Kazakh National University

CREATION OF A SIMPLE NETWORK CONFIGURATION

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Learning Objectives

- Outline Basic network configurations

- Name kinds of applications that might use each Configuration

Network Configurations?

- Ways of organizing data processing
  - Where to do processing

- Decision on "which configuration" depends on:
  - Available equipment
  - Applications

- Many Basic configurations
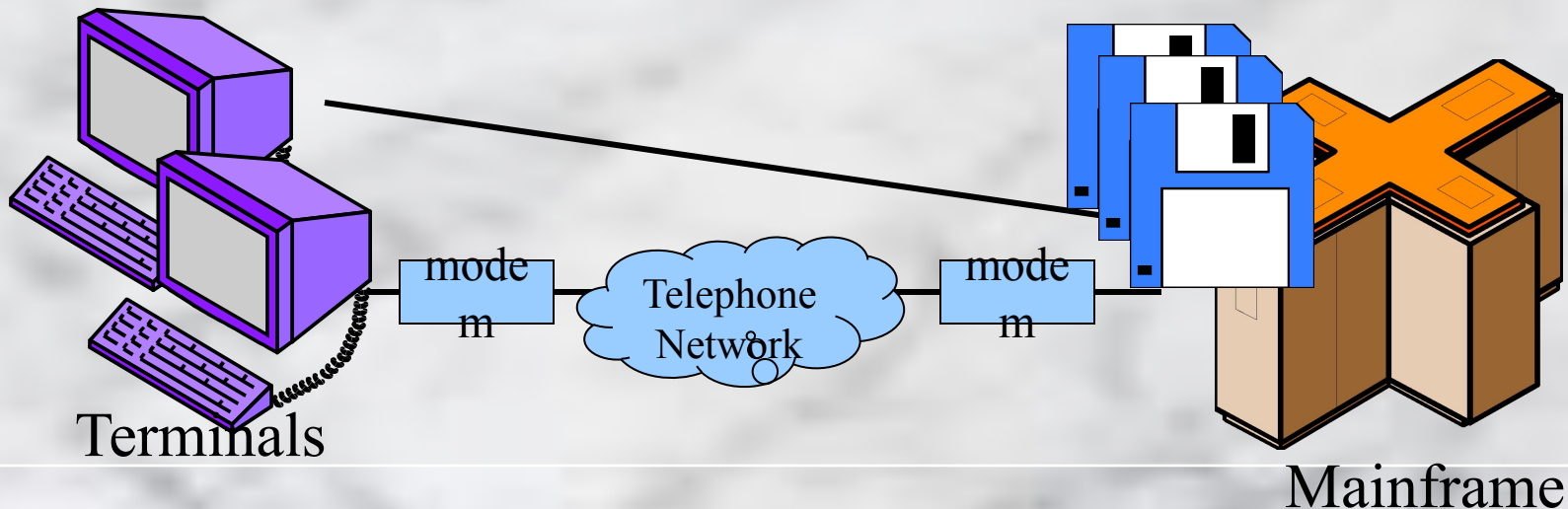
Basic configurations

- Terminal to mainframe computer

- Microcomputer to mainframe computer

- Microcomputer to local area network

- Microcomputer to Internet

- Local area network to local area network

Basic configurations

- Local area network to wide area network

- Wide Area network to Wide Area network

- Sensor to local area network

- Satellite and microwave

- Wireless telephone

Terminal-to-mainframe configuration

- Created in the 1960s
  - *Mainframe* does all the processing
  - *Terminals* are dumb--only a remote screen and keyboard
  - Created in the 1960s, when microprocessors for terminal intelligence did not exist

- Use in decrease (*Legacy* Systems)

mode
m

Telephone
Network

mode
m

Terminals

Mainframe

# Terminal-to-mainframe configuration

- Usually, *Mainframe*
  - Optimized for business uses--file access speed is more crucial than mathematical processing

- Terminals used for:
  - Entering data into system
  - Displaying results from the Mainframe

- Configuration used for:
  - Inquiry/Response applications
  - Interactive applications

- Examples: Airline reservation, Motor Vehicle licensing

Terminal-to-mainframe configuration

- Mainframe controls:
  - Sending data to the terminals
  - Receiving data from the terminals

- Require special types of protocols

- Transmission at relatively slow speed (e.g. 9600 bps)

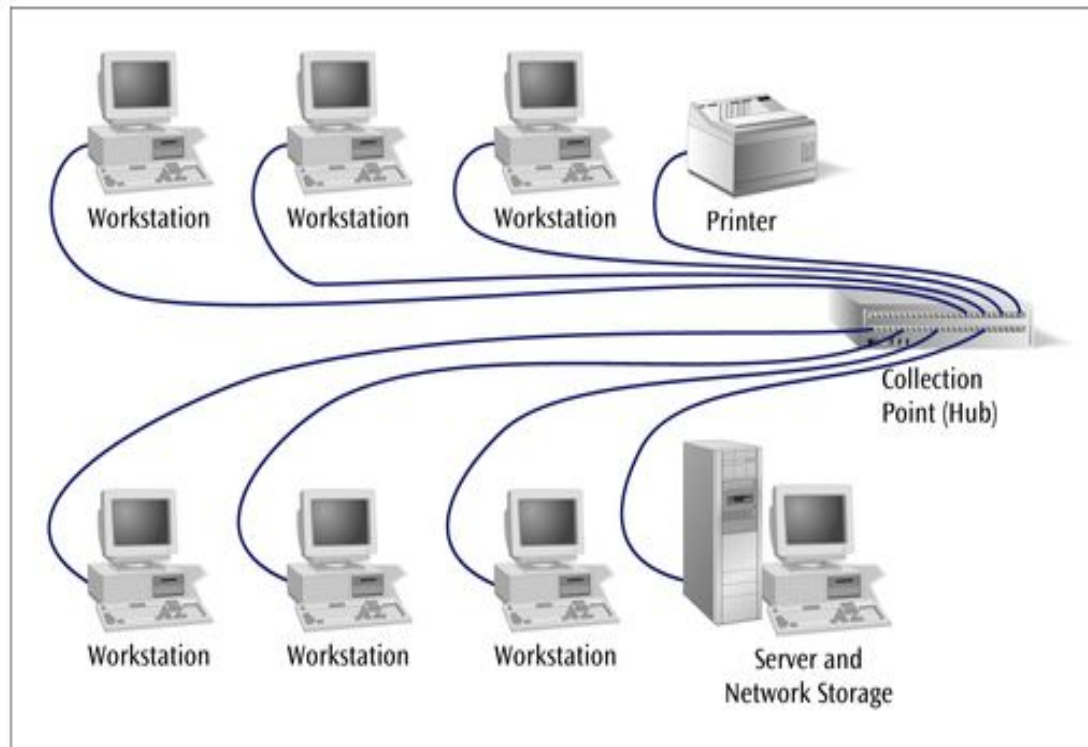# Microcomputer-to-mainframe configuration

