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CS415
PA1 Report
02/19/2017

Overview:
This report details the results of passing integer buffers of varying sizes between two computers. For each individual timing test, 30 sample times were collected and averaged to ensure their accuracy. The one box test, the two box test, and the timing tests will be discussed below. The complete test data sample is available in Report_Data.txt.

One Box:
One integer was passed between two nodes on one box in this test. The averaged results are displayed in Table 1.

Integers	Seconds
1	4.667E-06

Table 1: the one box test timing in seconds. The use of shared memory is likely the cause of the very small amount of time necessary to “ping pong” the data.

Two Box:
One integer was passed between two boxes in the cluster in this test. The average results are displayed in Table 2.

Integers	Seconds
1	0.000161

Table 2: the two box test timing in seconds. The transmission of the data over the network caused a considerable delay.

Timing Test:
In the timing test 10,000 trial timings were ran over a range of 1 to 10,000 integers. Each trial timing consisted of 30 samples which were averaged. Figure 1 displays all 10,000 trial timings.

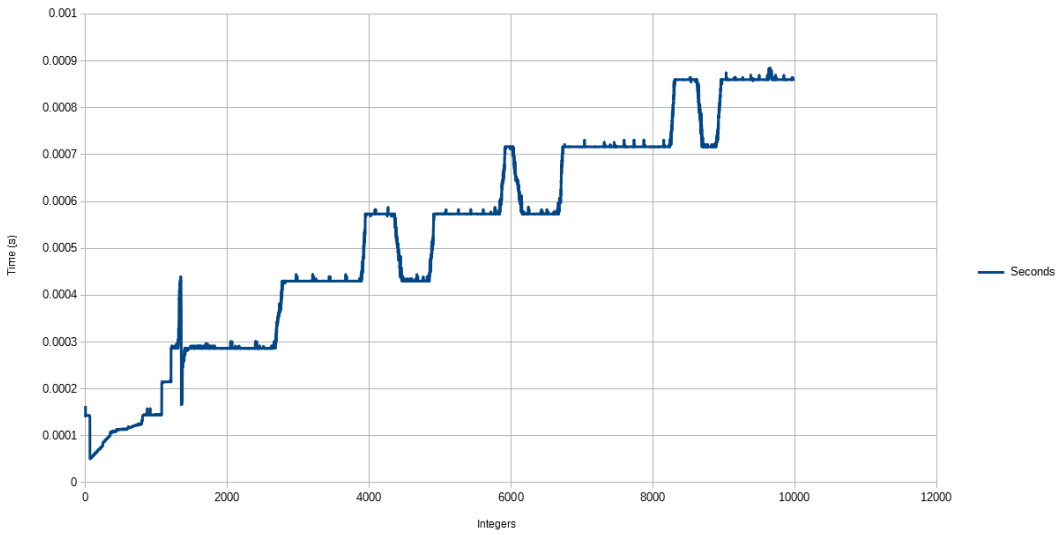

Figure 1: 10,000 trials run over a range of 1 to 10,000 integers. As this graph shows, there are significant timing jumps roughly every 1000 integers added.

There are large jumps around every 1000 integers. Several of these jumps are followed by an equivalent drop in the amount of time used to transfer the integers. Table 3 shows where the data jumps at around 1000 ints.

Integers	Seconds
1075	0.000145
1076	0.0001452
1077	0.000210533
1078	0.0002149
1079	0.000214833
1080	0.000214867
1081	0.000214867

Table 3: The data jumps between passing 1076 and 1077 integers in a buffer.

The data jumped after adding one more integer to a buffer size of 1076 integers. A buffer of 1076 ints is 4304 bytes. Adding another 4 bytes of data caused about a 0.00007 second increase in transfer time. For greater understanding of where these jumps occur specific subsets of the data are analyzed. The first subset of data that is being analyzed is the range between 1 and 100 integers. Figure 2 shows the graph of this range.

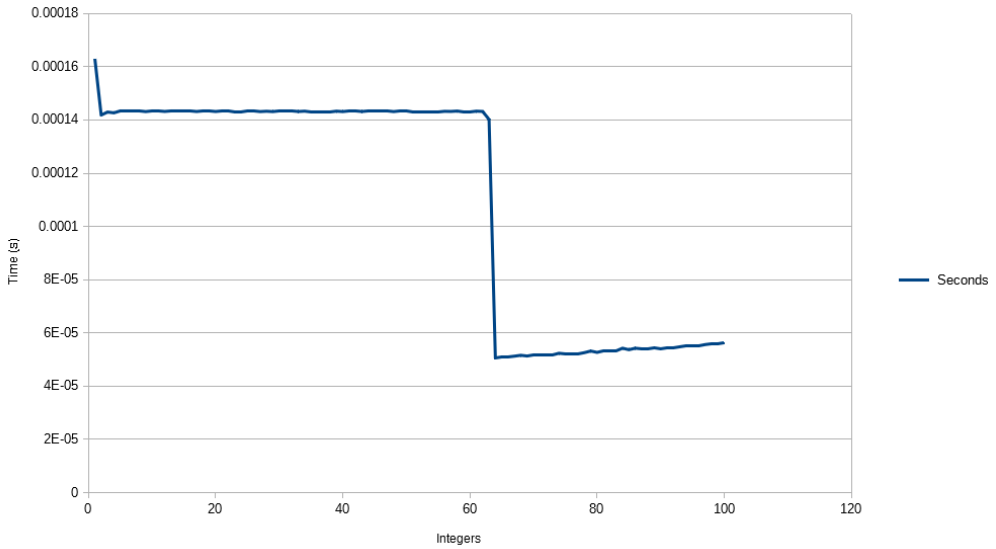

Figure 2: the timings of 1 to 100 integers. As this chart shows, there is a considerable drop in the time required between 1 and 100.

