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Институт №8 “Компьютерные науки и прикладная математика”
Кафедра №806 “Вычислительная математика и программирование”

Лабораторная работа №8 по курсу
«Операционные системы»

Группа: М8О-215Б-23

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Оценка: _____

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Постановка задачи

Вариант -

Цель работы: Приобретение практических навыков диагностики работы программного обеспечения.

Задание: при выполнении лабораторных работ по курсу ОС необходимо продемонстрировать ключевые системные вызовы, которые в них используются и то, что их использование соответствует варианту ЛР. По итогам выполнения всех лабораторных работ отчет по данной ЛР должен содержать краткую сводку по исследованию написанных программ.

Общий метод и алгоритм решения

Для демонстрации системных вызовов будем использовать утилиту `strace` в операционной системе `linux`.

`Strace` — это диагностическая, отладочная и обучающая утилита пользовательского пространства для `Linux`. Она используется для мониторинга и вмешательства во взаимодействия между процессами и ядром `Linux`, включая системные вызовы, доставку сигналов и изменение состояния процесса. Работа `strace` возможна благодаря функции ядра, известной как `ptrace`. Наиболее часто он используется для запуска программы и вывода списка системных вызовов, которые она выполняет. Это особенно полезно, когда программа часто аварийно завершает работу или ведет себя непредсказуемо; например, `strace` может показать, что программа пытается получить доступ к несуществующему или недоступному файлу.

Еще одно полезное применение `strace` — это использование флага `-p` для присоединения к уже запущенному процессу. Это может быть полезно, если процесс перестал отвечать, и `strace` может помочь определить, что процесс заблокирован при попытке установить сетевое соединение.

Кроме того, `strace` предоставляет множество других возможностей:

- **Фильтрация системных вызовов:** Вы можете указать, какие системные вызовы следует отслеживать, используя параметр `-e trace=`. Это можно сделать по имени (например, `clone`, `fork`, `vfork`), с использованием предопределенных групп (например, `%ipc` или `%file`) или с помощью регулярных выражений (начиная с версии `strace 4.17`, например, `-e trace=/clock_.*`).
- **Трассировка путей:** Вы можете указать список путей для трассировки, используя параметр `-P` (например, `-P /etc/ld.so.cache`).
- **Выгрузка ввода-вывода:** Вы можете указать список файловых дескрипторов для выгрузки ввода-вывода, используя параметры `-e read=` и `-e write=`.
- **Подсчет времени выполнения:** `Strace` позволяет подсчитывать время выполнения системных вызовов и их количество, используя параметры `-T`, `-c`, `-C` и `-w`. Параметр `-U` позволяет выводить дополнительную информацию, такую как минимальное и максимальное время выполнения системного вызова.
- **Временные метки:** `Strace` может печатать относительные или абсолютные временные метки, используя опции `-t` и `-r`.
- **Изменение системных вызовов:** `Strace` позволяет изменять выполняемые системные вызовы, включая изменение возвращаемого значения и кода ошибки, внедрение сигналов, задержек и изменение данных, на которые указывают аргументы системных вызовов. Это достигается с помощью опции `-e inject=syscall specification:tampering specification:retval=:error=:signal=:delay_enter=:delay_exit=:poke_enter=:poke_exit=`.
- **Информация о дескрипторах файлов:** `Strace` может извлекать информацию о дескрипторах файлов, включая сокеты, используя опцию `-u`. Опция `-uu` предоставляет дополнительную информацию, такую как адреса конечных точек для сокетов, пути и основные/дополнительные номера устройств для файлов.
- **Трассировка стека:** `Strace` может печатать трассировки стека, включая разборку символов (начиная с версии `strace 4.21`, используя опцию `-k`).

`Strace` также поддерживает множество других опций и параметров, которые делают его мощным инструментом

