

CpE/NIS654 Design and Analysis of Network Systems
Fall 2017
Homework 03

Please Note that this being a design course, some of the exercises in these assignments often have really no ‘right’ or “wrong” answer. Your analysis, justification and logic behind your answers is, therefore very important. We are looking for your supportive text with your answers to understand your rationale behind your answers. We encourage you to take every opportunity to explain and expand on what is being asked.

Q1. Please do Problem 1, Chapter 4 (McCabe p206):

Show flows for each set of devices and applications below. Label each as either a uni- or bi-directional flow.

- a. Client-server application: downstream (from server to client) – 1.2 Mb/s capacity; upstream (from client to server) – 15 kb/s capacity.
- b. Streaming video (UDP) from video server to a subscriber’s PC: 300 kb/s capacity, 40 ms delay (one-way).
- c. Downloading pages from the web: downstream - 250 kb/s capacity, 5 second delay; upstream – 100 kb/s capacity.
- d. Transaction processing from point-of-sale machine to server: upstream (from PoS machine to server) – 30 kb/s capacity, 100 ms round-trip delay; downstream – 50 kb/s capacity.

Hint: Uni vs. bi directionality of a flow that you determine is a subjective assessment which will impact your network design. Flows that have significant temporal separation are better classified as two unidirectional flows rather a bidirectional.

Q2. Please do Problem 6, Chapter 4 (page 207)*:

You are developing a network for a company’s on-line transaction processing (OLTP) application (e.g. a retail sales network). Their current system is a mainframe that has

Chapters refer to the text book for the course: James D. McCabe, “Network Analysis, Architecture and Design”, Third Edition, Morgan Kaufmann Publishers.

several terminals connected to it, either directly or through a terminal server, as in Figure 4.51 below. They are moving to a hierarchical client server network, where there will be multiple regional database servers, each acting in a client-server fashion and updating each other's regions via a database manager, as in Figure 4.52.

- Show the probable data sources and sinks for both environments.
- How does migrating from the mainframe environment to the hierarchical client-server environment modify the traffic flows in the network?
- In what ways does the network environment improve the traffic flows?
- What are some of the potential trade-offs between the two environments, for example, in security, management, and performance?

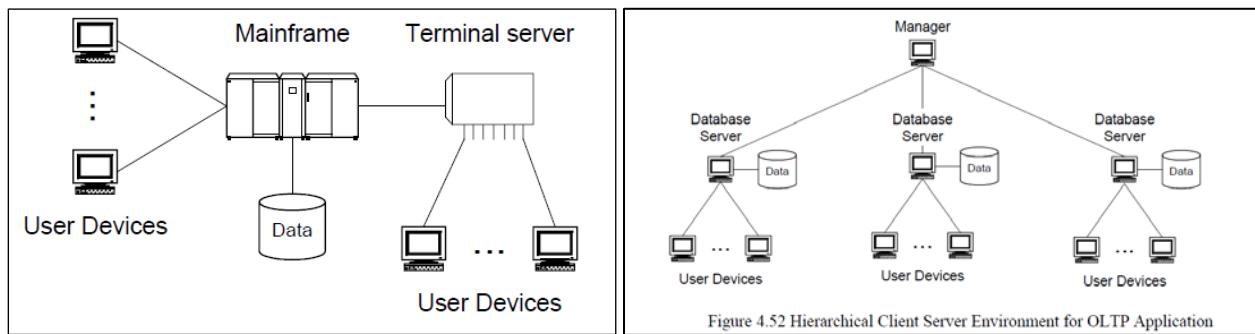


Figure 4.51 A Mainframe Environment for an OLTP Application

Q3. Please do Problem 4 in Chapter 5 (pages 246)*:

Give examples of external relationships between each of the following component architectures: addressing/routing, network management, performance, and security.

Hint Q3: Refer to the section on external relationships to better appreciate their importance in an overall design of the network.

Q4. Please do Problem 6 in Chapter 5: (page 247)*

Consider the development of a demilitarized zone (DMZ), also known as an isolation LAN (iLAN), between 2 different networks (2 different autonomous systems (AS), managed by different organizations). The purpose of a DMZ is to separate and isolate the 2 networks. Briefly outline what you consider to be the most important addressing/routing, network management, performance, and security requirements and issues for a DMZ.

Hint Q4: Note that DMZ helps isolate parts of the network for securing it from external threats.

Q5: Please do Problem7, Chapter 5 (Page247)*:

For Q5 (Problem 6, Chapter 5), what are some potential external relationships between addressing/routing, network management, performance and security for this DMZ? How do the component architectures need to work together to achieve the goal of effectively isolating and separating the two autonomous systems?