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Кафедра вычислительной математики и программирования

Лабораторная работа №1 по курсу
«Операционные системы»

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Содержание

Репозиторий

https://github.com/YMusaelyan/os

Постановка задачи

Цель работы

Приобретение практических навыков диагностики работы программного обеспечения.

Задание

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

Для уменьшения размеров отчета, проведу диагностику для второй и третьей ЛР.

Общие сведения о программе

Для диагностики работы программного обеспечения используется утилита strace.

В программе используются следующие системные вызовы:

1. int fstat(int filedes, struct stat *buf) - stat возвращает информацию о файле file_name и заполняет буфер buf. lstat идентична stat, но в случае символьных сылок она возвращает информацию о самой ссылке, а не о файле, на который она указывает. fstat идентична stat, только возвращается информация об открытом файле, на который указывает filedes, а не о file_name.
2. int mprotect(const void *addr, size_t len, int prot) mprotect контролирует доступ к области памяти. Если программой производится запрещенный этой функцией доступ к памяти, то такая программа получает сигнал SIGSEGV. prot состоит из следующих побитно и логически сложенных значений: PROT_NONE Доступ к памяти запрещен; PROT_READ Данные в памяти можно читать; PROT_WRITE В память можно записать информацию; PROT_EXEC Память может содержать исполняемый код.
3. int prlimit(pid_t pid, int resource, const struct rlimit *new_limit, struct rlimit *old_limit) Специфичный для Linux системный вызов prlimit() объединяет и расширяет функции setrlimit() и getrlimit(). Его можно использовать как для набора и получения лимиты ресурсов произвольного процесса. Аргумент resource имеет то же значение, что и для setrlimit() и getlimit().Если аргумент new_limit не равен NULL, то структура rlimit для который он указывает, используется для установки новых значений для мягких и жестких ограничений для resource. Если аргумент old_limit не равен NULL, то полный вызов prlimit() устанавливает предыдущие мягкие и жесткие ограничения для повторного использования resource в структуре rlimit, на которую указывает old_limit. Аргумент pid указывает идентификатор процесса, для которого выполняется вызов.
4. execve - выполняет программу, заданную параметром *filename*

