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Лабораторная работа №8 по курсу
«Операционные системы»

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Репозиторий

Цель работы

Приобретение практических навыков диагностики работы программного обеспечения.

Задание

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

Описание strace

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

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

Возможные флаги:

- `-k` - выводить стек вызовов для отслеживаемого процесса после каждого системного вызова
- `-o` - выводить всю информацию о системных вызовах не в стандартный поток ошибок, а в файл
- `-с` - подсчитывать количество ошибок, вызовов и время выполнения для каждого системного вызова
- `-T` - выводить длительность выполнения системного вызова
- `-u` - выводить пути для файловых дескрипторов
- `-уу` - выводить информацию о протоколе для файловых дескрипторов
- `-р` - указывает `pid` процесса, к которому следует подключиться

- -f - отслеживать также дочерние процессы, если они будут созданы

Демонстрация работы

qwz@qwz-VirtualBox:~/OS_LABS/build \$

strace -f ./ lab3 / lab3

execve (". / lab3 / lab3 " , [". / lab3 / lab3 "] , 0 x7ffd71132798 /* 51 vars */) = 0

brk (NULL) = 0 x56197b5bd000

arch_prctl (0 x3001 /* ARCH_ ??? */ , 0 x7ffe32913560) = -1

EINVAL (Invalid argument)

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

such file or directory)

openat (AT_FDCWD , "/ opt /ros / noetic /lib/ tls / x86_64 / x86_64 / libpthread .so .0" , O_RDONLY | O_CLOEXEC) = -1 ENOENT (No such file or directory)

stat ("/ opt /ros/ noetic / lib /tls / x86_64 / x86_64 " , 0 x7ffe329127b0) = -1

ENOENT (No such file or directory) openat (AT_FDCWD , "/ opt /ros / noetic /lib/ tls / x86_64 / libpthread .so .0" , O_RDONLY | O_CLOEXEC) = -1

ENOENT (No such file or directory) stat ("/ opt /ros/ noetic / lib /tls / x86_64 " , 0 x7ffe329127b0) = -1 ENOENT (No such file or directory) openat (AT_FDCWD ,

"/ opt /ros / noetic /lib/ tls / x86_64 / libpthread .so .0" , O_RDONLY |

O_CLOEXEC) = -1 ENOENT (No such file or directory) stat ("/ opt /ros/ noetic / lib /tls / x86_64 " , 0 x7ffe329127b0) = -1 ENOENT (No such file or directory)

openat (AT_FDCWD , "/ opt /ros / noetic /lib/ tls / libpthread .so .0" ,

O_RDONLY | O_CLOEXEC) = -1 ENOENT (No such file or directory) stat ("/ opt /ros/ noetic / lib /tls " , 0 x7ffe329127b0) = -1 ENOENT (No such file or

directory) openat (AT_FDCWD , "/ opt /ros / noetic /lib/ x86_64 / x86_64 /

libpthread .so .0" , O_RDONLY | O_CLOEXEC) = -1 ENOENT (No such file or directory) stat ("/ opt /ros/ noetic / lib / x86_64 / x86_64 " , 0 x7ffe329127b0) = -

1 ENOENT (No such file or directory) openat (AT_FDCWD , "/ opt /ros / noetic /lib/ x86_64 / libpthread . so .0" , O_RDONLY | O_CLOEXEC) = -1 ENOENT