- Began to emerge in the early 1980s

- Usually:
  - Mainframes store databases
  - Microcomputers perform operations on downloaded data
  - File Server Program Access is used (see next) for processing
  - Client/Server processing could also be used (see next)

- Can be used as a Terminal-to-Mainframe (w. Terminal-emulation cards)

- Example: Business employees accessing corporate database

Data are downloaded to Microcomputer. Executed There

Uploaded to Mainframe

Microcomputer

Mainframe
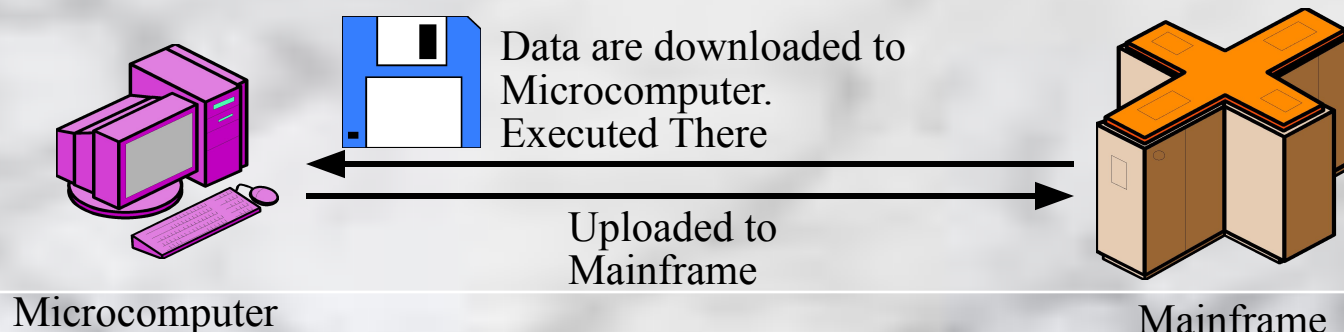
Microcomputer-to-LAN configuration

Figure 1-3

A microcomputer lab, showing the cabling that exits from the back of a computer and runs to a collection point of the LAN in the back of the room
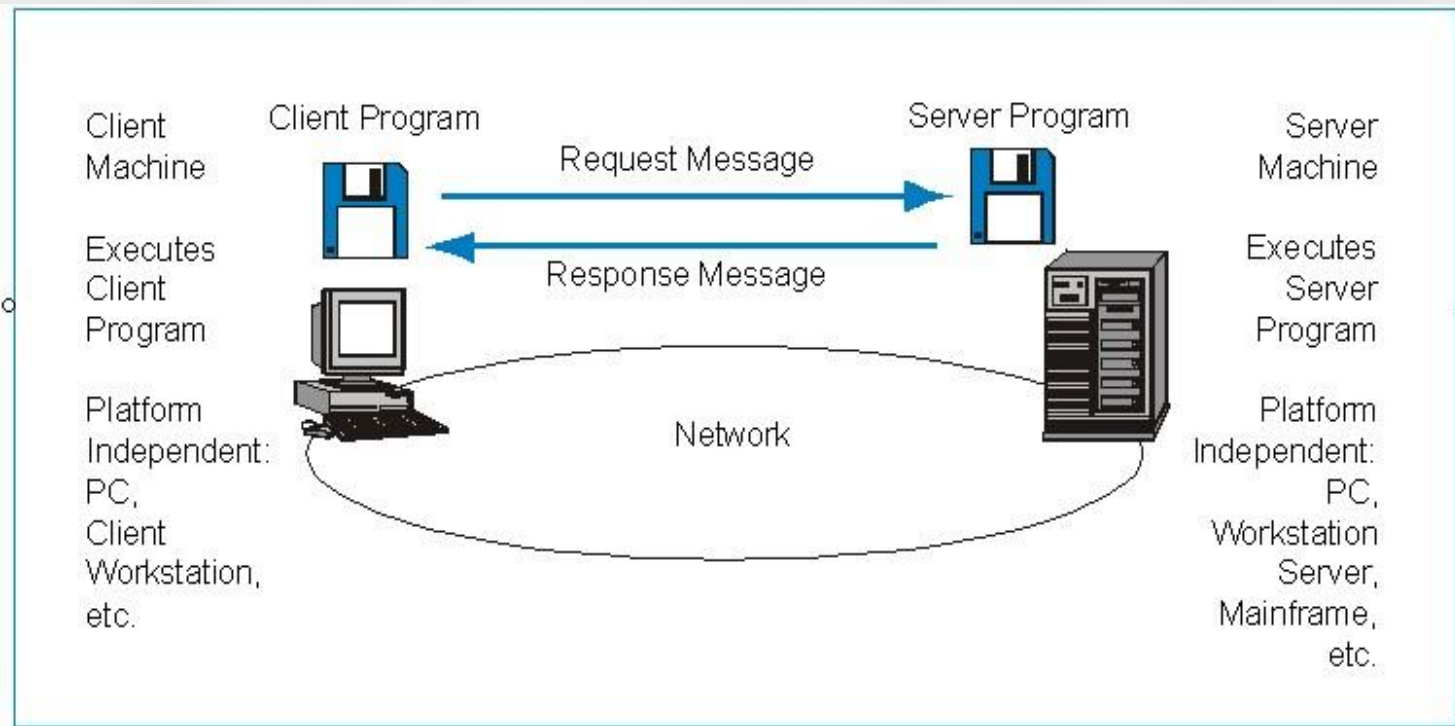
Microcomputer-to-LAN configuration

- Perhaps the most common Network configuration
    - Very common in business and academic environments

- LAN = Excellent system for sharing software (Word processing, spreadsheet, etc.) and peripherals (High quality printers, etc.)

