ELL402/785 Assignment 1: Network Programming Using Internet Sockets (18/08/2021)
Semester I, 2021-22, EE, IIT Delhi
Up to TWO students per group; 20 marks (+ 4 marks on bonus Q/A)

Objective: Writing a client-server program using C/C++/Python, where clients (instructor or students of a class) access the server (storing students' marks in 5 subjects out of 100) for information about marks in a semester examination.

Following tasks have to be performed:

(1) Client will connect to server and logon through username and password pre-stored on server. Server will refuse connection without proper authentication.

(2) If client is logged on using 'instructor' as username, it will have access to marks of all the students in the class.

(3) If client is any other user '<username>' (i.e. client is student) it will have access to his/her marks only.

(4) Client (student) should be able to get information about:

- (a) His/her marks in each subject
- (b) Aggregate percentage
- (c) Subjects with maximum and minimum marks

(5) Client (instructor) should be able to get information about:

- (a) Marks (individual and aggregate percentage) of each student
- (b) Class average
- (c) Number of students failed (passing percentage 33.33%) in each subject
- (d) Name of best and worst performing students
- (e) **BONUS Question: Instructor can update the marks of any student if he/she finds a bug (or need for correction). Therefore, create a menu having option 'Update' for 'Instructor' login to update marks of a particular student in a subject.**

(6) Create 'student_marks' file that contains marks of each student and is accessed by server for responding to client queries.

(7) Create 'user_pass' file to hold data for usernames and passwords (with at least 20 users). This file is accessed by server for authentication

(8) Create menu to select required information from client, either at client side or server side.

(9) Exception handling is a must.

(10) Using Wireshark, analyze packet size and frame size in different TCP/IP layers. Also trace the communication path between client and server machines, and find the number of hops used for communications. Comment on all the observations.

Submission Instructions:

- *All the assignment submissions will be M**oodle** based.*
- *Create a "zip/rar" file namely **'entry_number_assign_number'**. This folder should contain the source codes and the report file. It should be uploaded on moodle before the deadline.*
- *Queries can be mailed to **Ashutosh Balakrishnan** <tiz198343@nctu.iitd.ac.in>*
- ***The individual groups will be called for online demo on MS Teams for explanation/interpretation of the results.***

Useful references are mentioned below:

(1) The basics of socket programming are given at : http://www.linuxhowtos.org/C_C++/socket.htm

(2) beej network programming guide... --> ***url --> https://beej.us/guide/bgnet/***

(3) Network programming by Richard Stevens.