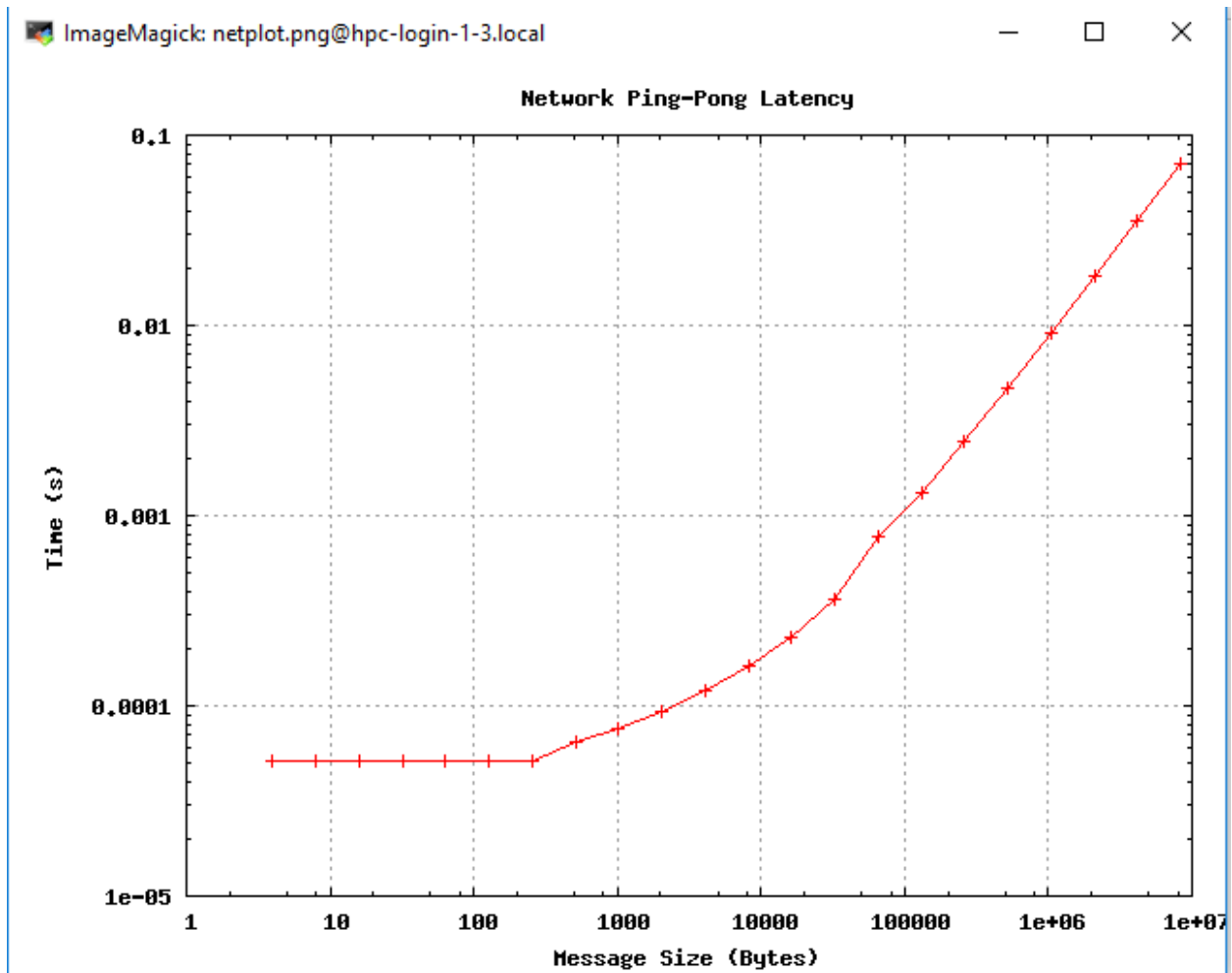


Jack Melcher
67574625
EECS 117
HW1 Part1



1. Minimum time to send a message of any size is approximately $5e-05$ seconds.
2. The slope of the line when message size is large is approximately $1e-08$ [s/Bytes]. The slope represents that the time to send a message is proportional to the size of a message.

$$3. T(m) = \begin{cases} 5e^{-05} \text{ seconds}, & m \leq 256 \text{ bytes} \\ (1e^{-08})m + 5e^{-05} \text{ seconds}, & m > 256 \text{ bytes} \end{cases}$$

4. Explanation of pingpong function

```
1 void pingpong (int* msgbuf, const int len)
2 {
3     const int MSG_PING = 1;
4     const int MSG_PONG = 2;
5
6     int rank;
7     MPI_Comm_rank (MPI_COMM_WORLD, &rank);
8
9     if (rank == 0) {
10        MPI_Status stat;
11        MPI_Send (msgbuf, len, MPI_INT, 1, MSG_PING, MPI_COMM_WORLD);
12        MPI_Recv (msgbuf, len, MPI_INT, 1, MSG_PONG, MPI_COMM_WORLD, &stat);
13    } else {
14        MPI_Status stat;
15        MPI_Recv (msgbuf, len, MPI_INT, 0, MSG_PING, MPI_COMM_WORLD, &stat);
16        MPI_Send (msgbuf, len, MPI_INT, 0, MSG_PONG, MPI_COMM_WORLD);
17    }
18 }
```

Line 1:

The function definition of pingpong. It has two arguments. The int* msgbuf is a pointer that references an array that is used as the message buffer. The const int len specifies the length/size of the message buffer array.

Line 3 and 4:

MSG_PING = 1 and MSG_PONG = 2 are tags used during sending and receiving messages

Line 5 and 6:

int rank will be used to store the rank of the node which is determined by MPI_Comm_rank(MPI_COMM_WORLD, &rank)

Line 9 through 17:

If the rank of the node is 0, the node will send a message using MPI_SEND to node of rank 1 using message tag MSG_PING within the group of MPI_COMM_WORLD. Once the message is successfully sent, the node will wait to receive a message using MPI_RECEIVE from node of rank 1 with message tag MSG_PONG within the group of MPI_COMM_WORLD.

If the rank of the node is 1, the node will wait to receive a message using MPI_RECEIVE from node of rank 0 with message tag MSG_PING within the group of MPI_COMM_WORLD. Once the message is successfully received, the node will send a message using MPI_SEND to node of rank 0 using message tag MSG_PONG within the group of MPI_COMM_WORLD.

MPI_Status stat is used when receiving to report status of the communication.