- LAN contain software necessary to route request to appropriate resource

Microcomputer-to-LAN configuration

- Client/Server processing system = one of the most common processing techniques used.

Client Machine · Client Program · Request Message → Server Program · Server Machine

Executes Client Program ← Response Message · Executes Server Program

Platform Independent: PC, Client Workstation, etc. · Network · Platform Independent: PC, Workstation Server, Mainframe, etc.

Client/Server Processing

- ## Division of Labor
  - *Client program handles lighter work,* such as user interface chores and light processing chores
  - *Server program handles heavy work,* such as database retrieval

Client Program

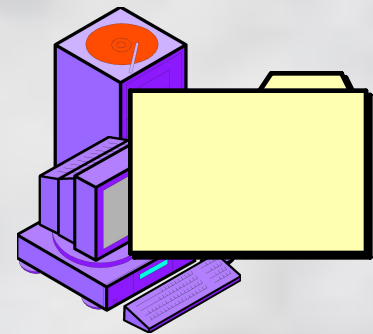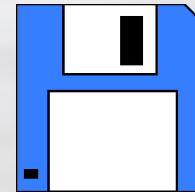Server Program

Client Machine
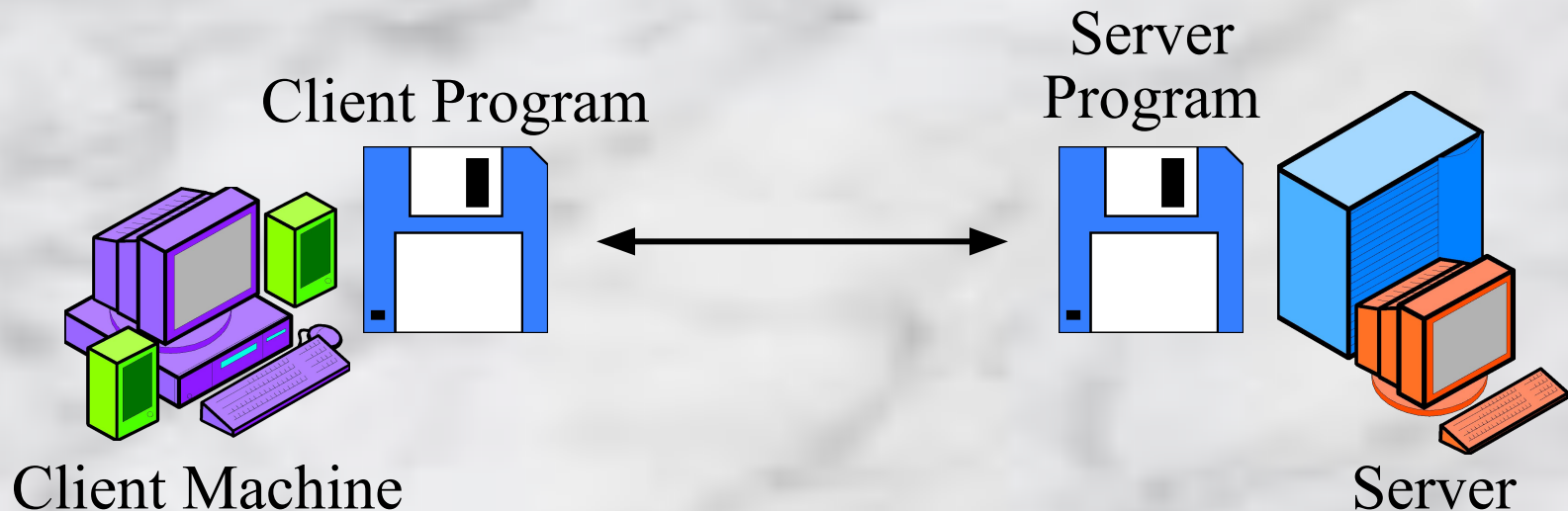
Server

File Server Program Access

- *File Server Program Access* is another Common Way to Execute Programs in Networks with Microcomputer-to-LAN configurations
 - Program files and Data files are *stored* on a file server before execution
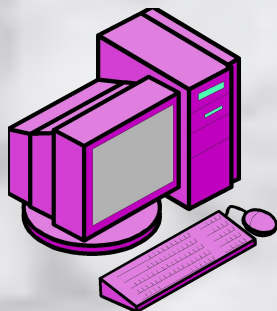
Stored on the File Server
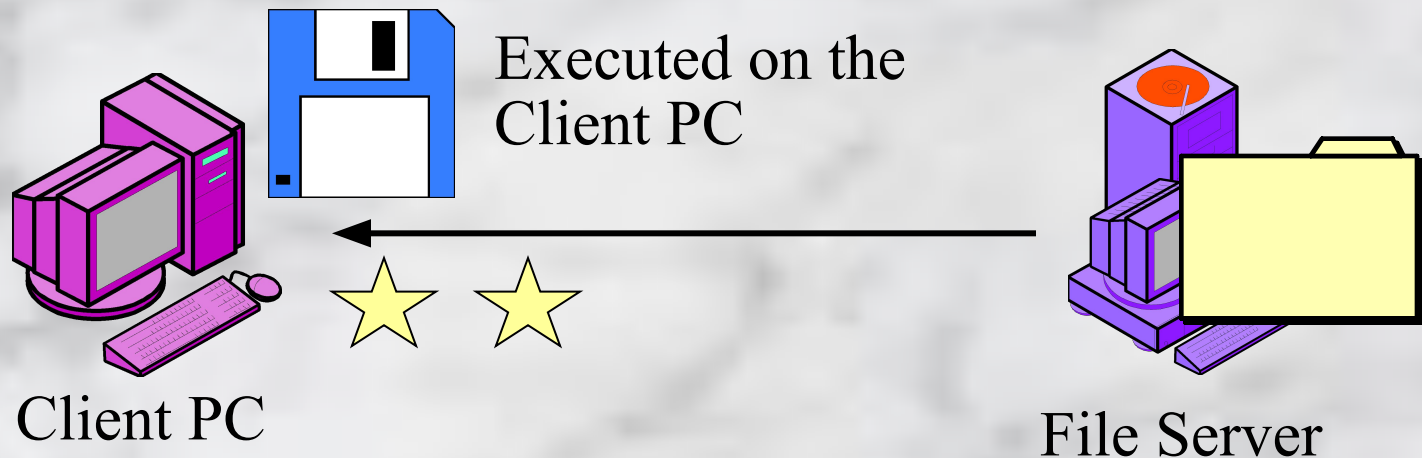
Client PC

