

Lab 6: Graphics Processing Unit CME433-01

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Contents

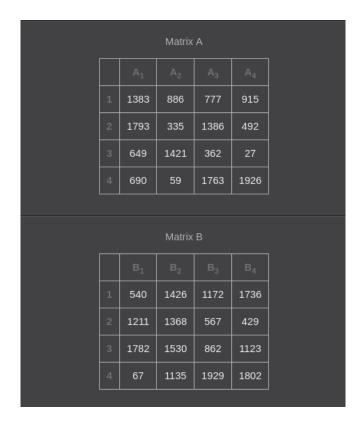
Single-Line Cache	Error! Bookmark not defined.
Microprocessor Layout	Error! Bookmark not defined.
My Program Sequencer	Error! Bookmark not defined.
Questions	Error! Bookmark not defined.
Question 1	Error! Bookmark not defined.
Question 2	Error! Bookmark not defined.
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Step 1: matrixMul.c

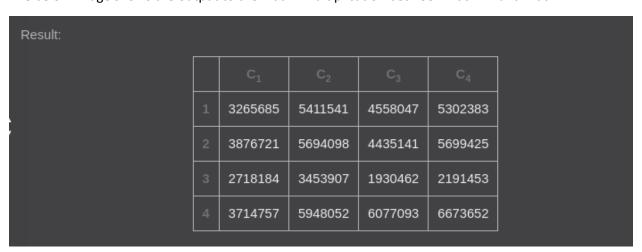
This will outline the proof that confirms step one is working as intended

Expected Output

The below photo shows in the input to the matrix calculator



The below image shows the output to the matrix multiplication between matrix A and matrix B.



Actual Output

After finishing matrixMul.c and compiling the code. The below picture shows the outcome with the same inputs.

```
[caa746@engr-elec70-09L files]$ ./matrixMul
matrixA =
1383
       886
                777
                        915
1793
       335
                1386
                        492
649
       1421
                362
                        27
690
       59
                1763
                        1926
matrixB =
540
       1426
                1172
                        1736
1211
       1368
                567
                        429
1782
       1530
                862
                        1123
67
       1135
                1929
                        1802
matrixC=
3265685 5411541 4558047 5302383
3876721 5694098 4435141 5699425
2718184 3453907 1930462 2191453
3714757 5948052 6077093 6673652
Dimension of matrixA: 4 x 4
Dimension of matrixB: 4 x 4
Multiplication of matrixA and matrixB need 1.000000 ms
```

Table of Matrixes

Matrix Size	Time
3x3	1ms
10x10	5ms
123x123	8077ms
210x210	40031ms
421x421	323071ms
512x512	579135ms

Conclusion

The matrixMul.c does work and its quite slow when it hits 512x512

Step 2: matrixMul_host.c and matrixMul_kernel.cl

The below photo shows the outcome of the adjusted files

```
[caa746@engr-elec70-09L files]$ ./matrixmul_host
Initializing OpenCL device...
Device: Intel(R) UHD Graphics 630 [0x9bc5]
Running matrix multiplication for matrices A (512x512) and B (512x512) ...
Matrix multiplication completed...
Execution time in milliseconds = 7.483 ms
[caa746@engr-elec70-09L files]$ [
```

Conclusion

The parallel processing is a magnitude faster than the single thread processing. Using the GPU implementation shows the value of using processing on the GPU and the speed that it can save you. OpenCL implementation on the GPU offers faster processing than the just a single core CPU.