Московский Авиационный Институт

(Национальный Исследовательский Университет)

Институт №8 “Компьютерные науки и прикладная математика”

Кафедра №806 “Вычислительная математика и программирование”

Лабораторная работа №8 по курсу

«Операционные системы»

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Оценка: _____

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Постановка задачи

Цель работы

Приобретение практических навыков диагностики работы программного обеспечения.

Задание

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

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

Общий метод и алгоритм решения

Утилита strace отслеживает системные вызовы и сигналы.

strace – инструмент диагностики, обучения и отладки. Он очень полезен для решения проблем с программами, для которых источник недоступен, поскольку их не нужно перекомпилировать для отслеживания.

Поскольку системные вызовы и сигналы являются событиями, которые происходят в интерфейсе пользователя/ядра, тщательное изучение этой границы очень полезно для изоляции ошибок, проверки работоспособности и попыток получения условий гонки.
Формат каждого вывода сообщения трассировки:

<seq> <time> <ticks> <level> <flags> <mid> <sid> <text>

- <seq> – порядковый номер трассировки;
- <time> – время сообщения в hh:mm:ss;
- <ticks> – время сообщения в машинных тиках с момента загрузки;
- <level> – уровень приоритета трассировки;
- <flags> – E: сообщение также находится в журнале ошибок, F: указывает на фатальную ошибку, N: письмо было отправлено системному администратору (жестко закодировано как root);
- <mid> – идентификационный номер модуля источника;
- <sid> – субидентификационный номер источника sub-ID;
- <text> – форматированный текст сообщения трассировки.

После запуска strace продолжит выполнение до тех пор, пока пользователь не прекратит работу.

Основные опции

- -D – запускать процесс трассировки как отдельный "внук", а не как родитель трассировки. Это уменьшает видимый эффект strace, сохраняя трассировку прямым потомком вызывающего процесса.
- -d – показать некоторые отладочные данные самого strace для стандартной ошибки.
- -f – отследить дочерние процессы по мере того, как они создаются отслеживаемыми в настоящее время процессами в результате системного вызова fork(2).

- -q – подавлять сообщения о присоединении, отсоединении и т. д. Это происходит автоматически, когда вывод перенаправляется в файл и команда запускается непосредственно вместо присоединения.
- -u username – запустить команду с идентификатором пользователя, идентификатором группы и дополнительными группами имени пользователя. Эта опция полезна только при запуске от имени пользователя root и позволяет правильно выполнять двоичные файлы setuid и setgid. Если не используется эта опция, программы setuid и setgid выполняются без действующих привилегий.

Опции выходного формата

- -a column – выравнивать возвращаемые значения в определённом столбце (по умолчанию 40);
- -i – распечатать указатель на инструкции во время системного вызова;
- -k – вывести трассировку стека выполнения отслеживаемых процессов после каждого системного вызова;
- -o имя_файла – записать вывод трассировки в файл, а не в stderr. Форма filename.pid используется, если указана опция -ff. Если аргумент начинается с '|' или '!', остальная часть аргумента обрабатывается как команда, и весь вывод передается по ней. Это удобно для передачи результатов отладки в программу без влияния на перенаправление исполняемых программ. Последнее не совместимо с опцией -ff в настоящее время.
- -A – открыть файл, указанный в опции -o, в режиме добавления;
- -q – подавлять сообщения о присоединении, отсоединении и т. д. Это происходит автоматически, когда вывод перенаправляется в файл и команда запускается непосредственно вместо присоединения.
- -qq – подавить сообщения о состоянии завершения процесса;
- -s strsize – указать максимальный размер строки для печати (по умолчанию 32). Следует обратить внимание, что имена файлов не считаются строками и всегда печатаются полностью;
- -t – префикс каждой строки трассировки со временем настенных часов.

Опции статистики

- -c – подсчитывать время, вызовы и ошибки для каждого системного вызова и сообщать сводные данные о выходе из программы, подавляя обычный вывод. Команда пытается показать системное время (процессорное время, потраченное на работу в ядре) независимо от времени настенных часов. Если -c используется с -f, сохраняются только совокупные итоги для всех отслеживаемых процессов.
- -S sortby – сортировать выходные данные гистограммы, напечатанной параметром -c, по указанному критерию. Допустимые значения: time, calls, name и nothing (по умолчанию time).
- -w – суммировать разницу во времени между началом и концом каждого системного вызова. По умолчанию суммируется системное время.

Опция фильтрации

- -e expr – уточняющее выражение, которое изменяет, какие события отслеживать или как их отслеживать.

