



PI Approximation:MPI



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Overview:

The objective of the exercise was to estimate the value of pi using the reduce clause in MPI and compare the elapsed time with the time obtained by using reduction clause in OpenMp performed in exercise 1.

Outcome :

The approximation of pi was carried out by using the following algorithm:

- * 1. Calculate the interval for integration for all the processes.
- * 2. If I am not the last process, perform the integration within local intervals.
- * 4. Perform reduce clause by the last process i.e. numprocs-1 .
- * 5. If I am the last process ,send the reduced result to the root .
- * 6. If I am the root process , receive the result and print .

No of threads	No of Process	OpenMP:Reduction Timing	MPI:Reduce Timing
1	1	1.36	0.62
2	2	0.57	0.32
4	4	0.16	0.15
8	8	0.08	0.08
16	16	0.04	0.04
20	20	0.06	0.03

Table: Records of time elapsed for reduce operation with OpenMP and MPI

From the above table we can compare the elapsed time yielded from using reduce clause in OpenMp and MPI. The results show that by running the program within the single node, the elapsed time for both the cases are similar. The communication overhead for MPI seems to have no effect in the results obtained from MPI.

Build Instructions:

The file named '**MPI_pi_calc.c**' available in github repo can be executed with the help of the attached **makefile** and the result can be obtained by submitting the code in Ulysses's node with the following command line:

qsub -l nodes=1:ppn=20,walltime=3600 -q regular script.sh