МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ РОССИЙСКОЙ

ФЕДЕРАЦИИ

Московский Авиационный Институт

(Национальный Исследовательский Университет)

Институт №8 "Компьютерные науки и прикладная математика"

Кафедра 806 "Вычислительная математика и программирование"

Лабораторная работа №8

По курсу «Операционные системы»

Студент: Теребаев К. Д.

Группа: М8О-203Б-22

Преподаватель: Миронов Е. С.

Дата: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Оценка: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Подпись: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Москва, 2024

**Цель работы**

Приобретение практических навыков диагностики работы программного обеспечения.

**Задание**

*При выполнении лабораторных работ по курсу ОС необходимо продемонстрировать ключевые системные вызовы, которые в них используются и то, что их использование соответствует варианту ЛР*

По итогам выполнения всех лабораторных работ отчет по данной ЛР должен содержать краткую сводку по исследованию написанных программ

**Общие сведения о программе**

Strace – это утилита Linux, отслеживающая системные вызовы, которые представляют собой механизм трансляции, обеспечивающий интерфейс между процессором и операционной системой. Использование данной утилиты позволяет понять, что процесс пытается сделать в данное время. Strace может быть очень полезен при отладке программ.

**Основные файлы программы**

lw\_1.log  
execve("./main", ["./main"], 0x7ffcd051e010 /\* 92 vars \*/) = 0

brk(NULL)                               = 0x55b9fdcb6000

arch\_prctl(0x3001 /\* ARCH\_??? \*/, 0x7fff4b4365d0) = -1 EINVAL (Invalid argument)

mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7fdd81206000

access("/etc/ld.so.preload", R\_OK)      = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "/etc/ld.so.cache", O\_RDONLY|O\_CLOEXEC) = 3

newfstatat(3, "", {st\_mode=S\_IFREG|0644, st\_size=75567, ...}, AT\_EMPTY\_PATH) = 0

mmap(NULL, 75567, PROT\_READ, MAP\_PRIVATE, 3, 0) = 0x7fdd811f3000

close(3)                                = 0

openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = 3

read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

newfstatat(3, "", {st\_mode=S\_IFREG|0644, st\_size=2522552, ...}, AT\_EMPTY\_PATH) = 0

mmap(NULL, 2535872, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7fdd80e00000

mmap(0x7fdd80e9c000, 1249280, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x9c000) = 0x7fdd80e9c000

mmap(0x7fdd80fcd000, 577536, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1cd000) = 0x7fdd80fcd000

mmap(0x7fdd8105a000, 57344, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x25a000) = 0x7fdd8105a000

mmap(0x7fdd81068000, 12736, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7fdd81068000

close(3)                                = 0

openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libgcc\_s.so.1", O\_RDONLY|O\_CLOEXEC) = 3

read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

newfstatat(3, "", {st\_mode=S\_IFREG|0644, st\_size=141872, ...}, AT\_EMPTY\_PATH) = 0

mmap(NULL, 144232, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7fdd811cf000

mmap(0x7fdd811d2000, 110592, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x3000) = 0x7fdd811d2000

mmap(0x7fdd811ed000, 16384, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1e000) = 0x7fdd811ed000

mmap(0x7fdd811f1000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x21000) = 0x7fdd811f1000

close(3)                                = 0

openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libc.so.6", O\_RDONLY|O\_CLOEXEC) = 3

read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0P<\2\0\0\0\0\0"..., 832) = 832

pread64(3, "\6\0\0\0\4\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0"..., 784, 64) = 784

newfstatat(3, "", {st\_mode=S\_IFREG|0644, st\_size=2072888, ...}, AT\_EMPTY\_PATH) = 0

pread64(3, "\6\0\0\0\4\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0"..., 784, 64) = 784

mmap(NULL, 2117488, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7fdd80a00000

mmap(0x7fdd80a22000, 1540096, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x22000) = 0x7fdd80a22000

mmap(0x7fdd80b9a000, 360448, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x19a000) = 0x7fdd80b9a000

mmap(0x7fdd80bf2000, 24576, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1f1000) = 0x7fdd80bf2000

mmap(0x7fdd80bf8000, 53104, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7fdd80bf8000

close(3)                                = 0

openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libm.so.6", O\_RDONLY|O\_CLOEXEC) = 3

read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

newfstatat(3, "", {st\_mode=S\_IFREG|0644, st\_size=948816, ...}, AT\_EMPTY\_PATH) = 0

