Московский Авиационный Институт

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Кафедра вычислительной математики и программирования

Лабораторная работа №1 по курсу

«Операционные системы»

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Содержание

Репозиторий

Постановка задачи

Подробно рассказать о каждом системном вызове из утилиты strace на примере лабораторной работы №4.

Описание работы strace

execve — открывает файл на исполнение.

brk — изменяет расположение маркера окончания неинициализированных данных, который определяет конец сегмента данных процесса.

arch_prtcl — устанавливает состояние процесса или потока, зависящее от архитектуры.

access - для проверки существования файла

openat — открывает файл в определенной директории.

newfstatat — возвращает информацию о файле в буфер.

close — закрывает файловый дескриптор.

mmap — создает новое отображение памяти в адресном пространстве процесса.

ftruncate — устанавливает файлу необходимый размер.

munmap — удаляет отображение.

mprotect − контролирует доступ к области памяти.

set_robust_list - запрашивает ядро записать начало списка надёжных фьютексов, принадлежащего вызывающей нити

rt_sigaction - получает и изменяет обработчик сигнала.

rt_sigprocmask - используется для проверки или настройки сигнальной маски текущего процесса.

set_tid_address - устанавливает у вызывающей нити значение clear_child_tid равным tidptr (В ядре для каждой нити хранится два атрибута (адреса): set_child_tid и clear_child_tid. Их значение по умолчанию равно NULL)

futex - предоставляет программам метод для ожидания пока определённое условие не станет истинным

fstatat — требует права выполнения (поиска) на все каталоги, указанные в полном имени файла pathname. (опрашиваемый файл задаётся в виде файлового дескриптора fd.)

statfs - возвращает информацию о смонтированной файловой системе

clone - создаёт новый процесс подобно fork

clock_nanosleep - позволяет вызывающей нити приостановить работу на некоторое время с наносекундной точностью

lseek - позволяет задавать смещение, которое будет находиться за существующим концом файла (но это не изменяет размер файла)

exit_group - завершает исполнение всех потоков процесса.

