Cloud Computing

Message Passing Interface

By

Nandhini Santhanam

Sunilkumar Raghurman

Objective given at the starting of the course

To develop a parallel application with MPI.

Test the application on the cluster.

- with sufficient large problem sizes.
- with different numbers of cores.

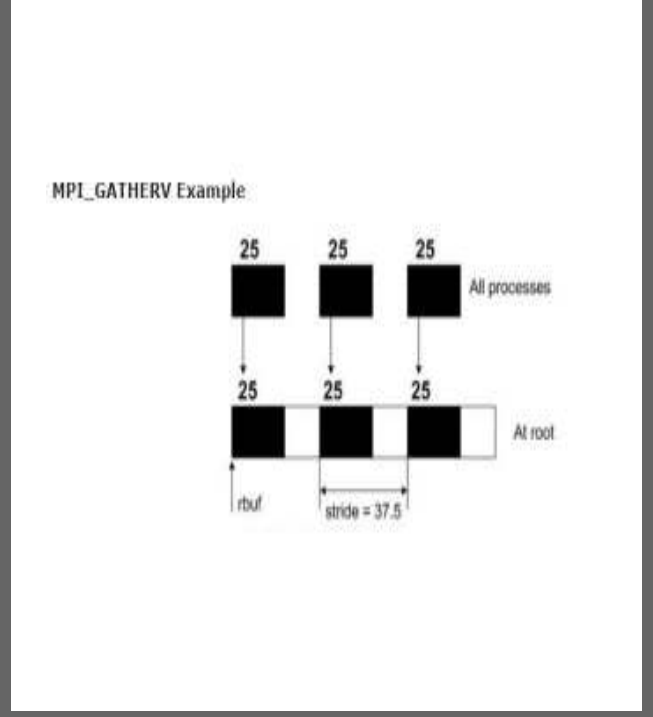
Calculate the speedup .

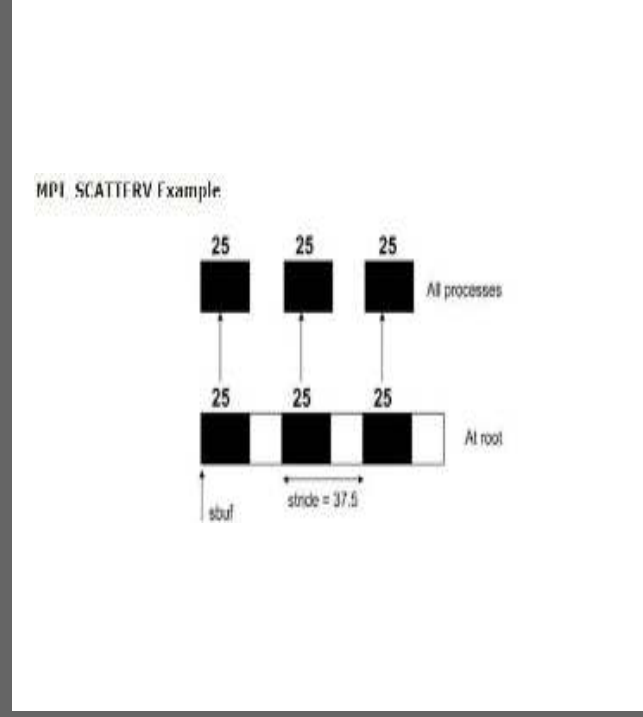
MPI – Message Passing Interface

- Parallel computing has been in development for many years. MPI is one of the basic library which enables to do parallel programming across a cluster of computers.
- It works based on the concept of message communication between the different system in the cluster.
- There are different libraries like MPICH , OpenMPI which offer the functionality of MPI.

