Objectives:

- Define how people use the Application Layer to communicate across the information network.
- Explain how protocols ensure services running on one kind of device can send to and receive data from many different network devices.
- Use network analysis tools to examine and explain how common user applications work.

Intro:

Due to the fast growth of the company, ACME Inc. needed to hire a programmer to write software to help employees accessing and updating projects.

ACME Inc. has a central server which stores internal ACME Inc. files. Because the company's needs are specific, the program has to be specially written for ACME Inc.

Two versions of the program were written. One version runs on the server computer and another, slightly different version, runs on the employee's computers. The employee's version communicates with the server version in order to access, share, update and transfer ACME Inc. internal files. While accessing, sharing and updating files, the program uses a proprietary protocol, written specifically to be used between the two versions. When transferring files, simple FTP protocol is used.

The software also has another feature: It is able to contact the local mail server and send emails, keeping project members posted about any changes.

Question 1:

a. Into which layer of the OSI Model does this program best fit?

b. What about the TCP/IP Model?

Question 2:

a. Based on your knowledge of the CCNA Exploration 1 Chapter 3, is this structure familiar?

b. What is this structure called?

c. Identify the components.

One morning, a project member named Tom reported that he could not acquire a file from the server. According to Tom, he was able access and update the file but not download it to his computer. Nobody but Tom reported any problems that morning.

Due to the transfer problems, Tom called his manager, Jerry, saying the ACME Server was not working properly since he couldn't retrieve files from the server.

Tom and Jerry have worked together for a long time. Tom always has the latest version of software installed on his work PC; does not install random software and runs a ***firewall*** software on his computer. Because he trusts Tom's knowledge, Jerry picked up the phone and called you, as you are responsible for the project. You were told by Jerry that the ACME Server was down.

Question 3:

Based on the facts described above, consider the statement "the ACME Server is down."

a. Is that a correct statement?
b. Why?
c. Show a counter-example if it is a not correct statement.

Once at ACME Inc Office, you go to check the server. Everything looks to be working and the server's version of the ACME Inc. software is running. Since Daisy's desk is the closest, you ask her to access and transfer a file from the server using ACME Inc. software. She reports the operation was successful.

After a quick chat with Tom, you decide to check his desktop PC. The PC looks fine; no suspicious software is installed and the anti-virus is updated and running. After a deeper verification, you find **firewall** software running on Tom's desktop PC. Tom explains he uses the ***firewall*** software because it helps keep malicious users from accessing his desktop PC via the network by blocking malicious network packets that attempt to reach a few specific network ports on his desktop PC.

You ask Tom to perform a simple test: stop the ***firewall*** and try to access the ACME server again. When the ***firewall*** software is not active, the ACME Inc. software is able to successfully transfer file from the server.

Question 4: ACME Inc. software and the Firewall software are two completely different applications.

a. What is the relation between the firewall software and the ACME Inc. software?
b. How could the ***firewall*** software keep ACME Software from transferring files from the server?
c. What must be done to avoid such a conflict?

Answers:

Q1a. *The ACME program is an application and thus, Layer 7, The Application Layer is the layer which the software fits best.*

Q1b. *TCP Layer model merges the OSI application, presentation and session layers together in a new "application" layer and thus the application layer is also the answer.*

Q2a. *Yes.*

Q2b. *Client-Server structure or Client-Server Model*

Q2c. *ACME server running the server version of ACME Software is the Server and the user PCs running the client version of the software are the Clients.*

Q3a. *No*

Q3b. *There is not enough information to declare the server down.*

Q3c. *1. A transfer via ACME software should be done from another user PC. 2. Tom was the only user to place a complaint.*

Q4a. *ACME software is an independent application but still uses the FTP Protocol to transfer files which forces ACME software to respect the FTP protocol's rules. One of these rules regards to operation ports: ACME software requires specific FTP ports to be reachable in order to work properly.*

Q4b. *A firewall software works by blocking network ports. A firewall which blocks FTP ports would keep ACME software from transfer files.*

Q4c. *The firewall software running on Tom's desktop PC must be tuned in order to allow FTP packets to go through.*