File Server

File Server Program Access

- For execution,
  - Program and data files are *downloaded* (copied) to the Client PC
  - *Processing* on the client PC, not on the file server
  - File server merely *stores* programs and data files

Downloaded to Client PC, Executed There

Client PC
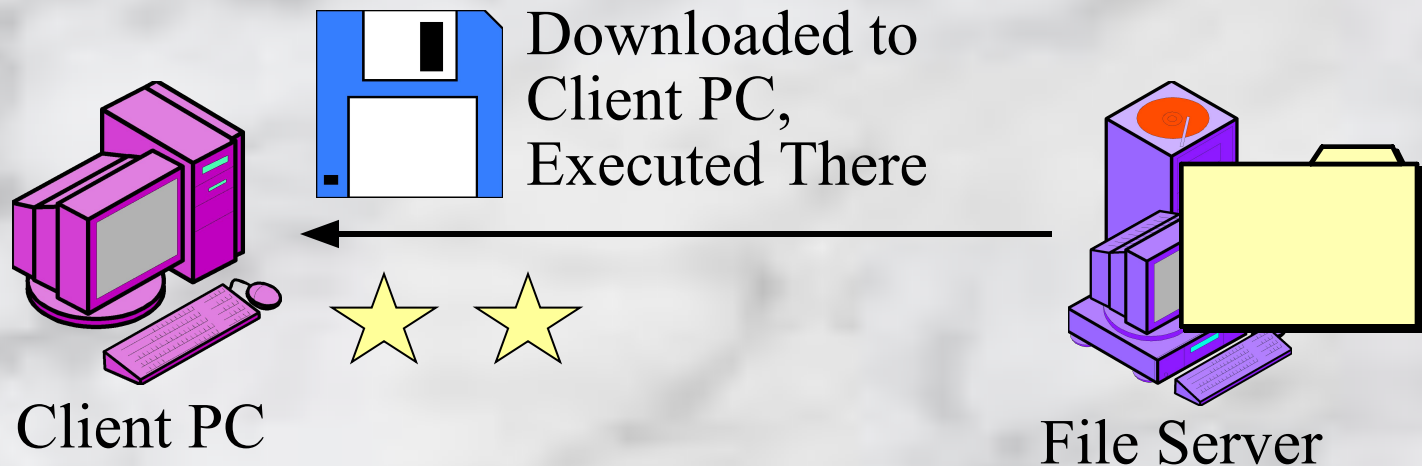
File Server

File Server Program Access

- PC processing power limits FSPA programs
    - Client PCs do not get very large
    - Only programs small enough to operate on limited client PCs can be used

Executed on the
Client PC

Client PC

File Server

Comparing FSPA, Client/Server, and Terminal-to-mainframe ⭐⭐

	File Server Program Access	Client/Server Processing	Terminal–to-mainframe
• **Location of processing**	• Client PC (not on the file server)	• Client computer and Server (2 programs)	• Mainframe (terminals are dumb)
• **Graphics**	Very good because of local processing in client PC	• Very good because of local processing in client PC	• Poor because rich graphics would require expensive high-speed network traffic.
• **Response Times**	• Very good because of local processing on client PC	• Very good because of local process in client PC, although some server delay.	• Poor because mainframes often are overloaded.
• **Scalability**	• Low: Client PCs do not get very large.	• High: Upgrade the server.	• Very high: Mainframes get very large

Comparing Distributed Processing Alternatives (Continued) ⭐⭐

	File Server Program Access	**Client/Server Processing**	**Terminal–to-mainframe**
• **Platform independent?**	• No. For PCs only	• Yes. Client and server machines may be of any platform type. The two machines may be of different platform types	• No. For terminals and mainframes only

Summary Questions

1. What kind of application might use: (a) a terminal-to-mainframe configuration, (b) a microcomputer-to-mainframe configuration, (c) client/server processing ?

2. Distinguish among Terminal–to-mainframe, File Server Program Access, and Client/Server processing in terms of where processing is done

Summary Questions (cont.)

- Which of the following may involve using a Terminal-to-Mainframe configuration?

  a) You are surfing the Web at home using a dial-up connection to the Internet

  b) You are downloading files located on a computer in your organization's LAN using your laptop computer from home.

