

Московский авиационный институт  
(Национальный исследовательский университет)  
Факультет "Информационные технологии и прикладная математика"  
Кафедра "Вычислительная математика и программирование"

**Лабораторная работа №8 по курсу  
“Операционные системы”**

*Студент:* Кочкожаров Иван Вячеславович

*Группа:* М8О-208Б-22

*Преподаватель:* Миронов Евгений Сергеевич

*Оценка:* \_\_\_\_\_

*Дата:* \_\_\_\_\_

*Подпись:* \_\_\_\_\_

Москва, 2023

# Содержание

1	Репозиторий . . . . .	3
2	Цель работы . . . . .	3
3	Задание . . . . .	3
4	Описание strace . . . . .	3
5	Демонстрация работы . . . . .	4
6	Выводы . . . . .	20

# 1 Репозиторий

<https://github.com/kochkozharov/os-labs>

## 2 Цель работы

Приобретение практических навыков диагностики работы программного обеспечения.

## 3 Задание

Продемонстрировать ключевые системные вызовы, используемые в лабораторной работе и то, что их использование соответствует варианту ЛР на примере лабораторной работы №3.

## 4 Описание strace

Команда `strace` является инструментом диагностики в Linux. Она перехватывает и записывает любые системные вызовы, выполняемые командой. Кроме того, также записывает любой сигнал Linux, отправляемый процессу. Затем мы можем использовать эту информацию для отладки или диагностики программы.

В самом простом варианте `strace` запускает переданную команду с её аргументами и выводит в стандартный поток ошибок все системные вызовы команды.

Возможные флаги:

- `-k` - выводить стек вызовов для отслеживаемого процесса после каждого системного вызова
- `-o` - выводить всю информацию о системных вызовах не в стандартный поток ошибок, а в файл
- `-s` - подсчитывать количество ошибок, вызовов и время выполнения для каждого системного вызова
- `-T` - выводить длительность выполнения системного вызова
- `-u` - выводить пути для файловых дескрипторов
- `-uu` - выводить информацию о протоколе для файловых дескрипторов
- `-p` - указывает `pid` процесса, к которому следует подключиться
- `-f` - отслеживать также дочерние процессы, если они будут созданы

## 5 Демонстрация работы

```
execve("./lab3", ["lab3"], 0x7ffc1ebf2be8 /* 58 vars */)
    = 0 <0.001022>
brk(NULL)                                = 0x55787aea9000
    <0.000027>
access("/etc/ld.so.preload", R_OK)        = -1 ENOENT (No
    such file or directory) <0.000043>
openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC)
    = 3 <0.000076>
newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=100195,
    ...}, AT_EMPTY_PATH) = 0 <0.000036>
mmap(NULL, 100195, PROT_READ, MAP_PRIVATE, 3, 0) = 0
    x7f69e80dc000 <0.000041>
close(3)                                = 0 <0.000021>
openat(AT_FDCWD, "/usr/lib64/libc.so.6", O_RDONLY|
    O_CLOEXEC) = 3 <0.000032>
read(3, "...", 832) = 832 <0.000027>
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
    <0.000022>
newfstatat(3, "", {st_mode=S_IFREG|0755, st_size
    =1905600, ...}, AT_EMPTY_PATH) = 0 <0.000023>
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|
    MAP_ANONYMOUS, -1, 0) = 0x7f69e80da000 <0.000040>
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
    <0.000025>
mmap(NULL, 1936688, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE
    , 3, 0) = 0x7f69e7f01000 <0.000032>
mmap(0x7f69e7f23000, 1396736, PROT_READ|PROT_EXEC,
    MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x22000) = 0
    x7f69e7f23000 <0.000062>
mmap(0x7f69e8078000, 344064, PROT_READ, MAP_PRIVATE|
    MAP_FIXED|MAP_DENYWRITE, 3, 0x177000) = 0
    x7f69e8078000 <0.000044>
mmap(0x7f69e80cc000, 24576, PROT_READ|PROT_WRITE,
    MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1ca000) = 0
    x7f69e80cc000 <0.000047>
mmap(0x7f69e80d2000, 32048, PROT_READ|PROT_WRITE,
    MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0
    x7f69e80d2000 <0.000033>
close(3)                                = 0 <0.000021>
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|
    MAP_ANONYMOUS, -1, 0) = 0x7f69e7eff000 <0.000030>
arch_prctl(ARCH_SET_FS, 0x7f69e80db680) = 0 <0.000020>
set_tid_address(0x7f69e80db950)          = 494752
    <0.000023>
set_robust_list(0x7f69e80db960, 24)      = 0 <0.000026>
```

```

rseq(0x7f69e80dbfa0, 0x20, 0, 0x53053053) = 0 <0.000019>
mprotect(0x7f69e80cc000, 16384, PROT_READ) = 0
<0.000033>
mprotect(0x5578793aa000, 4096, PROT_READ) = 0 <0.000031>
mprotect(0x7f69e8126000, 8192, PROT_READ) = 0 <0.000046>
prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024,
    rlim_max=RLIM64_INFINITY}) = 0 <0.000023>
munmap(0x7f69e80dc000, 100195) = 0 <0.000069>
openat(AT_FDCWD, "/dev/shm/shared_memory_1", O_RDWR|
    O_CREAT|O_NOFOLLOW|O_CLOEXEC, 0600) = 3 <0.000060>
ftruncate(3, 1024) = 0 <0.000043>
mmap(NULL, 1024, PROT_READ|PROT_WRITE, MAP_SHARED, 3, 0)
    = 0x7f69e80f4000 <0.000036>
openat(AT_FDCWD, "/dev/shm/shared_memory_2", O_RDWR|
    O_CREAT|O_NOFOLLOW|O_CLOEXEC, 0600) = 4 <0.000036>
ftruncate(4, 1024) = 0 <0.000020>
mmap(NULL, 1024, PROT_READ|PROT_WRITE, MAP_SHARED, 4, 0)
    = 0x7f69e80f3000 <0.000031>
openat(AT_FDCWD, "/dev/shm/sem.w_semaphore_1", O_RDWR|
    O_NOFOLLOW) = -1 ENOENT (No such file or directory)
<0.000050>
getrandom("\xc2\x82\xf3\xc3\xf4\xca\xc7\x40", 8,
    GRND_NONBLOCK) = 8 <0.000033>
newfstatat(AT_FDCWD, "/dev/shm/sem.YCQqCP", 0
    x7fff80dcb940, AT_SYMLINK_NOFOLLOW) = -1 ENOENT (No
    such file or directory) <0.000034>
openat(AT_FDCWD, "/dev/shm/sem.YCQqCP", O_RDWR|O_CREAT|
    O_EXCL, 0600) = 5 <0.000049>
write(5, "\1\0...\0", 32) = 32 <0.000035>
mmap(NULL, 32, PROT_READ|PROT_WRITE, MAP_SHARED, 5, 0) =
    0x7f69e80f2000 <0.000030>
link("/dev/shm/sem.YCQqCP", "/dev/shm/sem.w_semaphore_1
    ") = 0 <0.000035>
newfstatat(5, "", {st_mode=S_IFREG|0600, st_size=32,
    ...}, AT_EMPTY_PATH) = 0 <0.000021>
getrandom("\xc8\xc0\x25\x58\xbf\xbb\x56\xd7", 8,
    GRND_NONBLOCK) = 8 <0.000019>
brk(NULL) = 0x55787aea9000
<0.000019>
brk(0x55787aeca000) = 0x55787aeca000
<0.000023>
unlink("/dev/shm/sem.YCQqCP") = 0 <0.000027>
close(5) = 0 <0.000018>
openat(AT_FDCWD, "/dev/shm/sem.rev_semaphore_1", O_RDWR|
    O_NOFOLLOW) = -1 ENOENT (No such file or directory)
<0.000030>
getrandom("\x09\x34\xd0\xd7\xfe\x72\xef\x85", 8,
    GRND_NONBLOCK) = 8 <0.000019>
newfstatat(AT_FDCWD, "/dev/shm/sem.zUlo3n", 0