Strace:

```
$ strace -f ./main

execve("./main", ["./main"], 0x7ffce4389438 /* 35 vars */) = 0

brk(NULL)                               = 0x560696bb9000

arch_prctl(0x3001 /* ARCH_??? */, 0x7ffc6ce60700) = -1 EINVAL (Invalid argument)

mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7f1f851d7000

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

openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3

newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=26299, ...}, AT_EMPTY_PATH) = 0

mmap(NULL, 26299, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7f1f851d0000

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\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=2252096, ...}, AT_EMPTY_PATH) = 0

mmap(NULL, 2267328, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f1f84fa6000

mmap(0x7f1f85040000, 1114112, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x9a000) = 0x7f1f85040000

mmap(0x7f1f85150000, 454656, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x1aa000) = 0x7f1f85150000

mmap(0x7f1f851bf000, 57344, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x218000) = 0x7f1f851bf000

mmap(0x7f1f851cd000, 10432, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,
-1, 0) = 0x7f1f851cd000

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\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=125488, ...}, AT_EMPTY_PATH) = 0

mmap(NULL, 127720, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f1f84f86000

mmap(0x7f1f84f89000, 94208, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x3000) = 0x7f1f84f89000

mmap(0x7f1f84fa0000, 16384, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1a000)
= 0x7f1f84fa0000

mmap(0x7f1f84fa4000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x1d000) = 0x7f1f84fa4000

close(3)                                = 0
```

```
     openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libc.so.6", O_RDONLY|O_CLOEXEC) = 3

     read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0P\237\2\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 \0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0\0"..., 48,
848) = 48

     pread64(3,
"\4\0\0\0\24\0\0\0\3\0\0\0GNU\0i8\235HZ\227\223\333\350s\360\352,\223\340."..., 68, 896) =
68

     newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=2216304, ...}, AT_EMPTY_PATH) = 0

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

     mmap(NULL, 2260560, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f1f84d5e000

     mmap(0x7f1f84d86000, 1658880, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x28000) = 0x7f1f84d86000

     mmap(0x7f1f84f1b000, 360448, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x1bd000) = 0x7f1f84f1b000

     mmap(0x7f1f84f73000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x214000) = 0x7f1f84f73000

     mmap(0x7f1f84f79000, 52816, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,
-1, 0) = 0x7f1f84f79000

     close(3)                                = 0

     openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libm.so.6", O_RDONLY|O_CLOEXEC) = 3

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

     newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=940560, ...}, AT_EMPTY_PATH) = 0

     mmap(NULL, 942344, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f1f84c77000

     mmap(0x7f1f84c85000, 507904, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0xe000) = 0x7f1f84c85000

     mmap(0x7f1f84d01000, 372736, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x8a000) = 0x7f1f84d01000

     mmap(0x7f1f84d5c000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0xe4000) = 0x7f1f84d5c000

     close(3)                                = 0

     mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7f1f84c75000

     arch_prctl(ARCH_SET_FS, 0x7f1f84c763c0) = 0

     set_tid_address(0x7f1f84c76690)         = 2456

     set_robust_list(0x7f1f84c766a0, 24)     = 0
```

```
     rseq(0x7f1f84c76d60, 0x20, 0, 0x53053053) = 0

     mprotect(0x7f1f84f73000, 16384, PROT_READ) = 0

     mprotect(0x7f1f84d5c000, 4096, PROT_READ) = 0

     mprotect(0x7f1f84fa4000, 4096, PROT_READ) = 0

     mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7f1f84c73000

     mprotect(0x7f1f851bf000, 45056, PROT_READ) = 0

     mprotect(0x560694e74000, 4096, PROT_READ) = 0

     mprotect(0x7f1f85211000, 8192, PROT_READ) = 0

     prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 0

     munmap(0x7f1f851d0000, 26299)           = 0

     getrandom("\x63\x38\xee\x06\xa4\x0c\xf5\x05", 8, GRND_NONBLOCK) = 8

     brk(NULL)                               = 0x560696bb9000

     brk(0x560696bda000)                     = 0x560696bda000

     futex(0x7f1f851cd77c, FUTEX_WAKE_PRIVATE, 2147483647) = 0

     newfstatat(1, "", {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0x3), ...},
AT_EMPTY_PATH) = 0

     write(1, "\320\222\320\262\320\265\320\264\320\270\321\202\320\265
\320\270\320\274\321\217 \321\204\320\260\320\271\320\273\320\260"..., 35Введите имя файла:

     ) = 35

     newfstatat(0, "", {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0x3), ...},
AT_EMPTY_PATH) = 0

     read(0, 0x560696bcb2c0, 1024)           = ? ERESTARTSYS (To be restarted if SA_RESTART
is set)

     --- SIGWINCH {si_signo=SIGWINCH, si_code=SI_KERNEL} ---

     read(0, 0x560696bcb2c0, 1024)           = ? ERESTARTSYS (To be restarted if SA_RESTART
is set)

     --- SIGWINCH {si_signo=SIGWINCH, si_code=SI_KERNEL} ---

     read(0, foutput.txt

     "foutput.txt\n", 1024)          = 12

     openat(AT_FDCWD, "foutput.txt", O_WRONLY|O_CREAT, 0777) = 3

     pipe2([4, 5], 0)                        = 0

     pipe2([6, 7], 0)                        = 0

     clone(child_stack=NULL, flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLDstrace:
Process 2624 attached

     , child_tidptr=0x7f1f84c76690) = 2624
```

```
     [pid  2624] set_robust_list(0x7f1f84c766a0, 24 <unfinished ...>

     [pid  2456] close(4 <unfinished ...>

     [pid  2624] <... set_robust_list resumed>) = 0

     [pid  2456] <... close resumed>)        = 0

     [pid  2624] close(5 <unfinished ...>

     [pid  2456] close(7 <unfinished ...>

     [pid  2624] <... close resumed>)        = 0

     [pid  2456] <... close resumed>)        = 0

     [pid  2624] close(6 <unfinished ...>

     [pid  2456] read(0,  <unfinished ...>

     [pid  2624] <... close resumed>)        = 0

     [pid  2624] dup2(4, 0)                  = 0

     [pid  2624] dup2(7, 2)                  = 2

     [pid  2624] dup2(3, 1)                  = 1

     [pid  2624] execve("./child", ["./child"], 0x7ffc6ce608d8 /* 35 vars */) = 0

     [pid  2624] brk(NULL)                   = 0x55b2ccdbb000

     [pid  2624] arch_prctl(0x3001 /* ARCH_??? */, 0x7ffcdee8ea50) = -1 EINVAL (Invalid
argument)

     [pid  2624] mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7f44a3e1a000

     [pid  2624] access("/etc/ld.so.preload", R_OK) = -1 ENOENT (No such file or directory)

     [pid  2624] openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 5

     [pid  2624] newfstatat(5, "", {st_mode=S_IFREG|0644, st_size=26299, ...},
AT_EMPTY_PATH) = 0

     [pid  2624] mmap(NULL, 26299, PROT_READ, MAP_PRIVATE, 5, 0) = 0x7f44a3e13000

     [pid  2624] close(5)                    = 0

     [pid  2624] openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libstdc++.so.6",
O_RDONLY|O_CLOEXEC) = 5

     [pid  2624] read(5,
"\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

     [pid  2624] newfstatat(5, "", {st_mode=S_IFREG|0644, st_size=2252096, ...},
AT_EMPTY_PATH) = 0

     [pid  2624] mmap(NULL, 2267328, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 5, 0) =
0x7f44a3be9000

     [pid  2624] mmap(0x7f44a3c83000, 1114112, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 5, 0x9a000) = 0x7f44a3c83000
```

```
     [pid  2624] mmap(0x7f44a3d93000, 454656, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 5, 0x1aa000) = 0x7f44a3d93000

     [pid  2624] mmap(0x7f44a3e02000, 57344, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 5, 0x218000) = 0x7f44a3e02000

     [pid  2624] mmap(0x7f44a3e10000, 10432, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x7f44a3e10000