mmap(NULL, 950520, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7fdd810e6000

mmap(0x7fdd810f4000, 516096, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0xe000) = 0x7fdd810f4000

mmap(0x7fdd81172000, 372736, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x8c000) = 0x7fdd81172000

mmap(0x7fdd811cd000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0xe6000) = 0x7fdd811cd000

close(3)                                = 0

mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7fdd810e4000

arch\_prctl(ARCH\_SET\_FS, 0x7fdd810e5440) = 0

set\_tid\_address(0x7fdd810e5710)         = 63484

set\_robust\_list(0x7fdd810e5720, 24)     = 0

rseq(0x7fdd810e5d60, 0x20, 0, 0x53053053) = 0

mprotect(0x7fdd80bf2000, 16384, PROT\_READ) = 0

mprotect(0x7fdd811cd000, 4096, PROT\_READ) = 0

mprotect(0x7fdd811f1000, 4096, PROT\_READ) = 0

mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7fdd810e2000

mprotect(0x7fdd8105a000, 45056, PROT\_READ) = 0

mprotect(0x55b9fd8ba000, 4096, PROT\_READ) = 0

mprotect(0x7fdd8123b000, 8192, PROT\_READ) = 0

prlimit64(0, RLIMIT\_STACK, NULL, {rlim\_cur=8192\*1024, rlim\_max=RLIM64\_INFINITY}) = 0

munmap(0x7fdd811f3000, 75567)           = 0

futex(0x7fdd810687fc, FUTEX\_WAKE\_PRIVATE, 2147483647) = 0

getrandom("\x53\x3d\x00\x92\x5f\xd1\xd0\x8b", 8, GRND\_NONBLOCK) = 8

brk(NULL)                               = 0x55b9fdcb6000

brk(0x55b9fdcd7000)                     = 0x55b9fdcd7000

pipe2([3, 4], 0)                        = 0

pipe2([5, 6], 0)                        = 0

newfstatat(0, "", {st\_mode=S\_IFCHR|0620, st\_rdev=makedev(0x88, 0), ...}, AT\_EMPTY\_PATH) = 0

read(0, "test.txt\n", 1024)             = 9

clone(child\_stack=NULL, flags=CLONE\_CHILD\_CLEARTID|CLONE\_CHILD\_SETTID|SIGCHLD, child\_tidptr=0x7fdd810e5710) = 63506

close(3)                                = 0

close(6)                                = 0

read(0, "1 2 3 4 5 6\n", 1024)          = 12

write(4, "1 2 3 4 5 6\n", 12)           = 12

read(0, "", 1024)                       = 0

close(4)                                = 0

close(5)                                = 0

wait4(-1, NULL, 0, NULL)                = 63506

--- SIGCHLD {si\_signo=SIGCHLD, si\_code=CLD\_EXITED, si\_pid=63506, si\_uid=1000, si\_status=0, si\_utime=0, si\_stime=0} ---

exit\_group(0)                           = ?

+++ exited with 0 +++

lw\_2.log  
execve("./main", ["./main", "2"], 0x7ffece14dbf8 /\* 95 vars \*/) = 0

brk(NULL)                               = 0x55ed1ea73000

arch\_prctl(0x3001 /\* ARCH\_??? \*/, 0x7fff8edf9df0) = -1 EINVAL (Invalid argument)

mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f2a4c654000

access("/etc/ld.so.preload", R\_OK)      = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "/etc/ld.so.cache", O\_RDONLY|O\_CLOEXEC) = 3

newfstatat(3, "", {st\_mode=S\_IFREG|0644, st\_size=76571, ...}, AT\_EMPTY\_PATH) = 0

mmap(NULL, 76571, PROT\_READ, MAP\_PRIVATE, 3, 0) = 0x7f2a4c641000

close(3)                                = 0

openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = 3

read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

newfstatat(3, "", {st\_mode=S\_IFREG|0644, st\_size=2522552, ...}, AT\_EMPTY\_PATH) = 0

mmap(NULL, 2535872, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f2a4c200000

mmap(0x7f2a4c29c000, 1249280, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x9c000) = 0x7f2a4c29c000

mmap(0x7f2a4c3cd000, 577536, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1cd000) = 0x7f2a4c3cd000

mmap(0x7f2a4c45a000, 57344, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x25a000) = 0x7f2a4c45a000

