

CS6230 Coursework 4 Due April 30th 2014

Introduction

This exercise concerns the use of OpenMP on shared memory machines. You may use any machine that you have access to, the KingsPeak cluster on CHPC for example. on the assignment web page is an OpenMP code that is the basis for this coursework.

Task 1 - 30 percent

Run with one thread and by varying the different mesh sizes. Please note that you may have to use a large number of mesh points. Next run the OpenMP version with different numbers of threads. Runtime and accuracy increase with the number of mesh points used. Test the scalability of these codes, Look at varying numbers of processors and both produce a table and graph the results to show the trend. Vary the mesh sizes used.

Task 2 - 30 percent

Measure the overhead of the code due to using OpenMP. Use the Karp Flatt Metric for different mesh sizes and numbers of cores. Experiment with different approaches to scheduling threads so as to reduce the parallel overhead and different ways of writing the double loops.

Task 3 - 30 percent

Extend your code to the Gauss Seidel method by using the wavefront approach in the supplied notes. Compare both the time to solution and the parallel scalability against the Jacobi.

Task 4 - 10 percent

Use your code and experiments to determine a simple performance model for OpenMP. What conclusions can you draw from your model for the usefulness of OpenMP?

Deliverables

Please submit a report as a pdf electronically including:

1. A careful and thorough description of your experiments.
2. Evidence to show the scalability of the openmp codes.
3. A discussion of the overhead of OpenMP including Karp Flatt Results. Use tables not graphs for timings, please.
4. A clear description of how OpenMP should be used to achieve scalability for this problem.
5. A performance model of for the simple openmp constructs used in your programs.

Please also submit electronically your code for these tasks together with any makefiles etc that you used. Please submit everything in a .zip file.

Deadline

The work should be submitted by the end of April 30th. Electronic submissions should be emailed to me at mb@sci.utah.edu.