Лабораторная работа №1

Strace:

```
strace -f ./parent
execve("./parent", ["/parent"], 0x7fffc9da9a68 /* 21 vars */) = 0
brk(NULL) = 0x794000
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7f950c739000
access("/etc/ld.so.preload", R_OK) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3
newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=25258, ...}, AT_EMPTY_PATH) = 0
mmap(NULL, 25258, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7f950c732000
close(3) = 0
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libc.so.6", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\211\1\3\0\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\20t\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
newfstatat(3, "", {st_mode=S_IFREG|0755, st_size=1922136, ...}, AT_EMPTY_PATH) = 0
pread64(3, "\6\0\0\0\4\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0"..., 784, 64) = 784
mmap(NULL, 1970000, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f950c551000
mmap(0x7f950c577000, 1396736, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x26000) = 0x7f950c577000
mmap(0x7f950c6cc000, 339968, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x17b000) = 0x7f950c6cc000
mmap(0x7f950c71f000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1ce000) = 0x7f950c71f000
mmap(0x7f950c725000, 53072, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x7f950c725000
close(3) = 0
mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7f950c54e000
arch_prctl(ARCH_SET_FS, 0x7f950c54e740) = 0
set_tid_address(0x7f950c54ea10) = 1763
set_robust_list(0x7f950c54ea20, 24) = 0
rseq(0x7f950c54f060, 0x20, 0, 0x53053053) = 0
mprotect(0x7f950c71f000, 16384, PROT_READ) = 0
mprotect(0x403000, 4096, PROT_READ) = 0
mprotect(0x7f950c76b000, 8192, PROT_READ) = 0
prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 0
munmap(0x7f950c732000, 25258) = 0
pipe2([3, 4], 0) = 0
pipe2([5, 6], 0) = 0
clone(child_stack=NULL, flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLDstrace: Process 1764 attached
, child_tidptr=0x7f950c54ea10) = 1764
[pid 1764] set_robust_list(0x7f950c54ea20, 24 <unfinished ...>
[pid 1763] clone(child_stack=NULL, flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD <unfinished ...>
[pid 1764] <... set_robust_list resumed>) = 0
[pid 1764] close(4strace: Process 1765 attached
) = 0
[pid 1763] <... clone resumed>, child_tidptr=0x7f950c54ea10) = 1765
[pid 1765] set_robust_list(0x7f950c54ea20, 24 <unfinished ...>
[pid 1764] close(5 <unfinished ...>
[pid 1765] <... set_robust_list resumed>) = 0
[pid 1763] close(3 <unfinished ...>
[pid 1764] <... close resumed>) = 0
[pid 1763] <... close resumed>) = 0
[pid 1765] close(3 <unfinished ...>
[pid 1763] close(5 <unfinished ...>
[pid 1764] dup2(3, 0 <unfinished ...>
[pid 1763] <... close resumed>) = 0
[pid 1765] <... close resumed>) = 0
[pid 1763] close(6 <unfinished ...>
[pid 1764] <... dup2 resumed>) = 0
[pid 1763] <... close resumed>) = 0
[pid 1765] close(4 <unfinished ...>
```

```

[pid 1764] dup2(6, 1 <unfinished ...>
[pid 1763] newfstatat(1, "", <unfinished ...>
[pid 1765] <... close resumed>      = 0
[pid 1763] <... newfstatat resumed>{st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0x1), ...}, AT_EMPTY_PATH) = 0
[pid 1764] <... dup2 resumed>      = 1
[pid 1765] close(6 <unfinished ...>
[pid 1763] getrandom( <unfinished ...>
[pid 1764] close(3 <unfinished ...>
[pid 1763] <... getrandom resumed>"xf7\xb1\xdb\x02\xc9\xbb\x0d\xc3", 8, GRND_NONBLOCK) = 8
[pid 1765] <... close resumed>      = 0
[pid 1763] brk(NULL <unfinished ...>
[pid 1764] <... close resumed>      = 0
[pid 1763] <... brk resumed>       = 0x794000
[pid 1765] dup2(5, 0 <unfinished ...>
[pid 1763] brk(0x7b5000 <unfinished ...>
[pid 1764] close(6 <unfinished ...>
[pid 1763] <... brk resumed>       = 0x7b5000
[pid 1765] <... dup2 resumed>      = 0
[pid 1763] write(1, "\320\222\320\262\320\265\320\264\320\270\321\202\320\265
\321\201\321\202\321\200\320\276\320\272\320\270 (Ctr"..., 66 <unfinished ...>
[pid 1764] <... close resumed>      = 0
Введите строки (Ctrl+D для завершения):
[pid 1765] close(5 <unfinished ...>
[pid 1763] <... write resumed>      = 66
[pid 1764] execve("./child1", ["child1"], 0x7ffe64516438 /* 21 vars */ <unfinished ...>
[pid 1763] newfstatat(0, "", <unfinished ...>
[pid 1765] <... close resumed>      = 0
[pid 1763] <... newfstatat resumed>{st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0x1), ...}, AT_EMPTY_PATH) = 0
[pid 1765] execve("./child2", ["child2"], 0x7ffe64516438 /* 21 vars */ <unfinished ...>
[pid 1763] read(0, <unfinished ...>
[pid 1765] <... execve resumed>     = 0
[pid 1764] <... execve resumed>     = 0
[pid 1765] brk(NULL <unfinished ...>
[pid 1764] brk(NULL <unfinished ...>
[pid 1765] <... brk resumed>       = 0x1bdc000
[pid 1764] <... brk resumed>       = 0x14c8000
[pid 1765] mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0 <unfinished ...>
[pid 1764] mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0 <unfinished ...>
[pid 1765] <... mmap resumed>      = 0x7f515d657000
[pid 1764] <... mmap resumed>      = 0x7fbc566bb000
[pid 1765] access("/etc/ld.so.preload", R_OK <unfinished ...>
[pid 1764] access("/etc/ld.so.preload", R_OK <unfinished ...>
[pid 1765] <... access resumed>     = -1 ENOENT (No such file or directory)
[pid 1764] <... access resumed>     = -1 ENOENT (No such file or directory)
[pid 1765] openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC <unfinished ...>
[pid 1764] openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC <unfinished ...>
[pid 1765] <... openat resumed>     = 3
[pid 1764] <... openat resumed>     = 3
[pid 1765] newfstatat(3, "", <unfinished ...>
[pid 1764] newfstatat(3, "", <unfinished ...>
[pid 1765] <... newfstatat resumed>{st_mode=S_IFREG|0644, st_size=25258, ...}, AT_EMPTY_PATH) = 0
[pid 1764] <... newfstatat resumed>{st_mode=S_IFREG|0644, st_size=25258, ...}, AT_EMPTY_PATH) = 0
[pid 1765] mmap(NULL, 25258, PROT_READ, MAP_PRIVATE, 3, 0 <unfinished ...>
[pid 1764] mmap(NULL, 25258, PROT_READ, MAP_PRIVATE, 3, 0 <unfinished ...>
[pid 1765] <... mmap resumed>      = 0x7f515d650000
[pid 1764] <... mmap resumed>      = 0x7fbc566b4000
[pid 1765] close(3 <unfinished ...>
[pid 1764] close(3 <unfinished ...>
[pid 1765] <... close resumed>     = 0
[pid 1764] <... close resumed>     = 0
[pid 1765] openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libc.so.6", O_RDONLY|O_CLOEXEC <unfinished ...>
[pid 1764] openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libc.so.6", O_RDONLY|O_CLOEXEC <unfinished ...>

