HW4 Matrix Multiplication

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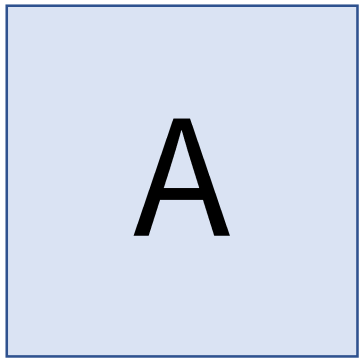
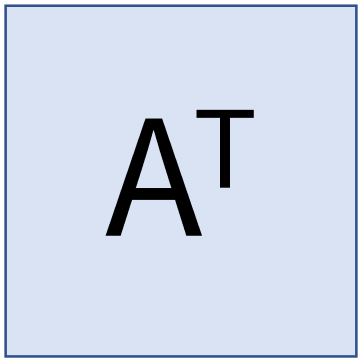
Environment

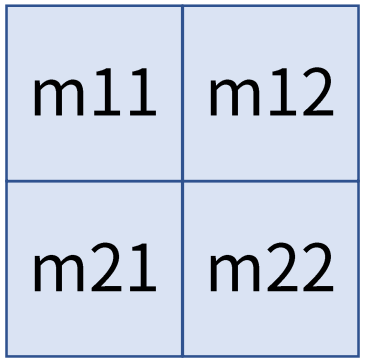
- Language：
  - Rust (crossbeam)：Windows 10 + Cygwin
  - C++ (openmp)：Windows 10 + Cygwin
  - Java (Thread)：Mac
  - Matlab： Windows 10 + matlab r2015a

Special Structure (Rust)

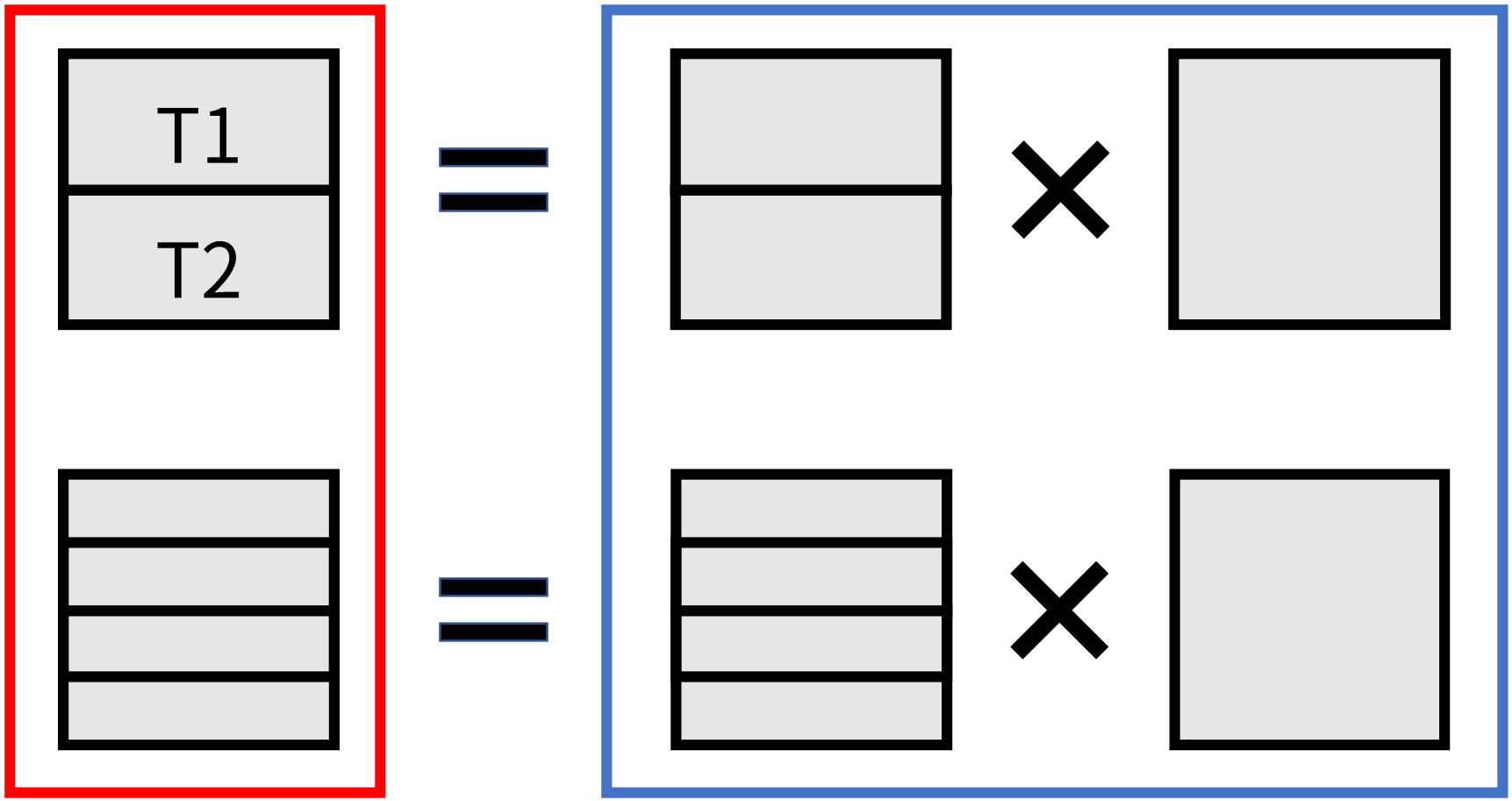
```
M {
    matrix: two-dimensional vector
    matrix_tr: transpose matrix
    m11,m12,m21,m22: submatrix
}
```