5 arch_prctl - установить состояние треда, специфичное для архитектуры

6 access - проверить права доступа пользователя к файлу

7 openat, open – открывает файл

8 mmap, munmap - отражает файлы или устройства в памяти или снимает их отражение

9 stat, fstat, lstat - считывает статус файла

10 mprotect - контролирует доступ к области памяти

11 brk, sbrk - изменение размера сегмента данных

12 pipe - создает канал

13 clone - создать процесс-потомок

14 lseek - установить смещение для позиционирования операций чтения/записи

15 futex - системный вызов быстрых связей пространства пользователя

16 madvise - выдает предложения об использовании памяти

17 exit - обычное завершение работы программы

Демонстрация работы программы

lab2

```
yarik@asus:~/os/os/lab2$ strace -f ./main
execve("./main", ["./main"], 0x7ffe10603118 /* 48 vars */) = 0
brk(NULL)                               = 0x55700b7b5000
arch_prctl(0x3001 /* ARCH_??? */, 0x7fff29dfc760) = -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=82021, ...}) = 0
mmap(NULL, 82021, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7fc7d3c2c000
close(3)                                = 0
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libstdc++.so.6", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0`\341\t\0\0\0\0\0"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0644, st_size=1956992, ...}) = 0
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7fc7d3c2a000
mmap(NULL, 1972224, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7fc7d3a48000
mprotect(0x7fc7d3ade000, 1290240, PROT_NONE) = 0
mmap(0x7fc7d3ade000, 987136, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 3, 0x96000) = 0x7fc7d3ade000
mmap(0x7fc7d3bcf000, 299008, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x187000) = 0x7fc7d3bcf000
mmap(0x7fc7d3c19000, 57344, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 3, 0x1d0000) = 0x7fc7d3c19000
mmap(0x7fc7d3c27000, 10240, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_ANONYMOUS, -1, 0) = 0x7fc7d3c27000
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\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) = 0x7fc7d3a2d000
mmap(0x7fc7d3a30000, 73728, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 3, 0x3000) = 0x7fc7d3a30000
mmap(0x7fc7d3a42000, 16384, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x15000)
= 0x7fc7d3a42000
mmap(0x7fc7d3a46000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 3, 0x18000) = 0x7fc7d3a46000
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\300A\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\0\0"..., 784, 64) = 784
pread64(3, "\4\0\0\0\20\0\0\0\5\0\0\0GNU\0\2\0\0\0300\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\30x\346\264ur\f|Q\226\236i\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\0\0"..., 784, 64) = 784
pread64(3, "\4\0\0\0\20\0\0\0\5\0\0\0GNU\0\2\0\0\0300\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\30x\346\264ur\f|Q\226\236i\253-'o"..., 68, 880) = 68
mmap(NULL, 2037344, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7fc7d383b000
mmap(0x7fc7d385d000, 1540096, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 3, 0x22000) = 0x7fc7d385d000
mmap(0x7fc7d39d5000, 319488, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x19a000) = 0x7fc7d39d5000
mmap(0x7fc7d3a23000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 3, 0x1e7000) = 0x7fc7d3a23000
mmap(0x7fc7d3a29000, 13920, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_ANONYMOUS, -1, 0) = 0x7fc7d3a29000
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=1369384, ...}) = 0
mmap(NULL, 1368336, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7fc7d36ec000
mmap(0x7fc7d36f9000, 684032, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 3, 0xd000) = 0x7fc7d36f9000
mmap(0x7fc7d37a0000, 626688, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0xb4000)
= 0x7fc7d37a0000
mmap(0x7fc7d3839000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 3, 0x14c000) = 0x7fc7d3839000
close(3)                                = 0
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7fc7d36ea000
arch_prctl(ARCH_SET_FS, 0x7fc7d36eb100) = 0
mprotect(0x7fc7d3a23000, 16384, PROT_READ) = 0
mprotect(0x7fc7d3839000, 4096, PROT_READ) = 0
mprotect(0x7fc7d3a46000, 4096, PROT_READ) = 0
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7fc7d36e8000
mprotect(0x7fc7d3c19000, 45056, PROT_READ) = 0
mprotect(0x55700ad49000, 4096, PROT_READ) = 0
mprotect(0x7fc7d3c6e000, 4096, PROT_READ) = 0
munmap(0x7fc7d3c2c000, 82021)           = 0
brk(NULL)                               = 0x55700b7b5000
brk(0x55700b7d6000)                     = 0x55700b7d6000
fstat(0, {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0x1), ...}) = 0
read(0, 1.txt
"1.txt\n", 1024)                = 6
openat(AT_FDCWD, "1.txt", O_RDONLY)     = 3
pipe([4, 5])                            = 0
clone(child_stack=NULL, flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD,
child_tidptr=0x7fc7d36eb3d0) = 57517
strace: Process 57517 attached
[pid 57516] read(4,  <unfinished ...>
[pid 57517] execve("./child", ["3", "4", "5"], 0x7fff29dfc848 /* 48 vars */) = 0
[pid 57517] brk(NULL)                   = 0x5623a684f000
[pid 57517] arch_prctl(0x3001 /* ARCH_??? */, 0x7ffdc2c53390) = -1 EINVAL (Недопустимый аргумент)
[pid 57517] access("/etc/ld.so.preload", R_OK) = -1 ENOENT (Нет такого файла или каталога)
[pid 57517] openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 6
[pid 57517] fstat(6, {st_mode=S_IFREG|0644, st_size=82021, ...}) = 0
[pid 57517] mmap(NULL, 82021, PROT_READ, MAP_PRIVATE, 6, 0) = 0x7fc1a6ed2000
[pid 57517] close(6)                    = 0
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[pid 57517] openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libstdc++.so.6", O_RDONLY|O_CLOEXEC) = 6
[pid 57517] read(6, "\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 57517] fstat(6, {st_mode=S_IFREG|0644, st_size=1956992, ...}) = 0
[pid 57517] mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7fc1a6ed0000
[pid 57517] mmap(NULL, 1972224, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 6, 0) =
0x7fc1a6cee000
[pid 57517] mprotect(0x7fc1a6d84000, 1290240, PROT_NONE) = 0
[pid 57517] mmap(0x7fc1a6d84000, 987136, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 6, 0x96000) = 0x7fc1a6d84000
[pid 57517] mmap(0x7fc1a6e75000, 299008, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