mmap(0x7f2a4c468000, 12736, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f2a4c468000

close(3)                                = 0

openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libgcc\_s.so.1", O\_RDONLY|O\_CLOEXEC) = 3

read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

newfstatat(3, "", {st\_mode=S\_IFREG|0644, st\_size=141872, ...}, AT\_EMPTY\_PATH) = 0

mmap(NULL, 144232, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f2a4c61d000

mmap(0x7f2a4c620000, 110592, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x3000) = 0x7f2a4c620000

mmap(0x7f2a4c63b000, 16384, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1e000) = 0x7f2a4c63b000

mmap(0x7f2a4c63f000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x21000) = 0x7f2a4c63f000

close(3)                                = 0

openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libc.so.6", O\_RDONLY|O\_CLOEXEC) = 3

read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0P<\2\0\0\0\0\0"..., 832) = 832

pread64(3, "\6\0\0\0\4\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0"..., 784, 64) = 784

newfstatat(3, "", {st\_mode=S\_IFREG|0644, st\_size=2072888, ...}, AT\_EMPTY\_PATH) = 0

pread64(3, "\6\0\0\0\4\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0"..., 784, 64) = 784

mmap(NULL, 2117488, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f2a4be00000

mmap(0x7f2a4be22000, 1540096, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x22000) = 0x7f2a4be22000

mmap(0x7f2a4bf9a000, 360448, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x19a000) = 0x7f2a4bf9a000

mmap(0x7f2a4bff2000, 24576, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1f1000) = 0x7f2a4bff2000

mmap(0x7f2a4bff8000, 53104, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f2a4bff8000

close(3)                                = 0

openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libm.so.6", O\_RDONLY|O\_CLOEXEC) = 3

read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

newfstatat(3, "", {st\_mode=S\_IFREG|0644, st\_size=948816, ...}, AT\_EMPTY\_PATH) = 0

mmap(NULL, 950520, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f2a4c534000

mmap(0x7f2a4c542000, 516096, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0xe000) = 0x7f2a4c542000

mmap(0x7f2a4c5c0000, 372736, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x8c000) = 0x7f2a4c5c0000

mmap(0x7f2a4c61b000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0xe6000) = 0x7f2a4c61b000

close(3)                                = 0

mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f2a4c532000

arch\_prctl(ARCH\_SET\_FS, 0x7f2a4c533440) = 0

set\_tid\_address(0x7f2a4c533710)         = 60911

set\_robust\_list(0x7f2a4c533720, 24)     = 0

rseq(0x7f2a4c533d60, 0x20, 0, 0x53053053) = 0

mprotect(0x7f2a4bff2000, 16384, PROT\_READ) = 0

mprotect(0x7f2a4c61b000, 4096, PROT\_READ) = 0

mprotect(0x7f2a4c63f000, 4096, PROT\_READ) = 0

mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f2a4c530000

mprotect(0x7f2a4c45a000, 45056, PROT\_READ) = 0

mprotect(0x55ed1e1b1000, 4096, PROT\_READ) = 0

mprotect(0x7f2a4c689000, 8192, PROT\_READ) = 0

prlimit64(0, RLIMIT\_STACK, NULL, {rlim\_cur=8192\*1024, rlim\_max=RLIM64\_INFINITY}) = 0

munmap(0x7f2a4c641000, 76571)           = 0

futex(0x7f2a4c4687fc, FUTEX\_WAKE\_PRIVATE, 2147483647) = 0

getrandom("\xcc\x78\xab\x13\x0d\x58\x01\x1c", 8, GRND\_NONBLOCK) = 8

brk(NULL)                               = 0x55ed1ea73000

brk(0x55ed1ea94000)                     = 0x55ed1ea94000

openat(AT\_FDCWD, "../InOutFiles/output.txt", O\_WRONLY|O\_CREAT|O\_TRUNC, 0700) = 3

openat(AT\_FDCWD, "../InOutFiles/10.txt", O\_RDONLY) = 4

dup2(4, 0)                              = 0

newfstatat(0, "", {st\_mode=S\_IFREG|0664, st\_size=344, ...}, AT\_EMPTY\_PATH) = 0

read(0, "10\r\n13 12 14 10 13 14 13 10 12 1"..., 4096) = 344

rt\_sigaction(SIGRT\_1, {sa\_handler=0x7f2a4be8c450, sa\_mask=[], sa\_flags=SA\_RESTORER|SA\_ONSTACK|SA\_RESTART|SA\_SIGINFO, sa\_restorer=0x7f2a4be3c460}, NULL, 8) = 0