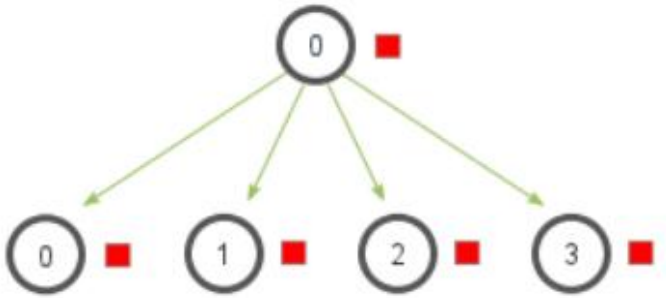
MPI

- MPI_Bcast
- MPI_Gatherv
- MPI_Scatterv



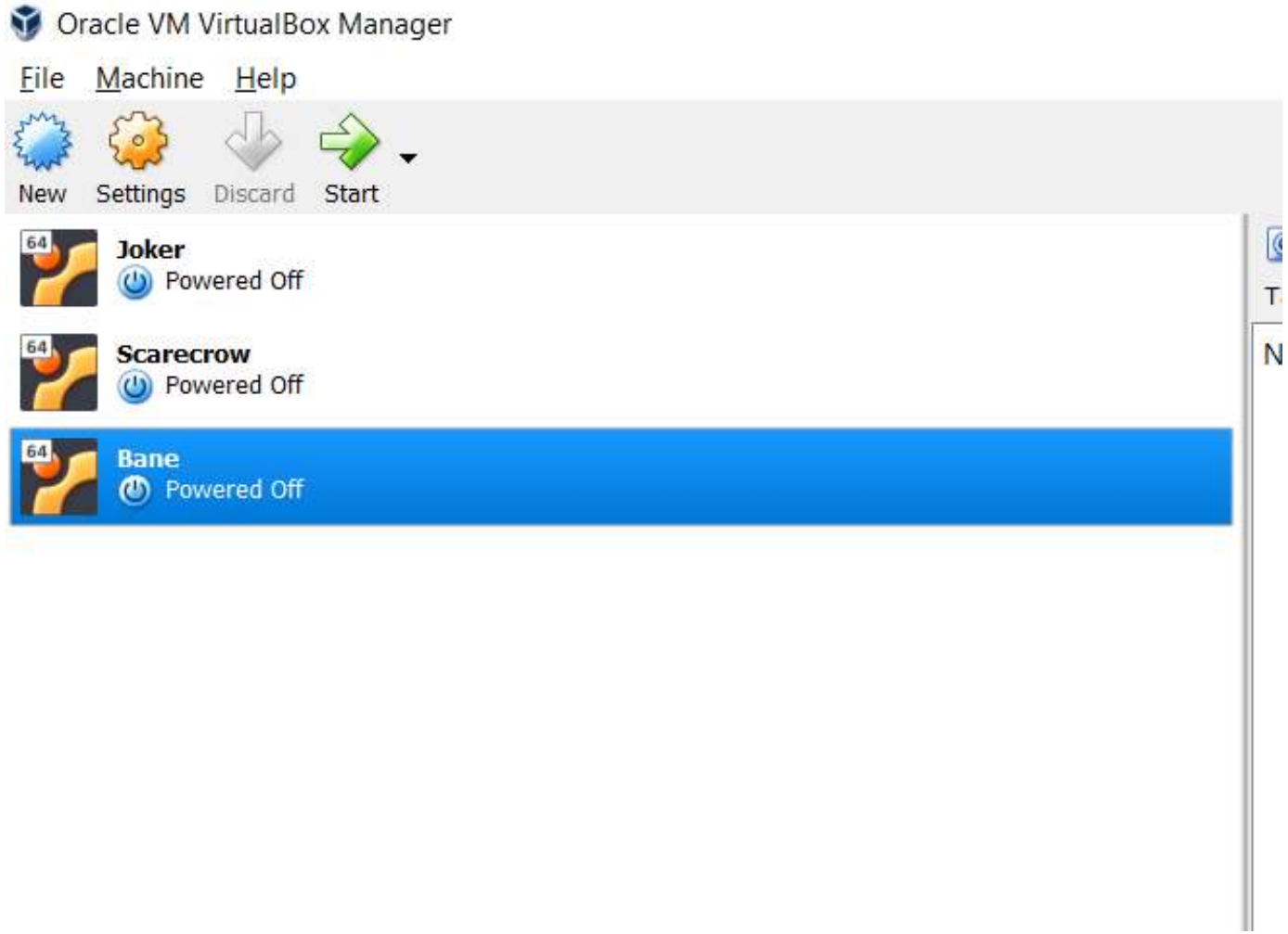


