

Csc656 Computer Organization and Architecture
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Project 3
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PROJECT 3A

MaxCol.c

To Compile : `gcc MaxCol.c -o MaxCol`

To Run : `./MaxCol [Matrix size]`

```
[hniftiye.csc656@tiger:~]$ cd CSC656/Project3a/
[hniftiye.csc656@tiger:~/CSC656/Project3a$ ls
MaxCol.c  MaxCol.cu
[hniftiye.csc656@tiger:~/CSC656/Project3a$ gcc MaxCol.c -o MaxCol
[hniftiye.csc656@tiger:~/CSC656/Project3a$ ./MaxCol 1024
Elapsed CPU time = 27.453000 ms
1047552
1047553
1047554
1047555
1047556
1047557
1047558
1047559
1047560
1047561
```

MaxCol.cu:

To Compile : `nvcc MaxCol.cu -o MaxCol`

To Run : `./MaxCol [Matrix size] [threads per block]`

```
[hniftiye.csc656@tiger:~/CSC656/Project3a$ source ~whsu/lees.bash_profile
[hniftiye.csc656@tiger:~/CSC656/Project3a$ nvcc MaxCol.cu -o MaxCol
nvcc warning : The 'compute_20', 'sm_20', and 'sm_21' architectures are deprecated, and may be removed in a future release (Use -Wno-deprecated-gpu-targets to suppress warning).
[hniftiye.csc656@tiger:~/CSC656/Project3a$ ./MaxCol 1024 8
Elapsed time = 0.212288
Arrays match
[hniftiye.csc656@tiger:~/CSC656/Project3a$ ]
```

Performance of Max Column (w x w matrix)

Average of 3 excluding max and min (All times in ms)

	w=1024	w=2048	w=4096
CPU	25.261	119.500	504.330
GPU			
8 threads/block	0.2260587	0.6223467	1.6678933
16 threads/block	0.221888	0.3652587	1.1353387
32 threads/block	0.212864	0.3705707	0.6504747
64 threads/block	0.2164693	0.370528	0.64976
128 threads/block	0.2233174	0.3662294	0.6529067

Sample run

```

hniftiye.csc656@tiger:~/CSC656/Project3a$ ./MaxCol 1024 8
Elapsed time = 0.218816
Arrays match
hniftiye.csc656@tiger:~/CSC656/Project3a$ ./MaxCol 1024 16
Elapsed time = 0.216416
Arrays match
hniftiye.csc656@tiger:~/CSC656/Project3a$ ./MaxCol 1024 32
Elapsed time = 0.217568
Arrays match
hniftiye.csc656@tiger:~/CSC656/Project3a$ ./MaxCol 1024 64
Elapsed time = 0.216288
Arrays match
hniftiye.csc656@tiger:~/CSC656/Project3a$ ./MaxCol 2048 8
Elapsed time = 0.618976
Arrays match
hniftiye.csc656@tiger:~/CSC656/Project3a$ ./MaxCol 2048 16
Elapsed time = 0.369184
Arrays match
hniftiye.csc656@tiger:~/CSC656/Project3a$ ./MaxCol 2048 32
Elapsed time = 0.364672
Arrays match
hniftiye.csc656@tiger:~/CSC656/Project3a$ ./MaxCol 2048 64
Elapsed time = 0.360512
Arrays match
hniftiye.csc656@tiger:~/CSC656/Project3a$ ./MaxCol 2048 128
Elapsed time = 0.367424
Arrays match
hniftiye.csc656@tiger:~/CSC656/Project3a$ ./MaxCol 4096 8
Elapsed time = 1.663872
Arrays match
hniftiye.csc656@tiger:~/CSC656/Project3a$ ./MaxCol 4096 16
Elapsed time = 1.136768
Arrays match
hniftiye.csc656@tiger:~/CSC656/Project3a$ ./MaxCol 4096 32
Elapsed time = 0.648288
Arrays match
hniftiye.csc656@tiger:~/CSC656/Project3a$ ./MaxCol 4096 64
Elapsed time = 0.646080
Arrays match
hniftiye.csc656@tiger:~/CSC656/Project3a$ ./MaxCol 4096 128
Elapsed time = 0.649216
Arrays match

```

PROJECT 3B - Part 1

minDist.c

To Compile : gcc minDist.c -O3 -o minDist -lm

To Run : ./minDist

minDistSOA.c:

To Compile : gcc minDistSOA.c -O3 -o minDistSOA -lm

To Run : ./minDistSOA

```
hniftiye.csc656@tiger:~/CSC656/Project3b$ gcc minDist.c -O3 -o minDist -lm
hniftiye.csc656@tiger:~/CSC656/Project3b$ gcc minDistSOA.c -O3 -o minDistSOA -lm
hniftiye.csc656@tiger:~/CSC656/Project3b$ ./minDist
8192 particles
Elapsed CPU time = 229.869000 ms
hniftiye.csc656@tiger:~/CSC656/Project3b$ ./minDistSOA
8192 particles
Elapsed CPU time = 230.560000 ms
hniftiye.csc656@tiger:~/CSC656/Project3b$ head dump_minDist.out
0 5444 0.000625
1 5343 0.000626
2 3234 0.000363
3 4773 0.000649
4 7623 0.001903
5 4496 0.000770
6 4355 0.000192
7 7418 0.001714
8 7408 0.001964
9 3990 0.001153
hniftiye.csc656@tiger:~/CSC656/Project3b$ head dump_minDistSOA.out
0 5444 0.000625
1 5343 0.000626
2 3234 0.000363
3 4773 0.000649
4 7623 0.001903
5 4496 0.000770
6 4355 0.000192
7 7418 0.001714
8 7408 0.001964
9 3990 0.001153
hniftiye.csc656@tiger:~/CSC656/Project3b$ diff dump_minDist.out dump_minDistSOA.out
hniftiye.csc656@tiger:~/CSC656/Project3b$
hniftiye.csc656@tiger:~/CSC656/Project3b$ cmp --silent dump_minDist.out dump_minDistSOA.out && echo '### SUCCESS: Files Are Identical! ###' || echo '### WARNING: Files Are Different! ###'
### SUCCESS: Files Are Identical! ###
```

PROJECT 3B - Part 2

minDistSOAGPUDriver.cu

To Compile : `nvcc minDistSOAGPUDriver.cu -o minDistSOAGPUDriver`

To Run : `./minDistSOAGPUDriver`

```
hniftiye.csc656@tiger:~/CSC656/Project3b$ nvcc minDistSOAGPUDriver.cu -o minDistSOAGPUDriver
nvcc warning : The 'compute_20', 'sm_20', and 'sm_21' architectures are deprecated, and may be removed in a future release (Use -Wno-deprecated-gpu-targets to suppress warning).
hniftiye.csc656@tiger:~/CSC656/Project3b$ ./minDistSOAGPUDriver
8192 particles, 32 threads per block
Elapsed time = 10.733824
hniftiye.csc656@tiger:~/CSC656/Project3b$ head dump_minDistSOAGPUDriver.out
0 5444 0.000625
1 5343 0.000626
2 3234 0.000363
3 4773 0.000649
4 7623 0.001903
5 4496 0.000770
6 4355 0.000192
7 7418 0.001714
8 7408 0.001964
9 3990 0.001153
hniftiye.csc656@tiger:~/CSC656/Project3b$ diff dump_minDist.out dump_minDistSOA.out
hniftiye.csc656@tiger:~/CSC656/Project3b$ cmp --silent dump_minDist.out dump_minDistSOA.out && echo '### SUCCESS: Files Are Identical! ###' || echo '### WARNING: Files Are Different! ###'
### SUCCESS: Files Are Identical! ###
hniftiye.csc656@tiger:~/CSC656/Project3b$ diff dump_minDistSOAGPUDriver.out dump_minDist.out
hniftiye.csc656@tiger:~/CSC656/Project3b$ head dump_minDist.out
0 5444 0.000625
1 5343 0.000626
2 3234 0.000363
3 4773 0.000649
4 7623 0.001903
5 4496 0.000770
6 4355 0.000192
7 7418 0.001714
8 7408 0.001964
9 3990 0.001153
```

Performance of minDist

Average of 3 excluding max and min (All times in ms)

Particles	1024	8192	32768
minDist	29.3663	1,726.3183	27,638.7063
minDistSOA	27.53167	1,631.1963	26,081.0593
minDistSOAGPU			
4 threads/block	2.3347733	43.5000317	548.447754
16 threads/block	1.7028587	15.2040000	144.807358
64 threads/block	1.748096	6.4190613	66.262464

