For this experiment, I used the Pleiades cluster on the TriCity WSU campus. I was to estimate the network latency, bandwidth and network buffer size. To do this, I called various MPI_Send messages, then MPI_Recv messages, and calculated the send time, receive time, and overall latency between send and receive. I did this for various sizes of messages, from 1 byte to 8MB.

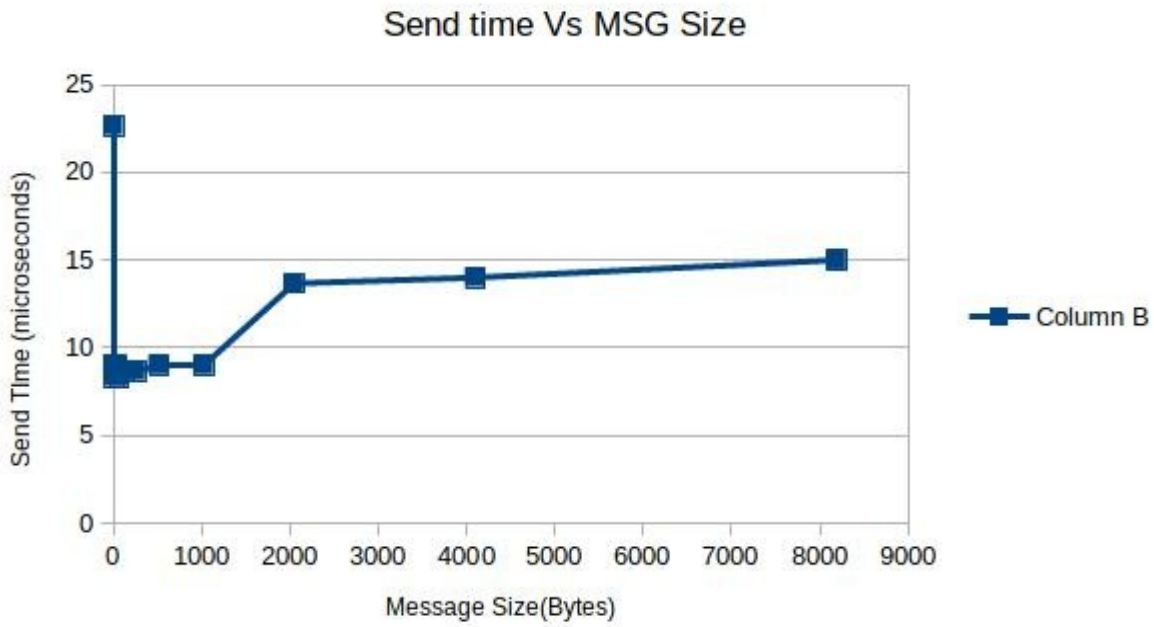

Figure 1: Send time vs Message size.

From this figure we see that the very first message, took much longer than every other message. I am not sure why this is, but I believe it to be related to the system setting up a connection between the processes. Aside from this outlier, we see that as the message size exponentially increases, send time stays relatively flat, until we cross the 1MB threshold. After 1MB, send time began to gradually increase. Thus, it makes sense to say that the Network Buffer size is around 1MB of data. Below 1MB, it took on average about 9 microseconds to send data.

