Московский Авиационный Институт

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Факультет информационных технологий и прикладной математики

Кафедра вычислительной математики и программирования

**Лабораторная работа №1 по курсу**

**«Операционные системы»**

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Дата: \_\_\_\_\_\_\_\_\_\_\_

Подпись: \_\_\_\_\_\_\_\_\_\_\_

Москва, 2022

**Постановка задачи**

Приобретение практических навыков диагностики работы программного обеспечения. Используемое средство диагностики — утилита strace**.**

**Демонстрация полного функционала утилиты strace на**

**примере ЛР №2**

Strace - это утилита для диагностики, отладки и поиска неисправностей

программ для Linux. Она используется для мониторинга взаимодействиями

между процессами и ядром Linux, которые включают в себя системные вызовы,

доставку сигналов и изменение состояния процесса. Работа strace становится

возможной благодаря функции ядра, известной как ptrace.

Отображение всех вызовов:

execve("./lab2", ["./lab2", "child1", "child2"], 0x7ffc23170b60 /\* 18 vars \*/) = 0

brk(NULL) = 0x562bd9d30000

arch\_prctl(0x3001 /\* ARCH\_??? \*/, 0x7fff92df4950) = -1 EINVAL (Invalid argument)

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

fstat(3, {st\_mode=S\_IFREG|0644, st\_size=82162, ...}) = 0

mmap(NULL, 82162, PROT\_READ, MAP\_PRIVATE, 3, 0) = 0x7f5d3fe63000

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`\341\t\0\0\0\0\0"..., 832) = 832

fstat(3, {st\_mode=S\_IFREG|0644, st\_size=1956992, ...}) = 0

mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f5d3fe61000

mmap(NULL, 1972224, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f5d3fc7f000

mprotect(0x7f5d3fd15000, 1290240, PROT\_NONE) = 0

mmap(0x7f5d3fd15000, 987136, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x96000) = 0x7f5d3fd15000

mmap(0x7f5d3fe06000, 299008, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x187000) = 0x7f5d3fe06000

mmap(0x7f5d3fe50000, 57344, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1d0000) = 0x7f5d3fe50000

mmap(0x7f5d3fe5e000, 10240, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f5d3fe5e000

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\3405\0\0\0\0\0\0"..., 832) = 832

fstat(3, {st\_mode=S\_IFREG|0644, st\_size=104984, ...}) = 0

mmap(NULL, 107592, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f5d3fc64000

mmap(0x7f5d3fc67000, 73728, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x3000) = 0x7f5d3fc67000

mmap(0x7f5d3fc79000, 16384, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x15000) = 0x7f5d3fc79000

mmap(0x7f5d3fc7d000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x18000) = 0x7f5d3fc7d000

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\360q\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

pread64(3, "\4\0\0\0\20\0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0\0", 32, 848) = 32

pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\t\233\222%\274\260\320\31\331\326\10\204\276X>\263"..., 68, 880) = 68

fstat(3, {st\_mode=S\_IFREG|0755, st\_size=2029224, ...}) = 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

pread64(3, "\4\0\0\0\20\0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0\0", 32, 848) = 32

pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\t\233\222%\274\260\320\31\331\326\10\204\276X>\263"..., 68, 880) = 68

mmap(NULL, 2036952, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f5d3fa72000

mprotect(0x7f5d3fa97000, 1847296, PROT\_NONE) = 0

mmap(0x7f5d3fa97000, 1540096, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x25000) = 0x7f5d3fa97000

mmap(0x7f5d3fc0f000, 303104, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x19d000) = 0x7f5d3fc0f000

mmap(0x7f5d3fc5a000, 24576, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1e7000) = 0x7f5d3fc5a000

mmap(0x7f5d3fc60000, 13528, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f5d3fc60000

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\300\363\0\0\0\0\0\0"..., 832) = 832

fstat(3, {st\_mode=S\_IFREG|0644, st\_size=1369352, ...}) = 0

mmap(NULL, 1368336, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f5d3f923000

mmap(0x7f5d3f932000, 684032, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0xf000) = 0x7f5d3f932000

mmap(0x7f5d3f9d9000, 618496, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0xb6000) = 0x7f5d3f9d9000

mmap(0x7f5d3fa70000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x14c000) = 0x7f5d3fa70000

close(3) = 0

mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f5d3f921000

arch\_prctl(ARCH\_SET\_FS, 0x7f5d3f922100) = 0

mprotect(0x7f5d3fc5a000, 12288, PROT\_READ) = 0

mprotect(0x7f5d3fa70000, 4096, PROT\_READ) = 0

mprotect(0x7f5d3fc7d000, 4096, PROT\_READ) = 0

mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f5d3f91f000

mprotect(0x7f5d3fe50000, 45056, PROT\_READ) = 0

mprotect(0x562bd9503000, 4096, PROT\_READ) = 0

mprotect(0x7f5d3fea5000, 4096, PROT\_READ) = 0

munmap(0x7f5d3fe63000, 82162) = 0

brk(NULL) = 0x562bd9d30000

brk(0x562bd9d51000) = 0x562bd9d51000

fstat(0, {st\_mode=S\_IFCHR|0620, st\_rdev=makedev(0x88, 0x3), ...}) = 0

read(0,

"\n", 1024) = 1

pipe([3, 4]) = 0

pipe([5, 6]) = 0

clone(child\_stack=NULL, flags=CLONE\_CHILD\_CLEARTID|CLONE\_CHILD\_SETTID|SIGCHLD, child\_tidptr=0x7f5d3f9223d0) = 1876

close(3) = 0

write(4, "", 0) = 0

close(4) = 0

pipe([3, 4]) = 0

clone(child\_stack=NULL, flags=CLONE\_CHILD\_CLEARTID|CLONE\_CHILD\_SETTID|SIGCHLD, child\_tidptr=0x7f5d3f9223d0) = 1877

close(4) = 0

close(6) = 0

close(5) = 0

wait4(-1, NULL, 0, NULL) = 1876

--- SIGCHLD {si\_signo=SIGCHLD, si\_code=CLD\_EXITED, si\_pid=1876, si\_uid=1000, si\_status=0, si\_utime=0, si\_stime=0} ---

read(3, "", 1) = 0

close(3) = 0

fstat(1, {st\_mode=S\_IFCHR|0620, st\_rdev=makedev(0x88, 0x3), ...}) = 0

write(1, "\n", 1

) = 1

exit\_group(0) = ?

+++ exited with 0 +++

**Опция -e служит для отображения лишь определенных вызовов.**

kivi@LAPTOP-DGOM1IRE:~/os/lab\_2/lab2/l2$ strace -e fork ./lab2 child1 child2

--- SIGCHLD {si\_signo=SIGCHLD, si\_code=CLD\_EXITED, si\_pid=1889, si\_uid=1000, si\_status=0, si\_utime=0, si\_stime=1} ---

--- SIGCHLD {si\_signo=SIGCHLD, si\_code=CLD\_EXITED, si\_pid=1890, si\_uid=1000, si\_status=0, si\_utime=0, si\_stime=0} ---

+++ exited with 0 +++

kivi@LAPTOP-DGOM1IRE:~/os/lab\_2/lab2/l2$ strace -e close ./lab2 child1 child2

close(3) = 0

close(3) = 0

close(3) = 0

close(3) = 0

close(3) = 0

close(3) = 0

close(4) = 0

--- SIGCHLD {si\_signo=SIGCHLD, si\_code=CLD\_EXITED, si\_pid=1895, si\_uid=1000, si\_status=0, si\_utime=0, si\_stime=0} ---

close(4) = 0

close(6) = 0

close(5) = 0

--- SIGCHLD {si\_signo=SIGCHLD, si\_code=CLD\_EXITED, si\_pid=1896, si\_uid=1000, si\_status=0, si\_utime=1, si\_stime=0} ---

close(3) = 0

+++ exited with 0 +++

kivi@LAPTOP-DGOM1IRE:~/os/lab\_2/lab2/l2$ strace -e pipe ./lab2 child1 child2

pipe([3, 4]) = 0

pipe([5, 6]) = 0

pipe([3, 4]) = 0

--- SIGCHLD {si\_signo=SIGCHLD, si\_code=CLD\_EXITED, si\_pid=1901, si\_uid=1000, si\_status=0, si\_utime=0, si\_stime=0} ---

