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Parallel Programming
Project 0

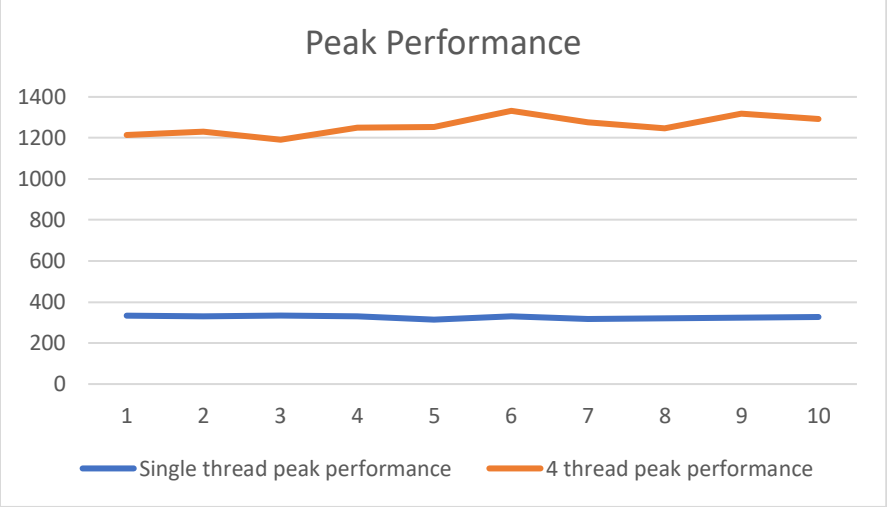
1. Tell what machine you ran this on

I used a flip server to run the program.

2. What performance results did you get?

Number of tries = 2000

Array size	Single thread peak performance	4 thread peak performance	Ratio
100000	333.38	1215.67	3.64649949
200000	331.32	1231.16	3.715924182
300000	334.03	1191.23	3.566236566
400000	330.07	1251.63	3.792013815
500000	314.11	1252.33	3.986915412
600000	329.52	1332.08	4.04248604
700000	317.84	1277.62	4.019695444
800000	322.03	1246.64	3.871192125
900000	323.28	1317.69	4.076002227
1000000	326.32	1291.58	3.958016671



Average Single thread peak performance = 316.50 MegaMults/Sec
Average 4 thread peak performance = 1203.43 MegaMults/Sec

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3. What was your 4-thread-to-one-thread speedup?

The average speed up = 3.80

4. If the 4-thread-to-one-thread speedup is less than 4.0, why do you think it is this way?

This might be because of the waiting caused by the shared memory, communications, and input/output resources. There also might be differences in the peak performances of each core. For instance, 12th Gen CPUs integrate two types of cores into a single die:

- Performance cores (P-cores)
- Efficiency cores (E-cores).

5. What was your Parallel Fraction, Fp?

$$\text{Speedup}(4) = \frac{1}{(1 - Fp) + Fp / 4}$$

$$3.80 = \frac{1}{1 - Fp*(3/4)}$$

$$0.263 = 1 - Fp * (3/4)$$

$$Fp = \frac{56}{57}$$