rt\_sigprocmask(SIG\_UNBLOCK, [RTMIN RT\_1], NULL, 8) = 0

mmap(NULL, 8392704, PROT\_NONE, MAP\_PRIVATE|MAP\_ANONYMOUS|MAP\_STACK, -1, 0) = 0x7f2a4b5ff000

mprotect(0x7f2a4b600000, 8388608, PROT\_READ|PROT\_WRITE) = 0

rt\_sigprocmask(SIG\_BLOCK, ~[], [], 8)   = 0

clone3({flags=CLONE\_VM|CLONE\_FS|CLONE\_FILES|CLONE\_SIGHAND|CLONE\_THREAD|CLONE\_SYSVSEM|CLONE\_SETTLS|CLONE\_PARENT\_SETTID|CLONE\_CHILD\_CLEARTID, child\_tid=0x7f2a4bdff990, parent\_tid=0x7f2a4bdff990, exit\_signal=0, stack=0x7f2a4b5ff000, stack\_size=0x7fff80, tls=0x7f2a4bdff6c0} => {parent\_tid=[60912]}, 88) = 60912

rt\_sigprocmask(SIG\_SETMASK, [], NULL, 8) = 0

mmap(NULL, 8392704, PROT\_NONE, MAP\_PRIVATE|MAP\_ANONYMOUS|MAP\_STACK, -1, 0) = 0x7f2a4adfe000

mprotect(0x7f2a4adff000, 8388608, PROT\_READ|PROT\_WRITE) = 0

rt\_sigprocmask(SIG\_BLOCK, ~[], [], 8)   = 0

clone3({flags=CLONE\_VM|CLONE\_FS|CLONE\_FILES|CLONE\_SIGHAND|CLONE\_THREAD|CLONE\_SYSVSEM|CLONE\_SETTLS|CLONE\_PARENT\_SETTID|CLONE\_CHILD\_CLEARTID, child\_tid=0x7f2a4b5fe990, parent\_tid=0x7f2a4b5fe990, exit\_signal=0, stack=0x7f2a4adfe000, stack\_size=0x7fff80, tls=0x7f2a4b5fe6c0} => {parent\_tid=[60913]}, 88) = 60913

rt\_sigprocmask(SIG\_SETMASK, [], NULL, 8) = 0

futex(0x7f2a4bdff990, FUTEX\_WAIT\_BITSET|FUTEX\_CLOCK\_REALTIME, 60912, NULL, FUTEX\_BITSET\_MATCH\_ANY) = -1 EAGAIN (Resource temporarily unavailable)

newfstatat(1, "", {st\_mode=S\_IFCHR|0620, st\_rdev=makedev(0x88, 0), ...}, AT\_EMPTY\_PATH) = 0

write(1, "Time = 0.000766437 seconds\n", 27) = 27

dup2(3, 1)                              = 1

write(1, "4.77141\n", 8)                = 8

write(1, "-1.3921\n", 8)                = 8

write(1, "2.02755\n", 8)                = 8

write(1, "3.21891\n", 8)                = 8

write(1, "0.39909\n", 8)                = 8

write(1, "-1.84526\n", 9)               = 9

write(1, "2.29108\n", 8)                = 8

write(1, "-6.67633\n", 9)               = 9

write(1, "1.35875\n", 8)                = 8

write(1, "-3.68416\n", 9)               = 9

close(4)                                = 0

close(3)                                = 0

lseek(0, -2, SEEK\_CUR)                  = 342

exit\_group(0)                           = ?

+++ exited with 0 +++

lw\_3.log

execve("./main", ["./main"], 0x7ffd52c376e0 /\* 92 vars \*/) = 0

brk(NULL)                               = 0x55b263696000

arch\_prctl(0x3001 /\* ARCH\_??? \*/, 0x7ffd19692da0) = -1 EINVAL (Invalid argument)

mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f930b1b0000

access("/etc/ld.so.preload", R\_OK)      = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "/etc/ld.so.cache", O\_RDONLY|O\_CLOEXEC) = 3

newfstatat(3, "", {st\_mode=S\_IFREG|0644, st\_size=78325, ...}, AT\_EMPTY\_PATH) = 0

