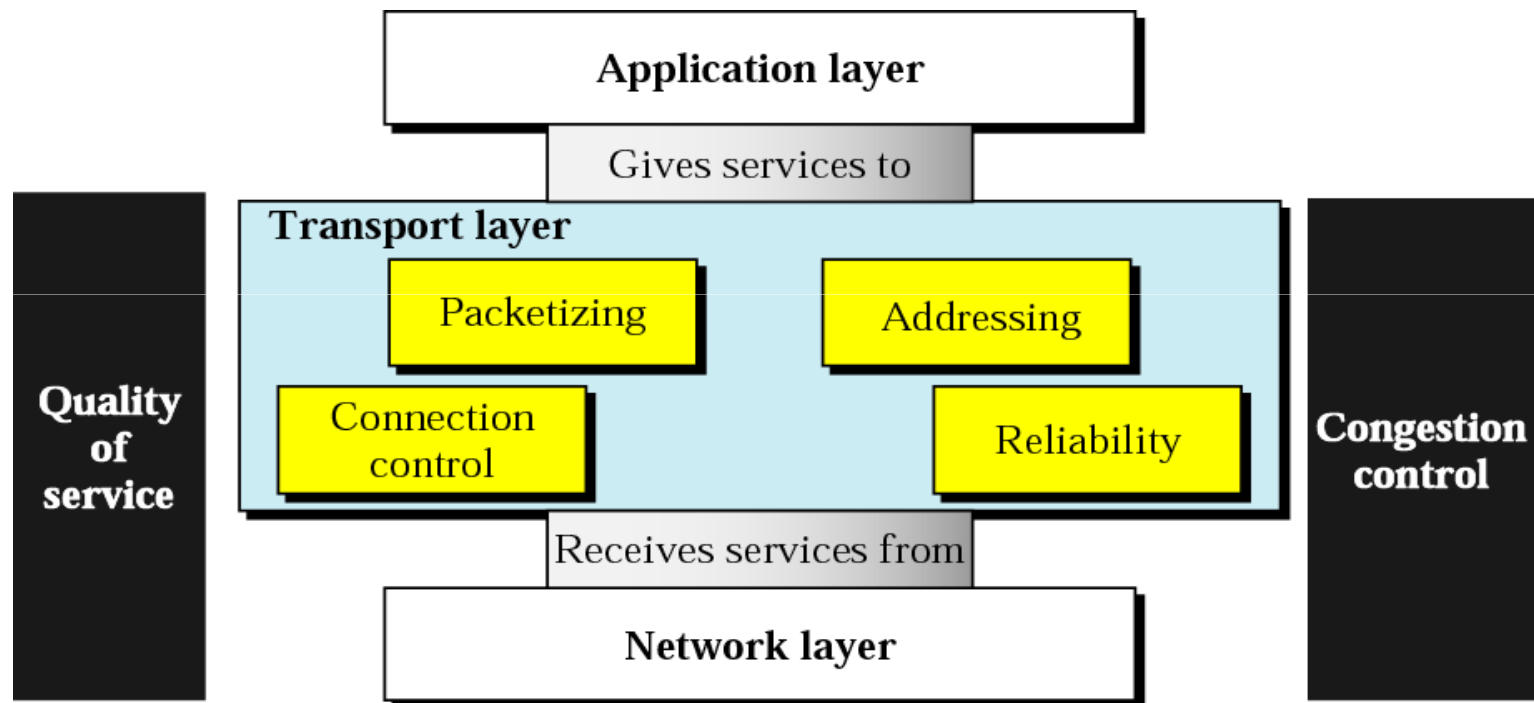# Computer Networks: Transport Layer and Protocols

By,

Mr. Kumar Pudashine, (MEng, AIT)
CCNP (Security), CEH, ITIL Expert, ISO 27001, CISA, AcitivIdentity Certified
Information Technology Division,
Agricultural Development Bank,
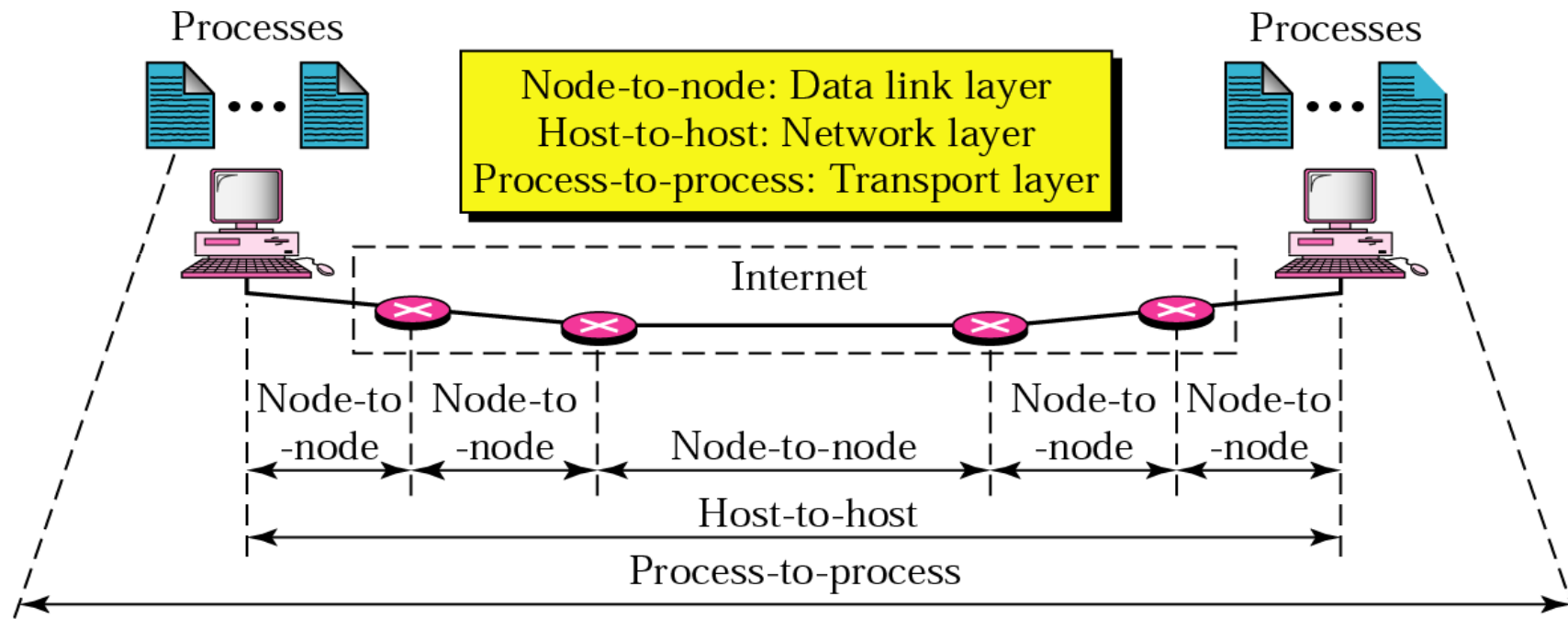Ramshahpath, Kathmandu
Nepal

