ME964: Assignment 8
Using OpenMP to Evaluate an Integral on a Multi-Core Machine

March 26, 2011

Write a program that uses the OpenMP parallel programming paradigm to evaluate the integral

\[ I = \int_{0}^{100} e^{\sin x} \cos \left( \frac{x}{40} \right) \, dx \]

Note that the value provided by MATLAB for this integral is \( I = 32.12040688226245 \). To approximate the value of \( I \) use the following “alternative 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 equation 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 \( I \).

You will have to run on Newton the code using first only one core and then eight cores. For each of the two scenarios report in a “results table” as well as on the class forum the value that you obtained for \( I \) along with the amount of time required to carry out the computation.

Please zip your directory containing your OpenMP code and report and use the Learn@UW drop-box to submit your work by April 14, 11:59 PM.