Question for assignment1:

The main goal of this assignment is to learn with an example of client server socket programming arithmetic calculator java application, the difference in performance between multiple threads as compared to a single thread server, to respond to multiple clients requests simultaneously. You will learn why multithreaded servers are better as compared to a single thread server.

Task:

The client sends two numbers and an operator to the server by taking input from the end user. The server will perform the arithmetic operation and return the result of the operation between the two numbers and the operator. For example, the client sends two numbers 50 and 20 and the operator A. Then the server should do 50+20 and return to the client. Client should display 70 (which is the result from the server).

Server code should support four operations, A, S, M, D corresponding to the operation of addition, subtraction, multiplication and division (+, -, \* and / ). This should be implemented as a switch case on the server side.

Multiple clients should send requests for addition, subtraction, multiplication, division and modulus operation on two input numbers simultaneously, and the server should calculate the result of the operations on the given numbers.

Now, you should test the result of simultaneous client requests(minimum 10 simultaneous client requests) on **both single threaded and multithreaded server code**.

Next, you have to calculate the time taken to process all the threads simultaneously. You have to calculate this time on both single thread and multithreaded server code. Of course, on a single thread server 10 threads can not run simultaneously/parallely/concurrently and therefore, when the first thread finishes then only the second thread will start processing.

Observe the difference in performance as “time delay” to process ten threads on a single threaded and multithreaded server.

**As a rule of thumb**: time taken by a single threaded server to process ten simultaneous client requests is **more than** time taken by a multithreaded server for the same ten simultaneous client requests.

Here is a sample example of input from the client and result from a multithreaded server displayed at the client side. You will adapt the same example for a single threaded server.

Output of program : Time taken to process ten threads (sec): ?? seconds

This assignment will be done in groups of 2. Groups will be of your choice.

1. You will submit both the codes of single threaded client server and multithreaded client server.
2. You will submit the report where you will explain the difference in the time performance between single thread and multiple thread handling simultaneous calculation requests from multiple clients.
3. You will also submit a video of running your application code and demonstrating the difference in the performance you observed.
4. A document mentioning what was the individual contribution of all the members.

Note: Feel free to experiment with more simultaneous client requests and check the difference in the performance.

You are free to do some enhancements in the code but that is not mandatory.

You have learnt client server socket programming before so use the knowledge from there to code.