Project 01 main purpose was to teach students how to do message passing (ping-pong) between two processes and see how the timings of this ping-pong message passing changed with different variables such as hardware and variables. This was accomplished by using MPI_Send and MPI_Recv. The project was split into 3 parts a) message passing between two processes in 1 box, b) message passing between two processes in 2 boxes, and c) finding how many integers are needed to create some a jump in the timing. The timing function that was used for this project was MPI_Wtime.

Part 1: One Box

The code for this portion of the project would ping-pong a single integer 100 times, then average those 100 ping pong times which resulted in an average time. Figure 1 shows the average times of 10 different full program trials. The average of these 10 different trials is 2.20E-06. The 3 largest outliers are seen in trial 1,3, and 5. These outliers are probably due to network congestion since many people were using the h1 node as these trials were occurring.

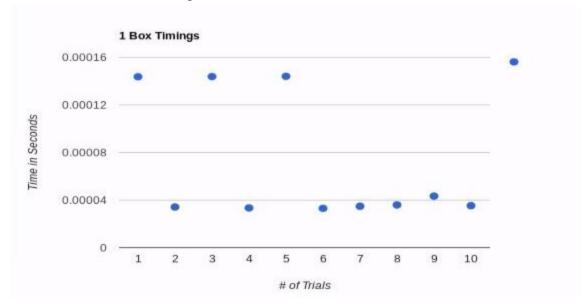


Fig. 1: A Scatter plot that shows the average times of different trials for message passing between a single boxes. The average time of these trials is 2.20Ee-6 seconds. The most likely reason for the outliers is due to many people using the h1 node at the same time.

Part 2: Two Boxes

The code for this part of the project is the same from first portion. The only thing that changed is the line of code that is used to run the program. Instead of using "-n2" which uses two different nodes from the same box, using "-N2" makes it so the program runs with two nodes from two separate boxes.

Figure 2 shows the averages of times from 10 different trials. The data is a little more spread out as these tests were taken at different times as the middle tests were occurring when many students were using the network which could have slowed down the program and timings. The average time from all 10 trials below is 6.81E-05 seconds.

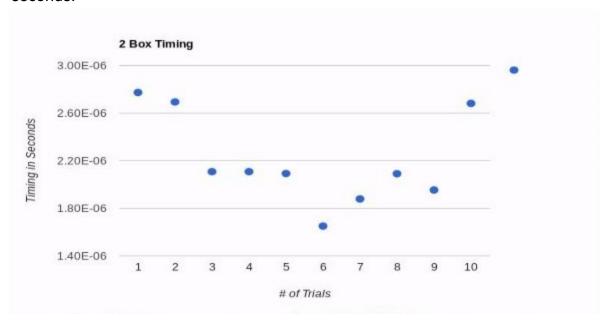


Fig. 2: A Scatter plot that shows the average times of different trials for message passing between two different boxes. The average time of these trials is 6.81E-05 seconds. The most likely reason for the outliers is due to many people using the the h1 node at the same time.

Part 3: Timing

The last part of the project tries to make students figure out how many integers being passed would cause the time to increase during a ping pong. For my code, I sent different amounts of integers ranging from 1 integer to 10000 integers and after determining how many integers that would be passed, the program sends that amount of integers 100 times and then find the average time. Figure 3 shows the results of 5

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different trials. The differences of the trials can be due to network issues such as many students using the h1 node and multiple programs running at the same time.

Fig. 3 has many jumps however these jumps occur around the a certain amounts of integers are being passed around. These jumps can occur due to the large amount of integers that can be passed however there is not many integers left to pass. Also the times can change since the packets of info that are passed between nodes may not arrive sequential, which can create jumps.

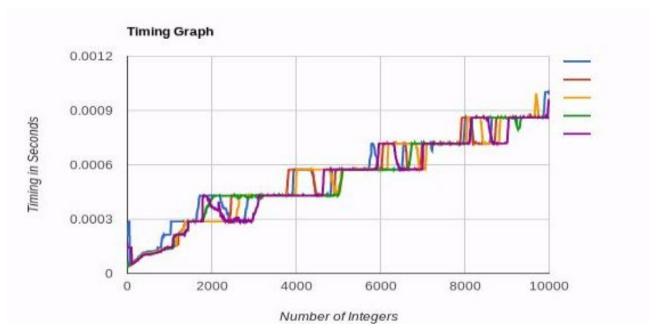


Fig. 3 Line graph that shows an increase in time as more integers are allowed to pass. Jumps may occur due to several reasons like people using the network and packet size.