(No such file or directory) stat ("/ opt /ros/ noetic / lib / x86_64 " , 0

x7ffe329127b0) = -1 ENOENT (No such file or directory) openat (AT_FDCWD

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, "/ opt /ros / noetic /lib/ x86_64 / libpthread . so .0" , O_RDONLY | O_CLOEXEC
) = -1 ENOENT (No such file or directory ) stat ( "/ opt /ros/ noetic / lib / x86_64 " ,
0 x7ffe329127b0 ) = -1 ENOENT (No such file or directory ) openat (
AT_FDCWD , "/ opt /ros / noetic /lib/ libpthread .so .0" , O_RDONLY |
O_CLOEXEC ) = -1 ENOENT (No such file or directory ) stat ( "/ opt /ros/ noetic /
lib " , { st_mode = S_IFDIR |0755 , st_size =12288 , ...}) = 0 openat ( AT_FDCWD
, "/ etc /ld.so. cache " , O_RDONLY | O_CLOEXEC ) = 3 fstat (3 , { st_mode =
S_IFREG |0644 , st_size =239963 , ...}) = 0 mmap (NULL , 239963 ,
PROT_READ , MAP_PRIVATE , 3 , 0) = 0 x7f34fc57e000 close (3) = 0 openat (
AT_FDCWD , "/ lib /x86_64 -linux -gnu / libpthread .so .0" , O_RDONLY |
O_CLOEXEC ) = 3 read (3 , "\177 ELF \2\1\1\0\0\0\0\0\0\0\3\0
>\0\1\0\0\0\220 q \0\0\0\0\0\0"... , 832) = 832 pread64 (3 ,
"\4\0\0\0\24\0\0\0\3\0\0\0 GNU \0{ E6 \364\34\332\245\210\204\10\350 -
\0106\343="... , 68 , 824) = 68 fstat (3 , { st_mode = S_IFREG |0755 , st_size
=157224 , ...}) = 0 mmap (NULL , 8192 , PROT_READ | PROT_WRITE ,
MAP_PRIVATE | MAP_ANONYMOUS , -1 , 0) = 0 x7f34fc57c000 pread64 (3 ,
"\4\0\0\0\24\0\0\0\3\0\0\0 GNU \0{ E6 \364\34\332\245\210\204\10\350 -
\0106\343="... , 68 , 824) = 68 mmap (NULL , 140408 , PROT_READ ,
MAP_PRIVATE | MAP_DENYWRITE , 3 , 0) = 0 x7f34fc559000 mmap (0
x7f34fc55f000 , 69632 , PROT_READ | PROT_EXEC , MAP_PRIVATE |
MAP_FIXED | MAP_DENYWRITE , 3 , 0 x6000 ) = 0 x7f34fc55f000 mmap (0
x7f34fc570000 , 24576 , PROT_READ , MAP_PRIVATE | MAP_FIXED |
MAP_DENYWRITE , 3 , 0 x17000 ) = 0 x7f34fc570000 mmap (0 x7f34fc576000
, 8192 , PROT_READ | PROT_WRITE , MAP_PRIVATE | MAP_FIXED |
MAP_DENYWRITE , 3 , 0 x1c000 ) = 0 x7f34fc576000 mmap (0 x7f34fc578000
, 13432 , PROT_READ | PROT_WRITE , MAP_PRIVATE | MAP_FIXED |
MAP_ANONYMOUS , -1 , 0) = 0 x7f34fc578000 close (3) = 0 openat (
AT_FDCWD , "/ opt /ros / noetic /lib/ librt .so .1" , O_RDONLY | O_CLOEXEC )
= -1 ENOENT (No such file or directory ) openat ( AT_FDCWD , "/ lib /x86_64 -
linux -gnu / librt .so .1" , O_RDONLY | O_CLOEXEC ) = 3 read (3 , "\177 ELF
\2\1\1\0\0\0\0\0\0\0\3\0 >\0\1\0\0\0 '\0\0\0\0\0\0"... , 832) = 832 fstat (3 , {
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st_mode = S_IFREG |0644 , st_size =35960 , ...}) = 0 mmap (NULL , 39904 ,
PROT_READ , MAP_PRIVATE | MAP_DENYWRITE , 3 , 0) = 0 x7f34fc54f000
mmap (0 x7f34fc551000 , 16384 , PROT_READ | PROT_EXEC ,
MAP_PRIVATE | MAP_FIXED | MAP_DENYWRITE , 3 , 0 x2000 ) = 0
x7f34fc551000 mmap (0 x7f34fc555000 , 8192 , PROT_READ , MAP_PRIVATE
| MAP_FIXED | MAP_DENYWRITE , 3 , 0 x6000 ) = 0 x7f34fc555000 mmap (0
x7f34fc557000 , 8192 , PROT_READ | PROT_WRITE , MAP_PRIVATE |
MAP_FIXED | MAP_DENYWRITE , 3 , 0 x7000 ) = 0 x7f34fc557000 close (3) =
0 openat ( AT_FDCWD , "/ opt /ros / noetic /lib/ libstdc ++. so .6" , O_RDONLY |
O_CLOEXEC ) = -1 ENOENT (No such file or directory ) openat ( AT_FDCWD ,
"/ lib /x86_64 -linux -gnu / libstdc ++. so .6" , O_RDONLY | O_CLOEXEC ) = 3
read (3 , "\177 ELF \2\1\1\3\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) = 0 x7f34fc36d000 mprotect (0 x7f34fc403000 ,
1290240 , PROT_NONE ) = 0 mmap (0 x7f34fc403000 , 987136 , PROT_READ |
PROT_EXEC , MAP_PRIVATE | MAP_FIXED | MAP_DENYWRITE , 3 , 0
x96000 ) = 0 x7f34fc403000 mmap (0 x7f34fc4f4000 , 299008 , PROT_READ ,
MAP_PRIVATE | MAP_FIXED | MAP_DENYWRITE , 3 , 0 x187000 ) = 0
x7f34fc4f4000 mmap (0 x7f34fc53e000 , 57344 , PROT_READ | PROT_WRITE ,
MAP_PRIVATE | MAP_FIXED | MAP_DENYWRITE , 3 , 0 x1d0000 ) = 0
x7f34fc53e000 mmap (0 x7f34fc54c000 , 10240 , PROT_READ | PROT_WRITE ,
MAP_PRIVATE | MAP_FIXED | MAP_ANONYMOUS , -1 , 0) = 0
x7f34fc54c000 close (3) = 0 openat ( AT_FDCWD , "/ opt /ros / noetic /lib/
libgcc_s .so .1" , O_RDONLY | O_CLOEXEC ) = -1 ENOENT (No such file or
directory ) openat ( AT_FDCWD , "/ lib /x86_64 -linux -gnu / libgcc_s .so .1" ,
O_RDONLY | O_CLOEXEC ) = 3 read (3 , "\177 ELF \2\1\1\0\0\0\0\0\0\0\0\3\0
>\0\1\0\0\0\3405\0\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) = 0 x7f34fc352000 mmap (0

