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LAB ASSESSMENT #8

SCENARIO – 1

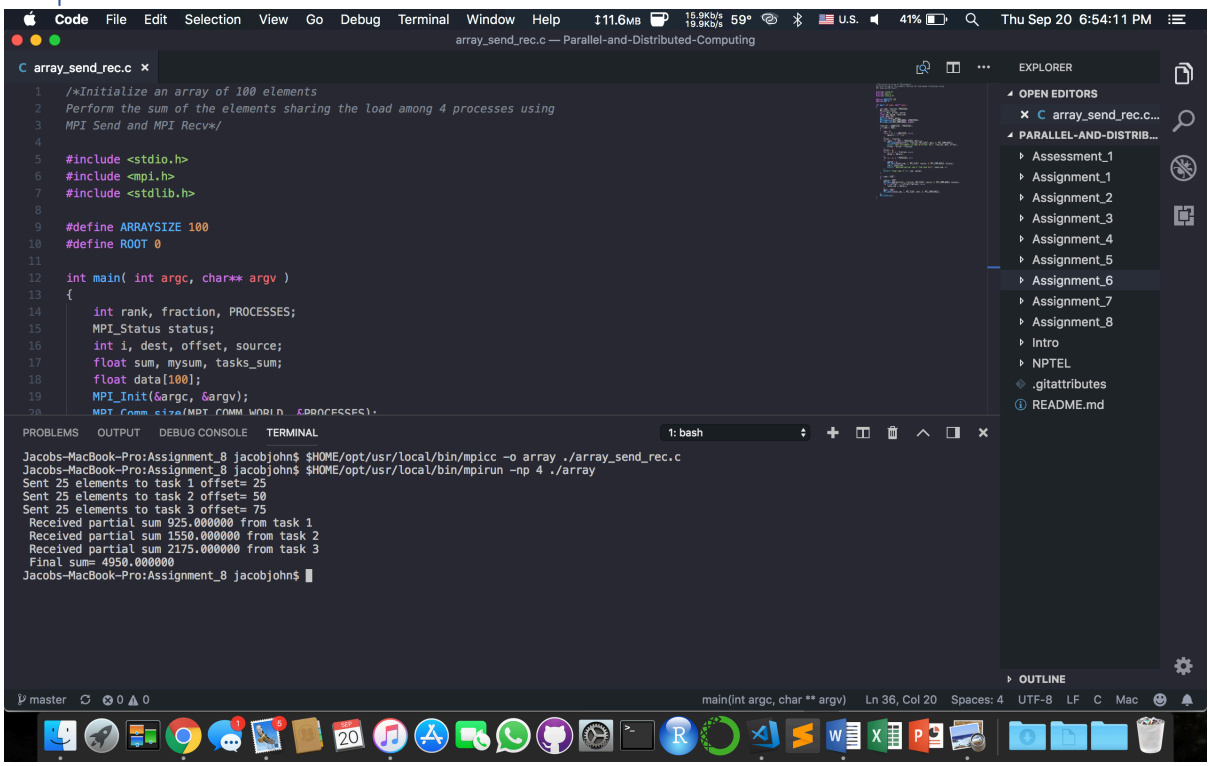
Write a 'C' Program to initialize an array of 100 elements in order to perform the sum of the elements sharing the load among 4 processes using MPI Send and MPI Recv.

Code:

```
/*Initialize an array of 100 elements
Perform the sum of the elements sharing the load among 4 processes using
MPI Send and MPI Recv*/

#include <stdio.h>
#include <mpi.h>
#include <stdlib.h>

#define ARRAYSIZE 100
#define ROOT 0

int main( int argc, char** argv )
{
    int rank, fraction, PROCESSES;
    MPI_Status status;
    int i, dest, offset, source;
    float sum, mysum, tasks_sum;
    float data[100];
    MPI_Init(&argc, &argv);
    MPI_Comm_size(MPI_COMM_WORLD, &PROCESSES);
    MPI_Comm_rank(MPI_COMM_WORLD, &rank);

    fraction = (ARRAYSIZE / PROCESSES);
    if (rank == ROOT)
    {
        sum = 0;
        for(i = 0; i < ARRAYSIZE; i++){
            data[i] = i * 1.0;
        }
        offset = fraction;
        for (dest = 1; dest < PROCESSES; dest++){
            MPI_Send(&data[offset], fraction, MPI_FLOAT, dest, 0,
MPI_COMM_WORLD);
            printf("Sent %d elements to task %d offset= %d\n", fraction, dest,
offset);
```

```
            offset = offset + fraction;
        }
        offset = 0;
        for (i = 0; i < fraction; i++){
            mysum += data[i];
        }
        for (i = 1; i < PROCESSES; i++)
        {
            source = i;
            MPI_Recv(&tasks_sum, 1, MPI_FLOAT, source, 0, MPI_COMM_WORLD,
&status);
            sum += tasks_sum;
            printf(" Received partial sum %f from task %d\n", tasks_sum, i);
        }
        printf(" Final sum= %f \n", sum + mysum);
    }

    if (rank > ROOT)
    {
        source = ROOT;
        MPI_Recv(&data[offset], fraction, MPI_FLOAT, source, 0, MPI_COMM_WORLD,
&status);
        for ( i=offset ; i <(offset+fraction); i++){
            tasks_sum += data[i];
        }
        dest = ROOT;
        MPI_Send(&tasks_sum, 1, MPI_FLOAT, dest, 0, MPI_COMM_WORLD);
    }
    MPI_Finalize();
}
```

Output:



Execution

```
Jacobs-MacBook-Pro:Assignment_8 jacobjohn$ $HOME/opt/usr/local/bin/mpicc -o array ./array_send_rec.c
Jacobs-MacBook-Pro:Assignment_8 jacobjohn$ $HOME/opt/usr/local/bin/mpirun -np 4 ./array
Sent 25 elements to task 1 offset= 25
Sent 25 elements to task 2 offset= 50
Sent 25 elements to task 3 offset= 75
 Received partial sum 925.000000 from task 1
 Received partial sum 1550.000000 from task 2
 Received partial sum 2175.000000 from task 3
 Final sum= 4950.000000
```