     [pid  2624] close(5)                    = 0

     [pid  2624] openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libgcc_s.so.1", O_RDONLY|O_CLOEXEC)
= 5

     [pid  2624] read(5,
"\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

     [pid  2624] newfstatat(5, "", {st_mode=S_IFREG|0644, st_size=125488, ...},
AT_EMPTY_PATH) = 0

     [pid  2624] mmap(NULL, 127720, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 5, 0) =
0x7f44a3bc9000

     [pid  2624] mmap(0x7f44a3bcc000, 94208, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 5, 0x3000) = 0x7f44a3bcc000

     [pid  2624] mmap(0x7f44a3be3000, 16384, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
5, 0x1a000) = 0x7f44a3be3000

     [pid  2624] mmap(0x7f44a3be7000, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 5, 0x1d000) = 0x7f44a3be7000

     [pid  2624] close(5)                    = 0

     [pid  2624] openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libc.so.6", O_RDONLY|O_CLOEXEC) = 5

     [pid  2624] read(5,
"\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0P\237\2\0\0\0\0\0"..., 832) = 832

     [pid  2624] pread64(5,
"\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

     [pid  2624] pread64(5, "\4\0\0\0
\0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0\0"..., 48, 848) = 48

     [pid  2624] pread64(5,
"\4\0\0\0\24\0\0\0\3\0\0\0GNU\0i8\235HZ\227\223\333\350s\360\352,\223\340."..., 68, 896) =
68

     [pid  2624] newfstatat(5, "", {st_mode=S_IFREG|0644, st_size=2216304, ...},
AT_EMPTY_PATH) = 0

     [pid  2624] pread64(5,
"\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

     [pid  2624] mmap(NULL, 2260560, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 5, 0) =
0x7f44a39a1000

     [pid  2624] mmap(0x7f44a39c9000, 1658880, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 5, 0x28000) = 0x7f44a39c9000
```

```
     [pid  2624] mmap(0x7f44a3b5e000, 360448, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 5, 0x1bd000) = 0x7f44a3b5e000

     [pid  2624] mmap(0x7f44a3bb6000, 24576, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 5, 0x214000) = 0x7f44a3bb6000

     [pid  2624] mmap(0x7f44a3bbc000, 52816, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x7f44a3bbc000

     [pid  2624] close(5)                    = 0

     [pid  2624] openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libm.so.6", O_RDONLY|O_CLOEXEC) = 5

     [pid  2624] read(5,
"\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

     [pid  2624] newfstatat(5, "", {st_mode=S_IFREG|0644, st_size=940560, ...},
AT_EMPTY_PATH) = 0

     [pid  2624] mmap(NULL, 942344, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 5, 0) =
0x7f44a38ba000

     [pid  2624] mmap(0x7f44a38c8000, 507904, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 5, 0xe000) = 0x7f44a38c8000

     [pid  2624] mmap(0x7f44a3944000, 372736, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 5, 0x8a000) = 0x7f44a3944000

     [pid  2624] mmap(0x7f44a399f000, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 5, 0xe4000) = 0x7f44a399f000

     [pid  2624] close(5)                    = 0

     [pid  2624] mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7f44a38b8000

     [pid  2624] arch_prctl(ARCH_SET_FS, 0x7f44a38b93c0) = 0

     [pid  2624] set_tid_address(0x7f44a38b9690) = 2624

     [pid  2624] set_robust_list(0x7f44a38b96a0, 24) = 0

     [pid  2624] rseq(0x7f44a38b9d60, 0x20, 0, 0x53053053) = 0

     [pid  2624] mprotect(0x7f44a3bb6000, 16384, PROT_READ) = 0

     [pid  2624] mprotect(0x7f44a399f000, 4096, PROT_READ) = 0

     [pid  2624] mprotect(0x7f44a3be7000, 4096, PROT_READ) = 0

     [pid  2624] mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7f44a38b6000

     [pid  2624] mprotect(0x7f44a3e02000, 45056, PROT_READ) = 0

     [pid  2624] mprotect(0x55b2cb736000, 4096, PROT_READ) = 0

     [pid  2624] mprotect(0x7f44a3e54000, 8192, PROT_READ) = 0

     [pid  2624] prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024,
rlim_max=RLIM64_INFINITY}) = 0

     [pid  2624] munmap(0x7f44a3e13000, 26299) = 0
```

```
[pid  2624] getrandom("\x98\x9b\x5b\x98\xeb\xc3\x0e\x5e", 8, GRND_NONBLOCK) = 8
[pid  2624] brk(NULL)                   = 0x55b2ccdbb000
[pid  2624] brk(0x55b2ccddc000)         = 0x55b2ccddc000
[pid  2624] futex(0x7f44a3e1077c, FUTEX_WAKE_PRIVATE, 2147483647) = 0
[pid  2624] read(0, pivet;
 <unfinished ...>
[pid  2456] <... read resumed>"pivet;\n", 1024) = 7
[pid  2456] pselect6(7, [6], NULL, NULL, {tv_sec=0, tv_nsec=0}, NULL) = 0 (Timeout)
[pid  2456] write(5, "\6\0\0\0", 4)     = 4
[pid  2624] <... read resumed>"\6\0\0\0", 4) = 4
[pid  2456] write(5, "pivet;", 6 <unfinished ...>
[pid  2624] read(0,  <unfinished ...>
[pid  2456] <... write resumed>)        = 6
[pid  2624] <... read resumed>"pivet;", 6) = 6
[pid  2456] read(0,  <unfinished ...>
[pid  2624] write(1, "pivet;\n", 7)     = 7
[pid  2624] read(0, hello;
 <unfinished ...>
[pid  2456] <... read resumed>"hello;\n", 1024) = 7
[pid  2456] pselect6(7, [6], NULL, NULL, {tv_sec=0, tv_nsec=0}, NULL) = 0 (Timeout)
[pid  2456] write(5, "\6\0\0\0", 4)     = 4
[pid  2624] <... read resumed>"\6\0\0\0", 4) = 4
[pid  2456] write(5, "hello;", 6 <unfinished ...>
[pid  2624] read(0,  <unfinished ...>
[pid  2456] <... write resumed>)        = 6
[pid  2624] <... read resumed>"hello;", 6) = 6
[pid  2456] read(0,  <unfinished ...>
[pid  2624] write(1, "hello;\n", 7)     = 7
[pid  2624] read(0, ban?
 <unfinished ...>
[pid  2456] <... read resumed>"ban?\n", 1024) = 5
[pid  2456] pselect6(7, [6], NULL, NULL, {tv_sec=0, tv_nsec=0}, NULL) = 0 (Timeout)
[pid  2456] write(5, "\4\0\0\0", 4)     = 4
```

```
[pid  2624] <... read resumed>"\4\0\0\0", 4) = 4

[pid  2456] write(5, "ban?", 4 <unfinished ...>

[pid  2624] read(0,  <unfinished ...>

[pid  2456] <... write resumed>)        = 4

[pid  2624] <... read resumed>"ban?", 4) = 4

[pid  2456] read(0,  <unfinished ...>

[pid  2624] write(2, "E\0\0\0", 4)      = 4

[pid  2624] write(2, "\320\241\321\202\321\200\320\276\320\272\320\260 \320\275\320\265
\320\276\320\272\320\260\320\275\321\207\320\270\320\262"..., 69) = 69

[pid  2624] exit_group(0)               = ?

[pid  2624] +++ exited with 0 +++

<... read resumed>0x560696bcb2c0, 1024) = ? ERESTARTSYS (To be restarted if SA_RESTART
is set)

--- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=2624, si_uid=1000,
si_status=0, si_utime=1, si_stime=1} ---

read(0, baaan!

"baaan!\n", 1024)               = 7

pselect6(7, [6], NULL, NULL, {tv_sec=0, tv_nsec=0}, NULL) = 1 (in [6], left {tv_sec=0,
tv_nsec=0})

wait4(-1, NULL, 0, NULL)                = 2624

read(6, "E\0\0\0", 4)                   = 4

read(6, "\320\241\321\202\321\200\320\276\320\272\320\260 \320\275\320\265
\320\276\320\272\320\260\320\275\321\207\320\270\320\262"..., 69) = 69

write(1, "\320\241\321\202\321\200\320\276\320\272\320\260 \320\275\320\265
\320\276\320\272\320\260\320\275\321\207\320\270\320\262"..., 69Строка не оканчивается на
"." или ";": ban?

) = 69

close(5)                                = 0

close(6)                                = 0

close(3)                                = 0

exit_group(0)                           = ?

+++ exited with 0 +++

strace ./lr2 1

execve("./lr2", ["./lr2", "1"], 0x7fff0007a8a8 /* 74 vars */) = 0

brk(NULL)                               = 0x5650ca00b000

arch_prctl(0x3001 /* ARCH_??? */, 0x7fff18ea20b0) = -1 EINVAL (Недопустимый аргумент)
```

```
     mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7f447022b000

     access("/etc/ld.so.preload", R_OK)      = -1 ENOENT (Нет такого файла или каталога)

     openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3

     newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=68035, ...}, AT_EMPTY_PATH) = 0

     mmap(NULL, 68035, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7f447021a000

     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\3\0>\0\1\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

     newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=2260296, ...}, AT_EMPTY_PATH) = 0

     mmap(NULL, 2275520, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f446fe00000

     mprotect(0x7f446fe9a000, 1576960, PROT_NONE) = 0

