Assignment 1: Socket programming

This project should be done in teams of two.

Objectives:

- Introduce basic concepts of computer networks
- Introduce network/socket programming
- Develop networks based applications
- Explain how distributed applications can communicate using sockets

Key words: Sockets, Client-Server Model, TCP, UDP, FTP, retransmission protocol

Part 1

Write a basic TCP client and server where both client and server will be connected to the same LAN and run on two different machines. The client sends a greeting message to the server and the server responds. You need to select a port number and determine the IP address (use IPCONFIG command).

Use Wireshark to observe packets exchanged between a client and server. Run the client and server on different platforms. Take screen shots of wireshark in both client and server and explain your findings.

Modify the code so that the client and the server code makes use of UDP sockets instead of TCP sockets. Note that no connection is required for UDP communication.

Part 2

You are required to implement a client-server communication programs in the same network that can achieve a file transfer.

The goal is to implement a simple File Transfer Protocol (FTP) using TCP protocol. Accordingly, the server will be waiting for a TCP connection from the client. Then, the client will connect to the server using server's TCP port. After successful connection, the client should be able to transfer the file specified by the user to the server. Then, the server stores the file in its disk. If the file is already existing in the server disk, it communicates with the client to inform it.

Moreover, the client should fetch the file specified by the user from the server. On receiving the file, client stores the file in its disk.

Your server should support time-out and retransmission. It is up to you to design the retransmission protocol.

Part 3

Modify the server and client application of part 1 or 2 so that the client and server are not in the same network.

References:

1. J. Kurose and K. Ross, "Computer Networking: A Top Down Approach", 7th Edition. Pearson Education.

2. https://www.javatpoint.com/socket-programming

Submission: Submit a report including the screen shots of programs execution and the Wireshark results. It should explain how you solve the remote communication in part 3.

In addition to the report, you have to submit all the developed code sources.

Deadlines: November, 8th 2020

Grading details:

Part 1 (40 pts)

35 pts for correctness

- 5 pts: client-server connection
- 10 pts: TCP implementation
- 10 pts: UDP implementation
- 10 pts: Wireshark use

5 pts for clean and well-documented code

Part 2 (45 pts)

40 pts for correctness

- 20 pts: 2 way file transfer
- 10 pts: TCP implementation
- 10 pts: retransmission protocol implementation

5 pts for clean and well-documented code

Part 3 (15 pts)

5 pts for explanation

10 pts for implementation