SNS College of Technology

Department of Information Technology

19CSB302-COMPUTER NETWORKS

UNIT-4 APPLICATION LAYER

SOCKET PROGRAMMING

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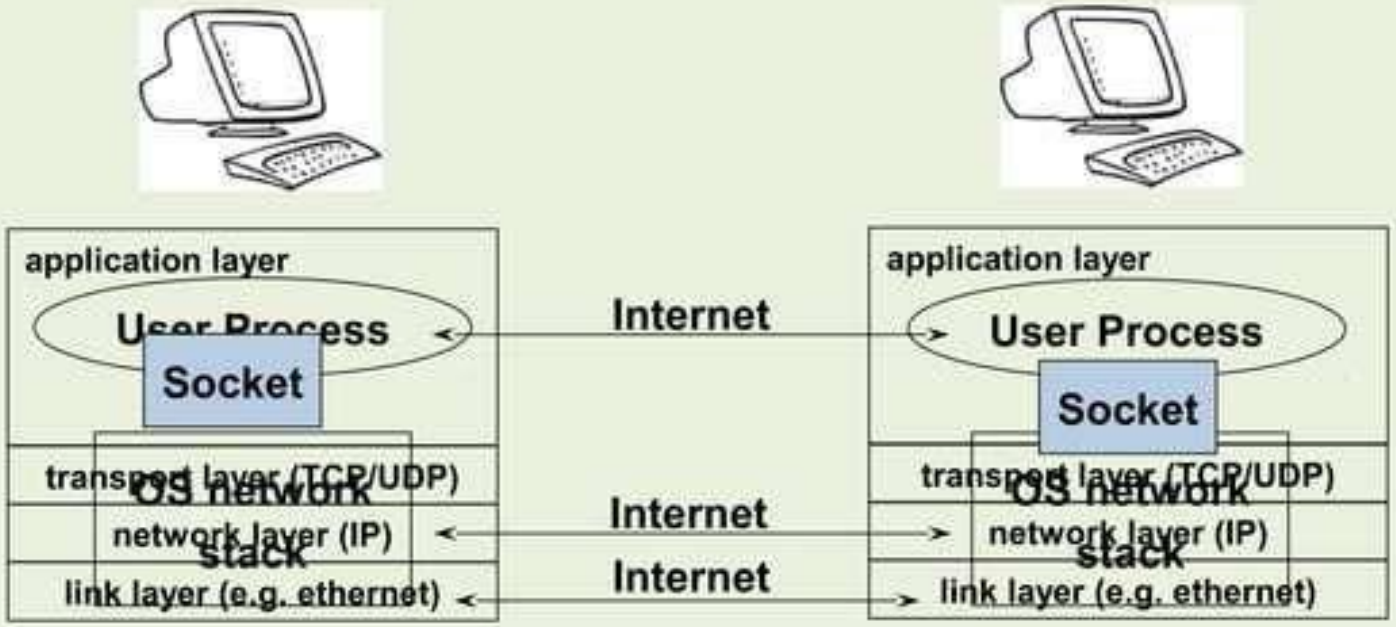
SNSCT

Definition of Socket

- when we desire a communication between two applications possibly running on different machines, we need **sockets**.
- Socket needs to return the file descriptor of following values like domain name, type of socket and name of the protocol.
- Socket commonly executes the user processes at Transport Layer.

Socket and Process Communication



The interface that the OS provides to its networking subsystem

Network Address

For Two processes to communicate, they need to know each others Network address.