  c) The airline company clerk is booking for a flight ticket for a customer.
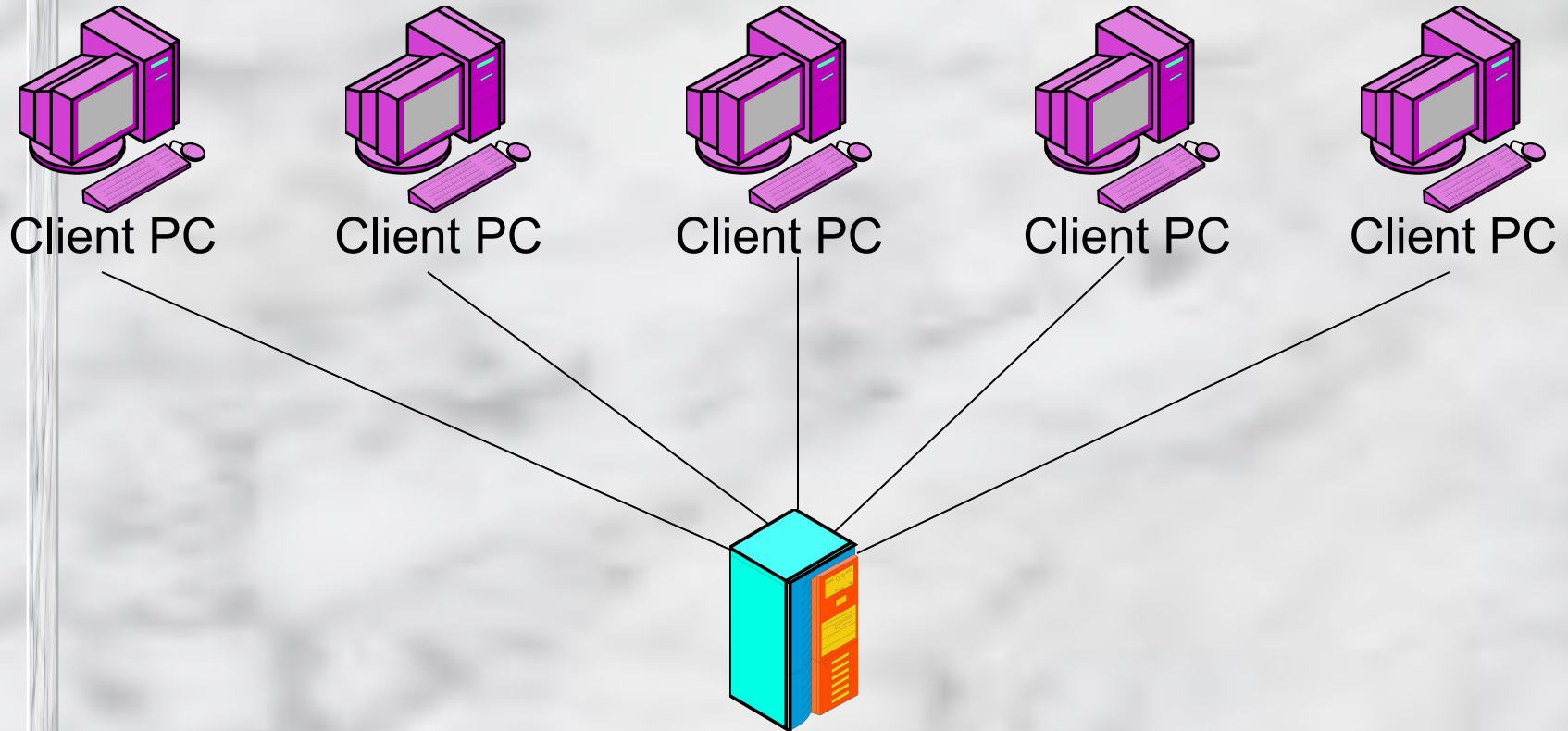
Summary Questions (cont.)

- Which of the following processing techniques is commonly used in schools' LANs to provide software programs to students in computer labs?

  a) Client/server processing

  b) File Server Program Access
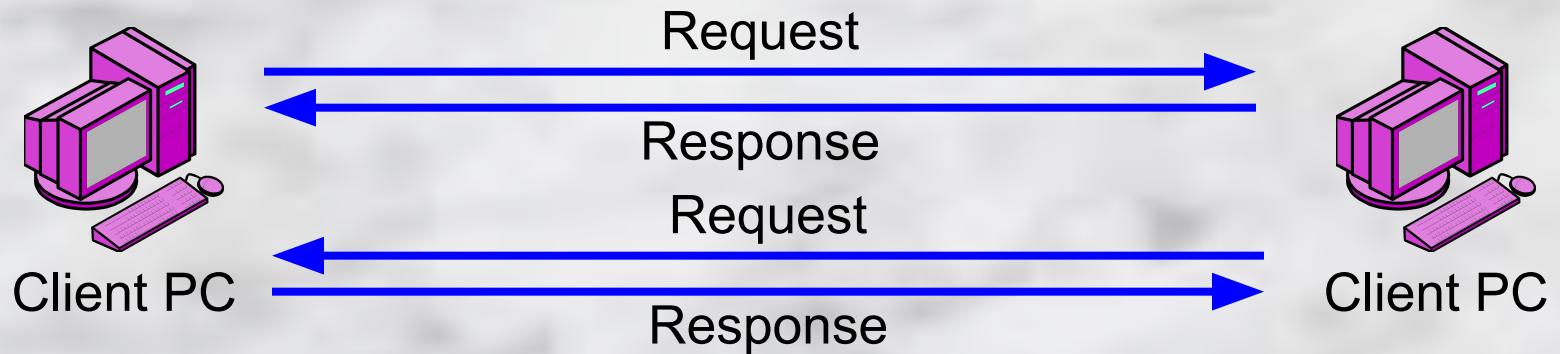
Other slides