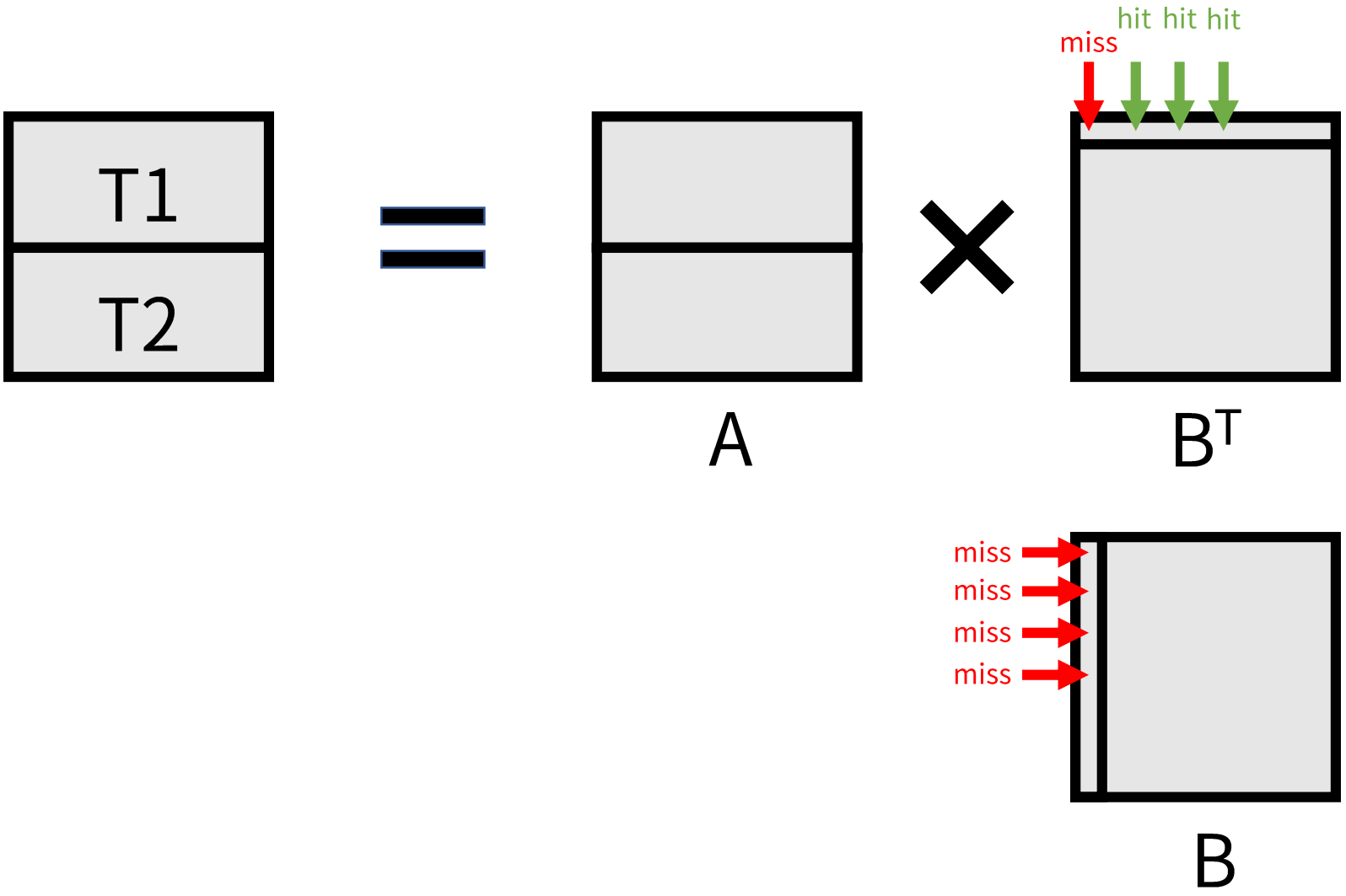
Concurrency



Concurrency (cont'd)