+++ exited with 0 +++

**Можно и несколько типов вызовов сразу: -e trace= и через запятую — список вызовов.**

kivi@LAPTOP-DGOM1IRE:~/os/lab\_2/lab2/l2$ strace -f -e trace=write,read ./lab2 child1 child2

read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0`\341\t\0\0\0\0\0"..., 832) = 832

read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\3405\0\0\0\0\0\0"..., 832) = 832

read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\360q\2\0\0\0\0\0"..., 832) = 832

read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\300\363\0\0\0\0\0\0"..., 832) = 832

read(0,

"\n", 1024) = 1

strace: Process 1930 attached

[pid 1929] write(4, "", 0) = 0

strace: Process 1931 attached

[pid 1930] read(4, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0`\341\t\0\0\0\0\0"..., 832) = 832

[pid 1931] read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0`\341\t\0\0\0\0\0"..., 832) = 832

[pid 1930] read(4, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\360q\2\0\0\0\0\0"..., 832) = 832

[pid 1931] read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\360q\2\0\0\0\0\0"..., 832) = 832

[pid 1930] read(4, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\300\363\0\0\0\0\0\0"..., 832) = 832

[pid 1931] read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\300\363\0\0\0\0\0\0"..., 832) = 832

[pid 1930] read(4, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\3405\0\0\0\0\0\0"..., 832) = 832

[pid 1931] read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\3405\0\0\0\0\0\0"..., 832) = 832

[pid 1931] read(0, <unfinished ...>

[pid 1930] read(0, "", 100) = 0

[pid 1931] <... read resumed>"", 100) = 0

[pid 1930] +++ exited with 0 +++

[pid 1929] --- SIGCHLD {si\_signo=SIGCHLD, si\_code=CLD\_EXITED, si\_pid=1930, si\_uid=1000, si\_status=0, si\_utime=0, si\_stime=0} ---

[pid 1929] read(3, "", 1) = 0

[pid 1931] +++ exited with 0 +++

--- SIGCHLD {si\_signo=SIGCHLD, si\_code=CLD\_EXITED, si\_pid=1931, si\_uid=1000, si\_status=0, si\_utime=0, si\_stime=0} ---

write(1, "\n", 1

) = 1

+++ exited with 0 +++

**Отслеживание дочерних процессов:**

**Отслеживать дерево процессов целиком помогает флаг -f, с которым strace отслеживает системные вызовы в процессах-потомках. К каждой строке вывода при этом добавляется pid процесса, делающего системный вывод:**

kivi@LAPTOP-DGOM1IRE:~/os/lab\_2/lab2/l2$ strace -f -e trace=pipe ./lab2 child1 child2

pipe([3, 4]) = 0

pipe([5, 6]) = 0

strace: Process 1937 attached

[pid 1936] pipe([3, 4]) = 0

strace: Process 1938 attached

[pid 1937] +++ exited with 0 +++

[pid 1936] --- SIGCHLD {si\_signo=SIGCHLD, si\_code=CLD\_EXITED, si\_pid=1937, si\_uid=1000, si\_status=0, si\_utime=0, si\_stime=0} ---

[pid 1938] +++ exited with 0 +++

--- SIGCHLD {si\_signo=SIGCHLD, si\_code=CLD\_EXITED, si\_pid=1938, si\_uid=1000, si\_status=0, si\_utime=0, si\_stime=0} ---

+++ exited with 0 +++

**Пути к файлам вместо дескрипторов: Ключ -y позволяет взглянуть на название файлов, с которыми работает процесс, вместо файловых дескрипторов:**

kivi@LAPTOP-DGOM1IRE:~/os/lab\_2/lab2/l2$ strace -y -e read ./lab2 child1 child2

read(3</usr/lib/x86\_64-linux-gnu/libstdc++.so.6.0.28>, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0`\341\t\0\0\0\0\0"..., 832) = 832

read(3</usr/lib/x86\_64-linux-gnu/libgcc\_s.so.1>, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\3405\0\0\0\0\0\0"..., 832) = 832

read(3</usr/lib/x86\_64-linux-gnu/libc-2.31.so>, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\360q\2\0\0\0\0\0"..., 832) = 832

read(3</usr/lib/x86\_64-linux-gnu/libm-2.31.so>, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\300\363\0\0\0\0\0\0"..., 832) = 832

read(0</dev/pts/3>,

"\n", 1024) = 1

--- SIGCHLD {si\_signo=SIGCHLD, si\_code=CLD\_EXITED, si\_pid=1951, si\_uid=1000, si\_status=0, si\_utime=0, si\_stime=0} ---read(3<pipe:[261277]>, "", 1) = 0

--- SIGCHLD {si\_signo=SIGCHLD, si\_code=CLD\_EXITED, si\_pid=1952, si\_uid=1000, si\_status=0, si\_utime=0, si\_stime=0} ---

+++ exited with 0 +++

**Отображение времени выполнения вызова: Посмотреть время выполнения того или иного вызова позволяет ключ -t:**

kivi@LAPTOP-DGOM1IRE:~/os/lab\_2/lab2/l2$ strace -y -t -e read ./lab2 child1 child2

01:05:28 read(3</usr/lib/x86\_64-linux-gnu/libstdc++.so.6.0.28>, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0`\341\t\0\0\0\0\0"..., 832) = 832

01:05:28 read(3</usr/lib/x86\_64-linux-gnu/libgcc\_s.so.1>, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\3405\0\0\0\0\0\0"..., 832) = 832

01:05:28 read(3</usr/lib/x86\_64-linux-gnu/libc-2.31.so>, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\360q\2\0\0\0\0\0"..., 832) = 832

01:05:28 read(3</usr/lib/x86\_64-linux-gnu/libm-2.31.so>, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\300\363\0\0\0\0\0\0"..., 832) = 832

01:05:28 read(0</dev/pts/3>,

"\n", 1024) = 1

01:05:30 --- SIGCHLD {si\_signo=SIGCHLD, si\_code=CLD\_EXITED, si\_pid=1957, si\_uid=1000, si\_status=0, si\_utime=0, si\_stime=0} ---

01:05:30 --- SIGCHLD {si\_signo=SIGCHLD, si\_code=CLD\_EXITED, si\_pid=1958, si\_uid=1000, si\_status=0, si\_utime=0, si\_stime=0} ---

01:05:30 read(3<pipe:[265752]>, "", 1) = 0

01:05:30 +++ exited with 0 +++

**Печать “относительной” времени вызова системных процессов:**

kivi@LAPTOP-DGOM1IRE:~/os/lab\_2/lab2/l2$ strace -r -e close ./lab2 child1 child2

0.000000 close(3) = 0

0.000855 close(3) = 0

0.000542 close(3) = 0

0.001064 close(3) = 0

0.000543 close(3) = 0

0.997358 close(3) = 0

0.000291 close(4) = 0

0.000579 close(4) = 0

0.000105 close(6) = 0

0.000129 --- SIGCHLD {si\_signo=SIGCHLD, si\_code=CLD\_EXITED, si\_pid=1970, si\_uid=1000, si\_status=0, si\_utime=0, si\_stime=0} ---

0.000067 close(5) = 0

0.000446 --- SIGCHLD {si\_signo=SIGCHLD, si\_code=CLD\_EXITED, si\_pid=1971, si\_uid=1000, si\_status=0, si\_utime=0, si\_stime=0} ---

