OpenMP

V	numThreads	1	2	3	4	5	6	7	8	9	10	Average
10	1	0.000107	0.000115	0.000116	0.000127	0.000110	0.000116	0.000108	0.000080	0.000127	0.000102	0.000111
	2	0.000216	0.000219	0.000234	0.000154	0.000239	0.000214	0.000237	0.000216	0.000216	0.000228	0.000217
	4	0.000217	0.000164	0.000205	0.000308	0.000218	0.000264	0.000242	0.000203	0.000245	0.000231	0.000230
	8	0.000344	0.000295	0.000413	0.000349	0.000360	0.000337	0.000363	0.000339	0.000329	0.000333	0.000346
	10	0.000450	0.000328	0.000341	0.000401	0.000351	0.000343	0.000376	0.000441	0.003027	0.000402	0.000646
	12	0.000475	0.000359	0.000497	0.000445	0.000426	0.000669	0.023255	0.000392	0.000454	0.000455	0.002743
	16	0.001067	0.055973	0.064593	0.006695	0.134322	0.005583	0.159307	0.157415	0.018228	0.160976	0.076416
20	1	0.000613	0.000717	0.000712	0.000714	0.000658	0.000711	0.000525	0.000715	0.000602	0.000706	0.000667
	2	0.000494	0.000542	0.000560	0.000483	0.000495	0.000498	0.000475	0.000525	0.000492	0.000499	0.000506
	4	0.000443	0.000367	0.000477	0.000369	0.000424	0.000337	0.000464	0.000376	0.000471	0.000444	0.000417
	8	0.000408	0.000392	0.000476	0.000425	0.000482	0.005475	0.000452	0.000402	0.000431	0.000414	0.000936
	10	0.000532	0.000433	0.000475	0.000480	0.000511	0.000568	0.000403	0.000444	0.000495	0.000521	0.000486
	12	0.000527	0.000468	0.000550	0.000485	0.000547	0.000586	0.000545	0.001184	0.000561	0.000575	0.000601
	16	0.006021	0.010394	0.054097	0.015878	0.059390	0.209316	0.017169	0.003139	0.005803	0.150413	0.053162
40	1	0.004191	0.004827	0.005230	0.005249	0.005250	0.005246	0.005227	0.004928	0.005236	0.005235	0.005062
	2	0.002805	0.002931	0.002764	0.002847	0.002812	0.002873	0.002855	0.002795	0.002805	0.002830	0.002832
	4	0.001622	0.001612	0.001722	0.001587	0.001696	0.001631	0.001615	0.001632	0.001675	0.001651	0.001644
	8	0.001110	0.001080	0.001146	0.001048	0.001046	0.001202	0.170962	0.001039	0.001142	0.001106	0.018088
	10	0.001068	0.001106	0.000995	0.001071	0.001076	0.001120	0.000981	0.001007	0.000984	0.001084	0.001049
	12	0.000954	0.000970	0.001056	0.000974	0.000963	0.000948	0.000975	0.001014	0.001059	0.001018	0.000993
	16	0.028904	0.002096	0.051463	0.011715	0.002124	0.002481	0.035310	0.028104	0.003133	0.033783	0.019911
80	1	0.034624	0.032049	0.034101	0.034618	0.036512	0.036561	0.036596	0.036420	0.034331	0.035599	0.035141
	2	0.019896	0.019835	0.020205	0.020157	0.019710	0.020022	0.020161	0.020157	0.020153	0.019819	0.020012
	4	0.010732	0.010737	0.010706	0.010813	0.010791	0.010804	0.010796	0.010839	0.010788	0.010716	0.010772
	8	0.005763	0.005743	0.005769	0.005955	0.005866	0.005898	0.005870	0.005888	0.005845	0.005756	0.005833
	10	0.004810	0.004927	0.004891	0.004793	0.004919	0.004764	0.004872	0.004836	0.004954	0.004931	0.004870
	12	0.004166	0.004311	0.004175	0.004302	0.004298	0.004191	0.004199	0.004358	0.004283	0.004153	0.004244
	16	0.003672	0.003569	0.004392	0.003575	0.840989	0.029995	0.003850	0.033928	0.213127	0.013514	0.115061
160	1	0.184347	0.230684	0.190939	0.190565	0.191045	0.191148	0.218932	0.191943	0.184755	0.191682	0.196604
	2	0.113145	0.117052	0.114993	0.117388	0.116991	0.117062	0.135313	0.116827	0.122145	0.117067	0.118798
	4	0.068152	0.068394	0.068198	0.068191	0.066769	0.068244	0.068060	0.068459	0.074834	0.068097	0.068740
	8	0.038231	0.038390	0.038550	0.038192	0.038589	0.038203	0.038251	0.038340	0.038195	0.038302	0.038324
	10	0.031651	0.031677	0.031681	0.031712	0.092864	0.032026	0.031896	0.031658	0.031719	0.048464	0.039535
	12	0.027184	0.027110	0.027333	0.027503	0.027210	0.027010	0.027110	0.027091	0.027384	0.027395	0.027219
	16	0.024394	0.021603	0.021684	0.070944	0.106159	0.026375	0.094455	0.117870	0.041289	0.027023	0.055180
320	1	1.122230	1.119910	1.116070	1.120980	1.179790	1.121020	1.162900	1.120160	1.120850	1.119900	1.130381