```

```

    x7fff80dcb940, AT_SYMLINK_NOFOLLOW) = -1 ENOENT (No
    such file or directory) <0.000025>
    openat(AT_FDCWD, "/dev/shm/sem.zUlo3n", O_RDWR|O_CREAT|
    O_EXCL, 0600) = 5 <0.000035>
    write(5, "\\0\\0\\...\\0", 32) = 32 <0.000030>
    mmap(NULL, 32, PROT_READ|PROT_WRITE, MAP_SHARED, 5, 0) =
    0x7f69e80f1000 <0.000032>
    link("/dev/shm/sem.zUlo3n", "/dev/shm/sem.
    rev_semaphore_1") = 0 <0.000030>
    newfstatat(5, "", {st_mode=S_IFREG|0600, st_size=32,
    ...}, AT_EMPTY_PATH) = 0 <0.000020>
    unlink("/dev/shm/sem.zUlo3n") = 0 <0.000037>
    close(5) = 0 <0.000019>
    openat(AT_FDCWD, "/dev/shm/sem.w_semaphore_2", O_RDWR|
    O_NOFOLLOW) = -1 ENOENT (No such file or directory)
    <0.000035>
    getrandom("\\xee\\x01\\x82\\xa7\\x3a\\x5e\\x6c\\x62", 8,
    GRND_NONBLOCK) = 8 <0.000056>
    newfstatat(AT_FDCWD, "/dev/shm/sem.MMjCpl", 0
    x7fff80dcb940, AT_SYMLINK_NOFOLLOW) = -1 ENOENT (No
    such file or directory) <0.000043>
    openat(AT_FDCWD, "/dev/shm/sem.MMjCpl", O_RDWR|O_CREAT|
    O_EXCL, 0600) = 5 <0.000095>
    write(5, "\\1\\0\\...\\0", 32) = 32 <0.000049>
    mmap(NULL, 32, PROT_READ|PROT_WRITE, MAP_SHARED, 5, 0) =
    0x7f69e80f0000 <0.000091>
    link("/dev/shm/sem.MMjCpl", "/dev/shm/sem.w_semaphore_2
    ") = 0 <0.000058>
    newfstatat(5, "", {st_mode=S_IFREG|0600, st_size=32,
    ...}, AT_EMPTY_PATH) = 0 <0.000027>
    unlink("/dev/shm/sem.MMjCpl") = 0 <0.000029>
    close(5) = 0 <0.000018>
    openat(AT_FDCWD, "/dev/shm/sem.rev_semaphore_2", O_RDWR|
    O_NOFOLLOW) = -1 ENOENT (No such file or directory)
    <0.000035>
    getrandom("\\x8c\\x94\\xaa\\x16\\x0d\\x79\\xbd\\xfc", 8,
    GRND_NONBLOCK) = 8 <0.000019>
    getrandom("\\x17\\x6b\\x19\\x9c\\xb0\\x88\\x95\\xeb", 8,
    GRND_NONBLOCK) = 8 <0.000018>
    newfstatat(AT_FDCWD, "/dev/shm/sem.LnzjdY", 0
    x7fff80dcb940, AT_SYMLINK_NOFOLLOW) = -1 ENOENT (No
    such file or directory) <0.000027>
    openat(AT_FDCWD, "/dev/shm/sem.LnzjdY", O_RDWR|O_CREAT|
    O_EXCL, 0600) = 5 <0.000043>
    write(5, "\\0\\0\\0\\0\\0\\0\\0\\0\\200\\0\\...\\0", 32) = 32
    <0.000044>
    mmap(NULL, 32, PROT_READ|PROT_WRITE, MAP_SHARED, 5, 0) =
    0x7f69e80ef000 <0.000029>
    link("/dev/shm/sem.LnzjdY", "/dev/shm/sem.