MPI_Bcast

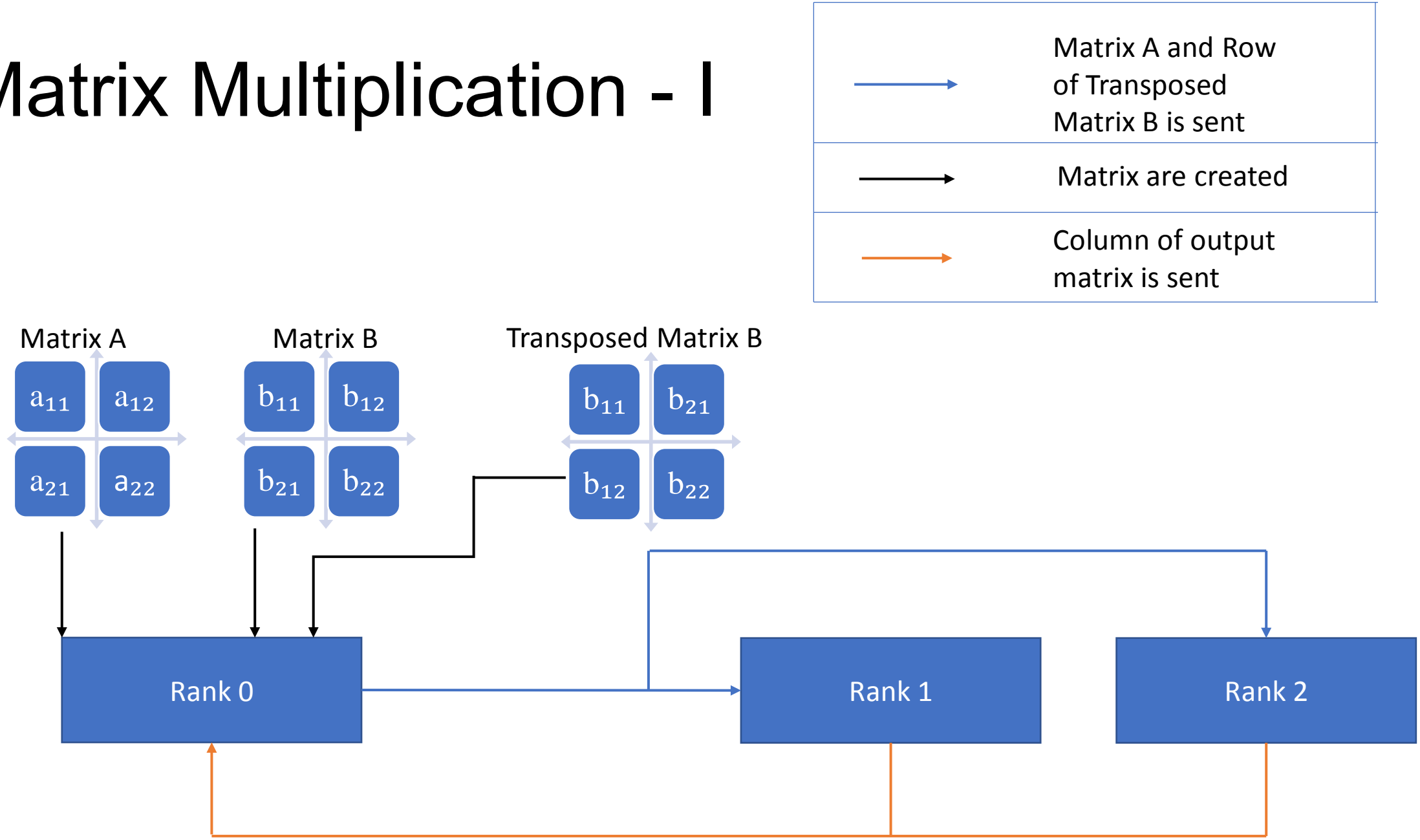


Environment Setup

We have set up a virtual box with 1 master and 2 Slaves.



