

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 $I = 32.121040688226245$. 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.