0.000051 close(3) = 0

0.000394 +++ exited with 0 +++

**Трассировка вызовов запущенного процесса:**

**Для подключения к уже работающему процессу — используется опция -p.**

**Запустим main и оставим его ожидать входные данные. Узнаем его PID и подключимся к нему в другой консоли**

kivi@LAPTOP-DGOM1IRE:~/os/lab\_2/lab2/l2$ ps -a

PID TTY TIME CMD

1973 pts/3 00:00:00 lab2

1992 pts/4 00:00:00 ps

**Статистика системных вызовов: С помощью опции -c — можно получить наглядную статистику выполнения программы:**

kivi@LAPTOP-DGOM1IRE:~/os/lab\_2/lab2/l2$ strace -c ./lab2

% time seconds usecs/call calls errors syscall

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18.99 0.000545 24 22 mmap

17.07 0.000490 245 2 clone

13.14 0.000377 377 1 execve

8.68 0.000249 22 11 close

6.45 0.000185 30 6 read

6.38 0.000183 22 8 mprotect

6.06 0.000174 24 7 fstat

5.47 0.000157 31 5 openat

4.43 0.000127 21 6 pread64

3.38 0.000097 32 3 pipe

2.26 0.000065 21 3 brk

2.06 0.000059 29 2 write

1.64 0.000047 23 2 1 arch\_prctl

1.53 0.000044 44 1 munmap

1.53 0.000044 44 1 wait4

0.94 0.000027 27 1 1 access

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100.00 0.002870 81 2 total

**Диагностика Strace других ЛР**

0.000000 execve("./lab3", ["./lab3"], 0x7ffef2cf3640 /\* 17 vars \*/) = 0

0.003221 brk(NULL) = 0x55b870f43000

0.000149 arch\_prctl(0x3001 /\* ARCH\_??? \*/, 0x7fff8b92a030) = -1 EINVAL (Invalid argument)

0.000217 access("/etc/ld.so.preload", R\_OK) = -1 ENOENT (No such file or directory)

0.000142 openat(AT\_FDCWD, "/etc/ld.so.cache", O\_RDONLY|O\_CLOEXEC) = 3

0.000115 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=82162, ...}) = 0

0.000158 mmap(NULL, 82162, PROT\_READ, MAP\_PRIVATE, 3, 0) = 0x7fc4a4c8f000

0.000085 close(3) = 0

0.000128 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = 3

0.000132 read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0`\341\t\0\0\0\0\0"..., 832) = 832

0.000137 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=1956992, ...}) = 0

0.000116 mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7fc4a4c8d000

0.000116 mmap(NULL, 1972224, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7fc4a4aab000

0.000101 mprotect(0x7fc4a4b41000, 1290240, PROT\_NONE) = 0

0.000096 mmap(0x7fc4a4b41000, 987136, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x96000) = 0x7fc4a4b41000

0.000104 mmap(0x7fc4a4c32000, 299008, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x187000) = 0x7fc4a4c32000 0.000102 mmap(0x7fc4a4c7c000, 57344, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1d0000) = 0x7fc4a4c7c000

0.000100 mmap(0x7fc4a4c8a000, 10240, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7fc4a4c8a000

0.000121 close(3) = 0

0.000113 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libgcc\_s.so.1", O\_RDONLY|O\_CLOEXEC) = 3

0.000110 read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\3405\0\0\0\0\0\0"..., 832) = 832

0.000096 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=104984, ...}) = 0

0.000110 mmap(NULL, 107592, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7fc4a4a90000

0.000101 mmap(0x7fc4a4a93000, 73728, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x3000) = 0x7fc4a4a93000

0.000093 mmap(0x7fc4a4aa5000, 16384, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x15000) = 0x7fc4a4aa5000

0.000085 mmap(0x7fc4a4aa9000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x18000) = 0x7fc4a4aa9000

0.000096 close(3) = 0

0.000090 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libpthread.so.0", O\_RDONLY|O\_CLOEXEC) = 3

0.000112 read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\220\201\0\0\0\0\0\0"..., 832) = 832

0.000091 pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\345Ga\367\265T\320\374\301V)Yf]\223\337"..., 68, 824) = 68

0.000096 fstat(3, {st\_mode=S\_IFREG|0755, st\_size=157224, ...}) = 0

0.000090 pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\345Ga\367\265T\320\374\301V)Yf]\223\337"..., 68, 824) = 68

0.000091 mmap(NULL, 140408, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7fc4a4a6d000

0.000111 mmap(0x7fc4a4a74000, 69632, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x7000) = 0x7fc4a4a74000

0.000108 mmap(0x7fc4a4a85000, 20480, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x18000) = 0x7fc4a4a85000

0.000088 mmap(0x7fc4a4a8a000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1c000) = 0x7fc4a4a8a000

0.000093 mmap(0x7fc4a4a8c000, 13432, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7fc4a4a8c000

0.000106 close(3) = 0

0.000113 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libc.so.6", O\_RDONLY|O\_CLOEXEC) = 3

0.000111 read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\360q\2\0\0\0\0\0"..., 832) = 832

0.000121 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

0.000106 pread64(3, "\4\0\0\0\20\0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0\0", 32, 848) = 32

0.000107 pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\t\233\222%\274\260\320\31\331\326\10\204\276X>\263"..., 68, 880) = 68

0.000096 fstat(3, {st\_mode=S\_IFREG|0755, st\_size=2029224, ...}) = 0

0.000082 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

0.000104 pread64(3, "\4\0\0\0\20\0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0\0", 32, 848) = 32

0.000105 pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\t\233\222%\274\260\320\31\331\326\10\204\276X>\263"..., 68, 880) = 68

0.000089 mmap(NULL, 2036952, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7fc4a487b000

0.000088 mprotect(0x7fc4a48a0000, 1847296, PROT\_NONE) = 0

0.000095 mmap(0x7fc4a48a0000, 1540096, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x25000) = 0x7fc4a48a0000

0.000108 mmap(0x7fc4a4a18000, 303104, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x19d000) = 0x7fc4a4a18000 0.000112 mmap(0x7fc4a4a63000, 24576, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1e7000) = 0x7fc4a4a63000

0.000089 mmap(0x7fc4a4a69000, 13528, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7fc4a4a69000

0.000095 close(3) = 0

0.000107 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libm.so.6", O\_RDONLY|O\_CLOEXEC) = 3

0.000106 read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\300\363\0\0\0\0\0\0"..., 832) = 832

0.000099 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=1369352, ...}) = 0

0.000090 mmap(NULL, 1368336, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7fc4a472c000

0.000110 mmap(0x7fc4a473b000, 684032, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0xf000) = 0x7fc4a473b000

0.000104 mmap(0x7fc4a47e2000, 618496, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0xb6000) = 0x7fc4a47e2000

0.000097 mmap(0x7fc4a4879000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x14c000) = 0x7fc4a4879000

0.000123 close(3) = 0

0.000110 mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7fc4a472a000

0.000146 mmap(NULL, 12288, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7fc4a4727000

0.000097 arch\_prctl(ARCH\_SET\_FS, 0x7fc4a4727740) = 0

0.000137 mprotect(0x7fc4a4a63000, 12288, PROT\_READ) = 0

0.000129 mprotect(0x7fc4a4879000, 4096, PROT\_READ) = 0

0.000117 mprotect(0x7fc4a4a8a000, 4096, PROT\_READ) = 0

0.000115 mprotect(0x7fc4a4aa9000, 4096, PROT\_READ) = 0

0.000524 mprotect(0x7fc4a4c7c000, 45056, PROT\_READ) = 0

0.000127 mprotect(0x55b86fbff000, 4096, PROT\_READ) = 0

0.000124 mprotect(0x7fc4a4cd1000, 4096, PROT\_READ) = 0

0.000104 munmap(0x7fc4a4c8f000, 82162) = 0

0.000107 set\_tid\_address(0x7fc4a4727a10) = 2031

0.000088 set\_robust\_list(0x7fc4a4727a20, 24) = 0

0.000095 rt\_sigaction(SIGRTMIN, {sa\_handler=0x7fc4a4a74bf0, sa\_mask=[], sa\_flags=SA\_RESTORER|SA\_SIGINFO, sa\_restorer=0x7fc4a4a823c0}, NULL, 8) = 0

0.000117 rt\_sigaction(SIGRT\_1, {sa\_handler=0x7fc4a4a74c90, sa\_mask=[], sa\_flags=SA\_RESTORER|SA\_RESTART|SA\_SIGINFO, sa\_restorer=0x7fc4a4a823c0}, NULL, 8) = 0

0.000102 rt\_sigprocmask(SIG\_UNBLOCK, [RTMIN RT\_1], NULL, 8) = 0

0.000101 prlimit64(0, RLIMIT\_STACK, NULL, {rlim\_cur=8192\*1024, rlim\_max=RLIM64\_INFINITY}) = 0

