HW2 Report (Multi-threaded and kernel module programming)

資訊系113 F74096247 陳映伃

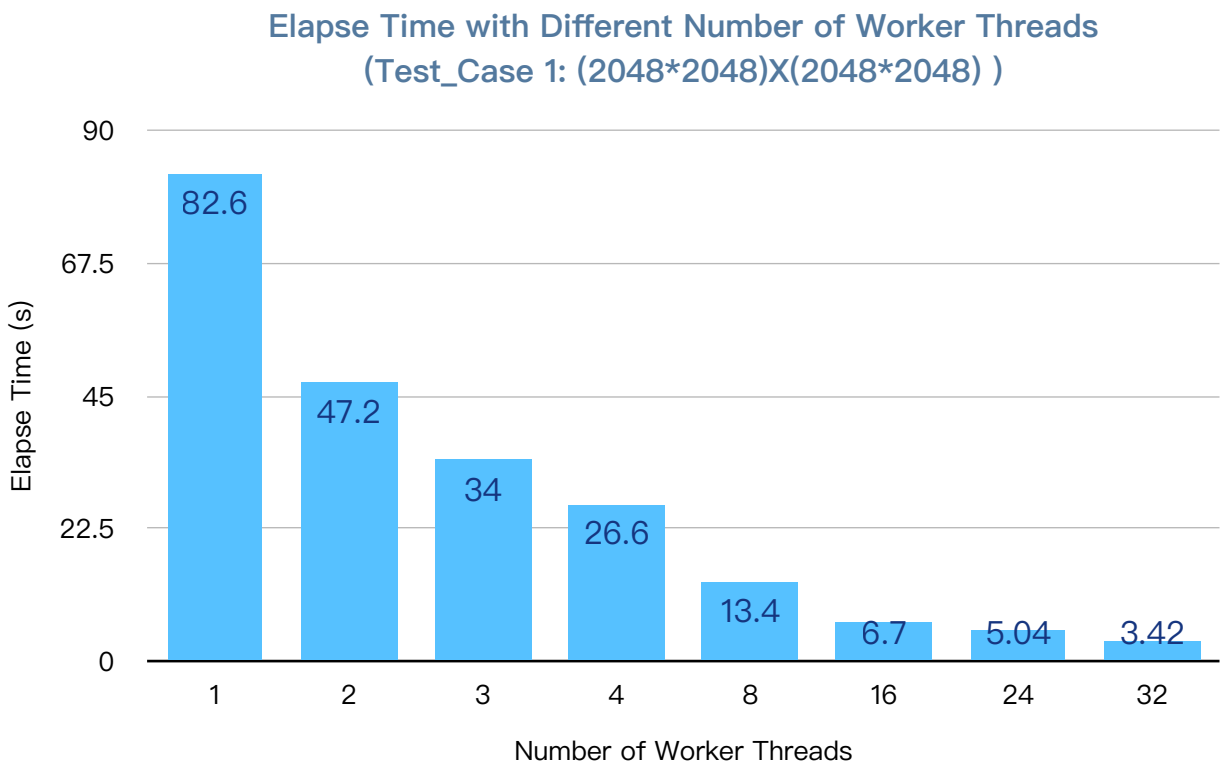
- **Explain my dispatch**

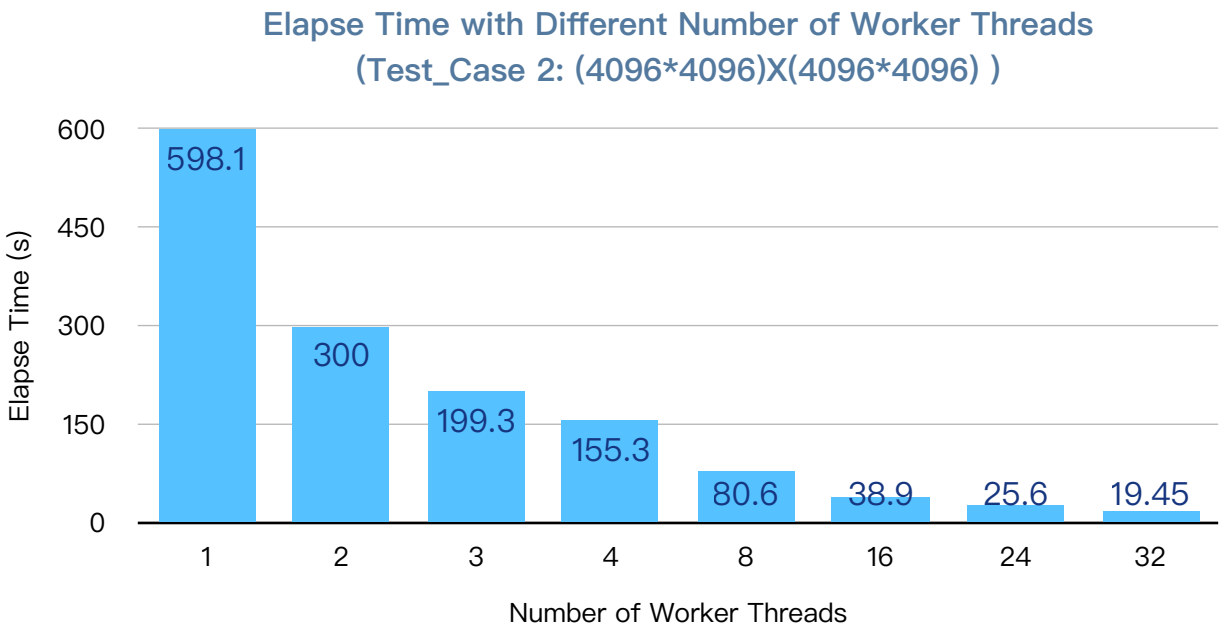
I use “row dispatch” to deal with my multiplication.
That is to say, I separated the row of the first matrix evenly to my threads.

