Lab Session 11

Tutorial llnl
MPI The complete Reference

Home exercises

1. **[5p]** Write an MPI program with two processes.
   - Process one sends a value to process two using non-blocking functions
2. **[5p]** Start from the previous code.
   - What happens if we modify the buffer right after MPI_Isend?
   - What happens if the buffer is very large and we modify near its end?
3. **[10p]** For the code in the support write a function that gives you the list of all neighbors of a given node and one which given a graph returns and a start node calculates the shortest path to all other nodes and returns the list of first nodes in the shortest path to all others (BFS).

Lab Exercises

1. **[20p]** Start from the code in support.
   - Write the MPI program that finds the topology of a distributed network.
   - Each node can only send and receive messages from its neighbors.
   - All nodes should have the same topology at the end.
2. **[10p]** After the topology is found the process with rank 0 will transmit a message to process with rank 10.
   - All processes will print messages as the message passes through them.
   - Printing should have the form “I am X, I received message Y from Z sending to W”
3. **[10p]** Start from sendIsBlocking.c and show that MPI_Send can be blocking.
4. **[20p]** Start from mpiGraph.c and implement choosing the leader in a graph
   - Use the heartbeat algorithm.
   - All processes can be initiators.
   - The size of the network is known and smaller than 1000.
5. **[20p]** Start from mpiGraph.c. Using the algorithm epidemic calculate how many processes are part of the distributed system.
   - Use the previous program to choose the leader.
   - Only the leader will set its value to 1.
   - Make sure you only use MPI_Sendrecv.