August 2016
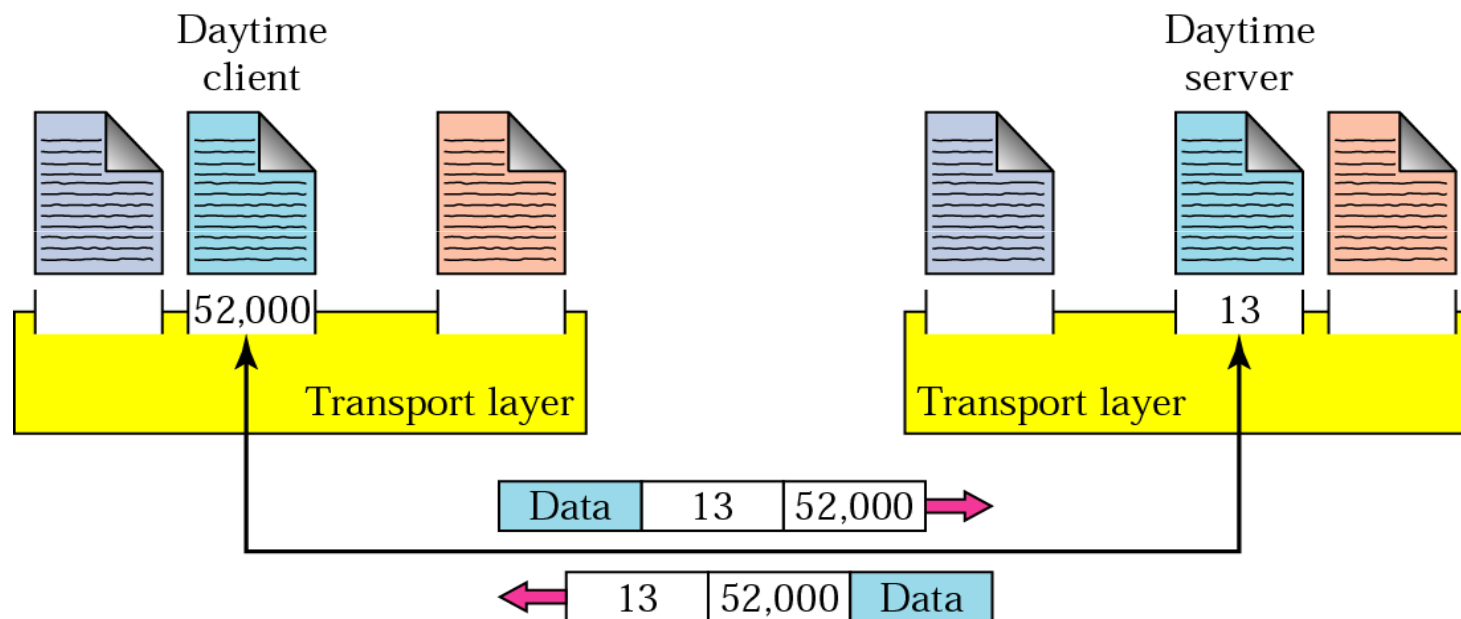
Transport Layer : Duties ??