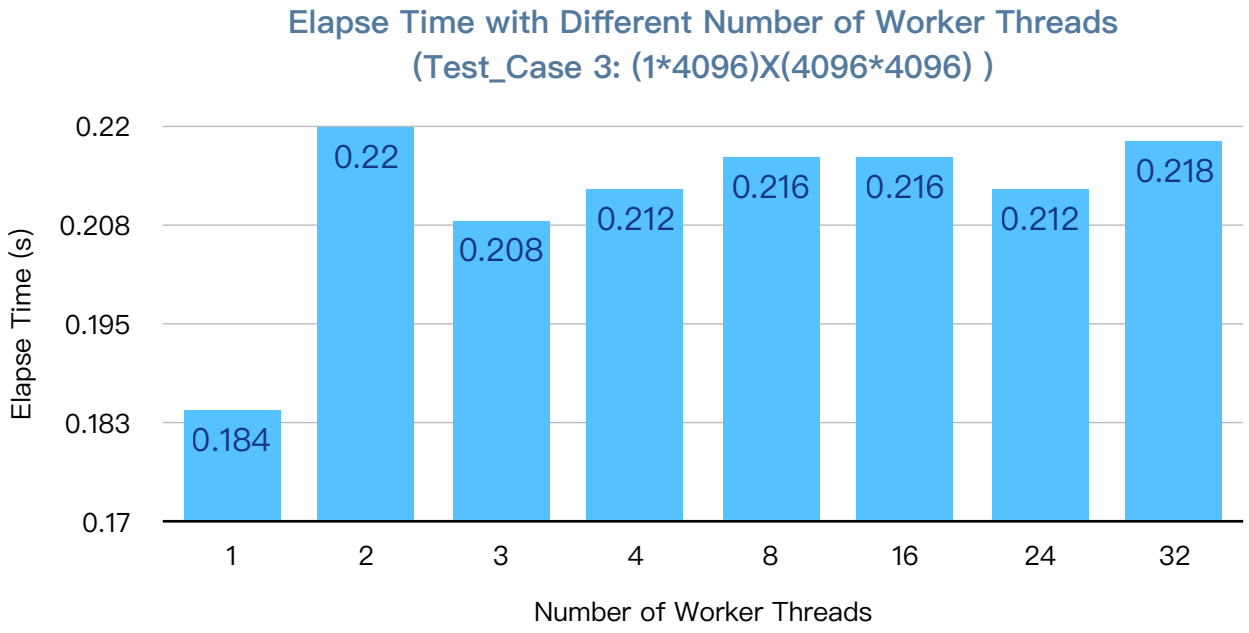
For example:
If thread_num = 4, with matrix m1 having 4096 row…
thread[0] will deal with the multiplication from row0 to row1023
thread[1] will deal with the multiplication from row1024 to row2047
… and so on