```

[illegible]

```

[pid 1764] <... set_tid_address resumed> = 1764
[pid 1765] rseq(0x7f515d46d060, 0x20, 0, 0x53053053 <unfinished ...>
[pid 1764] set_robust_list(0x7fbc564d0a20, 24 <unfinished ...>
[pid 1765] <... rseq resumed> = 0
[pid 1764] <... set_robust_list resumed> = 0
[pid 1764] rseq(0x7fbc564d1060, 0x20, 0, 0x53053053 <unfinished ...>
[pid 1765] mprotect(0x7f515d63d000, 16384, PROT_READ <unfinished ...>
[pid 1764] <... rseq resumed> = 0
[pid 1765] <... mprotect resumed> = 0
[pid 1765] mprotect(0x403000, 4096, PROT_READ <unfinished ...>
[pid 1764] mprotect(0x7fbc566a1000, 16384, PROT_READ <unfinished ...>
[pid 1765] <... mprotect resumed> = 0
[pid 1764] <... mprotect resumed> = 0
[pid 1765] mprotect(0x7f515d689000, 8192, PROT_READ <unfinished ...>
[pid 1764] mprotect(0x403000, 4096, PROT_READ <unfinished ...>
[pid 1765] <... mprotect resumed> = 0
[pid 1764] <... mprotect resumed> = 0
[pid 1765] prlimit64(0, RLIMIT_STACK, NULL, <unfinished ...>
[pid 1764] mprotect(0x7fbc566ed000, 8192, PROT_READ <unfinished ...>
[pid 1765] <... prlimit64 resumed>{rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 0
[pid 1764] <... mprotect resumed> = 0
[pid 1765] munmap(0x7f515d650000, 25258) = 0
[pid 1764] prlimit64(0, RLIMIT_STACK, NULL, <unfinished ...>
[pid 1765] newfstatat(0, "", <unfinished ...>
[pid 1764] <... prlimit64 resumed>{rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 0
[pid 1765] <... newfstatat resumed>{st_mode=S_IFIFO|0600, st_size=0, ...}, AT_EMPTY_PATH) = 0
[pid 1765] getrandom(<unfinished ...>
[pid 1764] munmap(0x7fbc566b4000, 25258 <unfinished ...>
[pid 1765] <... getrandom resumed>"\x5c\xbf\xaf\x8a\xed\x83\x71\xcb", 8, GRND_NONBLOCK) = 8
[pid 1764] <... munmap resumed> = 0
[pid 1765] brk(NULL) = 0x1bdc000
[pid 1764] newfstatat(0, "", <unfinished ...>
[pid 1765] brk(0x1bfd000 <unfinished ...>
[pid 1764] <... newfstatat resumed>{st_mode=S_IFIFO|0600, st_size=0, ...}, AT_EMPTY_PATH) = 0
[pid 1765] <... brk resumed> = 0x1bfd000
[pid 1764] getrandom(<unfinished ...>
[pid 1765] read(0, <unfinished ...>
[pid 1764] <... getrandom resumed>"\x93\x37\xcc\x65\x88\xf1\xc2\x41", 8, GRND_NONBLOCK) = 8
[pid 1764] brk(NULL) = 0x14c8000
[pid 1764] brk(0x14e9000) = 0x14e9000
[pid 1764] read(0, Sun of the sleepless! Melancholy star!
Whose tearful beam glows tremulously far,
That show'st the darkness thou canst not dispel,
How like art thou to joy remember'd well! <unfinished ...>
[pid 1763] <... read resumed>"Sun of the sleepless! Melanc"..., 1024) = 44
[pid 1763] write(4, "Sun of the sleepless! Melanc"..., 44) = 44
[pid 1764] <... read resumed>"Sun of the sleepless! Melanc"..., 4096) = 44
[pid 1763] read(0, <unfinished ...>
[pid 1764] newfstatat(1, "", <unfinished ...>
[pid 1763] <... read resumed>"Whose tearful beam glows tre"..., 1024) = 47
[pid 1764] <... newfstatat resumed>{st_mode=S_IFIFO|0600, st_size=0, ...}, AT_EMPTY_PATH) = 0
[pid 1763] write(4, "Whose tearful beam glows tre"..., 47 <unfinished ...>
[pid 1764] read(0, <unfinished ...>
[pid 1763] <... write resumed> = 47
[pid 1764] <... read resumed>"Whose tearful beam glows tre"..., 4096) = 47
[pid 1763] read(0, <unfinished ...>
[pid 1764] read(0, <unfinished ...>
[pid 1763] <... read resumed>"That show\342\200\231st the darkness "..., 1024) = 58
[pid 1763] write(4, "That show\342\200\231st the darkness "..., 58) = 58
[pid 1764] <... read resumed>"That show\342\200\231st the darkness "..., 4096) = 58
[pid 1763] read(0, <unfinished ...>
[pid 1764] read(0,

```

```

<unfinished ...>
[pid 1763] <... read resumed>"How like art thou to joy r"..., 1024) = 51
[pid 1763] write(4, "How like art thou to joy r"..., 51) = 51
[pid 1764] <... read resumed>"How like art thou to joy r"..., 4096) = 51
[pid 1763] read(0, <unfinished ...>
[pid 1764] read(0, <unfinished ...>
[pid 1763] <... read resumed>"", 1024) = 0
[pid 1763] close(4) = 0
[pid 1764] <... read resumed>"", 4096) = 0
[pid 1763] wait4(-1, <unfinished ...>
[pid 1764] write(1, "SUN OF THE SLEEPLESS! MELANC"..., 200) = 200
[pid 1765] <... read resumed>"SUN OF THE SLEEPLESS! MELANC"..., 4096) = 200
[pid 1764] exit_group(0) = ?
[pid 1765] newfstatat(1, "", {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0x1), ...}, AT_EMPTY_PATH) = 0
[pid 1765] write(1, "SUN OF THE SLEEPLESS! MELANCHOLY"..., 39 <unfinished ...>
[pid 1764] +++ exited with 0 +++
SUN OF THE SLEEPLESS! MELANCHOLY STAR!
[pid 1763] <... wait4 resumed>NULL, 0, NULL) = 1764
[pid 1765] <... write resumed> = 39
[pid 1763] --- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=1764, si_uid=0, si_status=0, si_utime=0, si_stime=0}
---
[pid 1765] write(1, "WHOSE TEARFUL BEAM GLOWS TREMULO"..., 42WHOSE TEARFUL BEAM GLOWS TREMULOUSLY
FAR,
<unfinished ...>
[pid 1763] wait4(-1, <unfinished ...>
[pid 1765] <... write resumed> = 42
[pid 1765] write(1, "THAT SHOW\342\200\231ST THE DARKNESS THOU"..., 51THAT SHOW'ST THE DARKNESS THOU
CANST NOT DISPEL,
) = 51
[pid 1765] write(1, "HOW LIKE ART THOU TO JOY REMEMBE"..., 44HOW LIKE ART THOU TO JOY REMEMBER'D WELL!
) = 44
[pid 1765] read(0, "", 4096) = 0
[pid 1765] exit_group(0) = ?
[pid 1765] +++ exited with 0 +++
<... wait4 resumed>NULL, 0, NULL) = 1765
--- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=1765, si_uid=0, si_status=0, si_utime=0, si_stime=0} ---
write(1, "\320\222\321\201\320\265 \320\277\321\200\320\276\321\206\320\265\321\201\321\201\321\213
\320\267\320\260\320\262\320\265"..., 44Все процессы завершены.
) = 44
exit_group(0) = ?
+++ exited with 0 +++

```

Лабораторная работа №2

Strace:

```

execve("./timsort2", ["/timsort2", "3"], 0xfffff3d44008 /* 9 vars */) = 0
brk(NULL) = 0xaaaafda59000
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0xfffffb29d3000
faccessat(AT_FDCWD, "/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=8467, ...}) = 0
mmap(NULL, 8467, PROT_READ, MAP_PRIVATE, 3, 0) = 0xfffffb29d0000
close(3) = 0

