

High Performance Computing Lab

Practical No. 7

PRN : 21510111

Batch : B5

Title of practical:

Installation of MPI & Implementation of basic functions of MPI

Problem Statement 1:

Implement a simple hello world program by setting number of processes equal to 10

Screenshots:

```
as7 > C hello_mpi.c > ...
1  #include <mpi.h>
2  #include <stdio.h>
3
4  int main(int argc, char** argv) {
5      int rank, size;
6
7      // Initialize the MPI environment
8      MPI_Init(&argc, &argv);
9
10     // Get the number of processes
11     MPI_Comm_size(MPI_COMM_WORLD, &size);
12
13     // Get the rank of the process
14     MPI_Comm_rank(MPI_COMM_WORLD, &rank);
15
16     // Print "Hello, World!" from each process
17     printf("Hello, World! from process %d of %d\n", rank, size);
18
19     // Finalize the MPI environment
20     MPI_Finalize();
21
22     return 0;
23 }
```

Information 1:

Output :

```
• *[main][~/acad/hpc-lab/as7]$ mpirun -np 4 ./hello_mpi
Hello, World! from process 0 of 4
Hello, World! from process 2 of 4
Hello, World! from process 3 of 4
Hello, World! from process 1 of 4
```

Problem Statement 2:

Implement a program to display rank and communicator group of five processes

Screenshots:

```
7 > C 2.c > ...
1  #include <mpi.h>
2  #include <stdio.h>
3
4  int main(int argc, char** argv) {
5      int rank, size;
6      MPI_Group world_group;
7
8      // Initialize the MPI environment
9      MPI_Init(&argc, &argv);
10
11     // Get the rank of the process in MPI_COMM_WORLD
12     MPI_Comm_rank(MPI_COMM_WORLD, &rank);
13
14     // Get the group associated with MPI_COMM_WORLD
15     MPI_Comm_group(MPI_COMM_WORLD, &world_group);
16
17     // Print rank and communicator group
18     printf("Process %d: Rank = %d, Communicator Group = %p\n", rank, rank, (void*)world_group);
19
20     // Finalize the MPI environment
21     MPI_Finalize();
22
23     return 0;
24 }
```

Information:

Output:

```
• *[main][~/acad/hpc-lab/as7]$ mpirun --oversubscribe -np 5 ./a.out
Process 0: Rank = 0, Communicator Group = 0x56f4c13b9cc0
Process 1: Rank = 1, Communicator Group = 0x5bf41e2b6b40
Process 2: Rank = 2, Communicator Group = 0x621c5eb6d9b0
Process 3: Rank = 3, Communicator Group = 0x61ad7aad6b40
Process 4: Rank = 4, Communicator Group = 0x5565c65a6b00
○ *[main][~/acad/hpc-lab/as7]$
```