```

```

    rev_semaphore_2") = 0 <0.000029>
newfstatat(5, "", {st_mode=S_IFREG|0600, st_size=32,
    ...}, AT_EMPTY_PATH) = 0 <0.000020>
unlink("/dev/shm/sem.LnzjdY") = 0 <0.000023>
close(5) = 0 <0.000018>
newfstatat(0, "", {st_mode=S_IFREG|0644, st_size=145,
    ...}, AT_EMPTY_PATH) = 0 <0.000019>
read(0, "short_strings.txt\nlong_string.tx"... , 4096) =
    145 <0.000021>
openat(AT_FDCWD, "short_strings.txt", O_WRONLY|O_CREAT|
    O_TRUNC, 0644) = 5 <0.000155>
openat(AT_FDCWD, "long_string.txt", O_WRONLY|O_CREAT|
    O_TRUNC, 0644) = 6 <0.000072>
clone(child_stack=NULL, flags=CLONE_CHILD_CLEARTID|
    CLONE_CHILD_SETTID|SIGCHLDstrace: Process 494753
    attached
, child_tidptr=0x7f69e80db950) = 494753 <0.000302>
[pid 494753] set_robust_list(0x7f69e80db960, 24 <
    unfinished ...>
[pid 494752] clone(child_stack=NULL, flags=
    CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD <
    unfinished ...>
[pid 494753] <... set_robust_list resumed>) = 0
    <0.000033>
[pid 494753] close(6) = 0 <0.000019>
[pid 494753] dup2(3, 0) = 0 <0.000012>
[pid 494752] <... clone resumed>, child_tidptr=0
    x7f69e80db950) = 494754 <0.000260>
strace: Process 494754 attached
[pid 494753] dup2(5, 1 <unfinished ...>
[pid 494752] close(5 <unfinished ...>
[pid 494754] set_robust_list(0x7f69e80db960, 24 <
    unfinished ...>
[pid 494753] <... dup2 resumed>) = 1 <0.000063>
[pid 494752] <... close resumed>) = 0 <0.000050>
[pid 494754] <... set_robust_list resumed>) = 0
    <0.000045>
[pid 494752] close(6 <unfinished ...>
[pid 494753] close(5 <unfinished ...>
[pid 494752] <... close resumed>) = 0 <0.000022>
[pid 494753] <... close resumed>) = 0 <0.000029>
[pid 494754] close(5 <unfinished ...>
[pid 494753] execve("child_lab3", ["child_lab3", "
    w_semaphore_1", "rev_semaphore_1"], 0x7fff80dcbf18 /*
    58 vars */ <unfinished ...>
[pid 494752] futex(0x7f69e80f0000, FUTEX_WAIT_BITSET|
    FUTEX_CLOCK_REALTIME, 0, {tv_sec=1703624281, tv_nsec
    =470013742}, FUTEX_BITSET_MATCH_ANY <unfinished ...>
[pid 494754] <... close resumed>) = 0 <0.000132>

```

```

[pid 494754] dup2(4, 0) = 0 <0.000021>
[pid 494754] dup2(6, 1) = 1 <0.000018>
[pid 494754] close(6) = 0 <0.000021>
[pid 494754] execve("child_lab3", ["child_lab3", "
    w_semaphore_2", "rev_semaphore_2"], 0x7fff80dcbf18 /*
    58 vars */ <unfinished ...>
[pid 494753] <... execve resumed>) = 0 <0.000483>
[pid 494753] brk(NULL) = 0x55d66f6bb000
    <0.000026>
[pid 494753] access("/etc/ld.so.preload", R_OK) = -1
    ENOENT (No such file or directory) <0.000035>
[pid 494753] openat(AT_FDCWD, "/etc/ld.so.cache",
    O_RDONLY|O_CLOEXEC <unfinished ...>
[pid 494754] <... execve resumed>) = 0 <0.000454>
[pid 494753] <... openat resumed>) = 3 <0.000030>
[pid 494753] newfstatat(3, "", <unfinished ...>
[pid 494754] brk(NULL <unfinished ...>
[pid 494753] <... newfstatat resumed>{st_mode=S_IFREG
    |0644, st_size=100195, ...}, AT_EMPTY_PATH) = 0
    <0.000137>
[pid 494754] <... brk resumed>) = 0x558139088000
    <0.000032>
[pid 494753] mmap(NULL, 100195, PROT_READ, MAP_PRIVATE,
    3, 0 <unfinished ...>
[pid 494754] access("/etc/ld.so.preload", R_OK <
    unfinished ...>
[pid 494753] <... mmap resumed>) = 0x7f03abb8d000
    <0.000093>
[pid 494754] <... access resumed>) = -1 ENOENT (No
    such file or directory) <0.000034>
[pid 494753] close(3 <unfinished ...>
[pid 494754] openat(AT_FDCWD, "/etc/ld.so.cache",
    O_RDONLY|O_CLOEXEC <unfinished ...>
[pid 494753] <... close resumed>) = 0 <0.000044>
[pid 494754] <... openat resumed>) = 3 <0.000034>
[pid 494754] newfstatat(3, "", <unfinished ...>
[pid 494753] openat(AT_FDCWD, "/usr/lib64/libc.so.6",
    O_RDONLY|O_CLOEXEC <unfinished ...>
[pid 494754] <... newfstatat resumed>{st_mode=S_IFREG
    |0644, st_size=100195, ...}, AT_EMPTY_PATH) = 0
    <0.000033>
[pid 494753] <... openat resumed>) = 3 <0.000037>
[pid 494754] mmap(NULL, 100195, PROT_READ, MAP_PRIVATE,
    3, 0 <unfinished ...>
[pid 494753] read(3, <unfinished ...>
[pid 494754] <... mmap resumed>) = 0x7ff48b90d000
    <0.000029>
[pid 494754] close(3 <unfinished ...>
[pid 494753] <... read resumed>"\177ELF