Transport Layer : Type of Data Deliveries

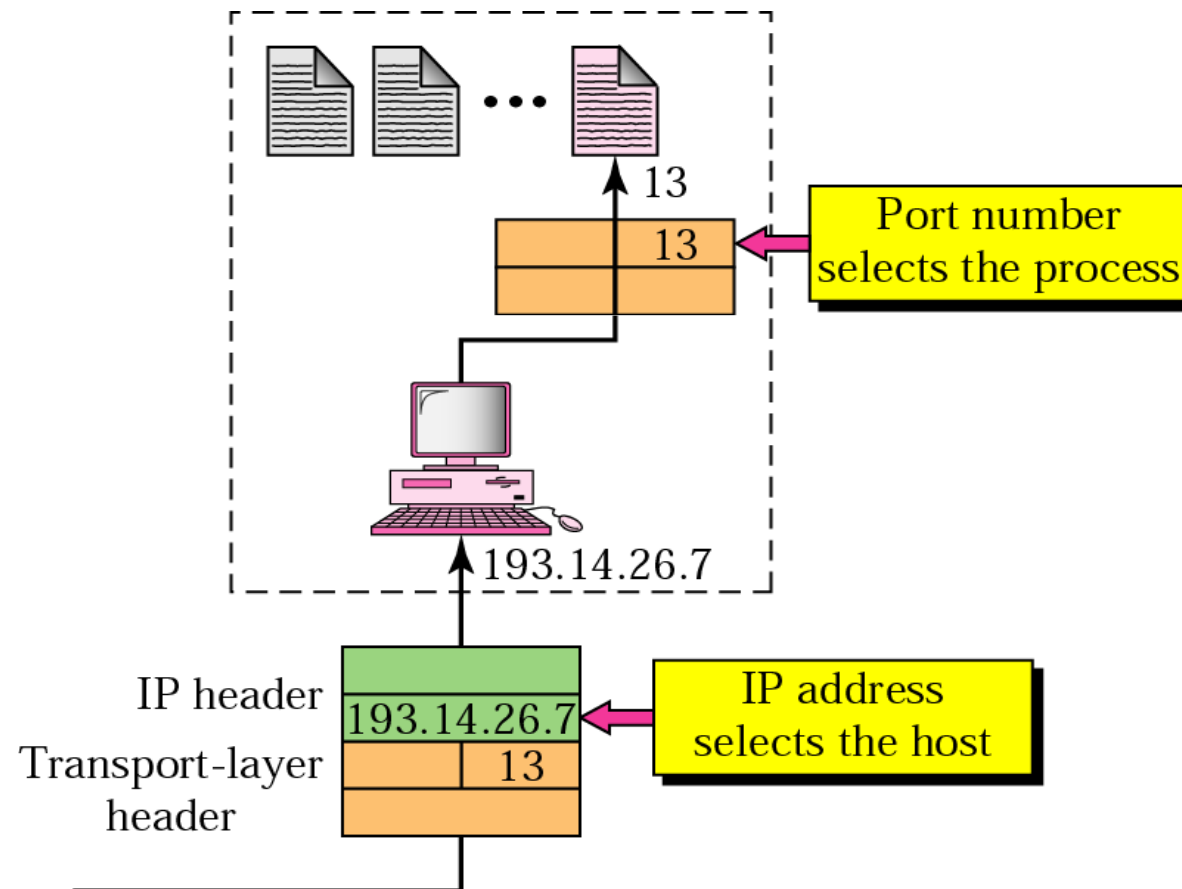Processes

Node-to-node: Data link layer
Host-to-host: Network layer
Process-to-process: Transport layer

Processes

Internet

Node-to -node | Node-to -node | Node-to-node | Node-to -node | Node-to -node

Host-to-host

Process-to-process

Transport Layer : Port Numbers

Transport Layer : IP VS Port Numbers

13

13

Port number
selects the process

193.14.26.7

IP header 193.14.26.7

Transport-layer
header 13

IP address
selects the host

Transport Layer : Port Numbers (IANA Range)
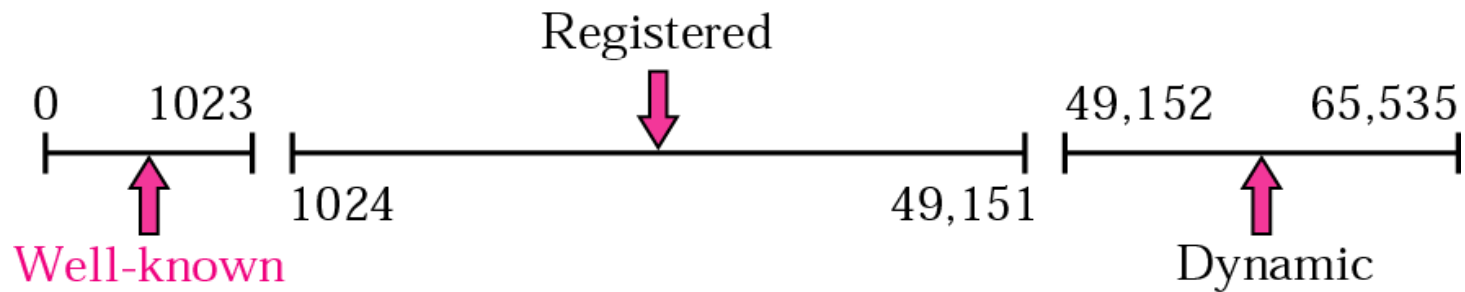
Transport Layer : Socket Address

