COMP 4901Q: High Performance Computing (HPC)

Programming Assignment 1

Due date: **6 March 2022 23:59**

Notes

1. Each problem counts 10 points. Totally 20 points contribute 10% of the overall credit of the course.
2. All submitted code will be compiled and tested on the lab 2 machines to evaluate the assignments.
3. Points may be deducted if your programs consistently achieve no speedup over the serial program or much slower speed than the linear speedup.

Problem 1: Matrix Multiplication

Write an OpenMP parallel program to do the matrix multiplication of two $N \times N$ matrices. Your program should be able to

(1) correctly add the necessary pragma to parallelize the program.
(2) print the running time of your solution and the serial solution.

You are recommended to scale up to different matrix shape through changing the matrix size N. Sample code of the serial program can be found in "matrix.c".

Problem 2: Histogram

Write an OpenMP parallel program that generates the histogram of an array of floating-point numbers. Your program should do the followings:

(1) Read in an integer *n* from the user;
(2) Generate an array of *n* floating point numbers, whose values are randomly generated between 0.0 and 10.0;
(3) Print how many numbers are in the range of [0, 1), [1, 2), [2, 3), ..., [9, 10], respectively.
(4) Print the running time of your solution and the serial solution.

Sample code of the serial program can be found in "hist.c".