1. The speed up for large problem in Part B weren’t very good, but mostly because I only used the parallelized the calculations the main calculations loop as I did in A. Probably would’ve gotten more speed if I parallelized the inner loops too. The speed up on small problem weren’t very good either, probably because it’s a small data set rather than a large one.
2. Part A was simply to implement, while part B and C were a bit difficult. Part B was a bit difficult to debug since I didn’t know how to properly use the iA array and jA array and I couldn’t get it to run on 1 thread, while it worked fine for 4 up to 16 threads. For Part C, it very difficult to understand how to write the code for parallelization. Using the video and some help, I managed to figure it out. I definitely find using OMP easier than MPI C in this case.

Small problem

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Part A |  |  |  |  |
| Threads | Time | Speed up | Min | Max |
| 1 | 5.67E-03 | 1.00E+00 | 0.000277 | 0.000973 |
| 4 | 4.97E-03 | 1.14E+00 | 0.000277 | 0.000973 |
| 8 | 3.51E-02 | 1.61E-01 | 0.000277 | 0.000973 |
| 16 | 2.56E-02 | 2.22E-01 | 0.000277 | 0.000973 |
|  |  |  |  |  |
| Part B |  |  |  |  |
| Threads | Time | Speed up | Min | Max |
| 1 | 4.79E-03 | 1.00E+00 | 0.000277 | 0.000973 |
| 4 | 4.79E-03 | 1.00E+00 | 0.000277 | 0.000973 |
| 8 | 4.42E-03 | 1.08E+00 | 0.000277 | 0.000973 |
| 16 | 2.17E-01 | 2.21E-02 | 0.000277 | 0.000973 |
|  |  |  |  |  |
|  |  |  |  |  |
| Part C |  |  |  |  |
| Processors | Time | Speed up | Min | Max |
| 1 | 2.92E-03 | 1.00E+00 | 0.000277 | 0.000973 |
| 2 | 2.74E-03 | 1.07E+00 | 0.000277 | 0.000973 |
| 4 | 2.95E-03 | 9.87E-01 | 0.000277 | 0.000973 |
| 8 | 3.65E-03 | 7.99E-01 | 0.000277 | 0.000973 |
| 16 | 6.68E+00 | 4.36E-04 | 0.000277 | 0.000973 |

Large problem

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Part A |  |  |  |  |
| Threads | Time | Speed up | Min | Max |
| 1 | 5.67E-03 | 1.00E+00 | 0.000277 | 0.000973 |
| 4 | 4.97E-03 | 1.14E+00 | 0.000277 | 0.000973 |
| 8 | 3.51E-02 | 1.61E-01 | 0.000277 | 0.000973 |
| 16 | 2.56E-02 | 2.22E-01 | 0.000277 | 0.000973 |
|  |  |  |  |  |
| Part B |  |  |  |  |
| Threads | Time | Speed up | Min | Max |
| 1 | 4.79E-03 | 1.00E+00 | 0.000277 | 0.000973 |
| 4 | 4.79E-03 | 1.00E+00 | 0.000277 | 0.000973 |
| 8 | 4.42E-03 | 1.08E+00 | 0.000277 | 0.000973 |
| 16 | 2.17E-01 | 2.21E-02 | 0.000277 | 0.000973 |
|  |  |  |  |  |
|  |  |  |  |  |
| Part C |  |  |  |  |
| Processors | Time | Speed up | Min | Max |
| 1 | 2.92E-03 | 1.00E+00 | 0.000277 | 0.000973 |
| 2 | 2.74E-03 | 1.07E+00 | 0.000277 | 0.000973 |
| 4 | 2.95E-03 | 9.87E-01 | 0.000277 | 0.000973 |
| 8 | 3.65E-03 | 7.99E-01 | 0.000277 | 0.000973 |
| 16 | 6.68E+00 | 4.36E-04 | 0.000277 | 0.000973 |