2023-Batch-I-Set-2

Lab 9 - CSS 311 – Parallel and Distributed Computing

MPI – Basics – Part-1

Instructions

Due date: 26-10-2025 (Sunday), 05:30 P.M. (deadline)

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1. Write an MPI program with C to show the text "**Your Name**" and "**Roll Number**" with its process ID (rank). Assume, number of processes (np) = 4.

2. Write an MPI program with C without MPI built-in functions to compute the following:
   Process ID = 0, do c=a&b
   Process ID = 1, do c=a|b
   Process ID > 1, do c=a^b
   Show the output with its respective process ID. Assume **np=5**.

3. Consider the scenario. ISRO sent Chandrayan-3 satellite successfully soft-landed on the moon on 23-August-2023. Write an MPI program for the given scenario. It is expected to create two-process, process 0 (ISRO) send the string tokens **Chandrayaan-3** and **23-August-2023** to the process 1 (Moon). Use appropriate MPI built-in functions with blocking communications scenario to solve this problem.

4. Write a program using MPI for the following:
   a) Consider a parallel matrix-vector multiplication using MPI, where a large matrix is distributed among different processes. The distribution is achieved using MPI_Scatter, and after computation, partial results are gathered using MPI_Allgather. Matrix size should not be less than 3*3. Requested to receive input matrix and vector from user.
   b) Consider the following two-dimensional array values and distribute the values of each row to one process.
   B[4][4] = {{'A', 'B', 'C', 'D'},
   {'E', 'F', 'G', 'H'},
   {'I', 'J', 'K', 'L'},
   {'M', 'N', 'O', 'P'}};

---------- ALL THE BEST ----------