

Class: Final Year (Computer Science and Engineering)

Year: 2023-24 Semester: 1

Course: High Performance Computing Lab

## Practical No.10

PRN No: 2020BTECS00112

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Q1: Implement a MPI program to give an example of Deadlock.

```
PS E:\Acad\Sem VII\HPCL> cd '.\Assignment 10\'
PS E:\Acad\Sem VII\HPCL\Assignment 10> mpiexec -n 5 deadlock

job aborted:
[ranks] message

[0] terminated

[1] fatal error
Fatal error in MPI_Ssend: Other MPI error, error stack:
MPI_Ssend(buf=0x00000003E735FF830, count=1, MPI_DOUBLE, dest=1,
tag=1, MPI_COMM_WORLD) failed
DEADLOCK: attempting to send a message to the local process without a prior matching receive

[2-4] terminated

---- error analysis ----

[1] on DESKTOP-AF6P6IM
mpi has detected a fatal error and aborted deadlock

---- error analysis ----
PS E:\Acad\Sem VII\HPCL\Assignment 10>
```

Q2. Implement blocking MPI send & receive to demonstrate Nearest neighbor exchange of data in a ring topology.

```
PS E:\Acad\Sem VII\HPCL\Assignment 10> mpiexec -n 6 ring
Rank 0: sending to 1
Rank 0: receiving from 5
Rank 1: sending to 2
Rank 1: receiving from 0
Rank 4: sending to 5
Rank 4: receiving from 3
Rank 5: sending to 0
Rank 5: receiving from 4
Rank 3: sending to 4
Rank 3: receiving from 2
Rank 2: sending to 3
Rank 2: receiving from 1
PS E:\Acad\Sem VII\HPCL\Assignment 10>
```

Q3. Write a MPI program to find the sum of all the elements of an array A of size n. Elements of an array can be divided into two equals groups. The first  $\lceil n/2 \rceil$  elements are added by the first process, P0, and last  $\lceil n/2 \rceil$  elements the by second process, P1. The two sums then are added to get the final result.

```
int n = 10;  
int arr[10] = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10};
```



```
● PS E:\Acad\Sem VII\HPCL\Assignment 10> mpiexec -np 4 arraySum  
Sum of array = 55  
○ PS E:\Acad\Sem VII\HPCL\Assignment 10> |
```