



Introduction to Linux Systems

Basics of Performance Analysis Part I

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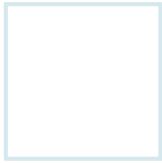
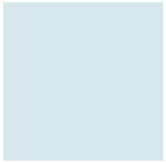


Lab

- Measuring software execution time with the time functions

$$f_n = f_{n-1} + f_{n-2}$$





Calculate Fibonacci Number in C (Ref.)

```
// **Configuration**
#define ROUNDS 1
#define D_GETTIME 0
// **Configuration**

#include <stdio.h>
#include <stdlib.h>
#include <stdint.h>
#include <time.h>

int main(int argc, char** argv)
{
    double measure_gettime = 0;
    uint64_t fib[50] = {0};

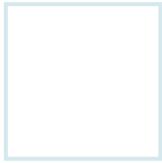
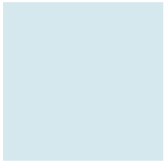
    #if D_GETTIME
        double t1 = GETTIME();
    #endif

    for (int r = 0; r < ROUNDS; r++) {
        /* fix me */
    }

    #if D_GETTIME
        double time_s = GETTIME()-t1;
        measure_gettime += time_s;
    #endif

    for(int i = 0; i < 50; i++) {
        printf("%lu ", fib[i]);
    }
    printf("\n");
    printf(" %.9lf | ", (double)measure_gettime/ROUNDS);
    printf("\n");
    return 0;
}
```

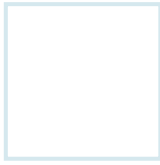
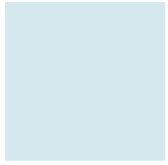




clock_gettime

```
double GETTIME() {  
    struct timespec ts;  
    double sec;  
    clock_gettime(CLOCK_REALTIME, &ts);  
    sec = ts.tv_nsec;  
    sec /= 1e9;  
    sec += ts.tv_sec;  
    return sec;  
}
```



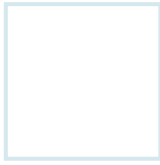
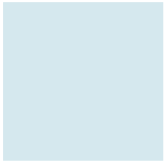


Compile

```
$ gcc fib.c
```

```
$ ./a.out
```





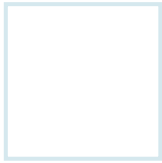
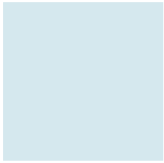
Time command

```
$ time ./a.out
```

```
$ /usr/bin/time -v ./a.out
```

```
1 1 2 3 5 8 13 21 34 55 89 144 233 377 610 987 1597 2584 4181 6765 10946 17711 28657 46368 75025 121393 196418 317811 514229 832040 1346269 217
8309 3524578 5702887 9227465 14930352 24157817 39088169 63245986 102334155 165580141 267914296 433494437 701408733 1134903170 1836311903 297121
5073 4807526976 7778742049 12586269025
0.000000 | 0.000006 |
real    0m0.002s
user    0m0.002s
sys     0m0.000s
```





Redirect results into files (Total 9 files)

`$/a.out > | G_1.md`

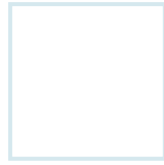
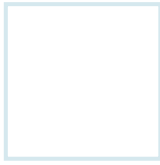
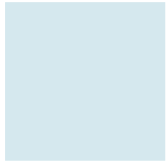
Round (ROUNDS)	1	10	100
clock_gettime #define D_GETTIME 1	G_1.md	G_10.md	G_100.md

```
eecheng@arm-server:~/qwe661234-workspace/LINUX2022/LAB10$ ./a.out > | T_1.md
eecheng@arm-server:~/qwe661234-workspace/LINUX2022/LAB10$ cat T_1.md
1 1 2 3 5 8 13 21 34 55 89 144 233 377 610 987 1597 2584 4181 6765 10946 17711 28657 46368 75025 121393 196418 317811 514229 832040 1346269 217
8309 3524578 5702887 9227465 14930352 24157817 39088169 63245986 102334155 165580141 267914296 433494437 701408733 1134903170 1836311903 297121
5073 4807526976 7778742049 12586269025
0.000021720 |
```

Note 1. CPU Time = CPU Clock Cycles * Clock Cycle Time = CPU Clock Cycles / Clock Rate

Note 2. Organizing information with tables with GitHub

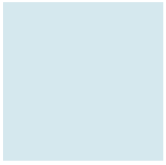




Demo

- 上傳 G_10.md 和 G_100.md 至 moodle





QUESTIONS

