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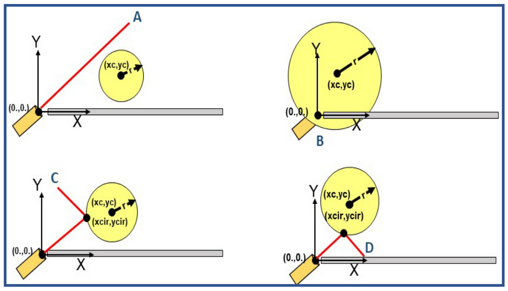
Project 1

Objective – The goal of this project is to simulate Monte Carlo and determine how likely a particular output is to happen.

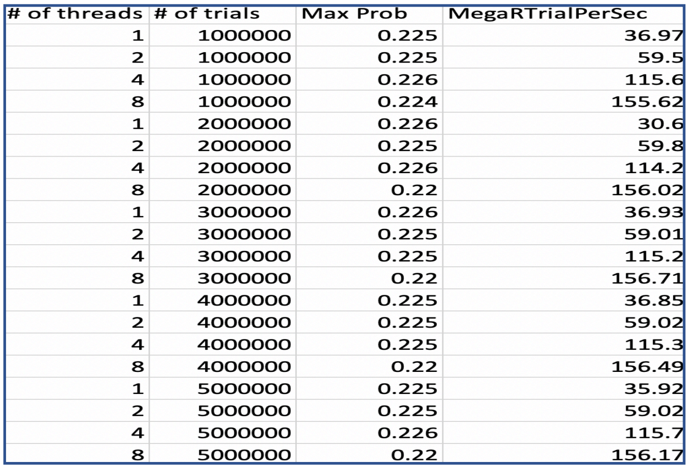
Summary – The particular output we are interested in this assignment is to find the probability of the laser pointer hitting the bottom bar, or scenario D as illustrated and shown below. Attempt this project using some number of tries, NUMTRIES and record the peak. Afterward, compute a table and two graphs showing performance versus trial and performance versus threads. I then select the run with most runs, return the probability and compute the Fp, the Parallel Fraction.

Possible Scenarios

A) Miss the circle completely
B) Circle engulf the laser pointer
C) Bounce off the circle and miss the plate entirely
D) Bounce off the ball



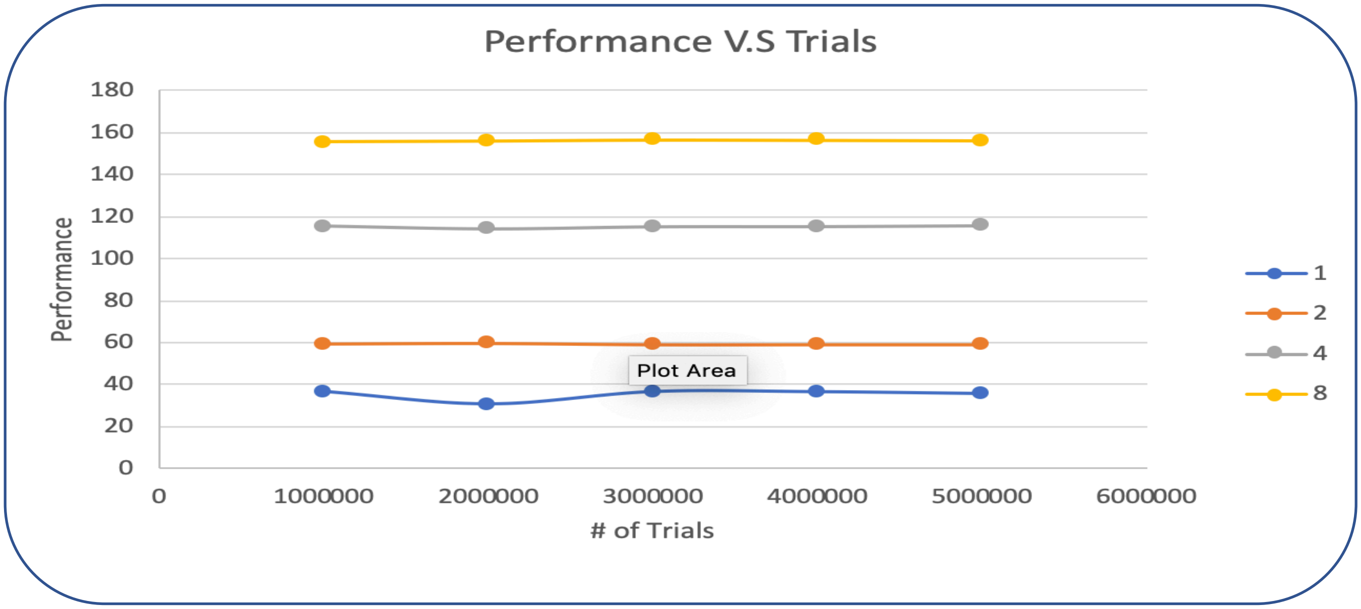
With the given scenarios and probabilities, the following table my recorded data ranging from 1 to 8 threads, with trials ranging from 1000000 to 5000000. As indicated, the chart includes maximum probability recorded as well as the performance, which is labeled as MegaRTrialPerSec.



