SIT315 M3.S2P: Distributed Computing - MPI

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No Group

Activity 1 – Distributed Vector Addition – MPI

With my implementations of vector addition programs running sequentially, with pthreads, with OpenMP, and with MPI, results were not as initially expected. Since I have an ARM-based machine I was using Docker containers as nodes in the MPI version and this was performing slower than all other three implementations. When I instead ran it directly on my machine and set the number of nodes to the number of cores I have (10) it ran much faster and was able to compete with the other implementations. Also, since we were required to use MPI_Scatter() and MPI_Gather(), the random filling of the two vectors was done sequentially by the master node. Previously, my pthreads and OpenMP programs did filling in parallel and so for accurate comparison I changed them to do that part sequentially. This also resulted in a significant drop in improvement against the sequential version which implies that the filling operation what benefits most from parallelisation.

```
codey@codey-mac ~/Library/CloudStorage/OneDrive-DeakinUniversity/315
/Module3/ps2/A2 [main] $ ./compare.sh
--- seq ---

21634 14682 12973 12879 12882 12623 12352 12817 11405 11512 11481 12
819 12525 12531 12790 12177 11679 12485 12779 13124 12478 12593 1244
7 11787 12946 12942 12308 11533 12819 12818 12402 12296 12217 12560
12384 12935 13147 12661 12189 11732 12868 12566 12468 13143 12700 12
304 12060 12679 12189 12393 12441 12737 12785 11953 12878 12945 1271
7 11401 12485 12712 13194 12616 12754 12518 12795 12552 12885 12371
12802 12472 12349 12720 13137 12771 12254 12607 12302 12438 12805 12
504 11363 12367 12976 12831 11606 12423 12799 11921 12348 13254 1283
6 12393 11233 12951 12954 11854 12805 12224 12895 12486

Average: 12611.32 µs

--- par ---

12000 12138 11280 12566 11826 12050 11924 11759 11813 12375 11735 12
250 12357 12166 11794 11923 12272 12421 11517 12605 11789 11914 1247
6 12597 11760 11998 12466 12403 11565 11311 11769 12621 12491 12645
12148 12622 12555 12195 12215 11790 12140 12144 12043 12456 11980 11
955 12021 12089 12074 12505 11733 12050 11860 12397 12324 11875 1244
2 11687 12373 11699 12127 12113 12489 11849 12511 12042 11584 12295
11820 11783 12216 12267 11684 12260 11783 12532 11889 12275 11187 11
958 12394 11826 12243 12399 12083 10750 12414 12097 12074 11853 1248
6 11905 12552 11950 10973 12318 12359 12382 11923 11591

Average: 12071.84 µs

--- omp ---

12632 12392 12762 12930 12215 12674 12802 12047 12122 12312 12313 12
224 12870 12710 12188 12758 12874 12691 12460 12632 12719 12459 1224
0 12461 12887 12156 12448 12504 12103 11569 12865 12054 12355 12040
12535 12681 12740 12531 12715 13010 12648 12287 12448 12460 12356 12
553 12722 12549 12698 11627 12189 11900 12134 12401 12039 12324 1188
8 12233 12852 12571 12498 12301 12734 11729 13102 12120 12874 12895
12497 12503 12482 12490 12086 12796 12258 12547 11489 12460 11216 12
586 12762 12436 12313 12899 11970 12212 12688 12546 12555 12017 1286
6 12284 12903 12051 12871 12329 12080 13052 12431 11464

Average: 12429.51 µs

--- mpi ---

16498 16508 16362 16923 16683 16984 15313 16113 15870 17828 16741 15
871 19195 19515 16622 20459 20478 16908 17479 17268 18836 16753 1670
4 15998 14972 17505 16622 15302 16449 17126 18711 16505 16151 18795
16374 17015 16564 16572 17085 16005 16963 15737 18802 17348 17030 16
104 17651 15568 16147 16749 18478 17864 16808 17132 16230 17347 1631
5 18561 16758 18574 16861 18769 19190 16305 16281 16165 17010 18070
19045 20377 17251 18678 15326 19310 16996 18669 14843 16856 15458 16
733 18218 18925 19240 16636 16945 15639 16486 18059 17251 17557 1723
3 17585 21397 16560 18969 17042 16844 17244 19021 17024

Average: 17258.96 µs

codey@codey-mac ~/Library/CloudStorage/OneDrive-DeakinUniversity/315
/Module3/ps2/A2 [main] $
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