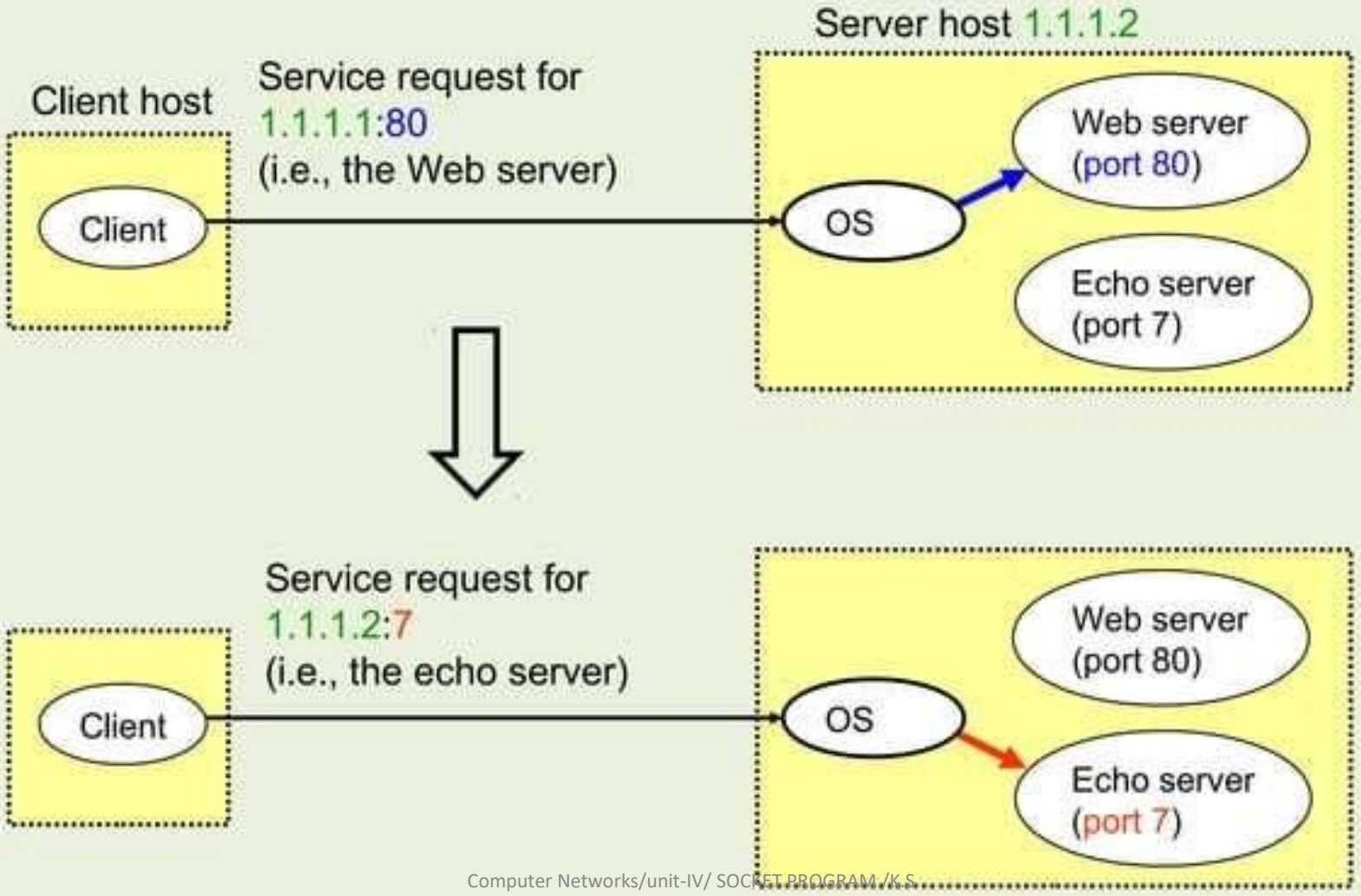
Network address consist of two parts:

<Internet (IP) address, Port number>

Port no. 1024-49151 are registered port

Port 4915-65536 can not be used. They are called ephemeral ports, which are assigned automatically by TCP or UDP for Client

Using Ports to Identify Services



Two Types of Application Processes Communication

- Datagram Socket (UDP)
  - Collection of messages
  - Best effort
  - Connectionless
- Stream Socket (TCP)
  - Stream of bytes
  - Reliable
  - Connection-oriented

User Datagram Protocol (UDP): Datagram Socket

UDP	Postal Mail
• Single socket to receive messages	• Single mailbox to receive letters
• No guarantee of delivery	• Unreliable
• Not necessarily in-order delivery	• Not necessarily in-order delivery
• Datagram – independent packets	• Letters sent independently
• Must address each packet	• Must address each mail

Example UDP applications
Multimedia, voice over IP (Skype)

Transmission Control Protocol (TCP): Stream Socket

TCP	Telephone Call
• Reliable – guarantee delivery	• Guaranteed delivery
• Byte stream – in-order delivery	• In-order delivery
• Connection-oriented – single socket per connection	• Connection-oriented
• Setup connection followed by data transfer	• Setup connection followed by conversation

