Practical Exercise #8

MPI: Parallel Pectoral Inversion

Exercises

1. Why can't we simply block on receives, as we did for send/receive in the ghost exchange, using the packing buffer or array methods, respectively, in Listings 8.20 and 8.21?

2. Is it safe to block on receive, as shown in Listing 8.8 in the vector-type version of the ghost exchange? What are the advantages of only blocking on receive?

3. Modify the vector-type ghost cell exchange example in Listing 8.21 to use receive locking instead of wait. Will this be faster? Will it always work?

4. Try replacing explicit tags in one of the ghost exchange routines with MPI_ANY_TAG. Will this work? Will it be even slightly faster? What advantage do you see in using explicit tags?

5. Remove barriers for synchronized timers in one of the ghost exchange examples. Run the source code with the original synchronized timers and unsynchronized timers.

6. Add the timer statistics from Listing 8.11 to the thread triad throughput measurement source code in Listing 8.17.

7. Apply the steps for converting high-level OpenMP to the hybrid MPI plus OpenMP example in the source code accompanying this chapter (HybridMPIPlusOpenMP directory). Experiment with vectorization, number of threads, and MPI ranks on your platform.