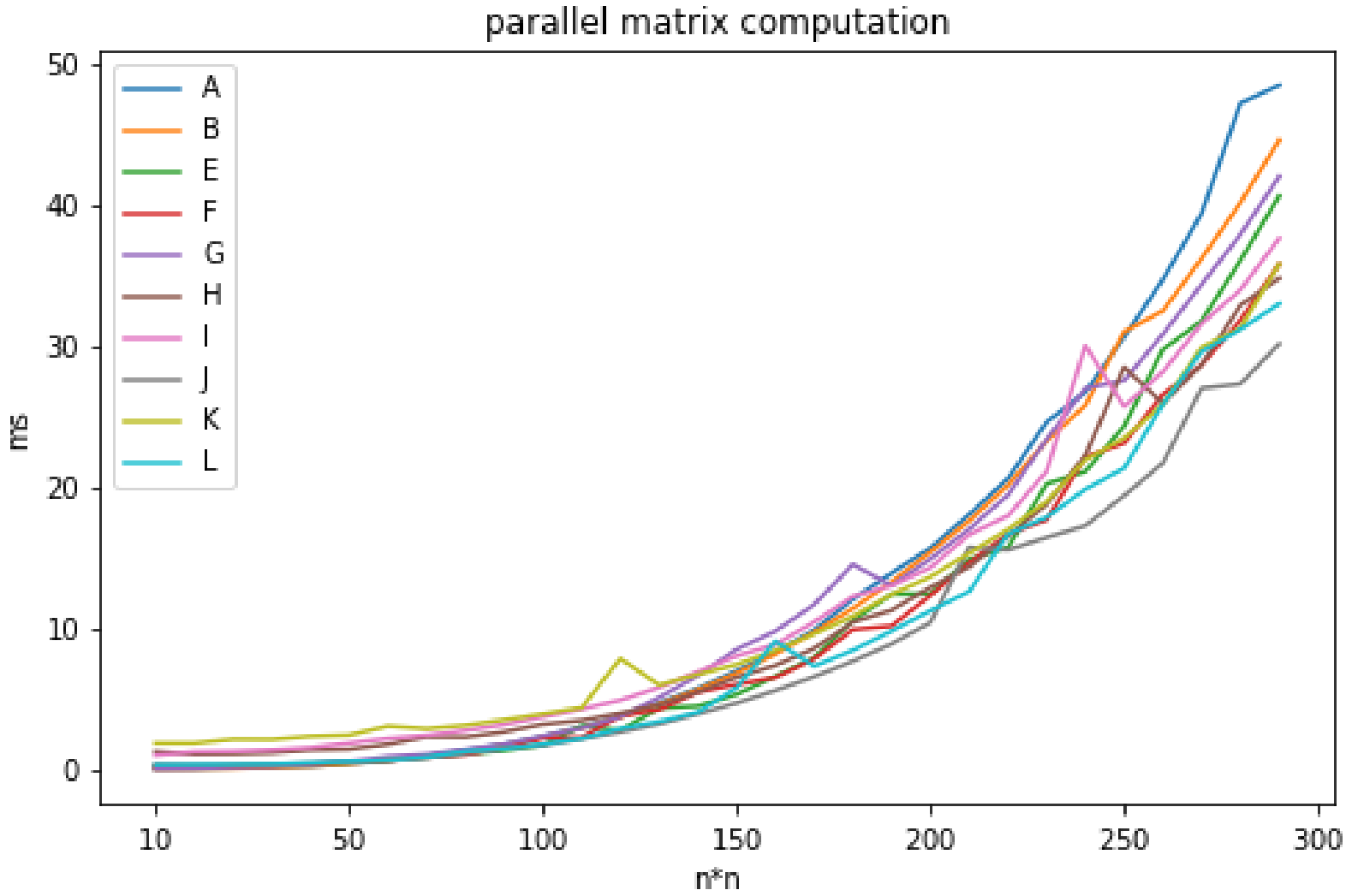
- Strassen algorithm
  - Call triple nested for loop, 4 threads

