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CS475

Project 6 Write Up

1. What machine you ran this on

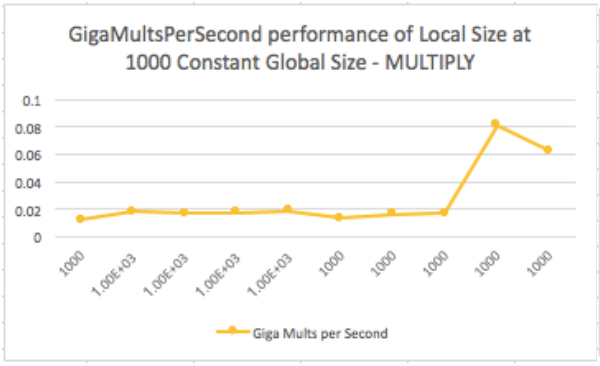
   I ran this on Rabbit which 2 E5-2630 Xeon Processors

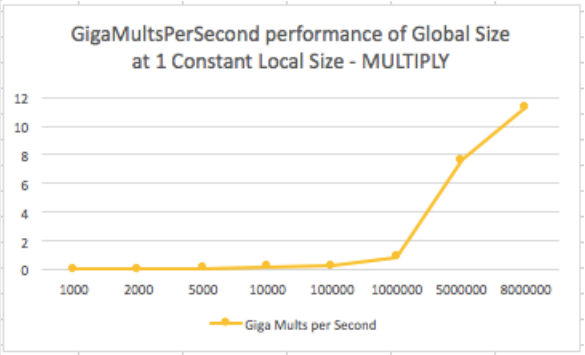
2. Show the table and graph

   Table at bottom of Write up and in Project6.xlxs excel spread sheet.

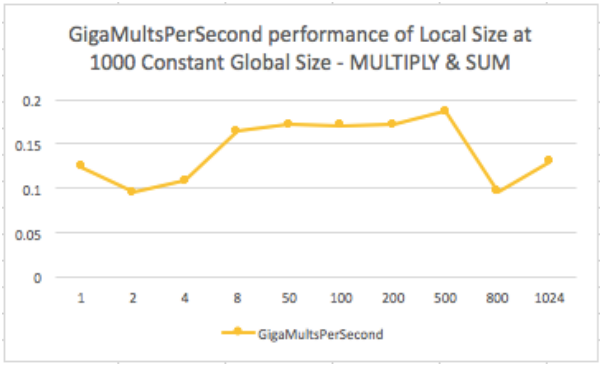
   Graph

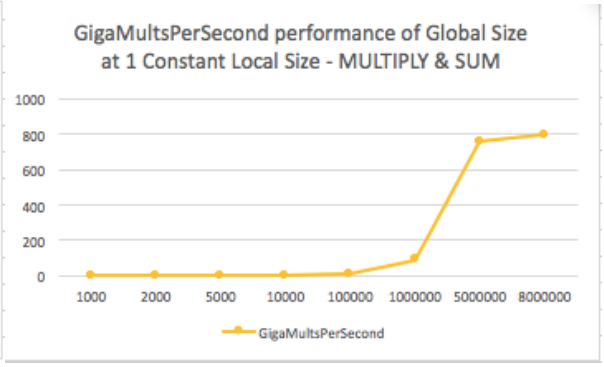
   Multiply



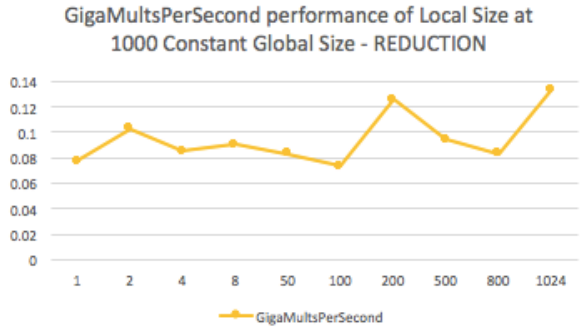


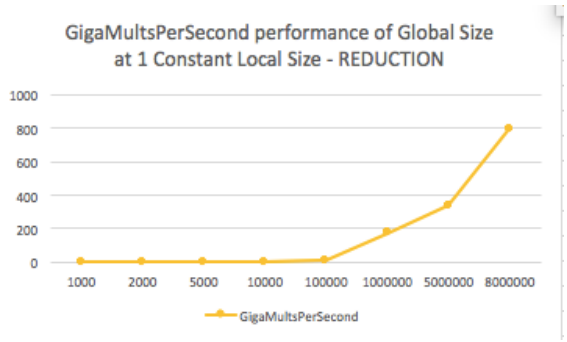
   Multiply & Sum





Reduction





3. What patterns are you seeing in the performance curves?

   With global size constant and local size changing there doesn't seem to be much of an increase in Giga Mults per second. With local size constant, it looks like there is a sharp increase in Giga Mults Per Second as the Global Size increases. In Reduction the increase doesn't level out after 8 million where as in multiply and in multiply & sum the Giga Mults per second does level out.