mmap(NULL, 78325, PROT\_READ, MAP\_PRIVATE, 3, 0) = 0x7f930b19c000

close(3)                                = 0

openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = 3

read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

newfstatat(3, "", {st\_mode=S\_IFREG|0644, st\_size=2522480, ...}, AT\_EMPTY\_PATH) = 0

mmap(NULL, 2535744, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f930ae00000

mmap(0x7f930ae9c000, 1249280, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x9c000) = 0x7f930ae9c000

mmap(0x7f930afcd000, 577536, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1cd000) = 0x7f930afcd000

mmap(0x7f930b05a000, 57344, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x25a000) = 0x7f930b05a000

mmap(0x7f930b068000, 12608, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f930b068000

close(3)                                = 0

openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libgcc\_s.so.1", O\_RDONLY|O\_CLOEXEC) = 3

read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

newfstatat(3, "", {st\_mode=S\_IFREG|0644, st\_size=141872, ...}, AT\_EMPTY\_PATH) = 0

mmap(NULL, 144232, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f930b178000

mmap(0x7f930b17b000, 110592, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x3000) = 0x7f930b17b000

mmap(0x7f930b196000, 16384, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1e000) = 0x7f930b196000

mmap(0x7f930b19a000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x21000) = 0x7f930b19a000

close(3)                                = 0

openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libc.so.6", O\_RDONLY|O\_CLOEXEC) = 3

read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\220\202\2\0\0\0\0\0"..., 832) = 832

pread64(3, "\6\0\0\0\4\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0"..., 784, 64) = 784

newfstatat(3, "", {st\_mode=S\_IFREG|0755, st\_size=2105184, ...}, AT\_EMPTY\_PATH) = 0

pread64(3, "\6\0\0\0\4\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0"..., 784, 64) = 784

mmap(NULL, 2150256, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f930aa00000

mmap(0x7f930aa26000, 1568768, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x26000) = 0x7f930aa26000

mmap(0x7f930aba5000, 348160, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1a5000) = 0x7f930aba5000

mmap(0x7f930abfa000, 24576, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1f9000) = 0x7f930abfa000

mmap(0x7f930ac00000, 53104, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f930ac00000

close(3)                                = 0

openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libm.so.6", O\_RDONLY|O\_CLOEXEC) = 3

read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

newfstatat(3, "", {st\_mode=S\_IFREG|0644, st\_size=957008, ...}, AT\_EMPTY\_PATH) = 0

mmap(NULL, 958712, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f930b08d000

mmap(0x7f930b09d000, 524288, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x10000) = 0x7f930b09d000

mmap(0x7f930b11d000, 364544, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x90000) = 0x7f930b11d000

mmap(0x7f930b176000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0xe8000) = 0x7f930b176000

close(3)                                = 0

mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f930b08b000

arch\_prctl(ARCH\_SET\_FS, 0x7f930b08c480) = 0

set\_tid\_address(0x7f930b08c750)         = 31308

set\_robust\_list(0x7f930b08c760, 24)     = 0

rseq(0x7f930b08cda0, 0x20, 0, 0x53053053) = 0

mprotect(0x7f930abfa000, 16384, PROT\_READ) = 0

mprotect(0x7f930b176000, 4096, PROT\_READ) = 0

mprotect(0x7f930b19a000, 4096, PROT\_READ) = 0

mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f930b089000

mprotect(0x7f930b05a000, 45056, PROT\_READ) = 0

mprotect(0x55b262dea000, 4096, PROT\_READ) = 0

mprotect(0x7f930b1e7000, 8192, PROT\_READ) = 0

prlimit64(0, RLIMIT\_STACK, NULL, {rlim\_cur=8192\*1024, rlim\_max=RLIM64\_INFINITY}) = 0

munmap(0x7f930b19c000, 78325)           = 0

futex(0x7f930b06877c, FUTEX\_WAKE\_PRIVATE, 2147483647) = 0

getrandom("\xa7\xe9\xed\x9b\xa9\xb8\x78\x48", 8, GRND\_NONBLOCK) = 8

brk(NULL)                               = 0x55b263696000

brk(0x55b2636b7000)                     = 0x55b2636b7000

newfstatat(1, "", {st\_mode=S\_IFCHR|0620, st\_rdev=makedev(0x88, 0), ...}, AT\_EMPTY\_PATH) = 0