```

```

openat(AT_FDCWD, "/lib/aarch64-linux-gnu/libc.so.6", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\3\0\267\0\1\0\0\0\360\206\2\0\0\0\0"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0755, st_size=1722920, ...}) = 0
mmap(NULL, 1892240, PROT_NONE,
MAP_PRIVATE|MAP_ANONYMOUS|MAP_DENYWRITE, -1, 0) = 0xffffb27cc000
mmap(0xffffb27d0000, 1826704, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0) = 0xffffb27d0000
munmap(0xffffb27cc000, 16384) = 0
munmap(0xffffb298e000, 49040) = 0
mprotect(0xffffb296a000, 77824, PROT_NONE) = 0
mmap(0xffffb297d000, 20480, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x19d000) = 0xffffb297d000
mmap(0xffffb2982000, 49040, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0xffffb2982000
close(3) = 0
set_tid_address(0xffffb29d3fb0) = 1495
set_robust_list(0xffffb29d3fc0, 24) = 0
rseq(0xffffb29d4600, 0x20, 0, 0xd428bc00) = 0
mprotect(0xffffb297d000, 12288, PROT_READ) = 0
mprotect(0xaaaacbb4f000, 4096, PROT_READ) = 0
mprotect(0xffffb29d8000, 8192, PROT_READ) = 0
prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 0
munmap(0xffffb29d0000, 8467) = 0
fstat(1, {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0), ...}) = 0
getrandom("\x05\xe8\xac\x89\x05\x92\xc1\x07", 8, GRND_NONBLOCK) = 8
brk(NULL) = 0xaaaafda59000
brk(0xaaaafda7a000) = 0xaaaafda7a000
fstat(0, {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0), ...}) = 0
write(1, "Enter the number of elements in "..., 43Enter the number of elements in the array: ) = 43
read(0, 100000
"100000\n", 1024) = 7
mmap(NULL, 401408, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0)
= 0xffffb276e000
rt_sigaction(SIGRT_1, {sa_handler=0xffffb2852840, sa_mask=[],
sa_flags=SA_ONSTACK|SA_RESTART|SA_SIGINFO}, NULL, 8) = 0
rt_sigprocmask(SIG_UNBLOCK, [RTMIN RT_1], NULL, 8) = 0
mmap(NULL, 8454144, PROT_NONE, MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK, -1,
0) = 0xffffb1e00000

```



```

mprotect(0xffffb1e10000, 8388608, PROT_READ|PROT_WRITE) = 0
rt_sigprocmask(SIG_BLOCK, ~[], [], 8) = 0
clone3({flags=CLONE_VM|CLONE_FS|CLONE_FILES|CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|CLONE_PARENT_SETTID|CLONE_CHILD_CLEARTID,
child_tid=0xffffb260f270, parent_tid=0xffffb260f270, exit_signal=0, stack=0xffffb1e00000,
stack_size=0x80ea60, tls=0xffffb260f8e0} => {parent_tid=[1496]}, 88) = 1496
rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0
mmap(NULL, 8454144, PROT_NONE, MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK, -1, 0) = 0xffffb1400000
mprotect(0xffffb1410000, 8388608, PROT_READ|PROT_WRITE) = 0
rt_sigprocmask(SIG_BLOCK, ~[], [], 8) = 0
clone3({flags=CLONE_VM|CLONE_FS|CLONE_FILES|CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|CLONE_PARENT_SETTID|CLONE_CHILD_CLEARTID,
child_tid=0xffffb1c0f270, parent_tid=0xffffb1c0f270, exit_signal=0, stack=0xffffb1400000,
stack_size=0x80ea60, tls=0xffffb1c0f8e0} => {parent_tid=[1497]}, 88) = 1497
rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0
mmap(NULL, 8454144, PROT_NONE, MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK, -1, 0) = 0xffffb0a00000
mprotect(0xffffb0a10000, 8388608, PROT_READ|PROT_WRITE) = 0
rt_sigprocmask(SIG_BLOCK, ~[], [], 8) = 0
clone3({flags=CLONE_VM|CLONE_FS|CLONE_FILES|CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|CLONE_PARENT_SETTID|CLONE_CHILD_CLEARTID,
child_tid=0xffffb120f270, parent_tid=0xffffb120f270, exit_signal=0, stack=0xffffb0a00000,
stack_size=0x80ea60, tls=0xffffb120f8e0} => {parent_tid=[1498]}, 88) = 1498
rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0
futex(0xffffb260f270, FUTEX_WAIT_BITSET|FUTEX_CLOCK_REALTIME, 1496, NULL, FUTEX_BITSET_MATCH_ANY) = 0
futex(0xffffb1c0f270, FUTEX_WAIT_BITSET|FUTEX_CLOCK_REALTIME, 1497, NULL, FUTEX_BITSET_MATCH_ANY) = 0
futex(0xffffb120f270, FUTEX_WAIT_BITSET|FUTEX_CLOCK_REALTIME, 1498, NULL, FUTEX_BITSET_MATCH_ANY) = 0
mmap(NULL, 135168, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0xffffb270f000
mmap(NULL, 135168, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0xffffb26ee000
munmap(0xffffb270f000, 135168) = 0
munmap(0xffffb26ee000, 135168) = 0

```

```

mmap(NULL, 270336, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0)
= 0xffffb26ee000
brk(0xaaaafda9b000)          = 0xaaaafda9b000
munmap(0xffffb26ee000, 270336)    = 0
write(1, "Time taken for sorting: 0.019089"... , 41Time taken for sorting: 0.019089 seconds
) = 41
write(1, "Number of threads used: 3\n", 26Number of threads used: 3
) = 26
munmap(0xffffb276e000, 401408)    = 0
lseek(0, -1, SEEK_CUR)          = -1 ESPIPE (Illegal seek)
exit_group(0)                  = ?
+++ exited with 0 +++

```

Лабораторная работа №3

Strace:

```

execve("./parent", [ "./parent" ], 0x7ffd98dc6968 /* 34 vars */) = 0
brk(NULL)                                = 0x559a8e7b9000
arch_prctl(0x3001 /* ARCH_??? */, 0x7ffc9fdb4020) = -1 EINVAL (Invalid argument)
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7f83c63b5000
access("/etc/ld.so.preload", R_OK)      = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3
newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=22187, ...}, AT_EMPTY_PATH) = 0
mmap(NULL, 22187, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7f83c63af000
close(3)                                = 0
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libc.so.6", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\3\0>\0\1\0\0\0P\237\2\0\0\0\0"... , 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"... , 784, 64) = 784
pread64(3, "\4\0\0\0 \0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0\0"... , 48, 848) = 48
pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0I\17\357\204\3$\f\221\2039x\324\224\323\236S"... , 68, 896) = 68
newfstatat(3, "", {st_mode=S_IFREG|0755, st_size=2220400, ...}, AT_EMPTY_PATH) = 0
pread64(3, "\6\0\0\0\4\0\0\0@\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0"... , 784, 64) = 784
mmap(NULL, 2264656, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f83c6186000
mprotect(0x7f83c61ae000, 2023424, PROT_NONE) = 0
mmap(0x7f83c61ae000, 1658880, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x28000) =
  0x7f83c61ae000
mmap(0x7f83c6343000, 360448, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1bd000) = 0x7f83c6343000
mmap(0x7f83c639c000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x215000) =
  0x7f83c639c000
mmap(0x7f83c63a2000, 52816, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) =
  0x7f83c63a2000
close(3)                                = 0
mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7f83c6183000
arch_prctl(ARCH_SET_FS, 0x7f83c6183740) = 0
set_tid_address(0x7f83c6183a10)        = 139005
set_robust_list(0x7f83c6183a20, 24)    = 0
rseq(0x7f83c61840e0, 0x20, 0, 0x53053053) = 0

