

# **Computer Networking**

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CSE 3034

Computer Networking

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Physical Layer, Data Link, The Medium Access Control Sublayer, Network Layer, The Transport, Application Layer, Network Security  
Communication: Connection Oriented Communication, Project: WWW Redirection, Connectionless Communication and Multicast, Project : Internet Radio, Project: Server Performance

Textbook

- Computer Networks by Tannenbaum, Pearson India
- UNIX Systems Programming: Communication, Concurrency and Threads by Robbins and Robbins, Pearson

Course Format: 3 Classes/week, 1hr/Class, 1 Lab/Week, 2hr/Lab, 1 credit = 4 Credits

# Introduction

- During the 20th century, the key technology was information gathering, processing, and distribution.
- Among other developments, the installation of worldwide telephone networks, the invention of radio and television, the birth and growth of the computer industry, and the launching of communication satellites.
- The merging of computers and communications has had a profound influence on the way computer systems are organized.
- The old model of a single computer serving all of the organization's computational needs has been replaced by one in which a large number of separate but interconnected computers do the job. These systems are called computer networks.
- **Computer network : a collection of autonomous computers interconnected by a single technology.**

# Introduction

- Computer network : a collection of autonomous computers interconnected by a single technology.
- Two computers are said to be interconnected if they are able to exchange information.
- Networks come in many sizes, shapes and forms. Although it may sound strange to some people, neither the Internet nor the World Wide Web is a computer network.
- The Internet is not a single network but a network of networks and the Web is a distributed system that runs on top of the Internet.

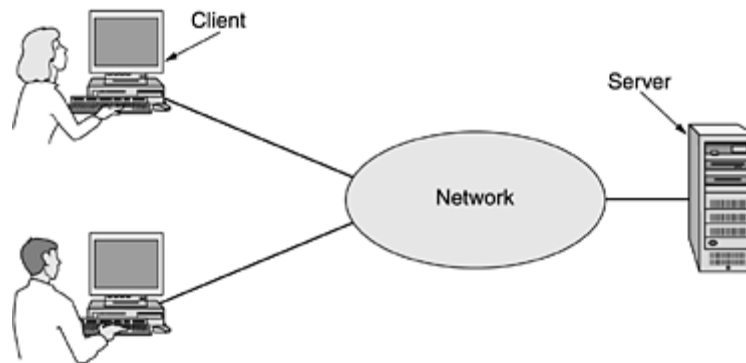
# Computer network and a distributed system

- **Distributed system:** a collection of independent computers appears to its users as a single coherent system.
- A well-known example of a distributed system is the World Wide Web, in which everything looks like a document (Web page).
- In a **computer network**, this coherence, model, and software are absent.
- A distributed system is a software system built on top of a network. The software gives it a high degree of cohesiveness and transparency.
- The distinction between a network and a distributed system lies with the software (especially the operating system), rather than with the hardware.

# Uses of Computer Networks

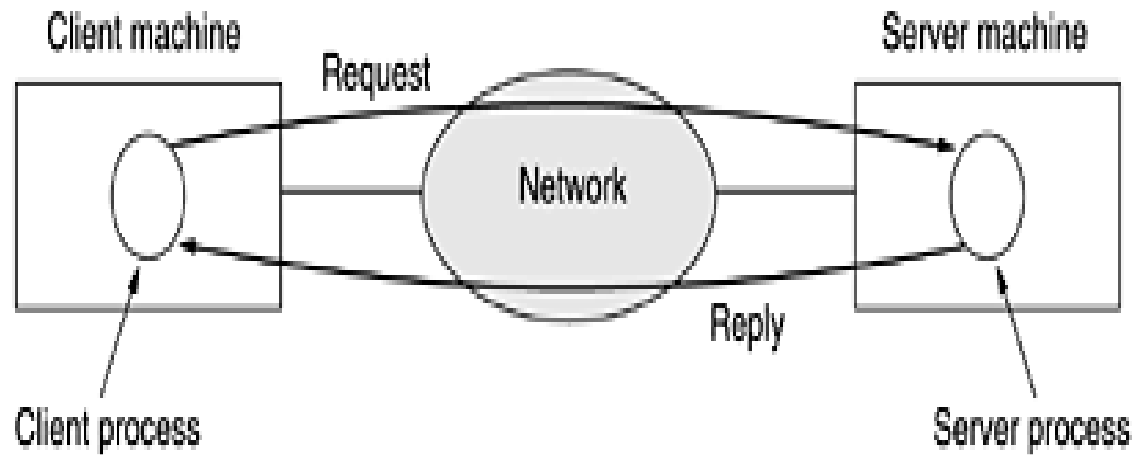
## 1. Business Applications

- Resource sharing
- Information sharing
- Client-server model
  - In client-server model , two processes are involved, one on the client machine and one on the server machine. Communication takes the form of the client process sending a message over the network to the server process.



## The client-server model involves requests and replies

- The client process then waits for a reply message. When the server process gets the request, it performs the requested work or looks up the requested data and sends back a reply.



