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»

Группа: М8О-208Б-23

Студент: Денисов К.Д.

Преподаватель: Живалев Е.А.

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Постановка задачи

Приобретение практических навыков диагностики работы программного обеспечения.

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
Утилита strace отслеживает системные вызовы и сигналы, которые процесс делает во время выполнения. Используется для диагностики и отладки на системном уровне.

Основные флаги
- -f - отслеживать дочерние процессы
- -o file - записывать вывод в файл
- -p PID - прикрепиться к работающему процессу
- -t - добавлять временные метки
- -e expr - фильтровать трассируемые события (например, -e open,close,network)
- -c - выводить сводку с подсчетом вызовов и времени
- -s SIZE - задать максимальную длину выводимых строк
- -T - показывать время, затраченное на каждый системный вызов
- -r - показывать относительное время между вызовами
- -k - отображать стек вызовов для каждого системного вызова
- -y - расшифровывать пути, связанные с файловыми дескрипторами

Протокол работы программы

Лабораторная работа №1

```
$ ./parent
Write a doc name
hellow
Enter a message
hellow;
Status: Success
Enter a message:
qwe
Status Not over in ';' or '.'
Enter a message
asfdd;
Status: Success
```

Enter a message

xddddd;

Status: Success

Enter a message

exit

Strace:

```
$ strace -f ./parent
execve("./parent", ["./parent"], 0x7ffd5c20faa8 /* 50 vars */) = 0
brk(NULL) = 0x5cec77aeb000
access("/etc/ld.so.preload", R_OK) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3
fstat(3, {st_mode=S_IFREG|0644, st_size=121423, ...}) = 0
mmap(NULL, 121423, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7fb904dc3000
close(3) = 0
openat(AT_FDCWD, "/usr/lib/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\340_\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
fstat(3, {st_mode=S_IFREG|0755, st_size=2014520, ...}) = 0
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7fb904dc1000
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, 2034616, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7fb904bd0000
mmap(0x7fb904bf4000, 1511424, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x24000) = 0x7fb904bf4000
mmap(0x7fb904d65000, 319488, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x195000) = 0x7fb904d65000
mmap(0x7fb904db3000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x1e3000) = 0x7fb904db3000
mmap(0x7fb904db9000, 31672, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,
-1, 0) = 0x7fb904db9000
close(3) = 0
mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7fb904bcd000
arch_prctl(ARCH_SET_FS, 0x7fb904bcd740) = 0
```

```
set_tid_address(0x7fb904bcda10) = 36016

set_robust_list(0x7fb904bcda20, 24) = 0

rseq(0x7fb904bce060, 0x20, 0, 0x53053053) = 0

mprotect(0x7fb904db3000, 16384, PROT_READ) = 0

mprotect(0x5cec42537000, 4096, PROT_READ) = 0

mprotect(0x7fb904e1b000, 8192, PROT_READ) = 0

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

munmap(0x7fb904dc3000, 121423) = 0

pipe2([3, 4], 0) = 0

pipe2([5, 6], 0) = 0

clone(child_stack=NULL, flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD,

child_tidptr=0x7fb904bcda10) = 36017

strace: Process 36017 attached

[pid 36016] close(3) = 0

[pid 36016] close(6 <unfinished ...>

[pid 36017] set_robust_list(0x7fb904bcda20, 24 <unfinished ...>

[pid 36016] <... close resumed>) = 0

[pid 36016] fstat(1, <unfinished ...>

[pid 36017] <... set_robust_list resumed>) = 0

[pid 36016] <... fstat resumed>{st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0), ...})
=0

[pid 36016] getrandom("\x30\x10\xd3\x1b\xe3\x53\x96\x65", 8, GRND_NONBLOCK) = 8

[pid 36016] brk(NULL) = 0x5cec77aeb000

[pid 36017] close(4 <unfinished ...>

[pid 36016] brk(0x5cec77b0c000) = 0x5cec77b0c000

[pid 36017] <... close resumed>) = 0

[pid 36016] write(1, "write a doc name\n", 17 <unfinished ...>

write a doc name

[pid 36017] close(5 <unfinished ...>

[pid 36016] <... write resumed>) = 17

[pid 36017] <... close resumed>) = 0

[pid 36016] fstat(0, {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0), ...}) = 0

[pid 36017] dup2(3, 0 <unfinished ...>

[pid 36016] read(0, <unfinished ...>

[pid 36017] <... dup2 resumed>) = 0

[pid 36017] dup2(6, 1) = 1

[pid 36017] close(3) = 0

[pid 36017] close(6) = 0
```

```
[pid 36017] execve("./child", ["child"], 0x7ffc5812e4b8 /* 50 vars */) = 0
[pid 36017] brk(NULL) = 0x569d17ded000
[pid 36017] access("/etc/ld.so.preload", R_OK) = -1 ENOENT (No such file or directory)
[pid 36017] openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3
[pid 36017] fstat(3, {st_mode=S_IFREG|0644, st_size=121423, ...}) = 0
[pid 36017] mmap(NULL, 121423, PROT_READ, MAP_PRIVATE, 3, 0) = 0x74a86bff5000
[pid 36017] close(3) = 0
[pid 36017] openat(AT_FDCWD, "/usr/lib/libc.so.6", O_RDONLY|O_CLOEXEC) = 3
[pid 36017] read(3,
"\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\340_\2\0\0\0\0\0"..., 832) = 832
