CSE 322 (A1)
Offline Assignment 1

Topic: Client-server application development using Socket Programming
Task: Implementation of both client and server sides of an application for conducting online examinations

1. **Requirement Specification:**
   In this assignment, you are required to build an application for conducting online examinations on a client-server architecture. You are required to write two programs (in whatever language you prefer that supports socket programming): (i) the client and (ii) the server. The client program will enable remote users to take exam online conducted by the server. Specific requirements for the task are as follows.

   - Clients will be able to receive questions from and submit answer to the server. The question file can be of any type; for this lab we assume the files be in *.doc* format.

   - On startup, the client program will prompt the user for the server's 'IP Address' and 'Port Number' as well as the 'Student ID'. Then the client will initiate a connection request with the server and send the 'Student ID'.

   - Upon receipt of the connection request from a client, the server will save the <IP Address, Student ID> mapping (in any suitable data structure). Then the server will create a folder named after the 'Student ID' and all the answers submitted through this connection will be saved under this folder. The 'Student IDs' are to be treated as numbers and should be within the range pre-configured in the server. If the 'Student ID' of an incoming request in not within the list, the server should notify the requesting client accordingly and ask him to send a valid ID. (*Optional and Bonus:* If two different Student IDs try to register from the same IP or same Student ID tries to register from two different IPs, the server admin will be explicitly asked, through a prompt, whether to accept or reject the connection request. In case of rejection, the requesting client will be notified accordingly).

   - After registering a valid Student ID, the server will first send the exam related information such as exam name, start time along with the current server time, rules and regulation related to the exam, backup interval etc. Then the server will check whether the exam time has already started in which case it will send the exam question to the client.

- A client upon receiving a question, will prompt the user to save it in his convenient location and notify him to start exam.

- We assume answers will be written in the same *.doc* file containing the questions. The client program will periodically send backups of the answer file according to the backup interval specified by the server. If no such periodic backup is not received from a client, the server program will notify the admin through some prompt.

- If a client machine crashes during the exam, then upon restarting the client program and resending the connection request to the server, the server will send the last saved copy of the answer to resume the exam.

- There will be provision in the server to send correction related to the question anytime during the exam. Upon receiving the correction, the client will show it to the examinee.

- There will be provision in the server to send warning message to the client reminding how much time is left for the exam.

- Upon timeout, the server will send a time over message to the client upon receipt of which the client will send the last saved copy of the answer file to the server and will close down. (*Optional:* After timeout, the server may optionally send a copy of an answer script to the client that the user can again save in any convenient location for viewing.)

- *Optional:* There may be cases of 'cheating' where a student may copy other's answer through pen drive or over network and overwrite his answer file. This has to be detected by tracking the file creation time and date by the client program and will be immediately notified to the server.

- The server program must provide interface for the following configurable options:
  (i) Exam related options such as exam name, exam start time, duration, warning time, i.e., how long before the end of the exam to show warning message to the examinee, rules and regulations related to exam, name and location of the exam's question papers etc.
  (ii) Location of where to store the answer files from the students. By default, the location will be the folder from which the server is running.
  (iii) List of Student IDs who are allowed to take the exams. IDs can be specified in range format such as 201305001-20130560 as well as comma separated individual IDs such as 200905100, 200805119.
  (iv) Duration of interval for sending file backup by the client to the server.

(v) Corrections related to question during the exam time.

- *Optional:* The server will send the list of applications that a client is allowed to open during exam hours. .

- *Optional:* There will be provision in the server for conducting multiple exams at a time. Each exam will have an associated list of Student IDs who are eligible to take the exam.

- *Optional:* There will be provision in the server for relative time tracking for each examinee, i.e., the start time and end time will not be the same for all students and countdown of duration for each student will begin from the moment he starts the exam.

2. **Programming Issues**

- You must use socket programming in your implementation, both for client and server.
- One of the primary objectives of this lab is to learn how to write message passing protocol. Therefore, all the prompts for user will be generated by client and client should know all the message formats. **You should not implement the client as a dumb terminal.**
- You may use any programming language you wish (Java, C#, Python) as long as it supports socket abstraction to access OS's native TCP service.
- Use object oriented programming. In that case, you will have at least two class files *client.class* and *server.class*.
- Use of GUI is desirable and recommended.
- Take care to handle exceptions. Unwanted action by client should not crash the server.

3. **Ethical Issues**

Since all of you will be doing the same assignment, experience tells us that there is high chance of copying. **Let us warn you that any case of plagiarism (copying) will be handled severely with nearly zero tolerance and may even result in suspension from the course irrespective of whether you were the server (source of code) or the client (who copied the code).**