SIT315- Seminar 7 - Distributed Computing - MPI

Overview

Form a group of 5-6 students and work on the following activities.

Submission Details

Each student should submit the answers in the onTrack individually. Please write the names of all of your group members in the first page of your submission.

Activity 1- MPI Communication

In Activity 2 of the week six seminar, you complied and ran a basic MPI program. In this task, you will extend that program by adding new features to it.

Pre-requisites

Read the following open-mpi documentation:
https://www.open-mpi.org/doc/v4.1/man3/MPI_Comm_rank.3.php
https://www.open-mpi.org/doc/v4.1/man3/MPI_Recv.3.php
https://www.open-mpi.org/doc/v4.1/man3/MPI_Send.3.php
https://www.open-mpi.org/doc/v4.1/man3/MPI_Bcast.3.php

1. Check process rank (MPI_COMM_RANK), and
    1. if the process is the master, then send a "Hello World!" message, in characters, to each of the workers (MPI_Send)
    2. if the process is a worker, then receive the "Hello World!" message and print it out (MPI_Recv)
2. Try again, but this time use MPI_Bcast to broadcasts a message from the master process to the workers.

Activity 2 - Distributed Vector Addition- MPI

In the resources, you have been provided with a simple vector addition program. In the week 4 and 5 seminars, you implemented parallel versions of this program using pthread and OMP. In this activity, you need to:

Pre-requisites

Read the following open-mpi documentation:
https://www.open-mpi.org/doc/v4.1/man3/MPI_Scatter.3.php
https://www.open-mpi.org/doc/v4.1/man3/MPI_Gather.3.php
https://www.open-mpi.org/doc/v4.1/man3/MPI_Reduce.3.php

1. Modify the sequential program to use MPI (`MPI_Scatter, MPI_Gather`) to distribute work on nodes.
2. Evaluate the performance of your program vs sequential and multi-threaded solutions.
3. Modify your code to calculate the total sum of all the elements in v3 using `MPI_Reduce` .