Lab - 9

The problem has to be supplemented with a brief write-up with the following details (wherever necessary):

1. Context:

   Brief description of the problem.

   Complexity of the algorithm (serial).

- Compute to memory access ratio
- Memory bound vs compute-bound problem
- Optimization strategy.

2. hardware details: CPU model, memory information details, no of cores, compiler, optimization flags if used, precision used. Max. Theoretical performance.

3. Wherever necessary, use log scale and auxiliary units.

Run time should be significant so that the run time can be measured properly using timer functions. Start with a small problem size and go to the maximum possible problem size as far as possible.

Problem:

Write a serial code and parallel code for the following (using openMP):
Calculation of pi using random numbers.

Reference for serial code (understand the algorithm properly):

https://www.geeksforgeeks.org/estimating-value-pi-using-monte-carlo/

Use the random function of the C library for random number generations.

1. Plot speedup vs number of processors (for a large value of number of points (1e9)). What kind of speedup do you observe? do it on both lab and cluster.

2. If you observe a major issue in parallelizing this code, report it and clearly mention how you solved it. Report on it briefly. Understand the problem of parallel random number generations using OpenMP.