Демонстрация работы strace

```
papik@papik-VirtualBox:~/OSlaba4/build$ strace -f ./main < test1.txt
execve("./main", ["./main"], 0x7ffcbfd25308 /* 49 vars */) = 0
brk(NULL)                               = 0x561aa1055000
arch_prctl(0x3001 /* ARCH_??? */, 0x7ffe4a34dc80) = -1 EINVAL (Недопустимый аргумент)
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
fstat(3, {st_mode=S_IFREG|0644, st_size=77566, ...}) = 0
mmap(NULL, 77566, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7f76ea49a000
close(3)                                = 0
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/librt.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"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0644, st_size=35928, ...}) = 0
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7f76ea498000
mmap(NULL, 39904, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f76ea48e000
mmap(0x7f76ea490000, 16384, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x2000) = 0x7f76ea490000
mmap(0x7f76ea494000, 8192, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x6000) =
0x7f76ea494000
mmap(0x7f76ea496000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x7000) = 0x7f76ea496000
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\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, 1972224, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f76ea2ac000
mprotect(0x7f76ea342000, 1290240, PROT_NONE) = 0
mmap(0x7f76ea342000, 987136, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x96000) = 0x7f76ea342000
mmap(0x7f76ea433000, 299008, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x187000) =
0x7f76ea433000
mmap(0x7f76ea47d000, 57344, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x1d0000) = 0x7f76ea47d000
mmap(0x7f76ea48b000, 10240, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0)
= 0x7f76ea48b000
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) = 0x7f76ea291000
mmap(0x7f76ea294000, 73728, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x3000) = 0x7f76ea294000
mmap(0x7f76ea2a6000, 16384, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x15000) =
0x7f76ea2a6000
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mmap(0x7f76ea2aa000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x18000) = 0x7f76ea2aa000
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\0\3\0>\0\1\0\0\0\220q\0\0\0\0\0\0"..., 832) = 832
pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\360\2300%\360\340\363'\246\332u/\364\377\246u"...,
68, 824) = 68
fstat(3, {st_mode=S_IFREG|0755, st_size=157224, ...}) = 0
pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\360\2300%\360\340\363'\246\332u/\364\377\246u"...,
68, 824) = 68
mmap(NULL, 140408, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f76ea26e000
mmap(0x7f76ea274000, 69632, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x6000) = 0x7f76ea274000
mmap(0x7f76ea285000, 24576, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x17000) =
0x7f76ea285000
mmap(0x7f76ea28b000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x1c000) = 0x7f76ea28b000
mmap(0x7f76ea28d000, 13432, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0)
= 0x7f76ea28d000
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\360A\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\237\333t\347\262\27\320l\223\27*\202C\370T\177"...,
68, 880) = 68
fstat(3, {st_mode=S_IFREG|0755, st_size=2029560, ...}) = 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\237\333t\347\262\27\320l\223\27*\202C\370T\177"...,
68, 880) = 68
mmap(NULL, 2037344, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f76ea07c000
mmap(0x7f76ea09e000, 1540096, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x22000) = 0x7f76ea09e000
mmap(0x7f76ea216000, 319488, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x19a000) =
0x7f76ea216000
mmap(0x7f76ea264000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x1e7000) = 0x7f76ea264000
mmap(0x7f76ea26a000, 13920, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0)
= 0x7f76ea26a000
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\323\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) = 0x7f76e9f2d000
mmap(0x7f76e9f3a000, 684032, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0xd000) = 0x7f76e9f3a000
mmap(0x7f76e9fe1000, 626688, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0xb4000) =
0x7f76e9fe1000
mmap(0x7f76ea07a000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x14c000) = 0x7f76ea07a000
close(3)                                = 0
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7f76e9f2b000
mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7f76e9f28000
arch_prctl(ARCH_SET_FS, 0x7f76e9f28740) = 0
mprotect(0x7f76ea264000, 16384, PROT_READ) = 0
mprotect(0x7f76ea07a000, 4096, PROT_READ) = 0
mprotect(0x7f76ea28b000, 4096, PROT_READ) = 0
mprotect(0x7f76ea2aa000, 4096, PROT_READ) = 0
mprotect(0x7f76ea47d000, 45056, PROT_READ) = 0
mprotect(0x7f76ea496000, 4096, PROT_READ) = 0
mprotect(0x561a9fef2000, 4096, PROT_READ) = 0
mprotect(0x7f76ea4da000, 4096, PROT_READ) = 0
munmap(0x7f76ea49a000, 77566)           = 0
set_tid_address(0x7f76e9f28a10)         = 7047
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set_robust_list(0x7f76e9f28a20, 24)       = 0
rt_sigaction(SIGRTMIN, {sa_handler=0x7f76ea274bf0, sa_mask=[],
sa_flags=SA_RESTORER|SA_SIGINFO, sa_restorer=0x7f76ea2823c0}, NULL, 8) = 0
rt_sigaction(SIGRT_1, {sa_handler=0x7f76ea274c90, sa_mask=[],
sa_flags=SA_RESTORER|SA_RESTART|SA_SIGINFO, sa_restorer=0x7f76ea2823c0}, NULL, 8) = 0
rt_sigprocmask(SIG_UNBLOCK, [RTMIN RT_1], NULL, 8) = 0
prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 0
brk(NULL)                                 = 0x561aa1055000
brk(0x561aa1076000)                       = 0x561aa1076000
futex(0x7f76ea48b6bc, FUTEX_WAKE_PRIVATE, 2147483647) = 0
futex(0x7f76ea48b6c8, FUTEX_WAKE_PRIVATE, 2147483647) = 0
fstat(0, {st_mode=S_IFREG|0664, st_size=6, ...}) = 0
read(0, "123 1\n", 4096)                  = 6
openat(AT_FDCWD, "123", O_WRONLY)         = -1 ENOENT (Нет такого файла или каталога)
statfs("/dev/shm/", {f_type=TMPFS_MAGIC, f_bsize=4096, f_blocks=502219, f_bfree=502217,
f_bavail=502217, f_files=502219, f_ffree=502216, f_fsid={val=[469513582, 769839164]},
f_namelen=255, f_frsize=4096, f_flags=ST_VALID|ST_NOSUID|ST_NODEV}) = 0
futex(0x7f76ea290390, FUTEX_WAKE_PRIVATE, 2147483647) = 0
openat(AT_FDCWD, "/dev/shm/sem.main1.semaphore", O_RDWR|O_NOFOLLOW) = 3
fstat(3, {st_mode=S_IFREG|0644, st_size=32, ...}) = 0
mmap(NULL, 32, PROT_READ|PROT_WRITE, MAP_SHARED, 3, 0) = 0x7f76ea4d9000
close(3)                                  = 0
clone(child_stack=NULL, flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLDstrace: Process
7048 attached
, child_tidptr=0x7f76e9f28a10) = 7048
[pid  7047] openat(AT_FDCWD, "/dev/shm/main1.back", O_RDWR|O_CREAT|O_NOFOLLOW|O_CLOEXEC, 0644
<unfinished ...>
[pid  7048] set_robust_list(0x7f76e9f28a20, 24 <unfinished ...>
[pid  7047] <... openat resumed>)         = 3
[pid  7048] <... set_robust_list resumed>) = 0
[pid  7048] execve("child", ["123"], 0x7ffe4a34dd68 /* 49 vars */) = 0
[pid  7048] brk(NULL)                     = 0x55aa53842000
[pid  7048] arch_prctl(0x3001 /* ARCH_??? */, 0x7ffda065a720) = -1 EINVAL (Недопустимый
аргумент)
[pid  7048] access("/etc/ld.so.preload", R_OK) = -1 ENOENT (Нет такого файла или каталога)
[pid  7048] openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3
[pid  7048] fstat(3, {st_mode=S_IFREG|0644, st_size=77566, ...}) = 0
[pid  7048] mmap(NULL, 77566, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7f0cbfeb6000
[pid  7048] close(3)                      = 0
[pid  7048] openat(AT_FDCWD, "/lib/x86_64-linux-gnu/librt.so.1", O_RDONLY|O_CLOEXEC) = 3
[pid  7048] 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
[pid  7048] fstat(3, {st_mode=S_IFREG|0644, st_size=35928, ...}) = 0
[pid  7048] mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7f0cbfeb4000
[pid  7048] mmap(NULL, 39904, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f0cbfeaa000
[pid  7048] mmap(0x7f0cbfeac000, 16384, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) = 0x7f0cbfeac000
[pid  7048] mmap(0x7f0cbfeb0000, 8192, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x6000) = 0x7f0cbfeb0000
[pid  7048] mmap(0x7f0cbfeb2000, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x7000) = 0x7f0cbfeb2000
[pid  7048] close(3)                      = 0
[pid  7048] openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libstdc++.so.6", O_RDONLY|O_CLOEXEC) = 3
[pid  7048] 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  7048] fstat(3, {st_mode=S_IFREG|0644, st_size=1956992, ...}) = 0
[pid  7048] mmap(NULL, 1972224, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f0cbfcc8000
[pid  7048] mprotect(0x7f0cbfd5e000, 1290240, PROT_NONE) = 0
[pid  7048] mmap(0x7f0cbfd5e000, 987136, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x96000) = 0x7f0cbfd5e000
[pid  7048] mmap(0x7f0cbfe4f000, 299008, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x187000) = 0x7f0cbfe4f000
[pid  7048] mmap(0x7f0cbfe99000, 57344, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1d0000) = 0x7f0cbfe99000
