

High Performance Computing : Home Work 5

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<https://github.com/SachinSBharadwaj/hw5.git>

Question 1

MPI 2D Jacobi Smoother

The 2D Jacobi MPI Smoother was run on NYU Prince HPC Computer on several cores and nodes. Both weak and strong scaling study was performed as reported below:

(1) WEAK SCALING:

For the weak scaling, $N_l = 100$ was set while the number of MPI tasks were increased as the number of points were also increased. Number of iterations was fixed to 1000.

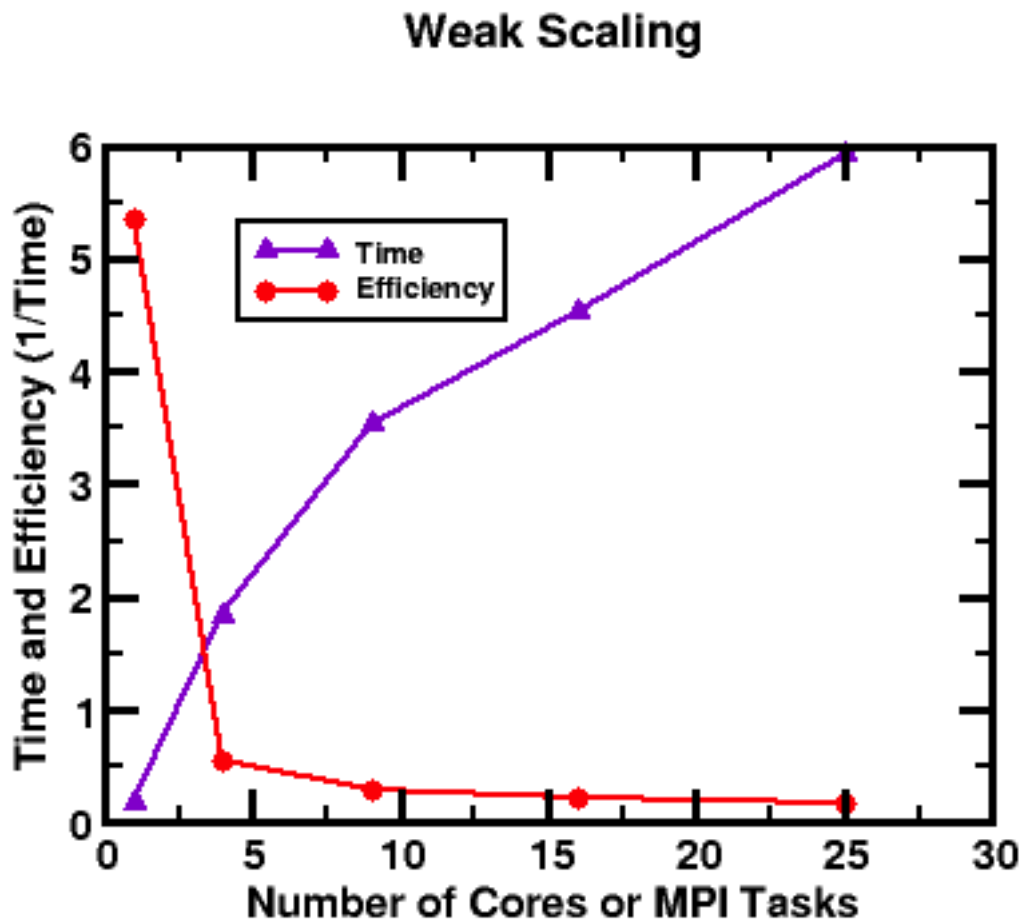


Figure 1: Time and Efficiency(*100 %)

(2) STRONG SCALING:

For strong scaling $N = 3600$ was set/fixed with iterations to 1000. The number of cores/tasks were gradually increased.

