Concurrency

Re-submit Assignment

Due Friday by 11:59pm **Points** 30 **Submitting** a file upload
File Types pdf

Concurrency is becoming a very important programming concept due to the explosion of multi-threaded, multi-core processors. You are to write a simple concurrent program in JAVA. You will create a square two dimensional matrix and calculate some basic statistics while measuring the time. **Click HERE to see a way to measure time in JAVA**. . You may want to use the INTERNET to see how you create threads in JAVA. The specifications are as follows

(here is some starter code for you fill in)

The program takes1 input from the user (or on command line)
1) the dimension of the matrix- N

Your program will do the following
1) Create an NxN two dimension INTEGER matrix
2) randomly assign INTEGER values to each element in the range of between 2^(32-N) and 2^(31-N). The best wait to do this is to do the following (assuming random() is in the range [0,1).)

trunc((2^(32-N) - (2^31-N))* Random() + 2^(31-N))

This is basically : range * Random() + start_value

START TIMER 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 what it needs to report for

summation/average
5) You should add a common set of arrays in the main object 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 TIMER

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.

You are then to do a time series analysis of your program by doing the following

Run your program for N ={2,4,8,16 }.

You are to run each series at LEAST 5 times to measure runtime. Your runtime needs to report average time run, and standard deviation.

You are to LINE plot the average time against the size of the data. You are to calculate the standard deviation on the run times appropriately.

You are to write a report that discusses your data plot.

Deliverables:

1) PDF with appropriate graphs
2) Your CODE (well documented describing how you broke up the code and collected the results)
3) The output of your code