```

```

mprotect(0x7f83c639c000, 16384, PROT_READ) = 0
mprotect(0x559a68f06000, 4096, PROT_READ) = 0
mprotect(0x7f83c63ef000, 8192, PROT_READ) = 0
prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 0
munmap(0x7f83c63af000, 22187) = 0
openat(AT_FDCWD, "shared_memory.bin", O_RDWR|O_CREAT|O_TRUNC, 0666) = 3 - открытие файла
ftruncate(3, 1096) = 0
mmap(NULL, 1096, PROT_READ|PROT_WRITE, MAP_SHARED, 3, 0) = 0x7f83c63ee000
close(3) = 0
clone(child_stack=NULL, flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLDstrace: Process 139006 attached
, child_tidptr=0x7f83c6183a10) = 139006
[pid 139006] set_robust_list(0x7f83c6183a20, 24 <unfinished ...>
[pid 139005] clone(child_stack=NULL, flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD <unfinished ...>
[pid 139006] <... set_robust_list resumed>) = 0
strace: Process 139007 attached
[pid 139006] execve("./child1", ["child1", "shared_memory.bin"], 0x7ffc9fdb41f8 /* 34 vars */ <unfinished
...>
[pid 139005] <... clone resumed>, child_tidptr=0x7f83c6183a10) = 139007
[pid 139007] set_robust_list(0x7f83c6183a20, 24 <unfinished ...>
[pid 139005] newfstatat(1, "", <unfinished ...>
[pid 139007] <... set_robust_list resumed>) = 0
[pid 139005] <... newfstatat resumed>{st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0xb), ...}, AT_EMPTY_PATH)
= 0
[pid 139007] execve("./child2", ["child2", "shared_memory.bin"], 0x7ffc9fdb41f8 /* 34 vars */ <unfinished
...>
[pid 139005] getrandom("\x36\x60\xb8\x86\x9c\x7e\xd9\xfe", 8, GRND_NONBLOCK) = 8
[pid 139005] brk(NULL) = 0x559a8e7b9000
[pid 139005] brk(0x559a8e7da000) = 0x559a8e7da000
[pid 139006] <... execve resumed>) = 0
[pid 139005] write(1, "\320\222\320\262\320\265\320\264\320\270\321\202\320\265
\321\201\321\202\321\200\320\276\320\272\320\270 (Ctr"... , 66 <unfinished ...>
[pid 139006] brk(NULL <unfinished ...>
[pid 139005] <... write resumed>) = 66
[pid 139005] newfstatat(0, "", <unfinished ...>
[pid 139006] <... brk resumed>) = 0x560153a59000
[pid 139005] <... newfstatat resumed>{st_mode=S_IFIFO|0600, st_size=0, ...}, AT_EMPTY_PATH) = 0
[pid 139007] <... execve resumed>) = 0
[pid 139005] read(0, <unfinished ...>
[pid 139006] arch_prctl(0x3001 /* ARCH_??? */, 0x7fff443314e0 <unfinished ...>
[pid 139005] <... read resumed>"abo1ba ba\nqwer3ty ty\nagag"... , 4096) = 49
[pid 139007] brk(NULL <unfinished ...>
[pid 139005] <unfinishe...> futex(0x7f83c63ee428, FUTEX_WAIT_BITSET|FUTEX_CLOCK_REALTIME, 0, NULL, FUTEX_BITSET_MATCH_ANY
[pid 139006] <... arch_prctl resumed>) = -1 EINVAL (Invalid argument)
[pid 139007] <... brk resumed>) = 0x55d15b9ec000
[pid 139006] mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0 <unfinished ...>
[pid 139007] arch_prctl(0x3001 /* ARCH_??? */, 0x7ffd05b91d80 <unfinished ...>
[pid 139006] <... mmap resumed>) = 0x7f3ed7017000
[pid 139007] <... arch_prctl resumed>) = -1 EINVAL (Invalid argument)
[pid 139006] access("/etc/ld.so.preload", R_OK <unfinished ...>
[pid 139007] mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0 <unfinished ...>
[pid 139006] <... access resumed>) = -1 ENOENT (No such file or directory)
[pid 139007] <... mmap resumed>) = 0x7fbfeee21000

