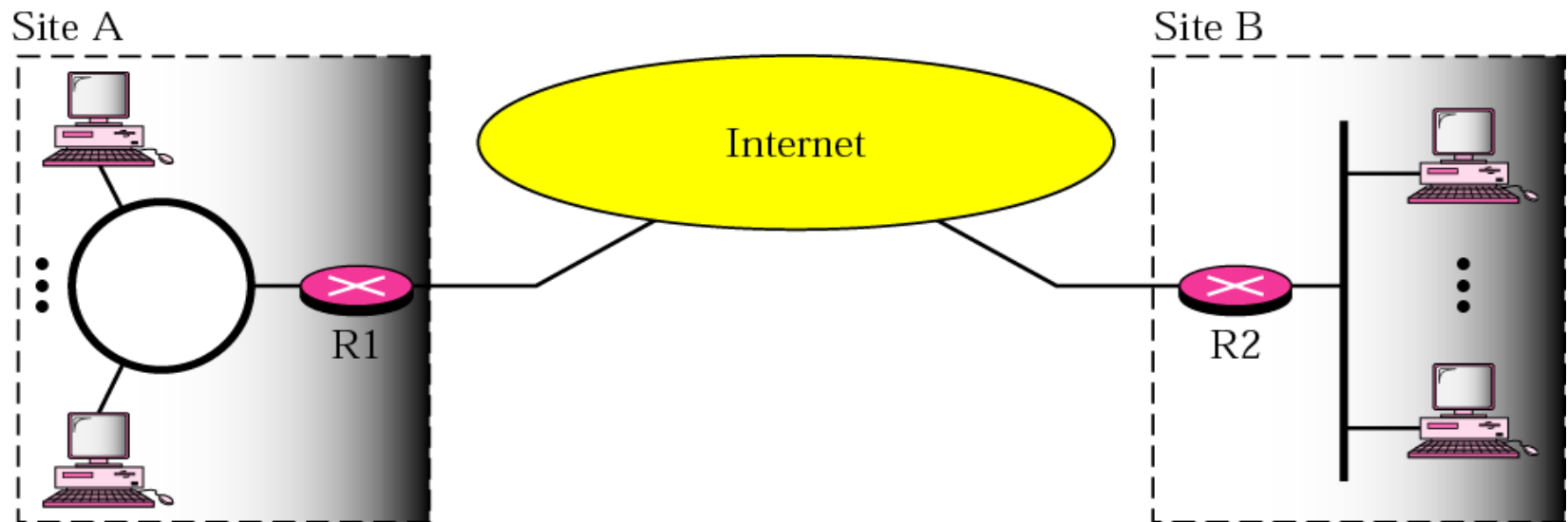
# VPN : Virtual Private Networks

28

- Both Private and Hybrid Networks are Expensive.
- Solution to use global Internet for both Private and Public Communication => VPN
- VPN Creates a Network that is Private but Virtual.
- It is Private because it guarantees Privacy inside the Organization.
- It is Virtual because it does not use Real Private WANs.
- The Network is Physically Public but Virtually Private.
- VPN Use IPSec in the Tunnel Mode to Provide Authentication, Integrity and Privacy.

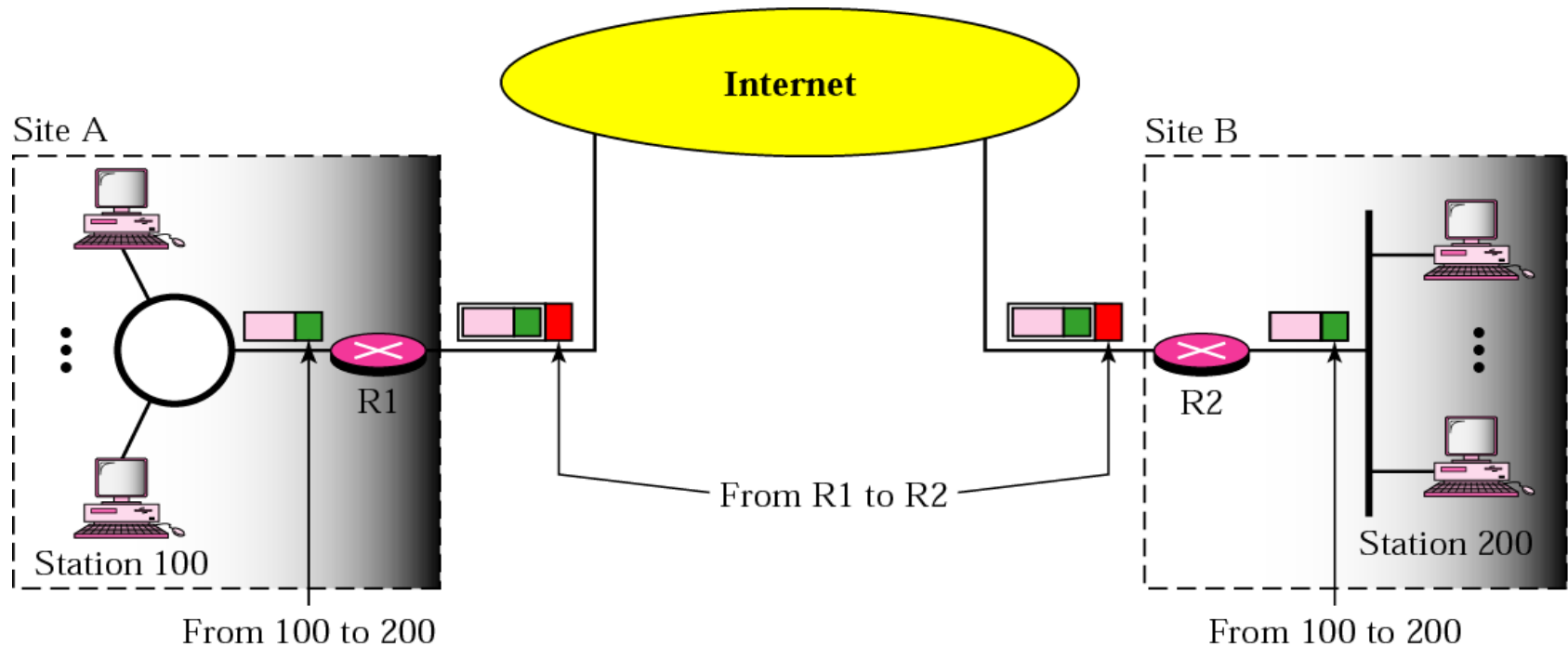
# VPN : Virtual Private Networks

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# Addressing in VPN

30



To use IPSec in Tunneling mode VPN need to use Two sets of Addressing

Thank You