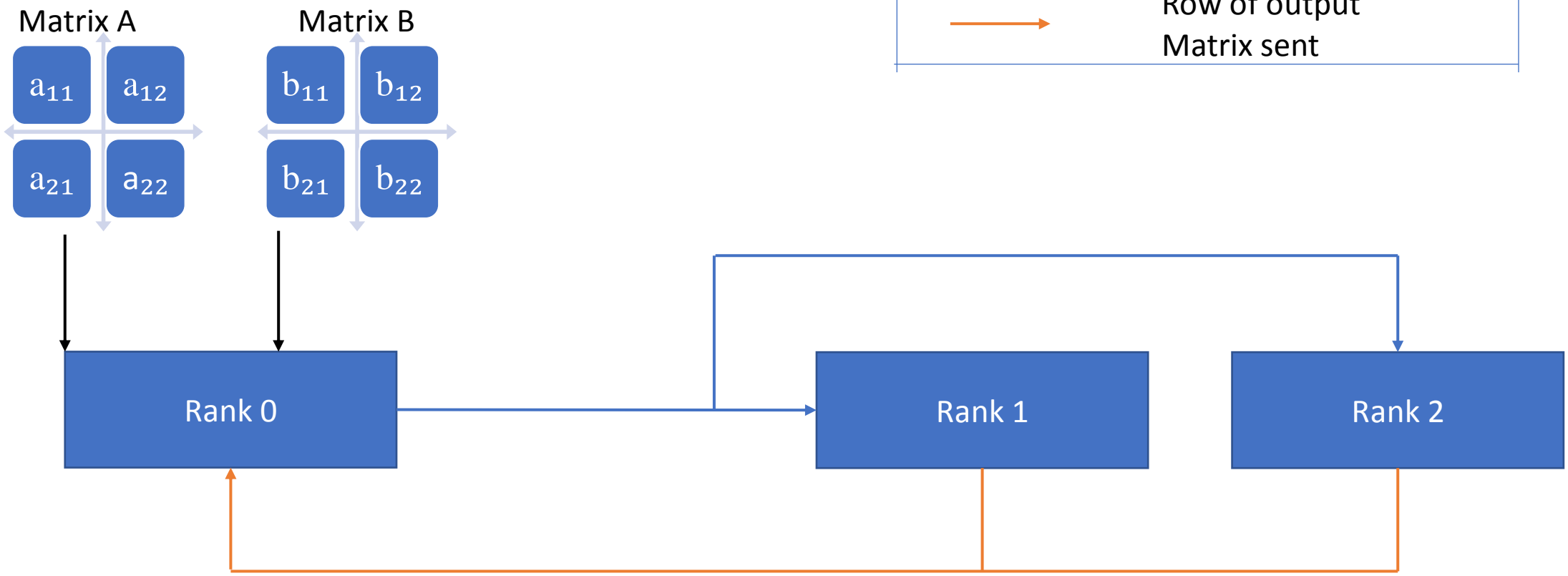
Matrix Multiplication - I



Shortcomings in this Approach

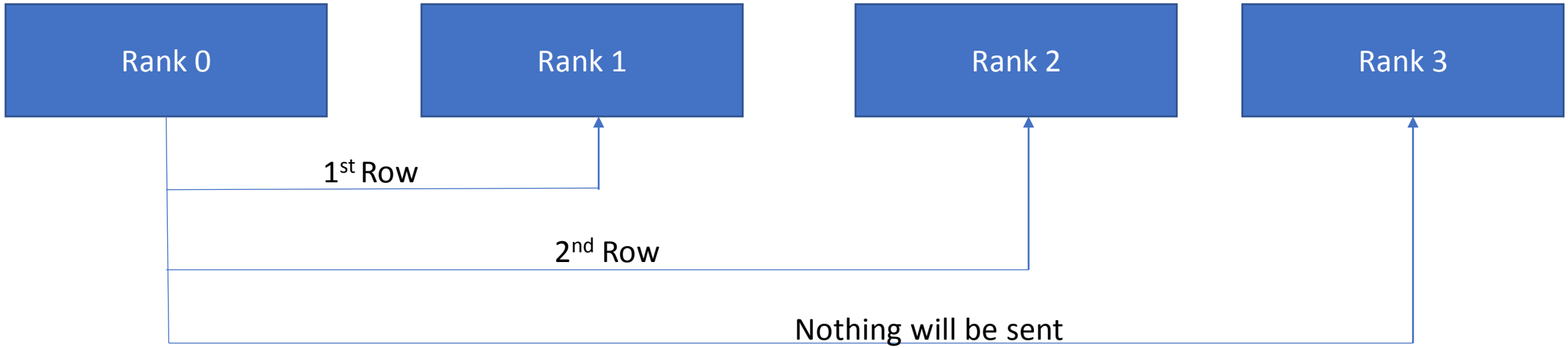
- The number of process should be equal to the number of columns in B matrix plus one
- There are additional time required for transposing the B matrix to be sent and the output matrix received from the processes.

