

CS596: Assignment2

code

```
#include "mpi.h"
#include <stdio.h>

int nprocs; /* Number of processes */
int myid;   /* My rank */

double global_sum(double partial) {
    /* Write your hypercube algorithm here */
    double mydone, hisdone, partner;
    int bitValue;
    MPI_Status status;

    mydone = partial;
    for(bitValue=1; bitValue<nprocs; bitValue*=2){
        partner = myid ^ bitValue;
        //send mydone to partner;
        MPI_Send(&mydone,1,MPI_DOUBLE,partner,bitValue,MPI_COMM_WORLD);
        //receive hisdone from partner;
        MPI_Recv(&hisdone,1,MPI_DOUBLE,partner,bitValue,MPI_COMM_WORLD, &status);
        mydone += hisdone;
    }
    return mydone;
}

int main(int argc, char *argv[]) {
    double partial, sum, avg;
    double cpu1, cpu2;

    MPI_Init(&argc, &argv);
    MPI_Comm_rank(MPI_COMM_WORLD, &myid);
    MPI_Comm_size(MPI_COMM_WORLD, &nprocs);

    partial = (double) myid;
    printf("Node %d has partial value %le\n", myid, partial);

    cpu1 = MPI_Wtime();
    sum = global_sum(partial);
    cpu2 = MPI_Wtime();

    if (myid == 0) {
        avg = sum/nprocs;
```

```
    printf("Global average = %le\n", avg);
    printf("Execution time (s) = %le\n",cpu2-cpu1);
}

MPI_Finalize();
return 0;
}
```

Figure: Results for running the global summation program on 4 and 8 processors



```
1. gaot@discovery:~cs596/as2 (ssh)
[gaot@discovery as2]$ mpicc -o global_avg global_avg.c
[gaot@discovery as2]$ sbatch global_avg.sl
Submitted batch job 171987
[gaot@discovery as2]$ ls
global_avg  global_avg.c  global_avg.out  global_avg.sl
[gaot@discovery as2]$ more global_avg.out
Node 0 has partial value 0.000000e+00
Node 3 has partial value 3.000000e+00
Node 2 has partial value 2.000000e+00
Node 5 has partial value 5.000000e+00
Node 6 has partial value 6.000000e+00
Node 1 has partial value 1.000000e+00
Node 4 has partial value 4.000000e+00
Node 7 has partial value 7.000000e+00
Global average = 3.500000e+00
Execution time (s) = 2.818890e-02
Node 2 has partial value 2.000000e+00
Node 0 has partial value 0.000000e+00
Node 3 has partial value 3.000000e+00
Node 1 has partial value 1.000000e+00
Global average = 1.500000e+00
Execution time (s) = 2.363400e-04
[gaot@discovery as2]$
```