0.000292 brk(NULL) = 0x55b870f43000

0.000094 brk(0x55b870f64000) = 0x55b870f64000

0.000121 futex(0x7fc4a4c8a6bc, FUTEX\_WAKE\_PRIVATE, 2147483647) = 0

0.000156 futex(0x7fc4a4c8a6c8, FUTEX\_WAKE\_PRIVATE, 2147483647) = 0

0.000112 fstat(0, {st\_mode=S\_IFCHR|0620, st\_rdev=makedev(0x88, 0x3), ...}) = 0

0.000106 read(0,

"\n", 1024) = 1

5.238468 read(0,

"\n", 1024) = 1

0.976995 read(0,

"\n", 1024) = 1

0.346844 read(0,

"\n", 1024) = 1

0.478044 read(0,

"\n", 1024) = 1

0.281061 read(0,

"\n", 1024) = 1

0.756995 read(0,

"\n", 1024) = 1

0.507046 read(0,

"\n", 1024) = 1

0.032345 read(0,

"\n", 1024) = 1

0.030472 read(0,

"\n", 1024) = 1

0.031948 read(0,

"\n", 1024) = 1

0.031054 read(0,

"\n", 1024) = 1

0.046101 read(0,

"\n", 1024) = 1

0.032738 read(0,

"\n", 1024) = 1

0.029735 read(0, 0x55b870f54eb0, 1024) = ? ERESTARTSYS (To be restarted if SA\_RESTART is set)

1.377311 --- SIGWINCH {si\_signo=SIGWINCH, si\_code=SI\_KERNEL} ---

**ЛР №4**

kivi@LAPTOP-DGOM1IRE:~/os/lab\_4/l4$ strace -f -r ./lab4

0.000000 execve("./lab4", ["./lab4"], 0x7ffd37f5e240 /\* 17 vars \*/) = 0

0.000399 brk(NULL) = 0x559011705000

0.000209 arch\_prctl(0x3001 /\* ARCH\_??? \*/, 0x7ffc146bbaa0) = -1 EINVAL (Invalid argument)

0.000231 access("/etc/ld.so.preload", R\_OK) = -1 ENOENT (No such file or directory)

0.000152 openat(AT\_FDCWD, "/etc/ld.so.cache", O\_RDONLY|O\_CLOEXEC) = 3

0.000150 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=82162, ...}) = 0

0.000128 mmap(NULL, 82162, PROT\_READ, MAP\_PRIVATE, 3, 0) = 0x7f6121a6a000

0.000100 close(3) = 0

0.000100 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/librt.so.1", O\_RDONLY|O\_CLOEXEC) = 3

0.000103 read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0 7\0\0\0\0\0\0"..., 832) = 832

0.000097 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=40040, ...}) = 0

0.000091 mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f6121a68000

0.000102 mmap(NULL, 44000, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f6121a5d000

0.000110 mprotect(0x7f6121a60000, 24576, PROT\_NONE) = 0

0.000171 mmap(0x7f6121a60000, 16384, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x3000) = 0x7f6121a60000

0.000102 mmap(0x7f6121a64000, 4096, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x7000) = 0x7f6121a64000

0.000097 mmap(0x7f6121a66000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x8000) = 0x7f6121a66000

0.000102 close(3) = 0

0.000100 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = 3

0.000101 read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0`\341\t\0\0\0\0\0"..., 832) = 832

0.000101 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=1956992, ...}) = 0

0.000100 mmap(NULL, 1972224, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f612187b000

0.000097 mprotect(0x7f6121911000, 1290240, PROT\_NONE) = 0

0.000096 mmap(0x7f6121911000, 987136, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x96000) = 0x7f6121911000

0.000109 mmap(0x7f6121a02000, 299008, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x187000) = 0x7f6121a02000

0.000102 mmap(0x7f6121a4c000, 57344, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1d0000) = 0x7f6121a4c000

0.000104 mmap(0x7f6121a5a000, 10240, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f6121a5a000

0.000104 close(3) = 0

0.000119 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libgcc\_s.so.1", O\_RDONLY|O\_CLOEXEC) = 3

0.000091 read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\3405\0\0\0\0\0\0"..., 832) = 832

0.000090 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=104984, ...}) = 0

0.000104 mmap(NULL, 107592, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f6121860000

0.000110 mmap(0x7f6121863000, 73728, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x3000) = 0x7f6121863000

0.000126 mmap(0x7f6121875000, 16384, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x15000) = 0x7f6121875000

0.000100 mmap(0x7f6121879000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x18000) = 0x7f6121879000

0.000100 close(3) = 0

0.000102 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libpthread.so.0", O\_RDONLY|O\_CLOEXEC) = 3

0.000130 read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\220\201\0\0\0\0\0\0"..., 832) = 832

0.000086 pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\345Ga\367\265T\320\374\301V)Yf]\223\337"..., 68, 824) = 68

0.000063 fstat(3, {st\_mode=S\_IFREG|0755, st\_size=157224, ...}) = 0

0.000102 pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\345Ga\367\265T\320\374\301V)Yf]\223\337"..., 68, 824) = 68

0.000097 mmap(NULL, 140408, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f612183d000

0.000094 mmap(0x7f6121844000, 69632, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x7000) = 0x7f6121844000

0.000097 mmap(0x7f6121855000, 20480, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x18000) = 0x7f6121855000

0.000093 mmap(0x7f612185a000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1c000) = 0x7f612185a000

0.000099 mmap(0x7f612185c000, 13432, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f612185c000

0.000111 close(3) = 0

0.000106 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libc.so.6", O\_RDONLY|O\_CLOEXEC) = 3

0.000102 read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\360q\2\0\0\0\0\0"..., 832) = 832

0.000090 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

0.000088 pread64(3, "\4\0\0\0\20\0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0\0", 32, 848) = 32

0.000098 pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\t\233\222%\274\260\320\31\331\326\10\204\276X>\263"..., 68, 880) = 68

0.000099 fstat(3, {st\_mode=S\_IFREG|0755, st\_size=2029224, ...}) = 0

0.000101 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

0.000084 pread64(3, "\4\0\0\0\20\0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0\0", 32, 848) = 32

0.000095 pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\t\233\222%\274\260\320\31\331\326\10\204\276X>\263"..., 68, 880) = 68

0.000093 mmap(NULL, 2036952, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f612164b000

0.000102 mprotect(0x7f6121670000, 1847296, PROT\_NONE) = 0

0.000106 mmap(0x7f6121670000, 1540096, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x25000) = 0x7f6121670000

0.000098 mmap(0x7f61217e8000, 303104, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x19d000) = 0x7f61217e8000

0.000092 mmap(0x7f6121833000, 24576, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1e7000) = 0x7f6121833000

0.000101 mmap(0x7f6121839000, 13528, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f6121839000

0.000097 close(3) = 0

0.000083 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libm.so.6", O\_RDONLY|O\_CLOEXEC) = 3

0.000113 read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\300\363\0\0\0\0\0\0"..., 832) = 832

0.000112 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=1369352, ...}) = 0

0.000101 mmap(NULL, 1368336, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f61214fc000

0.000082 mmap(0x7f612150b000, 684032, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0xf000) = 0x7f612150b000

0.000091 mmap(0x7f61215b2000, 618496, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0xb6000) = 0x7f61215b2000

0.000101 mmap(0x7f6121649000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x14c000) = 0x7f6121649000

0.000116 close(3) = 0

0.000110 mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f61214fa000

0.000113 mmap(NULL, 12288, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f61214f7000

