

Basic Computer Networks Configurations

(August 31, 2016)

Learning Objectives

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- Outline Basic network configurations
- Name kinds of applications that might use each Configuration

Network Configurations?

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- Ways of organizing data processing
 - Where to do processing
- Decision on “which configuration” depends on:
 - Available equipment
 - Applications
- Many Basic configurations

Basic configurations

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- 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

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- Local area network to wide area network
- Wide Area network to Wide Area network
- Sensor to local area network
- Satellite and microwave
- Wireless telephone

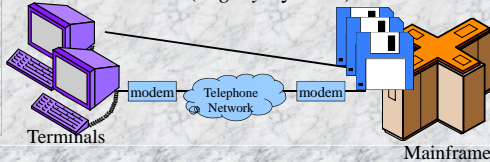
Terminal-to-mainframe configuration

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- 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*)



Terminal-to-mainframe configuration 7

- 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 8

- 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)

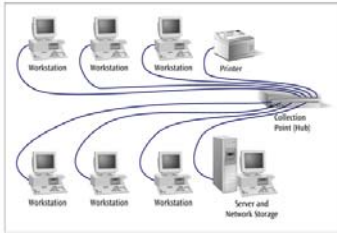
Microcomputer-to-mainframe configuration 9

- 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

Microcomputer Mainframe

Microcomputer-to-LAN configuration 10

Figure 3-3
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

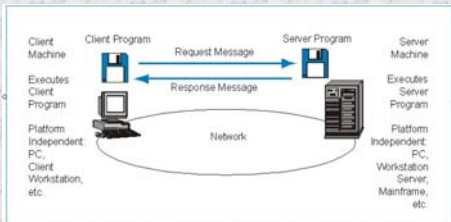


Microcomputer-to-LAN configuration 11

- 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 12

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



Client/Server Processing 13

- 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

File Server Program Access 14

- 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

File Server Program Access 15

- 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

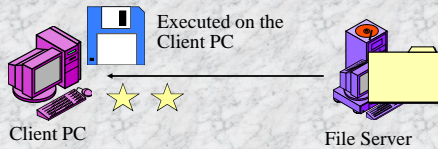
File Server Program Access

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- 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



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

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	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)

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	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

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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.)

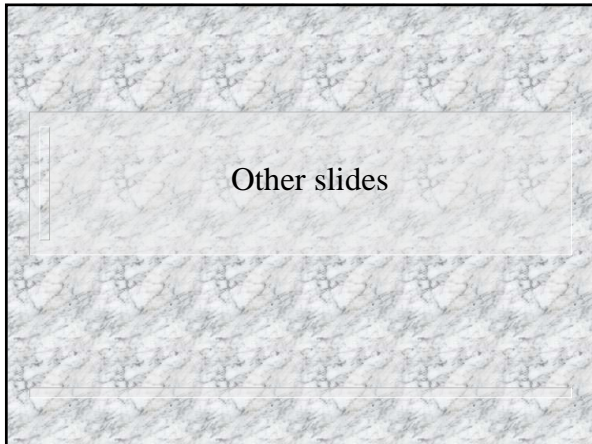
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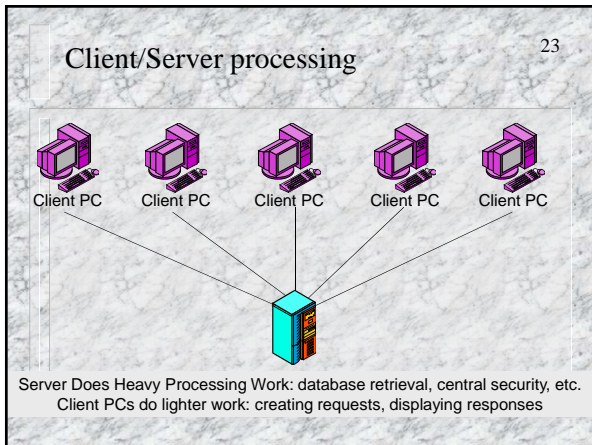
- Which of the following may involve using a Terminal-to-Mainframe configuration?
 - a) You are surfing the Web at home using a dial-up connection to the Internet
 - b) You are downloading files located on a computer in your organization's LAN using your laptop computer from home.
 - c) The airline company clerk is booking a flight ticket for a customer.

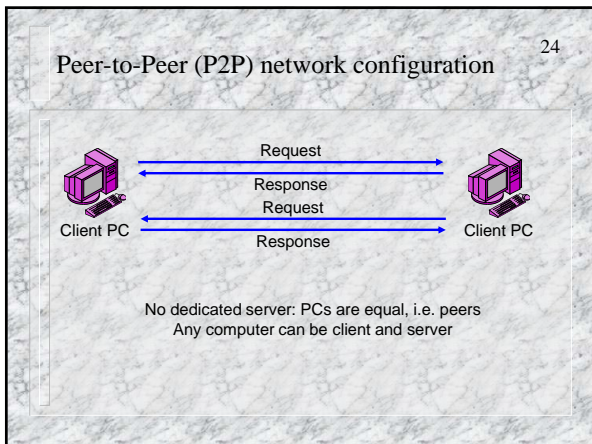
Summary Questions (cont.)

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- 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



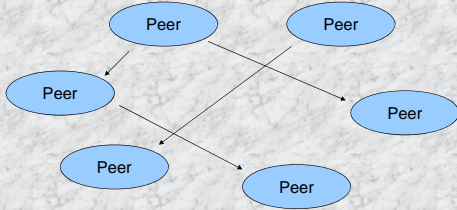




P2P Applications

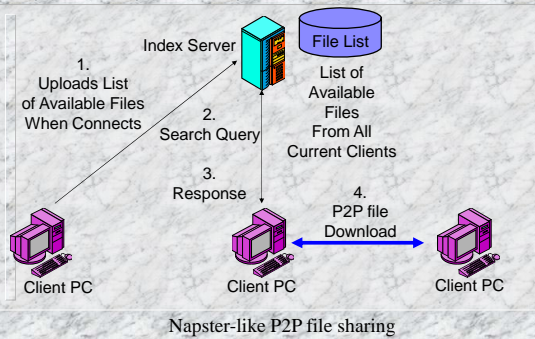
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- Direct service, although some P2P systems use facilitating servers for some of the work



P2P network configuration w/ facilitating server

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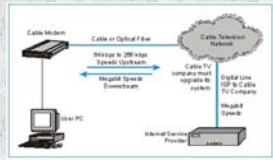
Microcomputer-to-Internet configuration

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- 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

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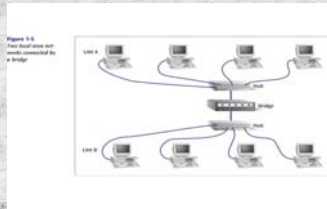


Cable Modem

LAN-to-LAN configuration

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- 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



LAN-to-WAN configuration

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- 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