```

```
[pid 139006] openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC <unfinished ...>
[pid 139007] access("/etc/ld.so.preload", R_OK <unfinished ...>
[pid 139006] <... openat resumed>          = 3
[pid 139007] <... access resumed>         = -1 ENOENT (No such file or directory)
[pid 139006] newfstatat(3, "", <unfinished ...>
[pid 139007] openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC <unfinished ...>
[pid 139006] <... newfstatat resumed>{st_mode=S_IFREG|0644, st_size=22187, ...}, AT_EMPTY_PATH) = 0
[pid 139007] <... openat resumed>          = 3
[pid 139006] mmap(NULL, 22187, PROT_READ, MAP_PRIVATE, 3, 0 <unfinished ...>
[pid 139007] newfstatat(3, "", <unfinished ...>
[pid 139006] <... mmap resumed>           = 0x7f3ed7011000
[pid 139007] <... newfstatat resumed>{st_mode=S_IFREG|0644, st_size=22187, ...}, AT_EMPTY_PATH) = 0
[pid 139006] close(3 <unfinished ...>
[pid 139007] mmap(NULL, 22187, PROT_READ, MAP_PRIVATE, 3, 0 <unfinished ...>
[pid 139006] <... close resumed>          = 0
[pid 139007] <... mmap resumed>           = 0x7fbfee1b000
[pid 139006] openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libc.so.6", O_RDONLY|O_CLOEXEC <unfinished ...>
[pid 139007] close(3)                     = 0
[pid 139006] <... openat resumed>         = 3
[pid 139007] openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libc.so.6", O_RDONLY|O_CLOEXEC <unfinished ...>
[pid 139006] read(3, <unfinished ...>
[pid 139007] <... openat resumed>         = 3
[pid 139006] <... read resumed>"\177ELF\2\1\1\3\0\0\0\0\0\0\0\3\0\0\0\1\0\0\0P\237\2\0\0\0\0"... , 832) =
832
[pid 139007] read(3, <unfinished ...>
[pid 139006] pread64(3, <unfinished ...>
[pid 139007] <... read resumed>"\177ELF\2\1\1\3\0\0\0\0\0\0\0\3\0\0\0\1\0\0\0P\237\2\0\0\0\0"... , 832) =
832
[pid 139006] <... pread64 resumed>"\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 139007] pread64(3, <unfinished ...>
[pid 139006] pread64(3, <unfinished ...>
[pid 139007] <... pread64 resumed>"\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 139006] <... pread64 resumed>"\4\0\0\0 \0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0"... , 48,
848) = 48
[pid 139007] pread64(3, <unfinished ...>
[pid 139006] pread64(3, <unfinished ...>
[pid 139007] <... pread64 resumed>"\4\0\0\0 \0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0"... , 48,
848) = 48
[pid 139006] <... pread64
resumed>"\4\0\0\0\24\0\0\0\3\0\0\0GNU\0I\17\357\204\3$\f\221\2039x\324\224\323\2365"... , 68, 896) = 68
[pid 139007] pread64(3, <unfinished ...>
[pid 139006] newfstatat(3, "", <unfinished ...>
[pid 139007] <... pread64
resumed>"\4\0\0\0\24\0\0\0\3\0\0\0GNU\0I\17\357\204\3$\f\221\2039x\324\224\323\2365"... , 68, 896) = 68
[pid 139006] <... newfstatat resumed>{st_mode=S_IFREG|0755, st_size=2220400, ...}, AT_EMPTY_PATH) = 0
[pid 139007] newfstatat(3, "", <unfinished ...>
[pid 139006] pread64(3, <unfinished ...>
[pid 139007] <... newfstatat resumed>{st_mode=S_IFREG|0755, st_size=2220400, ...}, AT_EMPTY_PATH) = 0
[pid 139006] <... pread64 resumed>"\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 139007] pread64(3, <unfinished ...>
```

```

[pid 139006] mmap(NULL, 2264656, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0 <unfinished ...>
[pid 139007] <... pread64 resumed>"\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"... , 784,
64) = 784
[pid 139006] <... mmap resumed>          = 0x7f3ed6de8000
[pid 139007] mmap(NULL, 2264656, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0 <unfinished ...>
[pid 139006] mprotect(0x7f3ed6e10000, 2023424, PROT_NONE <unfinished ...>
[pid 139007] <... mmap resumed>          = 0x7fbfeebf2000
[pid 139006] <... mprotect resumed>      = 0
[pid 139007] mprotect(0x7fbfeec1a000, 2023424, PROT_NONE <unfinished ...>
[pid 139006] mmap(0x7f3ed6e10000, 1658880, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x28000 <unfinished ...>
[pid 139007] <... mprotect resumed>      = 0
[pid 139006] <... mmap resumed>          = 0x7f3ed6e10000
[pid 139007] mmap(0x7fbfeec1a000, 1658880, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x28000 <unfinished ...>
[pid 139006] mmap(0x7f3ed6fa5000, 360448, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1bd000
<unfinished ...>
[pid 139007] <... mmap resumed>          = 0x7fbfeec1a000
[pid 139006] <... mmap resumed>          = 0x7f3ed6fa5000
[pid 139007] mmap(0x7fbfeedaf000, 360448, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1bd000
<unfinished ...>
[pid 139006] mmap(0x7f3ed6ffe000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x215000 <unfinished ...>
[pid 139007] <... mmap resumed>          = 0x7fbfeedaf000
[pid 139006] <... mmap resumed>          = 0x7f3ed6ffe000
[pid 139007] mmap(0x7fbfeee08000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x215000 <unfinished ...>
[pid 139006] mmap(0x7f3ed7004000, 52816, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0
<unfinished ...>
[pid 139007] <... mmap resumed>          = 0x7fbfeee08000
[pid 139006] <... mmap resumed>          = 0x7f3ed7004000
[pid 139007] mmap(0x7fbfeee0e000, 52816, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0
<unfinished ...>
[pid 139006] close(3 <unfinished ...>
[pid 139007] <... mmap resumed>          = 0x7fbfeee0e000
[pid 139006] <... close resumed>         = 0
[pid 139007] close(3 <unfinished ...>
[pid 139006] mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0 <unfinished ...>
[pid 139007] <... close resumed>         = 0
[pid 139006] <... mmap resumed>          = 0x7f3ed6de5000
[pid 139007] mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0 <unfinished ...>
[pid 139006] arch_prctl(ARCH_SET_FS, 0x7f3ed6de5740 <unfinished ...>
[pid 139007] <... mmap resumed>          = 0x7fbfeebef000
[pid 139006] <... arch_prctl resumed>    = 0
[pid 139007] arch_prctl(ARCH_SET_FS, 0x7fbfeebef740 <unfinished ...>
[pid 139006] set_tid_address(0x7f3ed6de5a10 <unfinished ...>
[pid 139007] <... arch_prctl resumed>    = 0
[pid 139006] <... set_tid_address resumed> = 139006
[pid 139007] set_tid_address(0x7fbfeebefa10 <unfinished ...>
[pid 139006] set_robust_list(0x7f3ed6de5a20, 24 <unfinished ...>
[pid 139007] <... set_tid_address resumed> = 139007
[pid 139006] <... set_robust_list resumed> = 0
[pid 139007] set_robust_list(0x7fbfeebefa20, 24 <unfinished ...>