0.000100 arch\_prctl(ARCH\_SET\_FS, 0x7f61214f7740) = 0

0.000139 mprotect(0x7f6121833000, 12288, PROT\_READ) = 0

0.000118 mprotect(0x7f6121649000, 4096, PROT\_READ) = 0

0.000109 mprotect(0x7f612185a000, 4096, PROT\_READ) = 0

0.000105 mprotect(0x7f6121879000, 4096, PROT\_READ) = 0

0.000483 mprotect(0x7f6121a4c000, 45056, PROT\_READ) = 0

0.000117 mprotect(0x7f6121a66000, 4096, PROT\_READ) = 0

0.000102 mprotect(0x55900fdb4000, 4096, PROT\_READ) = 0

0.000094 mprotect(0x7f6121aac000, 4096, PROT\_READ) = 0

0.000102 munmap(0x7f6121a6a000, 82162) = 0

0.000102 set\_tid\_address(0x7f61214f7a10) = 2204

0.000103 set\_robust\_list(0x7f61214f7a20, 24) = 0

0.000093 rt\_sigaction(SIGRTMIN, {sa\_handler=0x7f6121844bf0, sa\_mask=[], sa\_flags=SA\_RESTORER|SA\_SIGINFO, sa\_restorer=0x7f61218523c0}, NULL, 8) = 0

0.000095 rt\_sigaction(SIGRT\_1, {sa\_handler=0x7f6121844c90, sa\_mask=[], sa\_flags=SA\_RESTORER|SA\_RESTART|SA\_SIGINFO, sa\_restorer=0x7f61218523c0}, NULL, 8) = 0

0.000103 rt\_sigprocmask(SIG\_UNBLOCK, [RTMIN RT\_1], NULL, 8) = 0

0.000101 prlimit64(0, RLIMIT\_STACK, NULL, {rlim\_cur=8192\*1024, rlim\_max=RLIM64\_INFINITY}) = 0

0.000175 brk(NULL) = 0x559011705000

0.000091 brk(0x559011726000) = 0x559011726000

0.000117 futex(0x7f6121a5a6bc, FUTEX\_WAKE\_PRIVATE, 2147483647) = 0

0.000141 futex(0x7f6121a5a6c8, FUTEX\_WAKE\_PRIVATE, 2147483647) = 0

0.000125 fstat(0, {st\_mode=S\_IFCHR|0620, st\_rdev=makedev(0x88, 0x3), ...}) = 0

**ЛР №5**

kivi@LAPTOP-DGOM1IRE:~/os/lab\_5/ch1/lch1$ strace -f -r ./lab5

0.000000 execve("./lab5", ["./lab5"], 0x7ffcf8325720 /\* 17 vars \*/) = 0

0.000342 brk(NULL) = 0x55898d59a000

0.000140 arch\_prctl(0x3001 /\* ARCH\_??? \*/, 0x7ffc8bf1e270) = -1 EINVAL (Invalid argument)

0.000200 access("/etc/ld.so.preload", R\_OK) = -1 ENOENT (No such file or directory)

0.000111 openat(AT\_FDCWD, "/etc/ld.so.cache", O\_RDONLY|O\_CLOEXEC) = 3

0.000190 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=82162, ...}) = 0

0.000123 mmap(NULL, 82162, PROT\_READ, MAP\_PRIVATE, 3, 0) = 0x7f56a0906000

0.000097 close(3) = 0

0.000088 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = 3

0.000104 read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0`\341\t\0\0\0\0\0"..., 832) = 832

0.000095 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=1956992, ...}) = 0

0.000107 mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f56a0904000

0.000126 mmap(NULL, 1972224, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f56a0722000

0.000129 mprotect(0x7f56a07b8000, 1290240, PROT\_NONE) = 0

0.000106 mmap(0x7f56a07b8000, 987136, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x96000) = 0x7f56a07b8000

0.000102 mmap(0x7f56a08a9000, 299008, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x187000) = 0x7f56a08a9000

0.000089 mmap(0x7f56a08f3000, 57344, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1d0000) = 0x7f56a08f3000

0.000123 mmap(0x7f56a0901000, 10240, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f56a0901000

0.000126 close(3) = 0

0.000130 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libc.so.6", O\_RDONLY|O\_CLOEXEC) = 3

0.000113 read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\360q\2\0\0\0\0\0"..., 832) = 832

0.000108 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

0.000127 pread64(3, "\4\0\0\0\20\0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0\0", 32, 848) = 32

0.000109 pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\t\233\222%\274\260\320\31\331\326\10\204\276X>\263"..., 68, 880) = 68

0.000100 fstat(3, {st\_mode=S\_IFREG|0755, st\_size=2029224, ...}) = 0

0.000105 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

0.000107 pread64(3, "\4\0\0\0\20\0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0\0", 32, 848) = 32

0.000092 pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\t\233\222%\274\260\320\31\331\326\10\204\276X>\263"..., 68, 880) = 68

0.000096 mmap(NULL, 2036952, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f56a0530000

0.000098 mprotect(0x7f56a0555000, 1847296, PROT\_NONE) = 0

0.000095 mmap(0x7f56a0555000, 1540096, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x25000) = 0x7f56a0555000

0.000089 mmap(0x7f56a06cd000, 303104, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x19d000) = 0x7f56a06cd000

0.000097 mmap(0x7f56a0718000, 24576, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1e7000) = 0x7f56a0718000

0.000099 mmap(0x7f56a071e000, 13528, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f56a071e000

0.000098 close(3) = 0

0.000102 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libm.so.6", O\_RDONLY|O\_CLOEXEC) = 3

0.000101 read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\300\363\0\0\0\0\0\0"..., 832) = 832

0.000100 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=1369352, ...}) = 0

0.000090 mmap(NULL, 1368336, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f56a03e1000

0.000089 mmap(0x7f56a03f0000, 684032, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0xf000) = 0x7f56a03f0000

0.000102 mmap(0x7f56a0497000, 618496, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0xb6000) = 0x7f56a0497000

0.000092 mmap(0x7f56a052e000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x14c000) = 0x7f56a052e000

0.000110 close(3) = 0

0.000151 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libgcc\_s.so.1", O\_RDONLY|O\_CLOEXEC) = 3

0.000108 read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\3405\0\0\0\0\0\0"..., 832) = 832

0.000100 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=104984, ...}) = 0

0.000100 mmap(NULL, 107592, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f56a03c6000

0.000099 mmap(0x7f56a03c9000, 73728, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x3000) = 0x7f56a03c9000

0.000101 mmap(0x7f56a03db000, 16384, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x15000) = 0x7f56a03db000

0.000097 mmap(0x7f56a03df000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x18000) = 0x7f56a03df000

0.000096 close(3) = 0

0.000105 mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f56a03c4000

0.000108 arch\_prctl(ARCH\_SET\_FS, 0x7f56a03c4f40) = 0

0.000118 mprotect(0x7f56a0718000, 12288, PROT\_READ) = 0

0.000088 mprotect(0x7f56a03df000, 4096, PROT\_READ) = 0

0.000106 mprotect(0x7f56a052e000, 4096, PROT\_READ) = 0

0.000184 mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f56a03c2000

0.000356 mprotect(0x7f56a08f3000, 45056, PROT\_READ) = 0

0.000108 mprotect(0x55898c2a2000, 4096, PROT\_READ) = 0

0.000102 mprotect(0x7f56a0948000, 4096, PROT\_READ) = 0

0.000098 munmap(0x7f56a0906000, 82162) = 0

0.000162 brk(NULL) = 0x55898d59a000

0.000090 brk(0x55898d5bb000) = 0x55898d5bb000

0.000168 fstat(0, {st\_mode=S\_IFCHR|0620, st\_rdev=makedev(0x88, 0x3), ...}) = 0

2 программа:

kivi@LAPTOP-DGOM1IRE:~/os/lab\_5/ch2/lch2$ strace -f -r ./lab5

0.000000 execve("./lab5", ["./lab5"], 0x7ffdd8dcb8e0 /\* 17 vars \*/) = 0

0.000287 brk(NULL) = 0x560fe1e0a000

0.000138 arch\_prctl(0x3001 /\* ARCH\_??? \*/, 0x7ffc5bccaf40) = -1 EINVAL (Invalid argument)

0.000161 access("/etc/ld.so.preload", R\_OK) = -1 ENOENT (No such file or directory)

0.000124 openat(AT\_FDCWD, "/etc/ld.so.cache", O\_RDONLY|O\_CLOEXEC) = 3

0.000143 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=82162, ...}) = 0

0.000105 mmap(NULL, 82162, PROT\_READ, MAP\_PRIVATE, 3, 0) = 0x7f54868fa000

0.000158 close(3) = 0

0.000124 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libdl.so.2", O\_RDONLY|O\_CLOEXEC) = 3