Matrix Multiplication - II



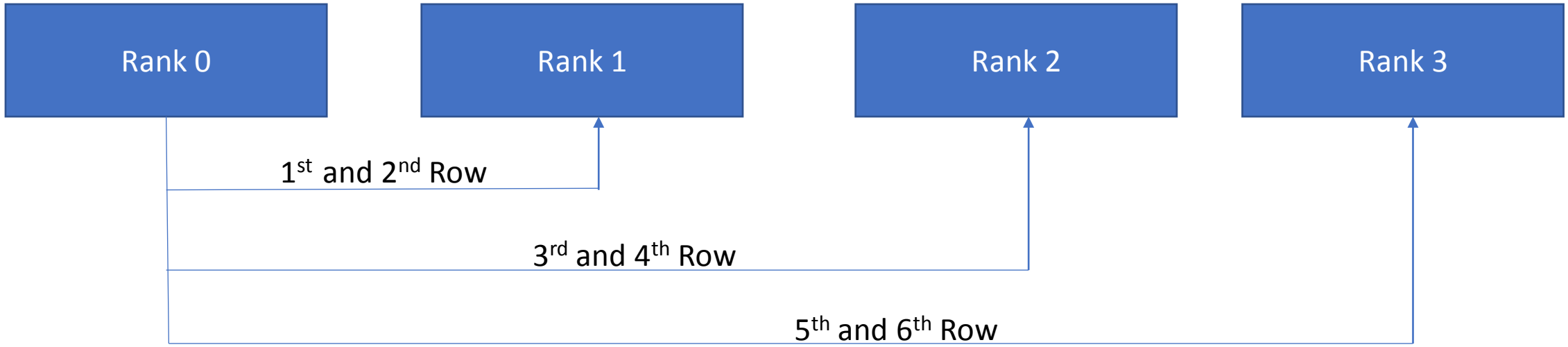
Case 1: Number of process is greater Than Number of Rows

- Number of Process : 4
- Number of Rows of Matrix A : 2



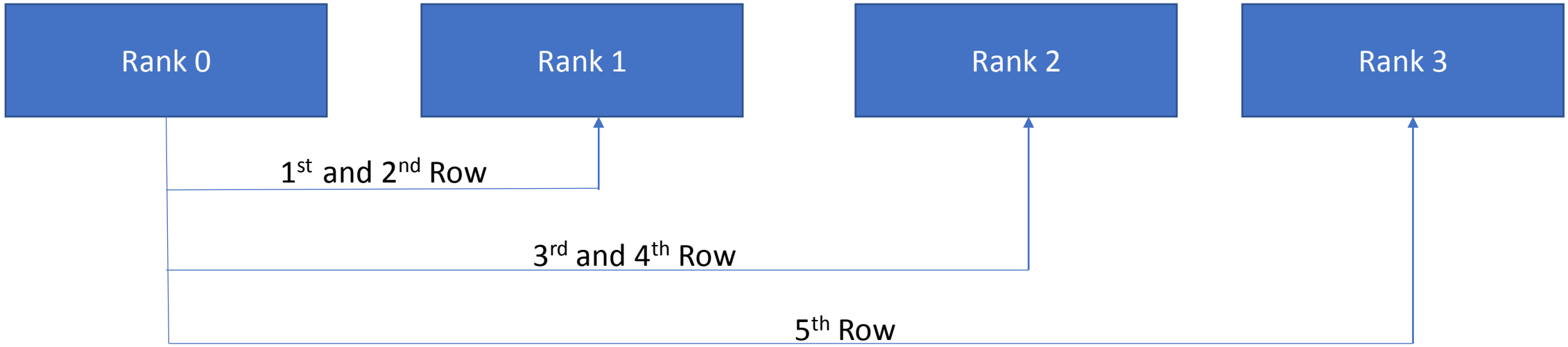
Case 2a: Number of process is less Than Number of Rows

- Number of Process : 4
- Number of Rows of Matrix A : 6



Case 2b: Number of process is less Than Number of Rows

- Number of Process : 4
- Number of Rows of Matrix A : 5



CONCLUSION

1

The short comings in previous approach is overcome in this approach

2

The timing is compared for series multiplication and Parallel multiplication.

3

The Problem size , number of processes and the number of CPU cores are dependent

References

- COMP 605: Introduction to Parallel Computing Topic: MPI: Matrix-Matrix Multiplication By Mary Thomas
- Matrix Multiplication using MPI Dieter an Dieter an Mey Center for Computing and Communication Center for Computing.
- https://stackoverflow.com/questions/41575243/matrix-multiplication-using-mpi-scatter-and-mpi-gather
- https://www.daniweb.com/programming/software-development/code/334470/matrix-multiplication-using-mpi-parallel-programming-approach

Thank You!!!