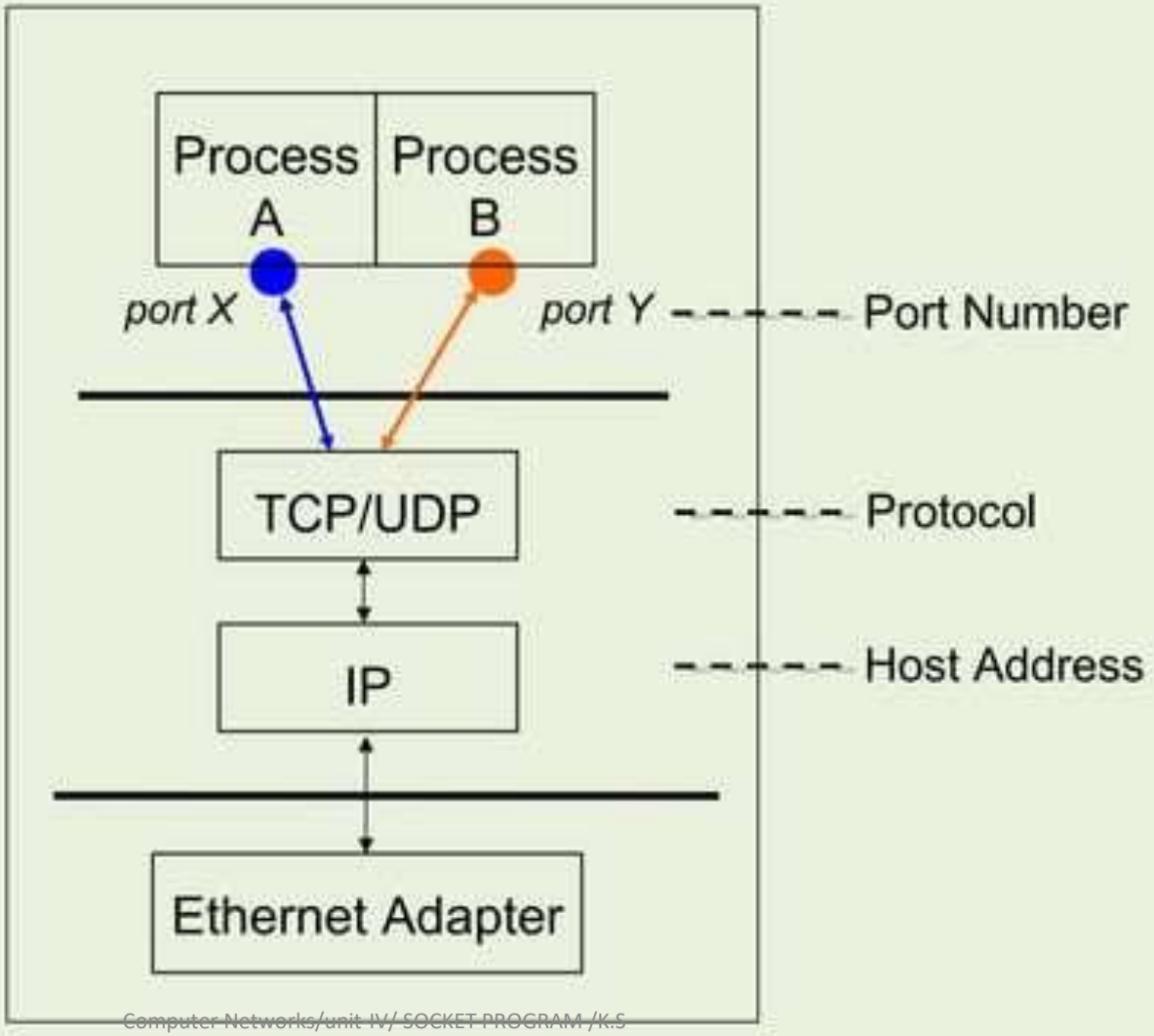
Example TCP applications

Web, Email, Telnet

Socket Identification

- Communication Protocol
  - TCP (Stream Socket): streaming, reliable
  - UDP (Datagram Socket): packets, best effort
- Receiving host
  - Destination **address** that uniquely identifies the host
  - An **IP address** is a 32-bit quantity
- Receiving socket
  - Host may be running many different processes
  - Destination **port** that uniquely identifies the socket
  - A **port number** is a 16-bit quantity

Socket Identification (Cont.)



