

Assignment No.3

Problem Statement:

Develop a distributed system, to find sum of N elements in an array by distributing N/n elements to n number of processors MPI or OpenMP. Demonstrate by displaying the intermediate sums calculated at different processors.

Code:

```
import mpi.MPI;

public class ScatterGather {
    public static void main(String args[]){
        //Initialize MPI execution environment
        MPI.Init(args);
        //Get the id of the process
        int rank = MPI.COMM_WORLD.Rank();
        //total number of processes is stored in size
        int size = MPI.COMM_WORLD.Size();
        int root=0;
        //array which will be filled with data by root process
        int sendbuf[] = null;

        sendbuf = new int[size];

        //creates data to be scattered
        if(rank==root){
            sendbuf[0] = 10;
            sendbuf[1] = 20;
            sendbuf[2] = 30;
            sendbuf[3] = 40;

            //print current process number
            System.out.print("Processor "+rank+" has data: ");
            for(int i = 0; i < size; i++){
                System.out.print(sendbuf[i]+" ");
            }
            System.out.println();
        }
        //collect data in recvbuf
        int recvbuf[] = new int[1];

        //following are the args of Scatter method
        //send, offset, chunk_count, chunk_data_type, recv, offset, chunk_count,
        chunk_data_type, root_process_id
        MPI.COMM_WORLD.Scatter(sendbuf, 0, 1, MPI.INT, recvbuf, 0, 1, MPI.INT, root);
        System.out.println("Processor "+rank+" has data: "+recvbuf[0]);
        System.out.println("Processor "+rank+" is doubling the data");
        recvbuf[0]=recvbuf[0]*2;
        //following are the args of Gather method
        //Object sendbuf, int sendoffset, int sendcount, Datatype sendtype,
        //Object recvbuf, int recvoffset, int recvcount, Datatype recvtype,
```

```

//int root)
    MPI.COMM_WORLD.Gather(recvbuf, 0, 1, MPI.INT, sendbuf, 0, 1, MPI.INT, root);
    //display the gathered result
    if(rank==root){
        System.out.println("Process 0 has data: ");
        for(int i=0;i<4;i++){
            System.out.print(sendbuf[i]+ " ");
        }
    }
    //Terminate MPI execution environment
    MPI.Finalize();
}
}

```

OUTPUT:

```

student@ioe-it-lab-2-139:~/Desktop/19_Hetavi Dave/MPI$ export MPJ_HOME=/home/student/MPI/mpj-v0_44
student@ioe-it-lab-2-139:~/Desktop/19_Hetavi Dave/MPI$ cd ..
student@ioe-it-lab-2-139:~/Desktop/19_Hetavi Dave$ cd MPI/
student@ioe-it-lab-2-139:~/Desktop/19_Hetavi Dave/MPI$ javac -cp $MPJ_HOME/lib/mpj.jar ScatterGather.java
student@ioe-it-lab-2-139:~/Desktop/19_Hetavi Dave/MPI$ ls
'Assignment No.3.docx'  mpj-v0_44  Readme.odt  ScatterGather.class  ScatterGather.java  sc.odt
student@ioe-it-lab-2-139:~/Desktop/19_Hetavi Dave/MPI$ $MPJ_HOME/bin/mpjrun.sh -np 4 ScatterGather
MPJ Express (0.44) is started in the multicore configuration
Processor 0 has data: 10 20 30 40
Processor 0 has data: 10
Processor 1 has data: 20
Processor 2 has data: 30
Processor 3 has data: 40
Processor 0 is doubling the data
Processor 1 is doubling the data
Processor 2 is doubling the data
Processor 3 is doubling the data
Process 0 has data:
20 40 60 80

```