

CEE 618 – Scientific Parallel Computing: Midterm

Name: _____

Due 11:00 pm, Thursday 28, 2013

1. Matrix multiplication using MPI and OpenMP. Matrix A and B have the same dimensions of 1000×1000 , where the values are:

$$A_{i,j} = 1.0 \quad \text{and} \quad B_{i,j} = 2.0 \quad (1)$$

for $i, j = 1 - 1000$. Calculate matrix C as a product of matrix A and B :

$$C_{i,j} = \sum_{k=1}^{1000} A_{i,k} B_{k,j} \quad (2)$$

and sum of all the elements of C matrix:

$$\sum_{i,j} C_{i,j} \quad (3)$$

Procedure:

- (a) Develop and run a serial code, check your answer, and measure a run time.
- (b) Parallelize you serial code using MPI and run it using 2, 4, and 8 processors.
- (c) Parallelize you serial code using OpenMP and run it using 2, 4, and 8 threads.

Note: For all runs, use PBS to submit jobs. Identify names of hosts, which participate above runs.

Evaluation criteria:

- (a) Accuracy of answers.
- (b) Shorter run times. (It depends hosts so indicate them.)
- (c) Shorter codes, i.e., less number of lines and characters.