Cache miss

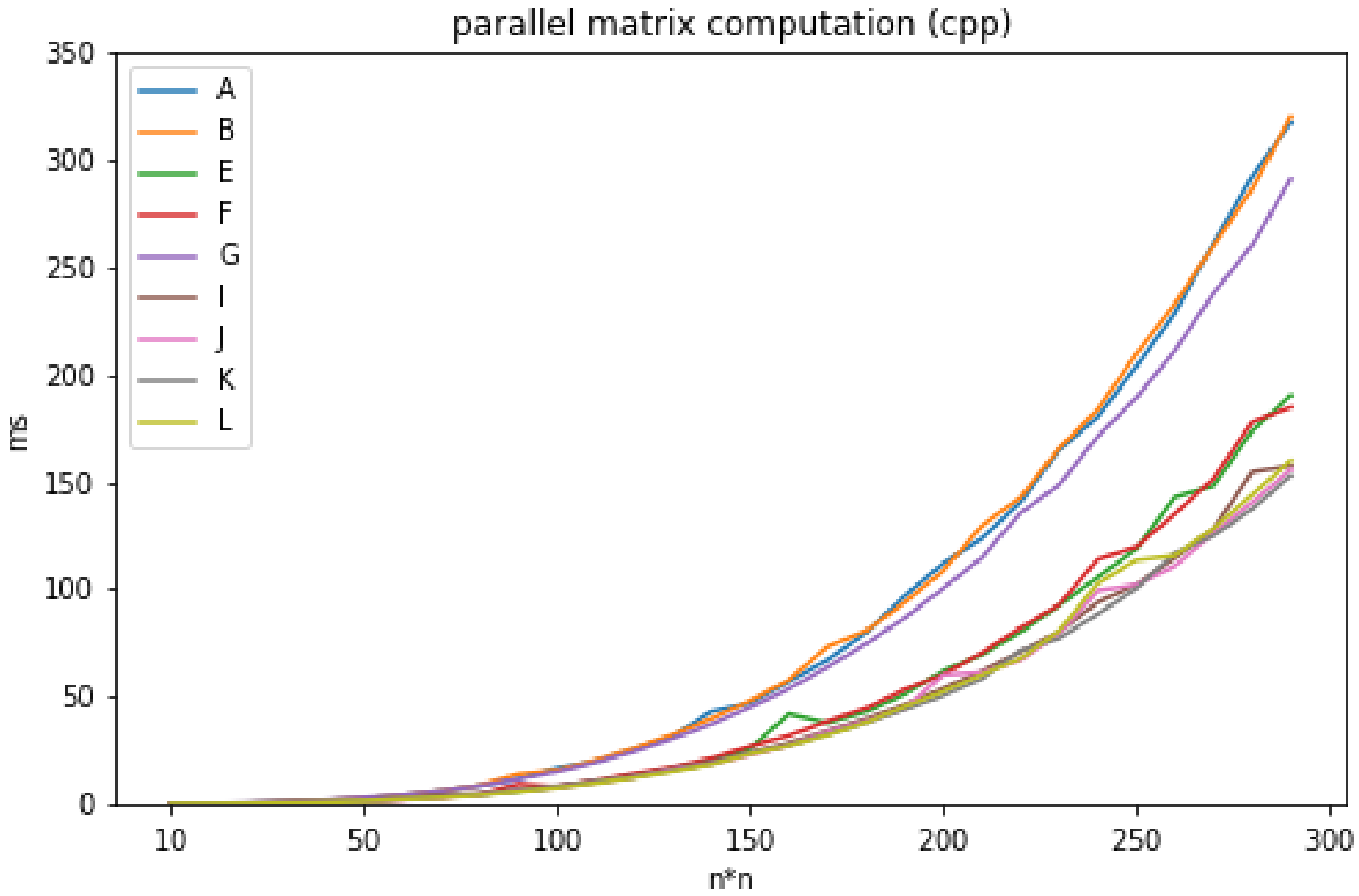


Analysis (Rust)