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[pid  7048] mmap(0x7f0cbfea7000, 10240, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x7f0cbfea7000
[pid  7048] close(3)                    = 0
[pid  7048] openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libgcc_s.so.1", O_RDONLY|O_CLOEXEC) = 3
[pid  7048] 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  7048] fstat(3, {st_mode=S_IFREG|0644, st_size=104984, ...}) = 0
[pid  7048] mmap(NULL, 107592, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f0cbfcad000
[pid  7048] mmap(0x7f0cbfcb0000, 73728, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x3000) = 0x7f0cbfcb0000
[pid  7048] mmap(0x7f0cbfcc2000, 16384, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x15000) = 0x7f0cbfcc2000
[pid  7048] mmap(0x7f0cbfcc6000, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x18000) = 0x7f0cbfcc6000
[pid  7048] close(3)                    = 0
[pid  7048] openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libpthread.so.0", O_RDONLY|O_CLOEXEC) = 3
[pid  7048] read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\220q\0\0\0\0\0\0"..., 832)
= 832
[pid  7048] pread64(3,
"\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\360\2300%\360\340\363'\246\332u/\364\377\246u"..., 68, 824) =
68
[pid  7048] fstat(3, {st_mode=S_IFREG|0755, st_size=157224, ...}) = 0
[pid  7048] pread64(3,
"\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\360\2300%\360\340\363'\246\332u/\364\377\246u"..., 68, 824) =
68
[pid  7048] mmap(NULL, 140408, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f0cbfc8a000
[pid  7048] mmap(0x7f0cbfc90000, 69632, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x6000) = 0x7f0cbfc90000
[pid  7048] mmap(0x7f0cbfca1000, 24576, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x17000) = 0x7f0cbfca1000
[pid  7048] mmap(0x7f0cbfca7000, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1c000) = 0x7f0cbfca7000
[pid  7048] mmap(0x7f0cbfca9000, 13432, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x7f0cbfca9000
[pid  7048] close(3)                    = 0
[pid  7048] openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libc.so.6", O_RDONLY|O_CLOEXEC) = 3
[pid  7048] read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\360A\2\0\0\0\0\0"..., 832)
= 832
[pid  7048] 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
[pid  7048] 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
[pid  7048] pread64(3,
"\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\237\333t\347\262\27\320l\223\27*\202C\370T\177"..., 68, 880) =
68
[pid  7048] fstat(3, {st_mode=S_IFREG|0755, st_size=2029560, ...}) = 0
[pid  7048] 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
[pid  7048] 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
[pid  7048] pread64(3,
"\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\237\333t\347\262\27\320l\223\27*\202C\370T\177"..., 68, 880) =
68
[pid  7048] mmap(NULL, 2037344, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f0cbfa98000
[pid  7048] mmap(0x7f0cbfaba000, 1540096, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x22000) = 0x7f0cbfaba000
[pid  7048] mmap(0x7f0cbfc32000, 319488, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x19a000) = 0x7f0cbfc32000
[pid  7048] mmap(0x7f0cbfc80000, 24576, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1e7000) = 0x7f0cbfc80000
[pid  7048] mmap(0x7f0cbfc86000, 13920, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x7f0cbfc86000
[pid  7048] close(3)                    = 0
[pid  7048] openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libm.so.6", O_RDONLY|O_CLOEXEC) = 3
```

```
[pid  7048] read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\300\323\0\0\0\0\0\0"..., 
832) = 832
[pid  7048] fstat(3, {st_mode=S_IFREG|0644, st_size=1369352, ...}) = 0
[pid  7048] mmap(NULL, 1368336, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f0cbf949000
[pid  7048] mmap(0x7f0cbf956000, 684032, PROT_READ|PROT_EXEC, 
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0xd000) = 0x7f0cbf956000
[pid  7048] mmap(0x7f0cbf9fd000, 626688, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 
0xb4000) = 0x7f0cbf9fd000
[pid  7048] mmap(0x7f0cbfa96000, 8192, PROT_READ|PROT_WRITE, 
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x14c000) = 0x7f0cbfa96000
[pid  7048] close(3)                    = 0
[pid  7048] mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 
0x7f0cbf947000
[pid  7048] mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 
