April James

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CS475 Parallel Programming

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Project 1: OpenMP Monte Carlo Simulation

Program Details:

For this Monte Carlo simulation, the program was ran a total of 24 times using a combination of 10, 100, 1000, 5000, 10000, 50000, and 100000 number of trials, and 1, 2, 4, and 8 threads. The simulation was ran on Oregon State's flip server. At the time of running the program, `uptime` outputted "up 104 days, 16:13, 116 users, load average: 7.91, 7.99, 7.81".

Estimated Probability of Hitting the Castle: **6.63%**

This value was calculated by taking the probability results from a simulation ran using 8 threads and 100,000 trials.

Calculated Parallel Fraction:

$$F_p = \frac{n}{n-1} * \left(1 - \frac{1}{S}\right)$$

$$F_p = \frac{8}{8-1} * \left(1 - \frac{1}{P_n / P_1}\right)$$

$$F_p = \frac{8}{7} * \left(1 - \frac{1}{37.0279 / 4.8413}\right)$$

$$F_p = \mathbf{0.993}$$

Tables and Graphs: Included on the following pages.

Table: Performance versus the Number of Monte Carlo trials

Num Threads	Number of Trials: 10	100	1000	5000	10000	50000	100000
1	3.79951	8.662	9.02562	4.86429	4.88039	4.90779	4.8413
2	2.30516	8.53802	9.77729	9.61438	9.60312	9.64687	9.56968
4	4.09825	10.5871	18.8627	19.2488	18.6549	18.4351	18.8284
8	2.7846	13.4318	34.5811	36.8603	33.175	37.052	37.0279

Graph: Performance versus the Number of Monte Carlo trials

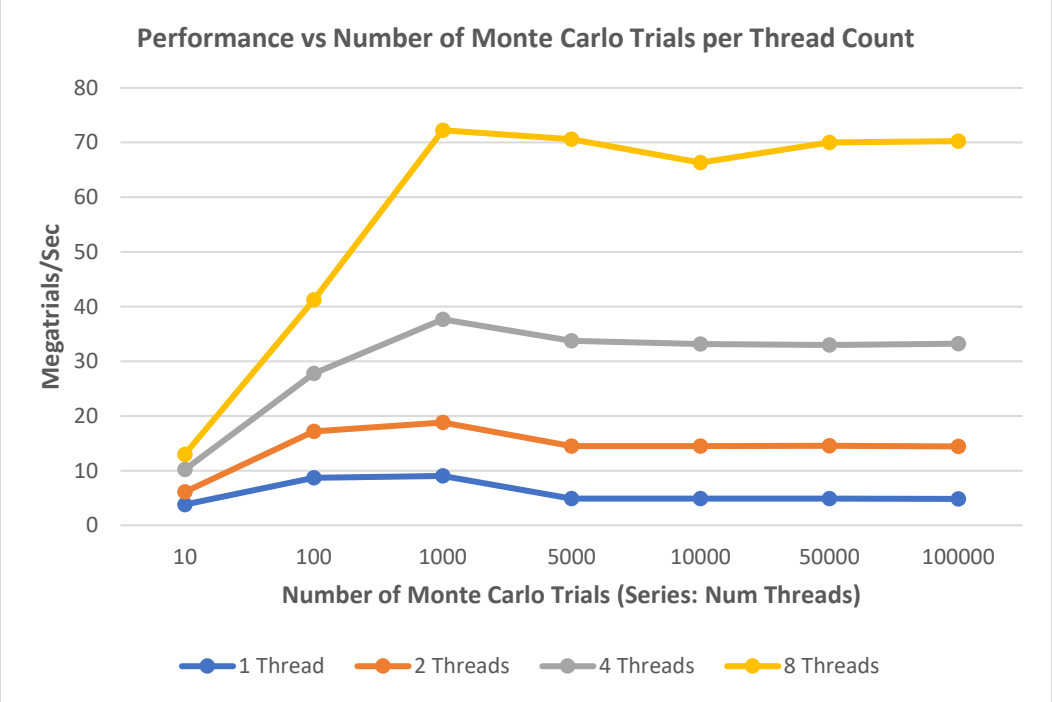

Table: Performance versus the Number of OpenMP Threads

Num Trials	Number of Threads 1	2	4	8
10	3.79951	2.30516	4.09825	2.7846
100	8.662	8.53802	10.5871	13.4318
1000	9.02562	9.77729	18.8627	34.5811
5000	4.86429	9.61438	19.2488	36.8603
10000	4.88039	9.60312	18.6549	33.175
50000	4.90779	9.64687	18.4351	37.052
100000	4.8413	9.56968	18.8284	37.0279

Graph: Performance versus the Number of OpenMP Threads