CS 475/575 -- Spring Quarter 2022 Konda Bhanu Prasanth

Project #1 934403560

OpenMP: Monte Carlo Simulation kondab@oregonstate.edu

1. Choosing one of the runs (the one with the maximum number of trials would be good), tell me what you think the actual probability is.

The actual probability might be between 28% to 31% (checked probabilities for trails between 10000 to 1000000)

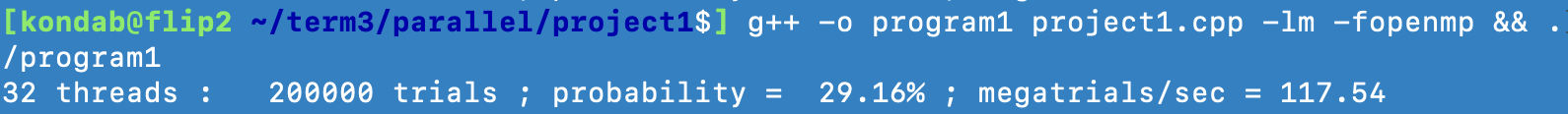
|  |  |  |  |
| --- | --- | --- | --- |
| **threads** | **trails** | **megatrials/sec** | **probability** |
| 8 | 100000 | 121.71 | 28.78 |
| 8 | 500000 | 115.73 | 29.05 |
| 8 | 1000000 | 118.98 | 29.06 |
| 12 | 100000 | 121.48 | 29.19 |
| 12 | 500000 | 132.33 | 29.12 |
| 12 | 1000000 | 126.17 | 29.1 |
| 16 | 100000 | 161.22 | 28.67 |
| 16 | 500000 | 160.74 | 28.98 |
| 16 | 1000000 | 138.43 | 29.07 |
| 20 | 100000 | 200.71 | 29.26 |
| 20 | 500000 | 188.01 | 29.25 |
| 20 | 1000000 | 174 | 29.08 |
| 24 | 100000 | 25.65 | 29.06 |
| 24 | 500000 | 49.07 | 29.14 |
| 24 | 1000000 | 107.55 | 29.06 |
| 32 | 100000 | 149.97 | 29.08 |
| 32 | 500000 | 158.25 | 29.09 |
| 32 | 1000000 | 127.28 | 29.03 |

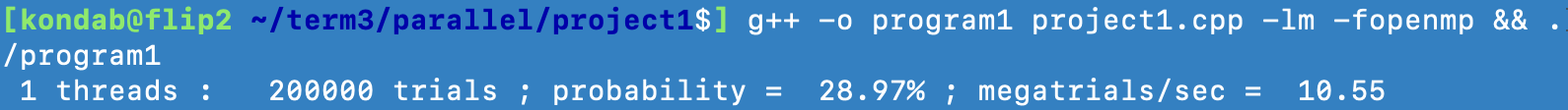
2. Do a table and two graphs. The two graphs need to be:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Threads\Trails** | **1** | **10** | **100** | **1000** | **10000** | **100000** | **500000** | **1000000** |
| 1 | 1.37 | 7.94 | 13.04 | 15.21 | 15.2 | 15.34 | 15.32 | 15.31 |
| 2 | 0.72 | 6.5 | 23.58 | 29.15 | 30.57 | 30.43 | 30.47 | 30.1 |
| 4 | 0.73 | 4.97 | 28.55 | 55.01 | 46.02 | 60.67 | 60.75 | 60.17 |
| 8 | 0.41 | 4.08 | 25.77 | 72.73 | 79.23 | 121.71 | 115.73 | 118.98 |
| 12 | 0.31 | 3.36 | 27.4 | 91.21 | 118.36 | 121.48 | 132.33 | 126.17 |
| 16 | 0.25 | 2.72 | 26 | 98.96 | 148.6 | 161.22 | 160.74 | 138.43 |
| 20 | 0.18 | 1.64 | 18.75 | 105.37 | 187.17 | 200.71 | 188.01 | 174 |
| 24 | 0 | 0 | 0.05 | 0.4 | 3.38 | 25.65 | 49.07 | 107.55 |
| 32 | 0.02 | 0.24 | 2.59 | 27.51 | 83.37 | 149.97 | 158.25 | 127.28 |

1. Performance versus the number of Monte Carlo trials, with the colored lines being the number of OpenMP threads.
2. Performance versus the number OpenMP threads, with the colored lines being the number of Monte Carlo trials.

3. Compute Fp, the Parallel Fraction, for this computation.





Fp = (4./3.)\*( 1. - (1./S) ) S = 117.54/10.55 =11.141 (32 core:1core)

= (4./3.) \* (1. – 0.0542) 1. / S = 0.089

= (4./3.) \* 0.9458

= 0.998