

# Department of Computer Science & Engineering

## University of Dhaka



**CSE-4209: Parallel and Distributed Systems Lab**

## **Assignment 3**

PI Calculation Using the Master-Worker Paradigm (MPI)

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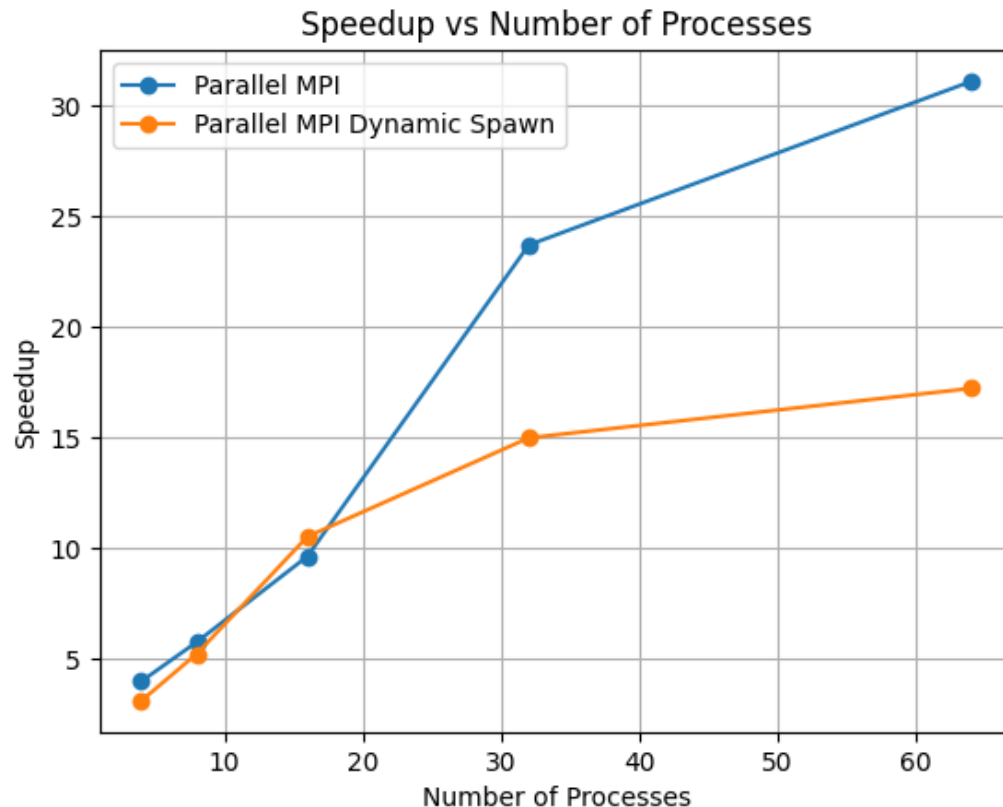
**Calculate Speedup:** Speedup is typically defined as the ratio of the sequential execution time to the parallel execution time. The formula for speedup (S) is:

$$S = T(1) / T(p)$$

Where:

T(1) is the execution time for the Sequential Version.

T(p) is the execution time for the parallel version with p workers.



The graph shows that both parallel MPI and MPI dynamic spawning speedup increase with the number of processes, but MPI dynamic spawning speedup is consistently higher than parallel MPI speedup. This is because MPI dynamic spawning can more efficiently distribute the workload among the processors.

The speedup curves start to saturate at around 30-40 processes, which suggests that the dartboard algorithm is not perfectly parallelizable. This is because there is some overhead associated with communicating and synchronizing the processes.

Overall, the graph shows that MPI dynamic spawning can be used to significantly speed up the calculation of PI using the dartboard algorithm.