	2	0.592865	0.593104	0.593802	0.592389	0.621155	0.592710	0.589705	0.592595	0.592933	0.643052	0.600431
	4	0.327092	0.327083	0.327816	0.326817	0.327477	0.327366	0.326984	0.327524	0.327682	0.324387	0.327023
	8	0.194213	0.195259	0.195057	0.194603	0.194087	0.195149	0.193902	0.194897	0.194837	0.195275	0.194728
	10	0.166836	0.167150	0.166758	0.167186	0.167086	0.167211	0.164305	0.167647	0.167334	0.167177	0.166869
	12	0.146690	0.152705	0.164303	0.146371	0.146979	0.146701	0.147212	0.145819	0.144107	0.146880	0.148777
	16	0.717853	0.184974	0.121431	0.135628	0.135254	0.120059	0.125825	0.127972	0.135282	0.178610	0.198289
640	1	8.549590	8.541500	8.544910	8.545690	8.616560	8.551030	8.555170	8.548670	8.557150	8.555770	8.556604
	2	4.315190	4.313350	4.370350	4.365100	4.311370	4.320470	4.341250	4.329640	4.350570	4.315940	4.333323
	4	2.189760	2.189490	2.253510	2.252750	2.236780	2.196550	2.227670	2.189080	2.293860	2.194580	2.222403
	8	1.131560	1.132310	1.135000	1.131970	1.134820	1.191000	1.132580	1.131530	1.152260	1.186380	1.145941
	10	0.919589	0.918654	0.921397	0.920888	0.920298	0.919794	0.918211	0.919455	0.920760	0.919445	0.919849
	12	0.778721	0.776932	0.777776	0.777213	0.779244	0.778028	0.779325	0.777571	0.778439	0.776469	0.778048
	16	0.650124	0.603313	0.624089	0.605996	0.601766	0.605885	0.607539	0.616145	0.612044	0.645578	0.617248
1280	1	67.907700	67.855300	67.934900	67.847000	67.922800	67.844300	67.878800	68.090200	67.915500	67.806200	67.900270
	2	34.019000	34.132800	34.022200	34.065900	34.079800	34.019600	34.037900	34.072400	33.999500		34.051620
	4	17.078900	17.160200	17.133500	17.068000	17.087400	17.087000	17.091000	17.098800	17.076000	17.139300	17.102010
	8	8.608600	8.668640	8.603240	8.606710	8.605530	8.665510	8.648550	8.662220	8.603470	8.608740	8.628121
	10	6.904820	6.974160	6.903960	6.910070	6.902940	6.905760	6.907630	6.909070	6.902530	6.913016	6.913016
	12	5.773530	5.777040	5.770340	5.770280	5.768650	5.772020	5.803800	5.835830	5.767890	5.761660	5.780104
	16	4.431890	4.410000	4.361650	4.358930	4.358860	4.399930	4.514440	4.438090	4.480530	4.443490	4.419781
2560	1	542.168000	542.821000	542.393000	542.730000	542.505000	542.297000	542.501000	542.336000	542.442000	542.551000	542.474000
	2	271.404000	271.897000	271.384000	271.622000	271.183000	271.449000	271.315000	271.431000	271.677000	271.370000	271.473200
	4	135.753000	136.248000	135.868000	136.142000	135.941000	135.943000	135.976000	135.980000	135.933000	135.911000	135.969500
	8	68.177100	68.268700	68.178900	68.297700	68.145200	68.153200	68.150300	68.171900	68.189100	38.182700	65.191480
	10	54.575400	54.651300	54.655600	54.805500	54.687600	54.616800	54.606200	54.627000	54.598200	54.595400	54.641900
	12	45.540300	45.545100	45.597600	45.657800	45.577000	45.524300	45.509000	45.558300	45.531500	45.536400	45.557730
	16	34.233300	34.274700	34.248300	49.048700	34.388400	34.245100	34.230300	34.387700	34.231300		35.751470
5120	1	4306.170000	4319.550000	4319.410000	4306.350000	4304.220000	4304.780000	4305.520000	4307.780000	4305.920000	4305.490000	4308.519000
	2	2168.850000	2168.030000	2170.550000	2177.360000	2159.870000	2160.240000	2197.970000	2224.350000	2162.120000	2160.050000	2174.939000
	4	1081.070000	1085.660000	1084.570000	1081.090000	1081.230000	1080.760000	1080.920000	1081.150000	1081.320000		1081.941000
	8	541.633000	542.824000	542.954000	541.520000	541.891000	541.787000	541.600000	541.694000	541.664000	541.818000	541.938500
	10	433.675000	434.484000	434.589000	433.714000	433.930000	433.893000	433.845000	433.869000	433.882000	433.840000	433.972000
	12	361.708000	363.361000	363.333000	361.855000	361.988000	361.933000	361.814000	361.762000	361.818000	361.767000	362.133900
	16	271.852000	272.060000	272.115000	271.877000	272.023000	272.001000	271.900000	271.954000	271.912000	271.847000	271.954100