0.000130 read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0 \22\0\0\0\0\0\0"..., 832) = 832

0.000111 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=18816, ...}) = 0

0.000100 mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f54868f8000

0.000104 mmap(NULL, 20752, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f54868f2000

0.000089 mmap(0x7f54868f3000, 8192, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1000) = 0x7f54868f3000

0.000120 mmap(0x7f54868f5000, 4096, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x3000) = 0x7f54868f5000

0.000124 mmap(0x7f54868f6000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x3000) = 0x7f54868f6000

0.000109 close(3) = 0

0.000103 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = 3

0.000103 read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0`\341\t\0\0\0\0\0"..., 832) = 832

0.000099 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=1956992, ...}) = 0

0.000092 mmap(NULL, 1972224, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f5486710000

0.000093 mprotect(0x7f54867a6000, 1290240, PROT\_NONE) = 0

0.000089 mmap(0x7f54867a6000, 987136, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x96000) = 0x7f54867a6000

0.000123 mmap(0x7f5486897000, 299008, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x187000) = 0x7f5486897000

0.000104 mmap(0x7f54868e1000, 57344, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1d0000) = 0x7f54868e1000

0.000095 mmap(0x7f54868ef000, 10240, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f54868ef000

0.000105 close(3) = 0

0.000099 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libm.so.6", O\_RDONLY|O\_CLOEXEC) = 3

0.000099 read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\300\363\0\0\0\0\0\0"..., 832) = 832

0.000097 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=1369352, ...}) = 0

0.000101 mmap(NULL, 1368336, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f54865c1000

0.000089 mmap(0x7f54865d0000, 684032, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0xf000) = 0x7f54865d0000

0.000098 mmap(0x7f5486677000, 618496, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0xb6000) = 0x7f5486677000

0.000101 mmap(0x7f548670e000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x14c000) = 0x7f548670e000

0.000119 close(3) = 0

0.000108 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libgcc\_s.so.1", O\_RDONLY|O\_CLOEXEC) = 3

0.000131 read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\3405\0\0\0\0\0\0"..., 832) = 832

0.000107 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=104984, ...}) = 0

0.000096 mmap(NULL, 107592, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f54865a6000

0.000088 mmap(0x7f54865a9000, 73728, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x3000) = 0x7f54865a9000

0.000097 mmap(0x7f54865bb000, 16384, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x15000) = 0x7f54865bb000

0.000091 mmap(0x7f54865bf000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x18000) = 0x7f54865bf000

0.000110 close(3) = 0

0.000129 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libc.so.6", O\_RDONLY|O\_CLOEXEC) = 3

0.000091 read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\360q\2\0\0\0\0\0"..., 832) = 832

0.000103 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

0.000105 pread64(3, "\4\0\0\0\20\0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0\0", 32, 848) = 32

0.000097 pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\t\233\222%\274\260\320\31\331\326\10\204\276X>\263"..., 68, 880) = 68

0.000095 fstat(3, {st\_mode=S\_IFREG|0755, st\_size=2029224, ...}) = 0

0.000091 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

0.000085 pread64(3, "\4\0\0\0\20\0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0\0", 32, 848) = 32

0.000092 pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\t\233\222%\274\260\320\31\331\326\10\204\276X>\263"..., 68, 880) = 68

0.000087 mmap(NULL, 2036952, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f54863b4000

0.000103 mprotect(0x7f54863d9000, 1847296, PROT\_NONE) = 0

0.000100 mmap(0x7f54863d9000, 1540096, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x25000) = 0x7f54863d9000

0.000105 mmap(0x7f5486551000, 303104, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x19d000) = 0x7f5486551000

0.000114 mmap(0x7f548659c000, 24576, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1e7000) = 0x7f548659c000

0.000108 mmap(0x7f54865a2000, 13528, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f54865a2000

0.000092 close(3) = 0

0.000102 mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f54863b2000

0.000107 mmap(NULL, 12288, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f54863af000

0.000089 arch\_prctl(ARCH\_SET\_FS, 0x7f54863af740) = 0

0.000134 mprotect(0x7f548659c000, 12288, PROT\_READ) = 0

0.000094 mprotect(0x7f54865bf000, 4096, PROT\_READ) = 0

0.000093 mprotect(0x7f548670e000, 4096, PROT\_READ) = 0

0.000465 mprotect(0x7f54868e1000, 45056, PROT\_READ) = 0

0.000114 mprotect(0x7f54868f6000, 4096, PROT\_READ) = 0

0.000121 mprotect(0x560fe101c000, 4096, PROT\_READ) = 0

0.000096 mprotect(0x7f548693c000, 4096, PROT\_READ) = 0

0.000121 munmap(0x7f54868fa000, 82162) = 0

0.000177 brk(NULL) = 0x560fe1e0a000

0.000098 brk(0x560fe1e2b000) = 0x560fe1e2b000

0.000243 fstat(0, {st\_mode=S\_IFCHR|0620, st\_rdev=makedev(0x88, 0x3), ...}) = 0

0.000119 read(0,

"\n", 1024) = 1

1.303293 read(0,

"\n", 1024) = 1

0.436915 read(0, f

"f\n", 1024) = 2

8.225992 fstat(1, {st\_mode=S\_IFCHR|0620, st\_rdev=makedev(0x88, 0x3), ...}) = 0

0.000415 write(1, "rez: 4.67516e-310\n", 18rez: 4.67516e-310

) = 18

0.000194 lseek(0, -2, SEEK\_CUR) = -1 ESPIPE (Illegal seek)

0.000115 exit\_group(0) = ?

0.000272 +++ exited with 0 +++

**ЛР №6-8**

kivi@LAPTOP-DGOM1IRE:~/os/lab\_6-8/l6$ strace -f -r ./control

0.000000 execve("./control", ["./control"], 0x7ffe2fad70d0 /\* 17 vars \*/) = 0

0.000400 brk(NULL) = 0x55d8687f4000

0.000161 arch\_prctl(0x3001 /\* ARCH\_??? \*/, 0x7ffcb826b3e0) = -1 EINVAL (Invalid argument)

0.000292 access("/etc/ld.so.preload", R\_OK) = -1 ENOENT (No such file or directory)

0.000165 openat(AT\_FDCWD, "/etc/ld.so.cache", O\_RDONLY|O\_CLOEXEC) = 3

0.000130 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=82162, ...}) = 0

0.000110 mmap(NULL, 82162, PROT\_READ, MAP\_PRIVATE, 3, 0) = 0x7f3bcf1a6000

0.000105 close(3) = 0

0.000133 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libzmq.so.5", O\_RDONLY|O\_CLOEXEC) = 3

0.000145 read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0`z\1\0\0\0\0\0"..., 832) = 832

0.000177 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=675776, ...}) = 0

0.000149 mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f3bcf1a4000

0.000109 mmap(NULL, 678128, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f3bcf0fe000

0.000092 mmap(0x7f3bcf114000, 430080, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x16000) = 0x7f3bcf114000

0.000095 mmap(0x7f3bcf17d000, 126976, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x7f000) = 0x7f3bcf17d000

0.000109 mmap(0x7f3bcf19c000, 32768, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x9d000) = 0x7f3bcf19c000

0.000194 close(3) = 0

0.000129 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = 3

0.000115 read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0`\341\t\0\0\0\0\0"..., 832) = 832

0.000095 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=1956992, ...}) = 0

0.000100 mmap(NULL, 1972224, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f3bcef1c000

0.000132 mprotect(0x7f3bcefb2000, 1290240, PROT\_NONE) = 0

0.000140 mmap(0x7f3bcefb2000, 987136, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x96000) = 0x7f3bcefb2000

0.000108 mmap(0x7f3bcf0a3000, 299008, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x187000) = 0x7f3bcf0a3000

0.000105 mmap(0x7f3bcf0ed000, 57344, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1d0000) = 0x7f3bcf0ed000

0.000107 mmap(0x7f3bcf0fb000, 10240, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f3bcf0fb000

0.000113 close(3) = 0

0.000157 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libgcc\_s.so.1", O\_RDONLY|O\_CLOEXEC) = 3

