Assignment #3 – OpenMP Programming
EEL6763 Parallel Computer Architecture
Spring Semester 2019

Due: Feb 15

1. Write an original program to compute matrix multiplication in C and parallelize the code using the OpenMP work-sharing directive. Report speedup after parallelization using up to 16 threads and the double-precision, floating point data type.
    a. Report speedup for both weak and strong scaling (Use graphs)
    b. Include a short analysis of your results, including how the results may be improved
    c. You may implement an improvement/optimization for extra credit

2. Repeat problem 1 (above) using both MPI and OpenMP. The data from the matrix must be shared with at least 2 nodes (using MPI). Each node must have four threads running on them (using OpenMP).
    a. You may use your MPI assignment from part 1 or the solution code as a basis
    b. Vary the number of ranks and threads to find an "optimal" configuration

3. Write an original program to compute the Sobel 3x3 filter in C and parallelize the code using OpenMP. Report speedup (strong scaling) after parallelization up to 16 threads. Your input array/dataset should be of resolution/size 3840x2160 and 8-bit precision pixels.
    a. Include a graph and analysis of your results

Submission Guidelines

- Submit the C Source files and a PDF containing answers through e-Learning.
- Students may work in teams of two. Only ONE team-member has to submit PDF using Canvas (NOT BOTH) - Mention your partner's name in the comments sections during your submission on canvas.
- The answers should include source codes (copy-paste each complete source code from your source file), timing information from experiments, your observations, and any other files or documentation needed to replicate your experiments.
- In the final PDF, clearly differentiate between source code for the different questions.
- Please make sure that source code is consistently indented and commented.
- All code and answers should be your own and not copied from the Internet or elsewhere!
- Results should be run using HiPerGator batch scripts