COL380 Assignment 3

Compiling :

- mpic++ -fpermissive -mcmodel=medium -std=c++0x 2013CS10219_hypersort.cpp -o 2013CS10219_hypersort
- mpirun -np <procs> ./2013CS10219_hypersort <inputfilename> <outputfilename>

Design decisions :

1. Data is divided equally among the processors
2. If number of processors is one then it will undergo the complete sort.
3. It then does an MPI_Scatter to all other processes so that all
4. processes have equal parts of the array.

Parallelization strategy :

1. Every process sorts its local list
2. Pivot to divide this list into low and high(here , pivot = median of unsorted list)
3. Pivot is broadcasted.
4. Based on its rank it decides whether to send its lower or higher half.
5. Then it receives the other half from its partner.
6. It merges this with the unsent part of its buffer.
7. This entire procedure is done in parallel for each process.

Load-balancing strategy :

1. Since data is divided by giving the start and end in the array, if the randomness is more then load is balanced almost same on all processors.
2. If some sub arrays are sorted then their processors will be ideal

User + Real time in output of HPC is taken as time.

Size - nprocs	2	4	8	16	32
16	157 ms	264 ms	523	1160	6248
18	305	506	891	1752	7711
20	983	1460	2355	4249	12603
22	3705	5423	8504	14623	25289