[pid 36017] 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 36017] fstat(3, {st_mode=S_IFREG|0755, st_size=2014520, ...}) = 0
[pid 36017] mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x74a86bff3000
[pid 36017] 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 36017] mmap(NULL, 2034616, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x74a86be02000
[pid 36017] mmap(0x74a86be26000, 1511424, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x24000) = 0x74a86be26000
[pid 36017] mmap(0x74a86bf97000, 319488, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x195000) = 0x74a86bf97000
[pid 36017] mmap(0x74a86bfe5000, 24576, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1e3000) = 0x74a86bfe5000
[pid 36017] mmap(0x74a86bfeb000, 31672, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x74a86bfeb000
[pid 36017] close(3) = 0
[pid 36017] mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x74a86bdff000
[pid 36017] arch_prctl(ARCH_SET_FS, 0x74a86bdff740) = 0
[pid 36017] set_tid_address(0x74a86bdffa10) = 36017
[pid 36017] set_robust_list(0x74a86bdffa20, 24) = 0
[pid 36017] rseq(0x74a86be00060, 0x20, 0, 0x53053053) = 0
[pid 36017] mprotect(0x74a86bfe5000, 16384, PROT_READ) = 0
[pid 36017] mprotect(0x569cef063000, 4096, PROT_READ) = 0
[pid 36017] mprotect(0x74a86c04d000, 8192, PROT_READ) = 0
```

```
[pid 36017] prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024,
rlim_max=RLIM64_INFINITY}) = 0
[pid 36017] munmap(0x74a86bff5000, 121423) = 0
[pid 36017] read(0, hellow
<unfinished ...>
[pid 36016] <... read resumed>"hellow\n", 1024) = 7
[pid 36016] write(4, "hellow\n\0", 8) = 8
[pid 36017] <... read resumed>"hellow\n\0", 100) = 8
[pid 36016] write(1, "Enter a message: ", 17 <unfinished ...>
[pid 36017] getrandom(Enter a message: <unfinished ...>
[pid 36016] <... write resumed>) = 17
[pid 36017] <... getrandom resumed>"\xaa\x27\x82\x44\x3f\x93\xbb\x5e", 8,
GRND_NONBLOCK) = 8
[pid 36016] read(0, <unfinished ...>
[pid 36017] brk(NULL) = 0x569d17ded000
[pid 36017] brk(0x569d17e0e000) = 0x569d17e0e000
[pid 36017] openat(AT_FDCWD, "hellow\n", O_WRONLY|O_CREAT|O_TRUNC, 0666) = 3
[pid 36017] read(0, hellow;
<unfinished ...>
[pid 36016] <... read resumed>"hellow;\n", 1024) = 8
[pid 36016] write(4, "hellow;\n\0", 9) = 9
[pid 36017] <... read resumed>"hellow;\n\0", 100) = 9
[pid 36016] read(5, <unfinished ...>
[pid 36017] fstat(3, {st_mode=S_IFREG|0644, st_size=0, ...}) = 0
[pid 36017] write(1, "\320\243\321\201\320\277\320\265\321\210\320\275\320\276\0", 15)=
15
[pid 36016] <... read
resumed>"\320\243\321\201\320\277\320\265\321\210\320\275\320\276\0", 100) = 15
[pid 36017] read(0, <unfinished ...>
[pid 36016] write(1, "Parent read:
\320\243\321\201\320\277\320\265\321\210\320\275\320\276\n", 28Parent read: Успешно
) = 28
[pid 36016] write(1, "Enter a message: ", 17Enter a message: ) = 17
[pid 36016] read(0, bye
"bye\n", 1024) = 4
[pid 36016] write(4, "bye\n\0", 5) = 5
[pid 36017] <... read resumed>"bye\n\0", 100) = 5
[pid 36016] read(5, <unfinished ...>
```

```
[pid 36017] write(1,
"\320\237\321\200\320\265\320\264\320\273\320\276\320\266\320\265\320\275\320\270\320\2
65
\320\275\320\265 \320\276\320\272"..., 69 <unfinished ...>
[pid 36016] <... read
resumed>"\320\237\321\200\320\265\320\264\320\273\320\276\320\266\320\265\320\275\320\2
70\32
0\265 \320\275\320\265 \320\276\320\272"..., 100) = 69
[pid 36017] <... write resumed>) = 69
[pid 36016] write(1, "Parent read:
\320\237\321\200\320\265\320\264\320\273\320\276\320\266\320\265\320\275\320"..., 82
<unfinished ...>
[pid 36017] read(0, Parent read: Предложение не оканчивается на . или ;
<unfinished ...>
[pid 36016] <... write resumed>) = 82
[pid 36016] write(1, "Enter a message: ", 17Enter a message: ) = 17
[pid 36016] read(0, asd;
"asd;\n", 1024) = 5
[pid 36016] write(4, "asd;\n\0", 6) = 6
[pid 36017] <... read resumed>"asd;\n\0", 100) = 6
[pid 36016] read(5, <unfinished ...>
[pid 36017] write(1, "\320\243\321\201\320\277\320\265\321\210\320\275\320\276\0", 15)=
15
[pid 36016] <... read
resumed>"\320\243\321\201\320\277\320\265\321\210\320\275\320\276\0", 100) = 15
[pid 36017] read(0, <unfinished ...>
[pid 36016] write(1, "Parent read:
\320\243\321\201\320\277\320\265\321\210\320\275\320\276\n", 28Parent read: Успешно
) = 28
[pid 36016] write(1, "Enter a message: ", 17Enter a message: ) = 17
[pid 36016] read(0, exit
"exit\n", 1024) = 5
[pid 36016] close(4) = 0
[pid 36017] <... read resumed>"", 100) = 0
[pid 36016] close(5) = 0
[pid 36017] write(3, "hellow;\nasd;\n", 13 <unfinished ...>
[pid 36016] wait4(36017, <unfinished ...>
[pid 36017] <... write resumed>) = 13
[pid 36017] close(3) = 0
```

```
[pid 36017] exit_group(0) = ?
[pid 36017] +++ exited with 0 +++
<... wait4 resumed>NULL, 0, NULL) = 36017
--- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=36017, si_uid=1000,
si_status=0, si_utime=0, si_stime=0} ---
exit_group(0) = ?
+++ exited with 0 +++
```

