Operating Systems–1: CS3510

Programming Assignment -2: Multithreaded Computation of Statistics
Deadline: December 28, 2020, 21:00 hrs

Problem Statement: This assignment requires you to develop a multithreaded program that calculates various statistical values for a list of numbers. The program will be passed a series of numbers and it will then create three separate threads. One thread will determine the average of the numbers, the second will determine the minimum value and the third will determine the maximum value.

The variables representing the average, minimum and maximum values will be stored globally. The worker threads will set these values, and the parent thread will output the values once the workers have exited.

Input & Output: The input to the program will be a file (named inp.txt) containing a list of numbers. The first line of the file will be N which is the size of the input given. The second line will be a list of input numbers, separated by a single white space.

Example:

3
101 5479 61

The output will be another file that contains the statistics mentioned above in the following format:

The average value is 1880.33
The minimum value is 61
The maximum value is 5479

The output file generated by the program should be named as Asgn2-out-<Rollno>.txt

Measuring Performance: Calculate the time taken by this program to compute the above statistics for different values of N. Prepare a graph showing the time taken by the program for different values of N. The x-axis will consist of the following values of N: $1 * 10^6$, $2 * 10^6$, ..., $5 * 10^6$. The y-axis will consist of time taken by the program to terminate (in micro/milliseconds).

Deliverables:

1) As a part of this assignment, you have to prepare a report which will describe the low-level design of your program and give an analysis of its output. The report should also contain the graph showing the performance of the program, as described earlier. This file should be named as Asgn2-Report.pdf

2) Prepare a **README** file that contains the instructions on how to execute your submitted file. The file should be named as Asgn2-README.txt

3) Name the source code file in the following format: Asgn2-<Roll Number>.c

4) Upload the source code, report and README as a zip archive file and name it as Asgn2-<RollNo>.zip