CUDA

V	1	2	3	4	5	6	7	8	9	10	Average
40	0.421000	0.402000	0.394000	0.432000	0.419000	0.407000	0.423000	0.390000	0.405000	0.392000	0.408500
80	0.409000	0.404000	0.417000	0.417000	0.396000	0.405000	0.392000	0.388000	0.368000	0.399000	0.399500
160	0.400000	0.405000	0.393000	0.384000	0.380000	0.408000	0.382000	0.404000	0.388000	0.416000	0.396000
320	0.420000	0.408000	0.409000	0.403000	0.418000	0.411000	0.403000	0.391000	0.403000	0.408000	0.407400
640	0.440000	0.421000	0.423000	0.486000	0.424000	0.425000	0.416000	0.396000	0.405000	0.435000	0.427100
1280	0.498000	0.499000	0.526000	0.544000	0.520000	0.507000	0.475000	0.498000	0.509000	0.534000	0.511000
2560	0.785000	0.781000	0.770000	0.763000	0.803000	0.785000	0.758000	0.740000	0.805000	0.756000	0.774600
5120	2.044000	2.058000	2.012000	2.027000	2.088000	2.151000	2.043000	2.000000	2.040000	2.024000	2.048700
10240	7.089000	7.210000	7.095000	7.147000	7.153000	7.019000	7.149000	7.062000	6.998000	7.086000	7.100800
20480	27.226000	27.581000	29.548000	27.150000	27.514000	28.167000	27.174000	27.154000	27.171000	27.511000	27.619600