Лабораторная работа №2

```
$ strace -f ./main 5 4
execve("./main", ["./main", "5", "4"], 0x7ffcf3cb3ca8 /* 50 vars */) = 0
brk(NULL) = 0x5b46adac8000
access("/etc/ld.so.preload", R_OK) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3
fstat(3, {st_mode=S_IFREG|0644, st_size=121423, ...}) = 0
mmap(NULL, 121423, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7b82c2c90000
close(3) = 0
openat(AT_FDCWD, "/usr/lib/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\340_\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
fstat(3, {st_mode=S_IFREG|0755, st_size=2014520, ...}) = 0
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0)
=0x7b82c2c8e000
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, 2034616, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7b82c2a9d000
mmap(0x7b82c2ac1000, 1511424, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3, 0x24000) = 0x7b82c2ac1000
mmap(0x7b82c2c32000, 319488, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3,0x195000) = 0x7b82c2c32000
mmap(0x7b82c2c80000, 24576, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3, 0x1e3000) = 0x7b82c2c80000
mmap(0x7b82c2c86000, 31672, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,-1, 0) = 0x7b82c2c86000
close(3) = 0
mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0)
=0x7b82c2a9a000
arch_prctl(ARCH_SET_FS, 0x7b82c2a9a740) = 0
set_tid_address(0x7b82c2a9aa10) = 45190
set_robust_list(0x7b82c2a9aa20, 24) = 0
rseq(0x7b82c2a9b060, 0x20, 0, 0x53053053) = 0
```

```
mprotect(0x7b82c2c80000, 16384, PROT_READ) = 0

mprotect(0x5b469a694000, 4096, PROT_READ) = 0

mprotect(0x7b82c2ce8000, 8192, PROT_READ) = 0

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

munmap(0x7b82c2c90000, 121423) = 0

rt_sigaction(SIGRT_1, {sa_handler=0x7b82c2b2e2b0,
sa_mask=[],sa_flags=SA_RESTORER|SA_ONSTACK|SA_RESTART|SA_SIGINFO,
sa_restorer=0x7b82c2ada1d0}, 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)
=0x7b82c2200000

mprotect(0x7b82c2201000, 8388608, PROT_READ|PROT_WRITE) = 0

getrandom("\xe1\xab\xcf\x06\xb4\x30\xff\x30", 8, GRND_NONBLOCK) = 8

brk(NULL) = 0x5b46adac8000

brk(0x5b46adae9000) = 0x5b46adae9000

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=0x7b82c2a00990,parent_tid=0x7b82c2a00990, exit_signal=0, stack=0x7b82c2200000,
stack_size=0x7fff80,tls=0x7b82c2a006c0}strace: Process 45191 attached

=> {parent_tid=[45191]}, 88) = 45191

[pid 45191] rseq(0x7b82c2a00fe0, 0x20, 0, 0x53053053 <unfinished ...>

[pid 45190] rt_sigprocmask(SIG_SETMASK, [], <unfinished ...>

[pid 45191] <... rseq resumed>) = 0

[pid 45190] <... rt_sigprocmask resumed>NULL, 8) = 0

[pid 45190] mmap(NULL, 8392704, PROT_NONE, MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK, -1,
0<unfinished ...>

[pid 45191] set_robust_list(0x7b82c2a009a0, 24 <unfinished ...>

[pid 45190] <... mmap resumed>) = 0x7b82c1800000

[pid 45191] <... set_robust_list resumed>) = 0

[pid 45190] mprotect(0x7b82c1801000, 8388608, PROT_READ|PROT_WRITE <unfinished ...>

[pid 45191] rt_sigprocmask(SIG_SETMASK, [], <unfinished ...>

[pid 45190] <... mprotect resumed>) = 0

[pid 45191] <... rt_sigprocmask resumed>NULL, 8) = 0

[pid 45190] rt_sigprocmask(SIG_BLOCK, ~[], [], 8) = 0

[pid
45190]clone3({flags=CLONE_VM|CLONE_FS|CLONE_FILES|CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|C
LONE_SETTLS|CLONE_PARENT_SETTID|CLONE_CHILD_CLEARTID,
child_tid=0x7b82c2000990,parent_tid=0x7b82c2000990, exit_signal=0, stack=0x7b82c1800000,
stack_size=0x7fff80,tls=0x7b82c20006c0}strace: Process 45192 attached

=> {parent_tid=[45192]}, 88) = 45192

[pid 45192] rseq(0x7b82c2000fe0, 0x20, 0, 0x53053053 <unfinished ...>

[pid 45190] rt_sigprocmask(SIG_SETMASK, [], <unfinished ...>
```

[pid 45192] <... rseq resumed>) = 0

[pid 45190] <... rt_sigprocmask resumed>NULL, 8) = 0

[pid 45192] set_robust_list(0x7b82c20009a0, 24 <unfinished ...>

[pid 45190] mmap(NULL, 8392704, PROT_NONE, MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK, -1, 0<unfinished ...>

[pid 45192] <... set_robust_list resumed>) = 0

[pid 45190] <... mmap resumed>) = 0x7b82c0e00000

[pid 45192] rt_sigprocmask(SIG_SETMASK, [], <unfinished ...>

[pid 45190] mprotect(0x7b82c0e01000, 8388608, PROT_READ|PROT_WRITE <unfinished ...>

[pid 45192] <... rt_sigprocmask resumed>NULL, 8) = 0

[pid 45190] <... mprotect resumed>) = 0

[pid 45190] rt_sigprocmask(SIG_BLOCK, ~[], [], 8) = 0

[pid 45190]clone3({flags=CLONE_VM|CLONE_FS|CLONE_FILES|CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|CLONE_PARENT_SETTID|CLONE_CHILD_CLEARTID, child_tid=0x7b82c1600990,parent_tid=0x7b82c1600990, exit_signal=0, stack=0x7b82c0e00000, stack_size=0x7fff80,tls=0x7b82c16006c0}strace: Process 45193 attached