IP address

| 200.23.56.8 |

Port number

| 69 |

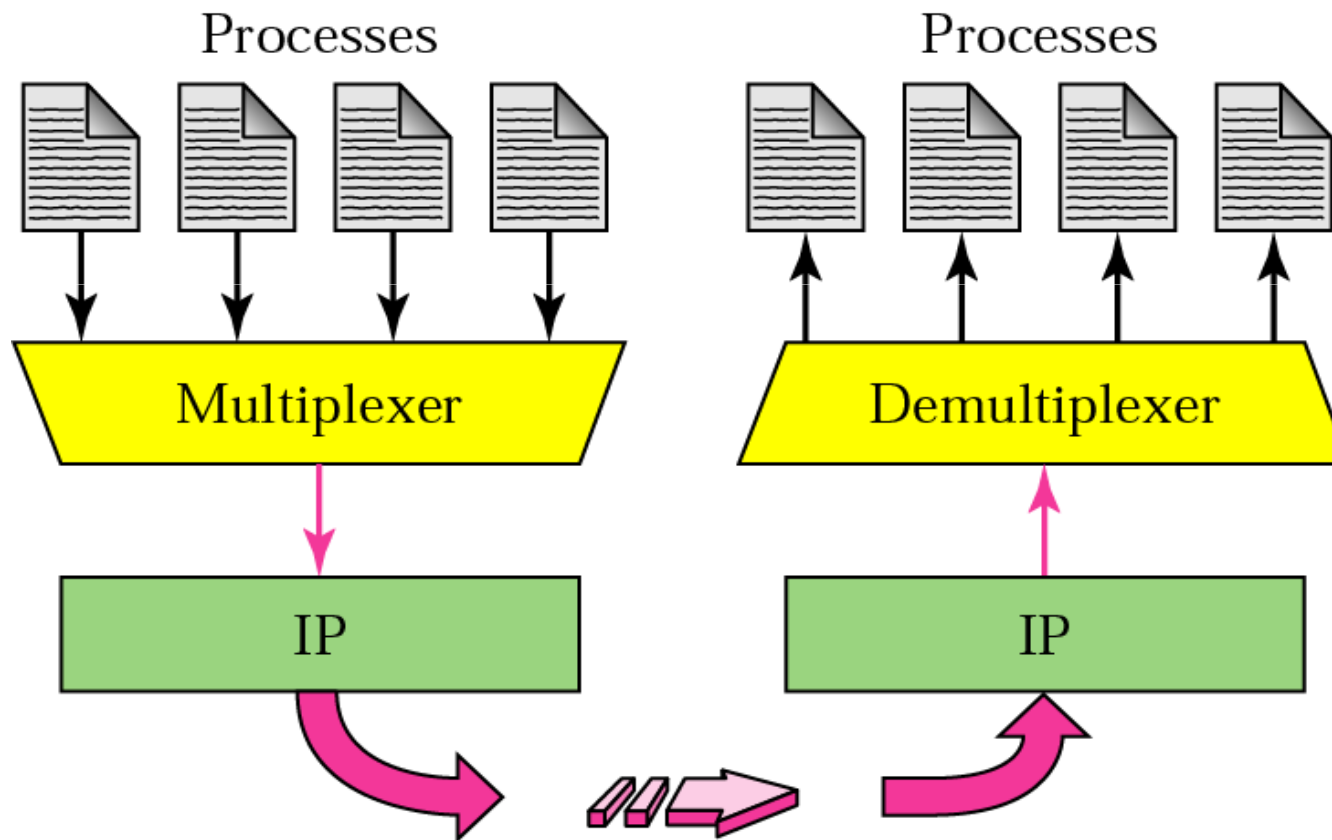| 200.23.56.8 | 69 |

Socket address
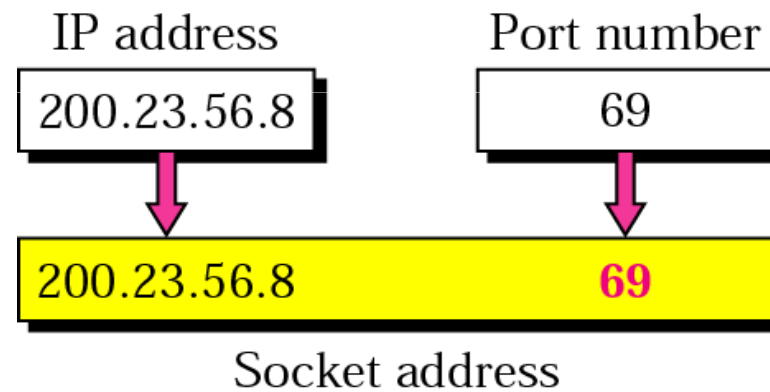
Transport Layer : Multiplexing and Demultiplexing