Client/Server processing

Client PC   Client PC   Client PC   Client PC   Client PC

Server Does Heavy Processing Work: database retrieval, central security, etc.
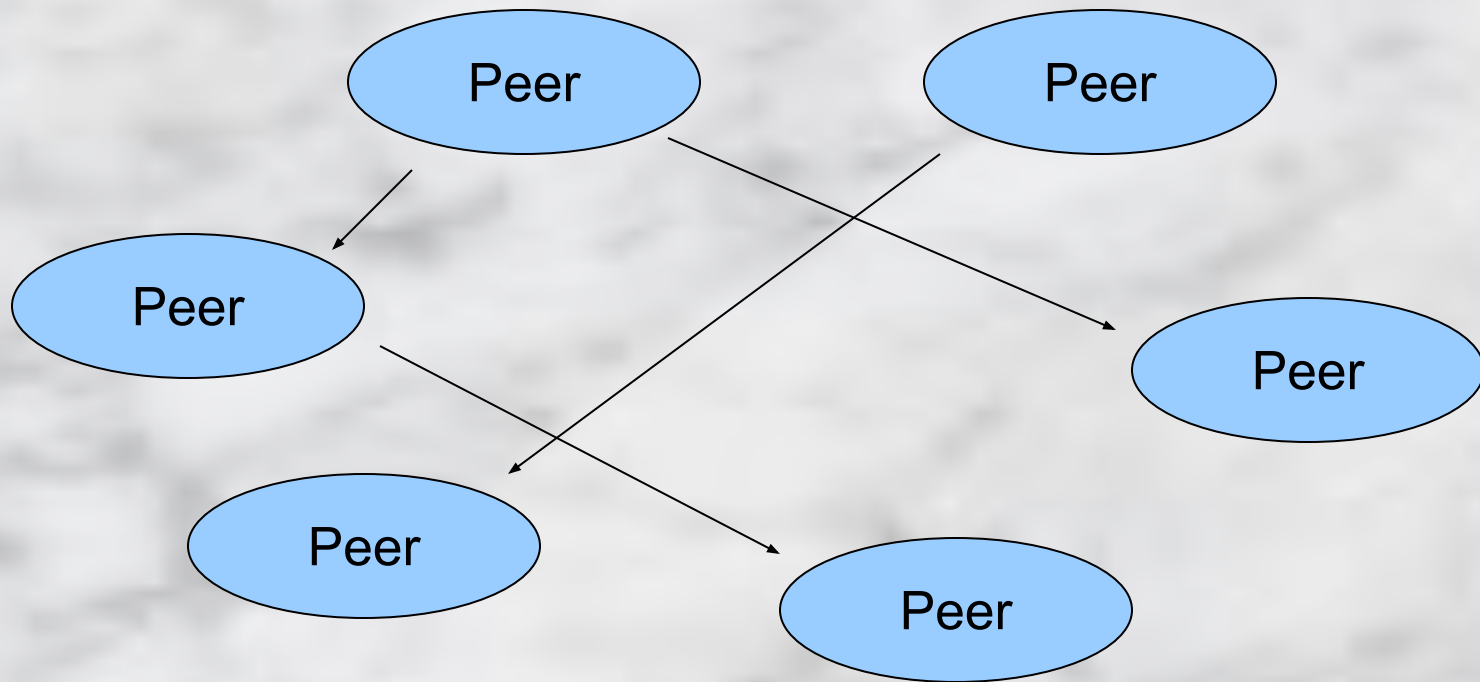Client PCs do lighter work: creating requests, displaying responses
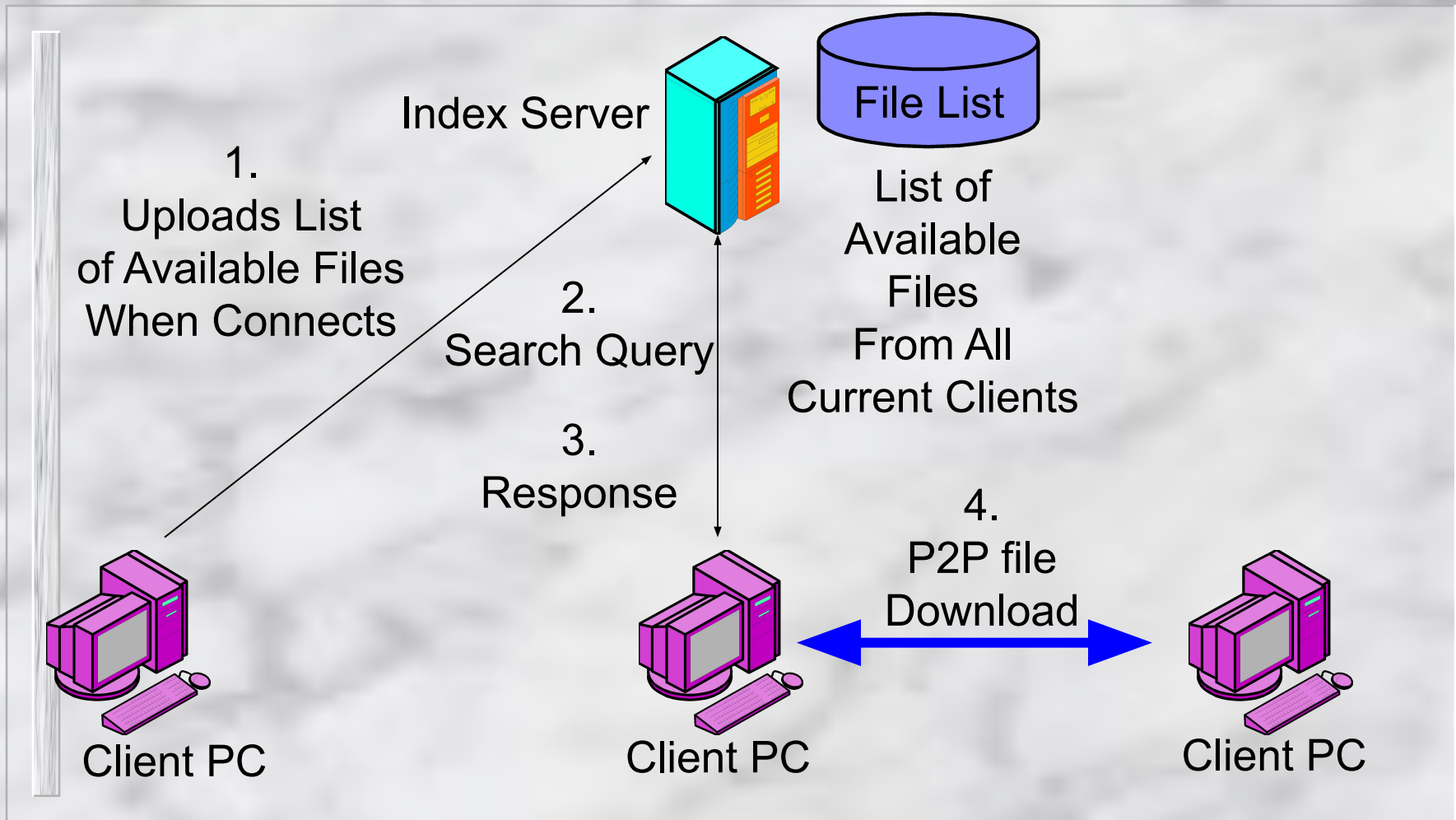
Peer-to-Peer (P2P) network configuration

Request

Response

Request

Response

Client PC

Client PC

No dedicated server: PCs are equal, i.e. peers
Any computer can be client and server