=> {parent_tid=[45193]}, 88) = 45193

[pid 45193] rseq(0x7b82c1600fe0, 0x20, 0, 0x53053053 <unfinished ...>

[pid 45190] rt_sigprocmask(SIG_SETMASK, [], <unfinished ...>

[pid 45193] <... rseq resumed>) = 0

[pid 45190] <... rt_sigprocmask resumed>NULL, 8) = 0

[pid 45193] set_robust_list(0x7b82c16009a0, 24 <unfinished ...>

[pid 45190] mmap(NULL, 8392704, PROT_NONE, MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK, -1, 0<unfinished ...>

[pid 45193] <... set_robust_list resumed>) = 0

[pid 45190] <... mmap resumed>) = 0x7b82c0400000

[pid 45193] rt_sigprocmask(SIG_SETMASK, [], <unfinished ...>

[pid 45190] mprotect(0x7b82c0401000, 8388608, PROT_READ|PROT_WRITE <unfinished ...>

[pid 45193] <... rt_sigprocmask resumed>NULL, 8) = 0

[pid 45190] <... mprotect resumed>) = 0

[pid 45190] rt_sigprocmask(SIG_BLOCK, ~[], [], 8) = 0

[pid 45190]clone3({flags=CLONE_VM|CLONE_FS|CLONE_FILES|CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|CLONE_PARENT_SETTID|CLONE_CHILD_CLEARTID, child_tid=0x7b82c0c00990,parent_tid=0x7b82c0c00990, exit_signal=0, stack=0x7b82c0400000, stack_size=0x7fff80,tls=0x7b82c0c006c0}strace: Process 45194 attached

=> {parent_tid=[45194]}, 88) = 45194

[pid 45194] rseq(0x7b82c0c00fe0, 0x20, 0, 0x53053053 <unfinished ...>

[pid 45190] rt_sigprocmask(SIG_SETMASK, [], <unfinished ...>

[pid 45194] <... rseq resumed>) = 0

[pid 45190] <... rt_sigprocmask resumed>NULL, 8) = 0

```
[pid 45194] set_robust_list(0x7b82c0c009a0, 24 <unfinished ...>

[pid 45190] futex(0x7b82c2a00990, FUTEX_WAIT_BITSET|FUTEX_CLOCK_REALTIME, 45191,
NULL,FUTEX_BITSET_MATCH_ANY <unfinished ...>

[pid 45194] <... set_robust_list resumed>) = 0

[pid 45194] rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0

[pid 45192] openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3

[pid 45192] fstat(3, {st_mode=S_IFREG|0644, st_size=121423, ...}) = 0

[pid 45192] mmap(NULL, 121423, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7b82c2c90000

[pid 45192] close(3) = 0

[pid 45192] mmap(NULL, 134217728, PROT_NONE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0)
=0x7b82b8400000

[pid 45192] munmap(0x7b82b8400000, 62914560) = 0

[pid 45192] munmap(0x7b82c0000000, 4194304 <unfinished ...>

[pid 45191] futex(0x7b82c2ceaa08, FUTEX_WAIT_PRIVATE, 2, NULL <unfinished ...>

[pid 45192] <... munmap resumed>) = 0

[pid 45192] mprotect(0x7b82bc000000, 135168, PROT_READ|PROT_WRITE) = 0

[pid 45192] openat(AT_FDCWD, "/usr/lib/libgcc_s.so.1", O_RDONLY|O_CLOEXEC) = 3

[pid 45192] 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 45192] fstat(3, {st_mode=S_IFREG|0644, st_size=915712, ...}) = 0

[pid 45192] mmap(NULL, 184808, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0)
=0x7b82c2a6c000

[pid 45192] mmap(0x7b82c2a70000, 147456,
PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x4000) = 0x7b82c2a70000

[pid 45192] mmap(0x7b82c2a94000, 16384, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3, 0x28000) = 0x7b82c2a94000

[pid 45192] mmap(0x7b82c2a98000, 8192,
PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2b000) = 0x7b82c2a98000

[pid 45192] close(3) = 0

[pid 45192] mprotect(0x7b82c2a98000, 4096, PROT_READ) = 0

[pid 45192] munmap(0x7b82c2c90000, 121423) = 0

[pid 45192] futex(0x7b82c2ceaa08, FUTEX_WAKE_PRIVATE, 1) = 1

[pid 45191] <... futex resumed>) = 0

[pid 45192] futex(0x7b82c2a99070, FUTEX_WAKE_PRIVATE, 2147483647 <unfinished ...>

[pid 45191] futex(0x7b82c2ceaa08, FUTEX_WAKE_PRIVATE, 1 <unfinished ...>

[pid 45192] <... futex resumed>) = 0

[pid 45191] <... futex resumed>) = 0

[pid 45192] rt_sigprocmask(SIG_BLOCK, ~[RT_1], <unfinished ...>

[pid 45191] rt_sigprocmask(SIG_BLOCK, ~[RT_1], <unfinished ...>

[pid 45192] <... rt_sigprocmask resumed>NULL, 8) = 0

[pid 45191] <... rt_sigprocmask resumed>NULL, 8) = 0
```

```
[pid 45192] madvise(0x7b82c1800000, 8368128, MADV_DONTNEED <unfinished ...>

[pid 45191] madvise(0x7b82c2200000, 8368128, MADV_DONTNEED <unfinished ...>

[pid 45192] <... madvise resumed>) = 0

[pid 45191] <... madvise resumed>) = 0

[pid 45192] exit(0 <unfinished ...>

[pid 45191] exit(0 <unfinished ...>

[pid 45192] <... exit resumed>) = ?

[pid 45191] <... exit resumed>) = ?

[pid 45192] +++ exited with 0 +++

[pid 45190] <... futex resumed>) = 0

[pid 45191] +++ exited with 0 +++

[pid 45190] futex(0x7b82c1600990, FUTEX_WAIT_BITSET|FUTEX_CLOCK_REALTIME, 45193,
NULL,FUTEX_BITSET_MATCH_ANY <unfinished ...>

[pid 45194] rt_sigprocmask(SIG_BLOCK, ~[RT_1], NULL, 8) = 0

[pid 45194] madvise(0x7b82c0400000, 8368128, MADV_DONTNEED) = 0

[pid 45194] exit(0) = ?

[pid 45194] +++ exited with 0 +++

[pid 45193] rt_sigprocmask(SIG_BLOCK, ~[RT_1], NULL, 8) = 0

[pid 45193] madvise(0x7b82c0e00000, 8368128, MADV_DONTNEED) = 0

[pid 45193] exit(0) = ?

[pid 45193] +++ exited with 0 +++

<... futex resumed>) = 0

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

write(1, "Circle area with radius 5.00 is "..., 41Circle area with radius 5.00
is78.54487

) = 41

exit_group(0) = ?

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

Лабораторная работа №3

