

1. MPI Based

- Design **Parallel Bucket Sorting Algorithm** and Implement using MPI (Simple and all-to-all broadcast); evaluate its performance for varying data size (100, 200, 1000, 5000 records) and Cluster configurations (say 1 node, 5 node, 10 node, 20 node, 40 node ...) and present results graphically.
- Design **Parallel Searching Algorithm** and Implement using MPI; evaluate its performance for varying data size (100, 200, 1000, 5000 records) and Cluster configurations (say 1 node, 5 node, 10 node, 20 node, 40 node ...) and present results graphically.
- Design **Parallel Vector Matrix Multiplication Algorithm (row-wise, column wise, block-decomposition)** and Implement using MPI; evaluate its performance for varying data size and Cluster configurations (say 1 node, 5 node, 10 node, 20 node, 40 node ...) and present results graphically.
- Design **Parallel Matrix Multiplication Algorithm** and Implement using MPI; evaluate its performance for varying data size (100x100, 200x100, 1000x2000, 5000x4000 data) and Cluster configurations (say 1 node, 5 node, 10 node, 20 node, 40 node ...) and present results graphically.
- Design **Parallel Shortest Path Algorithm** (say Dijkstra or Floyd Algorithm) and Implement using MPI; evaluate its performance for varying network size (10, 50, 100 nodes) and Cluster configurations (say 1 node, 5 node, 10 node, 20 node, 40 node ...) and present results graphically.
- Design **Parallel 3-SAT problem using Cyclic Allocation of jobs to Processes** and Implement using MPI; evaluate its performance for varying network sizes and Cluster configurations (say 1 node, 5 node, 10 node, 20 node, 40 node ...) and present results graphically.
- Design **Parallel Mandelbrot Set Algorithm (Using Static and Dynamic allocation of tasks)** and Implement using MPI; evaluate its performance for varying network size (10, 50, 100 nodes) and Cluster configurations (say 1 node, 5 node, 10 node, 20 node, 40 node ...) and present generation of set graphically.
- Write a parallel program and Implement using MPI that reads an image file in a suitable uncompressed format and generates a file of the **image shifted N pixels right**, where N is an input parameter.
- Design **Parallel Algorithm for computing the numerical integral of an arbitrary function using Monte Carlo methods (Using Static and Dynamic allocation of tasks)** and Implement using MPI; evaluate its performance for varying network sizes and Cluster configurations (say 1 node, 5 node, 10 node, 20 node, 40 node ...) and present results.
- Design a socket based program to mimic the behavior of following MPI routines:

- Broadcast
- Scatter
- Gather
- Scatterv
- Gatherv
- Alltoall, OR similar