write(1, "Enter filename: ", 16)        = 16

newfstatat(0, "", {st\_mode=S\_IFCHR|0620, st\_rdev=makedev(0x88, 0), ...}, AT\_EMPTY\_PATH) = 0

read(0, "q.txt\n", 1024)                = 6

write(1, "Enter commands:\n", 16)       = 16

openat(AT\_FDCWD, "/dev/shm/shared\_memory", O\_RDWR|O\_CREAT|O\_NOFOLLOW|O\_CLOEXEC, 0600) = 3

ftruncate(3, 88)                        = 0

mmap(NULL, 88, PROT\_WRITE, MAP\_SHARED, 3, 0) = 0x7f930b1af000

clone(child\_stack=NULL, flags=CLONE\_CHILD\_CLEARTID|CLONE\_CHILD\_SETTID|SIGCHLD, child\_tidptr=0x7f930b08c750) = 31358

read(0, "4.5 5.5\n", 1024)              = 8

read(0, "2.1 3.9 1.5 2.5\n", 1024)      = 16

read(0, "110.001 119.999\n", 1024)      = 16

read(0, "", 1024)                       = 0

futex(0x7f930b1af018, FUTEX\_WAKE, 1)    = 1

futex(0x7f930b1af018, FUTEX\_WAKE, 1)    = 1

futex(0x7f930b1af018, FUTEX\_WAKE, 1)    = 1

futex(0x7f930b1af018, FUTEX\_WAKE, 1)    = 1

wait4(-1, NULL, 0, NULL)                = 31358

--- SIGCHLD {si\_signo=SIGCHLD, si\_code=CLD\_EXITED, si\_pid=31358, si\_uid=1000, si\_status=0, si\_utime=0, si\_stime=0} ---

munmap(0x7f930b1af000, 88)              = 0

unlink("/dev/shm/shared\_memory")        = -1 ENOENT (No such file or directory)

exit\_group(0)                           = ?

+++ exited with 0 +++

lw\_4.log

execve("./dynamic", ["./dynamic"], 0x7ffd85e70360 /\* 92 vars \*/) = 0

brk(NULL)                               = 0x559125350000

arch\_prctl(0x3001 /\* ARCH\_??? \*/, 0x7ffd3a9aa870) = -1 EINVAL (Invalid argument)

mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f1f6ddac000

access("/etc/ld.so.preload", R\_OK)      = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "/home/sky/os/lw4/build/glibc-hwcaps/x86-64-v4/libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

newfstatat(AT\_FDCWD, "/home/sky/os/lw4/build/glibc-hwcaps/x86-64-v4/", 0x7ffd3a9a9aa0, 0) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "/home/sky/os/lw4/build/glibc-hwcaps/x86-64-v3/libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

newfstatat(AT\_FDCWD, "/home/sky/os/lw4/build/glibc-hwcaps/x86-64-v3/", 0x7ffd3a9a9aa0, 0) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "/home/sky/os/lw4/build/glibc-hwcaps/x86-64-v2/libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

newfstatat(AT\_FDCWD, "/home/sky/os/lw4/build/glibc-hwcaps/x86-64-v2/", 0x7ffd3a9a9aa0, 0) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "/home/sky/os/lw4/build/libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

newfstatat(AT\_FDCWD, "/home/sky/os/lw4/build/", {st\_mode=S\_IFDIR|0775, st\_size=4096, ...}, 0) = 0

openat(AT\_FDCWD, "/etc/ld.so.cache", O\_RDONLY|O\_CLOEXEC) = 3

newfstatat(3, "", {st\_mode=S\_IFREG|0644, st\_size=79781, ...}, AT\_EMPTY\_PATH) = 0

mmap(NULL, 79781, PROT\_READ, MAP\_PRIVATE, 3, 0) = 0x7f1f6dd98000

close(3)                                = 0

openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = 3

read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

newfstatat(3, "", {st\_mode=S\_IFREG|0644, st\_size=2522480, ...}, AT\_EMPTY\_PATH) = 0

mmap(NULL, 2535744, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f1f6da00000

mmap(0x7f1f6da9c000, 1249280, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x9c000) = 0x7f1f6da9c000

mmap(0x7f1f6dbcd000, 577536, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1cd000) = 0x7f1f6dbcd000

mmap(0x7f1f6dc5a000, 57344, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x25a000) = 0x7f1f6dc5a000