```
$ strace -f ./parent

execve("./parent", ["./parent"], 0x7fff222b3548 /* 50 vars */) = 0

brk(NULL) = 0x58cbfc040000

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

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

fstat(3, {st_mode=S_IFREG|0644, st_size=121891, ...}) = 0

mmap(NULL, 121891, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7e9538879000

close(3) = 0
```

```
openat(AT_FDCWD, "/usr/lib/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\340_\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
fstat(3, {st_mode=S_IFREG|0755, st_size=2014520, ...}) = 0
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7e9538877000
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, 2034616, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7e9538686000
mmap(0x7e95386aa000, 1511424, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x24000) = 0x7e95386aa000
mmap(0x7e953881b000, 319488, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x195000) = 0x7e953881b000
mmap(0x7e9538869000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x1e3000) = 0x7e9538869000
mmap(0x7e953886f000, 31672, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,
-1, 0) = 0x7e953886f000
close(3) = 0
mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7e9538683000
arch_prctl(ARCH_SET_FS, 0x7e9538683740) = 0
set_tid_address(0x7e9538683a10) = 30517
set_robust_list(0x7e9538683a20, 24) = 0
rseq(0x7e9538684060, 0x20, 0, 0x53053053) = 0
mprotect(0x7e9538869000, 16384, PROT_READ) = 0
mprotect(0x58cbf187c000, 4096, PROT_READ) = 0
mprotect(0x7e95388d1000, 8192, PROT_READ) = 0
prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 0
munmap(0x7e9538879000, 121891) = 0
openat(AT_FDCWD, "/dev/shm/shared_memory", O_RDWR|O_CREAT|O_NOFOLLOW|O_CLOEXEC, 0666) =
3
ftruncate(3, 256) = 0
mmap(NULL, 256, PROT_READ|PROT_WRITE, MAP_SHARED, 3, 0) = 0x7e9538896000
clone(child_stack=NULL, flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLDstrace:
Process 30518 attached
```

, child_tidptr=0x7e9538683a10) = 30518

[pid 30518] set_robust_list(0x7e9538683a20, 24 <unfinished ...>

[pid 30517] fstat(1, <unfinished ...>

[pid 30518] <... set_robust_list resumed>) = 0

[pid 30517] <... fstat resumed>{st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0), ...}) =
0

[pid 30517] getrandom("\x0b\x43\xf8\xda\x33\xbc\x71\x00", 8, GRND_NONBLOCK) = 8

[pid 30518] execve("./child", ["./child", "/shared_memory"], 0x7ffe560e3b68 /* 50 vars
*/ <unfinished ...>

[pid 30517] brk(NULL) = 0x58cbfc040000

[pid 30517] brk(0x58cbfc061000) = 0x58cbfc061000

[pid 30517] write(1, "Write a doc name\n", 17Write a doc name
) = 17

[pid 30517] fstat(0, {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0), ...}) = 0

[pid 30517] read(0, <unfinished ...>

[pid 30518] <... execve resumed>) = 0

[pid 30518] brk(NULL) = 0x5b3b8209b000

[pid 30518] access("/etc/ld.so.preload", R_OK) = -1 ENOENT (No such file or directory)

[pid 30518] openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3

[pid 30518] fstat(3, {st_mode=S_IFREG|0644, st_size=121891, ...}) = 0

[pid 30518] mmap(NULL, 121891, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7ef86a452000

[pid 30518] close(3) = 0

[pid 30518] openat(AT_FDCWD, "/usr/lib/libc.so.6", O_RDONLY|O_CLOEXEC) = 3

[pid 30518] read(3,
"\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\340_\2\0\0\0\0\0"..., 832) = 832

[pid 30518] 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 30518] fstat(3, {st_mode=S_IFREG|0755, st_size=2014520, ...}) = 0

[pid 30518] mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7ef86a450000

[pid 30518] 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 30518] mmap(NULL, 2034616, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x7ef86a25f000

[pid 30518] mmap(0x7ef86a283000, 1511424, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x24000) = 0x7ef86a283000

[pid 30518] mmap(0x7ef86a3f4000, 319488, PROT_READ,

MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x195000) = 0x7ef86a3f4000

[pid 30518] mmap(0x7ef86a442000, 24576, PROT_READ|PROT_WRITE,

MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1e3000) = 0x7ef86a442000

[pid 30518] mmap(0x7ef86a448000, 31672, PROT_READ|PROT_WRITE,

MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x7ef86a448000

[pid 30518] close(3) = 0

[pid 30518] mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =

0x7ef86a25c000

[pid 30518] arch_prctl(ARCH_SET_FS, 0x7ef86a25c740) = 0

[pid 30518] set_tid_address(0x7ef86a25ca10) = 30518

[pid 30518] set_robust_list(0x7ef86a25ca20, 24) = 0

[pid 30518] rseq(0x7ef86a25d060, 0x20, 0, 0x53053053) = 0

[pid 30518] mprotect(0x7ef86a442000, 16384, PROT_READ) = 0

[pid 30518] mprotect(0x5b3b715d7000, 4096, PROT_READ) = 0

[pid 30518] mprotect(0x7ef86a4aa000, 8192, PROT_READ) = 0

[pid 30518] prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024,

rlim_max=RLIM64_INFINITY}) = 0

[pid 30518] munmap(0x7ef86a452000, 121891) = 0

[pid 30518] openat(AT_FDCWD, "/dev/shm/shared_memory", O_RDWR|O_NOFOLLOW|O_CLOEXEC) = 3

[pid 30518] mmap(NULL, 256, PROT_READ|PROT_WRITE, MAP_SHARED, 3, 0) = 0x7ef86a46f000

[pid 30518] clock_nanosleep(CLOCK_REALTIME, 0, {tv_sec=1, tv_nsec=0},

test.0x7ffe5af1fe60) = 0

[pid 30518] clock_nanosleep(CLOCK_REALTIME, 0, {tv_sec=1, tv_nsec=0}, txt

<unfinished ...>

[pid 30517] <... read resumed>"test.txt\n", 1024) = 9

[pid 30517] write(1, "Enter a message (exit for exit)\n", 32Enter a message (exit for

exit)

) = 32

[pid 30517] read(0, <unfinished ...>

[pid 30518] <... clock_nanosleep resumed>0x7ffe5af1fe60) = 0

[pid 30518] getrandom("\xc5\x10\x72\x31\x59\xd1\x69\x43", 8, GRND_NONBLOCK) = 8

[pid 30518] brk(NULL) = 0x5b3b8209b000

[pid 30518] brk(0x5b3b820bc000) = 0x5b3b820bc000

[pid 30518] openat(AT_FDCWD, "test.txt", O_WRONLY|O_CREAT|O_TRUNC, 0666) = 4

[pid 30518] clock_nanosleep(CLOCK_REALTIME, 0, {tv_sec=1, tv_nsec=0}, 0x7ffe5af1fe60) =

0

[pid 30518] clock_nanosleep(CLOCK_REALTIME, 0, {tv_sec=1, tv_nsec=0}, 0x7ffe5af1fe60) =