```

```

[pid 139006] rseq(0x7f3ed6de60e0, 0x20, 0, 0x53053053 <unfinished ...>
[pid 139007] <... set_robust_list resumed>) = 0
[pid 139006] <... rseq resumed>          = 0
[pid 139007] rseq(0x7fbfeebf00e0, 0x20, 0, 0x53053053 <unfinished ...>
[pid 139006] mprotect(0x7f3ed6ffe000, 16384, PROT_READ <unfinished ...>
[pid 139007] <... rseq resumed>          = 0
[pid 139006] <... mprotect resumed>      = 0
[pid 139007] mprotect(0x7fbfeee08000, 16384, PROT_READ <unfinished ...>
[pid 139006] mprotect(0x56014680a000, 4096, PROT_READ <unfinished ...>
[pid 139007] <... mprotect resumed>      = 0
[pid 139006] <... mprotect resumed>      = 0
[pid 139007] mprotect(0x55d120064000, 4096, PROT_READ <unfinished ...>
[pid 139006] mprotect(0x7f3ed7051000, 8192, PROT_READ <unfinished ...>
[pid 139007] <... mprotect resumed>      = 0
[pid 139006] <... mprotect resumed>      = 0
[pid 139007] mprotect(0x7fbfeee5b000, 8192, PROT_READ <unfinished ...>
[pid 139006] prlimit64(0, RLIMIT_STACK, NULL, <unfinished ...>
[pid 139007] <... mprotect resumed>      = 0
[pid 139006] <... prlimit64 resumed>{rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 0
[pid 139007] prlimit64(0, RLIMIT_STACK, NULL, <unfinished ...>
[pid 139006] munmap(0x7f3ed7011000, 22187 <unfinished ...>
[pid 139007] <... prlimit64 resumed>{rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 0
[pid 139006] <... munmap resumed>        = 0
[pid 139007] munmap(0x7fbfeee1b000, 22187 <unfinished ...>
[pid 139006] openat(AT_FDCWD, "shared_memory.bin", O_RDWR <unfinished ...>
[pid 139007] <... munmap resumed>        = 0
[pid 139007] openat(AT_FDCWD, "shared_memory.bin", O_RDWR <unfinished ...>
[pid 139006] <... openat resumed>        = 3
[pid 139007] <... openat resumed>        = 3
[pid 139006] mmap(NULL, 1096, PROT_READ|PROT_WRITE, MAP_SHARED, 3, 0 <unfinished ...>
[pid 139007] mmap(NULL, 1096, PROT_READ|PROT_WRITE, MAP_SHARED, 3, 0 <unfinished ...>
[pid 139006] <... mmap resumed>          = 0x7f3ed7050000
[pid 139007] <... mmap resumed>          = 0x7fbfeee5a000
[pid 139006] close(3 <unfinished ...>
[pid 139007] close(3 <unfinished ...>
[pid 139006] <... close resumed>         = 0
[pid 139007] <... close resumed>         = 0
[pid 139006] futex(0x7f3ed70503e8, FUTEX_WAIT_BITSET|FUTEX_CLOCK_REALTIME, 0, NULL, FUTEX_BITSET_MATCH_ANY
<unfinished ...>
[pid 139007] futex(0x7fbfeee5a428, FUTEX_WAKE, 1 <unfinished ...>
[pid 139005] <... futex resumed>         = 0
[pid 139007] <... futex resumed>         = 1
[pid 139005] write(1, "\320\240\320\265\320\267\321\203\320\273\321\214\321\202\320\260\321\202: AB01BA
BA\n", 30 <unfinished ...>
[pid 139007] futex(0x7fbfeee5a408, FUTEX_WAIT_BITSET|FUTEX_CLOCK_REALTIME, 0, NULL, FUTEX_BITSET_MATCH_ANY
<unfinished ...>
[pid 139005] <... write resumed>         = 30
[pid 139005] write(1, "\n", 1)           = 1
[pid 139005] futex(0x7f83c63ee3e8, FUTEX_WAKE, 1) = 1
[pid 139006] <... futex resumed>         = 0
[pid 139005] futex(0x7f83c63ee428, FUTEX_WAIT_BITSET|FUTEX_CLOCK_REALTIME, 0, NULL, FUTEX_BITSET_MATCH_ANY
<unfinished ...>
[pid 139006] futex(0x7f3ed7050408, FUTEX_WAKE, 1 <unfinished ...>

```

```

[pid 139007] <... futex resumed>          = 0
[pid 139006] <... futex resumed>          = 1
[pid 139007] futex(0x7fbfeee5a428, FUTEX_WAKE, 1 <unfinished ...>
[pid 139006] futex(0x7f3ed70503e8, FUTEX_WAIT_BITSET|FUTEX_CLOCK_REALTIME, 0, NULL, FUTEX_BITSET_MATCH_ANY
<unfinished ...>
[pid 139005] <... futex resumed>          = 0
[pid 139007] <... futex resumed>          = 1
[pid 139005] write(1, "\320\240\320\265\320\267\321\203\320\273\321\214\321\202\320\260\321\202: QWER3TY
TY\n", 31 <unfinished ...>
[pid 139007] futex(0x7fbfeee5a408, FUTEX_WAIT_BITSET|FUTEX_CLOCK_REALTIME, 0, NULL, FUTEX_BITSET_MATCH_ANY
<unfinished ...>
[pid 139005] <... write resumed>          = 31
[pid 139005] write(1, "\n", 1)            = 1
[pid 139005] futex(0x7f83c63ee3e8, FUTEX_WAKE, 1) = 1
[pid 139006] <... futex resumed>          = 0
[pid 139005] futex(0x7f83c63ee428, FUTEX_WAIT_BITSET|FUTEX_CLOCK_REALTIME, 0, NULL, FUTEX_BITSET_MATCH_ANY
<unfinished ...>
[pid 139006] futex(0x7f3ed7050408, FUTEX_WAKE, 1 <unfinished ...>
[pid 139007] <... futex resumed>          = 0
[pid 139006] <... futex resumed>          = 1
[pid 139007] futex(0x7fbfeee5a428, FUTEX_WAKE, 1 <unfinished ...>
[pid 139006] futex(0x7f3ed70503e8, FUTEX_WAIT_BITSET|FUTEX_CLOCK_REALTIME, 0, NULL, FUTEX_BITSET_MATCH_ANY
<unfinished ...>
[pid 139005] <... futex resumed>          = 0
[pid 139007] <... futex resumed>          = 1
[pid 139005] write(1, "\320\240\320\265\320\267\321\203\320\273\321\214\321\202\320\260\321\202: AGAG48AGAG
A"..., 39 <unfinished ...>
[pid 139007] futex(0x7fbfeee5a408, FUTEX_WAIT_BITSET|FUTEX_CLOCK_REALTIME, 0, NULL, FUTEX_BITSET_MATCH_ANY
<unfinished ...>
[pid 139005] <... write resumed>          = 39
[pid 139005] write(1, "\n", 1)            = 1
[pid 139005] read(0, "", 4096)            = 0
[pid 139005] futex(0x7f83c63ee3e8, FUTEX_WAKE, 1) = 1
[pid 139006] <... futex resumed>          = 0
[pid 139005] futex(0x7f83c63ee428, FUTEX_WAIT_BITSET|FUTEX_CLOCK_REALTIME, 0, NULL, FUTEX_BITSET_MATCH_ANY
<unfinished ...>
[pid 139006] futex(0x7f3ed7050408, FUTEX_WAKE, 1 <unfinished ...>
[pid 139007] <... futex resumed>          = 0
[pid 139006] <... futex resumed>          = 1
[pid 139007] futex(0x7fbfeee5a428, FUTEX_WAKE, 1 <unfinished ...>
[pid 139006] munmap(0x7f3ed7050000, 1096 <unfinished ...>
[pid 139005] <... futex resumed>          = 0
[pid 139007] <... futex resumed>          = 1
[pid 139005] wait4(139006, <unfinished ...>
[pid 139006] <... munmap resumed>          = 0
[pid 139007] munmap(0x7fbfeee5a000, 1096 <unfinished ...>
[pid 139006] exit_group(0 <unfinished ...>
[pid 139007] <... munmap resumed>          = 0
[pid 139006] <... exit_group resumed>      = ?
[pid 139007] exit_group(0)                = ?
[pid 139006] +++ exited with 0 +++
[pid 139005] <... wait4 resumed>[{{WIFEXITED(s) && WEXITSTATUS(s) == 0}}, 0, NULL) = 139006
[pid 139007] +++ exited with 0 +++

