CS575:Parallel Programming

Vectorized Array Multiplication and Reduction using SSE

(project#4)

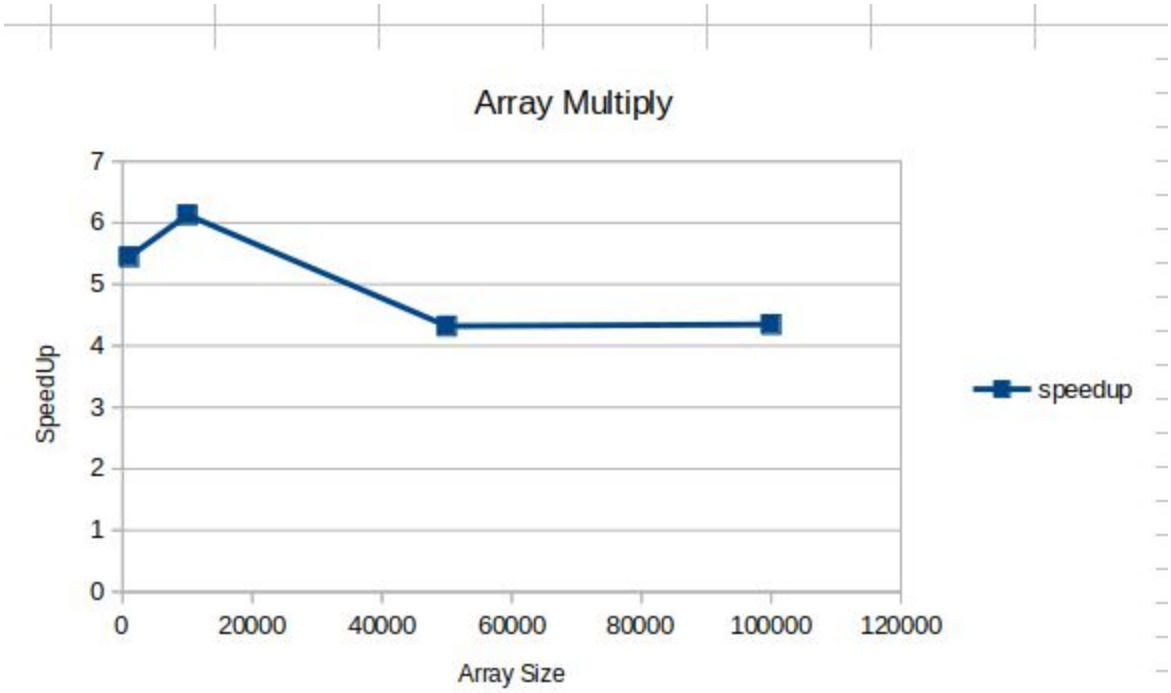
Student Name: Ping-Jui Liao
Student Email: liaop@oregonstate.edu
Project Number: 4
Project Name: Vectorized Array Multiplication and Reduction using SSE

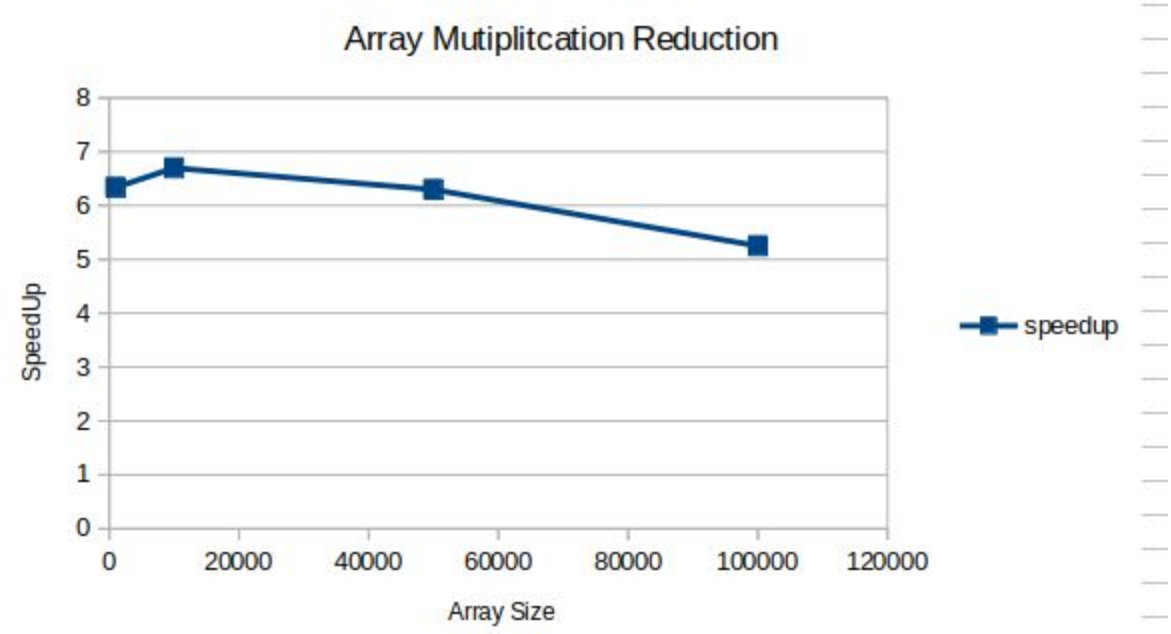
1. What machine you ran this on

   OSU flip, I got segmentation fault all the time in my Ubuntu 18.04

2. Show the table and graph

##########					
ARRAY SIZE = 1000					
##########					
1694.94	5.445940301	1000	5.445940301		
311.23					
1669.89	6.337463709			1000	6.337463709
263.495					
##########					
ARRAY SIZE = 10000					
##########					
1646.72	6.127923073	10000	6.127923073		
268.724					
1710.19	6.697225072			10000	6.697225072
255.358					
##########					
ARRAY SIZE = 50000					
##########					
1310	4.320566225	50000	4.320566225		
303.201					
1673.02	6.296176426			50000	6.296176426
265.72					
##########					
ARRAY SIZE = 100000					
##########					
1317.99	4.347620995	100000	4.347620995		
303.152					
1394.2	5.251580145			100000	5.251580145
265.482					


Array Multiply
SpeedUp
0
1
2
3
4
5
6
7
0
20000
40000
60000
80000
100000
120000
Array Size
speedup


Array Mutiplitcation Reduction
SpeedUp
0
1
2
3
4
5
6
7
8
0
20000
40000
60000
80000
100000
120000
Array Size
speedup

3. What patterns are you seeing in the speedups?

   The speedup reach a balance as even if the data grow larger

4. Are they consistent across a variety of array sizes?

   Not at all, you get an increase before 1000 to 10000 but get a decrease of growth after 20000

5. Why or why not, do you think?

   I think this is normal because the data goes beyond the size of the L2 cache and I believe the fetch of the memory still takes lots of time for simd to handle .

6. Knowing that SSE SIMD is 4-floats-at-a-time, why could you get a speed-up of < 4.0 or > 4.0 in the array-mutiplication?

   I get a speedup bigger than 4.0 in array multiplication because all the time, and I believe caches hit maybe increase while grabing the data.

7. Knowing that SSE SIMD is 4-floats-at-a-time, why could you get a speed-up of < 4.0 or > 4.0 in the array-mutiplication-reduction?

   I get a speedup bigger than 4.0 in array multiplication because all the time, and I believe caches hit maybe increase while grabing the data.