```
0
[pid 30518] clock_nanosleep(CLOCK_REALTIME, 0, {tv_sec=1, tv_nsec=0},
hel0x7ffe5af1fe60) = 0
[pid 30518] clock_nanosleep(CLOCK_REALTIME, 0, {tv_sec=1, tv_nsec=0},
low0x7ffe5af1fe60) = 0
[pid 30518] clock_nanosleep(CLOCK_REALTIME, 0, {tv_sec=1, tv_nsec=0}, ;
<unfinished ...>
[pid 30517] <... read resumed>"hellow;\n", 1024) = 8
[pid 30517] clock_nanosleep(CLOCK_REALTIME, 0, {tv_sec=0, tv_nsec=100000000}, NULL) = 0
[pid 30517] write(1, "Status: Not over in ';' or '.'\n", 31Status: Not over in ';' or
'.'
) = 31
[pid 30517] write(1, "Enter a message (exit for exit)\n", 32Enter a message (exit for
exit)
) = 32
[pid 30517] read(0, <unfinished ...>
[pid 30518] <... clock_nanosleep resumed>0x7ffe5af1fe60) = 0
[pid 30518] fstat(4, {st_mode=S_IFREG|0644, st_size=0, ...}) = 0
[pid 30518] clock_nanosleep(CLOCK_REALTIME, 0, {tv_sec=1, tv_nsec=0}, 0x7ffe5af1fe60) =
0
[pid 30518] clock_nanosleep(CLOCK_REALTIME, 0, {tv_sec=1, tv_nsec=0}, 0x7ffe5af1fe60) =
0
[pid 30518] clock_nanosleep(CLOCK_REALTIME, 0, {tv_sec=1, tv_nsec=0}, yo0x7ffe5af1fe60)
= 0
[pid 30518] clock_nanosleep(CLOCK_REALTIME, 0, {tv_sec=1, tv_nsec=0}, oo
<unfinished ...>
[pid 30517] <... read resumed>"yooo\n", 1024) = 5
[pid 30517] clock_nanosleep(CLOCK_REALTIME, 0, {tv_sec=0, tv_nsec=100000000}, NULL) = 0
[pid 30517] write(1, "Status: Success\n", 16Status: Success
) = 16
[pid 30517] write(1, "Enter a message (exit for exit)\n", 32Enter a message (exit for
exit)
) = 32
[pid 30517] read(0, <unfinished ...>
[pid 30518] <... clock_nanosleep resumed>0x7ffe5af1fe60) = 0
[pid 30518] clock_nanosleep(CLOCK_REALTIME, 0, {tv_sec=1, tv_nsec=0}, l0x7ffe5af1fe60)
= 0
```

```
[pid 30518] clock_nanosleep(CLOCK_REALTIME, 0, {tv_sec=1, tv_nsec=0},0x7ffe5af1fe60) =
0
[pid 30518] clock_nanosleep(CLOCK_REALTIME, 0, {tv_sec=1, tv_nsec=0}, 0x7ffe5af1fe60) =
0
[pid 30518] clock_nanosleep(CLOCK_REALTIME, 0, {tv_sec=1, tv_nsec=0}, n0x7ffe5af1fe60)
= 0
[pid 30518] clock_nanosleep(CLOCK_REALTIME, 0, {tv_sec=1, tv_nsec=0},
aaaa;0x7ffe5af1fe60) = 0
[pid 30518] clock_nanosleep(CLOCK_REALTIME, 0, {tv_sec=1, tv_nsec=0},
<unfinished ...>
[pid 30517] <... read resumed>"naaaa;\n", 1024) = 7
[pid 30517] clock_nanosleep(CLOCK_REALTIME, 0, {tv_sec=0, tv_nsec=100000000}, NULL) = 0
[pid 30517] write(1, "Status: Not over in ';' or '.'\n", 31Status: Not over in ';' or
'.'
) = 31
[pid 30517] write(1, "Enter a message (exit for exit)\n", 32Enter a message (exit for
exit)
) = 32
[pid 30517] read(0, e <unfinished ...>
[pid 30518] <... clock_nanosleep resumed>0x7ffe5af1fe60) = 0
[pid 30518] clock_nanosleep(CLOCK_REALTIME, 0, {tv_sec=1, tv_nsec=0},
xit0x7ffe5af1fe60) = 0
[pid 30518] clock_nanosleep(CLOCK_REALTIME, 0, {tv_sec=1, tv_nsec=0},
<unfinished ...>
[pid 30517] <... read resumed>"exit\n", 1024) = 5
[pid 30517] wait4(30518, <unfinished ...>
[pid 30518] <... clock_nanosleep resumed>0x7ffe5af1fe60) = 0
[pid 30518] write(4, "hellow;\nhellow;\nhellow;\nhellow;\n"..., 46) = 46
[pid 30518] close(4) = 0
[pid 30518] exit_group(0) = ?
[pid 30518] +++ exited with 0 +++
<... wait4 resumed>NULL, 0, NULL) = 30518
--- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=30518, si_uid=1000,
si_status=0, si_utime=0, si_stime=0} ---
unlink("/dev/shm/shared_memory") = 0
exit_group(0) = ?
+++ exited with 0 +++
```

Лабораторная работа №4

