2022 NYCU OS HW2 report
109550164 徐聖哲

Question	Answer
Q1. (5pts) Briefly describe your design for the add, multiple function of matrix, the thread management. Also, describe the number of threads in the Multi-thread program.	I use thread to separate the calculation of matrix. Separate matrix by row, and first add and multiply first 500/thread_number row first , then add the thread result together. For example, thread number = 4, I first compute the result of 125 row, then continue. This way I can speedup the time. The reason why I choose thread number as 4 is the workshop highest thread numbers are 4, so I think only 4 can reach the highest performance.
| Q2. (15pts)<br>Try at least 3 kinds of number of threads, and compare the difference in time.(Take screenshots of the time of each case)<br>Also, explain the results. | Threads: 2<br>```
bash-4.4$ time ./multi_thread < input.txt
2248968
2528950360

real    0m0.334s
user    0m0.579s
sys     0m0.006s
```<br>Threads: 4<br>```
bash-4.4$ time ./multi_thread < input.txt
2248968
2528950360

real    0m0.202s
user    0m0.580s
sys     0m0.006s
```<br>Threads: 10<br>```
bash-4.4$ time ./multi_thread < input.txt
2248968
2528950360

real    0m0.220s
user    0m0.602s
sys     0m0.005s
```<br><br>explain: First, Since the workshop max thread number is 4, so the time of thread equal or more than 2 will be similiar. Look at the result, we can find that 2 is not as fast as 4 , because more threads will speed the computation step. |

Q3. (10pts) Show the best speedup between multi-thread and single-thread. (Take screenshots of the time of single-thread and multi-thread) Also, explain why multi-thread is faster.	single-thread:

single-thread:

```
bash-4.4$ time ./single_thread < input.txt
2248968
2528950360

real    0m0.710s
user    0m0.588s
sys     0m0.008s
```

multi-thread: 4

```
bash-4.4$ time ./multi_thread < input.txt
2248968
2528950360

real    0m0.202s
user    0m0.580s
sys     0m0.006s
```

explain: Because multi threads can handle jobs at the same time, thus decrease code running time.