Parallel Computing Lab 1 Report
Name: Ran (Elaine) Ang
NetID: ra1695
Due Date: March 21

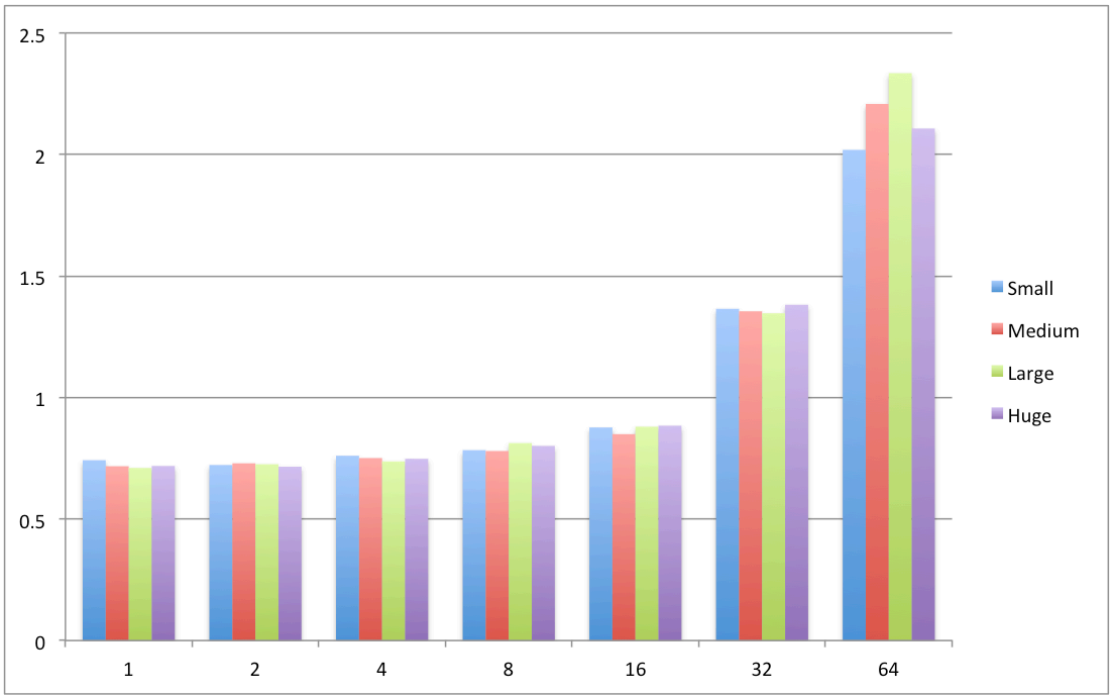
General Conclusion:
For these test cases, with a few exceptions, the performance decreases with the number of processes increase, and with the number of problem set increases.

Table & Graph:

1. Time Measurement (average time of 5 times of running, in seconds)

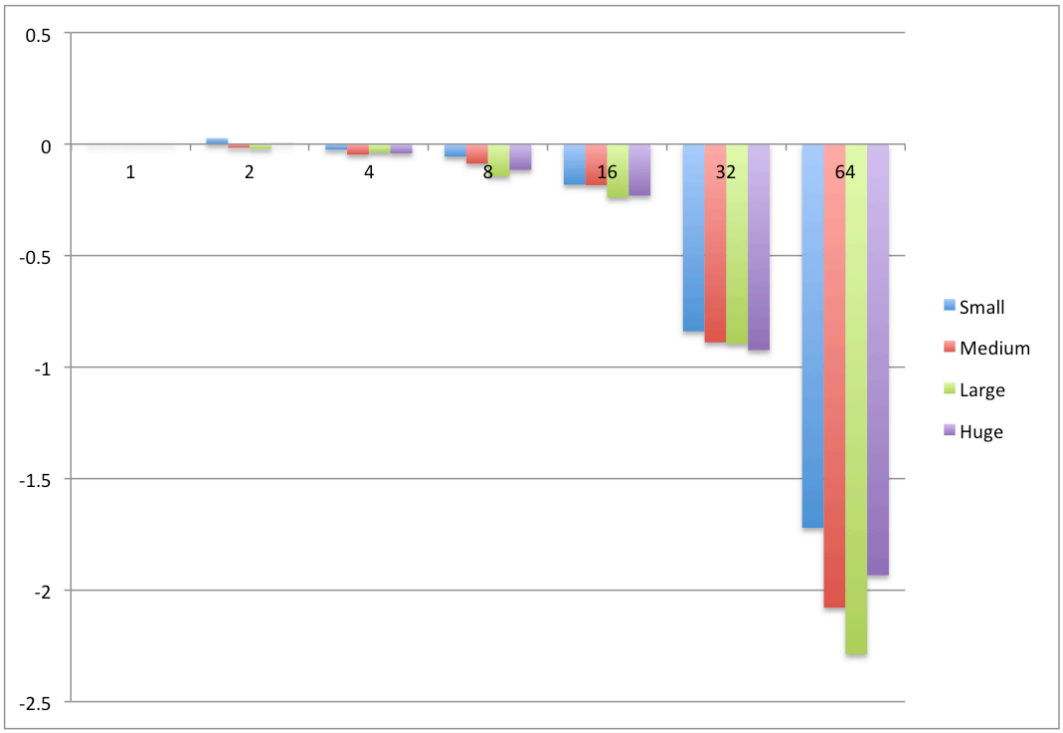
	Small	Medium	Large	Huge
1	0.7422	0.7174	0.7104	0.7184
2	0.7224	0.7294	0.7256	0.7156
4	0.7606	0.751	0.7372	0.748
8	0.7836	0.78	0.8128	0.8012
16	0.877	0.8494	0.8802	0.8842
32	1.3652	1.355	1.3468	1.3818
64	2.0192	2.2084	2.335	2.107

2. Time measurement in bar graph
y-axis: time in seconds; x-axis: number of processes



3. Speed-up Measurement

y-axis: relative speed-up (process 1 is always 0); x-axis: number of processes



Interpretation:

The dataset in this problem is relatively small, so pure computation will not be the major time consuming part. However, both creating processes and send messages between processes cost time. In this case, the time saved by diving problem set and assign them to different processes is shorter than the time spend for creating processes and communication.

In my implementation, process 0 first reads the input, construct send buffer and send to all other processes. These operations are sequential part of the program because other processes basically do nothing but blocked by MPI_Recv before them. With the dataset gets relatively large but not large enough, computation time in sequential code grows. Thus, the general trend for those test cases is that the performance decreases.

It is worth noting that in 64 processes, performance for huge is better than performance for large and medium. This is because there are more idle processes in large and medium than in huge. Processes creation overhead time dominates in this situation.

Lastly, in my implementation, number of times that processes communicate with each other does not grow when problem set grows, although the message sent for each time gets larger and communication time may increase a bit owing to having a larger send buffer.