```



```

\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\"... , 832) =
832 <0.000061>
[pid 494754] <... close resumed>) = 0 <0.000034>
[pid 494753] pread64(3, <unfinished ...>
[pid 494754] openat(AT_FDCWD, "/usr/lib64/libc.so.6",
O_RDONLY|O_CLOEXEC <unfinished ...>
[pid 494753] <... pread64 resumed>"\6\0\0\0\4\0\0\0@
\0\0\0\0\0\0\0\0\0\0\0\0\"... , 784, 64) = 784
<0.000055>
[pid 494754] <... openat resumed>) = 3 <0.000035>
[pid 494753] newfstatat(3, "", <unfinished ...>
[pid 494754] read(3, <unfinished ...>
[pid 494753] <... newfstatat resumed>{st_mode=S_IFREG
|0755, st_size=1905600, ...}, AT_EMPTY_PATH) = 0
<0.000035>
[pid 494754] <... read resumed>"\177ELF
\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\"... , 832) = 832
<0.000043>
[pid 494753] mmap(NULL, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_ANONYMOUS, -1, 0 <unfinished ...>
[pid 494754] pread64(3, <unfinished ...>
[pid 494753] <... mmap resumed>) = 0x7f03abb8b000
<0.000039>
[pid 494754] <... pread64 resumed>"\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\0\"... ,
784, 64) = 784 <0.000036>
[pid 494754] newfstatat(3, "", <unfinished ...>
[pid 494753] pread64(3, <unfinished ...>
[pid 494754] <... newfstatat resumed>{st_mode=S_IFREG
|0755, st_size=1905600, ...}, AT_EMPTY_PATH) = 0
<0.000062>
[pid 494753] <... pread64 resumed>"\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\0\"... ,
784, 64) = 784 <0.000030>
[pid 494754] mmap(NULL, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_ANONYMOUS, -1, 0 <unfinished ...>
[pid 494753] mmap(NULL, 1936688, PROT_READ, MAP_PRIVATE|
MAP_DENYWRITE, 3, 0 <unfinished ...>
[pid 494754] <... mmap resumed>) = 0x7ff48b90b000
<0.000022>
[pid 494754] pread64(3, <unfinished ...>
[pid 494753] <... mmap resumed>) = 0x7f03ab9b2000
<0.000073>
[pid 494754] <... pread64 resumed>"\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\0\"... ,
784, 64) = 784 <0.000030>
[pid 494753] mmap(0x7f03ab9d4000, 1396736, PROT_READ|
PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0
x22000 <unfinished ...>

```

```

[pid 494754] mmap(NULL, 1936688, PROT_READ, MAP_PRIVATE|
MAP_DENYWRITE, 3, 0) = 0x7ff48b732000 <0.000037>
[pid 494753] <... mmap resumed>) = 0x7f03ab9d4000
<0.000078>
[pid 494754] mmap(0x7ff48b754000, 1396736, PROT_READ|
PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0
x22000 <unfinished ...>
[pid 494753] mmap(0x7f03abb29000, 344064, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x177000 <
unfinished ...>
[pid 494754] <... mmap resumed>) = 0x7ff48b754000
<0.000059>
[pid 494753] <... mmap resumed>) = 0x7f03abb29000
<0.000062>
[pid 494754] mmap(0x7ff48b8a9000, 344064, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x177000 <
unfinished ...>
[pid 494753] mmap(0x7f03abb7d000, 24576, PROT_READ|
PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0
x1ca000 <unfinished ...>
[pid 494754] <... mmap resumed>) = 0x7ff48b8a9000
<0.000031>
[pid 494754] mmap(0x7ff48b8fd000, 24576, PROT_READ|
PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0
x1ca000 <unfinished ...>
[pid 494753] <... mmap resumed>) = 0x7f03abb7d000
<0.000066>
[pid 494754] <... mmap resumed>) = 0x7ff48b8fd000
<0.000033>
[pid 494753] mmap(0x7f03abb83000, 32048, PROT_READ|
PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1,
0 <unfinished ...>
[pid 494754] mmap(0x7ff48b903000, 32048, PROT_READ|
PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1,
0 <unfinished ...>
[pid 494753] <... mmap resumed>) = 0x7f03abb83000
<0.000030>
[pid 494754] <... mmap resumed>) = 0x7ff48b903000
<0.000032>
[pid 494754] close(3 <unfinished ...>
[pid 494753] close(3 <unfinished ...>
[pid 494754] <... close resumed>) = 0 <0.000030>
[pid 494753] <... close resumed>) = 0 <0.000034>
[pid 494754] mmap(NULL, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_ANONYMOUS, -1, 0 <unfinished ...>
[pid 494753] mmap(NULL, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_ANONYMOUS, -1, 0 <unfinished ...>
[pid 494754] <... mmap resumed>) = 0x7ff48b730000
<0.000033>

```

```

[pid 494753] <... mmap resumed>) = 0x7f03ab9b0000
<0.000032>
[pid 494754] arch_prctl(ARCH_SET_FS, 0x7ff48b90c680 <
unfinished ...>
[pid 494753] arch_prctl(ARCH_SET_FS, 0x7f03abb8c680 <
unfinished ...>
[pid 494754] <... arch_prctl resumed>) = 0 <0.000030>
[pid 494753] <... arch_prctl resumed>) = 0 <0.000030>
[pid 494754] set_tid_address(0x7ff48b90c950 <unfinished
...>
[pid 494753] set_tid_address(0x7f03abb8c950 <unfinished
...>
[pid 494754] <... set_tid_address resumed>) = 494754
<0.000032>
[pid 494753] <... set_tid_address resumed>) = 494753
<0.000031>
[pid 494754] set_robust_list(0x7ff48b90c960, 24 <
unfinished ...>
[pid 494753] set_robust_list(0x7f03abb8c960, 24 <
unfinished ...>
[pid 494754] <... set_robust_list resumed>) = 0
<0.000033>
[pid 494753] <... set_robust_list resumed>) = 0
<0.000045>
[pid 494754] rseq(0x7ff48b90cfa0, 0x20, 0, 0x53053053 <
unfinished ...>
[pid 494753] rseq(0x7f03abb8cfa0, 0x20, 0, 0x53053053 <
unfinished ...>
[pid 494754] <... rseq resumed>) = 0 <0.000031>
[pid 494753] <... rseq resumed>) = 0 <0.000031>
[pid 494754] mprotect(0x7ff48b8fd000, 16384, PROT_READ <
unfinished ...>
[pid 494753] mprotect(0x7f03abb7d000, 16384, PROT_READ <
unfinished ...>
[pid 494754] <... mprotect resumed>) = 0 <0.000035>
[pid 494753] <... mprotect resumed>) = 0 <0.000047>
[pid 494754] mprotect(0x55813846a000, 4096, PROT_READ <
unfinished ...>
[pid 494753] mprotect(0x55d66e551000, 4096, PROT_READ <
unfinished ...>
[pid 494754] <... mprotect resumed>) = 0 <0.000040>
[pid 494753] <... mprotect resumed>) = 0 <0.000033>
[pid 494754] mprotect(0x7ff48b957000, 8192, PROT_READ <
unfinished ...>
[pid 494753] mprotect(0x7f03abbd7000, 8192, PROT_READ <
unfinished ...>
[pid 494754] <... mprotect resumed>) = 0 <0.000061>
[pid 494753] <... mprotect resumed>) = 0 <0.000057>
[pid 494754] prlimit64(0, RLIMIT_STACK, NULL, <