6, 0x187000) = 0x7fc1a6e75000
[pid 57517] mmap(0x7fc1a6ebf000, 57344, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 6, 0x1d0000) = 0x7fc1a6ebf000
[pid 57517] mmap(0x7fc1a6ecd000, 10240, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_ANONYMOUS, -1, 0) = 0x7fc1a6ecd000
[pid 57517] close(6)                    = 0
[pid 57517] openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libc.so.6", O_RDONLY|O_CLOEXEC) = 6
[pid 57517] read(6, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\300A\2\0\0\0\0\0"..., 832) = 832
[pid 57517] pread64(6, "\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 57517] pread64(6, "\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 57517] pread64(6, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\30x\346\264ur\f|Q\226\236i\253-'o"..., 68, 880) = 68
[pid 57517] fstat(6, {st_mode=S_IFREG|0755, st_size=2029592, ...}) = 0
[pid 57517] pread64(6, "\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 57517] pread64(6, "\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 57517] pread64(6, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\30x\346\264ur\f|Q\226\236i\253-'o"..., 68, 880) = 68
[pid 57517] mmap(NULL, 2037344, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 6, 0) = 0x7fc1a6afc000
[pid 57517] mmap(0x7fc1a6b1e000, 1540096, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 6, 0x22000) = 0x7fc1a6b1e000
[pid 57517] mmap(0x7fc1a6c96000, 319488, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
6, 0x19a000) = 0x7fc1a6c96000
[pid 57517] mmap(0x7fc1a6ce4000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 6, 0x1e7000) = 0x7fc1a6ce4000
[pid 57517] mmap(0x7fc1a6cea000, 13920, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_ANONYMOUS, -1, 0) = 0x7fc1a6cea000
[pid 57517] close(6)                    = 0
[pid 57517] openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libm.so.6", O_RDONLY|O_CLOEXEC) = 6
[pid 57517] read(6, "\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 57517] fstat(6, {st_mode=S_IFREG|0644, st_size=1369384, ...}) = 0
[pid 57517] mmap(NULL, 1368336, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 6, 0) =
0x7fc1a69ad000
[pid 57517] mmap(0x7fc1a69ba000, 684032, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 6, 0xd000) = 0x7fc1a69ba000
[pid 57517] mmap(0x7fc1a6a61000, 626688, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
6, 0xb4000) = 0x7fc1a6a61000
[pid 57517] mmap(0x7fc1a6afa000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 6, 0x14c000) = 0x7fc1a6afa000
[pid 57517] close(6)                    = 0
[pid 57517] openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libgcc_s.so.1", O_RDONLY|O_CLOEXEC) = 6
[pid 57517] read(6, "\177ELF\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 57517] fstat(6, {st_mode=S_IFREG|0644, st_size=104984, ...}) = 0
[pid 57517] mmap(NULL, 107592, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 6, 0) = 0x7fc1a6992000
[pid 57517] mmap(0x7fc1a6995000, 73728, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 6, 0x3000) = 0x7fc1a6995000
[pid 57517] mmap(0x7fc1a69a7000, 16384, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
6, 0x15000) = 0x7fc1a69a7000
[pid 57517] mmap(0x7fc1a69ab000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 6, 0x18000) = 0x7fc1a69ab000
[pid 57517] close(6)                    = 0
[pid 57517] mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7fc1a6990000
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```
[pid 57517] arch_prctl(ARCH_SET_FS, 0x7fc1a6990f40) = 0
[pid 57517] mprotect(0x7fc1a6ce4000, 16384, PROT_READ) = 0
[pid 57517] mprotect(0x7fc1a69ab000, 4096, PROT_READ) = 0
[pid 57517] mprotect(0x7fc1a6afa000, 4096, PROT_READ) = 0
[pid 57517] mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7fc1a698e000
[pid 57517] mprotect(0x7fc1a6ebf000, 45056, PROT_READ) = 0
[pid 57517] mprotect(0x5623a5a29000, 4096, PROT_READ) = 0
[pid 57517] mprotect(0x7fc1a6f14000, 4096, PROT_READ) = 0
[pid 57517] munmap(0x7fc1a6ed2000, 82021) = 0
[pid 57517] brk(NULL)                   = 0x5623a684f000
[pid 57517] brk(0x5623a6870000)         = 0x5623a6870000
[pid 57517] dup2(3, 0)                  = 0
[pid 57517] dup2(5, 1)                  = 1
[pid 57517] fstat(0, {st_mode=S_IFREG|0664, st_size=41, ...}) = 0
[pid 57517] read(0, "24\n345672\n23242\n2122\n-132\n2324\n5"..., 4096) = 41
[pid 57517] fstat(1, {st_mode=S_IFIFO|0600, st_size=0, ...}) = 0
[pid 57517] write(1, "24\n", 3 <unfinished ...>
[pid 57516] <... read resumed>"2", 1)   = 1
[pid 57517] <... write resumed>)        = 3
[pid 57516] fstat(1,  <unfinished ...>
[pid 57517] write(1, "345672\n", 7 <unfinished ...>
[pid 57516] <... fstat resumed>{st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0x1), ...}) = 0
[pid 57517] <... write resumed>)        = 7
[pid 57516] read(4,  <unfinished ...>
[pid 57517] write(1, "23242\n", 6 <unfinished ...>
[pid 57516] <... read resumed>"4", 1)   = 1
[pid 57517] <... write resumed>)        = 6
[pid 57516] read(4,  <unfinished ...>
[pid 57517] write(1, "2122\n", 5 <unfinished ...>
[pid 57516] <... read resumed>"\n", 1)  = 1
[pid 57517] <... write resumed>)        = 5
[pid 57516] write(1, "24\n", 3 <unfinished ...>
[pid 57517] write(1, "\0", 124
 <unfinished ...>
[pid 57516] <... write resumed>)        = 3
[pid 57517] <... write resumed>)        = 1
[pid 57516] read(4, "3", 1)             = 1
[pid 57517] lseek(0, -16, SEEK_CUR <unfinished ...>
[pid 57516] read(4,  <unfinished ...>
[pid 57517] <... lseek resumed>)        = 25
[pid 57516] <... read resumed>"4", 1)   = 1
[pid 57517] exit_group(0 <unfinished ...>
[pid 57516] read(4,  <unfinished ...>
[pid 57517] <... exit_group resumed>)   = ?
[pid 57516] <... read resumed>"5", 1)   = 1
[pid 57516] read(4, "6", 1)             = 1
[pid 57516] read(4, "7", 1)             = 1
[pid 57516] read(4, "2", 1)             = 1
[pid 57517] +++ exited with 0 +++
--- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=57517, si_uid=1000, si_status=0, si_utime=0,
si_stime=0} ---
read(4, "\n", 1)                        = 1
write(1, "345672\n", 7345672
)               = 7
read(4, "2", 1)                         = 1
read(4, "3", 1)                         = 1
read(4, "2", 1)                         = 1
read(4, "4", 1)                         = 1
read(4, "2", 1)                         = 1
read(4, "\n", 1)                        = 1
```