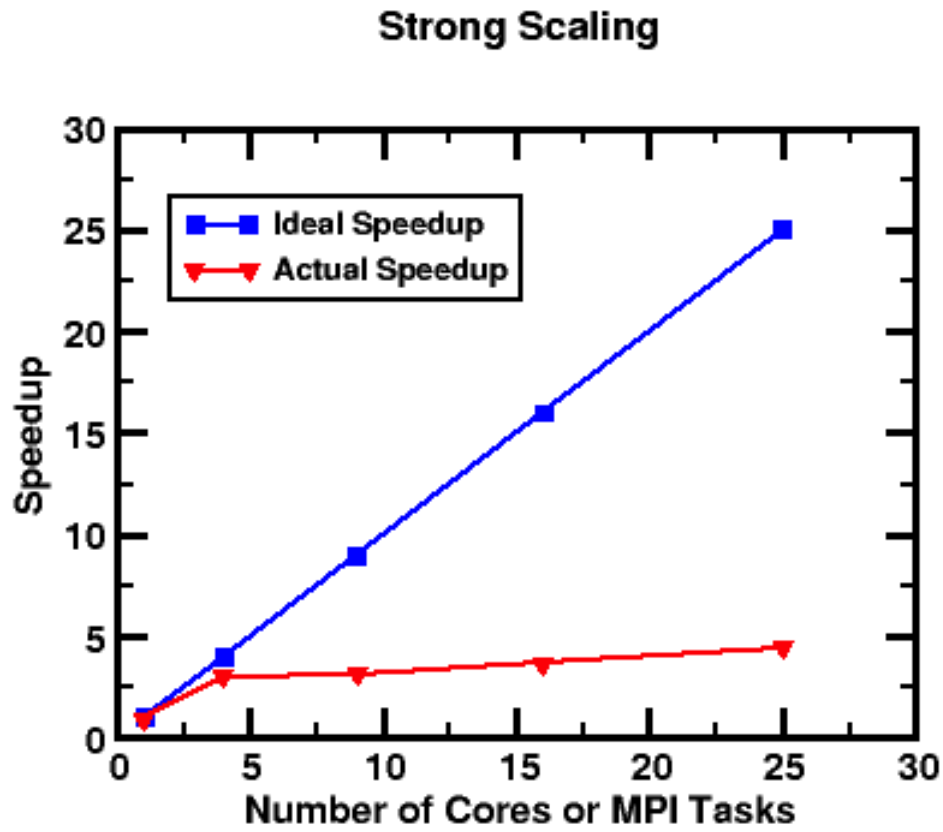


Figure 2: Speedup

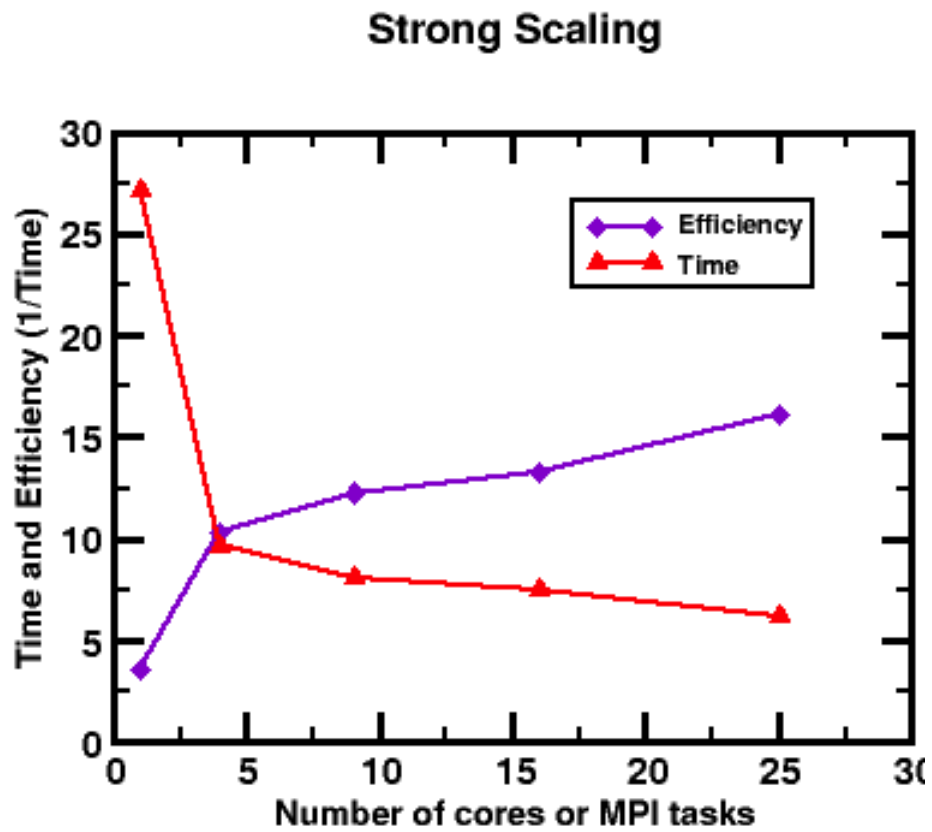


Figure 3: Time and Efficiency(in %)