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x7f34fc355000 , 73728 , PROT_READ | PROT_EXEC , MAP_PRIVATE |
MAP_FIXED | MAP_DENYWRITE , 3 , 0 x3000 ) = 0
x7f34fc355000 mmap (0 x7f34fc367000 , 16384 , PROT_READ ,
MAP_PRIVATE | MAP_FIXED | MAP_DENYWRITE , 3 , 0 x15000 ) = 0
x7f34fc367000 mmap (0 x7f34fc36b000 , 8192 , PROT_READ | PROT_WRITE ,
MAP_PRIVATE | MAP_FIXED | MAP_DENYWRITE , 3 , 0 x18000 ) = 0
x7f34fc36b000 close (3) = 0 openat ( AT_FDCWD , "/ opt /ros / noetic /lib/ libc
.so .6" , O_RDONLY | O_CLOEXEC ) = -1 ENOENT (No such file or directory )
openat ( AT_FDCWD , "/ lib /x86_64 -linux -gnu / libc .so .6" , O_RDONLY |
O_CLOEXEC ) = 3 read (3 , "\177 ELF \2\1\1\3\0\0\0\0\0\0\0\3\0
>\0\1\0\0\0\300 A \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\0 GNU \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\0 GNU \0\30 x \346\264 ur \f|Q \226\236
i\253 - 'o"... , 68 , 880) = 68 fstat (3 , { st_mode = S_IFREG |0755 , st_size
=2029592 , ...}) = 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\0 GNU \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\0 GNU \0\30 x \346\264 ur \f|Q \226\236
i\253 - 'o"... , 68 , 880) = 68 mmap (NULL , 2037344 , PROT_READ ,
MAP_PRIVATE | MAP_DENYWRITE , 3 , 0) = 0 x7f34fc160000 mmap (0
x7f34fc182000 , 1540096 , PROT_READ | PROT_EXEC , MAP_PRIVATE |
MAP_FIXED | MAP_DENYWRITE , 3 , 0 x22000 ) = 0 x7f34fc182000 mmap (0
x7f34fc2fa000 , 319488 , PROT_READ , MAP_PRIVATE | MAP_FIXED |
MAP_DENYWRITE , 3 , 0 x19a000 ) = 0 x7f34fc2fa000 mmap (0 x7f34fc348000
, 24576 , PROT_READ | PROT_WRITE , MAP_PRIVATE | MAP_FIXED |
MAP_DENYWRITE , 3 , 0 x1e7000 ) = 0 x7f34fc348000 mmap (0
x7f34fc34e000 , 13920 , PROT_READ | PROT_WRITE , MAP_PRIVATE |
MAP_FIXED | MAP_ANONYMOUS , -1 , 0) = 0 x7f34fc34e000 close (3) = 0
openat ( AT_FDCWD , "/ opt /ros / noetic /lib/ libm .so .6" , O_RDONLY |
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O_CLOEXEC ) = -1 ENOENT (No such file or directory ) openat ( AT_FDCWD ,
"/ lib /x86_64 -linux -gnu / libm .so .6" , O_RDONLY | O_CLOEXEC ) = 3
read (3 , "\177 ELF \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 =1369384 , ...}) = 0
mmap (NULL , 1368336 , PROT_READ , MAP_PRIVATE |
MAP_DENYWRITE , 3 , 0) = 0 x7f34fc011000 mmap (0 x7f34fc01e000 , 684032
, PROT_READ | PROT_EXEC , MAP_PRIVATE | MAP_FIXED |
MAP_DENYWRITE , 3 , 0 xd000 ) = 0 x7f34fc01e000 mmap (0 x7f34fc0c5000 ,
626688 , PROT_READ , MAP_PRIVATE | MAP_FIXED | MAP_DENYWRITE ,
3 , 0 xb4000 ) = 0 x7f34fc0c5000 mmap (0 x7f34fc15e000 , 8192 , PROT_READ |
PROT_WRITE , MAP_PRIVATE | MAP_FIXED | MAP_DENYWRITE , 3 , 0
x14c000 ) = 0 x7f34fc15e000 close (3) = 0 mmap (NULL , 8192 , PROT_READ |
PROT_WRITE , MAP_PRIVATE | MAP_ANONYMOUS , -1 , 0) = 0
x7f34fc00f000 mmap (NULL , 12288 , PROT_READ | PROT_WRITE ,
MAP_PRIVATE | MAP_ANONYMOUS , -1 , 0) = 0 x7f34fc00c000 arch_prctl (
ARCH_SET_FS , 0 x7f34fc00c740 ) = 0 mprotect (0 x7f34fc348000 , 16384 ,
PROT_READ ) = 0 mprotect (0 x7f34fc15e000 , 4096 , PROT_READ ) = 0
mprotect (0 x7f34fc36b000 , 4096 , PROT_READ ) = 0 mprotect (0
x7f34fc53e000 , 45056 , PROT_READ ) = 0 mprotect (0 x7f34fc576000 , 4096 ,
PROT_READ ) = 0 mprotect (0 x7f34fc557000 , 4096 , PROT_READ ) = 0
mprotect (0 x56197a78c000 , 4096 , PROT_READ ) = 0 mprotect (0
x7f34fc5e6000 , 4096 , PROT_READ ) = 0 munmap (0 x7f34fc57e000 , 239963)
= 0 set_tid_address (0 x7f34fc00ca10 ) = 16879 set_robust_list (0 x7f34fc00ca20 ,
24) = 0 rt_sigaction ( SIGRTMIN , { sa_handler =0 x7f34fc55fbf0 , sa_mask =[] ,
sa_flags = SA_RESTORER | SA_SIGINFO , sa_restorer =0 x7f34fc56d420 } ,
NULL , 8) = 0 rt_sigaction ( SIGRT_1 , { sa_handler =0 x7f34fc55fc90 , sa_mask
=[] , sa_flags = SA_RESTORER | SA_RESTART | SA_SIGINFO , sa_restorer =0
x7f34fc56d420 } , 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 ) = 0
x56197b5bd000 brk (0 x56197b5de000 ) = 0 x56197b5de000 futex (0

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x7f34fc54c6bc , FUTEX_WAKE_PRIVATE , 2147483647) = 0 futex (0
x7f34fc54c6c8 , FUTEX_WAKE_PRIVATE , 2147483647) = 0 fstat (0 , {
st_mode = S_IFCHR |0620 , st_rdev = makedev (0 x88 , 0 x8) , ...}) = 0
read (0 , file .txt " file . txt \n" , 1024) = 9 statfs ("/ dev/ shm /" , { f_type =
TMPFS_MAGIC , f_bsize =4096 , f_blocks =978472 , f_bfree =978468 , f_bavail
=978468 , f_files =978472 , f_ffree =978467 , f_fsid={ val =[2567178741 ,
3165115080]} , f_namelen =255 , f_frsize =4096 , f_flags = ST_VALID |
ST_NOSUID | ST_NODEV | ST_NOATIME }) = 0 futex (0 x7f34fc57b390 ,
FUTEX_WAKE_PRIVATE , 2147483647) = 0 openat ( AT_FDCWD , "/ dev
/shm / sem. semaphore_1 " , O_RDWR | O_NOFOLLOW ) = -1 ENOENT (No
such file or directory ) getpid () = 16879 lstat ("/ dev/ shm / yYM1Ow " , 0
x7ffe329131c0 ) = -1 ENOENT (No such file or directory ) openat ( AT_FDCWD
, "/ dev /shm / yYM1Ow " , O_RDWR | O_CREAT | O_EXCL , 0600) = 3 write (3
, "\0\0\0\0\0\0\0\0\200\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0" , 32) = 32
mmap (NULL , 32 , PROT_READ | PROT_WRITE , MAP_SHARED , 3 , 0) = 0
x7f34fc5e5000 link ("/ dev /shm/ yYM1Ow " , "/ dev/ shm /sem. semaphore_1 ") =
0 fstat (3 , { st_mode = S_IFREG |0600 , st_size =32 , ...}) = 0 unlink ("/ dev/ shm
/ yYM1Ow ") = 0 close (3) = 0 openat ( AT_FDCWD , "/ dev /shm /
shared_memory_1 " , O_RDWR | O_CREAT | O_NOFOLLOW | O_CLOEXEC ,
0600) = 3 ftruncate (3 , 1024) = 0 mmap (NULL , 1024 , PROT_READ |
PROT_WRITE , MAP_SHARED , 3 , 0) = 0 x7f34fc5b8000 openat (
AT_FDCWD , "/ dev /shm / sem. semaphore_2 " , O_RDWR | O_NOFOLLOW ) =
-1 ENOENT (No such file or directory ) getpid () = 16879 lstat ("/ dev/ shm /
bp0Cqx " , 0 x7ffe329131c0 ) = -1 ENOENT (No such file or directory ) openat (
AT_FDCWD , "/ dev /shm / bp0Cqx " , O_RDWR | O_CREAT | O_EXCL , 0600)
= 4 write (4 , "\0\0\0\0\0\0\0\0\200\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0" ,
32) = 32 mmap (NULL , 32 , PROT_READ | PROT_WRITE , MAP_SHARED , 4
, 0) = 0 x7f34fc5b7000 link ("/ dev /shm/ bp0Cqx " , "/ dev/ shm /sem.
semaphore_2 ") = 0 fstat (4 , { st_mode = S_IFREG |0600 , st_size =32 , ...}) = 0
unlink ("/ dev/ shm / bp0Cqx ") = 0 close (4) = 0 openat ( AT_FDCWD , "/ dev