```

```

unfinished ...>
[pid 494753] prlimit64(0, RLIMIT_STACK, NULL, <
unfinished ...>
[pid 494754] <... prlimit64 resumed>{rlim_cur=8192*1024,
    rlim_max=RLIM64_INFINITY}) = 0 <0.000025>
[pid 494753] <... prlimit64 resumed>{rlim_cur=8192*1024,
    rlim_max=RLIM64_INFINITY}) = 0 <0.000048>
[pid 494754] munmap(0x7ff48b90d000, 100195 <unfinished
...>
[pid 494753] munmap(0x7f03abb8d000, 100195 <unfinished
...>
[pid 494754] <... munmap resumed>) = 0 <0.000057>
[pid 494753] <... munmap resumed>) = 0 <0.000062>
[pid 494754] mmap(NULL, 1024, PROT_READ|PROT_WRITE,
    MAP_SHARED, 0, 0 <unfinished ...>
[pid 494753] mmap(NULL, 1024, PROT_READ|PROT_WRITE,
    MAP_SHARED, 0, 0 <unfinished ...>
[pid 494754] <... mmap resumed>) = 0x7ff48b925000
    <0.000055>
[pid 494753] <... mmap resumed>) = 0x7f03abba5000
    <0.000030>
[pid 494754] openat(AT_FDCWD, "/dev/shm/sem.
    w_semaphore_2", O_RDWR|O_NOFOLLOW <unfinished ...>
[pid 494753] openat(AT_FDCWD, "/dev/shm/sem.
    w_semaphore_1", O_RDWR|O_NOFOLLOW <unfinished ...>
[pid 494754] <... openat resumed>) = 3 <0.000054>
[pid 494753] <... openat resumed>) = 3 <0.000034>
[pid 494754] newfstatat(3, "", <unfinished ...>
[pid 494753] newfstatat(3, "", <unfinished ...>
[pid 494754] <... newfstatat resumed>{st_mode=S_IFREG
    |0600, st_size=32, ...}, AT_EMPTY_PATH) = 0
    <0.000034>
[pid 494753] <... newfstatat resumed>{st_mode=S_IFREG
    |0600, st_size=32, ...}, AT_EMPTY_PATH) = 0
    <0.000039>
[pid 494754] getrandom( <unfinished ...>
[pid 494753] getrandom( <unfinished ...>
[pid 494754] <... getrandom resumed>"\xd7\x6c\x06\xc6\x
    x8e\xf1\xa5\x4a", 8, GRND_NONBLOCK) = 8 <0.000024>
[pid 494753] <... getrandom resumed>"\x6e\x58\x57\x86\x
    xa7\x75\xe4\x3a", 8, GRND_NONBLOCK) = 8 <0.000036>
[pid 494754] brk(NULL <unfinished ...>
[pid 494753] brk(NULL <unfinished ...>
[pid 494754] <... brk resumed>) = 0x558139088000
    <0.000026>
[pid 494753] <... brk resumed>) = 0x55d66f6bb000
    <0.000028>
[pid 494754] brk(0x5581390a9000 <unfinished ...>
[pid 494753] brk(0x55d66f6dc000 <unfinished ...>

```

```

[pid 494754] <... brk resumed>) = 0x5581390a9000
<0.000027>
[pid 494753] <... brk resumed>) = 0x55d66f6dc000
<0.000028>
[pid 494754] mmap(NULL, 32, PROT_READ|PROT_WRITE,
MAP_SHARED, 3, 0 <unfinished ...>
[pid 494753] mmap(NULL, 32, PROT_READ|PROT_WRITE,
MAP_SHARED, 3, 0 <unfinished ...>
[pid 494754] <... mmap resumed>) = 0x7ff48b924000
<0.000024>
[pid 494753] <... mmap resumed>) = 0x7f03abba4000
<0.000026>
[pid 494754] close(3 <unfinished ...>
[pid 494753] close(3 <unfinished ...>
[pid 494754] <... close resumed>) = 0 <0.000026>
[pid 494753] <... close resumed>) = 0 <0.000038>
[pid 494754] openat(AT_FDCWD, "/dev/shm/sem.
rev_semaphore_2", O_RDWR|O_NOFOLLOW <unfinished ...>
[pid 494753] openat(AT_FDCWD, "/dev/shm/sem.
rev_semaphore_1", O_RDWR|O_NOFOLLOW <unfinished ...>
[pid 494754] <... openat resumed>) = 3 <0.000033>
[pid 494753] <... openat resumed>) = 3 <0.000030>
[pid 494754] newfstatat(3, "", <unfinished ...>
[pid 494753] newfstatat(3, "", <unfinished ...>
[pid 494754] <... newfstatat resumed>{st_mode=S_IFREG
|0600, st_size=32, ...}, AT_EMPTY_PATH) = 0
<0.000032>
[pid 494753] <... newfstatat resumed>{st_mode=S_IFREG
|0600, st_size=32, ...}, AT_EMPTY_PATH) = 0
<0.000038>
[pid 494754] mmap(NULL, 32, PROT_READ|PROT_WRITE,
MAP_SHARED, 3, 0 <unfinished ...>
[pid 494753] mmap(NULL, 32, PROT_READ|PROT_WRITE,
MAP_SHARED, 3, 0) = 0x7f03abba3000 <0.000035>
[pid 494753] close(3) = 0 <0.000020>
[pid 494753] futex(0x7f03abba3000, FUTEX_WAIT_BITSET|
FUTEX_CLOCK_REALTIME, 0, {tv_sec=1703624281, tv_nsec
=475385511}, FUTEX_BITSET_MATCH_ANY <unfinished ...>
[pid 494754] <... mmap resumed>) = 0x7ff48b923000
<0.000498>
[pid 494754] close(3) = 0 <0.000021>
[pid 494754] newfstatat(1, "", {st_mode=S_IFREG|0644,
st_size=0, ...}, AT_EMPTY_PATH) = 0 <0.000026>
[pid 494754] futex(0x7ff48b924000, FUTEX_WAKE, 1) = 1
<0.000021>
[pid 494752] <... futex resumed>) = 0 <0.005928>
[pid 494754] futex(0x7ff48b923000, FUTEX_WAIT_BITSET|
FUTEX_CLOCK_REALTIME, 0, {tv_sec=1703624281, tv_nsec
=476050170}, FUTEX_BITSET_MATCH_ANY <unfinished ...>

