SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

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Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ARTIFICIAL INTELLIGENCE

AI IN WEB TECHNOLOGY
III YEAR - VI SEM

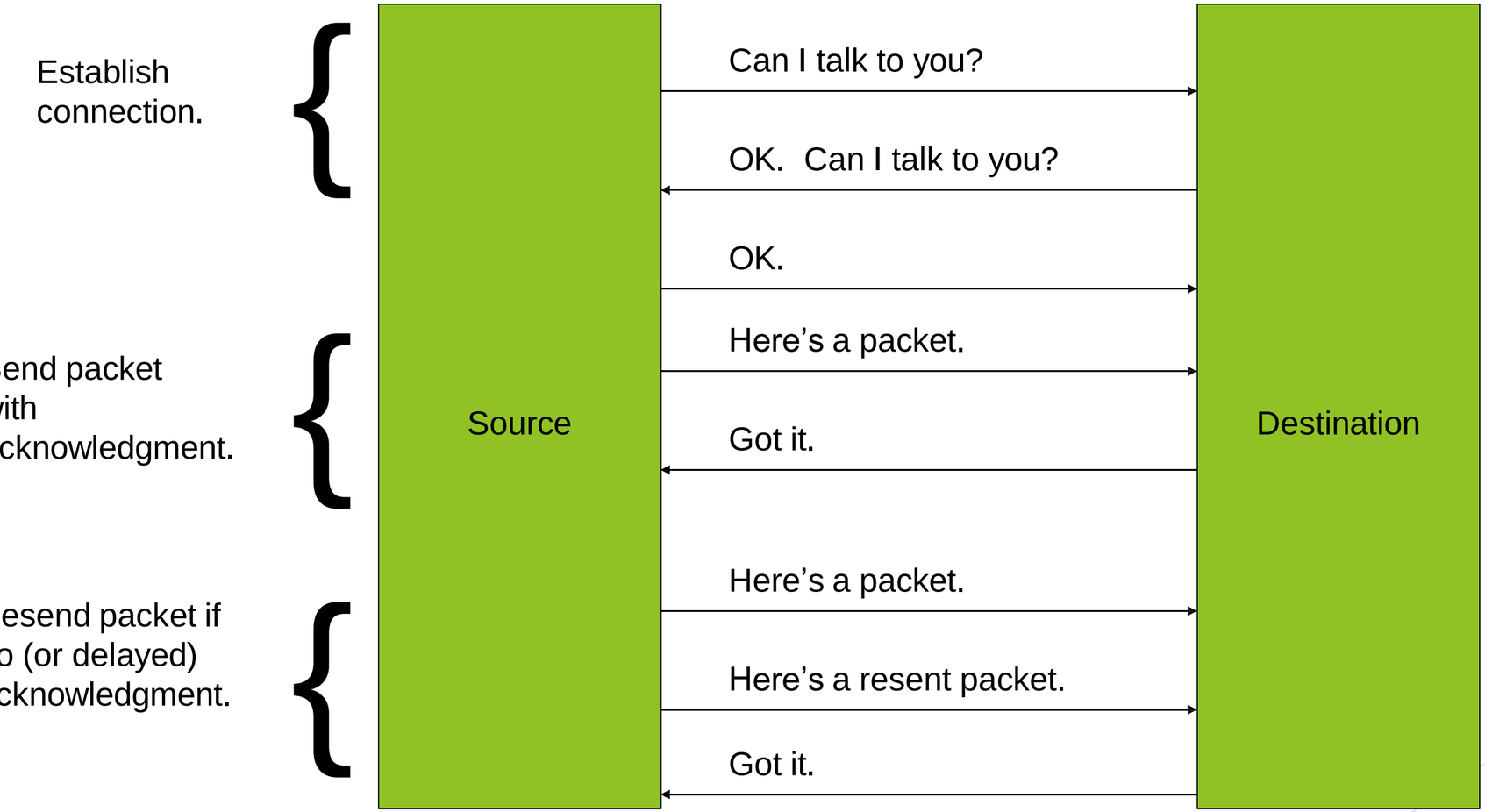
UNIT 1 – INTRODUCTION TO WEB TECHNOLOGY AND DESIGN

INTRODUCTION TO WEB TECHNOLOGY AND DESIGN

Transmission Control Protocol (TCP)