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/shm / shared_memory_2 ", O_RDWR | O_CREAT | O_NOFOLLOW |
O_CLOEXEC , 0600) = 4
ftruncate (4 , 1024) = 0 mmap (NULL , 1024 , PROT_READ | PROT_WRITE ,
MAP_SHARED , 4 , 0) = 0 x7f34fc5b6000 read (0 , aaa ; " aaa ;\n" , 1024) = 5
read (0 , ff. "ff.\n" , 1024) = 4 read (0 , ggg " ggg\n" , 1024) = 4 read (0 , "\n" ,
1024) = 1 clone ( child_stack =NULL , flags = CLONE_CHILD_CLEARTID |
CLONE_CHILD_SETTID | SIGCHLDstrace : Process 16973 attached ,
child_tidptr =0 x7f34fc00ca10 ) = 16973 [ pid 16973] set_robust_list (0
x7f34fc00ca20 , 24 < unfinished ... > [ pid 16879] futex (0 x7f34fc5b7000 ,
FUTEX_WAIT_BITSET | FUTEX_CLOCK_REALTIME , 0 , NULL ,
FUTEX_BITSET_MATCH_ANY [ pid 16973] <... set_robust_list resumed >) = 0
[ pid 16973] execve ("/ home / OS_LABS/ build / lab3 / child3 " , ["/ home / OS_1
"... , " file . txt " ] , 0 x7ffe32913648 /* 51 vars */) = 0
[ pid 16973] brk ( NULL ) = 0 x558a6cf5a000 [ pid 16973] arch_prctl (0 x3001 /*
ARCH_ ??? */ , 0 x7ffc54686ea0 ) = -1 EINVAL ( Invalid argument ) [ pid 16973]
access ("/ etc /ld.so. preload " , R_OK ) = -1 ENOENT (No such file or directory )
[ pid 16973] openat ( AT_FDCWD , "/ opt /ros / noetic / lib/ tls / x86_64 / x86_64
/ libpthread .so .0" , O_RDONLY | O_CLOEXEC ) = -1 ENOENT (No such file or
directory ) [ pid 16973] stat ("/ opt /ros/ noetic / lib /tls / x86_64 / x86_64 " , 0
x7ffc546860f0 ) = -1 ENOENT (No such file or directory ) [ pid 16973] openat (
AT_FDCWD , "/ opt /ros / noetic / lib/ tls / x86_64 / libpthread .so .0" ,
O_RDONLY | O_CLOEXEC ) = -1 ENOENT (No such file or directory ) [ pid
16973] stat ("/ opt /ros/ noetic / lib /tls / x86_64 " , 0 x7ffc546860f0 ) = -1
ENOENT (No such file or directory ) [ pid 16973] openat ( AT_FDCWD , "/ opt
/ros / noetic / lib/ tls / x86_64 / libpthread .so .0" , O_RDONLY | O_CLOEXEC )
= -1 ENOENT (No such file or directory ) [ pid 16973] stat ("/ opt /ros/ noetic / lib
/tls / x86_64 " , 0 x7ffc546860f0 ) = -1 ENOENT (No such file or directory ) [ pid
16973] openat ( AT_FDCWD , "/ opt /ros / noetic / lib/ tls /
libpthread .so .0" , O_RDONLY | O_CLOEXEC ) = -1 ENOENT (No such file or
directory ) [ pid 16973] stat ("/ opt /ros/ noetic / lib /tls " , 0 x7ffc546860f0 ) = -1
ENOENT (No such file or directory ) [ pid 16973] openat ( AT_FDCWD , "/ opt

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/rosc / noetic / lib/ x86_64 / x86_64 / libpthread .so .0" , O_RDONLY |
O_CLOEXEC ) = -1 ENOENT (No such file or directory ) [ pid 16973] stat ("/ opt
/rosc/ noetic / lib / x86_64 / x86_64 ", 0 x7ffc546860f0 ) = -1 ENOENT (No such
file or directory ) [ pid 16973] openat ( AT_FDCWD , "/ opt /rosc / noetic / lib/
x86_64 / libpthread .so .0" , O_RDONLY | O_CLOEXEC ) = -1 ENOENT ( No
such file or directory ) [ pid 16973] stat ("/ opt /rosc/ noetic / lib / x86_64 ", 0
x7ffc546860f0 ) = -1 ENOENT (No such file or directory ) [ pid 16973] openat (
AT_FDCWD , "/ opt /rosc / noetic / lib/ x86_64 / libpthread .so .0" , O_RDONLY |
O_CLOEXEC ) = -1 ENOENT ( No such file or directory ) [ pid 16973] stat ("/
opt /rosc/ noetic / lib / x86_64 ", 0 x7ffc546860f0 ) = -1 ENOENT (No such file or
directory ) [ pid 16973] openat ( AT_FDCWD , "/ opt /rosc / noetic / lib/ libpthread
.so .0" , O_RDONLY | O_CLOEXEC ) = -1 ENOENT (No such file or directory )
[ pid 16973] stat ("/ opt /rosc/ noetic / lib ", { st_mode = S_IFDIR |0755 , st_size
=12288 , ...}) = 0 [ pid 16973] openat ( AT_FDCWD , "/ etc /ld.so. cache " ,
O_RDONLY | O_CLOEXEC ) = 3 [ pid 16973] fstat (3 , { st_mode = S_IFREG
|0644 , st_size =239963 , ...}) = 0 [ pid 16973] mmap (NULL , 239963 ,
PROT_READ , MAP_PRIVATE , 3 , 0) = 0 x7f9274413000 [ pid 16973] close (3)
= 0 [ pid 16973] openat ( AT_FDCWD , "/ lib /x86_64 -linux -gnu/ libpthread .so
.0" , O_RDONLY | O_CLOEXEC ) = 3 [ pid 16973] read (3 , "\177 ELF
\2\1\1\0\0\0\0\0\0\0\0\0\3\0 >\0\1\0\0\0\220 q \0\0\0\0\0\0"... , 832) = 832 [ pid
16973] pread64 (3 , "\4\0\0\0\24\0\0\0\3\0\0\0 GNU \0{ E6
\364\34\332\245\210\204\10\350 -\0106\343="... , 68 , 824) = 68 [ pid 16973] fstat
(3 , { st_mode = S_IFREG |0755 , st_size =157224 , ...}) = 0 [ pid 16973] mmap
(NULL , 8192 , PROT_READ | PROT_WRITE , MAP_PRIVATE |
MAP_ANONYMOUS , -1, 0) = 0 x7f9274411000 [ pid 16973] pread64 (3 ,
"\4\0\0\0\24\0\0\0\3\0\0\0 GNU \0{ E6 \364\34\332\245\210\204\10\350 -
\0106\343="... , 68 ,
824) = 68 [ pid 16973] mmap (NULL , 140408 , PROT_READ , MAP_PRIVATE
| MAP_DENYWRITE , 3, 0) = 0 x7f92743ee000 [ pid 16973] mmap (0
x7f92743f4000 , 69632 , PROT_READ | PROT_EXEC , MAP_PRIVATE |
MAP_FIXED | MAP_DENYWRITE , 3 , 0 x6000 ) = 0 x7f92743f4000 [ pid

