ACM40660/PH504 Practical 7

ICHEC

2022/23 Spring

1 Ping Pong

Write a simple ping pong program. This involves passing of a message between two processes P_0 and P_1. The algorithm is as follows

1. let us assume we have an initial message which contains the integer value 10.
2. P_0 increments this message by one and passes it to P_1 (ping)
3. P_1 receives the message it increments it by one and passes it back to P_0
4. the last two steps are repeated n times. (see fig. 1)

The code shall do

1. rank 0 prints the value of the message it has after n exchanges.
2. rank 0 prints the average time per exchange. **Hint:** use MPI_Wtime() function to get the time.
3. determine the value n for which the measured time is meaningful. **Hint:** check the resolution of the timer with MPI_Wtick()
4. use MPI_Send and MPI_Recv to pass the messages around.

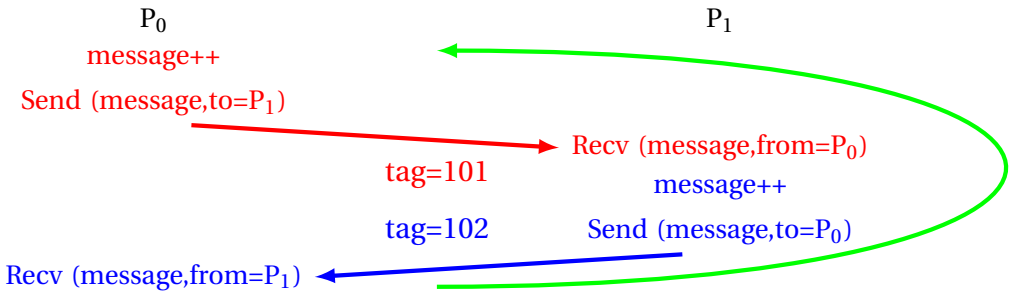

Figure 1. Ping Pong algorithm

2 Latency and Bandwidth

Latency is defined as the time to transfer a zero length message. Bandwidth is defined as the size of the message in bytes/ transfer time.

1. Modify the ping pong code to measure the latency (use MPI_CHAR as transfer type).
2. Modify the ping pong code to measure the Bandwidth (use double or real(kind=8)). Measure the bandwidth for the following sizes 8 B, 512 B, 32 KiB, 2MiB these correspond to arrays of length 1, 2^6, 2^{12} and 2^{18}, respectively.