     mmap(0x7f446fe9a000, 1118208, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x9a000) = 0x7f446fe9a000

     mmap(0x7f446ffab000, 454656, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x1ab000) = 0x7f446ffab000

     mmap(0x7f447001b000, 57344, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x21a000) = 0x7f447001b000

     mmap(0x7f4470029000, 10432, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,
-1, 0) = 0x7f4470029000

     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\3\0>\0\1\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

     newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=125488, ...}, AT_EMPTY_PATH) = 0

     mmap(NULL, 127720, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f44701fa000

     mmap(0x7f44701fd000, 94208, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x3000) = 0x7f44701fd000

     mmap(0x7f4470214000, 16384, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1a000)
= 0x7f4470214000

     mmap(0x7f4470218000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x1d000) = 0x7f4470218000

     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\3\0>\0\1\0\0\0P\237\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 \0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0\0"..., 48,
848) = 48
```

```
     pread64(3,
"\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\244;\374\204(\337f#\315I\214\234\f\256\271\32"..., 68, 896)
= 68

     newfstatat(3, "", {st_mode=S_IFREG|0755, st_size=2216304, ...}, AT_EMPTY_PATH) = 0

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

     mmap(NULL, 2260560, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f446fa00000

     mmap(0x7f446fa28000, 1658880, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x28000) = 0x7f446fa28000

     mmap(0x7f446fbbd000, 360448, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x1bd000) = 0x7f446fbbd000

     mmap(0x7f446fc15000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x214000) = 0x7f446fc15000

     mmap(0x7f446fc1b000, 52816, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,
-1, 0) = 0x7f446fc1b000

     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\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

     newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=940560, ...}, AT_EMPTY_PATH) = 0

     mmap(NULL, 942344, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f4470113000

     mmap(0x7f4470121000, 507904, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0xe000) = 0x7f4470121000

     mmap(0x7f447019d000, 372736, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x8a000) = 0x7f447019d000

     mmap(0x7f44701f8000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0xe4000) = 0x7f44701f8000

     close(3)                                = 0

     mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7f4470111000

     arch_prctl(ARCH_SET_FS, 0x7f44701123c0) = 0

     set_tid_address(0x7f4470112690)         = 7795

     set_robust_list(0x7f44701126a0, 24)     = 0

     rseq(0x7f4470112d60, 0x20, 0, 0x53053053) = 0

     mprotect(0x7f446fc15000, 16384, PROT_READ) = 0

     mprotect(0x7f44701f8000, 4096, PROT_READ) = 0

     mprotect(0x7f4470218000, 4096, PROT_READ) = 0

     mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7f447010f000

     mprotect(0x7f447001b000, 45056, PROT_READ) = 0

     mprotect(0x5650c939b000, 4096, PROT_READ) = 0

     mprotect(0x7f4470265000, 8192, PROT_READ) = 0
```

```
     prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 0

     munmap(0x7f447021a000, 68035)           = 0

     getrandom("\x9a\x2f\xd0\xb6\x33\xfd\xc0\x66", 8, GRND_NONBLOCK) = 8

     brk(NULL)                               = 0x5650ca00b000

     brk(0x5650ca02c000)                     = 0x5650ca02c000

     futex(0x7f447002977c, FUTEX_WAKE_PRIVATE, 2147483647) = 0

     newfstatat(1, "", {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0x1), ...},
AT_EMPTY_PATH) = 0

     write(1, "Enter the dimension of the matri"..., 86Enter the dimension of the matrices
to be multiplied to fill them with random numbers

     ) = 86

     write(1, "Matrix format: m*n, n*k, enter 3"..., 49Matrix format: m*n, n*k, enter 3
natural numbers

     ) = 49

     newfstatat(0, "", {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0x1), ...},
AT_EMPTY_PATH) = 0

     read(0, 6 6 6

     "6 6 6\n", 1024)                = 6

     write(1, "\n", 1

     )                           = 1

     rt_sigaction(SIGRT_1, {sa_handler=0x7f446fa91870, sa_mask=[],
sa_flags=SA_RESTORER|SA_ONSTACK|SA_RESTART|SA_SIGINFO, sa_restorer=0x7f446fa42520}, NULL, 8)
= 0

     rt_sigprocmask(SIG_UNBLOCK, [RTMIN RT_1], NULL, 8) = 0

     mmap(NULL, 8392704, PROT_NONE, MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK, -1, 0) =
0x7f446f1ff000

     mprotect(0x7f446f200000, 8388608, PROT_READ|PROT_WRITE) = 0

     rt_sigprocmask(SIG_BLOCK, ~[], [], 8)   = 0

     clone3({flags=CLONE_VM|CLONE_FS|CLONE_FILES|CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|CL
ONE_SETTLS|CLONE_PARENT_SETTID|CLONE_CHILD_CLEARTID, child_tid=0x7f446f9ff910,
parent_tid=0x7f446f9ff910, exit_signal=0, stack=0x7f446f1ff000, stack_size=0x7fff00,
tls=0x7f446f9ff640} => {parent_tid=[7816]}, 88) = 7816

     rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0

     futex(0x7f446f9ff910, FUTEX_WAIT_BITSET|FUTEX_CLOCK_REALTIME, 7816, NULL,
FUTEX_BITSET_MATCH_ANY) = 0

     write(1, "Result: 0.00216319 s\n", 21Result: 0.00216319 s

     )  = 21

     lseek(0, -1, SEEK_CUR)                  = -1 ESPIPE (Недопустимая операция смещения)

     exit_group(0)                           = ?

     +++ exited with 0 ++
```

```
tanya@tanya:~/Рабочий стол/OOS/OS3sem/3$ strace ./main
execve("./main", ["./main"], 0x7fffc20921c0 /* 74 vars */) = 0
brk(NULL)                               = 0x5600223ce000
arch_prctl(0x3001 /* ARCH_??? */, 0x7ffebcbf3f10) = -1 EINVAL (Недопустимый аргумент)
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7f20b4c59000
access("/etc/ld.so.preload", R_OK)      = -1 ENOENT (Нет такого файла или каталога)
openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3
newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=68035, ...}, AT_EMPTY_PATH) = 0
mmap(NULL, 68035, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7f20b4c48000
close(3)                                = 0
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libstdc++.so.6", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=2260296, ...}, AT_EMPTY_PATH) = 0
mmap(NULL, 2275520, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f20b4a00000
mprotect(0x7f20b4a9a000, 1576960, PROT_NONE) = 0
mmap(0x7f20b4a9a000, 1118208, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x9a000) = 0x7f20b4a9a000
mmap(0x7f20b4bab000, 454656, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x1ab000) = 0x7f20b4bab000
mmap(0x7f20b4c1b000, 57344, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x21a000) = 0x7f20b4c1b000
mmap(0x7f20b4c29000, 10432, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,
-1, 0) = 0x7f20b4c29000
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\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=125488, ...}, AT_EMPTY_PATH) = 0
mmap(NULL, 127720, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f20b49e0000
mmap(0x7f20b49e3000, 94208, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x3000) = 0x7f20b49e3000
mmap(0x7f20b49fa000, 16384, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1a000)
= 0x7f20b49fa000
mmap(0x7f20b49fe000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x1d000) = 0x7f20b49fe000
close(3)                                = 0
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libc.so.6", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0P\237\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 \0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0\0"..., 48,
848) = 48

     pread64(3,
"\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\244;\374\204(\337f#\315I\214\234\f\256\271\32"..., 68, 896)
= 68

     newfstatat(3, "", {st_mode=S_IFREG|0755, st_size=2216304, ...}, AT_EMPTY_PATH) = 0

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

     mmap(NULL, 2260560, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f20b4600000