- Limitations of IP:
  - No guarantee of packet delivery (packets can be dropped)
  - Communication is one-way (source to destination)
- TCP adds concept of a connection on top of IP
  - Provides guarantee that packets delivered
  - Provide two-way (full duplex) communication

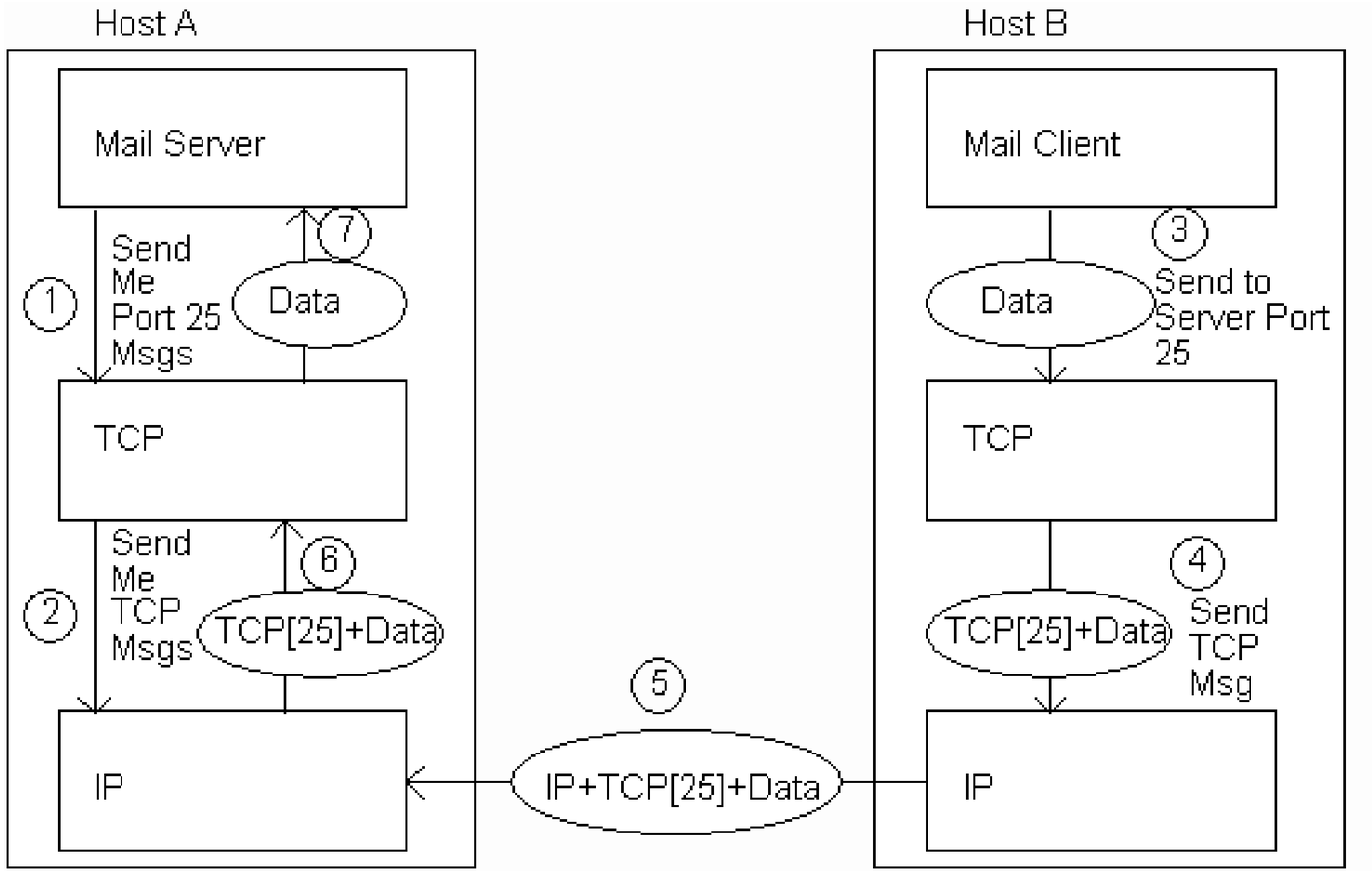
TCP


Establish connection.
Send packet with acknowledgment.
Resend packet if no (or delayed) acknowledgment.
Source
Destination
Can I talk to you?
OK. Can I talk to you?
OK.
Here's a packet.
Got it.
Here's a packet.
Here's a resent packet.
Got it.