Transport Layer : Three Step Connection Establishment

Client   Server

Segment 1: SYN
seq: 1200,   ack: –

Segment 2: SYN 1 ACK
seq: 4800,   ack: 1201

Segment 3: ACK
seq: 1201,   ack: 4801

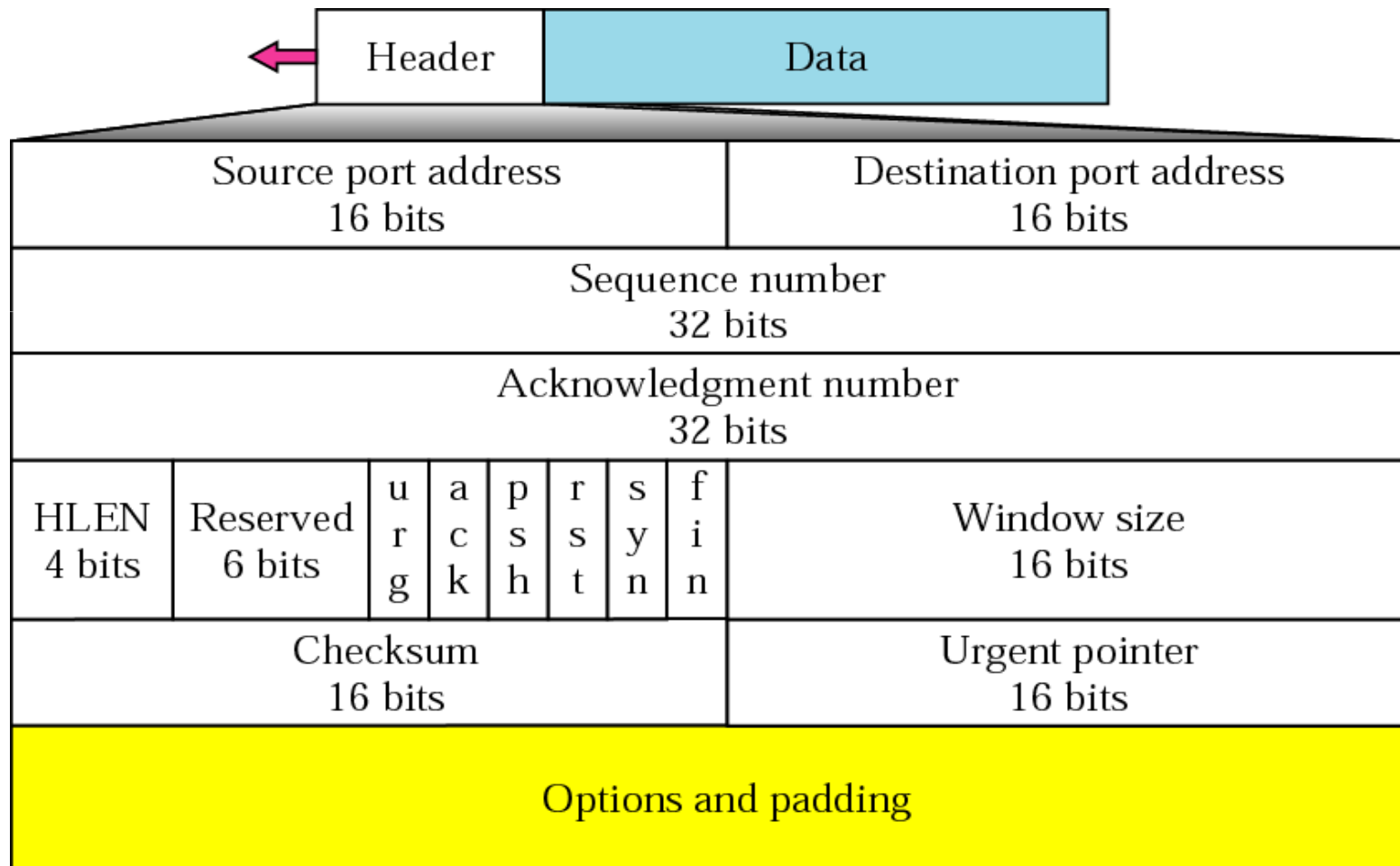Time   Time
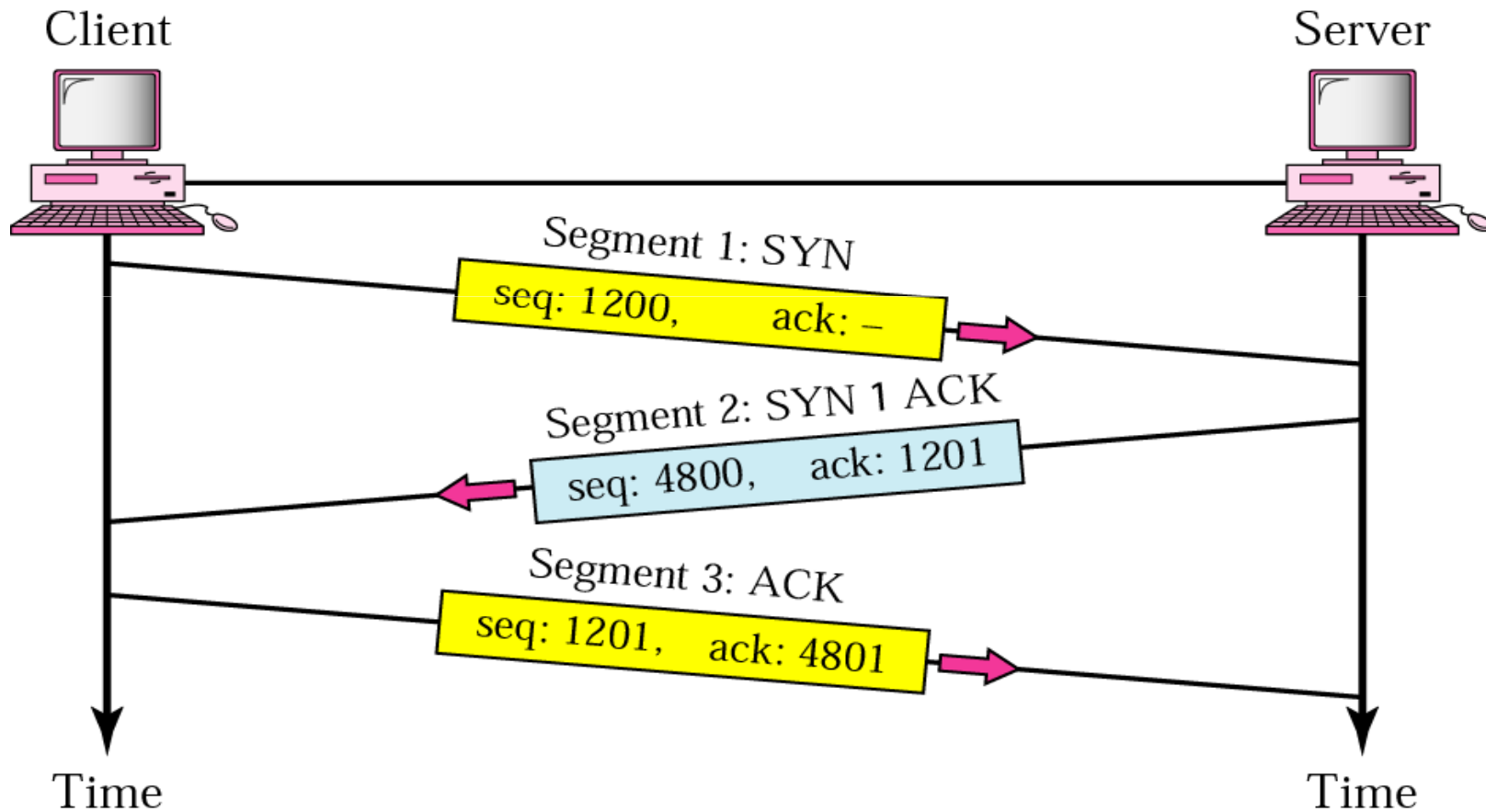
Transport Layer : Four Step Connection Termination
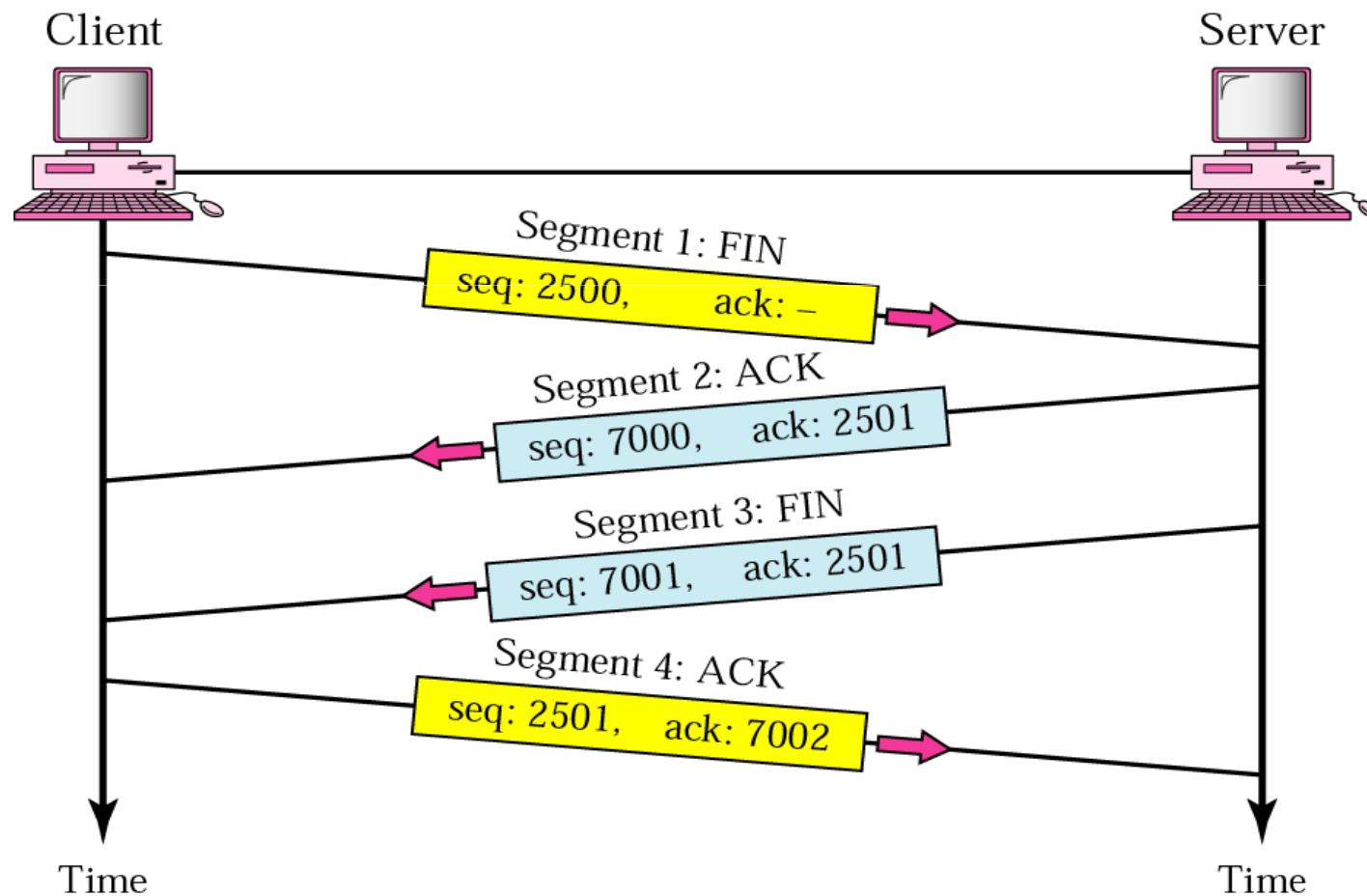
Transport Layer : TCP Segment Format
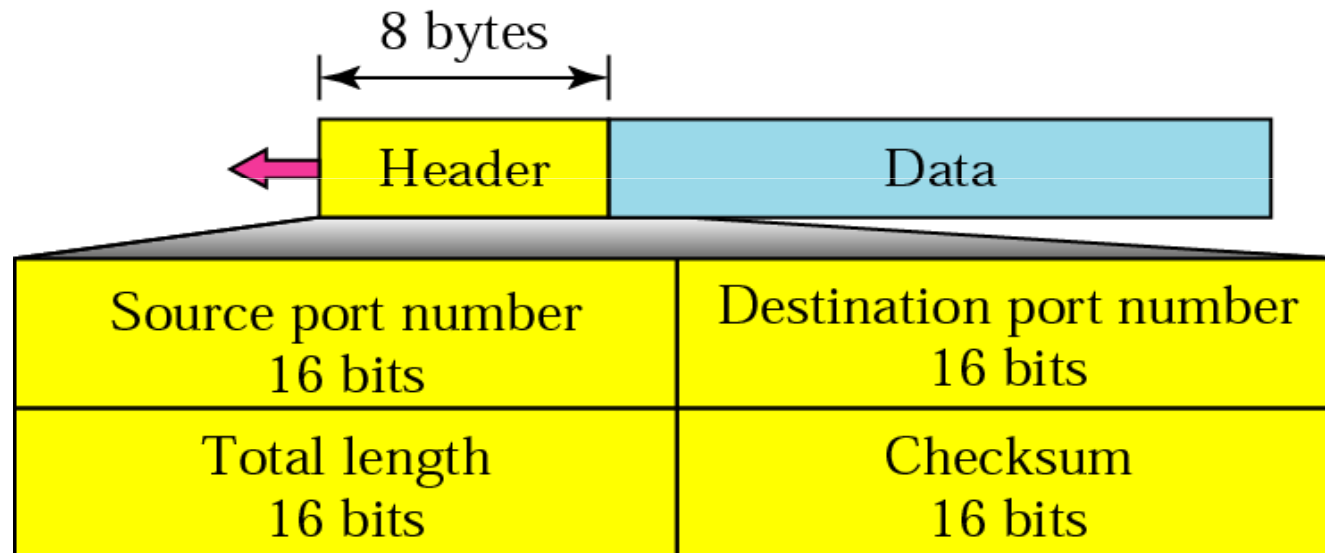
Transport Layer : TCP Segment Format (Control Fields)

