

Parallel Programming CS - 575

Project 6 - OpenCL Matrix Multiplication

Submitted by

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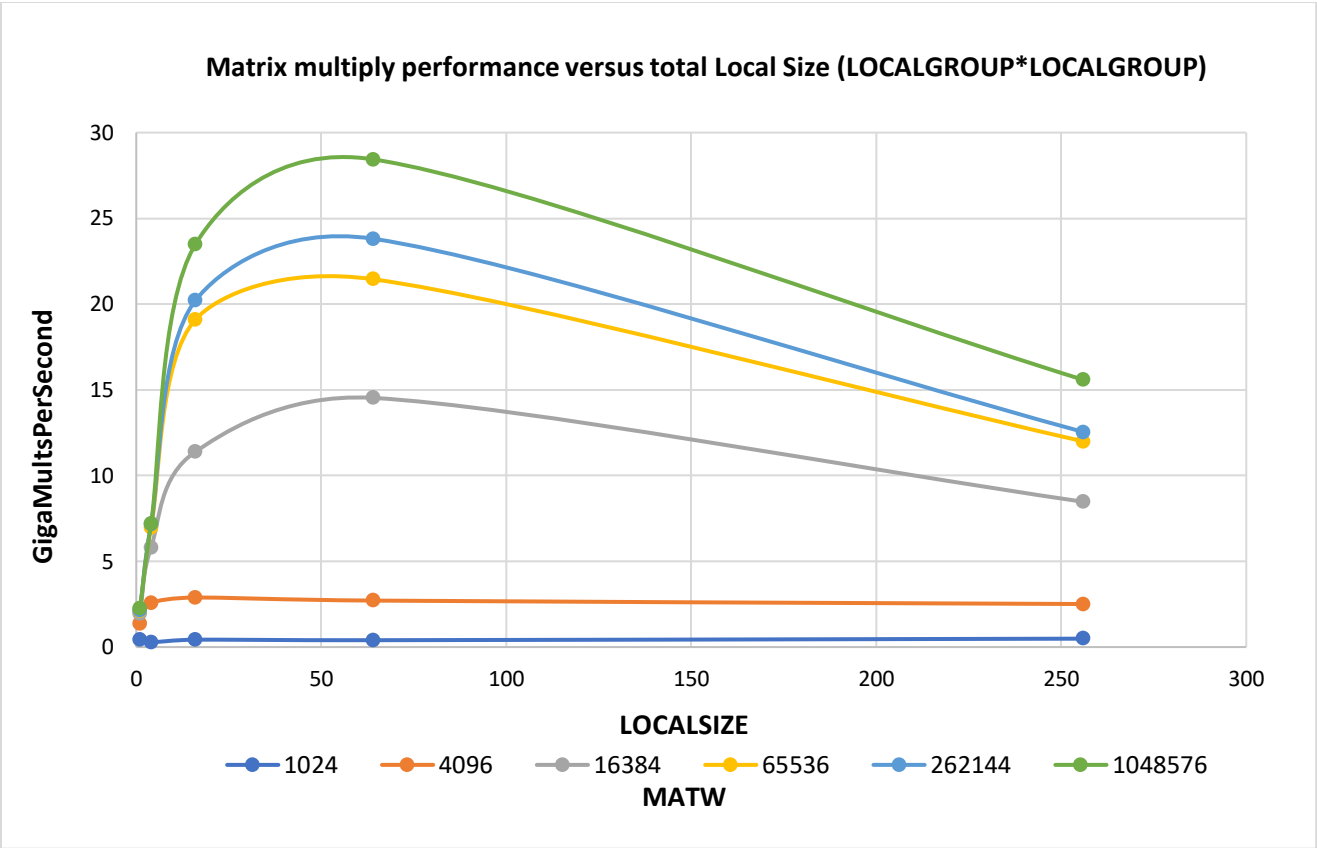
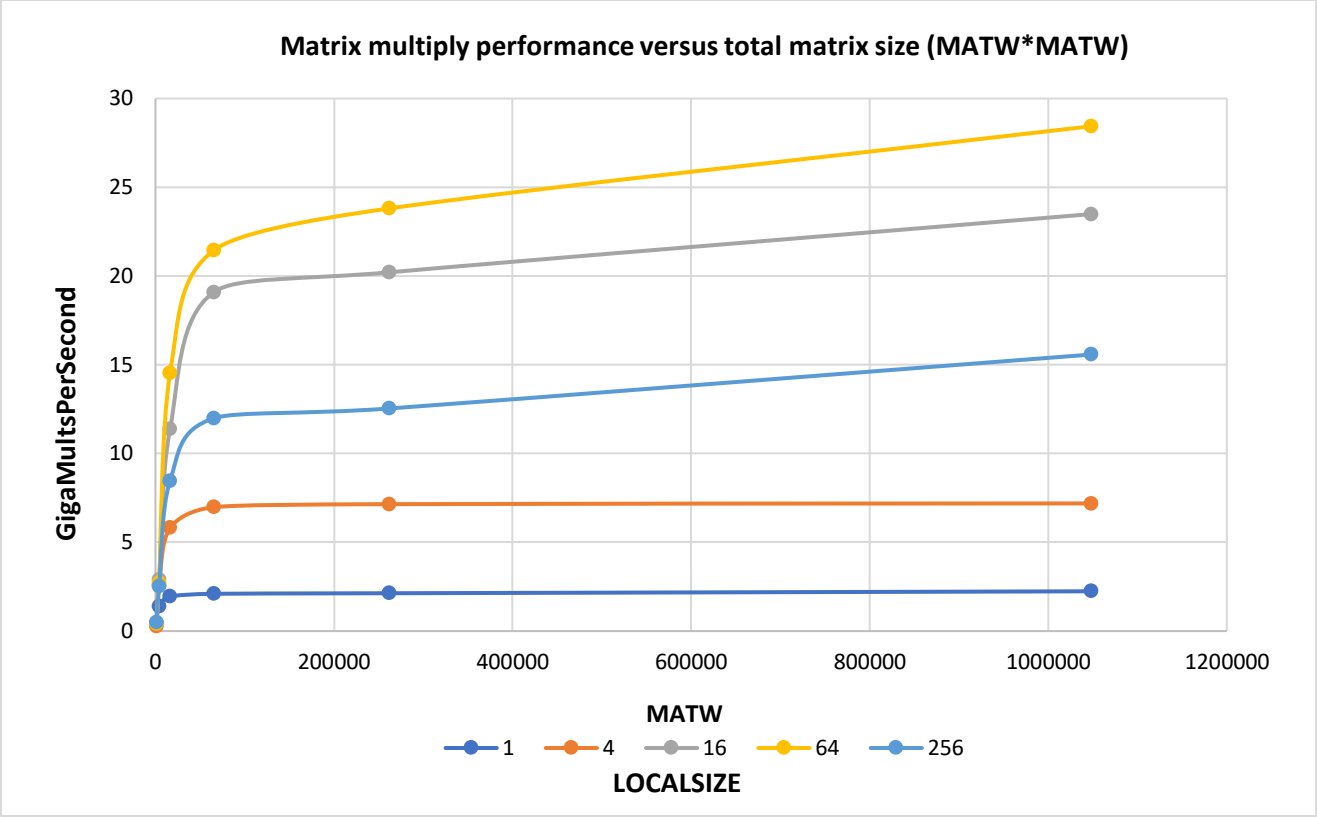
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1. What machine you ran this on?