The times required in the range of 1 to 100 show an interesting downward trend in the amount of time required to transfer the integers. Table 4 shows the jump point.

Integers	Seconds
60	0.0001431
61	0.0001433
62	0.0001432
63	0.000140167
64	5.0567E-05
65	5.0767E-05
66	5.11E-05
67	5.1233E-05
68	5.1567E-05
69	5.13E-05
70	5.1833E-05

Table 4: The jump point in the 1 to 100 range. The difference between 63 and 64 integers lead to time savings in the factor of tens.

The next subset of data will be analyzed over the 1 to 1000 integer range. Figure 3 shows the results of the timing trials in this range.

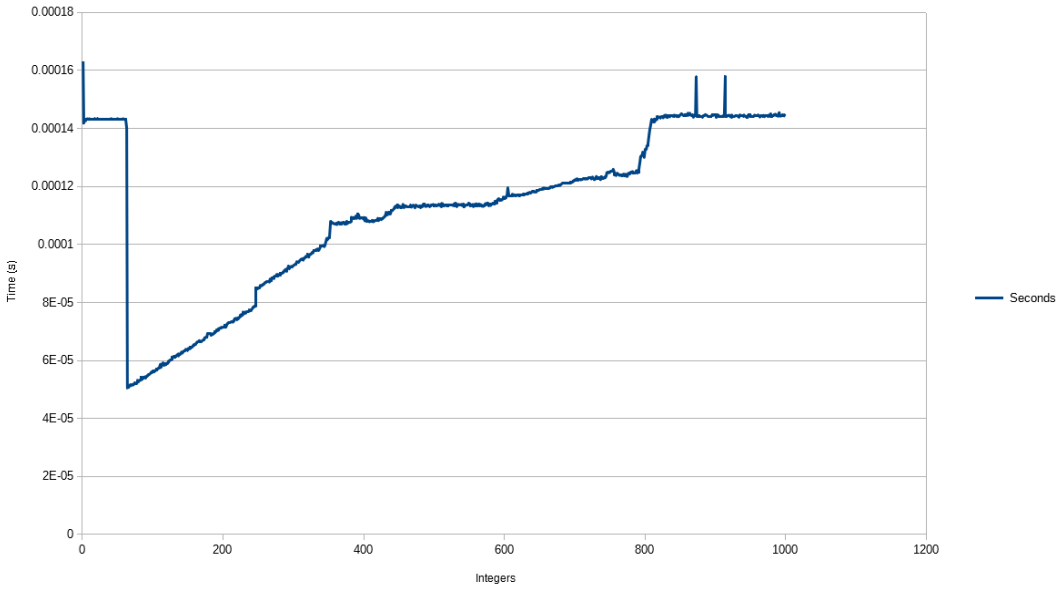

Figure 3: the timings of data over the 1 to 1000 integer range.

In the 1 to 1000 range jumps can be seen around passing 200, 400, 500, 600, 800, and 900 integers. Figure 4 shows the change bewteen passing 100 and 400 integers.

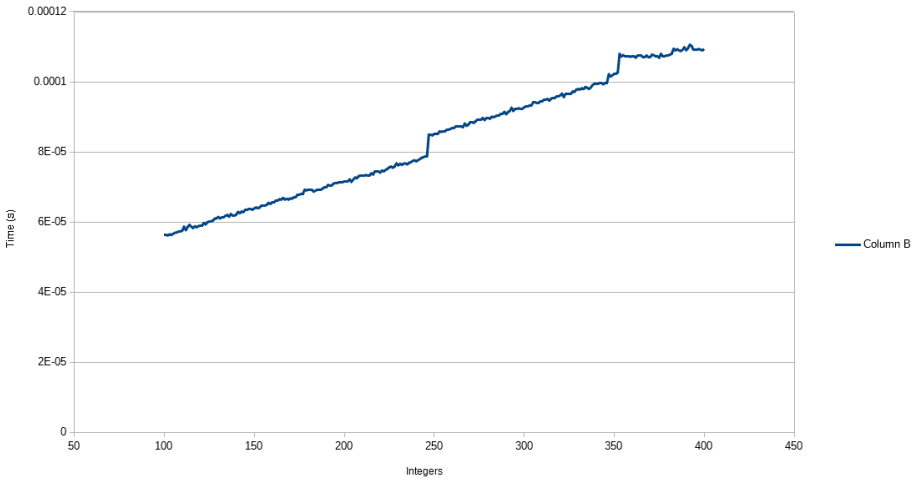

Figure 4: the timings of passing 100 to 400 integers.

As figure four shows, the jumps in this range occurred roughly at 250 and 350 integers passed. Table 5 shows the exact jump point around 250 integers.

Integers	Seconds
242	7.7933E-05
243	7.8333E-05
244	7.8467E-05
245	7.8667E-05
246	7.8667E-05
247	8.4967E-05
248	8.4867E-05
249	8.47E-05
250	8.5167E-05

Table 5: The jump in the amount of time to transfer a buffer of integers occurs between passing 246 integers and 247 integers.

The jump in this range occurs between passing 246 and 247 integers. A buffer of 246 integers is 984 bytes. For each packet there is some level of overhead to manage where the packet is sent. The closest power of two to 984 bytes is 1024 bytes. If a packet is 1024 bytes and 40 bytes of packet space is required for overhead, then adding another integer would require another packet to be sent.

Conclusion:

Based on the timing data collected it is the conclusion of this report that the cluster packet size is around 1024 bytes or 1 KB. The time in the graph has a small jump roughly every 100 to 200 integers and a large jump around every thousand integers.