

Homework 2

Due Monday, Feb. 1

These should be run on the scholar queue or qstruct.ecn.purdue.edu. Note that timings will only be accurate if running on the Scholar queue. Let me know if you do not have an account on these machines.

Each problem should be done in its own directory and you should turn in a .zip file called <username>2.zip that contains three directories, where each directory has the program code (no binaries, please) and a .txt file if you are asked to answer questions.

A. Write and run an OpenMP program that:

1. Determines the number of processors available to run the program on a qstruct and algol machine
2. Prints out a unique threadId for each thread using an OpenMP built-in function
3. Determines which thread executes a *master* and *single* statement of a parallel region.

B. Write and time 3 programs, two of which will be parallel. Initialize within the program a single-dimensioned array with 1,000,000 elements.

- a. Perform a sequential reduction on it.
- b. Perform a reduction such as:

```
int nt = numberofthreads
int res[nt*8];
#pragma omp parallel for
for (i=0; i < 1,000,000; i++) {
    res[thread*8] += a[i];
}
```

- c. use the OpenMP reduction

C. Write a sequential loop that sums the sequence $1.0 / i$, where i takes on values in the range of 1 ... 10,000,000. Do this using a loop running from 1 ... 1,000,000, from 10,000,000 and using an OpenMP reduction. Compare the answers and briefly explain why they differ.