```
$ strace ./prog1
execve("./prog1", ["./prog1"], 0x7ffcf53e8d60 /* 51 vars */) = 0
brk(NULL) = 0x60bc51ad6000
access("/etc/ld.so.preload", R_OK) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "./glibc-hwcaps/x86-64-v3/libprogv1.so", O_RDONLY|O_CLOEXEC) = -1
ENOENT (No such file or directory)
openat(AT_FDCWD, "./glibc-hwcaps/x86-64-v2/libprogv1.so", O_RDONLY|O_CLOEXEC) = -1
ENOENT (No such file or directory)
openat(AT_FDCWD, "./libprogv1.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
fstat(3, {st_mode=S_IFREG|0755, st_size=15040, ...}) = 0
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x78495b133000
getcwd("/home/abs/projects/os_labs/lab4/src", 128) = 36
mmap(NULL, 16416, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x78495b12e000
mmap(0x78495b12f000, 4096, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x1000) = 0x78495b12f000
mmap(0x78495b130000, 4096, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) =
0x78495b130000
mmap(0x78495b131000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x2000) = 0x78495b131000
close(3) = 0
openat(AT_FDCWD, "./glibc-hwcaps/x86-64-v3/libc.so.6", O_RDONLY|O_CLOEXEC) = -1 ENOENT
(No such file or directory)
openat(AT_FDCWD, "./glibc-hwcaps/x86-64-v2/libc.so.6", O_RDONLY|O_CLOEXEC) = -1 ENOENT
(No such file or directory)
openat(AT_FDCWD, "./libc.so.6", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or
directory)
openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3
fstat(3, {st_mode=S_IFREG|0644, st_size=121891, ...}) = 0
mmap(NULL, 121891, PROT_READ, MAP_PRIVATE, 3, 0) = 0x78495b110000
close(3) = 0
openat(AT_FDCWD, "/usr/lib/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\340_\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
fstat(3, {st_mode=S_IFREG|0755, st_size=2014520, ...}) = 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, 2034616, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x78495af1f000
mmap(0x78495af43000, 1511424, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x24000) = 0x78495af43000
mmap(0x78495b0b4000, 319488, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x195000) = 0x78495b0b4000
mmap(0x78495b102000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x1e3000) = 0x78495b102000
mmap(0x78495b108000, 31672, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,
-1, 0) = 0x78495b108000
close(3) = 0
mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x78495af1c000
arch_prctl(ARCH_SET_FS, 0x78495af1c740) = 0
set_tid_address(0x78495af1ca10) = 16594
set_robust_list(0x78495af1ca20, 24) = 0
rseq(0x78495af1d060, 0x20, 0, 0x53053053) = 0
mprotect(0x78495b102000, 16384, PROT_READ) = 0
mprotect(0x78495b131000, 4096, PROT_READ) = 0
mprotect(0x60bc23133000, 4096, PROT_READ) = 0
mprotect(0x78495b16f000, 8192, PROT_READ) = 0
prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 0
munmap(0x78495b110000, 121891) = 0
fstat(1, {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0), ...}) = 0
getrandom("\xcc\xa0\x17\x79\x0e\x5d\x4f\x6d", 8, GRND_NONBLOCK) = 8
brk(NULL) = 0x60bc51ad6000
brk(0x60bc51af7000) = 0x60bc51af7000
write(1, "1 - GCF\n", 81 - GCF
) = 8
write(1, "2 - Translate number\n", 212 - Translate number
) = 21
write(1, "3 - exit\n", 93 - exit
) = 9
```

```
fstat(0, {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0), ...}) = 0
read(0, 2
"2\n", 1024) = 2
write(1, "\320\222\320\262\320\265\320\264\320\270\321\202\320\265
\321\207\320\270\321\201\320\273\320\276\n", 26Введите число
) = 26
read(0, 10
"10\n", 1024) = 3
write(1, "1010\n", 51010
) = 5
write(1, "1 - GCF\n2 - Translate number\n", 291 - GCF
2 - Translate number
) = 29
write(1, "3 - exit\n", 93 - exit
) = 9
read(0, 15
"15\n", 1024) = 3
write(1, "1 - GCF\n2 - Translate number\n", 291 - GCF
2 - Translate number
) = 29
write(1, "3 - exit\n", 93 - exit
) = 9
read(0, 3
"3\n", 1024) = 2
lseek(0, -1, SEEK_CUR) = -1 ESPIPE (Illegal seek)
exit_group(0) = ?
+++ exited with 0 +++
strace prog2:
$ strace ./prog2
execve("./prog2", ["./prog2"], 0x7ffeb47c0b58 /* 51 vars */) = 0
brk(NULL) = 0x5a829db04000
access("/etc/ld.so.preload", R_OK) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "./glibc-hwcaps/x86-64-v3/libc.so.6", O_RDONLY|O_CLOEXEC) = -1 ENOENT
(No such file or directory)
openat(AT_FDCWD, "./glibc-hwcaps/x86-64-v2/libc.so.6", O_RDONLY|O_CLOEXEC) = -1 ENOENT
(No such file or directory)
openat(AT_FDCWD, "./libc.so.6", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or
```