P2P Applications

- Direct service, although some P2P systems use facilitating servers for some of the work

# P2P network configuration w/ facilitating server

Index Server

File List

List of
Available
Files
From All
Current Clients

1.
Uploads List
of Available Files
When Connects

2.
Search Query

3.
Response

4.
P2P file
Download

Client PC

Client PC

Client PC

Napster-like P2P file sharing
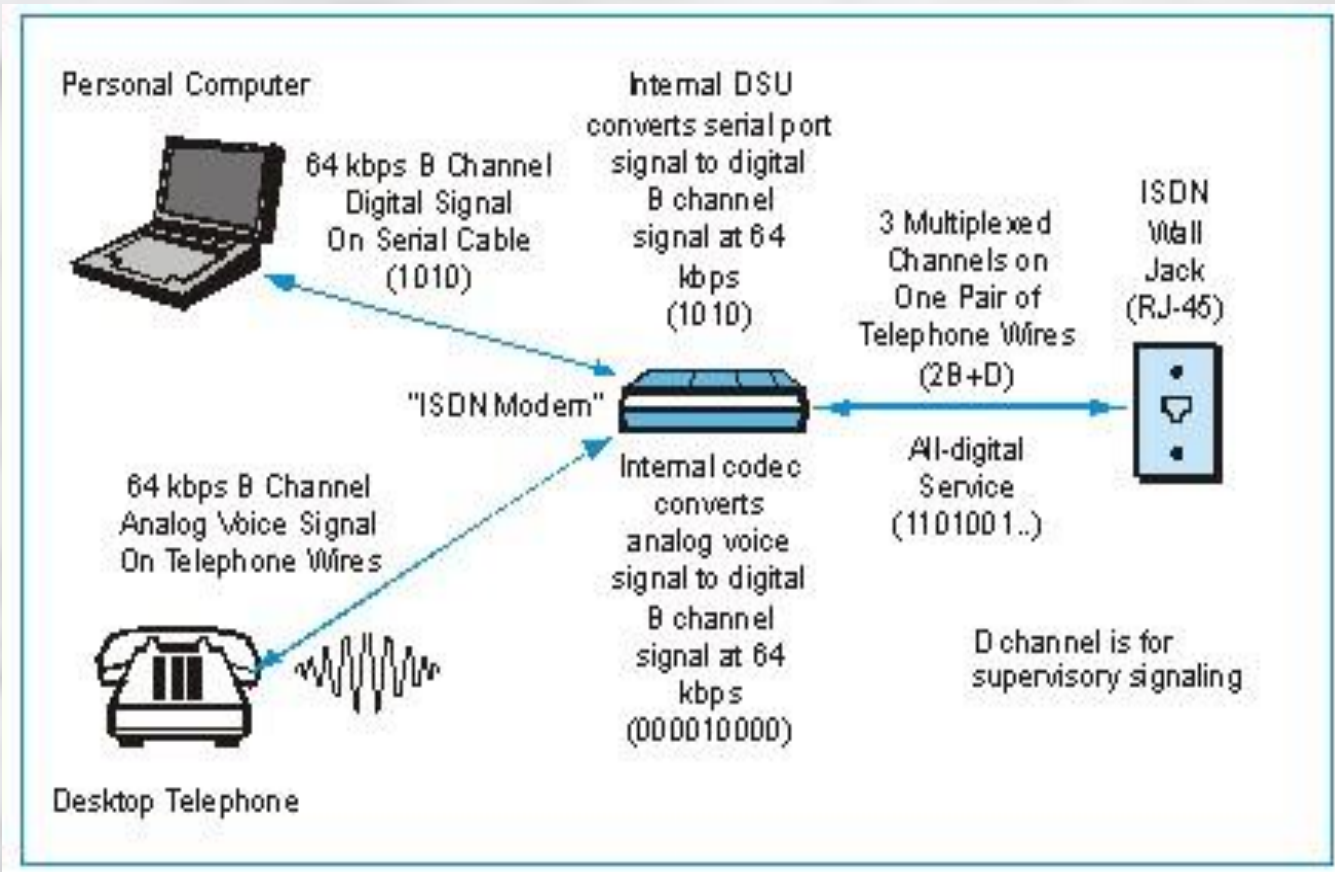
Microcomputer-to-Internet configuration

- Accessing the Internet using
  - A modem and a dial-up telephone service
  - ISDN (Integrated Services Digital Network)
  - DSL (Digital Subscriber Line)
  - Cable Modems

- Internet only "talk" TCP/IP
  - Microcomputers need to use Software that support TCP/IP