write(1, "23242\n", 623242
) = 6
read(4, "2", 1) = 1
read(4, "1", 1) = 1
read(4, "2", 1) = 1
read(4, "2", 1) = 1
read(4, "\n", 1) = 1
write(1, "2122\n", 52122
) = 5
read(4, "\0", 1) = 1
close(4) = 0
close(5) = 0
close(3) = 0
exit_group(0) = ?
+++ exited with 0 +++

lab3

yarik@asus:~/os/os/lab3$ strace -f ./lab3 4

execve("./lab3", ["./lab3", "4"], 0x7ffefce65540 /* 48 vars */) = 0

brk(NULL) = 0x5654a1fb6000

arch_prctl(0x3001 /* ARCH_??? */, 0x7ffec507fab0) = -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=82021, ...}) = 0

mmap(NULL, 82021, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7f82d3aa3000

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{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) = 0x7f82d3aa1000

pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\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) = 0x7f82d3a7e000

mmap(0x7f82d3a84000, 69632, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x6000) = 0x7f82d3a84000

mmap(0x7f82d3a95000, 24576, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x17000) = 0x7f82d3a95000

mmap(0x7f82d3a9b000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1c000) = 0x7f82d3a9b000

mmap(0x7f82d3a9d000, 13432, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x7f82d3a9d000

close(3) = 0

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

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

fstat(3, {st_mode=S_IFREG|0644, st_size=1956992, ...}) = 0

mmap(NULL, 1972224, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f82d389c000

mprotect(0x7f82d3932000, 1290240, PROT_NONE) = 0

mmap(0x7f82d3932000, 987136, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 3, 0x96000) = 0x7f82d3932000

mmap(0x7f82d3a23000, 299008, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x187000) = 0x7f82d3a23000

mmap(0x7f82d3a6d000, 57344, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 3, 0x1d0000) = 0x7f82d3a6d000

mmap(0x7f82d3a7b000, 10240, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_ANONYMOUS, -1, 0) = 0x7f82d3a7b000

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) = 0x7f82d3881000

mmap(0x7f82d3884000, 73728, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 3, 0x3000) = 0x7f82d3884000

mmap(0x7f82d3896000, 16384, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x15000)
= 0x7f82d3896000

mmap(0x7f82d389a000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 3, 0x18000) = 0x7f82d389a000