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16973] mmap (0 x7f9274405000 , 24576 , PROT_READ , MAP_PRIVATE |
MAP_FIXED | MAP_DENYWRITE , 3 , 0 x17000 ) = 0 x7f9274405000 [ pid
16973] mmap (0 x7f927440b000 , 8192 , PROT_READ | PROT_WRITE ,
MAP_PRIVATE | MAP_FIXED | MAP_DENYWRITE , 3 , 0 x1c000 ) = 0
x7f927440b000 [ pid 16973] mmap (0 x7f927440d000 , 13432 , PROT_READ |
PROT_WRITE , MAP_PRIVATE | MAP_FIXED | MAP_ANONYMOUS , -1 , 0)
= 0 x7f927440d000 [ pid 16973] close (3) = 0 [ pid 16973] openat ( AT_FDCWD ,
"/ opt /ros / noetic / lib/ librt . so .1" , O_RDONLY | O_CLOEXEC ) = -1
ENOENT (No such file or directory ) [ pid 16973] openat ( AT_FDCWD , "/ lib
/x86_64 -linux -gnu/ librt .so .1" , O_RDONLY | O_CLOEXEC ) = 3 [ pid 16973]
read (3 , "\177 ELF \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 16973] fstat (3 , { st_mode = S_IFREG |0644 , st_size =35960 , ...}) =
0 [ pid 16973] mmap (NULL , 39904 , PROT_READ , MAP_PRIVATE |
MAP_DENYWRITE , 3, 0) = 0 x7f92743e4000 [ pid 16973] mmap (0
x7f92743e6000 , 16384 , PROT_READ | PROT_EXEC , MAP_PRIVATE |
MAP_FIXED | MAP_DENYWRITE , 3 , 0 x2000 ) = 0 x7f92743e6000 [ pid
16973] mmap (0 x7f92743ea000 , 8192 , PROT_READ , MAP_PRIVATE |
MAP_FIXED | MAP_DENYWRITE , 3 , 0 x6000 ) = 0 x7f92743ea000 [ pid
16973] mmap (0 x7f92743ec000 , 8192 , PROT_READ | PROT_WRITE ,
MAP_PRIVATE | MAP_FIXED | MAP_DENYWRITE , 3, 0 x7000 ) = 0
x7f92743ec000 [ pid 16973] close (3) = 0 [ pid 16973] openat ( AT_FDCWD , "/
opt /ros / noetic / lib/ libstdc ++. so .6" , O_RDONLY | O_CLOEXEC ) = -1
ENOENT (No such file or directory ) [ pid 16973] openat ( AT_FDCWD , "/ lib
/x86_64 -linux -gnu/ libstdc ++. so .6" , O_RDONLY | O_CLOEXEC ) = 3 [ pid
16973] read (3 , "\177 ELF \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 16973] fstat (3 , { st_mode = S_IFREG |0644 ,
st_size =1956992 , ...}) = 0 [ pid 16973] mmap (NULL , 1972224 , PROT_READ ,
MAP_PRIVATE |
MAP_DENYWRITE , 3, 0) = 0 x7f9274202000 [ pid 16973] mprotect (0
x7f9274298000 , 1290240 , PROT_NONE ) = 0 [ pid 16973] mmap (0
x7f9274298000 , 987136 , PROT_READ | PROT_EXEC , MAP_PRIVATE |