0x7f0cbf944000
[pid  7048] arch_prctl(ARCH_SET_FS, 0x7f0cbf944740) = 0
[pid  7048] mprotect(0x7f0cbfc80000, 16384, PROT_READ) = 0
[pid  7048] mprotect(0x7f0cbfa96000, 4096, PROT_READ) = 0
[pid  7048] mprotect(0x7f0cbfca7000, 4096, PROT_READ) = 0
[pid  7048] mprotect(0x7f0cbfcc6000, 4096, PROT_READ) = 0
[pid  7048] mprotect(0x7f0cbfe99000, 45056, PROT_READ) = 0
[pid  7048] mprotect(0x7f0cbfeb2000, 4096, PROT_READ) = 0
[pid  7048] mprotect(0x55aa51fed000, 4096, PROT_READ) = 0
[pid  7048] mprotect(0x7f0cbfef6000, 4096, PROT_READ) = 0
[pid  7048] munmap(0x7f0cbfeb6000, 77566) = 0
[pid  7048] set_tid_address(0x7f0cbf944a10) = 7048
[pid  7048] set_robust_list(0x7f0cbf944a20, 24) = 0
[pid  7048] rt_sigaction(SIGRTMIN, {sa_handler=0x7f0cbfc90bf0, sa_mask=[], 
sa_flags=SA_RESTORER|SA_SIGINFO, sa_restorer=0x7f0cbfc9e3c0}, NULL, 8) = 0
[pid  7048] rt_sigaction(SIGRT_1, {sa_handler=0x7f0cbfc90c90, sa_mask=[], 
sa_flags=SA_RESTORER|SA_RESTART|SA_SIGINFO, sa_restorer=0x7f0cbfc9e3c0}, NULL, 8) = 0
[pid  7048] rt_sigprocmask(SIG_UNBLOCK, [RTMIN RT_1], NULL, 8) = 0
[pid  7048] prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 
0
[pid  7048] brk(NULL)                   = 0x55aa53842000
[pid  7048] brk(0x55aa53863000)         = 0x55aa53863000
[pid  7048] futex(0x7f0cbfea76bc, FUTEX_WAKE_PRIVATE, 2147483647) = 0
[pid  7048] futex(0x7f0cbfea76c8, FUTEX_WAKE_PRIVATE, 2147483647) = 0
[pid  7048] statfs("/dev/shm/", {f_type=TMPFS_MAGIC, f_bsize=4096, f_blocks=502219, 
f_bfree=502217, f_bavail=502217, f_files=502219, f_ffree=502216, f_fsid={val=[469513582, 
769839164]}, f_namelen=255, f_frsize=4096, f_flags=ST_VALID|ST_NOSUID|ST_NODEV}) = 0
[pid  7048] futex(0x7f0cbfcac390, FUTEX_WAKE_PRIVATE, 2147483647) = 0
[pid  7048] openat(AT_FDCWD, "/dev/shm/sem.main1.semaphore", O_RDWR|O_NOFOLLOW) = 3
[pid  7048] fstat(3, {st_mode=S_IFREG|0644, st_size=32, ...}) = 0
[pid  7048] mmap(NULL, 32, PROT_READ|PROT_WRITE, MAP_SHARED, 3, 0) = 0x7f0cbfef5000
[pid  7048] close(3)                    = 0
[pid  7047] futex(0x7f76ea4d9000, FUTEX_WAIT_BITSET|FUTEX_CLOCK_REALTIME, 0, NULL, 
FUTEX_BITSET_MATCH_ANY <unfinished ...>
[pid  7048] openat(AT_FDCWD, "123", O_RDONLY) = -1 ENOENT (Нет такого файла или каталога)
[pid  7048] openat(AT_FDCWD, "/dev/shm/main1.back", O_RDWR|O_NOFOLLOW|O_CLOEXEC) = 3
[pid  7048] ftruncate(3, 9)             = 0
[pid  7048] mmap(NULL, 9, PROT_READ|PROT_WRITE, MAP_SHARED, 3, 0) = 0x7f0cbfec8000
[pid  7048] close(3)                    = 0
[pid  7048] clock_nanosleep(CLOCK_REALTIME, 0, {tv_sec=0, tv_nsec=53248000}, NULL) = 0
[pid  7048] futex(0x7f0cbfef5000, FUTEX_WAKE, 1) = 1
[pid  7047] <... futex resumed>)        = 0
[pid  7048] munmap(0x7f0cbfef5000, 32 <unfinished ...>
[pid  7047] fstat(3,  <unfinished ...>
[pid  7048] <... munmap resumed>)       = 0
[pid  7047] <... fstat resumed>{st_mode=S_IFREG|0644, st_size=9, ...}) = 0
[pid  7048] exit_group(0 <unfinished ...>
[pid  7047] mmap(NULL, 9, PROT_READ|PROT_WRITE, MAP_SHARED, 3, 0 <unfinished ...>
[pid  7048] <... exit_group resumed>)   = ?
[pid  7047] <... mmap resumed>)         = 0x7f76ea4ac000
[pid  7048] +++ exited with 0 +++
```

```
--- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=7048, si_uid=1000, si_status=0,
si_utime=0, si_stime=0} ---
fstat(1, {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0x5), ...}) = 0
write(1, "Answer is:\n", 11Answer is:
)                    = 11
write(1, "0.000000\n", 90.000000
)                    = 9
lseek(0, -3, SEEK_CUR)                    = 3
exit_group(0)                             = ?
+++ exited with 0 +++ [pid  7723] <... futex resumed>)         = 0
[pid  7725] munmap(0x7f2975acd000, 32 <unfinished ...>
[pid  7723] newfstatat(1, "",  <unfinished ...>
[pid  7725] <... munmap resumed>)         = 0
[pid  7723] <... newfstatat resumed>{st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0), ...},
AT_EMPTY_PATH) = 0
[pid  7723] write(1, "#IFNDEF__MASHINA_TURINGA_H__\n", 29 <unfinished ...>
#IFNDEF__MASHINA_TURINGA_H__
[pid  7725] exit_group(0 <unfinished ...>
[pid  7723] <... write resumed>)          = 29
[pid  7723] write(1, "#DEFINE__MASHINA_TURINGA_H__\n", 29 <unfinished ...>
[pid  7725] <... exit_group resumed>)     = ?
#DEFINE__MASHINA_TURINGA_H__
[pid  7723] <... write resumed>)          = 29
[pid  7723] write(1, "#ENDIF\n", 7#ENDIF
)      = 7
[pid  7723] exit_group(0)                 = ?
[pid  7725] +++ exited with 0 +++
+++ exited with 0 +++
```

Вывод

Проделав лабораторную работу, я приобрёл навыки, необходимые для работы с strace, а также изучил системные вызовы.