0.000106 read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\3405\0\0\0\0\0\0"..., 832) = 832

0.000095 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=104984, ...}) = 0

0.000091 mmap(NULL, 107592, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f3bcef01000

0.000095 mmap(0x7f3bcef04000, 73728, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x3000) = 0x7f3bcef04000

0.000098 mmap(0x7f3bcef16000, 16384, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x15000) = 0x7f3bcef16000

0.000094 mmap(0x7f3bcef1a000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x18000) = 0x7f3bcef1a000

0.000107 close(3) = 0

0.000092 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libc.so.6", O\_RDONLY|O\_CLOEXEC) = 3

0.000111 read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\360q\2\0\0\0\0\0"..., 832) = 832

0.000103 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

0.000099 pread64(3, "\4\0\0\0\20\0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0\0", 32, 848) = 32

0.000089 pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\t\233\222%\274\260\320\31\331\326\10\204\276X>\263"..., 68, 880) = 68

0.000092 fstat(3, {st\_mode=S\_IFREG|0755, st\_size=2029224, ...}) = 0

0.000091 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

0.000100 pread64(3, "\4\0\0\0\20\0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0\0", 32, 848) = 32

0.000090 pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\t\233\222%\274\260\320\31\331\326\10\204\276X>\263"..., 68, 880) = 68

0.000100 mmap(NULL, 2036952, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f3bced0f000

0.000099 mprotect(0x7f3bced34000, 1847296, PROT\_NONE) = 0

0.000097 mmap(0x7f3bced34000, 1540096, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x25000) = 0x7f3bced34000

0.000102 mmap(0x7f3bceeac000, 303104, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x19d000) = 0x7f3bceeac000

0.000126 mmap(0x7f3bceef7000, 24576, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1e7000) = 0x7f3bceef7000

0.000108 mmap(0x7f3bceefd000, 13528, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f3bceefd000

0.000107 close(3) = 0

0.000095 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libsodium.so.23", O\_RDONLY|O\_CLOEXEC) = 3

0.000167 read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\200\302\0\0\0\0\0\0"..., 832) = 832

0.000178 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=355016, ...}) = 0

0.000088 mmap(NULL, 357384, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f3bcecb7000

0.000130 mmap(0x7f3bcecc3000, 229376, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0xc000) = 0x7f3bcecc3000

0.000140 mmap(0x7f3bcecfb000, 73728, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x44000) = 0x7f3bcecfb000

0.000120 mmap(0x7f3bced0d000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x55000) = 0x7f3bced0d000

0.000197 close(3) = 0

0.000207 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libpgm-5.2.so.0", O\_RDONLY|O\_CLOEXEC) = 3

0.000161 read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\240L\0\0\0\0\0\0"..., 832) = 832

0.000211 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=302056, ...}) = 0

0.000126 mmap(NULL, 321584, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f3bcec68000

0.000097 mmap(0x7f3bcec6c000, 163840, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x4000) = 0x7f3bcec6c000

0.000081 mmap(0x7f3bcec94000, 118784, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x2c000) = 0x7f3bcec94000

0.000077 mmap(0x7f3bcecb1000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x48000) = 0x7f3bcecb1000

0.000151 mmap(0x7f3bcecb3000, 14384, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f3bcecb3000

0.000138 close(3) = 0

0.000123 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libnorm.so.1", O\_RDONLY|O\_CLOEXEC) = 3

0.000153 read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\257\0\0\0\0\0\0"..., 832) = 832

0.000157 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=690344, ...}) = 0

0.000099 mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f3bcec66000

0.000091 mmap(NULL, 1420000, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f3bceb0b000

0.000103 mmap(0x7f3bceb15000, 421888, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0xa000) = 0x7f3bceb15000

0.000107 mmap(0x7f3bceb7c000, 217088, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x71000) = 0x7f3bceb7c000

0.000105 mmap(0x7f3bcebb1000, 16384, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0xa5000) = 0x7f3bcebb1000

0.000157 mmap(0x7f3bcebb5000, 723680, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f3bcebb5000

0.000157 close(3) = 0

0.000195 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libgssapi\_krb5.so.2", O\_RDONLY|O\_CLOEXEC) = 3

0.000119 read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0P\321\0\0\0\0\0\0"..., 832) = 832

0.000097 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=309712, ...}) = 0

0.000088 mmap(NULL, 312128, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f3bceabe000

0.000079 mmap(0x7f3bceac9000, 204800, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0xb000) = 0x7f3bceac9000

0.000095 mmap(0x7f3bceafb000, 49152, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x3d000) = 0x7f3bceafb000

0.000100 mmap(0x7f3bceb07000, 16384, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x48000) = 0x7f3bceb07000

0.000096 close(3) = 0

0.000096 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libpthread.so.0", O\_RDONLY|O\_CLOEXEC) = 3

0.000105 read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\220\201\0\0\0\0\0\0"..., 832) = 832

0.000084 pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\345Ga\367\265T\320\374\301V)Yf]\223\337"..., 68, 824) = 68

0.000106 fstat(3, {st\_mode=S\_IFREG|0755, st\_size=157224, ...}) = 0

0.000100 pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\345Ga\367\265T\320\374\301V)Yf]\223\337"..., 68, 824) = 68

0.000112 mmap(NULL, 140408, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f3bcea9b000

0.000247 mmap(0x7f3bceaa2000, 69632, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x7000) = 0x7f3bceaa2000

0.000112 mmap(0x7f3bceab3000, 20480, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x18000) = 0x7f3bceab3000

0.000118 mmap(0x7f3bceab8000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1c000) = 0x7f3bceab8000

0.000102 mmap(0x7f3bceaba000, 13432, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f3bceaba000

0.000092 close(3) = 0

0.000087 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libm.so.6", O\_RDONLY|O\_CLOEXEC) = 3

0.000096 read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\300\363\0\0\0\0\0\0"..., 832) = 832

0.000087 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=1369352, ...}) = 0

0.000086 mmap(NULL, 1368336, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f3bce94c000

0.000083 mmap(0x7f3bce95b000, 684032, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0xf000) = 0x7f3bce95b000

0.000090 mmap(0x7f3bcea02000, 618496, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0xb6000) = 0x7f3bcea02000

0.000084 mmap(0x7f3bcea99000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x14c000) = 0x7f3bcea99000

0.000092 close(3) = 0

0.000093 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libkrb5.so.3", O\_RDONLY|O\_CLOEXEC) = 3

0.000093 read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0 ?\2\0\0\0\0\0"..., 832) = 832

0.000119 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=902016, ...}) = 0

0.000087 mmap(NULL, 904640, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f3bce86f000

0.000123 mprotect(0x7f3bce891000, 700416, PROT\_NONE) = 0

0.000124 mmap(0x7f3bce891000, 397312, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x22000) = 0x7f3bce891000

0.000100 mmap(0x7f3bce8f2000, 299008, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x83000) = 0x7f3bce8f2000

0.000100 mmap(0x7f3bce93c000, 65536, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0xcc000) = 0x7f3bce93c000

0.000138 close(3) = 0

0.000108 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libk5crypto.so.3", O\_RDONLY|O\_CLOEXEC) = 3

0.000118 read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\240D\0\0\0\0\0\0"..., 832) = 832

0.000104 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=191040, ...}) = 0

0.000093 mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f3bce86d000

0.000093 mmap(NULL, 196696, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f3bce83c000

0.000093 mprotect(0x7f3bce840000, 172032, PROT\_NONE) = 0

0.000076 mmap(0x7f3bce840000, 114688, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x4000) = 0x7f3bce840000

0.000095 mmap(0x7f3bce85c000, 53248, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x20000) = 0x7f3bce85c000

0.000102 mmap(0x7f3bce86a000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x2d000) = 0x7f3bce86a000

0.000097 mmap(0x7f3bce86c000, 88, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f3bce86c000

0.000106 close(3) = 0

0.000109 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libcom\_err.so.2", O\_RDONLY|O\_CLOEXEC) = 3

0.000113 read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\200$\0\0\0\0\0\0"..., 832) = 832

0.000099 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=22600, ...}) = 0

0.000091 mmap(NULL, 24744, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f3bce835000