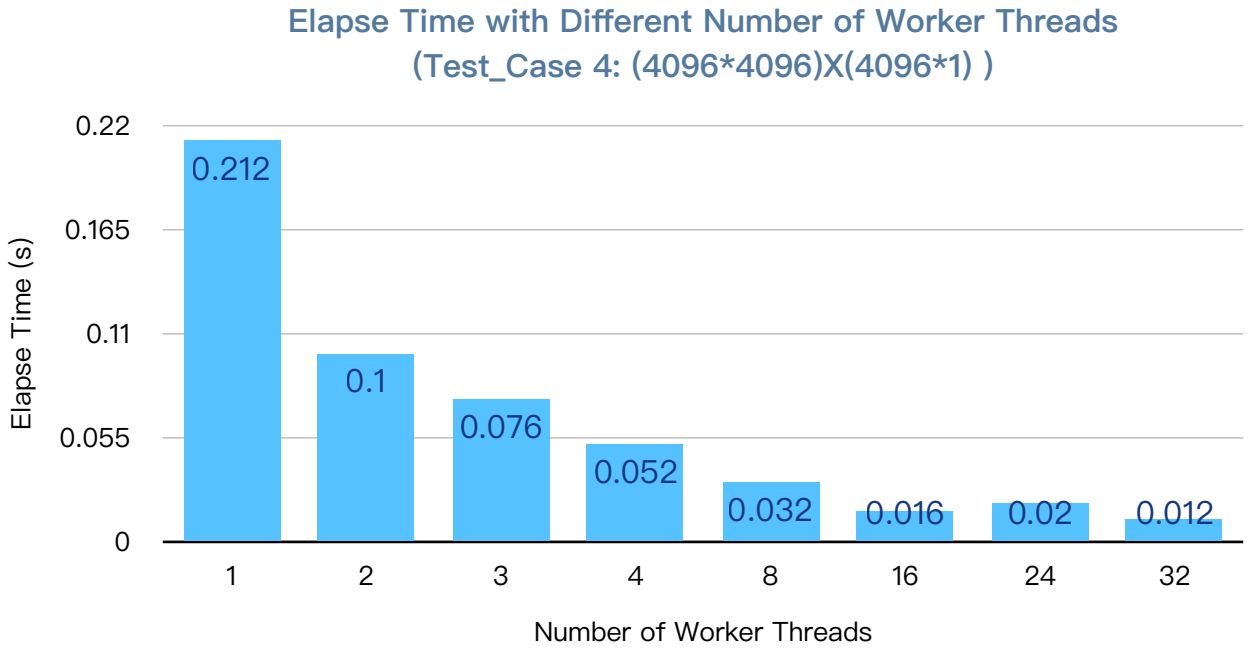
The merit of row dispatch: easy to perform and understand.
But there’s an obvious drawback…we can see it on the graph of test_case_3.
That is, no matter how many threads we have on the process, the runtime doesn't really vary.

- **Plot the matrix multiplication for the 4 test cases**




Elapse Time with Different Number of Worker Threads
(Test_Case 2: (4096*4096)X(4096*4096))
Elapse Time (s)
600
450
300
150
0
598.1
300
199.3
155.3
80.6
38.9
25.6
19.45
1
2
3
4
8
16
24
32
Number of Worker Threads


Elapse Time with Different Number of Worker Threads
(Test_Case 3: (1*4096)X(4096*4096))
Elapse Time (s)
0.22
0.208
0.195
0.183
0.17
0.184
0.22
0.208
0.212
0.216
0.216
0.212
0.218
1
2
3
4
8
16
24
32
Number of Worker Threads


Elapse Time with Different Number of Worker Threads
(Test_Case 4: (4096*4096)X(4096*1))
Elapse Time (s)
0.22
0.165
0.11
0.055
0
0.212
0.1
0.076
0.052
0.032
0.016
0.02
0.012
1
2
3
4
8
16
24
32
Number of Worker Threads

- **Discussion and Summary**

Number of cores: 4

Q1: What happen if the number of threads is less than the number of cores. Why ?

“Ideally”, we have one thread executing per core; that is to say the content switch count should be zero when the number of threads is less than the number of cores.

But in reality, we can still observe that the content switch happened while executing, because we won’t ever get a situation where a thread runs without having time “stolen” from it.

Still, execution with threads less than the number of cores should obtain less context switch count than the one with threads greater than the number of cores.

Q2: What happen if the number of threads is greater than the number of cores. Why ?

The process and its threads will constantly be switched out for other processes and threads.

In other words, the total context switch count of more threads (greater than 4) should be larger than that of less threads (less than 4).