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\300A\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\30x\346\264ur\f|Q\226\236i\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\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\30x\346\264ur\f|Q\226\236i\253-'o"..., 68, 880) = 68

mmap(NULL, 2037344, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f82d368f000

mmap(0x7f82d36b1000, 1540096, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 3, 0x22000) = 0x7f82d36b1000

mmap(0x7f82d3829000, 319488, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x19a000) = 0x7f82d3829000

mmap(0x7f82d3877000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 3, 0x1e7000) = 0x7f82d3877000

mmap(0x7f82d387d000, 13920, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_ANONYMOUS, -1, 0) = 0x7f82d387d000

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=1369384, ...}) = 0

mmap(NULL, 1368336, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f82d3540000

mmap(0x7f82d354d000, 684032, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 3, 0xd000) = 0x7f82d354d000

mmap(0x7f82d35f4000, 626688, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0xb4000)
= 0x7f82d35f4000

mmap(0x7f82d368d000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 3, 0x14c000) = 0x7f82d368d000

close(3)   = 0

mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7f82d353e000

mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7f82d353b000

arch_prctl(ARCH_SET_FS, 0x7f82d353b740) = 0

mprotect(0x7f82d3877000, 16384, PROT_READ) = 0

mprotect(0x7f82d368d000, 4096, PROT_READ) = 0

mprotect(0x7f82d389a000, 4096, PROT_READ) = 0

mprotect(0x7f82d3a6d000, 45056, PROT_READ) = 0

mprotect(0x7f82d3a9b000, 4096, PROT_READ) = 0

mprotect(0x5654a1ee5000, 4096, PROT_READ) = 0

mprotect(0x7f82d3ae5000, 4096, PROT_READ) = 0

munmap(0x7f82d3aa3000, 82021)   = 0

set_tid_address(0x7f82d353ba10)   = 61373

set_robust_list(0x7f82d353ba20, 24)   = 0

rt_sigaction(SIGRTMIN, {sa_handler=0x7f82d3a84bf0, sa_mask=[], sa_flags=SA_RESTORER|SA_SIGINFO,
sa_restorer=0x7f82d3a92420}, NULL, 8) = 0

rt_sigaction(SIGRT_1, {sa_handler=0x7f82d3a84c90, sa_mask=[], sa_flags=SA_RESTORER|SA_RESTART|
SA_SIGINFO, sa_restorer=0x7f82d3a92420}, 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)   = 0x5654a1fb6000

brk(0x5654a1fd7000)   = 0x5654a1fd7000

futex(0x7f82d3a7b6bc, FUTEX_WAKE_PRIVATE, 2147483647) = 0

futex(0x7f82d3a7b6c8, FUTEX_WAKE_PRIVATE, 2147483647) = 0

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

write(1, "\320\222\320\262\320\265\320\264\320\270\321\202\320\265 \
320\272\320\276\320\273\320\270\321\207\320\265\321\201\321\202\320"..., 53Введите количество массивов

) = 53

write(1, "\320\222\320\262\320\265\320\264\320\270\321\202\320\265 \
321\200\320\260\320\267\320\274\320\265\321\200 \320\274\320\260"..., 46Введите размер массивов

) = 46

write(1, "\320\222\320\262\320\265\320\264\320\270\321\202\320\265 \
320\274\320\260\321\201\321\201\320\270\320\262\321\213\n", 30Введите массивы

) = 30

clock_gettime(CLOCK_REALTIME, {tv_sec=1672946418, tv_nsec=629035629}) = 0

mmap(NULL, 8392704, PROT_NONE, MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK, -1, 0) =
0x7f82d2d3a000

mprotect(0x7f82d2d3b000, 8388608, PROT_READ|PROT_WRITE) = 0

clone(child_stack=0x7f82d3539fb0, flags=CLONE_VM|CLONE_FS|CLONE_FILES|CLONE_SIGHAND|
CLONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|CLONE_PARENT_SETTID|
CLONE_CHILD_CLEARTIDstrace: Process 61374 attached

, parent_tid=[61374], tls=0x7f82d353a700, child_tidptr=0x7f82d353a9d0) = 61374

[pid 61373] mmap(NULL, 8392704, PROT_NONE, MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK, -1, 0)
= 0x7f82d2539000

[pid 61374] set_robust_list(0x7f82d353a9e0, 24 <unfinished ...>

[pid 61373] mprotect(0x7f82d253a000, 8388608, PROT_READ|PROT_WRITE <unfinished ...>

