HW 7: MPI

DIHAN DAI

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Question 1

(a)

Table 1. Blocking

Message Size	Single Node (GBytes/sec)	Dual Nodes (GBytes/sec)
1	0.020563	0.003240
8	0.205246	0.041166
64	0.653472	0.082522
512	2.116805	1.022126
4096	6.008567	2.931520
32768	8.290290	7.305028
262144	11.249464	11.064174
1048576	11.743154	11.754455

(b)

Table 2. Non-blocking

Message Size	Single Node (GBytes/sec)	Dual Nodes (GBytes/sec)
1	0.014975	0.003374
8	0.203803	0.043088
64	0.665272	0.088325
512	2.117278	0.955206
4096	6.140279	3.256234
32768	8.311359	7.513894
262144	11.231122	11.075611
1048576	11.728460	11.765851

For both blocking and non-blocking communication, across-node communication is significantly slower than within-node communication when the size of the message is small ($\leq$ 32768K), but has almost the same speed as within-node communication's when the size of the message is large.

Question 2

The largest size that can be run on Notchpeak without causing deadlock is 4096K.

Table 3. Non-blocking Ring Communication

Message Size	Time (seconds)
1	0.000393
8	0.000381
64	0.000461
512	0.000284
4096	0.001384
32768	0.010622
262144	0.083207
1048576	0.332555

Question 3 (size 8192, Niter 10)

- Single Node:

Number of Nodes	GFLOPs	Time (seconds)
2	1.33	1.007
4	3.36	0.399
8	8.49	0.158
16	14.94	0.090

- Dual Nodes:

Number of Nodes	GFLOPs	Time (seconds)
24	15.56	0.086
32	14.46	0.093