MSc in High Performance Computing
Coursework for Threaded Programming Part 2

The object of this assessment is to experiment with the loop scheduling options in OpenMP. You will be required to conduct some experiments, and submit a report detailing the results of these experiments.

You are provided with a piece of code which contains two loops which are parallelised with OpenMP directives. The code measures the execution time for 1000 repetitions of each loop, and includes a verification test for each loop.

The code can be found on the course pages on Learn. You may choose to work with *either* the C (`loops.c`) *or* Fortran 90 (`loops.f90`)version.

You should use the Intel 19 compilers, and always compile the code with the `-O3 -qopenmp` options to ensure a high level of sequential optimisation and enable OpenMP.

SCHEDULE clause options

Run the code on 8 threads on the back end of Cirrus, using the following SCHEDULE clause options:

- STATIC

- AUTO

- STATIC,n

- DYNAMIC,n

- GUIDED,n

where for the latter three cases, n (the chunksize) takes the values $1, 2, 4, 8, 16, 32, 64$. From these experiments, determine for each loop the best scheduling option on 8 threads. You may find it convenient to use `schedule(runtime)` and run multiple experiments in the same batch job. Using this option (which may be different for the two loops), run the code on 1, 2, 4, 6, 8, 12, 16, 24 and 32 threads.

Submission

You are required to submit the following:

1. A written report.
   (Guideline length: 6-8 pages including figures.)

The deadline for submission is 16:00 on Friday 30th October 2020.
Your report should contain:

- a *very short* introduction;

- a description of the experimental environment and method

- graphs of the execution time of each loop versus the chunksize for the STATIC, n, DYNAMIC, n and GUIDED, n schedules.

- graphs of the speedup (T_1/T_p) for each loop using the best schedule versus number of threads.

- some text describing *and explaining* the results you obtained;

- some *brief* conclusions.

You should *not* include any background material in your report.

This assessment is worth 30% of the total marks for the course.