Parallel Computing Laboratory
IT-300
Fall-2019

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This week the students will exercise the basic constructs and OpenMP variables studies. The students are free to choose their programming environment. But the preferred language is C, based on which the following assignments' guidance is given:

The file is saved as regular 'C' file name: filename.c

Compilation using GCC: **gcc -fopenmp filename.c**

You are free to use your own compiler and get the instruction for the compilation. It is also shared in OpenMP lecture notes.

All the required OpenMP syntaxes are available in OpenMP-API-Specification-5.0.pdf, which is openly available for reference.

Exercise 1: Scalability-1

1. Choose an application that can be categorized as strongly scalable.
2. Implement the serial version of the program and measure the time.
3. Parallelize the program using OpenMP.
4. Compute the speed-up of your application. If not satisfied, check for the opportunities to further parallelize your application.
5. Prove that your application is strongly scalable.

Hint: note that your application may be strongly scalable, but you may be limited by the number of threads as you are on single nodes. Maybe you may try a prediction graph

Exercise 2: Scalability-2

1. Choose an application that can be categorized as weakly scalable.
2. Implement the serial version of the program and measure the time.
3. Parallelize your program using OpenMP.
4. Report on the speed-up achieved.
5. Prove that your application is weakly scalable.

6. Optimize the above program using OpenMP (especially, task and task wait constructs) and comment on your observations. You may use the data scoping as well.

Note: Choose a program where increasing the problem size will not cause any segmentation fault, so that you get a better chance to prove your choice.