6550 Parallel Programming HW7

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1 Global Sum

I used the ring method, master slave, and hyper cube. The ring ran in 0.50 sec. Master slave ran in 0.62 sec. Hyper cube ran in 0.45 sec. I expected the hyper cube to run the fastest because multiple sums are happening simultaneously. Below I have the code for my hyper cube solution.

2 Code

```
#include <iostream>
#include <mpi.h>
#include <unistd.h>
#include <random>
//#include "/usr/local/include/mpi.h"
#define MCW MPI_COMM_WORLD

using namespace std;

int main(int argc, char **argv)
{
  int rank, size;
  int data;
  MPI_Init(&argc, &argv);
  MPI_Comm_rank(MCW, &rank);
  MPI_Comm_size(MCW, &size);

  int sendTo;
  int sum = rank;
  int recv = 0;

  for (int i = 0; i < 3; i++)
  {
    sendTo = rank ^ (1 << i);
```

```
    MPI_Send(&sum, 1, MPI_INT, sendTo, 0, MCW);
    MPI_Recv(&recv, 1, MPI_INT, sendTo, 0, MCW, MPI_STATUS_IGNORE);
    sum += recv;
    MPI_Barrier;
  }
  cout << rank << " Total sum: " << sum << endl;

  MPI_Barrier;
  MPI_Finalize();

  return 0;
}
```

3 Output

3.1 Commands

```
mpic++ assign7.cpp
time mpirun -np 8 ./a.out
```

3.2 Output

```
1 Total sum: 28
2 Total sum: 28
3 Total sum: 28
4 Total sum: 28
5 Total sum: 28
6 Total sum: 28
0 Total sum: 28
7 Total sum: 28

real    0m0.454s
user    0m1.125s
sys     0m0.219s
```