4. Why do you think the patterns look this way?

   I believe these patterns are due to the advantage of reduction, in that it will always increase giga mults per second no matter how high a value you choose since there is time being saved using the reduction method and having to do less calculations.

5. What is the performance difference between doing a Multiply and doing a Multiply-Add?

   Multiply has much lower Giga mults per second values than Mulitply & Add. With a constant local size of 1 multiply got up to 11 Giga mults per second while Multiply & Add reached 800 Giga mults per second. So, there is a huge difference between the two.

6. What does that mean for the proper use of GPU parallel computing?

   For proper use of GPU parallel computing this means that we can still see an increase in Giga mults per second that we would not have seen otherwise. With Reduction the same held true.

Multiply Table

Global Size	Local Size	Work Group Size	GigaMultsPerSecond
1000	1	1000	0.0123197
1.00E+03	2.00E+00	500	0.0178021
1.00E+03	4.00E+00	250	0.0171851
1.00E+03	8.00E+00	125	0.0175633
1.00E+03	5.00E+01	20	0.0184648
1000	1.00E+02	10	0.0131387
1000	2.00E+02	5	0.0162989
1000	5.00E+02	2	0.0170864
1000	8.00E+02	1	0.081453
1000	1.02E+03	0	0.0627353
2000	1.00E+00	2000	0.0307977
2000	2	1000	0.0339213
2000	4	500	0.0304734
2000	8	250	0.0285413
2000	50	40	0.0356373
2000	100	20	0.0336638
2000	200	10	0.0464005
2000	500	4	0.0394727
2000	800	2	0.217179
2000	1024	1	0.165344
5000	1	5000	0.0821315
5000	2	2500	0.0812348
5000	4	1250	0.0800679
5000	8	625	0.0847932
5000	50	100	0.0716435
5000	100	50	0.0569424
5000	200	25	0.0873805
5000	500	10	0.084568
5000	800	6	0.455705
5000	1024	4	0.419216
10000	1	10000	0.176097
10000	2	5000	0.161186
10000	4	2500	0.116382
10000	8	1250	0.153759
10000	50	200	0.0542841
10000	100	100	0.16439

10000	200	50	0.160942
10000	500	20	0.106586
10000	800	12	0.576037
10000	1024	9	0.815195
100000	1	100000	0.228569
100000	2	50000	0.00880625
100000	4	25000	0.176865
100000	8	12500	0.0775412
100000	50	2000	0.00969371
100000	100	1000	0.173016
100000	200	500	0.179171
100000	500	200	0.174555
100000	800	125	0.157813
100000	1024	97	8.57632
1000000	1	1000000	0.85283
1000000	2	500000	0.876548
1000000	4	250000	0.788719
1000000	8	125000	1.81068
1000000	50	20000	0.0980657
1000000	100	10000	1.33413
1000000	200	5000	0.0915014
1000000	500	2000	0.0804581
1000000	800	1250	1.41752
1000000	1024	976	100.25
5000000	1	5000000	7.65157
5000000	2	2500000	11.9305
5000000	4	1250000	4.18011
5000000	8	625000	8.32513
5000000	50	100000	8.4942
5000000	100	50000	8.63233
5000000	200	25000	11.6405
5000000	500	10000	8.27383
5000000	800	6250	8.44023
5000000	1024	4882	410.273
8000000	1	8000000	11.3269
8000000	2	4000000	14.08
8000000	4	2000000	11.6672
8000000	8	1000000	13.8352
8000000	50	160000	0.0516821
8000000	100	80000	12.2147

8000000	200	40000	0.787309
8000000	500	16000	11.7276
8000000	800	10000	2.16258
8000000	1024	7812	615.858
1000	1	1000	0.0123197
2000	1.00E+00	2000	0.0307977
5000	1	5000	0.0821315
10000	1	10000	0.176097
100000	1	100000	0.228569
1000000	1	1000000	0.85283
5000000	1	5000000	7.65157
8000000	1	8000000	11.3269

Multiply & Sum

Global Size	Local Size	Work Group Size	GigaMultsPerSecond
1000	1	1000	0.123916
1000	2	500	0.0953016
1000	4	250	0.108214
1000	8	125	0.164772
1000	50	20	0.171527
1000	100	10	0.171263
1000	200	5	0.172355
1000	500	2	0.186811
1000	800	1	0.096581
1000	1024	0	0.130073
2000	1	2000	0.206015
2000	2	1000	0.191388
2000	4	500	0.255037
2000	8	250	0.349527
2000	50	40	0.228258
2000	100	20	0.241167
2000	200	10	0.276053
2000	500	4	0.344472
2000	800	2	0.351494
2000	1024	1	0.346982
5000	1	5000	0.475104
5000	2	2500	0.603137
5000	4	1250	0.760111
5000	8	625	0.540775

