

CSCI-GA.3033-004
Graphics Processing Units (GPUs): Architecture and Programming
Programming Assignment 3

In order to do this lab, you need first to do the following steps:

- Login to your CIMS account
- ssh to opencl1 (It is an AMD Radeon HD 7970 GPU)
- Download the two files (vector_add.c and vector_add_kernel.cl) from the course website
- You can compile them using: **gcc main.c -l OpenCL**

1. Using the *time* command, get the time taken by the program (total). Without modifying the lengths and sizes of the two arrays, can you optimize this program a bit? If so, modify it, write what you did at the top of the vector_add.c file as comments and report the new timing in the comments too. Rename the two files to q1.c and q1.cl (Be careful when you change the cl filename to modify the fopen in the main() function.)
2. The above files are just adding two vectors. Modify them in such a way that:
 - a. A[] contains random numbers from between 0 and 10,000 (not necessarily unique)
 - b. B[] is initialized to zero
 - c. At the end of the program, B[] must be the ascending sorted (from smaller to bigger) version of A[]
 - d. Print both A and B next to each other:

```
printf("A[%d] = %d B[%d] = %d\n", i, A[i], i, B[i]);
```

Write also the sequential version of the above program (seq_vector_sort.c) and report the performance of both versions the OpenCL and the sequential. Do not change the length of A and B arrays.

Rename the two files to q2.c and q2.cl

You need to submit a zip file (lastname.firstname.zip) containing:

- q1.c
- q1.cl
- q2.c
- q2.cl
- seq_vector_sort.c

Have Fun!