     mmap(0x7f20b4628000, 1658880, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x28000) = 0x7f20b4628000

     mmap(0x7f20b47bd000, 360448, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x1bd000) = 0x7f20b47bd000

     mmap(0x7f20b4815000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x214000) = 0x7f20b4815000

     mmap(0x7f20b481b000, 52816, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,
-1, 0) = 0x7f20b481b000

     close(3)                                = 0

     openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libm.so.6", O_RDONLY|O_CLOEXEC) = 3

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

     newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=940560, ...}, AT_EMPTY_PATH) = 0

     mmap(NULL, 942344, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f20b48f9000

     mmap(0x7f20b4907000, 507904, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0xe000) = 0x7f20b4907000

     mmap(0x7f20b4983000, 372736, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x8a000) = 0x7f20b4983000

     mmap(0x7f20b49de000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0xe4000) = 0x7f20b49de000

     close(3)                                = 0

     mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7f20b4c46000

     arch_prctl(ARCH_SET_FS, 0x7f20b4c473c0) = 0

     set_tid_address(0x7f20b4c47690)         = 12347

     set_robust_list(0x7f20b4c476a0, 24)     = 0

     rseq(0x7f20b4c47d60, 0x20, 0, 0x53053053) = 0

     mprotect(0x7f20b4815000, 16384, PROT_READ) = 0

     mprotect(0x7f20b49de000, 4096, PROT_READ) = 0

     mprotect(0x7f20b49fe000, 4096, PROT_READ) = 0

     mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7f20b4c44000
```

```
mprotect(0x7f20b4c1b000, 45056, PROT_READ) = 0

mprotect(0x56002167c000, 4096, PROT_READ) = 0

mprotect(0x7f20b4c93000, 8192, PROT_READ) = 0

prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 0

munmap(0x7f20b4c48000, 68035)          = 0

getrandom("\x93\xc1\xb7\x98\xc8\x96\x26\x74", 8, GRND_NONBLOCK) = 8

brk(NULL)                              = 0x5600223ce000

brk(0x5600223ef000)                    = 0x5600223ef000

futex(0x7f20b4c2977c, FUTEX_WAKE_PRIVATE, 2147483647) = 0

openat(AT_FDCWD, "/dev/shm/myshm", O_RDWR|O_CREAT|O_NOFOLLOW|O_CLOEXEC, 0666) = 3

ftruncate(3, 1024)                     = 0

mmap(NULL, 1024, PROT_READ|PROT_WRITE, MAP_SHARED, 3, 0) = 0x7f20b4c92000

newfstatat(0, "", {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0x2), ...},
AT_EMPTY_PATH) = 0

read(0, hiodxjsiv;

"hiodxjsiv;\n", 1024)           = 11

clone(child_stack=NULL, flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD,
child_tidptr=0x7f20b4c47690) = 12372

wait4(-1, hiodxjsiv;

NULL, 0, NULL)            = 12372

--- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=12372, si_uid=1000,
si_status=0, si_utime=0, si_stime=0} ---

munmap(0x7f20b4c92000, 1024)           = 0

close(3)                               = 0

unlink("/dev/shm/myshm")               = 0

exit_group(0)                          = ?

+++ exited with 0 +++

tanya@tanya:~/Рабочий стол/4$ strace ./main2

execve("./main2", ["./main2"], 0x7ffc6dd2a3e0 /* 74 vars */) = 0

brk(NULL)                              = 0x555d8a341000

arch_prctl(0x3001 /* ARCH_??? */, 0x7ffcf364e3c0) = -1 EINVAL (Недопустимый аргумент)

mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7fe26dbe4000

access("/etc/ld.so.preload", R_OK)     = -1 ENOENT (Нет такого файла или каталога)

openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3

newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=68035, ...}, AT_EMPTY_PATH) = 0

mmap(NULL, 68035, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7fe26dbd3000
```

```
     close(3)                                = 0

     openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libstdc++.so.6", O_RDONLY|O_CLOEXEC) = 3

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

     newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=2260296, ...}, AT_EMPTY_PATH) = 0

     mmap(NULL, 2275520, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7fe26d800000

     mprotect(0x7fe26d89a000, 1576960, PROT_NONE) = 0

     mmap(0x7fe26d89a000, 1118208, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x9a000) = 0x7fe26d89a000

     mmap(0x7fe26d9ab000, 454656, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x1ab000) = 0x7fe26d9ab000

     mmap(0x7fe26da1b000, 57344, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x21a000) = 0x7fe26da1b000

     mmap(0x7fe26da29000, 10432, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,
-1, 0) = 0x7fe26da29000

     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\3\0>\0\1\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

     newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=125488, ...}, AT_EMPTY_PATH) = 0

     mmap(NULL, 127720, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7fe26dbb3000

     mmap(0x7fe26dbb6000, 94208, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x3000) = 0x7fe26dbb6000

     mmap(0x7fe26dbcd000, 16384, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1a000)
= 0x7fe26dbcd000

     mmap(0x7fe26dbd1000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x1d000) = 0x7fe26dbd1000

     close(3)                                = 0

     openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libc.so.6", O_RDONLY|O_CLOEXEC) = 3

     read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0P\237\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 \0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0"..., 48,
848) = 48

     pread64(3,
"\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\244;\374\204(\337f#\315I\214\234\f\256\271\32"..., 68, 896)
= 68

     newfstatat(3, "", {st_mode=S_IFREG|0755, st_size=2216304, ...}, AT_EMPTY_PATH) = 0

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

     mmap(NULL, 2260560, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7fe26d400000

     mmap(0x7fe26d428000, 1658880, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x28000) = 0x7fe26d428000
```

```
     mmap(0x7fe26d5bd000, 360448, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x1bd000) = 0x7fe26d5bd000

     mmap(0x7fe26d615000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x214000) = 0x7fe26d615000

     mmap(0x7fe26d61b000, 52816, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,
-1, 0) = 0x7fe26d61b000

     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\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

     newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=940560, ...}, AT_EMPTY_PATH) = 0

     mmap(NULL, 942344, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7fe26dacc000

     mmap(0x7fe26dada000, 507904, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0xe000) = 0x7fe26dada000

     mmap(0x7fe26db56000, 372736, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x8a000) = 0x7fe26db56000

     mmap(0x7fe26dbb1000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0xe4000) = 0x7fe26dbb1000

     close(3)                                = 0

     mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7fe26daca000

     arch_prctl(ARCH_SET_FS, 0x7fe26dacb3c0) = 0

     set_tid_address(0x7fe26dacb690)         = 6456

     set_robust_list(0x7fe26dacb6a0, 24)     = 0

     rseq(0x7fe26dacbd60, 0x20, 0, 0x53053053) = 0

     mprotect(0x7fe26d615000, 16384, PROT_READ) = 0

     mprotect(0x7fe26dbb1000, 4096, PROT_READ) = 0

     mprotect(0x7fe26dbd1000, 4096, PROT_READ) = 0

     mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7fe26dac8000

     mprotect(0x7fe26da1b000, 45056, PROT_READ) = 0

     mprotect(0x555d89e3c000, 4096, PROT_READ) = 0

     mprotect(0x7fe26dc1e000, 8192, PROT_READ) = 0

     prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 0

     munmap(0x7fe26dbd3000, 68035)           = 0

     getrandom("\xd8\x7e\xe0\xf9\xb1\xa2\xc9\xaa", 8, GRND_NONBLOCK) = 8

     brk(NULL)                               = 0x555d8a341000

     brk(0x555d8a362000)                     = 0x555d8a362000

     futex(0x7fe26da2977c, FUTEX_WAKE_PRIVATE, 2147483647) = 0

     openat(AT_FDCWD, "./libGCF.so", O_RDONLY|O_CLOEXEC) = 3
```