```

```

[pid 494752] futex(0x7f69e80ef000, FUTEX_WAKE, 1 <
    unfinished ...>
[pid 494754] <... futex resumed>)          = -1 EAGAIN (
    Resource temporarily unavailable) <0.000028>
[pid 494752] <... futex resumed>)          = 0 <0.000038>
[pid 494754] futex(0x7ff48b923000, FUTEX_WAIT_BITSET|
    FUTEX_CLOCK_REALTIME, 0, {tv_sec=1703624281, tv_nsec
    =476147434}, FUTEX_BITSET_MATCH_ANY <unfinished ...>
[pid 494752] futex(0x7f69e80f1000, FUTEX_WAKE, 1) = 1
    <0.000027>
[pid 494753] <... futex resumed>)          = 0 <0.000808>
[pid 494752] futex(0x7f69e80f2000, FUTEX_WAIT_BITSET|
    FUTEX_CLOCK_REALTIME, 0, {tv_sec=1703624281, tv_nsec
    =476279223}, FUTEX_BITSET_MATCH_ANY <unfinished ...>
[pid 494753] newfstatat(1, "", {st_mode=S_IFREG|0644,
    st_size=0, ...}, AT_EMPTY_PATH) = 0 <0.000022>
[pid 494753] futex(0x7f03abba4000, FUTEX_WAKE, 1) = 1
    <0.000022>
[pid 494752] <... futex resumed>)          = 0 <0.000183>
[pid 494753] futex(0x7f03abba3000, FUTEX_WAIT_BITSET|
    FUTEX_CLOCK_REALTIME, 0, {tv_sec=1703624281, tv_nsec
    =476505291}, FUTEX_BITSET_MATCH_ANY <unfinished ...>
[pid 494752] futex(0x7f69e80f1000, FUTEX_WAKE, 1 <
    unfinished ...>
[pid 494753] <... futex resumed>)          = -1 EAGAIN (
    Resource temporarily unavailable) <0.000028>
[pid 494752] <... futex resumed>)          = 0 <0.000033>
[pid 494753] futex(0x7f03abba3000, FUTEX_WAIT_BITSET|
    FUTEX_CLOCK_REALTIME, 0, {tv_sec=1703624281, tv_nsec
    =476587397}, FUTEX_BITSET_MATCH_ANY <unfinished ...>
[pid 494752] futex(0x7f69e80f1000, FUTEX_WAKE, 1 <
    unfinished ...>
[pid 494753] <... futex resumed>)          = -1 EAGAIN (
    Resource temporarily unavailable) <0.000028>
[pid 494752] <... futex resumed>)          = 0 <0.000031>
[pid 494753] futex(0x7f03abba3000, FUTEX_WAIT_BITSET|
    FUTEX_CLOCK_REALTIME, 0, {tv_sec=1703624281, tv_nsec
    =476674672}, FUTEX_BITSET_MATCH_ANY <unfinished ...>
[pid 494752] futex(0x7f69e80f1000, FUTEX_WAKE, 1 <
    unfinished ...>
[pid 494753] <... futex resumed>)          = -1 EAGAIN (
    Resource temporarily unavailable) <0.000028>
[pid 494752] <... futex resumed>)          = 0 <0.000030>
[pid 494753] futex(0x7f03abba3000, FUTEX_WAIT_BITSET|
    FUTEX_CLOCK_REALTIME, 0, {tv_sec=1703624281, tv_nsec
    =476761175}, FUTEX_BITSET_MATCH_ANY <unfinished ...>
[pid 494752] futex(0x7f69e80ef000, FUTEX_WAKE, 1) = 1
    <0.000039>
[pid 494754] <... futex resumed>)          = 0 <0.000688>