5000	50	100	0.617665
5000	100	50	0.466417
5000	200	25	0.534702
5000	500	10	0.77018
5000	800	6	0.930059
5000	1024	4	0.467902
10000	1	10000	1.15141
10000	2	5000	0.947868
10000	4	2500	1.49142
10000	8	1250	1.28651
10000	50	200	0.973996
10000	100	100	1.74155
10000	200	50	1.69491
10000	500	20	1.7138
10000	800	12	1.6714
10000	1024	9	1.86255
100000	1	100000	12.95
100000	2	50000	16.818
100000	4	25000	16.9693
100000	8	12500	16.8293
100000	50	2000	14.3021
100000	100	1000	16.559
100000	200	500	12.8353
100000	500	200	12.6968
100000	800	125	11.2587
100000	1024	97	9.16338
1000000	1	1000000	91.0498
1000000	2	500000	81.3668
1000000	4	250000	92.9712
1000000	8	125000	94.4912
1000000	50	20000	88.4175
1000000	100	10000	89.7665
1000000	200	5000	106.44
1000000	500	2000	108.167
1000000	800	1250	130.565
1000000	1024	976	111.894
5000000	1	5000000	757.69
5000000	2	2500000	648.76
5000000	4	1250000	269.775
5000000	8	625000	643.998

5000000	50	100000	458.253
5000000	100	50000	834.169
5000000	200	25000	469.924
5000000	500	10000	687.756
5000000	800	6250	445.752
5000000	1024	4882	743.164
8000000	1	8000000	794.202
8000000	2	4000000	685.519
8000000	4	2000000	994.036
8000000	8	1000000	713.011
8000000	50	160000	670.184
8000000	100	80000	756.358
8000000	200	40000	706.527
8000000	500	16000	989.852
8000000	800	10000	748.853
8000000	1024	7812	1415.17
1000	1	1000	0.123916
2000	1	2000	0.206015
5000	1	5000	0.475104
10000	1	10000	1.15141
100000	1	100000	12.95
1000000	1	1000000	91.0498
5000000	1	5000000	757.69
8000000	1	8000000	794.202

Reduction

Global Size	Local Size	Work Group Size	GigaMultsPerSecond
1000	1	1000	0.0770237
1000	2	500	0.102522
1000	4	250	0.0848896
1000	8	125	0.090555
1000	50	20	0.083029
1000	100	10	0.0732976
1000	200	5	0.125691
1000	500	2	0.0943397
1000	800	1	0.0832848
1000	1024	0	0.133014
2000	1	2000	0.174474

2000	2	1000	0.178571
2000	4	500	0.188982
2000	8	250	0.318166
2000	50	40	0.187021
2000	100	20	0.190513
2000	200	10	0.198275
2000	500	4	0.180783
2000	800	2	0.190968
2000	1024	1	0.246123
5000	1	5000	0.29656
5000	2	2500	0.801794
5000	4	1250	0.469926
5000	8	625	0.467726
5000	50	100	0.431667
5000	100	50	0.412677
5000	200	25	0.461808
5000	500	10	0.467858
5000	800	6	0.801281
5000	1024	4	0.461127
10000	1	10000	1.14417
10000	2	5000	0.936067
10000	4	2500	0.909091
10000	8	1250	1.1192
10000	50	200	0.876423
10000	100	100	0.875657
10000	200	50	0.941618
10000	500	20	0.876423
10000	800	12	0.847457
10000	1024	9	0.901144
100000	1	100000	8.81057
100000	2	50000	8.41468
100000	4	25000	9.43397
100000	8	12500	9.46072
100000	50	2000	8.75655
100000	100	1000	9.88727
100000	200	500	9.16252
100000	500	200	9.29367
100000	800	125	5.88028
100000	1024	97	9.28504
1000000	1	1000000	175.963

1000000	2	500000	96.0617
1000000	4	250000	94.518
1000000	8	125000	97.0875
1000000	50	20000	96.2741
1000000	100	10000	102.554
1000000	200	5000	53.3419
1000000	500	2000	50.7537
1000000	800	1250	98.6972
1000000	1024	976	55.991
5000000	1	5000000	339.512
5000000	2	2500000	452.734
5000000	4	1250000	808.145
5000000	8	625000	469.175
5000000	50	100000	552.914
5000000	100	50000	462.236
5000000	200	25000	233.852
5000000	500	10000	10417.1
5000000	800	6250	425.64
5000000	1024	4882	455.913
8000000	1	8000000	796.018
8000000	2	4000000	762.848
8000000	4	2000000	686.284
8000000	8	1000000	732.398
8000000	50	160000	724.44
8000000	100	80000	717.489
8000000	200	40000	761.397
8000000	500	16000	729.926
8000000	800	10000	695.652
8000000	1024	7812	714.477
1000	1	1000	0.0770237
2000	1	2000	0.174474
5000	1	5000	0.29656
10000	1	10000	1.14417
100000	1	100000	8.81057
1000000	1	1000000	175.963
5000000	1	5000000	339.512
8000000	1	8000000	796.018