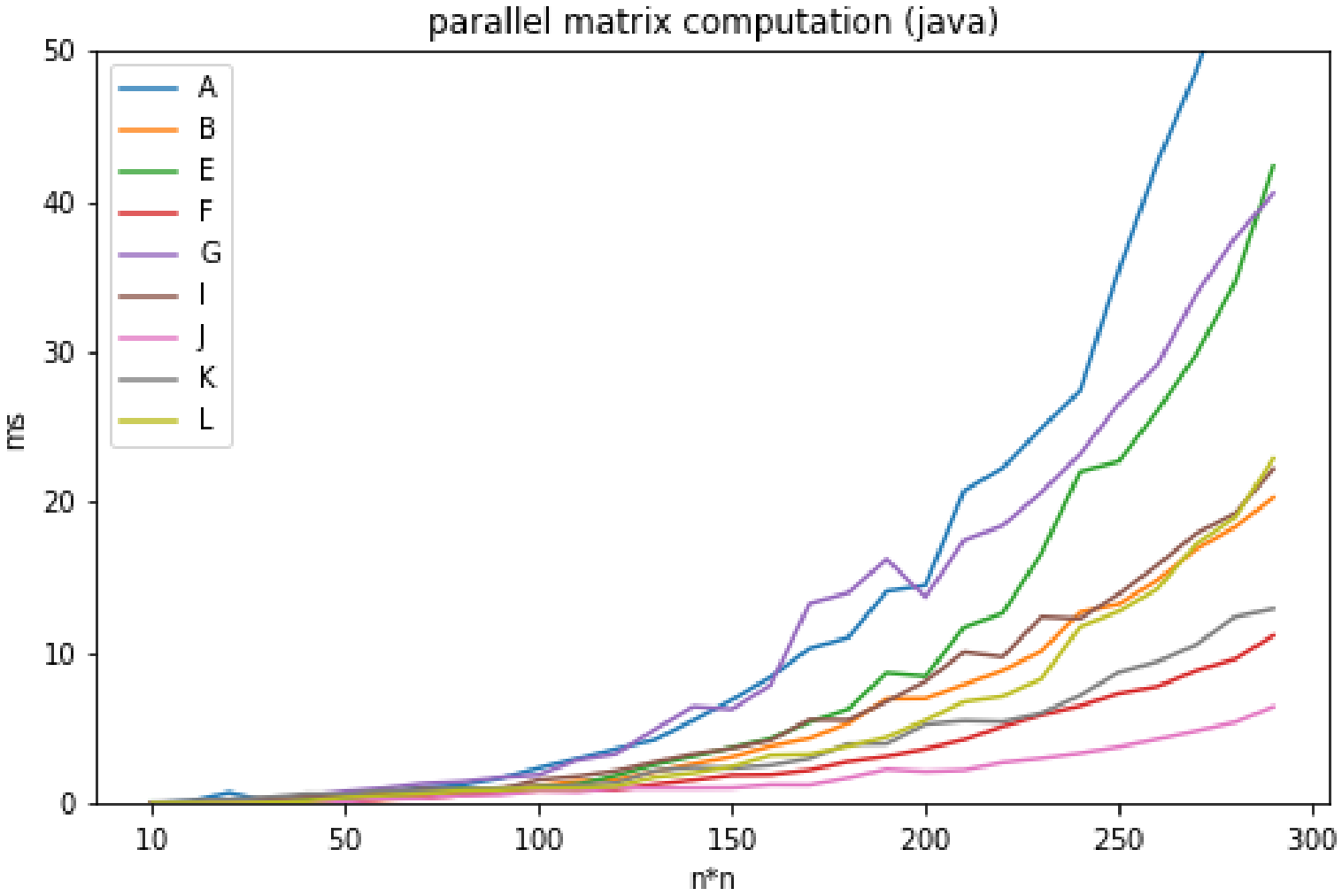
methods



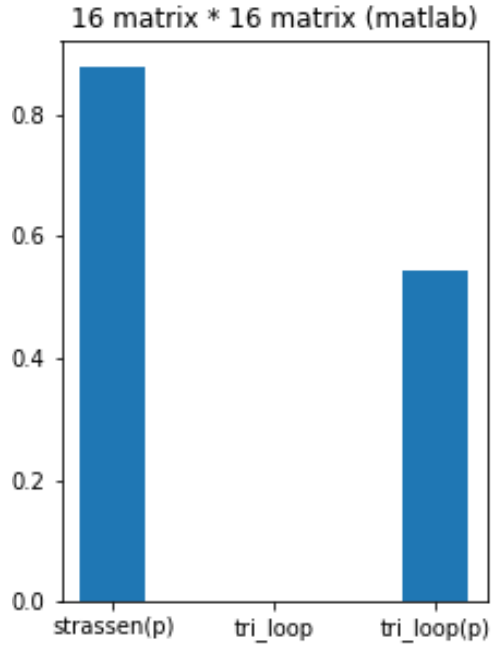
Analysis (C++)

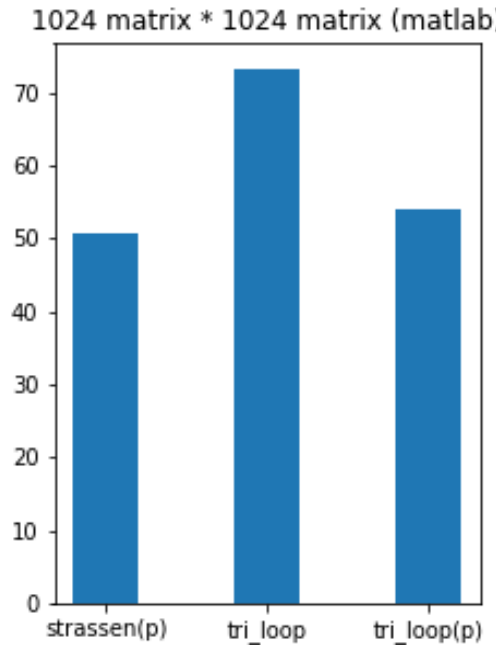

parallel matrix computation (cpp)
ms
n*n
A
B
E
F
G
I
J
K
L
0
50
100
150
200
250
300
350
10
50
100
150
200
250
300

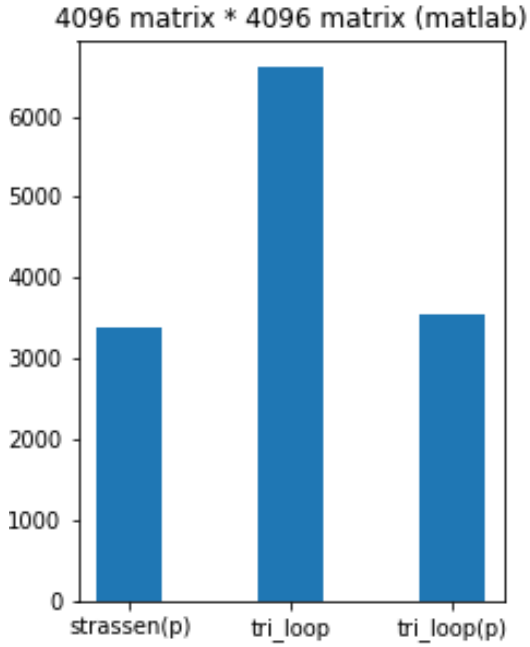
Analysis (Java)



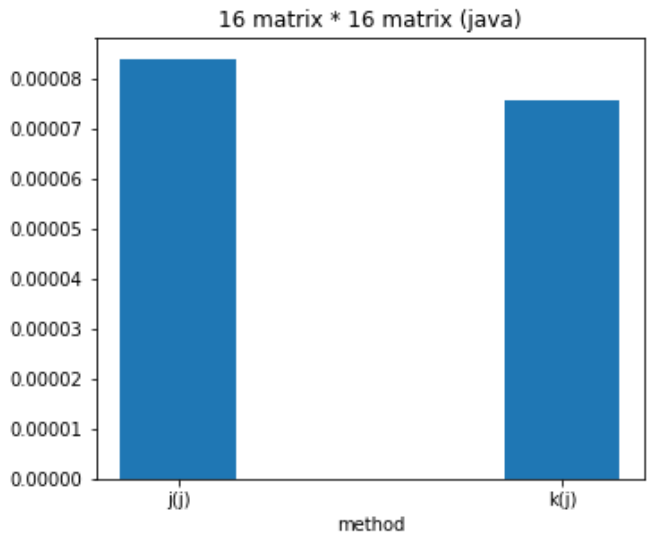
Analysis (Matlab)