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MAP_FIXED | MAP_DENYWRITE , 3 , 0 x96000 ) = 0 x7f9274298000 [ pid
16973] mmap (0 x7f9274389000 , 299008 , PROT_READ , MAP_PRIVATE |
MAP_FIXED | MAP_DENYWRITE , 3 , 0 x187000 ) = 0 x7f9274389000 [ pid
16973] mmap (0 x7f92743d3000 , 57344 , PROT_READ | PROT_WRITE ,
MAP_PRIVATE | MAP_FIXED | MAP_DENYWRITE , 3 , 0 x1d0000 ) = 0
x7f92743d3000 [ pid 16973] mmap (0 x7f92743e1000 , 10240 , PROT_READ |
PROT_WRITE , MAP_PRIVATE | MAP_FIXED | MAP_ANONYMOUS , -1 , 0)
= 0 x7f92743e1000 [ pid 16973] close (3) = 0 [ pid 16973] openat ( AT_FDCWD ,
"/ opt /ros / noetic / lib/ libgcc_s .so .1" , O_RDONLY | O_CLOEXEC ) = -1
ENOENT (No such file or directory ) [ pid 16973] openat ( AT_FDCWD , "/ lib
/x86_64 -linux -gnu/ libgcc_s .so .1" , O_RDONLY | O_CLOEXEC ) = 3 [ pid
16973] read (3 , "\177 ELF \2\1\1\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 16973] fstat (3 , { st_mode =
S_IFREG |0644 , st_size =104984 , ...}) = 0 [ pid 16973] mmap (NULL , 107592 ,
PROT_READ , MAP_PRIVATE | MAP_DENYWRITE , 3 , 0) = 0 x7f92741e7000
[ pid 16973] mmap (0 x7f92741ea000 , 73728 , PROT_READ | PROT_EXEC ,
MAP_PRIVATE | MAP_FIXED | MAP_DENYWRITE , 3 , 0 x3000 ) = 0
x7f92741ea000 [ pid 16973] mmap (0 x7f92741fc000 , 16384 , PROT_READ ,
MAP_PRIVATE | MAP_FIXED | MAP_DENYWRITE , 3 , 0 x15000 ) = 0
x7f92741fc000 [ pid 16973] mmap (0 x7f9274200000 , 8192 , PROT_READ |
PROT_WRITE , MAP_PRIVATE | MAP_FIXED | MAP_DENYWRITE , 3 , 0
x18000 ) = 0 x7f9274200000 [ pid 16973] close (3) = 0 [ pid 16973] openat (
AT_FDCWD , "/ opt /ros / noetic / lib/ libc . so .6" , O_RDONLY | O_CLOEXEC
) = -1 ENOENT (No such file or directory ) [ pid 16973] openat ( AT_FDCWD , "/
lib /x86_64 -linux -gnu/ libc .so .6" , O_RDONLY | O_CLOEXEC ) = 3 [ pid
16973] read (3 , "\177 ELF \2\1\1\3\0\0\0\0\0\0\0\3\0 >\0\1\0\0\0\300 A
\2\0\0\0\0\0" ... , 832) = 832 [ pid 16973] 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" ... , 784 , 64) = 784 [ pid 16973]
pread64 (3 , "\4\0\0\0\20\0\0\0\5\0\0\0 GNU
\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0\0" , 32 , 848) = 32 [ pid 16973] pread64 (3 ,
"\4\0\0\0\24\0\0\0\3\0\0\0 GNU \0\30 x \346\264 ur|f|Q \226\236 i\253 - 'o" ... , 68 ,

```

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880) = 68 [ pid 16973] fstat (3 , { st_mode = S_IFREG |0755 , st_size =2029592 ,
...}) = 0 [ pid 16973] 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"... , 784 , 64) = 784 [ pid 16973] pread64 (3 ,
"\4\0\0\0\20\0\0\0\5\0\0\0 GNU \0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0" , 32 , 848) =
32 [ pid 16973] pread64 (3 , "\4\0\0\0\24\0\0\0\3\0\0\0 GNU \0\30 x \346\264
ur\fiQ \226\236 i\253 - 'o"... , 68 , 880) = 68 [ pid 16973] mmap (NULL , 2037344
, PROT_READ , MAP_PRIVATE | MAP_DENYWRITE , 3, 0) = 0
x7f9273ff5000 [ pid 16973] mmap (0 x7f9274017000 , 1540096 , PROT_READ |
PROT_EXEC , MAP_PRIVATE | MAP_FIXED | MAP_DENYWRITE , 3 , 0
x22000 ) = 0 x7f9274017000 [ pid 16973] mmap (0 x7f927418f000 , 319488 ,
PROT_READ , MAP_PRIVATE | MAP_FIXED | MAP_DENYWRITE , 3 , 0
x19a000 ) = 0 x7f927418f000 [ pid 16973] mmap (0 x7f92741dd000 , 24576 ,
PROT_READ | PROT_WRITE , MAP_PRIVATE | MAP_FIXED |
MAP_DENYWRITE , 3, 0 x1e7000 ) = 0 x7f92741dd000 [ pid 16973] mmap (0
x7f92741e3000 , 13920 , PROT_READ | PROT_WRITE , MAP_PRIVATE |
MAP_FIXED | MAP_ANONYMOUS , -1 , 0) = 0 x7f92741e3000 [ pid 16973]
close (3) = 0 [ pid 16973] openat ( AT_FDCWD , "/ opt /ros / noetic / lib/ libm . so
.6" , O_RDONLY | O_CLOEXEC ) = -1 ENOENT (No such file or directory ) [
pid 16973] openat ( AT_FDCWD , "/ lib /x86_64 -linux -gnu/ libm .so .6" ,
O_RDONLY | O_CLOEXEC ) = 3 [ pid 16973] read (3 , "\177 ELF
\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
16973] fstat (3 , { st_mode = S_IFREG |0644 , st_size =1369384 , ...}) = 0 [ pid
16973] mmap (NULL , 1368336 , PROT_READ , MAP_PRIVATE |
MAP_DENYWRITE , 3, 0) = 0 x7f9273ea6000 [ pid 16973] mmap (0
x7f9273eb3000 , 684032 , PROT_READ | PROT_EXEC , MAP_PRIVATE |
MAP_FIXED | MAP_DENYWRITE , 3 , 0 xd000 ) = 0 x7f9273eb3000 [ pid
16973] mmap (0 x7f9273f5a000 , 626688 , PROT_READ , MAP_PRIVATE |
MAP_FIXED | MAP_DENYWRITE , 3 , 0 xb4000 ) = 0 x7f9273f5a000 [ pid
16973] mmap (0 x7f9273ff3000 , 8192 , PROT_READ | PROT_WRITE ,
MAP_PRIVATE | MAP_FIXED | MAP_DENYWRITE , 3, 0 x14c000 ) = 0
x7f9273ff3000

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[pid 16973] close (3) = 0 [pid 16973] mmap (NULL , 8192 , PROT_READ | PROT_WRITE , MAP_PRIVATE | MAP_ANONYMOUS , -1, 0) = 0
x7f9273ea4000 [pid 16973] mmap (NULL , 12288 , PROT_READ | PROT_WRITE , MAP_PRIVATE | MAP_ANONYMOUS , -1, 0) = 0
x7f9273ea1000 [pid 16973] arch_prctl (ARCH_SET_FS , 0 x7f9273ea1740) = 0
[pid 16973] mprotect (0 x7f92741dd000 , 16384 , PROT_READ) = 0 [pid 16973] mprotect (0 x7f9273ff3000 , 4096 , PROT_READ) = 0 [pid 16973] mprotect (0 x7f9274200000 , 4096 , PROT_READ) = 0 [pid 16973] mprotect (0 x7f92743d3000 , 45056 , PROT_READ) = 0 [pid 16973] mprotect (0 x7f927440b000 , 4096 , PROT_READ) = 0 [pid 16973] mprotect (0 x7f92743ec000 , 4096 , PROT_READ) = 0 [pid 16973] mprotect (0 x558a6ce7a000 , 4096 , PROT_READ) = 0 [pid 16973] mprotect (0 x7f927447b000 , 4096 , PROT_READ) = 0 [pid 16973] munmap (0 x7f9274413000 , 239963) = 0 [pid 16973] set_tid_address (0 x7f9273ea1a10) = 16973 [pid 16973] set_robust_list (0 x7f9273ea1a20 , 24) = 0 [pid 16973] rt_sigaction (SIGRTMIN , { sa_handler =0 x7f92743f4bf0 , sa_mask =[] , sa_flags = SA_RESTORER | SA_SIGINFO , sa_restorer =0 x7f9274402420 } , NULL , 8) = 0 [pid 16973] rt_sigaction (SIGRT_1 , { sa_handler =0 x7f92743f4c90 , sa_mask =[] , sa_flags = SA_RESTORER | SA_RESTART | SA_SIGINFO , sa_restorer =0 x7f9274402420 } , NULL , 8) = 0 [pid 16973] rt_sigprocmask (SIG_UNBLOCK , [RTMIN RT_1] , NULL , 8) = 0 [pid 16973] prlimit64 (0 , RLIMIT_STACK , NULL , { rlim_cur =8192*1024 , rlim_max = RLIM64_INFINITY }) = 0 [pid 16973] brk (NULL) = 0 x558a6cf5a000 [pid 16973] brk (0 x558a6cf7b000) = 0 x558a6cf7b000 [pid 16973] futex (0 x7f92743e16bc , FUTEX_WAKE_PRIVATE , 2147483647) = 0 [pid 16973] futex (0 x7f92743e16c8 , FUTEX_WAKE_PRIVATE , 2147483647) = 0 [pid 16973] openat (AT_FDCWD , " file .txt " , O_WRONLY | O_CREAT | O_APPEND , 0666) = 3 [pid 16973] lseek (3 , 0 , SEEK_END) = 0 [pid 16973] statfs ("/ dev /shm /" , { f_type = TMPFS_MAGIC , f_bsize =4096 , f_blocks =978472 , f_bfree =978465 , f_bavail =978465 , f_files =978472 , f_ffree =978463 , f_fsid ={ val =[2567178741 , 3165115080]} , f_namelen =255 ,