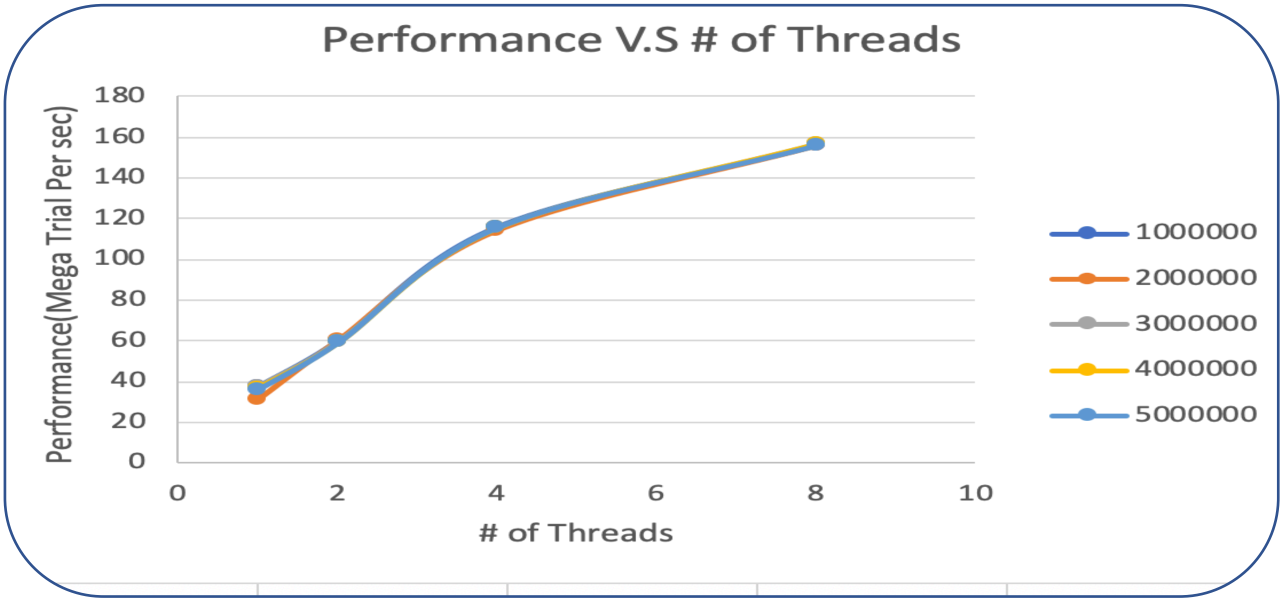
# of threads	# of trials	Max Prob	MegaRTrialPerSec
1	1000000	0.225	36.97
2	1000000	0.225	59.5
4	1000000	0.226	115.6
8	1000000	0.224	155.62
1	2000000	0.226	30.6
2	2000000	0.225	59.8
4	2000000	0.226	114.2
8	2000000	0.22	156.02
1	3000000	0.226	36.93
2	3000000	0.225	59.01
4	3000000	0.225	115.2
8	3000000	0.22	156.71
1	4000000	0.225	36.85
2	4000000	0.225	59.02
4	4000000	0.225	115.3
8	4000000	0.22	156.49
1	5000000	0.225	35.92
2	5000000	0.225	59.02
4	5000000	0.226	115.7
8	5000000	0.22	156.17

The following two graphs demonstrated comparison between performance vs trials and performance vs threads.

As indicated, this first graph shows the comparison between performance and trials. The graph indicates that there is a stable consistency in each thread level. This consistency in performance output was expected. Each thread level remain constant despites increasing trials.



The following graph indicates Performance versus number of threads. While each individual line was separated by the number of test runs, they somehow all ended roughly stable in turn of a singular time besides the minor difference when there was only one thread.



Analyze - (Actual Probability and Parallel Fraction / SpeedUp)

After analyzing my data, I chose the run with the maximum number of trials as suggested, the probability was 0.25.

$S = 156.17 / 35.92 = 4.68$

$Fp = (8/(8+1)) * (1 – (1 / 4.68) = 0.88 * 0.77 = 0.74$