```

```

[pid 494752] futex(0x7f69e80f1000, FUTEX_WAKE, 1 <
    unfinished ...>
[pid 494754] futex(0x7ff48b923000, FUTEX_WAIT_BITSET|
    FUTEX_CLOCK_REALTIME, 0, {tv_sec=1703624281, tv_nsec
    =476890691}, FUTEX_BITSET_MATCH_ANY <unfinished ...>
[pid 494752] <... futex resumed>) = 1 <0.000040>
[pid 494753] <... futex resumed>) = 0 <0.000163>
[pid 494752] futex(0x7f69e80f2000, FUTEX_WAIT_BITSET|
    FUTEX_CLOCK_REALTIME, 0, {tv_sec=1703624281, tv_nsec
    =476965382}, FUTEX_BITSET_MATCH_ANY <unfinished ...>
[pid 494753] futex(0x7f03abba4000, FUTEX_WAKE, 1 <
    unfinished ...>
[pid 494752] <... futex resumed>) = -1 EAGAIN (
    Resource temporarily unavailable) <0.000028>
[pid 494753] <... futex resumed>) = 0 <0.000033>
[pid 494752] futex(0x7f69e80f2000, FUTEX_WAIT_BITSET|
    FUTEX_CLOCK_REALTIME, 0, {tv_sec=1703624281, tv_nsec
    =477052808}, FUTEX_BITSET_MATCH_ANY <unfinished ...>
[pid 494753] futex(0x7f03abba4000, FUTEX_WAKE, 1 <
    unfinished ...>
[pid 494752] <... futex resumed>) = -1 EAGAIN (
    Resource temporarily unavailable) <0.000028>
[pid 494753] <... futex resumed>) = 0 <0.000031>
[pid 494752] futex(0x7f69e80f2000, FUTEX_WAIT_BITSET|
    FUTEX_CLOCK_REALTIME, 0, {tv_sec=1703624281, tv_nsec
    =477143830}, FUTEX_BITSET_MATCH_ANY <unfinished ...>
[pid 494753] futex(0x7f03abba4000, FUTEX_WAKE, 1 <
    unfinished ...>
[pid 494752] <... futex resumed>) = -1 EAGAIN (
    Resource temporarily unavailable) <0.000028>
[pid 494753] <... futex resumed>) = 0 <0.000030>
[pid 494752] futex(0x7f69e80f2000, FUTEX_WAIT_BITSET|
    FUTEX_CLOCK_REALTIME, 0, {tv_sec=1703624281, tv_nsec
    =477229412}, FUTEX_BITSET_MATCH_ANY <unfinished ...>
[pid 494753] futex(0x7f03abba4000, FUTEX_WAKE, 1 <
    unfinished ...>
[pid 494752] <... futex resumed>) = -1 EAGAIN (
    Resource temporarily unavailable) <0.000027>
[pid 494753] <... futex resumed>) = 0 <0.000032>
[pid 494752] futex(0x7f69e80f2000, FUTEX_WAIT_BITSET|
    FUTEX_CLOCK_REALTIME, 0, {tv_sec=1703624281, tv_nsec
    =477318741}, FUTEX_BITSET_MATCH_ANY <unfinished ...>
[pid 494753] futex(0x7f03abba4000, FUTEX_WAKE, 1 <
    unfinished ...>
[pid 494752] <... futex resumed>) = -1 EAGAIN (
    Resource temporarily unavailable) <0.000038>
[pid 494753] <... futex resumed>) = 0 <0.000037>
[pid 494752] futex(0x7f69e80ef000, FUTEX_WAKE, 1 <
    unfinished ...>

```

```

[pid 494753] futex(0x7f03abba3000, FUTEX_WAIT_BITSET|
    FUTEX_CLOCK_REALTIME, 0, {tv_sec=1703624281, tv_nsec
    =477443447}, FUTEX_BITSET_MATCH_ANY <unfinished ...>
[pid 494752] <... futex resumed>)          = 1 <0.000033>
[pid 494754] <... futex resumed>)          = 0 <0.000600>
[pid 494752] futex(0x7f69e80f1000, FUTEX_WAKE, 1 <
    unfinished ...>
[pid 494754] futex(0x7ff48b923000, FUTEX_WAIT_BITSET|
    FUTEX_CLOCK_REALTIME, 0, {tv_sec=1703624281, tv_nsec
    =477556150}, FUTEX_BITSET_MATCH_ANY <unfinished ...>
[pid 494752] <... futex resumed>)          = 1 <0.000039>
[pid 494753] <... futex resumed>)          = 0 <0.000114>
[pid 494752] read(0, <unfinished ...>
[pid 494753] futex(0x7f03abba3000, FUTEX_WAIT_BITSET|
    FUTEX_CLOCK_REALTIME, 0, {tv_sec=1703624281, tv_nsec
    =477634409}, FUTEX_BITSET_MATCH_ANY <unfinished ...>
[pid 494752] <... read resumed>"" , 4096) = 0 <0.000041>
[pid 494752] futex(0x7f69e80ef000, FUTEX_WAKE, 1) = 1
    <0.000023>
[pid 494752] futex(0x7f69e80f1000, FUTEX_WAKE, 1 <
    unfinished ...>
[pid 494754] <... futex resumed>)          = 0 <0.000221>
[pid 494752] <... futex resumed>)          = 1 <0.000028>
[pid 494753] <... futex resumed>)          = 0 <0.000168>
[pid 494752] wait4(-1, <unfinished ...>
[pid 494754] munmap(0x7ff48b925000, 1024 <unfinished
    ...>
[pid 494753] munmap(0x7f03abba5000, 1024 <unfinished
    ...>
[pid 494754] <... munmap resumed>)          = 0 <0.000044>
[pid 494753] <... munmap resumed>)          = 0 <0.000045>
[pid 494754] munmap(0x7ff48b924000, 32 <unfinished ...>
[pid 494753] munmap(0x7f03abba4000, 32 <unfinished ...>
[pid 494754] <... munmap resumed>)          = 0 <0.000028>
[pid 494753] <... munmap resumed>)          = 0 <0.000029>
[pid 494754] munmap(0x7ff48b923000, 32 <unfinished ...>
[pid 494753] munmap(0x7f03abba3000, 32 <unfinished ...>
[pid 494754] <... munmap resumed>)          = 0 <0.000027>
[pid 494753] <... munmap resumed>)          = 0 <0.000029>
[pid 494754] write(1, "flewllfelwlfewlfewlfewifjewif\nls
    "... , 83 <unfinished ...>
[pid 494753] write(1, "ds\n\n\nnsfd\ndggd\nd\nf\nnrhtrg\n\
    nr\n\n", 28 <unfinished ...>
[pid 494754] <... write resumed>)          = 83 <0.000101>
[pid 494753] <... write resumed>)          = 28 <0.000102>
[pid 494754] exit_group(0 <unfinished ...>
[pid 494753] exit_group(0 <unfinished ...>
[pid 494754] <... exit_group resumed>)      = ?
[pid 494753] <... exit_group resumed>)      = ?

