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CS-475 - Project 0

Written commentary

1. My personal desktop computer was used for the test

    Intel Xeon W3680 @3.33 GHz - 6 core / 12 thread

    24 GB DDR3 RAM

    Microsoft Windows 10 build 18362

    Visual Studio 2019

2. Test results

    Single Threaded: 296 mega-mults / sec

    Four Threads: 1129 mega-mults / sec

3. One thread to four thread speedup

    S = 1129 / 296 = 3.814

4. Why is the speedup S less than 4.0?

    The speedup result is less than 4.0 because there are still some serial operations happening in the four threaded test. The speedup result could only be 4.0 if the entire file were perfectly parallelized. The speedup result of 3.814 is very near to 4.0 because the runtime is dominated by the for loop which is doing the array multiplication and it is the one portion of the file which is being parallelized. This test used the recommended array size of 16384, which allowed for a clear result. Later, when doing extra testing with a very small array of size 4, I got better results with the single threaded version (20 Mmlts/sec), than the parallelized version (5 Mmlts/sec). I imagine that this would be the case because the allocation of the thread pool consumes a significant amount of the runtime when the array is small.

5. Parallel Fraction

    $Fp = (4 / 3) * (1 - (1 / 3.814)) = 0.9837$