

CS 6230 – High-Performance Computing and Parallelization

Project 3: Due April 28, 2011

This project is a continuation of the effort you initiated in Project 1 and Project 2. In Project 1, your goal was to parallelize using the distributed-computing paradigm a serial algorithm. You implemented your strategies in MPI. In Project 2, your goal was to parallelize using the shared memory paradigm a serial program. You implemented your strategies in OpenMP. In this assignment, your goal is to create a combined parallelization strategy using both MPI and OpenMP.

Your task is to parallelize the previously provided serial code using both MPI and OpenMP using the following guidelines:

1. Using a spatial domain decomposition strategy to partition amongst MPI processes. On each MPI process, use OpenMP parallelism to exploit loop-based parallelism.
2. Run your code on raven (which has only one processor per node). Report strong and weak scaling. This should be an inhibited case since multiple threads will be contending for the same processor resource.
3. Run your code on the CADE machines (which have multiprocessors per node). Report strong and weak scaling. Match the number of threads to the number of processing-units available per node.
4. Adjust the problem size as necessary (for both strong and weak scaling) to report meaningful results.

As with the previous projects, source-code and a report are required. Scaling results, modeling of performance, etc., must be provided in the report.