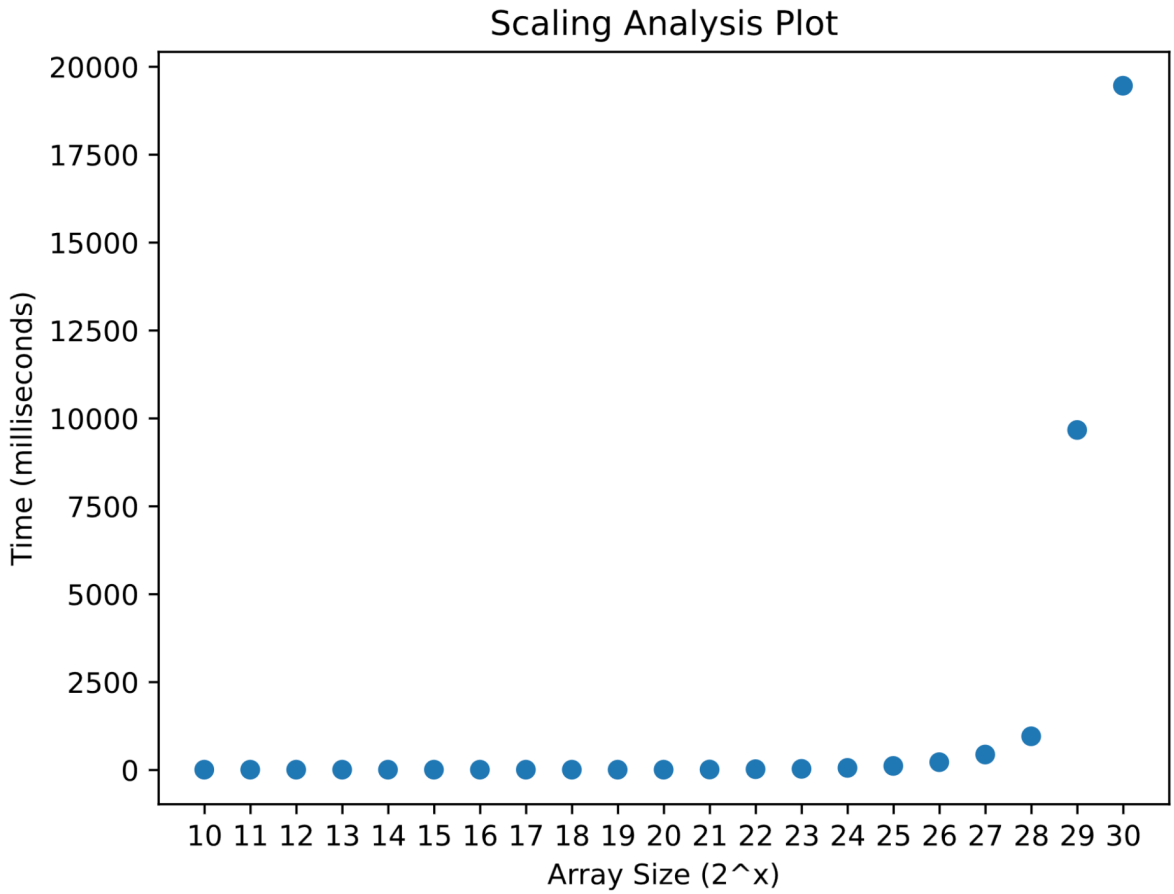
assignment2

GitHub link: https://github.com/LiqunXu/repo759.git

1

Me 50%, ChatGPT 30%, Online resources 20%

c)



2

Me 60%, ChatGPT 40%

3

Me 60%, ChatGPT 20%, Online resources 20%

The output of task3 is:

1024
2836.84
251.024
732.624
251.024
10296
251.024
2848.4
251.024

Among `mmul1`, `mmul2`, `mmul3`, we can tell from the output that `mmul2` speed is about 4 times and 14 times faster than `mmul1` and `mmul3`. This is due to the better locality which allows the caches to give a better performance. `mmul3` performed the worst of the three due to accessing elements in a column-wise manner, leading to cache thrashing and more cache misses.

Regarding the comparison between `mmul1` and `mmul4`, the primary difference lies in the data structure: `mmul1` uses raw arrays while `mmul4` uses `std::vector<double>`. Depending on how the vector is implemented and optimized by the compiler, `mmul4` might exhibit slightly different performance characteristics, although both should have similar computational patterns. In practice, the performance difference is minimal, but vectors can introduce additional overhead in bounds checking and abstraction, which can slightly impact speed compared to raw arrays.