URG: Urgent pointer is valid	RST: Reset the connection
ACK: Acknowledgment is valid	SYN: Synchronize sequence numbers
PSH: Request for push	FIN: Terminate the connection

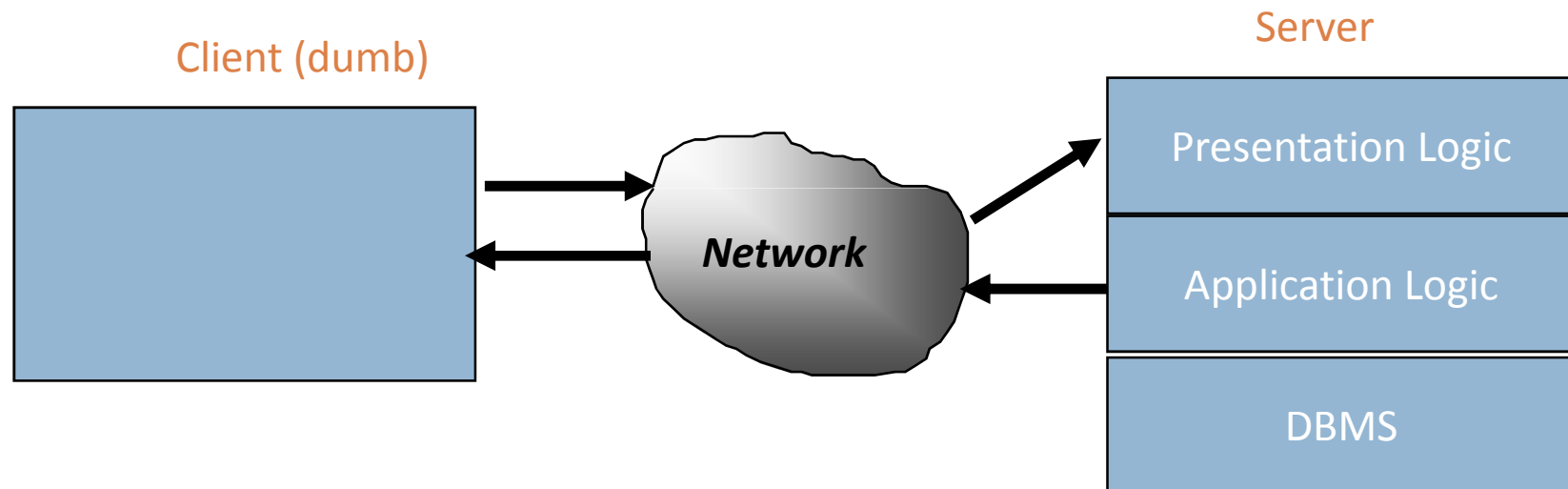| URG	ACK	PSH	RST	SYN	FIN

Transport Layer : UDP Segment Format

Client Server Computing: What it is ??