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

newfstatat(3, "", {st_mode=S_IFREG|0775, st_size=15200, ...}, AT_EMPTY_PATH) = 0

getcwd("/home/tanya/\320\240\320\260\320\261\320\276\321\207\320\270\320\271
\321\201\321\202\320\276\320\273/4", 128) = 38

mmap(NULL, 16424, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7fe26dbdf000

mmap(0x7fe26dbe0000, 4096, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x1000) = 0x7fe26dbe0000

mmap(0x7fe26dbe1000, 4096, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) =
0x7fe26dbe1000

mmap(0x7fe26dbe2000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x2000) = 0x7fe26dbe2000

close(3)                                = 0

mprotect(0x7fe26dbe2000, 4096, PROT_READ) = 0

openat(AT_FDCWD, "./libSort.so", O_RDONLY|O_CLOEXEC) = 3

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

newfstatat(3, "", {st_mode=S_IFREG|0775, st_size=15432, ...}, AT_EMPTY_PATH) = 0

getcwd("/home/tanya/\320\240\320\260\320\261\320\276\321\207\320\270\320\271
\321\201\321\202\320\276\320\273/4", 128) = 38

mmap(NULL, 16432, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7fe26dbda000

mmap(0x7fe26dbdb000, 4096, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x1000) = 0x7fe26dbdb000

mmap(0x7fe26dbdc000, 4096, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) =
0x7fe26dbdc000

mmap(0x7fe26dbdd000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x2000) = 0x7fe26dbdd000

close(3)                                = 0

mprotect(0x7fe26dbdd000, 4096, PROT_READ) = 0

newfstatat(1, "", {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0), ...}, AT_EMPTY_PATH)
= 0

write(1, "Choose command: \n", 17Choose command:

)     = 17

write(1, "\t0 - switch algo in lib,\n", 25    0 - switch algo in lib,

) = 25

write(1, "\t1 - calculate sin integral,\n", 29  1 - calculate sin integral,

) = 29

write(1, "\t2 - calculate cos derivative,\n", 31    2 - calculate cos derivative,

) = 31

write(1, "\t3 - exit.\n", 11     3 - exit.

)            = 11
```

```
     write(1, "==============================="...,
44============================================

     ) = 44

     newfstatat(0, "", {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0), ...}, AT_EMPTY_PATH)
= 0

     read(0, 1

     "1\n", 1024)                    = 2

     read(0, 16

     "16\n", 1024)                   = 3

     read(0, 28

     "28\n", 1024)                   = 3

     write(1, "GCF is: 4\n", 10GCF is: 4

     )            = 10

     read(0, 0

     "0\n", 1024)                    = 2

     write(1, "Algo switched to second\n", 24Algo switched to second

     ) = 24

     read(0, 16

     "16\n", 1024)                   = 3

     write(1, "Invalid command\n", 16Invalid command

     )     = 16

     read(0, 28

     "28\n", 1024)                   = 3

     write(1, "Invalid command\n", 16Invalid command

     )     = 16

     read(0, 1

     "1\n", 1024)                    = 2

     read(0, 16

     "16 \n", 1024)                  = 4

     read(0, 28

     "28\n", 1024)                   = 3

     write(1, "GCF is: 4\n", 10GCF is: 4

     )            = 10

     read(0, 0

     "0\n", 1024)                    = 2

     write(1, "Algo switched to first\n", 23Algo switched to first
```

```
) = 23
read(0, 2
"2\n", 1024)                    = 2
read(0, 4
"4\n", 1024)                    = 2
write(1, "\n", 1
)                         = 1
write(1, "Enter an array :", 16Enter an array :)    = 16
read(0, 1
"1\n", 1024)                    = 2
read(0, 8
"8\n", 1024)                    = 2
read(0, -8
"-8\n", 1024)                   = 3
read(0, 9
"9\n", 1024)                    = 2
write(1, "\n", 1
)                         = 1
write(1, "Sorted: -8 1 8 9 \n", 18Sorted: -8 1 8 9
)     = 18
read(0, 3
"3\n", 1024)                    = 2
--- SIGSEGV {si_signo=SIGSEGV, si_code=SEGV_MAPERR, si_addr=0x1fffffff0} ---
+++ killed by SIGSEGV (core dumped) +++
tanya@tanya:~/Рабочий стол/OOS/OS3sem/5_7$ strace ./server
execve("./server", ["./server"], 0x7ffe235271f0 /* 74 vars */) = 0
brk(NULL)                               = 0x55c2d368a000
arch_prctl(0x3001 /* ARCH_??? */, 0x7ffcf5992470) = -1 EINVAL (Недопустимый аргумент)
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7f5c81467000
access("/etc/ld.so.preload", R_OK)      = -1 ENOENT (Нет такого файла или каталога)
openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3
newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=71451, ...}, AT_EMPTY_PATH) = 0
mmap(NULL, 71451, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7f5c81455000
close(3)                                = 0
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libzmq.so.5", 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\240\233\1\0\0\0\0\0"..., 832) =
832

     newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=634936, ...}, AT_EMPTY_PATH) = 0

     mmap(NULL, 636784, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f5c813b9000

     mmap(0x7f5c813d1000, 397312, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x18000) = 0x7f5c813d1000

     mmap(0x7f5c81432000, 106496, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x79000) = 0x7f5c81432000

     mmap(0x7f5c8144c000, 36864, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x92000) = 0x7f5c8144c000

     close(3)                                  = 0

     openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libstdc++.so.6", O_RDONLY|O_CLOEXEC) = 3

