CSC 447: Parallel Programming for Multicore and Cluster Systems

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Lab 2
Data Race

Due: February 18, 2022

Compile the source code for the `count3s` algorithm that was explained in the class is available on piazza. Although you are not supposed to work with pthreads at this stage, please complete the following:

1. Reproduce the serial code. Create random arrays of sizes 1000, 10000, 100000, and 10000000. How many 3s do you count in each array? How long did it take? Plot the run-time versus the array size. Use a logarithmic scale if some of the results are too skewed to show.

2. Reproduce the first version that causes data race while removing the padding. Run again using variable number of threads (from 1 to 50 in increments of 4. That is, 1, 4, 8, …). Compute the time for each run. Plot the results. What do you observe?

3. Rerun the previous part by adding locks only. Compute the time for each run. Plot the results. What do you observe?

4. Rerun the previous part by adding locks and padding. Compute the time for each run. Plot the results. What do you observe?

5. Comment on the issue of scalability while keeping in mind whatever was discussed in the class.

Please submit your report using the provided LaTex Template.