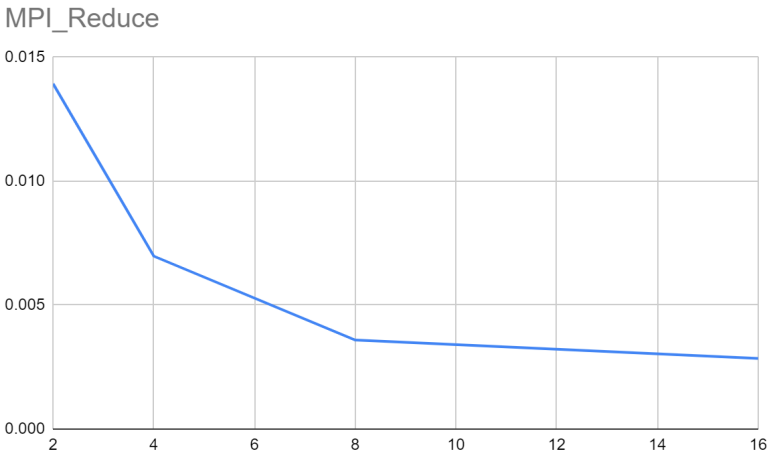
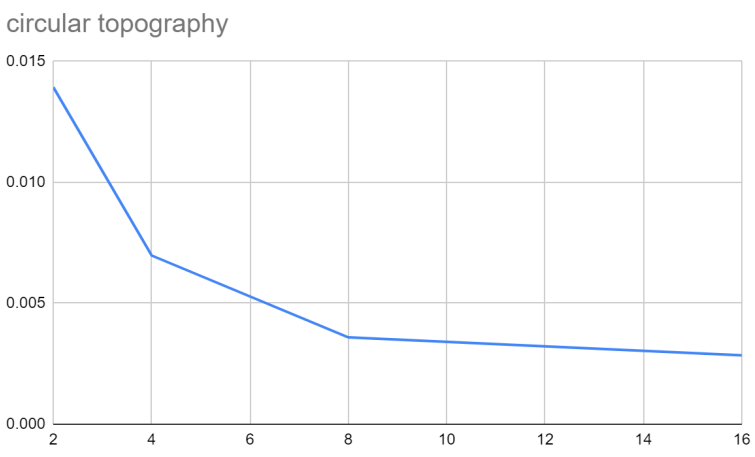
Henry Feng

Reporting Data





MPI_Reduce			Ring Topography	
nodes	time		nodes	time
2	0.01346101		2	0.01393134
4	0.006999278		4	0.006975771
8	0.004600312		8	0.003590227
16	0.002493883		16	0.002850604

b1	a	to	he	of	and	her	though	however	herself	elizabet
2	0.01300	0.01336	0.01290	0.01308	0.01348	0.01317	0.01409	0.01395	0.01363	0.01395
4	0.00708	0.00660	0.00657	0.00705	0.00676	0.00674	0.00754	0.00700	0.00701	0.00764
8	0.00476	0.00457	0.00541	0.00466	0.00465	0.00463	0.00474	0.00514	0.00402	0.00342
16	0.00234	0.00229	0.00229	0.00230	0.00383	0.00218	0.00246	0.00247	0.00245	0.00233
b2	a	to	he	of	and	her	though	however	herself	elizabet
2	0.01345	0.01348	0.01361	0.01343	0.01367	0.01395	0.01447	0.01425	0.01452	0.01449
4	0.00661	0.00713	0.00650	0.00645	0.00729	0.00675	0.00700	0.00757	0.00696	0.00752
8	0.00354	0.00328	0.00415	0.00326	0.00338	0.00337	0.00352	0.00353	0.00436	0.00352
16	0.00514	0.00226	0.00237	0.00236	0.00243	0.00248	0.00246	0.00407	0.00247	0.00248

Methods

Implementation:

Ring topography has a wait and go, where the node waits till the previous node sends a confirmation with the current sum only then will the node send to the next one

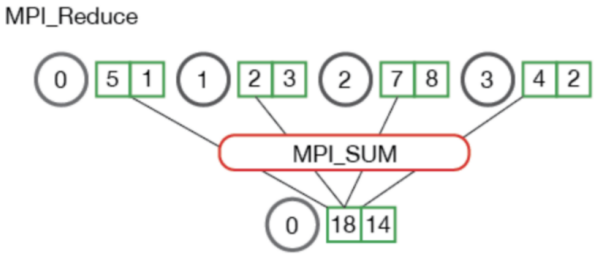
Testing:

Tested 10 words and averaged out the time for each node, I also hand tested a few words from 32 nodes to see the edges and confirm the expectation.

Questions

1. What is the topology used by MPI to implement its Reduce?

Centralized topography where every node sends to the root.



Taken from slides

2. How does the ring topology affect the runtime?

The ring topology at low numbers does not affect the timing at low numbers of nodes, but when the number of nodes begins to increase timing it is affected by the delay in communication.

3. Is there a case where the ring topology may be faster?

When information needs to be sent bidirectional, or if accurate information is needed. The ring topography is not very complex so information sent is quite accurate.

4. How many messages are passed between machines when the program is run with 2, 4, 8, and 16 processes?

The number of messages sent is equal to the number of processes in terms of the ring topography. (0->1->2 … n->n+1->0). Each node has 1 edge connecting to the next node and then finally the last node has one connection the first and one traversal is just n messages.

In terms of the MPI_reduce topography, 2(n-1) messages must be sent. One to the nodes other than the root and one back to the root.