Parallel Becnhmarking Practice

1. Aim of the Practice

The main aim of this practice is to learn to execute a parallel benchmark (application) written in the both most extended used parallel languages, MPI and OpenMP. Likewise, we will learn how to analyze the performance of a parallel machine by means of a benchmark.

According to this, you must use the NAS parallel benchmark suite. (NPB3.3.1) (https://www.nas.nasa.gov/publications/npb.html). This suite is composed by 12 different benchmarks with different characteristics each one. Each benchmark is written in MPI, OpenMP and a serial version.

You must install, execute and analyze only two of the benchmarks of the suite. You can choose anyone of them, apart from the both benchmarks (EP and IS) explained on class. All executions will be carried out in the cluster "moore.udl.cat ", which is the educational cluster of the Polytechnic School.

2. Contents of the work:

- **I.- Analysis of the chosen benchmark**: Main characteristics of the chosen two benchmarks, focusing on computation and communication pattern. In order to dos this, you should use the paper uploaded into the folder of the Sakai campus: Chapter2-Introduction Parallel Processing and benchmarking/NAS Parallel Benchmarks . You must justify why you have chosen those benchmarks. I
- **II.- Description of the machine to compare**: Main characteristics of the evaluated machine (http://moore.udl.net/wordpress/).
- **III. Serial, OpenMP and MPI Results:** In a Table, you must show the obtained results (Execution time (Wall clock time), Speedup and Efficiency) in relation to the class of the benchmark (W, A, B,…) that you have chosen and the number of nodes/cores.
- **IV.-Analysis of the benchmarking results in relation to the characteristics of the benchmarks.** In this section, you must explain the obtained results according to the characteristics of the benchmarks and the machine. Why the SpeedUp and Efficiency is different in relation to different benchmarks? Is the scalability the same for both programming models (OpenMP and MPI)? If you increased the number of tasks over 32, which would the predicted SpeedUp be for each bechmark?
- **V.- Conclusions**
- **VI.-Bibliography**

3.- Maximum Length of the work: 5 pages. Note that the most extended sections should be II, III and IV section.

4.- Work In pairs. The work can be done individually or by groups of two students.

4.- Deadline for downloading the work: 27th of March.