```

f_frsize =4096 , f_flags = ST_VALID | ST_NOSUID | ST_NODEV |
ST_NOATIME }) = 0 [ pid 16973] futex (0 x7f9274410390 ,
FUTEX_WAKE_PRIVATE , 2147483647) = 0 [ pid 16973] openat (
AT_FDCWD , "/ dev /shm / sem. semaphore_1 " , O_RDWR | O_NOFOLLOW )
= 4 [ pid 16973] fstat (4 , { st_mode = S_IFREG |0600 , st_size =32 , ...}) = 0 [ pid
16973] mmap (NULL , 32 , PROT_READ | PROT_WRITE , MAP_SHARED , 4 ,
0) = 0 x7f927447a000 [ pid 16973] close (4) = 0 [ pid 16973] openat (
AT_FDCWD , "/ dev /shm / shared_memory_1 " , O_RDWR | O_CREAT |
O_NOFOLLOW | O_CLOEXEC , 0600) = 4 [ pid 16973] ftruncate (4 , 1024) = 0 [
pid 16973] mmap (NULL , 1024 , PROT_READ | PROT_WRITE ,
MAP_SHARED , 4 , 0) = 0 x7f927444d000 [ pid 16973] openat ( AT_FDCWD ,
"/ dev /shm / sem. semaphore_2 " , O_RDWR | O_NOFOLLOW ) = 5 [ pid 16973]
fstat (5 , { st_mode = S_IFREG |0600 , st_size =32 , ...}) = 0 [ pid 16973] mmap
(NULL , 32 , PROT_READ | PROT_WRITE , MAP_SHARED , 5 , 0) = 0
x7f927444c000 [ pid 16973] close (5) = 0 [ pid 16973] openat ( AT_FDCWD , "/"
dev /shm / shared_memory_2 " , O_RDWR | O_CREAT | O_NOFOLLOW |
O_CLOEXEC , 0600) = 5 [ pid 16973] ftruncate (5 , 1024) = 0 [ pid 16973] mmap
(NULL , 1024 , PROT_READ | PROT_WRITE , MAP_SHARED , 5 , 0) = 0
x7f927444b000 [ pid 16973] write (3 , " aaa ;\n" , 5) = 5 [ pid 16973] futex (0
x7f927444c000 , FUTEX_WAKE , 1 < unfinished ... > [ pid 16879] <... futex
resumed >) = 0 [ pid 16973] <... futex resumed >) = 1 [ pid 16879] futex (0
x7f34fc5b7000 , FUTEX_WAIT_BITSET | FUTEX_CLOCK_REALTIME , 0 ,
NULL , FUTEX_BITSET_MATCH_ANY [ pid 16973] write (3 , "ff .\n" , 4) = 4 [
pid 16973] futex (0 x7f927444c000 , FUTEX_WAKE , 1 < unfinished ... > [ pid
16879] <... futex resumed >) = 0 [ pid 16973] <... futex resumed >) = 1 [ pid
16879] futex (0 x7f34fc5b7000 , FUTEX_WAIT_BITSET |
FUTEX_CLOCK_REALTIME , 0 , NULL , FUTEX_BITSET_MATCH_ANY [
pid 16973] futex (0 x7f927444c000 , FUTEX_WAKE , 1 < unfinished ... > [ pid
16879] <... futex resumed >) = -1 EAGAIN ( Resource temporarily unavailable ) [
pid 16973] <... futex resumed >) = 0

```



