Hayden Galante and Luke Hoskam
Experiment for ECE 362
March 8th, 2022

Homework 6

Report

ECE362

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Experiment Design:

To test the effect of threads on program execution time, we designed a series of tests in which we modify the array size, length of the grouping, and the number of threads to test the effect of multithreading on processing time.

Analysis:

- The data shows that as the size of the array increases, the benefit of adding multiple threads increases.
- When the data is sufficiently small, there is little to no benefit to adding threads, and in some cases, the cost of adding threads outweighs the benefit provided by dividing the task.
- The length of the 1 grouping requested had an effect on the benefits of threading. This is evident when evaluating the time saved column on charts 1 and 2. Chart 1 and 4 demonstrate that when the length of the grouping is shorter the benefit of adding more threads can diminish when adding a certain number of threads.
- With more time we could perform more statistical analysis. But with a primitive problem set, it was found that even with rows and columns = 16000 as we encountered very few matches above len = 30 with any seed value.

Data:

Chart #1: 16000 x 16000 Length 14					
Rows	Columns	Length	Threads	Real Time(sec)	Time Saved
16000	16000	14	16	6.4	3.56
16000	16000	14	8	7.1	2.86
16000	16000	14	4	8.74	1.22
16000	16000	14	2	7.7	2.26
16000	16000	14	1	9.96	0

Chart #2: 16000 x 16000 Length 22					
Rows	Columns	Length	Threads	Real Time(sec)	Time Saved
16000	16000	22	16	6.11	3.91
16000	16000	22	8	6.6	3.42

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16000	16000	22	4	9	1.02
16000	16000	22	2	9.85	0.17
16000	16000	22	1	10.02	0

Chart #3: 8000 x 8000 Length 22					
Rows	Columns	Length	Threads	Real Time(sec)	Time Saved
8000	8000	22	16	1.71	0.86
8000	8000	22	8	1.75	0.82
8000	8000	22	4	2.48	0.09
8000	8000	22	2	2.59	-0.02
8000	8000	22	1	2.57	0

Chart #4: 1600 x1600 Length 3					
Rows	Columns	Length	Threads	Real Time(sec)	Time Saved
1600	1600	3	16	0.1	0.02
1600	1600	3	8	0.1	0.02
1600	1600	3	4	0.11	0.01
1600	1600	3	2	0.1	0.02
1600	1600	3	1	0.12	0

Chart #5: 1600 x1600 Length 10					
Rows	Columns	Length	Threads	Real Time(sec)	Time Saved
1600	1600	10	16	0.12	0.01
1600	1600	10	8	0.09	0.04
1600	1600	10	4	0.12	0.01
1600	1600	10	2	0.11	0.02
1600	1600	10	1	0.13	0

Additional Data:

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No. Threads	Rows/Cols	time to find len 2	time to find len 20	time to find len 100
BASE	5000	0.86	1.06	1.03
1	5000	0.86	1.02	1.03
2	5000	0.72	1.05	0.8
4	5000	0.86	0.96	1.07
8	5000	0.73	0.7	0.72
16	5000	0.6	0.69	0.66
BASE	10000	3.25	3.84	3.83
1	10000	3.21	4.02	3.86
2	10000	3.51	3.38	2.82
4	10000	3.5	3.61	3.51
8	10000	2.55	2.64	2.57
16	10000	2.24	2.48	2.54
BASE	16000	7.97	9.59	9.77
1	16000	8.15	9.57	9.92
2	16000	8.72	10.03	9.7
4	16000	9.03	9.07	9.98
8	16000	6.34	6.89	6.69
16	16000	5.62	5.97	6.04