I ran my code on Rabbit Server.

2. Show the table and graphs.

MATW	LOCALSIZE	GigaMultsPerSecond
1024	1	0.44
1024	4	0.28
1024	16	0.43
1024	64	0.4
1024	256	0.49
4096	1	1.38
4096	4	2.57
4096	16	2.89
4096	64	2.71
4096	256	2.51
16384	1	1.95
16384	4	5.81
16384	16	11.39
16384	64	14.53
16384	256	8.47
65536	1	2.1
65536	4	6.98
65536	16	19.1
65536	64	21.45
65536	256	11.99
262144	1	2.13
262144	4	7.15
262144	16	20.21
262144	64	23.81
262144	256	12.54
1048576	1	2.24
1048576	4	7.19
1048576	16	23.49
1048576	64	28.44
1048576	256	15.58



3. What patterns are you seeing in the performance curves? What difference does the size of the matrices make? What difference does the size of each workgroup make?

- As the size of the matrix increases, the GigaMultsPerSecond (a measure of computational performance) generally increases. This pattern suggests that larger matrices allow for better utilization of computational resources, perhaps due to better parallelization or efficient use of memory and compute resources.
- Regarding the workgroup size, initially, increasing the workgroup size significantly increases performance. This is likely due to the increased parallel processing possible with a larger number of workers. However, beyond a certain workgroup size (in this case, 64), the performance increase diminishes and even slightly decreases.
- The highest GigaMultsPerSecond is typically achieved with a larger matrix size and a moderately large workgroup size. This suggests that the best performance is achieved with a balance of a large enough problem size (matrix size) to fully utilize the computational resources and an optimal workgroup size that maximizes parallelism without incurring too much coordination overhead.
- At the smallest matrix size (1024), the performance seems to decrease with increasing workgroup size.

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

The performance is lower when the matrix size is small because the processing power of the GPU is not fully utilized. As the matrix size increases, the GPU is used more efficiently, leading to better performance.