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CPSC 479 Homework 2: Introduction to HPC

For exercise 1, upload the program(s) and the results on Canvas.  
For exercise 2, upload the program(s) and the results on Canvas.

**Exercise 1. [ 8 points]** Write either a single program or two separate C/C++ programs that use(s) MPI blocking and non-blocking commands MPI\_Send, MPI\_Rcvd, MPI\_Isend and MPI\_Ircvd to exchange one double value between process with rank 0 and process with rank 1. Calculate the execution time using MPI\_Wtime to compute the execution time and write it down in the table below as follows:

|  |  |
| --- | --- |
|  | Execution Time |
| A single transmission using blocking communication | 0.000042 seconds |
| A single transmission using non blocking communication | 0.000036 seconds |
| Two transmissions (round trip) using blocking communication | 0.000117 seconds |
| Two transmissions (round trip) using non blocking communication | 0.000082 seconds |

**Exercise 2. [ 4 points]** Modify the ring example given in class to calculate the execution time using MPI\_Wtime of the transmission of the value -10 from process with rank 0 to process with rank 1, etc. until the value -10 is received back at the process with rank 0. Use only blocking communication. Launch the execution of the program with a varied number of parallel processes (mpirun -n 10 ./a.out to launch the executable a.out for 10 processes) and write down the execution time of the ring example as follows:

|  |  |
| --- | --- |
|  | Execution Time |
| Ring with 4 nodes | 0.000290 seconds |
| Ring with 8 nodes | 0.000426 seconds |
| Ring with 10 nodes | 0.000552 seconds |
| Ring with 12 nodes | 0.000772 seconds |