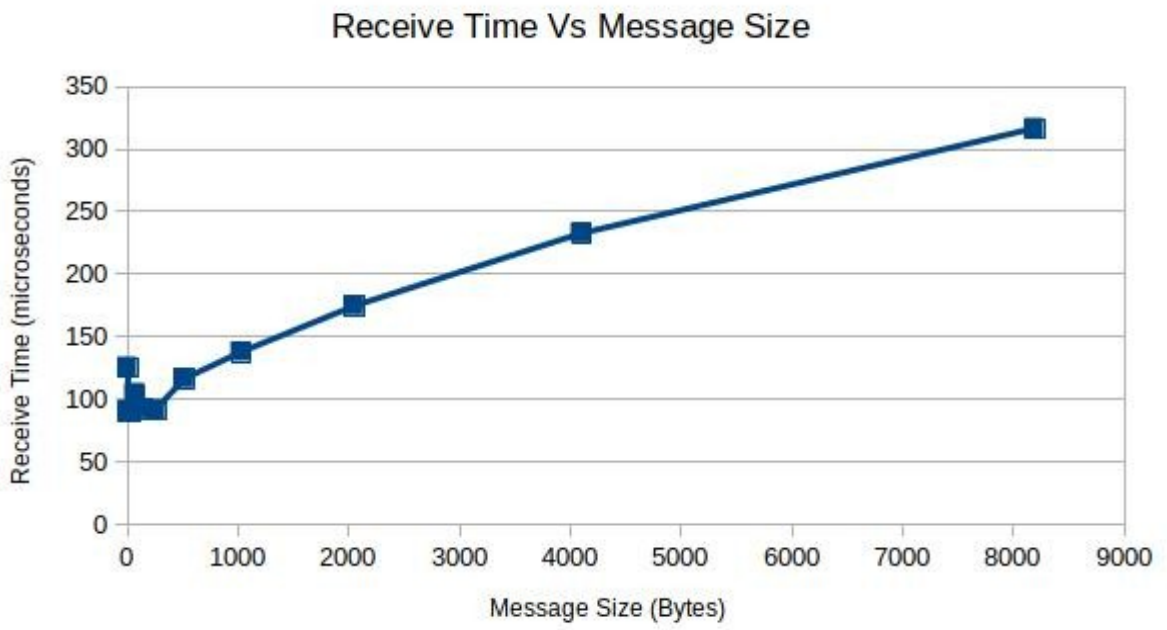

Figure 2: Recv Time vs Message Size

Again, from this figure, we can see that the very first message takes quite a long time, but up until a message of 1MB the receive time stays flat. After 1MB, receive time starts to grow quite drastically. I attribute this to the process having to wait and grab the extra bytes that are being sent over, since the network buffer had been overflown.

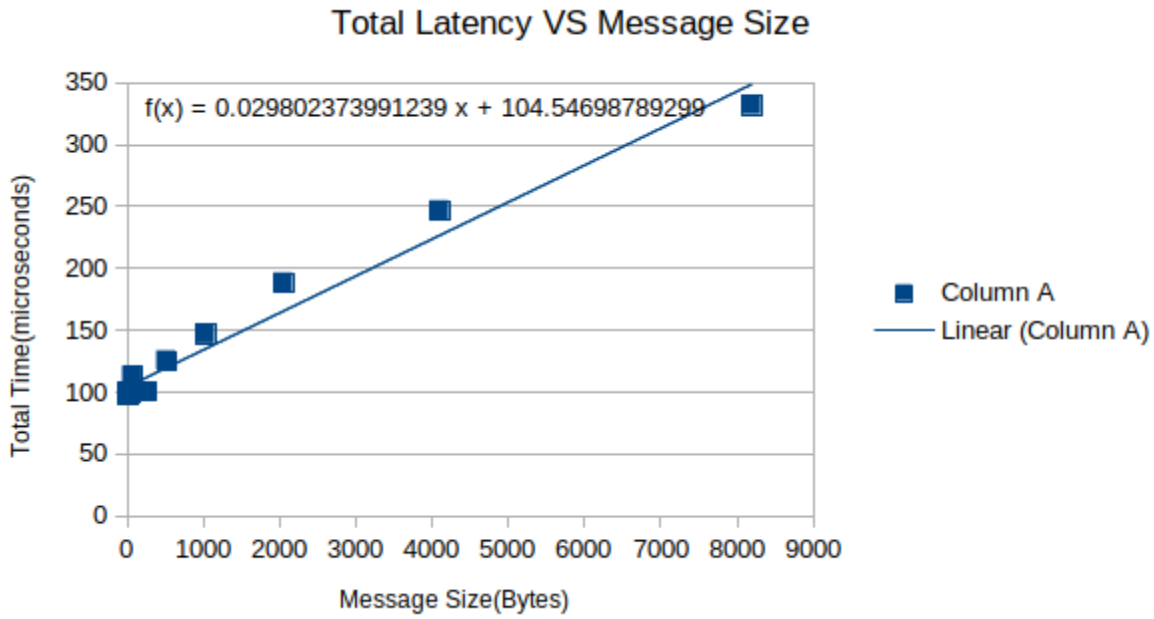

Figure 3: Total communication time vs message size

We can see from this graph, that there is an almost linear trend to the data when scaling the message size by two each iteration. We can see the slope is equal to 0.0298, which means there is about 0.0289

microseconds used for each byte we want to send. Our bandwidth will be equal to 1/slope. This means our bandwidth should be about 33.55 bytes sent, per one microsecond.

Also from this graph, we can take the y-intercept, which is 104.546. This y-intercept is equal to our overall latency of the system.

Latency: 104.546 microseconds
Bandwidth: 33.55 bytes per microsecond
Network Buffer: 1MB