ME964
High Performance Computing for Engineering Applications
Assignment 12
Date Assigned: April 21, 2012
Date Due: April 29, 2012 – 11:59 PM

The goal of this assignment is as follows:
- Getting familiar with OpenMP

Problem 1. Write a program that relies on OpenMP-enabled parallel programing to evaluate the integral

$$I = \int_0^{100} e^{\sin x} \cos(\frac{x}{40}) dx$$

Note that the value provided by MATLAB for this integral is I = 32.121040688226245. To approximate the value of I use the following extended Simpson's rule:

$$\int_0^{100} f(x)dx \approx \frac{h}{48}\left[17f(x_0) + 59f(x_1) + 43f(x_2) + 49f(x_3) + 48\sum_{i=4}^{n-4} f(x_i) + 49f(x_{n-3}) + 43f(x_{n-2}) + 59f(x_{n-1}) + 17f(x_n)\right]$$

In the approximation above, $x_0 = 0$, $x_n = 100$, $h = 10^{-4}$, and $n = \frac{100-0}{h} = 10^6$. This value of n goes to say that you divide the interval $[0, 100]$ in 10^6 subintervals when evaluating I.

After implementing the code, you will have to run the code on Euler using
- One computational thread (sequential execution)
- Using OpenMP on either an Intel (up to 8 physical and 16 virtual cores) or AMD (up to 64 cores) per box. Try to squeeze as much performance as possible out of the available hardware

Please report your timing results at http://sbel.wisc.edu/Forum/viewtopic.php?f=13&t=343 for both the sequential and OpenMP solutions. Report times in milliseconds.

`Mercurial` submitted work should include:

- Your source code ready to be compiled and run by the TA
- A report that includes a summary of the timing results