

# 高性能计算实践—实验二

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## 实验环境：

- 1.OS:Linux Ubuntu 22.04
- 2.gcc: version 11.4.0 (Ubuntu 11.4.0-1ubuntu1~22.04)
- 3.CPU: 11th Gen Intel(R) Core(TM) i7-1165G7 @ 2.80GHz cpu cores : 1 (虚拟机)
- 4.内存 3911MB

## Naïve 版本和 OpenBlas 版本时间对比：

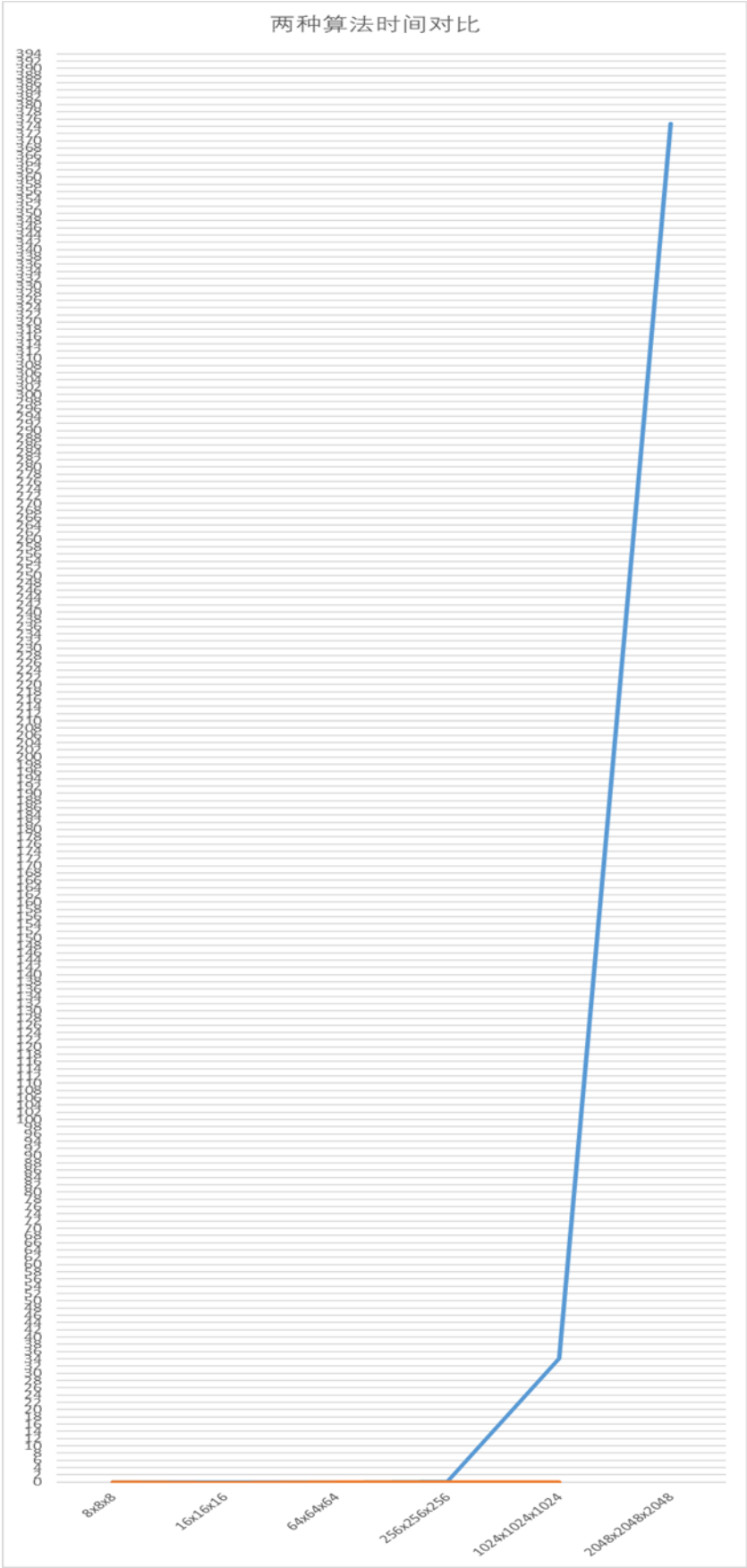
### Naive\_Degmm:

8x8x8	0.000006 s	1024.000000 GFLOPS
16x16x16	0.000068 s	8192.000000 GFLOPS
64x64x64	0.004285 s	524288.000000 GFLOPS
256x256x256	0.284712 s	33554432.000000 GFLOPS
1024x1024x1024	34.019774 s	2147483648.000000 GFLOPS
2048x2048x2048	374.871594 s	17179869184.000000 GFLOPS

### OpenBlas\_Degmm:

8x8x8	0.000389 s	0.002632 GFLOPS
16x16x16	0.000012 s	0.682667 GFLOPS
64x64x64	0.000134 s	3.912597 GFLOPS
256x256x256	0.004283 s	7.834329 GFLOPS
1024x1024x1024	0.043516 s	49.349289 GFLOPS
2048x2048x2048	0.220119 s	78.048098 GFLOPS

蓝色为 Naive\_Degmm, 橙色为 Naive\_Degmm;  
纵轴为时间, 单位为 s, 横轴为规模



朴素程序：

	matrix.c U	C degmn.c 2, U	time_DGEMM.txt U	time_Naive_Degmn.txt U X
time_Naive_Degmn.txt				
1	8x8x8	0.000006 s	1024.000000 GFLOPS	
2	16x16x16	0.000068 s	8192.000000 GFLOPS	
3	64x64x64	0.004285 s	524288.000000 GFLOPS	
4	256x256x256	0.284712 s	33554432.000000 GFLOPS	
5	1024x1024x1024	34.019774 s	2147483648.000000 GFLOPS	
6	2048x2048x2048	374.871594 s	17179869184.000000 GFLOPS	

OPenBlas 程序：

	matrix.c U	C degmn.c 2, U	time_DGEMM.txt U X	time_N
time_DGEMM.txt				
1	8x8x8	0.000389 s	0.002632 GFLOPS	
2	16x16x16	0.000012 s	0.682667 GFLOPS	
3	64x64x64	0.000134 s	3.912597 GFLOPS	
4	256x256x256	0.004283 s	7.834329 GFLOPS	
5	1024x1024x1024	0.043516 s	49.349289 GFLOPS	
6	2048x2048x2048	0.220119 s	78.048098 GFLOPS	

碰到的问题：在 main 函数里给三个矩阵分配空间过多导致栈溢出而运行不了，  
于是将其定义为全局变量