Microcomputer-to-Internet configuration

Figure 1-4
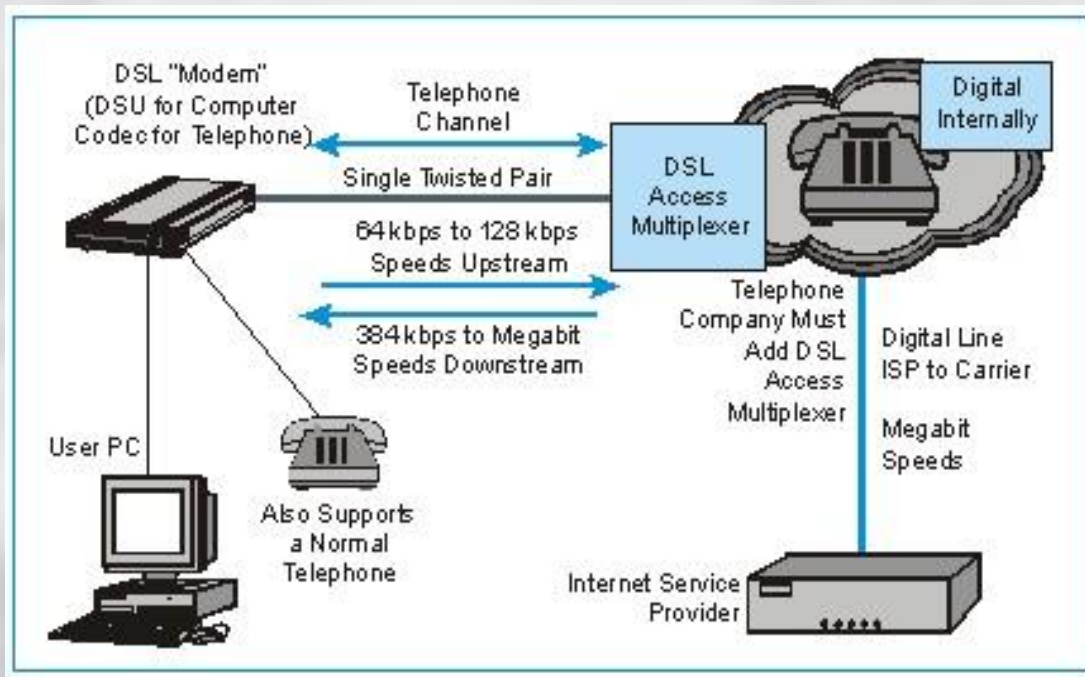*A microcomputer sending data over a telephone line to an Internet service provider and into the Internet*
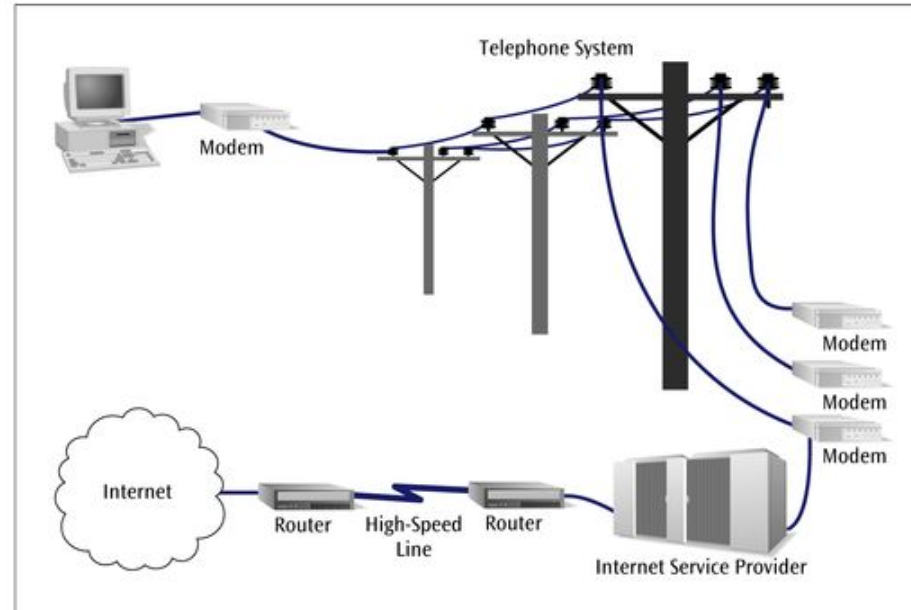
Microcomputer-to-Internet configuration
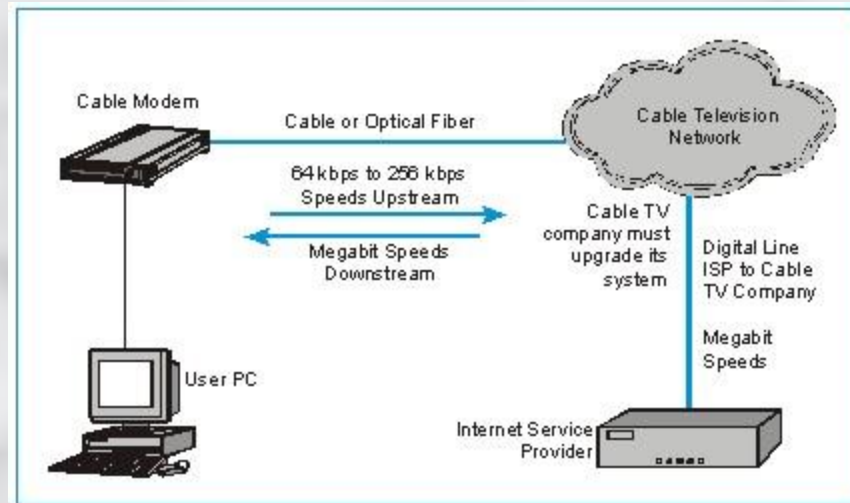

ISDN

Microcomputer-to-Internet configuration
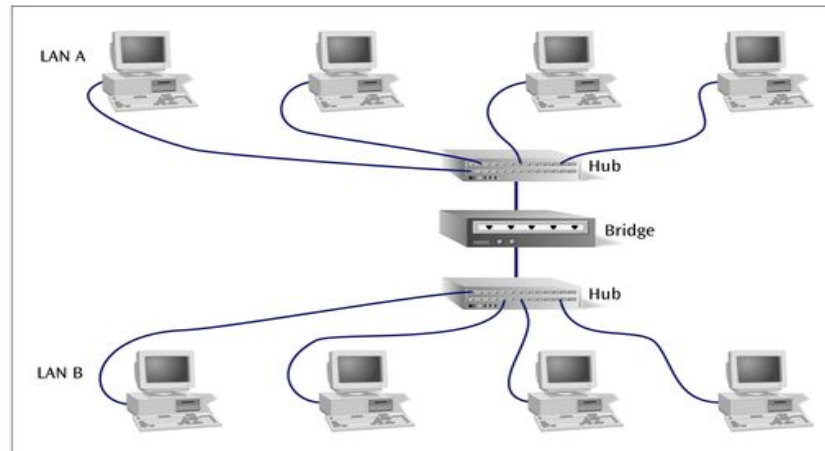

DSL

Microcomputer-to-Internet configuration

Cable Modem

LAN-to-LAN configuration

- Using *bridges* to connect distinct LANs

- Connecting LANs make it possible to share software and peripherals among LANs

- Examples: Schools or Businesses with multiple LANs

Figure 1-5
Two local area networks connected by a bridge

LAN-to-WAN configuration

- Using *routers* to connect LANs to WANs
- *Routers* more elaborate devices compared to bridges
  - More computing capabilities needed to convert data from a LAN into data bound for a WAN
- Examples: School or Business connecting to Internet or external database service

Figure 1-6
Local area network to a wide area network connection