mmap(0x7f1f6dc68000, 12608, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f1f6dc68000

close(3)                                = 0

openat(AT\_FDCWD, "/home/sky/os/lw4/build/libgcc\_s.so.1", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libgcc\_s.so.1", O\_RDONLY|O\_CLOEXEC) = 3

read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

newfstatat(3, "", {st\_mode=S\_IFREG|0644, st\_size=141872, ...}, AT\_EMPTY\_PATH) = 0

mmap(NULL, 144232, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f1f6dd74000

mmap(0x7f1f6dd77000, 110592, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x3000) = 0x7f1f6dd77000

mmap(0x7f1f6dd92000, 16384, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1e000) = 0x7f1f6dd92000

mmap(0x7f1f6dd96000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x21000) = 0x7f1f6dd96000

close(3)                                = 0

openat(AT\_FDCWD, "/home/sky/os/lw4/build/libc.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libc.so.6", O\_RDONLY|O\_CLOEXEC) = 3

read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\220\202\2\0\0\0\0\0"..., 832) = 832

pread64(3, "\6\0\0\0\4\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0"..., 784, 64) = 784

newfstatat(3, "", {st\_mode=S\_IFREG|0755, st\_size=2105184, ...}, AT\_EMPTY\_PATH) = 0

pread64(3, "\6\0\0\0\4\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0"..., 784, 64) = 784

mmap(NULL, 2150256, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f1f6d600000

mmap(0x7f1f6d626000, 1568768, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x26000) = 0x7f1f6d626000

mmap(0x7f1f6d7a5000, 348160, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1a5000) = 0x7f1f6d7a5000

mmap(0x7f1f6d7fa000, 24576, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1f9000) = 0x7f1f6d7fa000

mmap(0x7f1f6d800000, 53104, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f1f6d800000

close(3)                                = 0

openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libm.so.6", O\_RDONLY|O\_CLOEXEC) = 3

read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

newfstatat(3, "", {st\_mode=S\_IFREG|0644, st\_size=957008, ...}, AT\_EMPTY\_PATH) = 0

mmap(NULL, 958712, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f1f6dc89000

mmap(0x7f1f6dc99000, 524288, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x10000) = 0x7f1f6dc99000

mmap(0x7f1f6dd19000, 364544, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x90000) = 0x7f1f6dd19000

mmap(0x7f1f6dd72000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0xe8000) = 0x7f1f6dd72000

close(3)                                = 0

mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f1f6dc87000

mmap(NULL, 12288, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f1f6dc84000

arch\_prctl(ARCH\_SET\_FS, 0x7f1f6dc84740) = 0

set\_tid\_address(0x7f1f6dc84a10)         = 10162

set\_robust\_list(0x7f1f6dc84a20, 24)     = 0

rseq(0x7f1f6dc85060, 0x20, 0, 0x53053053) = 0

mprotect(0x7f1f6d7fa000, 16384, PROT\_READ) = 0

mprotect(0x7f1f6dd72000, 4096, PROT\_READ) = 0

mprotect(0x7f1f6dd96000, 4096, PROT\_READ) = 0

mprotect(0x7f1f6dc5a000, 45056, PROT\_READ) = 0

mprotect(0x559124d9f000, 4096, PROT\_READ) = 0

mprotect(0x7f1f6dde3000, 8192, PROT\_READ) = 0

prlimit64(0, RLIMIT\_STACK, NULL, {rlim\_cur=8192\*1024, rlim\_max=RLIM64\_INFINITY}) = 0

munmap(0x7f1f6dd98000, 79781)           = 0

futex(0x7f1f6dc6877c, FUTEX\_WAKE\_PRIVATE, 2147483647) = 0

getrandom("\xbc\xde\x1a\x68\x56\xfc\xe3\xa1", 8, GRND\_NONBLOCK) = 8

brk(NULL)                               = 0x559125350000

brk(0x559125371000)                     = 0x559125371000

openat(AT\_FDCWD, "/home/sky/os/lw4/build/libfunction1.so", O\_RDONLY|O\_CLOEXEC) = 3

read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

newfstatat(3, "", {st\_mode=S\_IFREG|0775, st\_size=15848, ...}, AT\_EMPTY\_PATH) = 0

mmap(NULL, 16424, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f1f6dda7000

mmap(0x7f1f6dda8000, 4096, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1000) = 0x7f1f6dda8000