- It is a logical extension of Modular Programming.

- Modular Programming => Concept of separation of Modules.

- Client Server Computing => New Idea !!

- Modules can be separated in different Machines.

- Calling Modules => Clients
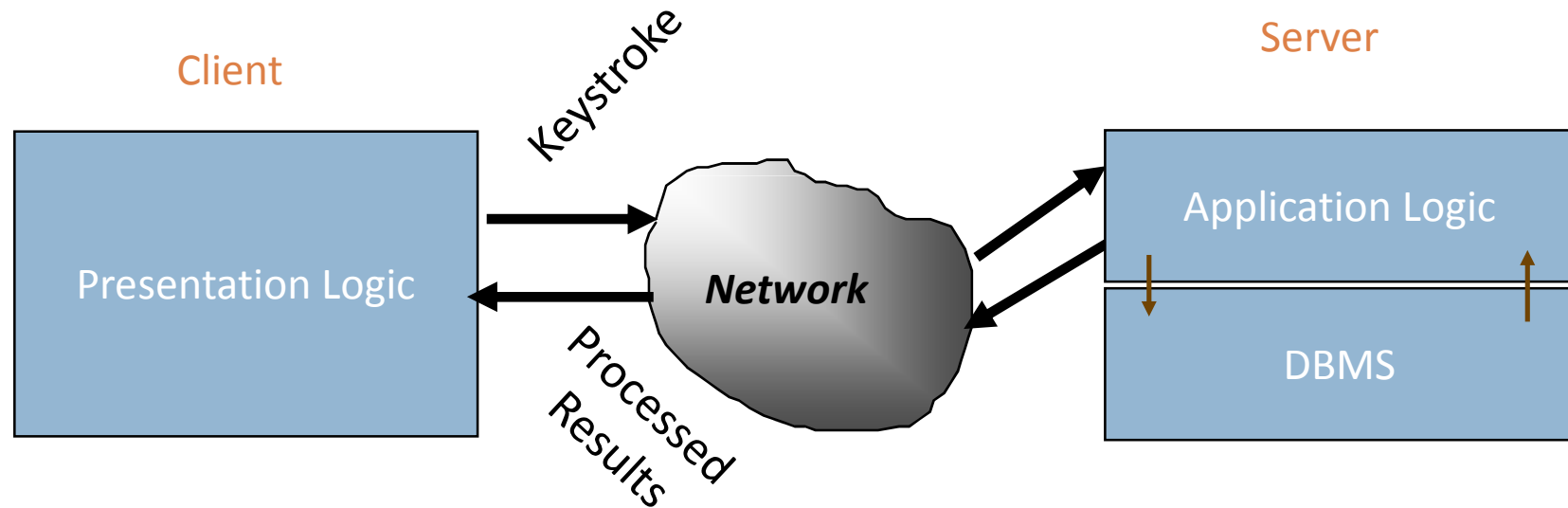
- Called Modules => Server

Client Server Model: Traditional Model

Client (dumb)