(3) VOLUNTARY BONUS QUESTION:

The same exercise was done with non-blocking type code and the scaling analysis results are as follows:

(1) WEAK SCALING:

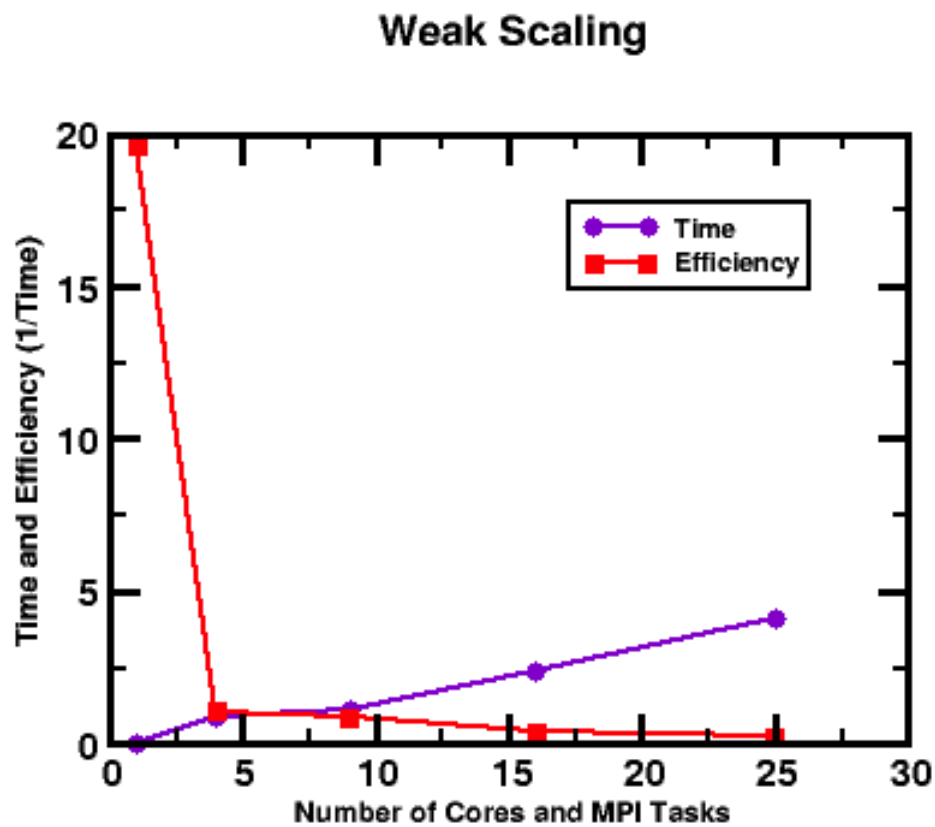


Figure 4: Time and Efficiency(*100 %)

(2) STRONG SCALING:

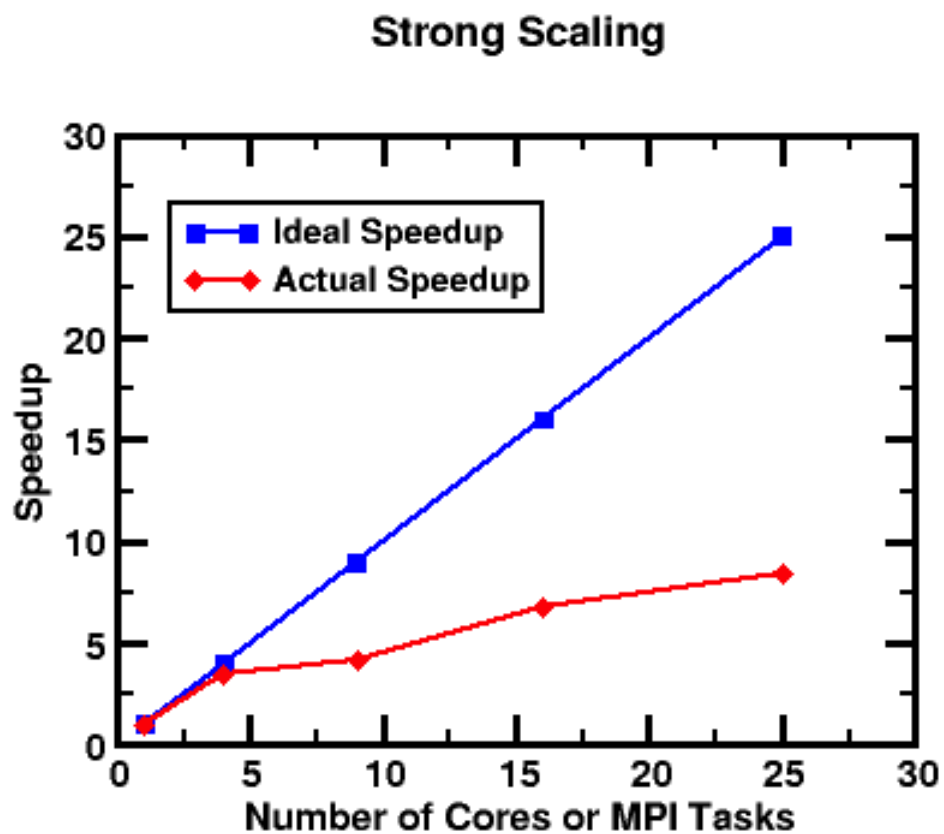


Figure 5: Speedup

Strong Scaling

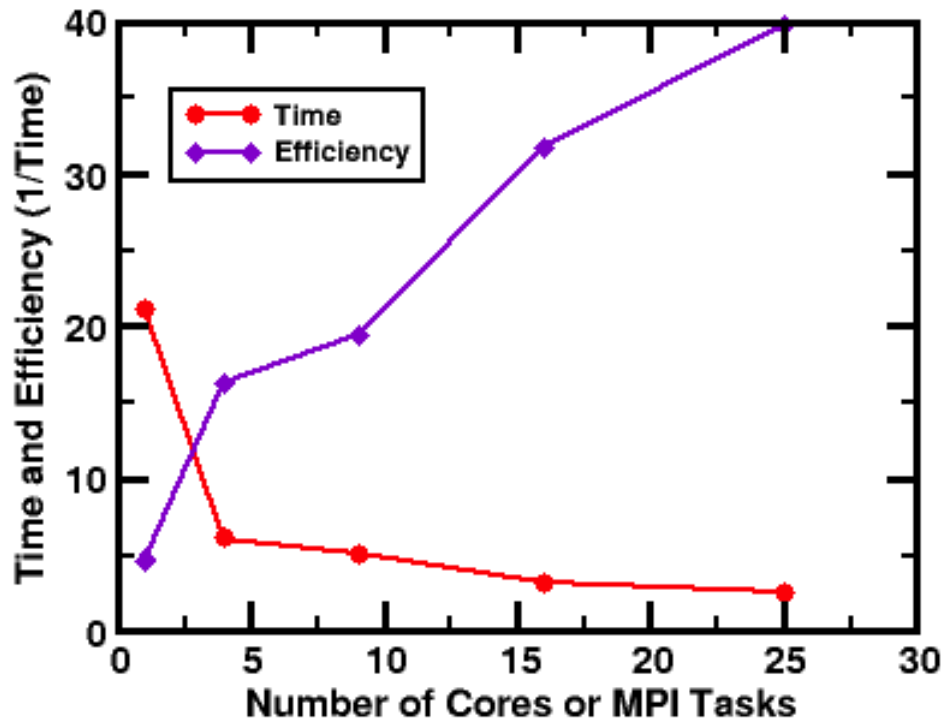


Figure 6: Time and Efficiency(in %)

Question 2

MPI Sample Sort

The Sample Sorting using MPI was performed and the timings, run on 64 cores on NYU Prince are as follows:

1. $N = 10^4$: 1.2351 s
2. $N = 10^5$: 1.3433 s
3. $N = 10^6$: 1.5048 s