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CS 475

Project #1 Writeup

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Write Up

The machine that I used to run all most tests was Flip3. When I did a top on it before and after my test it was under 5% usage on all time frames so there was little usage on the server.

The volume that my program calculated with 25000 subdivisions was: **14.0633100396021**

# Table and Graph for number of threads:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 10 | 100 | 1000 | 10000 | 20000 | 25000 |
| 1 | 4.76340006 | 32.78495877 | 18.44107 | 31.29785 | 34.24926 | 34.11482 |
| 2 | 0.79790579 | 21.75034814 | 36.75055 | 56.27798 | 65.83294 | 67.0366 |
| 3 | 0.68452676 | 25.94149497 | 53.96801 | 80.13354 | 95.04354 | 99.05142 |
| 4 | 0.52936844 | 50.58175105 | 72.10522 | 98.0671 | 122.4432 | 127.4 |
| 8 | 0.4323781 | 24.86448778 | 139.6682 | 152.8452 | 222.8067 | 228.8963 |
| 10 | 0.30744614 | 27.54720451 | 171.5987 | 179.0196 | 245.9983 | 255.0871 |
| 15 | 0.09023185 | 20.60481862 | 156.4371 | 187.2675 | 280.2425 | 311.1714 |

# Graph of NUMS:

# Patterns noticed:

For the number of threads used, there is a much larger gain in speed up till 8 threads after that there is diminished returns on how much each additional thread provides. So 8 threads is the sweet spot.

For the number of subdivisions, it takes roughly a linear increase in calculations per second for the number of threads increased.

# Reasons why:

The reason it behaves this way is because at some point there will be diminishing returns on the number of threads because the CPU almost certainly doesn’t have 15 threads so it needs to swap. Although it would make sense that for an increase in the number of subdivisions it would increase linearly for the number of threads because you are able to split up a large problem over more solvers (threads).

# Parallel Fraction & Max speed up:

For 8 Cores

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | T1 | Tn |  |  |  | Speed Up |  |  |
| 1 | 18.56952746 | 18.56952746 | #DIV/0! |  |  | 1 |  | #DIV/0! |
| 2 | 18.56952746 | 9.46730412 | 98% |  |  | 1.961437726 |  | 0.98034 |
| 4 | 18.56952746 | 4.915842929 | 98% |  |  | 3.777485922 |  | 0.980365 |
| 8 | 18.56952746 | 2.66960974 | 98% |  |  | 6.955895906 |  | 0.978557 |
| 10 | 18.56952746 | 2.200557461 | 98% |  |  | 8.438556043 |  | 0.97944 |
| 15 | 18.56952746 | 2.141360263 | 95% |  |  | 8.67183714 |  | 0.947876 |

From this data the conclusions is that 98% is the maximum speed up possible.