CS 471 Fall 2021, Homework 6

Due: November 22, Monday 11:59pm Mountain Time

The goal of this assignment (which is modified from Shaun Cooper's Concurrency assignment from CS 471, Fall 2020) is to write a simple concurrent program in either Python or Java (you can choose either of these two languages).

You will create a square two-dimensional matrix and calculate some basic statistics while measuring the time.

The program takes 1 input from the user (or on command line)

1) the dimension of the matrix- N

Your program will do the following 3 main tasks:

Task 1:

1) Create an NxN two dimension INTEGER matrix

2) randomly assign INTEGER values to each element in the range of between 0 and 2^20.

Task 2 (without threads):

START TIMER1 NOW

3) calculate and report the max, min and average of all values in the matrix by iterating over all values AFTER step 2 of task 1 is completed

STOP TIMER1

Task 3 (with threads):

START TIMER2 NOW

3) You will create N threads, each thread is responsible for one row of the matrix

4) each thread will calculate the max, min and average

5) You should add a common set of arrays in the main class to allow each thread to copy values back to

6) Your main thread will wait on all of the children threads, and then calculate the overall max, Min and average

STOP TIMER2

You will need to calculate and report the following from the matrix

a) The maximum value

b) The minimum value

c) The average of all of the values in the matrix

d) the time it took to do parts a-c

You may ONLY use INT and FLOAT for your calculation of MAX, SUM and average. You MAY ONLY use DOUBLE/LONG for time values. If you use larger primitives to solve sum and average you will see 50% off for any use of these primitive data types.

Ensure your results look valid; in particular, the average.

Include a readme.txt file, that includes the above a-d statistics for N = 4, 8, 16.

Format of the readme.txt file:

##

For N = 4

Task 2:

Max value:

Min value:

Average value:

Time taken to compute max, min, and average: X milliseconds

Task 3:

Max value:

Min value:

Average value:

Time taken to compute max, min, and average: X milliseconds

For N = 8

Task 2:

Max value:

Min value:

Average value:

Time taken to compute max, min, and average: X milliseconds

Task 3:

Max value:

Min value:

Average value:

Time taken to compute max, min, and average: X milliseconds

For N = 16

Task 2:

Max value:

Min value:

Average value:

Time taken to compute max, min, and average: X milliseconds

Task 3:

Max value:

Min value:

Average value:

Time taken to compute max, min, and average: X milliseconds

##

Assessment

Code should be:

Correct

Readme file should include the required information

Turn-in Instructions

Your files containing code should be properly commented. Zip all your files (**code + Readme.txt file)** in a file named file named hw6_*lastname_firstname.zip*, then submit it via Canvas.