Types of Socket

1. **Stream sockets** allow processes to communicate using TCP. A stream socket provides bidirectional, reliable, sequenced, and unduplicated flow of data with no record boundaries. Once the connection has been established, data can be read from and written to these sockets as a byte stream. The socket

type is SOCK_STREAM.

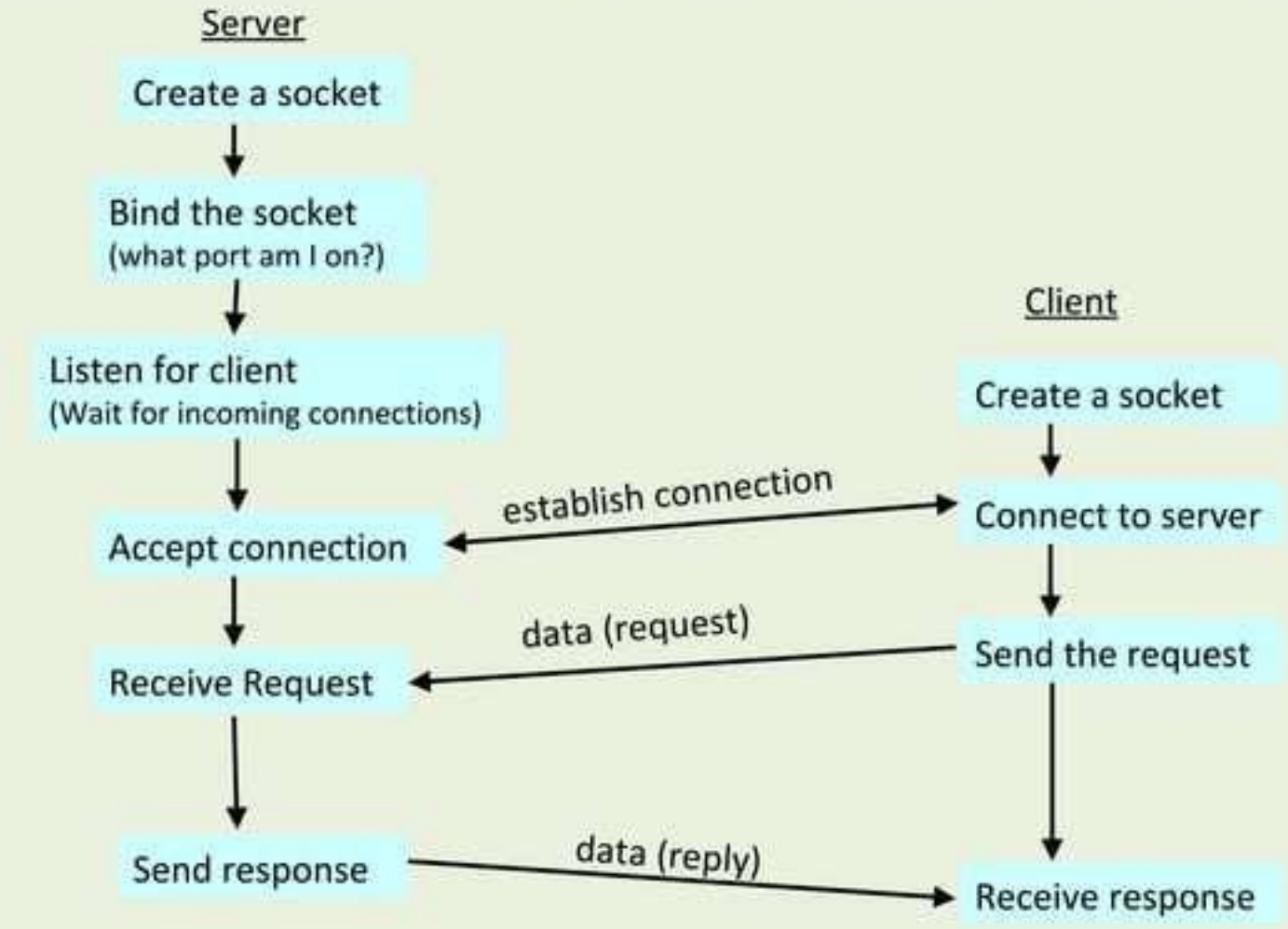
2. **Datagram sockets** allow processes to use UDP to communicate. A datagram socket supports bidirectional flow of messages. A process on a datagram socket may receive messages in a different order from the sending sequence and may receive duplicate messages. Record boundaries in the data are preserved. The socket type is SOCK_DGRAM.