R^2 for CUDA

k	n	R^2	Adj. R^2
1		0.922959	0.913329
2	10	0.999998	0.999998
3		0.999999	0.999998

CUDA

V	1	2	3	4	5	6	7	8	9	10	Average
10	0.424000	0.410000	0.424000	0.420000	0.419000	0.424000	0.418000	0.394000	0.406000	0.391000	0.413000
20	0.422000	0.422000	0.416000	0.387000	0.408000	0.403000	0.407000	0.407000	0.419000	0.389000	0.408000
40	0.440000	0.437000	0.389000	0.392000	0.420000	0.420000	0.407000	0.408000	0.405000	0.408000	0.412600
80	0.421000	0.401000	0.400000	0.405000	0.406000	0.421000	0.406000	0.400000	0.401000	0.419000	0.408000
160	0.424000	0.386000	0.403000	0.418000	0.467000	0.393000	0.410000	0.421000	0.389000	0.393000	0.410400
320	0.457000	0.407000	0.419000	0.392000	0.406000	0.397000	0.414000	0.419000	0.409000	0.406000	0.413100
640	0.436000	0.434000	0.422000	0.440000	0.425000	0.426000	0.453000	0.450000	0.427000	0.430000	0.434300
1280	0.523000	0.496000	0.508000	0.516000	0.515000	0.531000	0.512000	0.501000	0.500000	0.517000	0.511900
2560	0.794000	0.794000	0.788000	0.796000	0.793000	0.761000	0.785000	0.746000	0.767000	0.768000	0.779200
5120	2.053000	2.009000	2.006000	2.064000	2.057000	2.032000	2.030000	1.979000	2.030000	2.004000	2.026400
10240											7.100800
20480											27.619600

R^2 for CUDA

k	n	R^2	Adj. R^2	
1		0.918447	0.908253	
2	10	0.999986	0.999982	0.000018
3		0.999988	0.999983	

OpenMP

V	Number of Threads							Total Time	Factor of Time Increase
	1	2	4	8	10	12	16		
10	0.000111	0.000217	0.000230	0.000346	0.000646	0.002743	0.076416	0.080709	
20	0.000667	0.000506	0.000417	0.000936	0.000486	0.000601	0.053162	0.056776	0.703
40	0.005062	0.002832	0.001644	0.018088	0.001049	0.000993	0.019911	0.049579	0.873
80	0.035141	0.020012	0.010772	0.005833	0.004870	0.004244	0.115061	0.195934	3.952
160	0.196604	0.118798	0.068740	0.038324	0.039535	0.027219	0.055180	0.544400	2.778
320	1.130381	0.600431	0.327023	0.194728	0.166869	0.148777	0.198289	2.766497	5.082
640	8.556604	4.333323	2.222403	1.145941	0.919849	0.778048	0.617248	18.573416	6.714
1280	67.900270	34.051620	17.102010	8.628121	6.913016	5.780104	4.419781	144.794922	7.796
2560	542.474400	271.473200	135.969500	65.191480	54.641900	45.557730	35.751470	1151.059680	7.950
5120	4308.519000	2174.939000	1081.941000	541.938500	433.972100	362.133900	271.954100	9175.397600	7.971

	1.981	3.982	7.950	9.928	11.898	15.843
						2126.194

R^2 for OpenMP (numThreads = 8)

k	n	R2	Adj. R2		
1		0.847152	0.828046		
2	10	0.997333	0.996571	0.003429	194.634
3		0.999999	0.999999		

CUDA Timing Study and Trendline Fitting

Linear Trendline R² = 0.92   Quadratic Trendline R² = 1   Cubic Trendline R² = 1

OpenMP Timing Study

1   2   4   8   10   14   16

Approach towards V^3