[pid 61374] <... set_robust_list resumed>) = 0

[pid 61373] <... mprotect resumed>)   = 0

[pid 61373] clone(child_stack=0x7f82d2d38fb0, flags=CLONE_VM|CLONE_FS|CLONE_FILES|
CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|CLONE_PARENT_SETTID|
CLONE_CHILD_CLEARTID <unfinished ...>

[pid 61374] madvise(0x7f82d2d3a000, 8368128, MADV_DONTNEED) = 0

[pid 61373] <... clone resumed>, parent_tid=[61375], tls=0x7f82d2d39700, child_tidptr=0x7f82d2d399d0) = 61375

[pid 61374] exit(0strace: Process 61375 attached

 <unfinished ...>

[pid 61373] mmap(NULL, 8392704, PROT_NONE, MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK, -1, 0
<unfinished ...>

[pid 61374] <... exit resumed>)   = ?

[pid 61373] <... mmap resumed>)   = 0x7f82d1d38000

[pid 61375] set_robust_list(0x7f82d2d399e0, 24 <unfinished ...>

[pid 61373] mprotect(0x7f82d1d39000, 8388608, PROT_READ|PROT_WRITE <unfinished ...>

[pid 61374] +++ exited with 0 +++

[pid 61375] <... set_robust_list resumed>) = 0

[pid 61373] <... mprotect resumed>)   = 0

[pid 61375] madvise(0x7f82d2539000, 8368128, MADV_DONTNEED <unfinished ...>

[pid 61373] clone(child_stack=0x7f82d2537fb0, flags=CLONE_VM|CLONE_FS|CLONE_FILES|
CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|CLONE_PARENT_SETTID|
CLONE_CHILD_CLEARTID <unfinished ...>

[pid 61375] <... madvise resumed>)   = 0

[pid 61375] exit(0)   = ?

strace: Process 61376 attached

[pid 61373] <... clone resumed>, parent_tid=[61376], tls=0x7f82d2538700, child_tidptr=0x7f82d25389d0) = 61376

[pid 61373] mmap(NULL, 8392704, PROT_NONE, MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK, -1, 0 <unfinished ...>

[pid 61376] set_robust_list(0x7f82d25389e0, 24 <unfinished ...>

[pid 61375] +++ exited with 0 +++

[pid 61373] <... mmap resumed>)   = 0x7f82d1537000

[pid 61376] <... set_robust_list resumed>) = 0

[pid 61373] mprotect(0x7f82d1538000, 8388608, PROT_READ|PROT_WRITE) = 0

[pid 61376] madvise(0x7f82d1d38000, 8368128, MADV_DONTNEED <unfinished ...>

[pid 61373] clone(child_stack=0x7f82d1d36fb0, flags=CLONE_VM|CLONE_FS|CLONE_FILES|CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|CLONE_PARENT_SETTID|CLONE_CHILD_CLEARTID <unfinished ...>

[pid 61376] <... madvise resumed>)   = 0

[pid 61376] exit(0strace: Process 61377 attached

 <unfinished ...>

[pid 61373] <... clone resumed>, parent_tid=[61377], tls=0x7f82d1d37700, child_tidptr=0x7f82d1d379d0) = 61377

[pid 61373] futex(0x7f82d25389d0, FUTEX_WAIT, 61376, NULL <unfinished ...>

[pid 61377] set_robust_list(0x7f82d1d379e0, 24) = 0

[pid 61376] <... exit resumed>)   = ?

[pid 61377] madvise(0x7f82d1537000, 8368128, MADV_DONTNEED <unfinished ...>

[pid 61373] <... futex resumed>)   = 0

[pid 61376] +++ exited with 0 +++

[pid 61377] <... madvise resumed>)   = 0

[pid 61373] futex(0x7f82d1d379d0, FUTEX_WAIT, 61377, NULL <unfinished ...>

[pid 61377] exit(0)   = ?

[pid 61373] <... futex resumed>)   = 0

[pid 61377] +++ exited with 0 +++

clock_gettime(CLOCK_REALTIME, {tv_sec=1672946418, tv_nsec=630032397}) = 0

write(1, "-1753066810 218806642 -959136520"..., 88-1753066810 218806642 -959136520 -626942898 -1075785258 281729203 1783052302 467959327

) = 88

write(1, "0.000996768 \321\201\320\265\320\272.\n", 200.000996768 сек.

) = 20

exit_group(0)   = ?

+++ exited with 0 +++

Выводы

Данная лабораторная работа была очень полезной. Я приобрел практические навыки в диагностики работы программного обеспечения.