Server

Presentation Logic

Network

Application Logic

DBMS

True Client Server Model

Client

Server

Keystroke

Presentation Logic
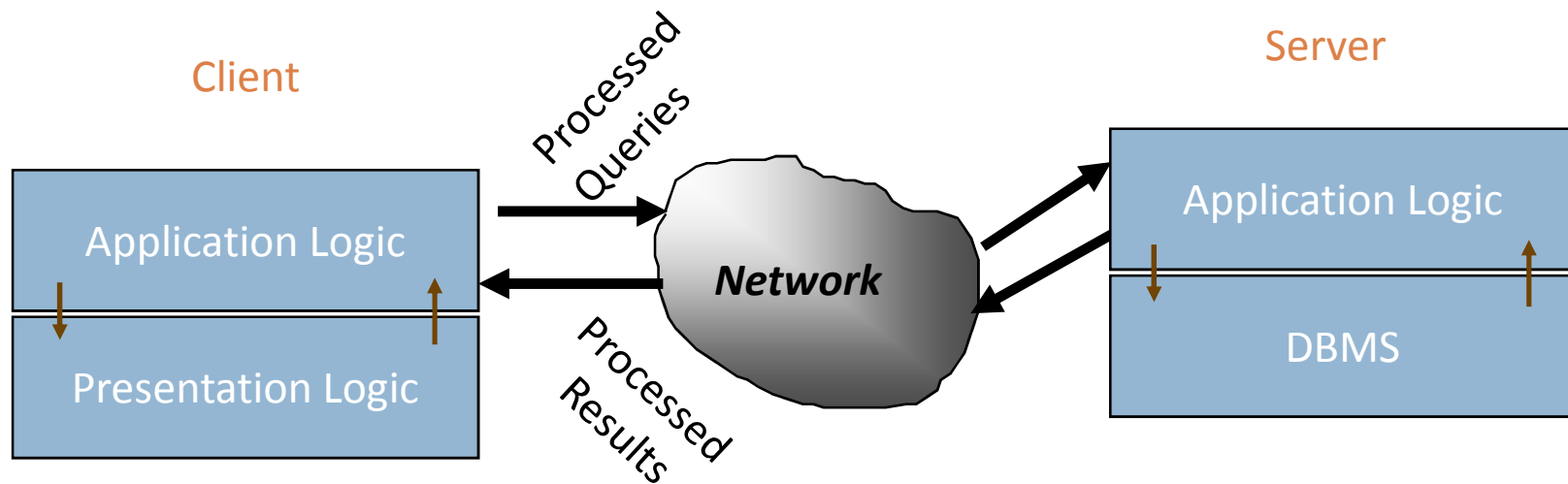
Network

Application Logic

Processed Results

DBMS
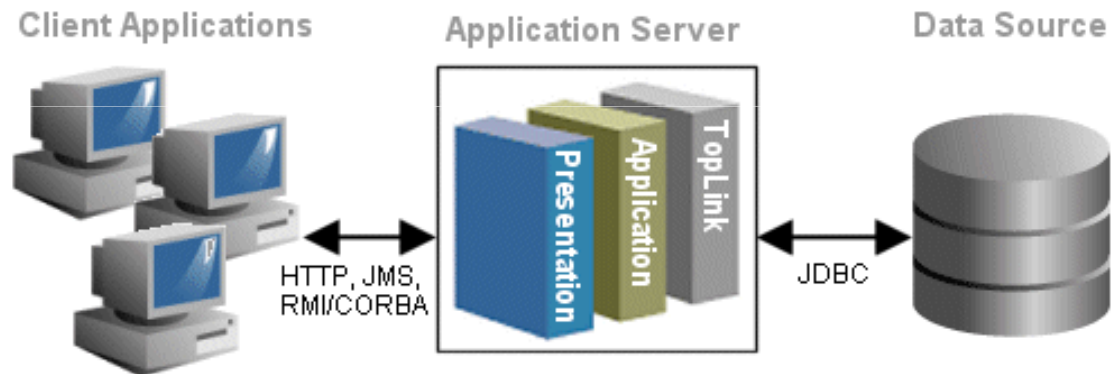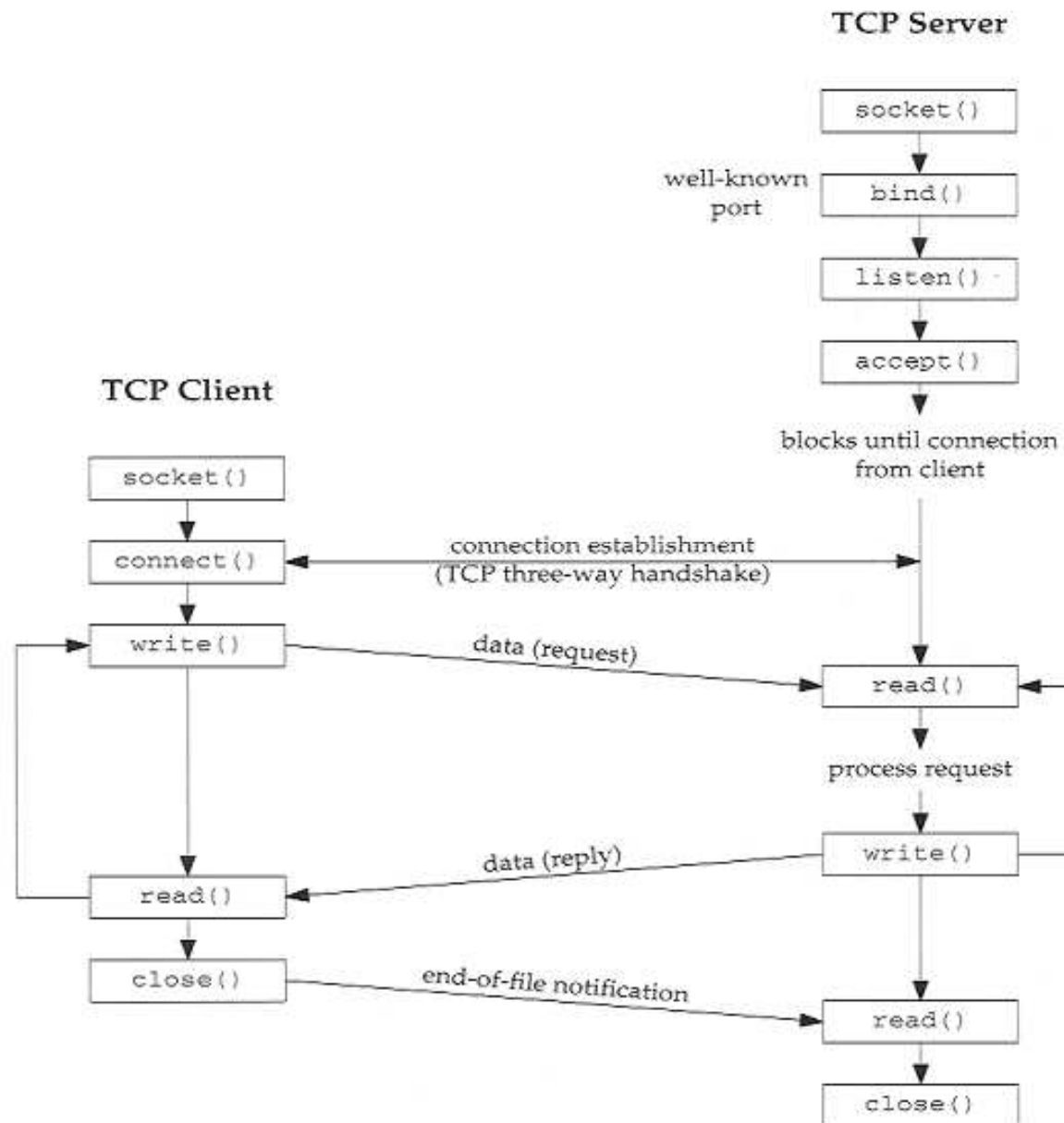
Distributed Client Server Model

Distributed Applications: Three-Tier Architecture

Socket Programming-01
(Client/Server Interaction with TCP Sockets)

TCP Server

```
socket()
```

well-known
port

```
bind()
```

```
listen()
```

```
accept()
```

blocks until connection
from client

TCP Client

```
socket()
```

```
connect()
```
connection establishment
(TCP three-way handshake)

```
write()
```
data (request)

```
read()
```

process request

```
write()
```
data (reply)

```
read()
```

```
close()
```
end-of-file notification

```
read()
```

```
close()
```

20

Socket Programming-02
Java Socket Programming

Thank You