```



```

[pid 494754] +++ exited with 0 +++
[pid 494753] +++ exited with 0 +++
<... wait4 resumed>[{WIFEXITED(s) && WEXITSTATUS(s) ==
  0}], 0, NULL) = 494753 <0.000861>
--- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED,
  si_pid=494754, si_uid=1000, si_status=0, si_utime=0,
  si_stime=0} ---
wait4(-1, [{WIFEXITED(s) && WEXITSTATUS(s) == 0}], 0,
  NULL) = 494754 <0.000030>
unlink("/dev/shm/sem.w_semaphore_1")      = 0 <0.000045>
munmap(0x7f69e80f2000, 32)                  = 0 <0.000066>
unlink("/dev/shm/sem.rev_semaphore_1")     = 0 <0.000033>
munmap(0x7f69e80f1000, 32)                  = 0 <0.000061>
unlink("/dev/shm/sem.w_semaphore_2")       = 0 <0.000034>
munmap(0x7f69e80f0000, 32)                  = 0 <0.000050>
unlink("/dev/shm/sem.rev_semaphore_2")     = 0 <0.000031>
munmap(0x7f69e80ef000, 32)                  = 0 <0.000051>
unlink("/dev/shm/shared_memory_1")         = 0 <0.000032>
munmap(0x7f69e80f4000, 1024)                = 0 <0.000037>
unlink("/dev/shm/shared_memory_2")         = 0 <0.000032>
munmap(0x7f69e80f3000, 1024)                = 0 <0.000039>
exit_group(0)                              = ?
+++ exited with 0 +++

```

1. `execve("./lab3 [\"lab3\"], 0x7ffc1ebf2be8 /* 58 vars */) = 0 <0.001022>`: Этот вызов `execve`, который выполняет программу `lab3`. Значение 0 означает успешное выполнение.
2. `brk(NULL) = 0x55787aea9000 <0.000027>`: Этот вызов `brk` используется для расширения размера кучи программы. Здесь он устанавливает верхний предел кучи на адрес `0x55787aea9000`.
3. `access("/etc/ld.so.preload R_OK) = -1 ENOENT (No such file or directory) <0.000043>` Этот вызов используется для того, чтобы узнать существует ли файл `/etc/ld.so.preload`. Он не обнаруживается.
4. `openat(AT_FDCWD, "/etc/ld.so.cache O_RDONLY|O_CLOEXEC) = 3 <0.000076>`: Этот вызов открывает файл `/etc/ld.so.cache` для чтения. Данный файл содержит кэш динамически загружаемых библиотек, которые используются для быстрого поиска библиотек при выполнении программ.
5. `newfstatat(3, , {st_mode=S_IFREG|0644, st_size=100195, ...}, AT_EMPTY_PATH) = 0 <0.000036>`: Этот вызов получает информацию о файле, который связан с дескриптором 3.
6. `mmap(NULL, 100195, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7f69e80dc000 <0.000041>`: Выделение памяти с использованием системного вызова `mmap`. Этот вызов создает отображение файла `/etc/ld.so.cache` в виртуальную память для чтения (`PROT_READ`) размером 100195 байт,

начиная с адреса 0x7f34fc57e000. Отображение является частным и открыто только для чтения.

7. `close(3) = 0`: Этот вызов закрывает файловый дескриптор 3 (который был использован для `ld.so.cache`).
8. `read(3, "...", 832) = 832 <0.000027>`: Чтение 832 битов из файла `/usr/lib64/libc.so.6`.
9. `arch_prctl(ARCH_SET_FS, 0x7f69e80db680) = 0 <0.000020>`: Задаёт состояние процесса.
10. `mprotect(0x7f69e8126000, 8192, PROT_READ) = 0 <0.000046>`: Этот вызов изменяет права доступа к памяти.
11. `munmap(0x7f69e80dc000, 100195) = 0 <0.000069>`: Снимает отражение файла или устройства в памяти.
12. `prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 0 <0.000023>`: Этот вызов изменяет ограничения ресурсов процесса. Здесь он изменяет текущий размер стека в  $8192*1024$  байт и убирает ограничение на максимальный размер стека.
13. `link("/dev/shm/sem.YCQqCP "/dev/shm/sem.w_semaphore_1") = 0 <0.000035>`: Создает новую ссылку (также известную как "жесткая" ссылка) на существующий файл.
14. `unlink("/dev/shm/sem.YCQqCP") = 0 <0.000027>` Удаляет имя из файловой системы.
15. `ftruncate(3, 1024) = 0 <0.000043>`: Этот вызов устанавливает размер файла, связанного с файловым дескриптором 3, в 1024 байта.
16. `getpid() = 16879`: Получение идентификатора текущего процесса.
17. `write(5, "0..0 32) = 32 <0.000044> = 32`: Запись 32 байт нулей в файл, связанный с файловым дескриптором 4.
18. `clone(child_stack=NULL, flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD, child_tidptr=0x7f69e80db950) = 494753 <0.000302>`: Создание нового дочернего процесса процесса, являющегося копией родительского.
19. `dup2(3, 0) = 0 <0.000012>`: Делает дескриптор 0 копией дескриптора 3.
20. `execve("child_lab3 ["child_lab3 "w_semaphore_1 "rev_semaphore_1"], 0x7fff80dcbf18)`: Выполняет программу, `child_lab3` в дочернем процессе.
21. `futex(0x7f69e80f2000, FUTEX_WAIT_BITSET|FUTEX_CLOCK_REALTIME, 0, {tv_sec=1703624281, tv_nsec=476965382}, FUTEX_BITSET_MATCH_ANY)`: Взаимодействие с фьютексом (низкоуровневый легковесный примитив синхронизации), на основе которого реализован семафор.

- 22. `wait4(-1, [{WIFEXITED(s) && WEXITSTATUS(s) == 0}], 0, NULL) = 494754 <0.000030>`: Приостанавливает исполнение текущего процесса до того, как свою работу завершит любой дочерний процесс.
- 23. `exit_group(0) = ?`: Завершает работу всех потоков процесса.

## 6 Выводы

В результате выполнения данной лабораторной работы я ознакомился с таким средством диагностики как `strace`, с помощью которой можно отследить системные вызовы, выполняемые программой. Я приобрёл практические навыки диагностики работы программного обеспечения.