Parallel computing - Exercise 3

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1 Compute `pi` by using MPI

The aim of the exercice is to approximate the value of pi using the *midpoint formula*. The code is implemented in the parallelized by using MPI and it is visible in the file *ex3.c*. The implementation reduces the result in the last process with `rank=npes-1` and print the final output in the process with `rank=0`.

2 Execution

The code described is executed on Ulysses through a script (*ex3.sh*) for 1,4,8,16,20, 32 and 40 threads and the time of execution is obtained by using `MPI_Wtime()`. The execution is performed by submitting a job on Ulysses through the command `qsub -l nodes=2:ppn=20 ex3.sh` that asks for two nodes.

3 Results

The result of executions are stored in the file *results.txt*. The Figure 1 shows the performance for the MPI case only; the Figure 2 shows a comparison between the OpenMP (using `atomic` directive) and the MPI implementations. In both cases the parameter n is set as `n=10e8`. The performance of `OpenMP` implementation are slightly better with respect to the other implementation until 16 threads, but both scale well.

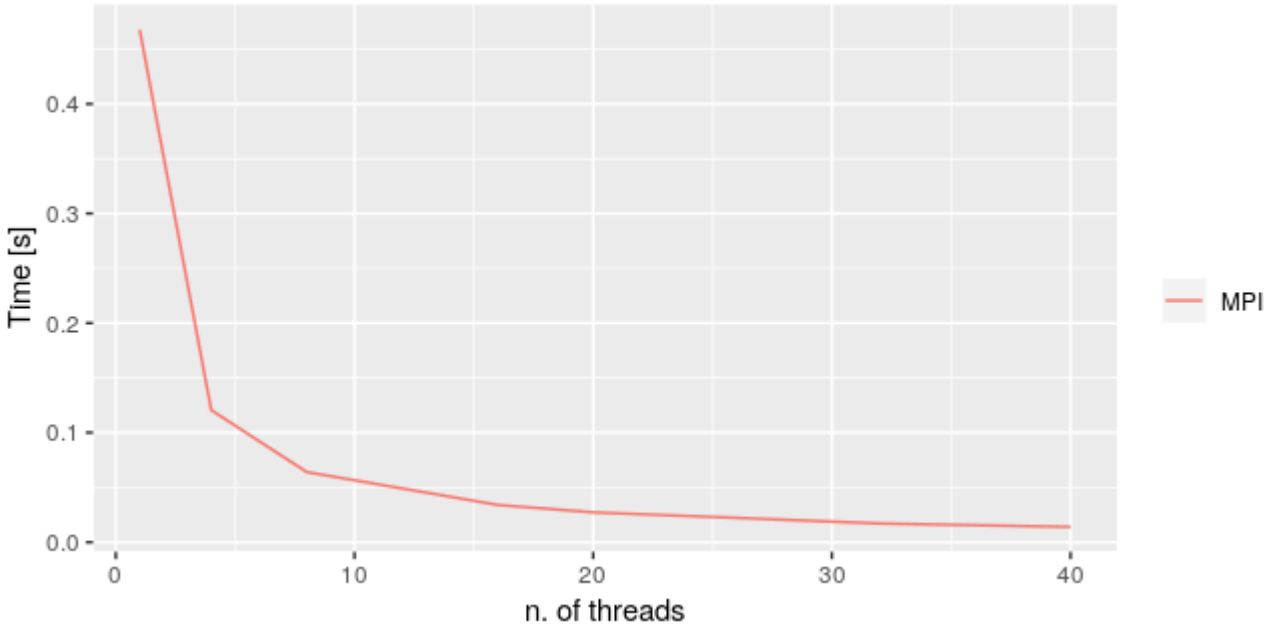

Figure 1: MPI implementation

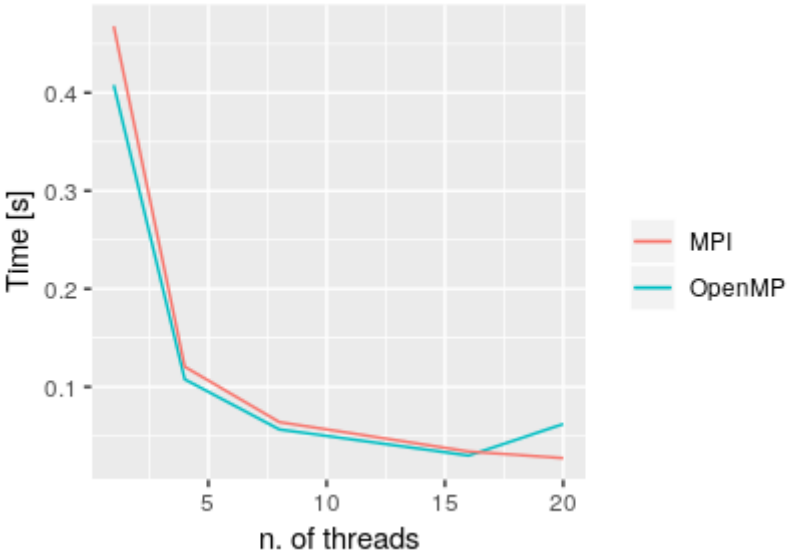

Figure 2: Comparison between parallel implementations