mmap(0x7f1f6dda9000, 4096, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x2000) = 0x7f1f6dda9000

mmap(0x7f1f6ddaa000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x2000) = 0x7f1f6ddaa000

close(3)                                = 0

mprotect(0x7f1f6ddaa000, 4096, PROT\_READ) = 0

newfstatat(0, "", {st\_mode=S\_IFCHR|0620, st\_rdev=makedev(0x88, 0), ...}, AT\_EMPTY\_PATH) = 0

read(0, "0\n", 1024)                    = 2

munmap(0x7f1f6dda7000, 16424)           = 0

openat(AT\_FDCWD, "/home/sky/os/lw4/build/libfunction2.so", O\_RDONLY|O\_CLOEXEC) = 3

read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

newfstatat(3, "", {st\_mode=S\_IFREG|0775, st\_size=16256, ...}, AT\_EMPTY\_PATH) = 0

mmap(NULL, 16464, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f1f6dda7000

mmap(0x7f1f6dda8000, 4096, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1000) = 0x7f1f6dda8000

mmap(0x7f1f6dda9000, 4096, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x2000) = 0x7f1f6dda9000

mmap(0x7f1f6ddaa000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x2000) = 0x7f1f6ddaa000

close(3)                                = 0

mprotect(0x7f1f6ddaa000, 4096, PROT\_READ) = 0

read(0, "0\n", 1024)                    = 2

munmap(0x7f1f6dda7000, 16464)           = 0

openat(AT\_FDCWD, "/home/sky/os/lw4/build/libfunction1.so", O\_RDONLY|O\_CLOEXEC) = 3

read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

newfstatat(3, "", {st\_mode=S\_IFREG|0775, st\_size=15848, ...}, AT\_EMPTY\_PATH) = 0

mmap(NULL, 16424, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f1f6dda7000

mmap(0x7f1f6dda8000, 4096, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1000) = 0x7f1f6dda8000

mmap(0x7f1f6dda9000, 4096, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x2000) = 0x7f1f6dda9000

mmap(0x7f1f6ddaa000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x2000) = 0x7f1f6ddaa000

close(3)                                = 0

mprotect(0x7f1f6ddaa000, 4096, PROT\_READ) = 0

read(0, "0\n", 1024)                    = 2

munmap(0x7f1f6dda7000, 16424)           = 0

openat(AT\_FDCWD, "/home/sky/os/lw4/build/libfunction2.so", O\_RDONLY|O\_CLOEXEC) = 3

read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

newfstatat(3, "", {st\_mode=S\_IFREG|0775, st\_size=16256, ...}, AT\_EMPTY\_PATH) = 0

mmap(NULL, 16464, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f1f6dda7000

mmap(0x7f1f6dda8000, 4096, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1000) = 0x7f1f6dda8000

mmap(0x7f1f6dda9000, 4096, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x2000) = 0x7f1f6dda9000

mmap(0x7f1f6ddaa000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x2000) = 0x7f1f6ddaa000

close(3)                                = 0

mprotect(0x7f1f6ddaa000, 4096, PROT\_READ) = 0

read(0, "0\n", 1024)                    = 2

munmap(0x7f1f6dda7000, 16464)           = 0

openat(AT\_FDCWD, "/home/sky/os/lw4/build/libfunction1.so", O\_RDONLY|O\_CLOEXEC) = 3

read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

newfstatat(3, "", {st\_mode=S\_IFREG|0775, st\_size=15848, ...}, AT\_EMPTY\_PATH) = 0

mmap(NULL, 16424, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f1f6dda7000

mmap(0x7f1f6dda8000, 4096, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1000) = 0x7f1f6dda8000

mmap(0x7f1f6dda9000, 4096, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x2000) = 0x7f1f6dda9000

mmap(0x7f1f6ddaa000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x2000) = 0x7f1f6ddaa000

close(3)                                = 0

mprotect(0x7f1f6ddaa000, 4096, PROT\_READ) = 0

read(0, "", 1024)                       = 0

exit\_group(0)                           = ?

+++ exited with 0 +++

**Вывод**

В ходе выполнения лабораторной работы я познакомился с таким средством отладки, как strace. Оно помогает выявить, какие системные вызовы совершает программа, что может помочь в поиске ошибок. По strace’у можно определить, какие действия в целом совершает программа, какие файлы открывает, когда и как выделяет память, что способствует более лучшему пониманию программы.