

## **COP 4520 Spring 2016**

### **Programming Assignment 2**

#### Note 1:

Please, submit your work via Webcourses.

Submissions by e-mail will not be accepted.

Due date: Monday, February 15<sup>th</sup> by 11:59 PM

Late submissions are not accepted.

#### Note 2:

You can use a programming language of your choice for this assignment.

If you do not have a preference for a programming language and a threading library to use for this assignment, I would recommend using C/C++ and POSIX threads.

#### Problem 1 (100 points)

In this assignment you will work with your project team. Refer to the document “Algorithm Assignments” to find out the specific algorithm assigned to your team. Carefully and thoroughly study the provided materials related to your algorithm.

Based on the functionality and algorithms described, implement a sequential version of the data structure specified in your assigned reading.

Refer to “Report Writing Guide” and compose a report describing your algorithms, implementation, design decisions, and performance evaluation.

Write a test module using 1, 2, 4 and 8 threads that share the data structure and protect the data structure using a global lock. Have each thread execute 500,000 operations on the shared data structure. Vary the distribution of the operations applied, e.g. in a Test Scenario 1 you can apply 50% push and 50% pop on a stack, and in a Test Scenario 2, you can apply 25% push and 75% pop on a stack, etc. Plot your results on several graphs, where the x-axis would represent the number of threads used, and the y-axis would represent the total execution time in seconds needed to complete all operations. In your report provide a summary of your experimental evaluation. Make sure to specify the platform you used in your experiments and the details about your experimental setup. Additionally, include your interpretation of the observed results (this is important).

Include a README file that provides thorough instructions on how to run your test program.

Grading policy:

General program design and correctness: 50%

Efficiency: 30%

Documentation including statements and proof of correctness, efficiency, and experimental evaluation: 20%

Additional Instructions:

Cheating in any form will not be tolerated. Please, submit your work via webcourses.