High Performance Computing Assignment 2

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The processor I use is i5-7267U @ 3.10GHz. It has 2 processors and 4 threads.

1 Approximating Special Functions Using Taylor Series & Vectorization

I implemented the AVX part of function `sin4_intrin()`, and the result is shown below.

Reference time: 0.2998

Taylor time: 1.7684 Error: 6.927903e-12

Intrin time: 0.0027 Error: 6.927903e-12

The function `sin4_intrin()` is about 100x faster than the `sin()` function.

I also found there is an intrinsic function(`_mm256_sin_pd()`) which can calculate $\sin(x)$ directly, and a group of intrinsic functions that use 512-bit registers. However the architecture of my CPU does not support any of them, so I left these code (`sin4_intrin2()`) commented out.

2 Parallel Scan in OpenMP

I modified the `scan_seq()` function so that $prefix\_sum[i] = \sum_{k=0}^{i} A[i]$ to match the description in the problem.

Thread=4:

sequential-scan = 0.434113s

parallel-scan = 0.233390s

Thread=2:
sequential-scan = 0.416888s
parallel-scan = 0.293155s