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

     newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=2260296, ...}, AT_EMPTY_PATH) = 0

     mmap(NULL, 2275520, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f5c81000000

     mprotect(0x7f5c8109a000, 1576960, PROT_NONE) = 0

     mmap(0x7f5c8109a000, 1118208, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x9a000) = 0x7f5c8109a000

     mmap(0x7f5c811ab000, 454656, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x1ab000) = 0x7f5c811ab000

     mmap(0x7f5c8121b000, 57344, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x21a000) = 0x7f5c8121b000

     mmap(0x7f5c81229000, 10432, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,
-1, 0) = 0x7f5c81229000

     close(3)                                  = 0

     openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libgcc_s.so.1", O_RDONLY|O_CLOEXEC) = 3

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

     newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=125488, ...}, AT_EMPTY_PATH) = 0

     mmap(NULL, 127720, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f5c81399000

     mmap(0x7f5c8139c000, 94208, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x3000) = 0x7f5c8139c000

     mmap(0x7f5c813b3000, 16384, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1a000)
= 0x7f5c813b3000

     mmap(0x7f5c813b7000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x1d000) = 0x7f5c813b7000

     close(3)                                  = 0

     openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libc.so.6", O_RDONLY|O_CLOEXEC) = 3

     read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0P\237\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 \0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0\0"..., 48,
848) = 48

     pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0
=\340\2563\265?\356\25x\261\27\313A#\350"..., 68, 896) = 68

     newfstatat(3, "", {st_mode=S_IFREG|0755, st_size=2216304, ...}, AT_EMPTY_PATH) = 0

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

     mmap(NULL, 2260560, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f5c80c00000

     mmap(0x7f5c80c28000, 1658880, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x28000) = 0x7f5c80c28000

     mmap(0x7f5c80dbd000, 360448, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x1bd000) = 0x7f5c80dbd000

     mmap(0x7f5c80e15000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x214000) = 0x7f5c80e15000

     mmap(0x7f5c80e1b000, 52816, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,
-1, 0) = 0x7f5c80e1b000

     close(3)                                = 0

     openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libbsd.so.0", O_RDONLY|O_CLOEXEC) = 3

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

     newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=89096, ...}, AT_EMPTY_PATH) = 0

     mmap(NULL, 94432, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f5c81381000

     mprotect(0x7f5c81385000, 69632, PROT_NONE) = 0

     mmap(0x7f5c81385000, 53248, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x4000) = 0x7f5c81385000

     mmap(0x7f5c81392000, 12288, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x11000)
= 0x7f5c81392000

     mmap(0x7f5c81396000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x14000) = 0x7f5c81396000

     mmap(0x7f5c81398000, 224, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,
-1, 0) = 0x7f5c81398000

     close(3)                                = 0

     openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libsodium.so.23", O_RDONLY|O_CLOEXEC) = 3

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

     newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=355040, ...}, AT_EMPTY_PATH) = 0

     mmap(NULL, 357440, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f5c81329000

     mprotect(0x7f5c81335000, 303104, PROT_NONE) = 0

     mmap(0x7f5c81335000, 229376, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0xc000) = 0x7f5c81335000

     mmap(0x7f5c8136d000, 69632, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x44000)
= 0x7f5c8136d000

     mmap(0x7f5c8137f000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x55000) = 0x7f5c8137f000
```

```
     close(3)                                = 0

     mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7f5c81327000

     openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libpgm-5.3.so.0", 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\340L\0\0\0\0\0\0"..., 832) =
832

     newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=310264, ...}, AT_EMPTY_PATH) = 0

     mmap(NULL, 329808, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f5c812d6000

     mmap(0x7f5c812da000, 172032, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x4000) = 0x7f5c812da000

     mmap(0x7f5c81304000, 118784, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x2e000) = 0x7f5c81304000

     mmap(0x7f5c81321000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x4a000) = 0x7f5c81321000

     mmap(0x7f5c81323000, 14416, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,
-1, 0) = 0x7f5c81323000

     close(3)                                = 0

     openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libnorm.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 \255\0\0\0\0\0\0"..., 832) =
832

     newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=497824, ...}, AT_EMPTY_PATH) = 0

     mmap(NULL, 1223168, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f5c80ed5000

     mprotect(0x7f5c80edf000, 446464, PROT_NONE) = 0

     mmap(0x7f5c80edf000, 286720, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0xa000) = 0x7f5c80edf000

     mmap(0x7f5c80f25000, 155648, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x50000) = 0x7f5c80f25000

     mmap(0x7f5c80f4c000, 16384, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x76000) = 0x7f5c80f4c000

     mmap(0x7f5c80f50000, 719360, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,
-1, 0) = 0x7f5c80f50000

     close(3)                                = 0

     openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libgssapi_krb5.so.2", O_RDONLY|O_CLOEXEC) = 3

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

     newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=338648, ...}, AT_EMPTY_PATH) = 0

     mmap(NULL, 340960, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f5c81282000

     mprotect(0x7f5c8128d000, 282624, PROT_NONE) = 0

     mmap(0x7f5c8128d000, 229376, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0xb000) = 0x7f5c8128d000

     mmap(0x7f5c812c5000, 49152, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x43000)
= 0x7f5c812c5000
```

```
     mmap(0x7f5c812d2000, 16384, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x4f000) = 0x7f5c812d2000

     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\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832

     newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=940560, ...}, AT_EMPTY_PATH) = 0

     mmap(NULL, 942344, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f5c80b19000

     mmap(0x7f5c80b27000, 507904, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0xe000) = 0x7f5c80b27000

     mmap(0x7f5c80ba3000, 372736, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x8a000) = 0x7f5c80ba3000

     mmap(0x7f5c80bfe000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0xe4000) = 0x7f5c80bfe000

     close(3)                                = 0

     openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libmd.so.0", O_RDONLY|O_CLOEXEC) = 3

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

     newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=47472, ...}, AT_EMPTY_PATH) = 0

     mmap(NULL, 49384, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f5c81275000

     mmap(0x7f5c81277000, 28672, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x2000) = 0x7f5c81277000

     mmap(0x7f5c8127e000, 8192, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x9000) =
0x7f5c8127e000

     mmap(0x7f5c81280000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0xa000) = 0x7f5c81280000

     close(3)                                = 0

     openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libpthread.so.0", O_RDONLY|O_CLOEXEC) = 3