```
directory)
openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3
fstat(3, {st_mode=S_IFREG|0644, st_size=121891, ...}) = 0
mmap(NULL, 121891, PROT_READ, MAP_PRIVATE, 3, 0) = 0x77624070e000
close(3) = 0
openat(AT_FDCWD, "/usr/lib/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\340_\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
fstat(3, {st_mode=S_IFREG|0755, st_size=2014520, ...}) = 0
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x77624070c000
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, 2034616, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x77624051b000
mmap(0x77624053f000, 1511424, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x24000) = 0x77624053f000
mmap(0x7762406b0000, 319488, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x195000) = 0x7762406b0000
mmap(0x7762406fe000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x1e3000) = 0x7762406fe000
mmap(0x776240704000, 31672, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,
-1, 0) = 0x776240704000
close(3) = 0
mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x776240518000
arch_prctl(ARCH_SET_FS, 0x776240518740) = 0
set_tid_address(0x776240518a10) = 16729
set_robust_list(0x776240518a20, 24) = 0
rseq(0x776240519060, 0x20, 0, 0x53053053) = 0
mprotect(0x7762406fe000, 16384, PROT_READ) = 0
mprotect(0x5a829a6d9000, 4096, PROT_READ) = 0
mprotect(0x776240766000, 8192, PROT_READ) = 0
prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 0
munmap(0x77624070e000, 121891) = 0
getrandom("\x3d\x53\xd9\xa9\x9b\x86\x8e\x8c", 8, GRND_NONBLOCK) = 8
```

```
brk(NULL) = 0x5a829db04000
brk(0x5a829db25000) = 0x5a829db25000
openat(AT_FDCWD, "./libprogv1.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"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0755, st_size=15040, ...}) = 0
getcwd("/home/abs/projects/os_labs/lab4/src", 128) = 36
mmap(NULL, 16416, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x776240727000
mmap(0x776240728000, 4096, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x1000) = 0x776240728000
mmap(0x776240729000, 4096, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) =
0x776240729000
mmap(0x77624072a000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x2000) = 0x77624072a000
close(3) = 0
mprotect(0x77624072a000, 4096, PROT_READ) = 0
fstat(1, {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0), ...}) = 0
write(1, "\320\242\320\265\320\272\321\203\321\211\320\260\321\217
\321\200\320\265\320\260\320\273\320\270\320\267\320\260\321\206\320"..., 40Текущая
реализация: 1v
) = 40
write(1, "0 -
\320\237\320\265\321\200\320\265\320\272\320\273\321\216\321\207\320\270\321\202\321\21
\321\200\320\265\320"..., 480 - Переключить реализацию
) = 48
write(1, "1 - GCF\n", 81 - GCF
) = 8
write(1, "2 - Translate number\n", 212 - Translate number
) = 21
write(1, "3 - Exit\n", 93 - Exit
) = 9
fstat(0, {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0), ...}) = 0
read(0, 0
"0\n", 1024) = 2
openat(AT_FDCWD, "./libprogv2.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"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0755, st_size=15040, ...}) = 0
getcwd("/home/abs/projects/os_labs/lab4/src", 128) = 36
```

4

```
mmap(NULL, 16416, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x776240722000
mmap(0x776240723000, 4096, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x1000) = 0x776240723000
mmap(0x776240724000, 4096, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) =
0x776240724000
mmap(0x776240725000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x2000) = 0x776240725000
close(3) = 0
mprotect(0x776240725000, 4096, PROT_READ) = 0
write(1, "\320\242\320\265\320\272\321\203\321\211\320\260\321\217
\321\200\320\265\320\260\320\273\320\270\320\267\320\260\321\206\320"..., 126Текущая
реализация: 2v
0 - Переключить реализацию
1 - GCF
2 - Translate number
3 - Exit
) = 126
read(0, 3
"3\n", 1024) = 2
lseek(0, -1, SEEK_CUR) = -1 ESPIPE (Illegal seek)
exit_group(0) = ?
+++ exited with 0 +++
```

Лабораторная работа №5-7

```
$ $ strace ./client
14163 eventfd2(0, EFD_CLOEXEC)          = 3

14163 fcntl(3, F_GETFL)                 = 0x2 (flags O_RDWR)
14163 fcntl(3, F_SETFL, O_RDWR|O_NONBLOCK) = 0
    # ZeroMQ использует eventfd для асинхронного оповещения о событиях между потоками.
14163 socket(AF_INET, SOCK_STREAM|SOCK_CLOEXEC, IPPROTO_TCP) = 10
14163 setsockopt(10, SOL_SOCKET, SO_REUSEADDR, [1], 4) = 0
14163 bind(10, {sa_family=AF_INET, sin_port=htons(59001),
sin_addr=inet_addr("127.0.0.1")}, 16) = 0
14163 listen(10, 100)                   = 0
    #Здесь программа создает TCP-сокет и привязывает его к порту 59001 на локальном
интерфейсе.    14163
```

```
clone3({flags=CLONE_VM|CLONE_FS|CLONE_FILES|CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|CLONE_S
ETTLS|CLONE_PARENT_SETTID|CLONE_CHILD_CLEARTID, ...
14164 prctl(PR_SET_NAME, "ZMQbg/Reaper")  = 0
...
14165 prctl(PR_SET_NAME, "ZMQbg/IO/0")  = 0
# потоки для обработки сообщений (Reaper для управления ресурсами и IO для операций
ввода-вывода).
14163 clone(child_stack=NULL, flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD,
...
14185 execve("./worker", ["worker", "1", "59001"], 0x7ffcb02eb0c8 /* 51 vars */)
```

Вывод

Были приобретены практические навыки для диагностики работы программного обеспечения.