0.000095 mmap(0x7f3bce837000, 8192, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x2000) = 0x7f3bce837000

0.000088 mmap(0x7f3bce839000, 4096, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x4000) = 0x7f3bce839000

0.000083 mmap(0x7f3bce83a000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x4000) = 0x7f3bce83a000

0.000101 close(3) = 0

0.000101 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libkrb5support.so.0", O\_RDONLY|O\_CLOEXEC) = 3

0.000143 read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\3605\0\0\0\0\0\0"..., 832) = 832

0.000099 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=56096, ...}) = 0

0.000101 mmap(NULL, 58344, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f3bce826000

0.000104 mmap(0x7f3bce829000, 28672, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x3000) = 0x7f3bce829000

0.000098 mmap(0x7f3bce830000, 12288, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0xa000) = 0x7f3bce830000

0.000087 mmap(0x7f3bce833000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0xc000) = 0x7f3bce833000

0.000130 close(3) = 0

0.000102 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libkeyutils.so.1", O\_RDONLY|O\_CLOEXEC) = 3

0.000096 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"..., 832) = 832

0.000080 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=22600, ...}) = 0

0.000084 mmap(NULL, 24592, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f3bce81f000

0.000114 mmap(0x7f3bce821000, 8192, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x2000) = 0x7f3bce821000

0.000089 mmap(0x7f3bce823000, 4096, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x4000) = 0x7f3bce823000

0.000100 mmap(0x7f3bce824000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x4000) = 0x7f3bce824000

0.000111 close(3) = 0

0.000085 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libresolv.so.2", O\_RDONLY|O\_CLOEXEC) = 3

0.000094 read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0 G\0\0\0\0\0\0"..., 832) = 832

0.000092 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=101320, ...}) = 0

0.000081 mmap(NULL, 113280, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f3bce803000

0.000078 mprotect(0x7f3bce807000, 81920, PROT\_NONE) = 0

0.000078 mmap(0x7f3bce807000, 65536, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x4000) = 0x7f3bce807000

0.000086 mmap(0x7f3bce817000, 12288, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x14000) = 0x7f3bce817000

0.000091 mmap(0x7f3bce81b000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x17000) = 0x7f3bce81b000

0.000091 mmap(0x7f3bce81d000, 6784, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f3bce81d000

0.000090 close(3) = 0

0.000097 openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libdl.so.2", O\_RDONLY|O\_CLOEXEC) = 3

0.000078 read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0 \22\0\0\0\0\0\0"..., 832) = 832

0.000126 fstat(3, {st\_mode=S\_IFREG|0644, st\_size=18816, ...}) = 0

0.000093 mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f3bce801000

0.000085 mmap(NULL, 20752, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f3bce7fb000

0.000074 mmap(0x7f3bce7fc000, 8192, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1000) = 0x7f3bce7fc000

0.000070 mmap(0x7f3bce7fe000, 4096, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x3000) = 0x7f3bce7fe000

0.000081 mmap(0x7f3bce7ff000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x3000) = 0x7f3bce7ff000

0.000103 close(3) = 0

0.000176 mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f3bce7f9000

0.000095 mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f3bce7f7000

0.000086 arch\_prctl(ARCH\_SET\_FS, 0x7f3bce7fa600) = 0

0.000122 mprotect(0x7f3bceef7000, 12288, PROT\_READ) = 0

0.000121 mprotect(0x7f3bce7ff000, 4096, PROT\_READ) = 0

0.000092 mprotect(0x7f3bce81b000, 4096, PROT\_READ) = 0

0.000088 mprotect(0x7f3bce824000, 4096, PROT\_READ) = 0

0.000097 mprotect(0x7f3bce833000, 4096, PROT\_READ) = 0

0.000127 mprotect(0x7f3bceab8000, 4096, PROT\_READ) = 0

0.000151 mprotect(0x7f3bce83a000, 4096, PROT\_READ) = 0

0.000087 mprotect(0x7f3bce86a000, 4096, PROT\_READ) = 0

0.000137 mprotect(0x7f3bce93c000, 57344, PROT\_READ) = 0

0.000122 mprotect(0x7f3bcea99000, 4096, PROT\_READ) = 0

0.000105 mprotect(0x7f3bceb07000, 8192, PROT\_READ) = 0

0.000081 mprotect(0x7f3bcef1a000, 4096, PROT\_READ) = 0

0.000658 mprotect(0x7f3bcf0ed000, 45056, PROT\_READ) = 0

0.000323 mprotect(0x7f3bcebb1000, 12288, PROT\_READ) = 0

0.000137 mprotect(0x7f3bcecb1000, 4096, PROT\_READ) = 0

0.000214 mprotect(0x7f3bced0d000, 4096, PROT\_READ) = 0

0.000567 mprotect(0x7f3bcf19c000, 28672, PROT\_READ) = 0

0.000161 mprotect(0x55d866fce000, 4096, PROT\_READ) = 0

0.000086 mprotect(0x7f3bcf1e8000, 4096, PROT\_READ) = 0

0.000114 munmap(0x7f3bcf1a6000, 82162) = 0

0.000086 set\_tid\_address(0x7f3bce7fa8d0) = 2515

0.000074 set\_robust\_list(0x7f3bce7fa8e0, 24) = 0

0.000094 rt\_sigaction(SIGRTMIN, {sa\_handler=0x7f3bceaa2bf0, sa\_mask=[], sa\_flags=SA\_RESTORER|SA\_SIGINFO, sa\_restorer=0x7f3bceab03c0}, NULL, 8) = 0

0.000084 rt\_sigaction(SIGRT\_1, {sa\_handler=0x7f3bceaa2c90, sa\_mask=[], sa\_flags=SA\_RESTORER|SA\_RESTART|SA\_SIGINFO, sa\_restorer=0x7f3bceab03c0}, NULL, 8) = 0

0.000084 rt\_sigprocmask(SIG\_UNBLOCK, [RTMIN RT\_1], NULL, 8) = 0

0.000085 prlimit64(0, RLIMIT\_STACK, NULL, {rlim\_cur=8192\*1024, rlim\_max=RLIM64\_INFINITY}) = 0

0.000171 brk(NULL) = 0x55d8687f4000

0.000077 brk(0x55d868815000) = 0x55d868815000

0.000588 futex(0x7f3bcf0fb6bc, FUTEX\_WAKE\_PRIVATE, 2147483647) = 0

0.000168 futex(0x7f3bcf0fb6c8, FUTEX\_WAKE\_PRIVATE, 2147483647) = 0

0.000242 fstat(0, {st\_mode=S\_IFCHR|0620, st\_rdev=makedev(0x88, 0x3), ...}) = 0

0.000116 read(0, 1

"1\n", 1024) = 2

3.290535 read(0, create 1 -1

"create 1 -1\n", 1024) = 12

10.674351 lseek(0, -12, SEEK\_CUR) = -1 ESPIPE (Illegal seek)

0.000146 exit\_group(0) = ?

0.000364 +++ exited with 0 +++

**Выводы**

По мере выполнения данной лабораторной работы я освоил диагностику работы ПО с помощью утилиты strace — простого и надёжного инструмента. Strace позволяет отслеживать выполнение системных вызовов и сигналов к ядру системы. Ее функционал прост, но широк; работать с ней комфортно и, главное, полезно. Я научился просматривать как все вызовы сразу, так и несколько отдельных; получилось отследить работу и дочерних процессов. Научился отображать названия, пути к файлам, с которыми работает программа, вместо дескрипторов. Получилось взглянуть на удобную статистику системных вызовов и наблюдать время выполнения (обычное и относительное) тех или иных вызовов. Смог подключиться к уже запущенному процессу. Все это — лишь малая часть функционала утилиты strace. С ее помощью можно делать еще много интересных вещей: намеренно ломать программу (инъекция ошибок) для выявления уязвимостей, наблюдать стек процесса в момент системного вызова и другое. Но больше всего мне понравилась возможность отследить время тех или иных вызовов, т.к. это в будущем позволит определить, в каком участке кода программа могла зациклиться; или понять, в каком месте стоит произвести оптимизацию. Также интересной и полезной я нахожу возможность отобразить статистику системных вызовов в удобной форме, в виде таблицы.