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

     newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=21448, ...}, AT_EMPTY_PATH) = 0

     mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7f5c81273000

     mmap(NULL, 16424, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f5c8126e000

     mmap(0x7f5c8126f000, 4096, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x1000) = 0x7f5c8126f000

     mmap(0x7f5c81270000, 4096, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) =
0x7f5c81270000

     mmap(0x7f5c81271000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x2000) = 0x7f5c81271000

     close(3)                                = 0

     openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libkrb5.so.3", O_RDONLY|O_CLOEXEC) = 3

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

```
     newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=827936, ...}, AT_EMPTY_PATH) = 0

     mmap(NULL, 830576, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f5c80a4e000

     mprotect(0x7f5c80a6f000, 634880, PROT_NONE) = 0

     mmap(0x7f5c80a6f000, 380928, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x21000) = 0x7f5c80a6f000

     mmap(0x7f5c80acc000, 249856, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x7e000) = 0x7f5c80acc000

     mmap(0x7f5c80b0a000, 61440, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0xbb000) = 0x7f5c80b0a000

     close(3)                                = 0

     openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libk5crypto.so.3", O_RDONLY|O_CLOEXEC) = 3

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

     newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=182864, ...}, AT_EMPTY_PATH) = 0

     mmap(NULL, 188472, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f5c8123f000

     mprotect(0x7f5c81243000, 163840, PROT_NONE) = 0

     mmap(0x7f5c81243000, 110592, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x4000) = 0x7f5c81243000

     mmap(0x7f5c8125e000, 49152, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1f000)
= 0x7f5c8125e000

     mmap(0x7f5c8126b000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x2b000) = 0x7f5c8126b000

     mmap(0x7f5c8126d000, 56, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1,
0) = 0x7f5c8126d000

     close(3)                                = 0

     openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libcom_err.so.2", O_RDONLY|O_CLOEXEC) = 3

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

     newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=18504, ...}, AT_EMPTY_PATH) = 0

     mmap(NULL, 20552, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f5c81239000

     mmap(0x7f5c8123b000, 4096, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x2000) = 0x7f5c8123b000

     mmap(0x7f5c8123c000, 4096, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x3000) =
0x7f5c8123c000

     mmap(0x7f5c8123d000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x3000) = 0x7f5c8123d000

     close(3)                                = 0

     openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libkrb5support.so.0", O_RDONLY|O_CLOEXEC) = 3

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

     newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=52016, ...}, AT_EMPTY_PATH) = 0

     mmap(NULL, 54224, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f5c80ec7000

     mprotect(0x7f5c80eca000, 36864, PROT_NONE) = 0
```

```
     mmap(0x7f5c80eca000, 24576, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x3000) = 0x7f5c80eca000

     mmap(0x7f5c80ed0000, 8192, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x9000) =
0x7f5c80ed0000

     mmap(0x7f5c80ed3000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0xb000) = 0x7f5c80ed3000

     close(3)                                = 0

     openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libkeyutils.so.1", O_RDONLY|O_CLOEXEC) = 3

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

     newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=22600, ...}, AT_EMPTY_PATH) = 0

     mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7f5c81237000

     mmap(NULL, 24592, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f5c81230000

     mmap(0x7f5c81232000, 8192, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x2000) = 0x7f5c81232000

     mmap(0x7f5c81234000, 4096, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x4000) =
0x7f5c81234000

     mmap(0x7f5c81235000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x4000) = 0x7f5c81235000

     close(3)                                = 0

     openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libresolv.so.2", O_RDONLY|O_CLOEXEC) = 3

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

     newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=68552, ...}, AT_EMPTY_PATH) = 0

     mmap(NULL, 80456, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f5c80eb3000

     mmap(0x7f5c80eb6000, 40960, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x3000) = 0x7f5c80eb6000

     mmap(0x7f5c80ec0000, 12288, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0xd000)
= 0x7f5c80ec0000

     mmap(0x7f5c80ec3000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0xf000) = 0x7f5c80ec3000

     mmap(0x7f5c80ec5000, 6728, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,
-1, 0) = 0x7f5c80ec5000

     close(3)                                = 0

     mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7f5c8122e000

     mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7f5c80eb0000

     arch_prctl(ARCH_SET_FS, 0x7f5c80eb09c0) = 0

     set_tid_address(0x7f5c80eb0c90)         = 29025

     set_robust_list(0x7f5c80eb0ca0, 24)     = 0

     rseq(0x7f5c80eb1360, 0x20, 0, 0x53053053) = 0
```

```
mprotect(0x7f5c80e15000, 16384, PROT_READ) = 0

mprotect(0x7f5c80ec3000, 4096, PROT_READ) = 0

mprotect(0x7f5c81235000, 4096, PROT_READ) = 0

mprotect(0x7f5c80ed3000, 4096, PROT_READ) = 0

mprotect(0x7f5c8123d000, 4096, PROT_READ) = 0

mprotect(0x7f5c8126b000, 4096, PROT_READ) = 0

mprotect(0x7f5c80b0a000, 53248, PROT_READ) = 0

mprotect(0x7f5c81271000, 4096, PROT_READ) = 0

mprotect(0x7f5c81280000, 4096, PROT_READ) = 0

mprotect(0x7f5c80bfe000, 4096, PROT_READ) = 0

mprotect(0x7f5c812d2000, 8192, PROT_READ) = 0

mprotect(0x7f5c813b7000, 4096, PROT_READ) = 0

mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7f5c8122c000

mprotect(0x7f5c8121b000, 45056, PROT_READ) = 0

mprotect(0x7f5c80f4c000, 12288, PROT_READ) = 0

mprotect(0x7f5c81321000, 4096, PROT_READ) = 0

mprotect(0x7f5c8137f000, 4096, PROT_READ) = 0

mprotect(0x7f5c81396000, 4096, PROT_READ) = 0

mprotect(0x7f5c8144c000, 32768, PROT_READ) = 0

mprotect(0x55c2d345f000, 4096, PROT_READ) = 0

mprotect(0x7f5c814a1000, 8192, PROT_READ) = 0

prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 0

munmap(0x7f5c81455000, 71451)           = 0

getrandom("\xaf\x99\xe5\x48\x6d\xf2\x5d\x53", 8, GRND_NONBLOCK) = 8

brk(NULL)                               = 0x55c2d368a000

brk(0x55c2d36ab000)                     = 0x55c2d36ab000

futex(0x7f5c8122977c, FUTEX_WAKE_PRIVATE, 2147483647) = 0

rt_sigaction(SIGCHLD, {sa_handler=0x55c2d3451d54, sa_mask=[CHLD],
sa_flags=SA_RESTORER|SA_RESTART, sa_restorer=0x7f5c80c42520}, {sa_handler=SIG_DFL,
sa_mask=[], sa_flags=0}, 8) = 0

exit_group(0)                           = ?

+++ exited with 0 +++
```

Вывод

В ходе лабораторной работы изучила утилиту strace, а также ее флаги. Данную утилиту я использовала, чтобы тщательно отследить работу системных вызовов. Утилита strace — простой и надёжный инструмент. Но помимо системных вызовов отлаживать случается и другие аспекты

работы программ и операционной системы. Например, отслеживать вызовы динамически линкуемых библиотек.