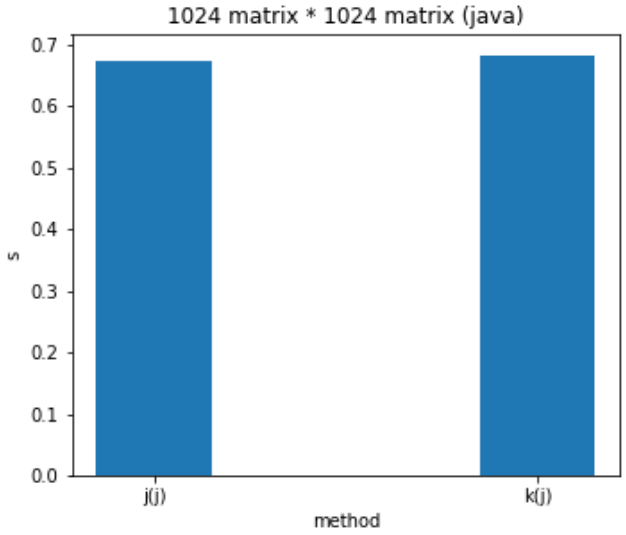




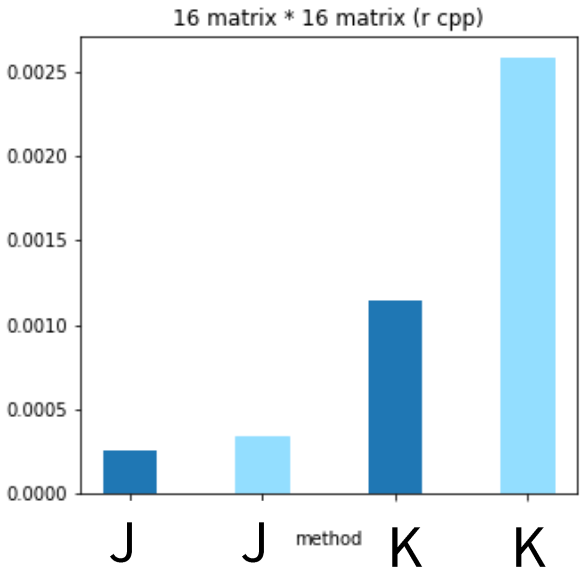


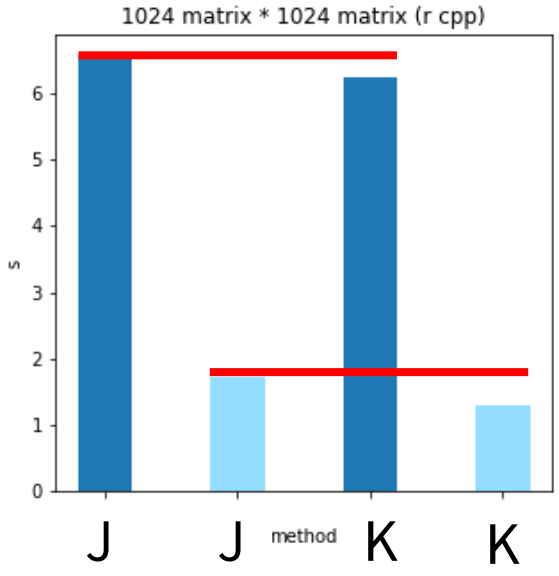
Analysis (Java)

