Miles Van de Wetering

Parallel Project 5

I ran my code on flip2, my data is included below.The speedup was very low when the array size was small, but rapidly caught up, presumable as the hardware advantages overcame the communication overhead. The speedup spiked again as the array sizes became very large. Interestingly, my speedup in both cases was greater than the expected value of 4. This is most likely because the provided assembly code was simply much more efficient than my own function calls. Interesting the speedups did not remain consistent, as one might expect. I’m not entirely sure why, since I thought that the speedup efficiency would be relatively flat after reaching a reasonably large array size, say 2k. They did, however, show consistent patterns across the sum and the sum/mult operations, and over multiple runs.

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| --- | --- | --- | --- |
| Array Multiplicaton & Summation | | | |
| Array Size | SIMD | CPP | Speedup |
| 1024 | 1.08E+08 | 59886254 | 1.801059 |
| 2048 | 5.17E+08 | 89961678 | 5.746121 |
| 4096 | 4.91E+08 | 88552461 | 5.544937 |
| 8192 | 4.66E+08 | 86333543 | 5.40017 |
| 16384 | 4.52E+08 | 85161254 | 5.305229 |
| 32768 | 4.27E+08 | 81415529 | 5.239231 |
| 65536 | 4.24E+08 | 83331254 | 5.08963 |
| 131072 | 4.31E+08 | 82059278 | 5.247192 |
| 262144 | 4.33E+08 | 81964318 | 5.280242 |
| 524288 | 4.26E+08 | 82232066 | 5.178677 |
| 1048576 | 5.76E+08 | 86841489 | 6.633363 |
| 2097152 | 7.52E+08 | 89387996 | 8.409945 |
| 4194304 | 8.59E+08 | 90837967 | 9.45453 |
| 8388608 | 9.25E+08 | 91505475 | 10.11226 |
| 16777216 | 9.62E+08 | 91819773 | 10.47531 |
| 33554432 | 9.83E+08 | 92042652 | 10.67614 |
|  |  |  |  |
| Array Multiplication | |  |  |
| Array Size | SIMD | CPP |  |
| 1024 | 1.08E+08 | 67900428 | 1.593799 |
| 2048 | 3.36E+08 | 1.19E+08 | 2.814973 |
| 4096 | 2.83E+08 | 1.2E+08 | 2.351172 |
| 8192 | 2.48E+08 | 1.21E+08 | 2.048628 |
| 16384 | 2.24E+08 | 1.21E+08 | 1.853314 |
| 32768 | 2.24E+08 | 1.21E+08 | 1.848934 |
| 65536 | 2.18E+08 | 1.21E+08 | 1.79949 |
| 131072 | 2.17E+08 | 1.16E+08 | 1.871552 |
| 262144 | 2.17E+08 | 1.2E+08 | 1.814925 |
| 524288 | 2.15E+08 | 1.2E+08 | 1.795216 |
| 1048576 | 3.09E+08 | 1.19E+08 | 2.587968 |
| 2097152 | 3.98E+08 | 1.19E+08 | 3.330891 |
| 4194304 | 4.57E+08 | 1.19E+08 | 3.843272 |
| 8388608 | 4.99E+08 | 1.18E+08 | 4.209196 |
| 16777216 | 5.2E+08 | 1.19E+08 | 4.37609 |
| 33554432 | 5.31E+08 | 1.3E+08 | 4.095221 |