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Project #4

Project Questions:

1. What machine did you run this on?

= I ran my program on my Windows machine on PuTTY utilizing the engineering server flip1.engr.oregonstate.edu. To run my program in the terminal, I inputted the following lines of code:

```
chmod u+x proj04.sh  
sh proj04.sh >& proj04.csv
```

2. Show the table of performances for each array size and the corresponding speedups?

Table of Performances for each Array Size:

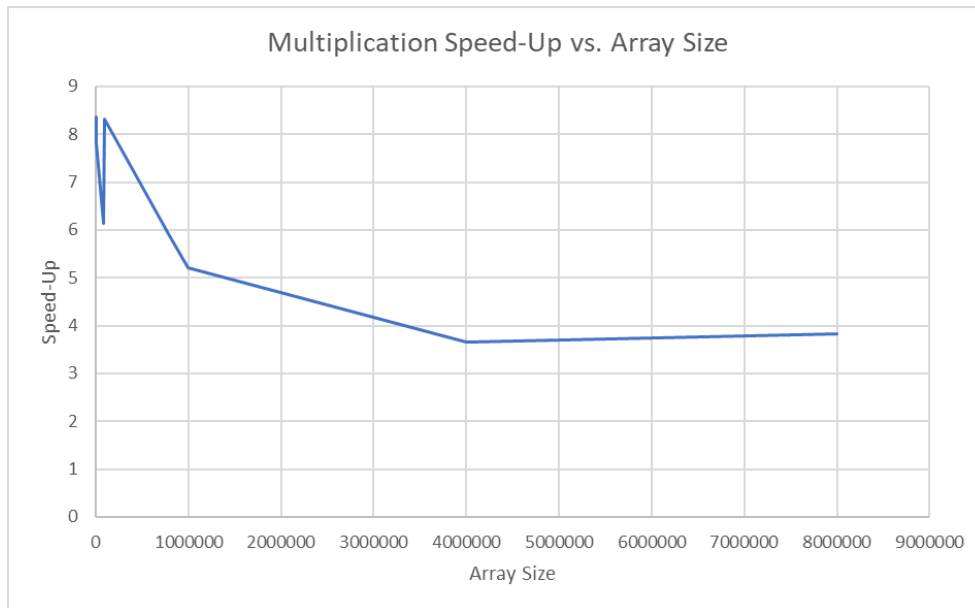
Array Size	Non-SIMD Multiplication Performance	SIMD Multiplication Performance	Non-SIMD Multiplication Sum Performance	SIMD Multiplication Sum Performance
1000	221.57	1821.44	233.65	1880.46
8000	221.47	1854.08	225.79	1842.15
10000	167.99	1314.33	173.86	1389.87
80000	221.21	1358.47	225.49	1804.15
100000	166.89	1387.51	225.6	1795.61
800000	227.89	1342.23	233.12	1765.14
1000000	216.58	1129.31	231.24	1732.59
4000000	219.65	801.74	218.03	1152.86
8000000	212.71	814.66	217.71	1164.92

Table of Speed-Ups for each Array Size:

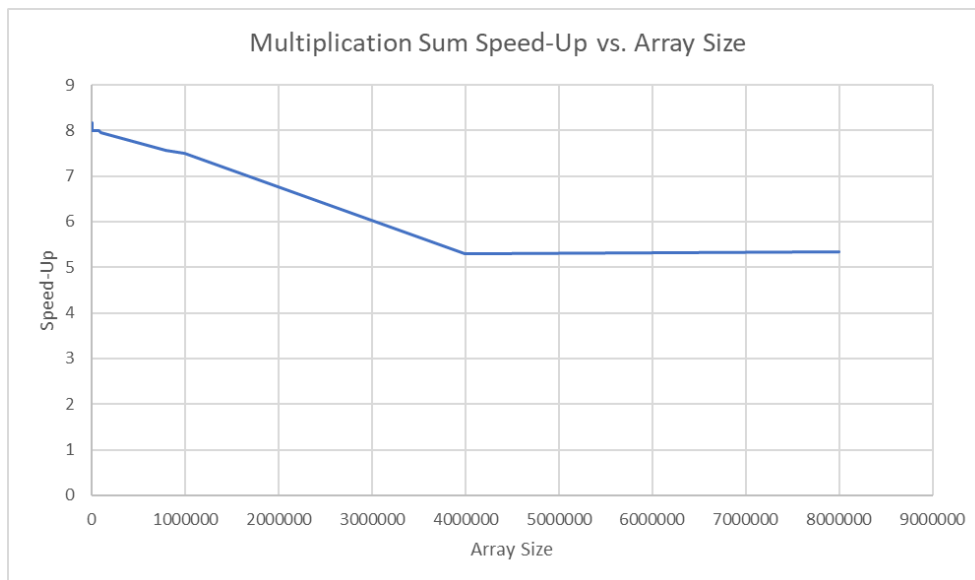
Array Size	Multiplication Speed-Up	Multiplication Sum Speed-Up
1000	8.22	8.05
8000	8.37	8.16
10000	7.82	7.99
80000	6.14	8
100000	8.31	7.96
800000	5.89	7.57
1000000	5.21	7.49
4000000	3.65	5.29
8000000	3.83	5.35

3. Show the graph of SIMD/non-SIMD speedup versus array size (one curve only)?

Graph of Multiplication Speed-Up vs. Array Size:



Graph of Multiplication Sum Speed-Up vs. Array Size:



4. What patterns are you seeing in the speedups?

= In the graph representing 'Multiplication Sum Speed-Up vs. Array Size', the speed-up appears to consistently decrease as the array size increases. As the array size increases from 1000 to 4000000 the speed-up steadily decreases, upon reaching the array size of

4000000 the speed-up appears to plateau rather than decreasing. In the graph representing 'Multiplication Speed-Up vs. Array Size', the speed-up initially drastically decreases and then jumps back to its original starting speed-up, and steadily decreases from then onwards. As the array size increases from 1000 to 80000, the speed-up rapidly decreases. After, it jumps from a speed-up of 6.14 to a speed-up of 8.31 as the array size increases from 80000 to 100000. As the array size increases from 100000 onwards, the speed-up steadily decreases throughout the rest of the graph. Overall, the pattern that I am seeing in the speed-ups within both graphs, is that as the array size increases the speed-up decreases.

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

= The patterns that I am seeing in the speed-ups do not appear to be consistent across a variety of array sizes. Although one can reasonably analyze that as the array size increases the speed-up decreases, this correlation has not been consistent throughout all array sizes present in both graphs. As shown in the 'Multiplication Speed-Up vs. Array Size', the speed-up initially rapidly decreases as array size increases, but then it jumps back to its original starting speed-up. Although one can make the claim that the speed-up recorded for the array size of 100000 was simply an outlier, this inconsistency weakens the overall correlation that we analyzed. In both graphs, once arriving at a certain array size, the speed-up appears to follow a consistent pattern, but when the array size is smaller the speed-up is much harder to predict.

6. Why or why not, do you think?

= There are many factors that contribute to why the speed-up is what it is, but the factor that appears more prevalent within the graphs is the decrease in speed-up when the array size is significantly large. A massive array size alludes to a massive dataset, running a program on this extremely large dataset results in the greater time since the running program will be significantly slower. This increase in time as the array size gets larger, results in the overall speed-up being smaller.