```

[ pid 16973] futex (0 x7f927447a000 , FUTEX_WAIT_BITSET |
FUTEX_CLOCK_REALTIME , 0 , NULL , FUTEX_BITSET_MATCH_ANY [
pid 16879] write (2 , " Error : " , 7 Error : ) = 7 [ pid 16879] write (2 , " ggg " , 3
ggg) = 3 [ pid 16879] write (2 , "\n" , 1 ) = 1 [ pid 16879] futex (0 x7f34fc5e5000 ,
FUTEX_WAKE , 1) = 1 [ pid 16973] <... futex resumed >) = 0 [ pid 16879]
munmap (0 x7f34fc5e5000 , 32 [ pid 16973] munmap (0 x7f927447a000 , 32 [ pid
16879] <... munmap resumed >) = 0 [ pid 16973] <... munmap resumed >) = 0 [
pid 16879] unlink ("/ dev /shm / sem. semaphore_1 " < unfinished ... > [ pid
16973] unlink ("/ dev /shm / sem. semaphore_1 " < unfinished ... > [ pid 16879]
<... unlink resumed >) = 0 [ pid 16973] <... unlink resumed >) = -1 ENOENT (No
such file or directory ) [ pid 16879] unlink ("/ dev /shm / shared_memory_1 " <
unfinished ... > [ pid 16973] unlink ("/ dev /shm / shared_memory_1 " < unfinished
... > [ pid 16879] <... unlink resumed >) = 0 [ pid 16973] <... unlink resumed >) = -
1 ENOENT (No such file or directory ) [ pid 16879] munmap (0 x7f34fc5b8000 ,
1024 [ pid 16973] munmap (0 x7f927444d000 , 1024 [ pid 16879] <... munmap
resumed >) = 0 [ pid 16973] <... munmap resumed >) = 0 [ pid 16879] close (3 [
pid 16973] close (4 [ pid 16879] <... close resumed >) = 0 [ pid 16973] <... close
resumed >) = 0 [ pid 16879] munmap (0 x7f34fc5b7000 , 32 [ pid 16973] munmap
(0 x7f927444c000 , 32 [ pid 16879] <... munmap resumed >) = 0 [ pid 16973] <...
munmap resumed >) = 0 [ pid 16879] unlink ("/ dev /shm / sem. semaphore_2 " <
unfinished ... > [ pid 16973] unlink ("/ dev /shm / sem. semaphore_2 " < unfinished
... > [ pid 16879] <... unlink resumed >) = 0 [ pid 16973] <... unlink resumed >) = -
1 ENOENT (No such file or directory ) [ pid 16879] unlink ("/ dev /shm /
shared_memory_2 " < unfinished ... > [ pid 16973] unlink ("/ dev /shm /
shared_memory_2 " <
unfinished ... > [ pid 16879] <... unlink resumed >) = 0 [ pid 16973] <... unlink
resumed >) = -1 ENOENT (No such file or directory ) [ pid 16879] munmap (0
x7f34fc5b6000 , 1024 [ pid 16973] munmap (0 x7f927444b000 , 1024 [ pid
16879] <... munmap resumed >) = 0 [ pid 16973] <... munmap resumed >) = 0 [
pid 16879] close (4 [ pid 16973] close (5 [ pid 16879] <... close resumed >) = 0 [
pid 16973] <... close resumed >) = 0 [ pid 16879] exit_group (0 [ pid 16973]

```

```
exit_group (0 [ pid 16879] <... exit_group resumed >) = ? [ pid 16973] <...  
exit_group resumed >) = ? [ pid 16879] +++ exited with 0 +++ +++ exited with 0  
+++
```

1. `execve("./lab3/lab3 [\"./lab3/lab3\"], 0x7ffd71132798 /* 51 vars */)` = 0: Этот вызов `execve`, который выполняет программу `lab3`. Значение 0 означает успешное выполнение.
2. `brk(NULL)` = 0x56197b5bd000: Этот вызов `brk` используется для расширения размера кучи программы. Здесь он устанавливает верхний предел кучи на адрес 0x56197b5bd000.
3. `openat(AT_FDCWD, "/etc/ld.so.cache O_RDONLY|O_CLOEXEC)` = 3: Этот вызов открывает файл `/etc/ld.so.cache` для чтения. Данный файл содержит кэш динамически загружаемых библиотек, которые используются для быстрого поиска библиотек при выполнении программ.
4. `fstat(3, st_mode=S_IFREG|0644, st_size=239963, ...)` = 0: Этот вызов получает информацию о файле, который открыт дескриптором 3.
5. `mmap(NULL, 239963, PROT_READ, MAP_PRIVATE, 3, 0)` = 0x7f34fc57e000: Выделение памяти с использованием системного вызова `mmap`. Этот вызов создает отображение виртуальной памяти для чтения (`PROT_READ`) размером 239963 байт, начиная с адреса 0x7f34fc57e000. Отображение является частным и открыто только для чтения. Файловый дескриптор 3 указывает на файл, откуда происходит отображение.
6. `close(3)` = 0: Этот вызов закрывает файловый дескриптор 3 (который был использован для `ld.so.cache`).
7. `read(3, "...", 832)` = 832: Чтение 832 битов из файла `/lib/x86_64-linux-gnu/librt.so.1`
8. `arch_prctl(ARCH_SET_FS, 0x7f34fc00c740)` = 0: Задаёт состояние процесса.
9. `mprotect(0x7f34fc348000, 16384, PROT_READ)` = 0: Этот вызов изменяет права доступа к памяти. Здесь он делает доступной для чтения область памяти, начинающуюся с адреса 0x7f34fc348000 и имеющую размер 16384 байта.

10. `munmap(0x7f34fc57e000, 239963) = 0`: Снимает отражение файла или устройства в памяти.
11. `set_tid_address(0x7f34fc00ca10) = 16879`: Этот вызов устанавливает адрес переменной в адресное пространство потока.
12. `prlimit64(0, RLIMIT_STACK, NULL, rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY) = 0`: Этот вызов изменяет ограничения ресурсов процесса. Здесь он изменяет текущий размер стека в 8192*1024 байт и максимальный размер стека в бесконечность.
13. `futex(0x7f34fc57b390, FUTEX_WAKE_PRIVATE, 2147483647) = 0`: Этот вызов реализует операции с futex (Fast Userspace Mutex). Здесь он пробуждает ожидающий поток (FUTEX_WAKE_PRIVATE).
14. `read(0, file.txt "file.txt 1024) = 9`: Этот вызов производит чтение из стандартного ввода в буфер размером 1024 байта. Прочитанная строка имеет длину 9 байт.
15. `ftruncate(3, 1024) = 0`: Этот вызов устанавливает размер файла, связанного с файловым дескриптором 3, в 1024 байта.
16. `getpid() = 16879`: Получение идентификатора текущего процесса.
17. `write(4, "0...0 32) = 32`: Запись 32 байт нулей в файл, связанный с файловым дескриптором 4.
18. `clone(child_stack=NULL, flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD, strace, child_tidptr=0x7f34fc00ca10) = 16973`: Создание нового процесса с помощью системного вызова clone.

Выводы

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

