lab2-Linux环境下C语言编程与矩阵乘法

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实验环境:

- **OS版本**: Ubuntu 22.04.2 LTS
- **gcc版本**: 11.4.0
- **CPU**:
    1. 型号: AMD Ryzen 5 4600H with Radeon Graphics
    2. 频率: 均为 2994.389 MHz
    3. 核数: 12
- **内存**: 7.5 Gi

运行结果:

1. naive:

运行结果截图如下:

```
hoshino_july@LAPTOP-S40B7Q22:~/hpc_practice/lab2-naive-gemm$ ls
dgemm_naive.c                       link         test_cblas_dgemm.c  time_dgemm    time_dgemm_naive    while.c
lab2-Linux环境下C语言编程与矩阵乘法.pdf  row_major.c  timeDGEMM.txt       time_dgemm.c  time_dgemm_naive.c
hoshino_july@LAPTOP-S40B7Q22:~/hpc_practice/lab2-naive-gemm$ ./time_dgemm_naive 16 16 16
test!
m=16,n=16,k=16,alpha=1.200000,beta=0.001000,sizeofc=256
hoshino_july@LAPTOP-S40B7Q22:~/hpc_practice/lab2-naive-gemm$ ./time_dgemm_naive 64 64 64
test!
m=64,n=64,k=64,alpha=1.200000,beta=0.001000,sizeofc=4096
hoshino_july@LAPTOP-S40B7Q22:~/hpc_practice/lab2-naive-gemm$ ./time_dgemm_naive 256 256 256
test!
m=256,n=256,k=256,alpha=1.200000,beta=0.001000,sizeofc=65536
hoshino_july@LAPTOP-S40B7Q22:~/hpc_practice/lab2-naive-gemm$ ./time_dgemm_naive 1024 1024 1024
test!
m=1024,n=1024,k=1024,alpha=1.200000,beta=0.001000,sizeofc=1048576
hoshino_july@LAPTOP-S40B7Q22:~/hpc_practice/lab2-naive-gemm$ ./time_dgemm_naive 2048 2048 2048
test!
m=2048,n=2048,k=2048,alpha=1.200000,beta=0.001000,sizeofc=4194304
hoshino_july@LAPTOP-S40B7Q22:~/hpc_practice/lab2-naive-gemm$
```

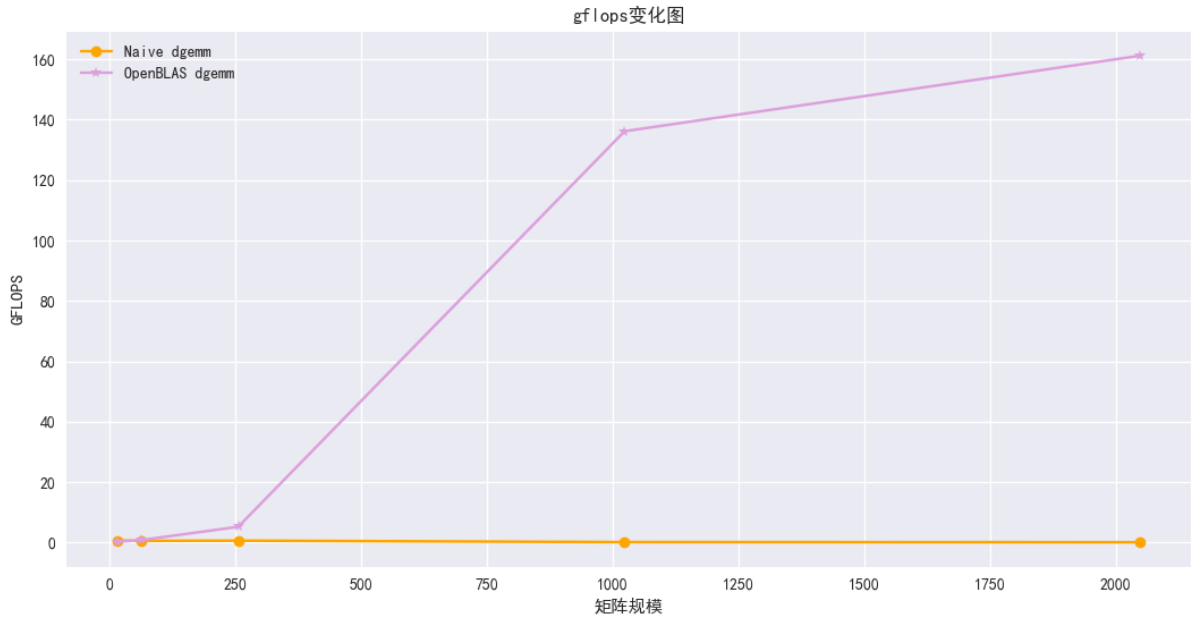
2. openblas:

运行结果截图如下:

```
hoshino_july@LAPTOP-S40B7Q22:~/hpc_practice/lab2-naive-gemm$ ls
dgemm_naive.c  lab2-Linux环境下C语言编程与矩阵乘法.pdf  link  row_major.c  test_cblas_dgemm.c  time_dgemm.c  while.c
hoshino_july@LAPTOP-S40B7Q22:~/hpc_practice/lab2-naive-gemm$ gcc -o time_dgemm time_dgemm.c -lopenblas
hoshino_july@LAPTOP-S40B7Q22:~/hpc_practice/lab2-naive-gemm$ ls
dgemm_naive.c                       link         test_cblas_dgemm.c  time_dgemm.c
lab2-Linux环境下C语言编程与矩阵乘法.pdf  row_major.c  time_dgemm          while.c
hoshino_july@LAPTOP-S40B7Q22:~/hpc_practice/lab2-naive-gemm$ ./time_dgemm 16 16 16
test!
m=16,n=16,k=16,alpha=1.200000,beta=0.001000,sizeofc=256
hoshino_july@LAPTOP-S40B7Q22:~/hpc_practice/lab2-naive-gemm$ ./time_dgemm 64 64 64
test!
m=64,n=64,k=64,alpha=1.200000,beta=0.001000,sizeofc=4096
hoshino_july@LAPTOP-S40B7Q22:~/hpc_practice/lab2-naive-gemm$ ./time_dgemm 256 256 256
test!
m=256,n=256,k=256,alpha=1.200000,beta=0.001000,sizeofc=65536
hoshino_july@LAPTOP-S40B7Q22:~/hpc_practice/lab2-naive-gemm$ ./time_dgemm 1024 1024 1024
test!
m=1024,n=1024,k=1024,alpha=1.200000,beta=0.001000,sizeofc=1048576
hoshino_july@LAPTOP-S40B7Q22:~/hpc_practice/lab2-naive-gemm$ ./time_dgemm 2048 2048 2048
test!
m=2048,n=2048,k=2048,alpha=1.200000,beta=0.001000,sizeofc=4194304
hoshino_july@LAPTOP-S40B7Q22:~/hpc_practice/lab2-naive-gemm$ ls
dgemm_naive.c                       link         test_cblas_dgemm.c  time_dgemm    while.c
lab2-Linux环境下C语言编程与矩阵乘法.pdf  row_major.c  timeDGEMM.txt       time_dgemm.c
hoshino_july@LAPTOP-S40B7Q22:~/hpc_practice/lab2-naive-gemm$ cat timeDGEMM.txt
16x16x16        0.000038 s      0.215579 GFLOPS
64x64x64        0.000650 s      0.806597 GFLOPS
256x256x256     0.006458 s      5.195793 GFLOPS
1024x1024x1024  0.015768 s      136.192520 GFLOPS
2048x2048x2048  0.106573 s      161.202830 GFLOPS
hoshino_july@LAPTOP-S40B7Q22:~/hpc_practice/lab2-naive-gemm$
```

gflops变化图

不同规模下naive和openblas的gflops变化图如下:



碰到的问题及解决方法:

在编译time_dgemm.c文件时,忘记链接openblas库,后在命令尾加上 `-lopenblas` 即解决问题.