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CS 475

Project #1 Writeup

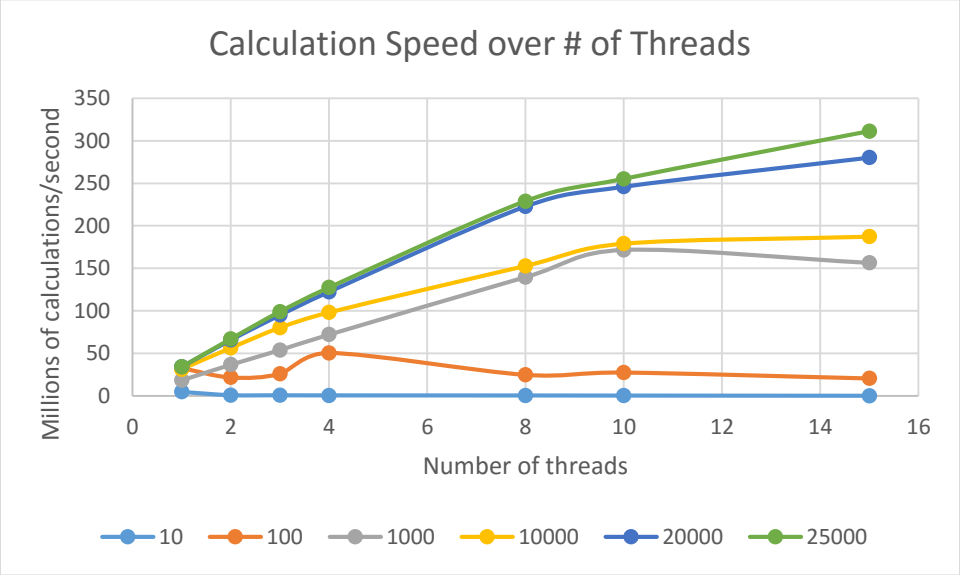
4/16/2016

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.

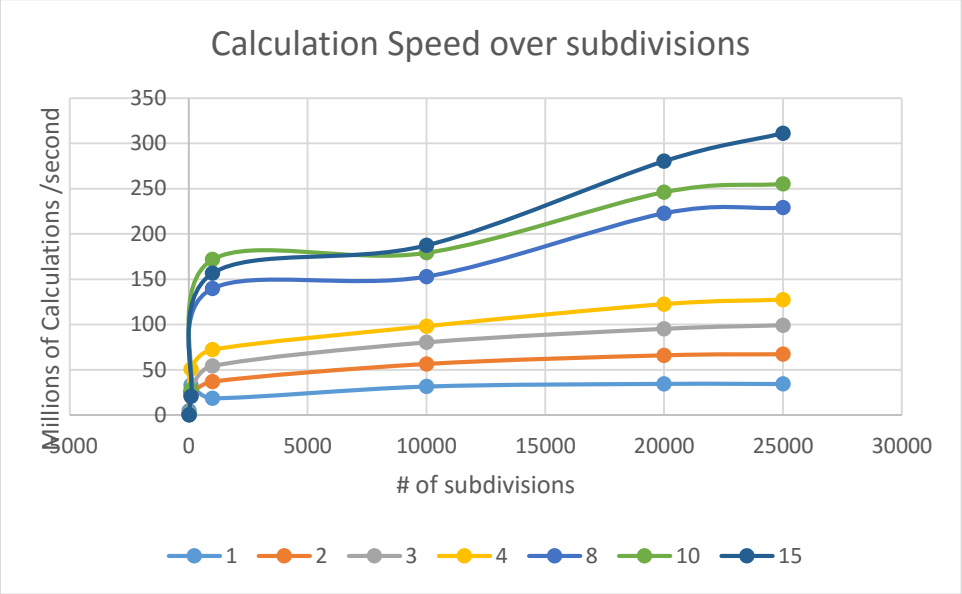
The volume that my program calculated with 25000 subdivisions was: **14.0633100396021**

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

$$Max_{speedup} = \frac{1}{\frac{F_{parallel}}{n} + F_{sequential}} = \frac{n}{(n-1)} \frac{T_1 - T_n}{T_1}$$

	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.