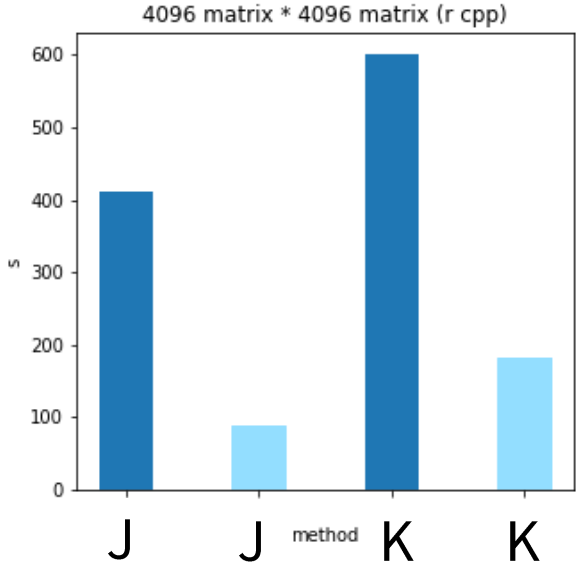




Rust C++ 







J：Triple nested for loop, 4 threads, transpose

K：Strassen algorithm, 4 threads

Issue

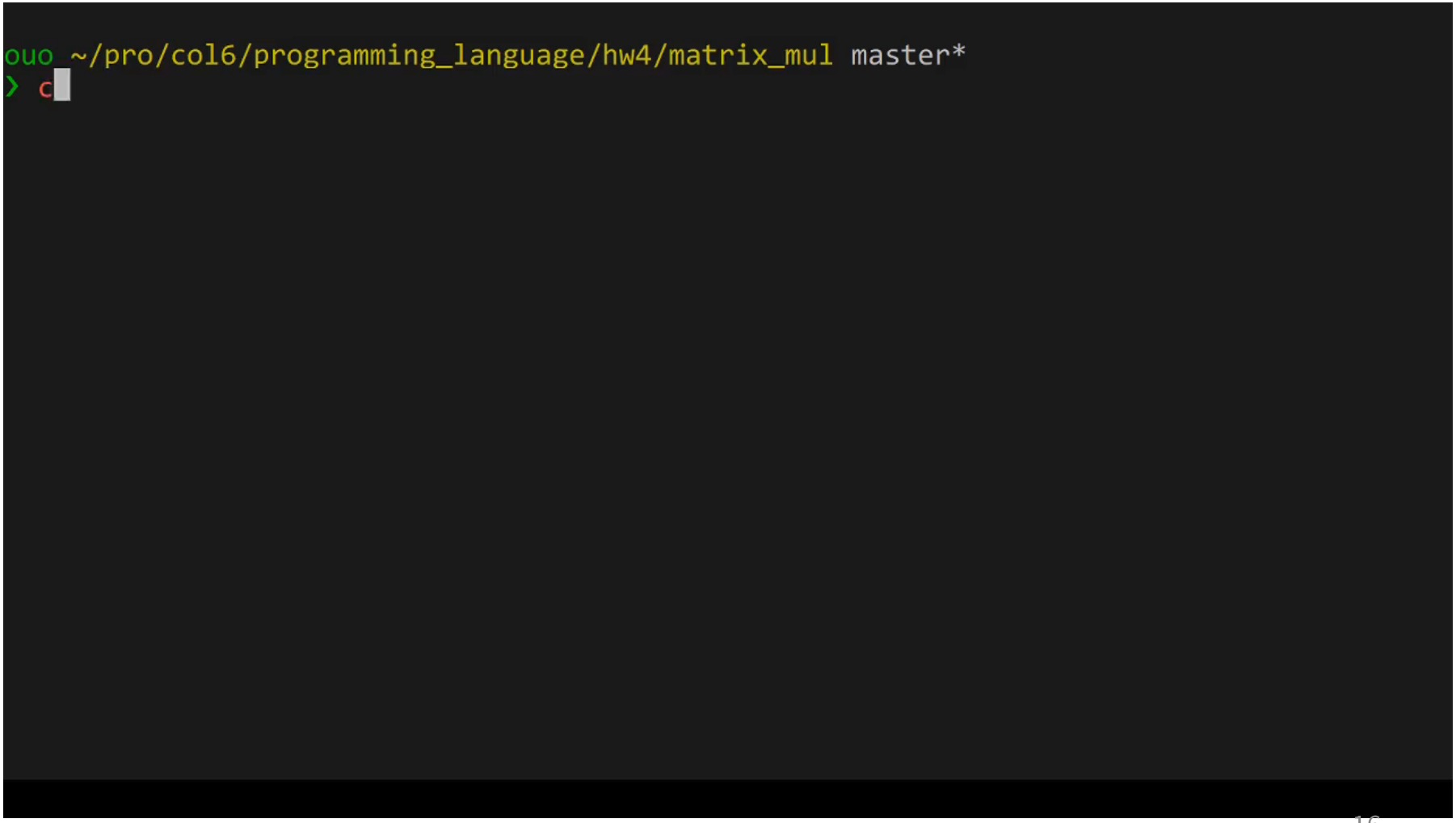
- Environment、machine(CPU)
- Structure：Vector、Array…
- Compiler optimization option
- Recursive