# Business Applications

- A second goal of setting up a computer network has to do with people rather than information or even computers. A computer network can provide a powerful communication medium among employees.
- A third goal for increasingly many companies is doing business electronically with other companies, especially suppliers and customers.
- A fourth goal that is starting to become more important is doing business with consumers over the Internet. It is called e-commerce (electronic commerce).



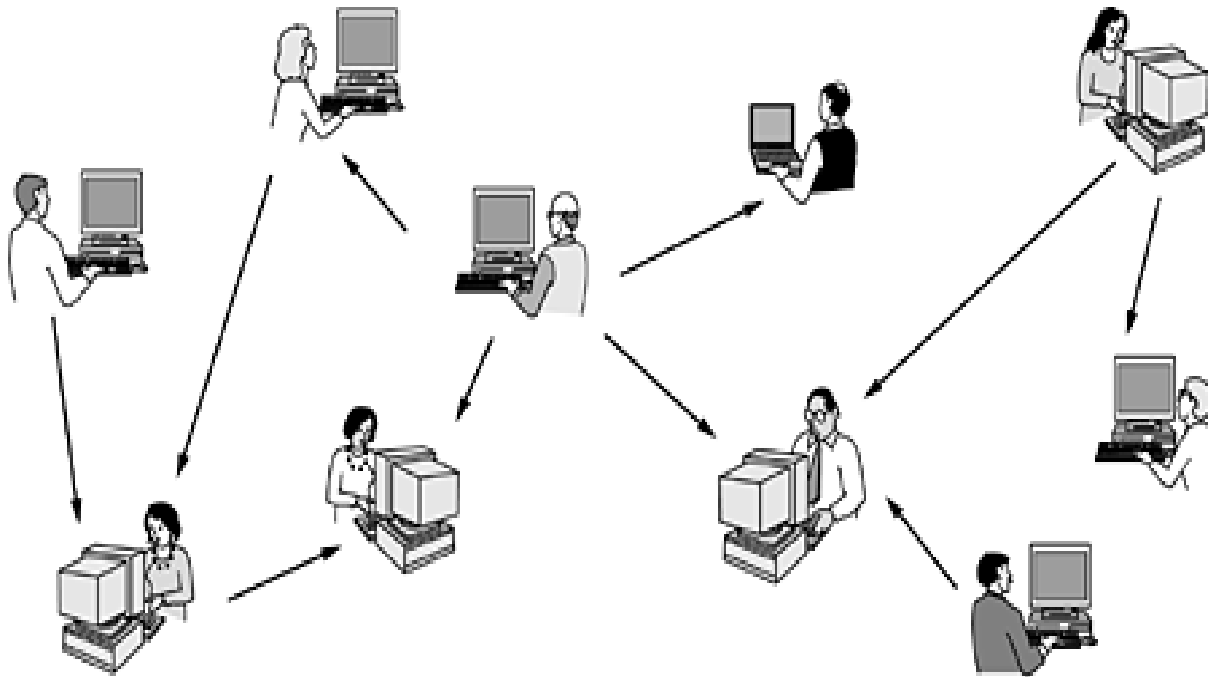
## 2. Home Applications

- Some of the more popular uses of the Internet for home users are as follows:
  - Access to remote information.
  - Person-to-person communication.
  - Interactive entertainment.
  - Electronic commerce.
- **Access to remote information** comes in many forms. It can be surfing the World Wide Web for information or just for fun.
- Information available includes the arts, business, cooking, government, health, history, hobbies, recreation, science, sports, travel, and many others.

# Person-to-Person communication

- The second broad category of network use is person-to-person communication. E-mail is already used on a daily basis by millions of people all over the world and its use is growing rapidly.
- Another type of person-to-person communication often goes by the name of peer-to-peer communication, to distinguish it from the client-server model.
- In this form, individuals who form group can communicate with others in the group. Every person can, in principle, communicate with one or more other people.
- In a peer-to-peer system there are no fixed clients and servers

# Peer-to-Peer system



- Third category is entertainment, which is a huge and growing industry.
- Our fourth category is electronic commerce in the broadest sense of the term
- Some forms of e-commerce.

Tag	Full name	Example
B2C	Business-to-consumer	Ordering books on-line
B2B	Business-to-business	Car manufacturer ordering tires from supplier
G2C	Government-to-consumer	Government distributing tax forms electronically
C2C	Consumer-to-consumer	Auctioning second-hand products on line
P2P	Peer-to-peer	File sharing

# 3. Mobile Users

- Mobile computers, such as notebook computers and personal digital assistants (PDAs), are one of the fastest- growing segments of the computer industry.
- Many owners of these computers have desktop machines back at the office and want to be connected to their home base even when away from home or en route. Since having a wired connection is impossible in cars and airplanes, there is a lot of interest in wireless networks.

# Combinations of wireless networks and mobile computing

Wireless	Mobile	Applications
No	No	Desktop computers in offices
No	Yes	A notebook computer used in a hotel room
Yes	No	Networks in older, unwired buildings
Yes	Yes	Portable office; PDA for store inventory