Types of Socket (1)

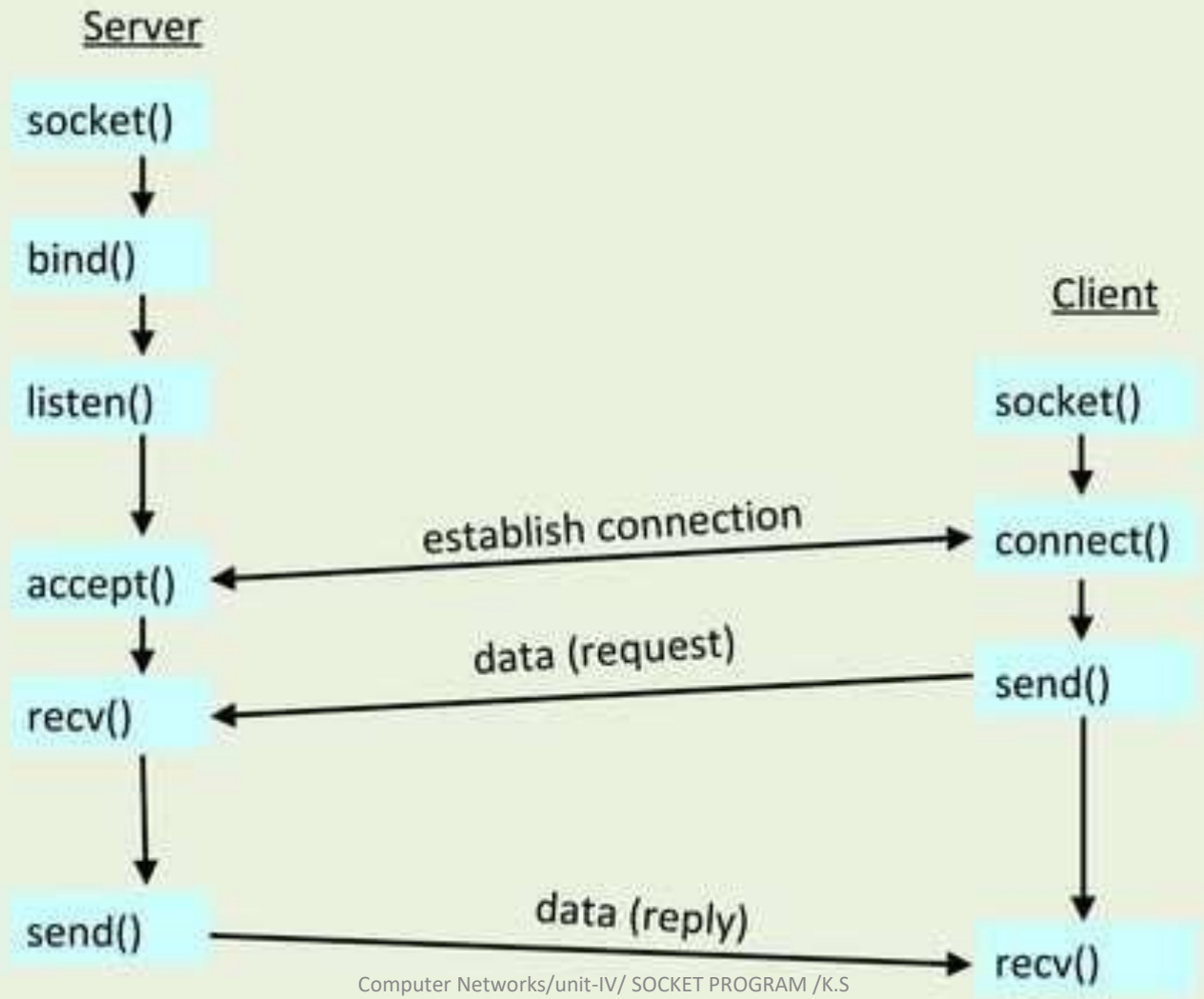
3. **Raw sockets** provide access to ICMP. These sockets are normally datagram oriented, although their exact characteristics are dependent on the interface provided by the protocol. Raw sockets are not for most applications. They are provided to support developing new communication protocols or for access to more esoteric facilities of an existing protocol.

Client-Server Communication

Stream Sockets (TCP): Connection-oriented



Connection-oriented Example (Stream Sockets -TCP)



THANK YOU