Demo

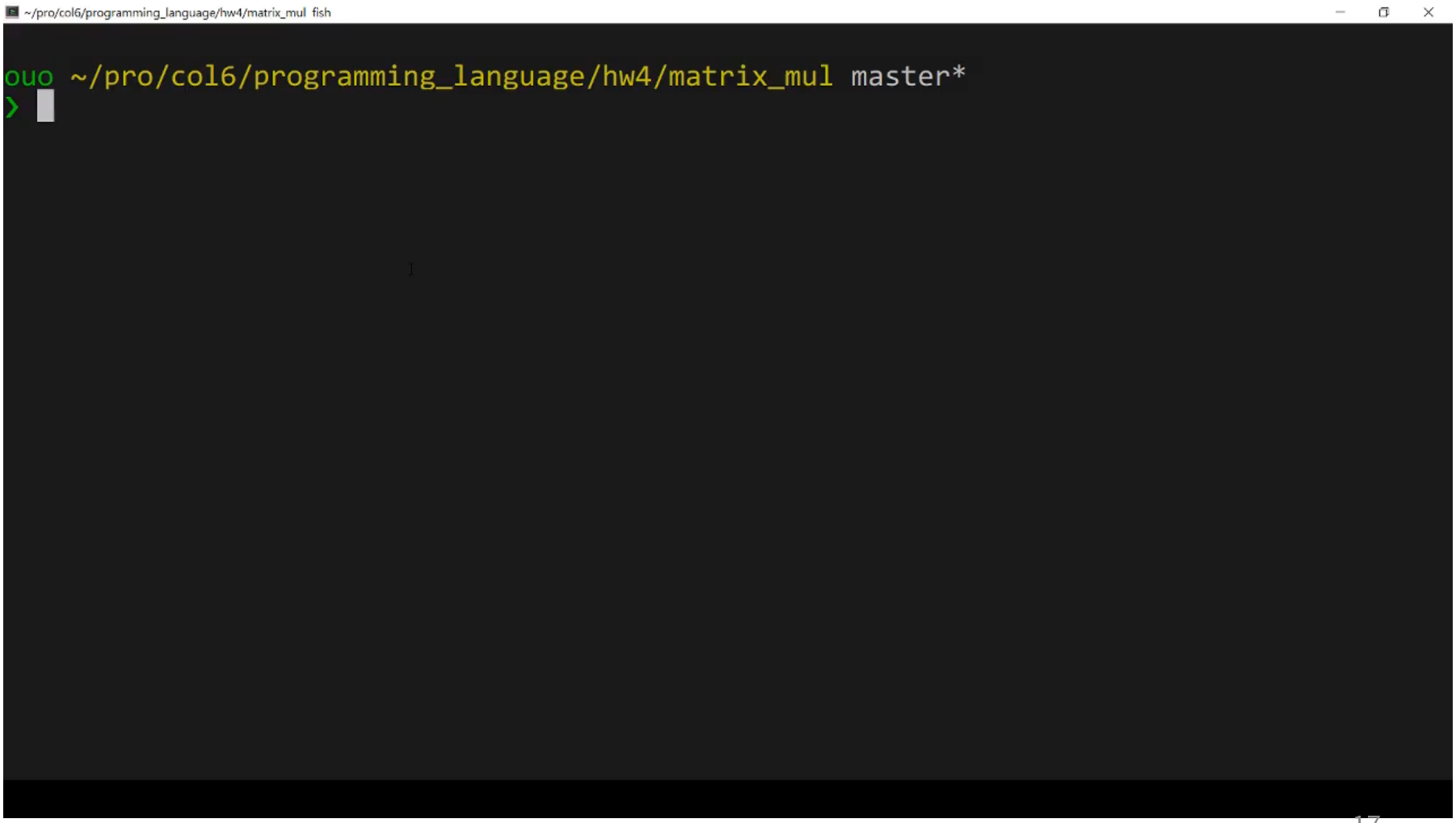
Rust

Triple nested for loop, 4 threads, transpose

test1, test2



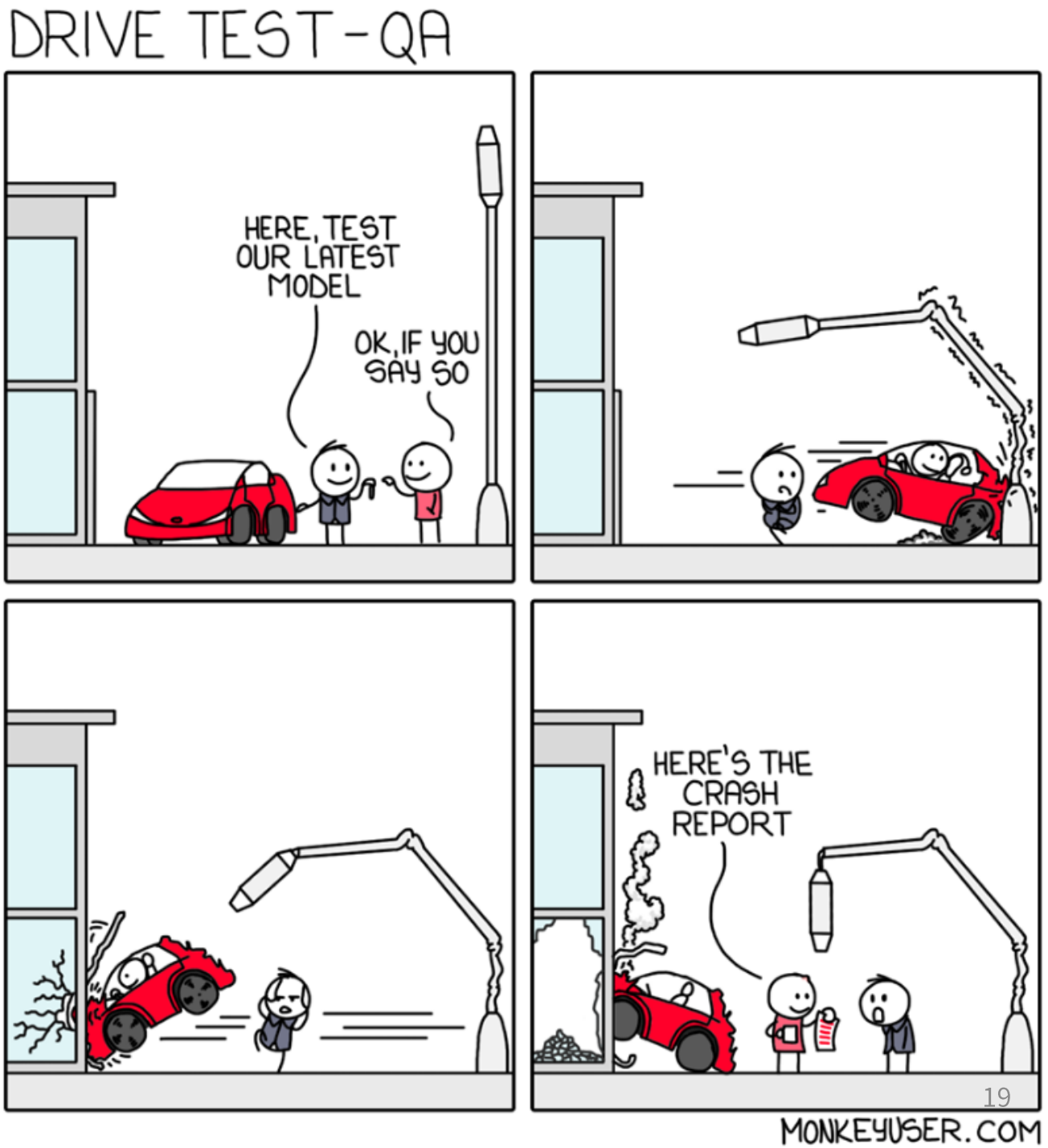
test3


~/pro/col6/programming_language/hw4/matrix_mul fish
ouo ~/pro/col6/programming_language/hw4/matrix_mul master*
❯

分工

- 何中淼：Java 版本
- 鍾日超：Matlab 版本、畫圖分析 (Python)
- 洪瑞隆：C++ 版本
- 黃柏瑄：Rust 版本、投影片

Q&A


DRIVE TEST - QA
HERE, TEST OUR LATEST MODEL
OK, IF YOU SAY SO
HERE'S THE CRASH REPORT
MONKEYUSER.COM