TCP

- TCP also adds concept of a port
  - TCP header contains port number representing an application program on the destination computer
  - Some port numbers have standard meanings
    - Example: port 25 is normally used for email transmitted using the Simple Mail Transfer Protocol (SMTP)
  - Other port numbers are available first-come-first served to any application

TCP


Host A
Mail Server
Send Me Port 25 Msgs
1
7
Data
TCP
Send Me TCP Msgs
2
6
TCP[25]+Data
IP
5
IP+TCP[25]+Data
Host B
Mail Client
3
Data
Send to Server Port 25
TCP
4
TCP[25]+Data
Send TCP Msg
IP

User Datagram Protocol (UDP)

- Like TCP in that:
  - Builds on IP
  - Provides port concept
- Unlike TCP in that:
  - No connection concept
  - No transmission guarantee
- Advantage of UDP vs. TCP:
  - Lightweight, so faster for one-time messages

Domain Name Service (DNS)

- DNS is the “phone book” for the Internet
  - Map between host names and IP addresses
  - DNS often uses UDP for communication
- Host names
  - Labels separated by dots, e.g., www.example.org
  - Final label is *top-level domain*
    - Generic: .com, .org, etc.
    - Country-code: .us, .il, etc.

DNS

- Domains are divided into second-level domains, which can be further divided into subdomains, etc.
  - E.g., in www.example.com, example is a second-level domain
- A host name plus domain name information is called the fully qualified domain name of the computer
  - Above, www is the host name, www.example.com is the FQDN

DNS

- nslookup program provides command-line access to DNS (on most systems)
- looking up a host name given an IP address is known as a reverse lookup
  - Recall that single host may have multiple IP addresses.
  - Address returned is the canonical IP address specified in the DNS system.

DNS

- `ipconfig` (on windows) can be used to find the IP address (addresses) of your machine
- *`ipconfig /displaydns`* displays the contents of the DNS Resolver Cache (*`ipconfig /flushdns`* to flush it)

Analogy to Telephone Network

- IP ~ the telephone network
- TCP ~ calling someone who answers, having a conversation, and hanging up
- UDP ~ calling someone and leaving a message
- DNS ~ directory assistance

Higher-level Protocols

- Many protocols build on TCP
  - Telephone analogy: TCP specifies how we initiate and terminate the phone call, but some other protocol specifies how we carry on the actual conversation
- Some examples:
  - SMTP (email)
  - FTP (file transfer)
  - HTTP (transfer of Web documents)

World Wide Web

- Originally, one of several systems for organizing Internet-based information
  - Competitors: WAIS, Gopher, ARCHIE
- Distinctive feature of Web: support for hypertext (text containing links)
  - Communication via Hypertext Transfer Protocol (HTTP)
  - Document representation using Hypertext Markup Language (HTML)

World Wide Web

- The Web is the collection of machines (Web servers) on the Internet that provide information, particularly HTML documents, via HTTP.
- Machines that access information on the Web are known as Web clients.
- A Web browser is software used by an end user to access the Web.

Hypertext Transfer Protocol (HTTP)

- HTTP is based on the request-response communication model:
  - Client sends a request
  - Server sends a response
- HTTP is a stateless protocol:
  - The protocol does not require the server to remember anything about the client between requests.

HTTP

- Normally implemented over a TCP connection (80 is standard port number for HTTP)
- Typical browser-server interaction:
  - User enters Web address in browser
  - Browser uses DNS to locate IP address
  - Browser opens TCP connection to server
  - Browser sends HTTP request over connection
  - Server sends HTTP response to browser over connection
  - Browser displays body of response in the client area of the browser window

HTTP

- The information transmitted using HTTP is often entirely text
- Can use the Internet's Telnet protocol to simulate browser request and view server response

HTTP

Connect

```
$ telnet www.example.org 80
Trying 192.0.34.166...
Connected to www.example.com (192.0.34.166).
Escape character is '^]'.
GET / HTTP/1.1
Host: www.example.org
```

Send Request

Receive Response

```
HTTP/1.1 200 OK
Date: Thu, 09 Oct 2020 20:30:49 GMT
…
```

HTTP Request

- Structure of the request:
  - start line
  - header field(s)
  - blank line
  - optional body

HTTP Request

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