COMP 4901Q: High Performance Computing (HPC)

Programming Assignment 1

Due date: **7 March 2021 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: Sum of the Fibonacci Sequence

Write an OpenMP parallel program to calculate the sum of *n* Fibonacci numbers. The Fibonacci sequence has the following form

$$F_n = F_{n-1} + F_{n-2},$$

and F_0 = 0, F_1 = 1. You are required to calculate sum=$\sum_{i=1}^{n} F_n$. You program should be able to

(1) receive an input *n*;
(2) print correct value of sum;
(3) print the running time of your solution and the serial solution.

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

Hint: The closed form of F_n can also be used if necessary.

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".