```

```

--- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=139006, si_uid=1000, si_status=0, si_utime=0,
si_stime=0} ---
wait4(139007, [{WIFEXITED(s) && WEXITSTATUS(s) == 0}], 0, NULL) = 139007
munmap(0x7f83c63ee000, 1096)          = 0
write(1, "\n", 1)                    = 1
write(1, "\320\222\321\201\320\265 \320\277\321\200\320\276\321\206\320\265\321\201\321\201\321\213
\320\267\320\260\320\262\320\265"... , 44) = 44
exit_group(0)                        = ?
+++ exited with 0 +++

```

Лабораторная работа №4

Strace:

test_static.c

```

execve("/test_static", ["/test_static"], 0x7ffc3fb39040 /* 34 vars */) = 0
brk(NULL)                          = 0x558b99efb000
arch_prctl(0x3001 /* ARCH_??? */, 0x7ffc24c602c0) = -1 EINVAL (Invalid argument)
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7ff2e41af000
access("/etc/ld.so.preload", R_OK) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "./glibc-hwcap/x86-64-v3/libImpl1.so", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "./glibc-hwcap/x86-64-v2/libImpl1.so", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "./tls/x86_64/x86_64/libImpl1.so", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "./tls/x86_64/libImpl1.so", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "./tls/x86_64/libImpl1.so", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "./tls/libImpl1.so", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "./x86_64/x86_64/libImpl1.so", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "./x86_64/libImpl1.so", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "./x86_64/libImpl1.so", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "./libImpl1.so", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\0\0\0\0>\0\1\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0...", 832) = 832
newfstatat(3, "", {st_mode=S_IFREG|0777, st_size=15648, ...}, AT_EMPTY_PATH) = 0
getcwd("/mnt/d/Projects/egorka_os/lab4/src", 128) = 35
mmap(NULL, 16432, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7ff2e41aa000
mmap(0x7ff2e41ab000, 4096, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1000) = 0x7ff2e41ab000
mmap(0x7ff2e41ac000, 4096, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) = 0x7ff2e41ac000
mmap(0x7ff2e41ad000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) = 0x7ff2e41ad000
close(3)                            = 0
openat(AT_FDCWD, "./glibc-hwcap/x86-64-v3/libc.so.6", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "./glibc-hwcap/x86-64-v2/libc.so.6", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "./tls/x86_64/x86_64/libc.so.6", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "./tls/x86_64/libc.so.6", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "./tls/x86_64/libc.so.6", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "./tls/libc.so.6", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "./x86_64/x86_64/libc.so.6", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "./x86_64/libc.so.6", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "./x86_64/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
newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=22187, ...}, AT_EMPTY_PATH) = 0
mmap(NULL, 22187, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7ff2e41a4000
close(3)                            = 0

```



```

openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libc.so.6", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\3\0\0\0\0\0\0\0\3\0>\0\1\0\0\0P\237\2\0\0\0\0"..., 832) = 832
pread64(3, "\6\0\0\0\4\0\0\0@\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0"..., 784, 64) = 784
pread64(3, "\4\0\0\0\0\0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0\0"..., 48, 848) = 48
pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\1\7\357\204\3$\f\221\2039x\324\224\323\236S"..., 68, 896) = 68
newfstatat(3, "", {st_mode=S_IFREG|0755, st_size=2220400, ...}, AT_EMPTY_PATH) = 0
pread64(3, "\6\0\0\0\4\0\0\0@\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0"..., 784, 64) = 784
mmap(NULL, 2264656, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7ff2e3f7b000
mprotect(0x7ff2e3fa3000, 2023424, PROT_NONE) = 0
mmap(0x7ff2e3fa3000, 1658880, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x28000) =
0x7ff2e3fa3000
mmap(0x7ff2e4138000, 360448, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1bd000) = 0x7ff2e4138000
mmap(0x7ff2e4191000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x215000) =
0x7ff2e4191000
mmap(0x7ff2e4197000, 52816, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x7ff2e4197000
close(3) = 0
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libm.so.6", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\3\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=940560, ...}, AT_EMPTY_PATH) = 0
mmap(NULL, 942344, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7ff2e3e94000
mmap(0x7ff2e3ea2000, 507904, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0xe000) = 0x7ff2e3ea2000
mmap(0x7ff2e3f1e000, 372736, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x8a000) = 0x7ff2e3f1e000
mmap(0x7ff2e3f79000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0xe4000) = 0x7ff2e3f79000
close(3) = 0
mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7ff2e3e91000
arch_prctl(ARCH_SET_FS, 0x7ff2e3e91740) = 0
set_tid_address(0x7ff2e3e91a10) = 57510
set_robust_list(0x7ff2e3e91a20, 24) = 0
rseq(0x7ff2e3e920e0, 0x20, 0, 0x53053053) = 0
mprotect(0x7ff2e4191000, 16384, PROT_READ) = 0
mprotect(0x7ff2e3f79000, 4096, PROT_READ) = 0
mprotect(0x7ff2e41ad000, 4096, PROT_READ) = 0
mprotect(0x558b7addf000, 4096, PROT_READ) = 0
mprotect(0x7ff2e41e9000, 8192, PROT_READ) = 0
prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 0
munmap(0x7ff2e41a4000, 22187) = 0
newfstatat(1, "", {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0x7), ...}, AT_EMPTY_PATH) = 0
getrandom("\x13\xf4\xf5\x10\xee\x37\xc5\xe3", 8, GRND_NONBLOCK) = 8
brk(NULL) = 0x558b99efb000
brk(0x558b99f1c000) = 0x558b99f1c000
write(1, "Input program code:\n", 20) = 20
write(1, " 1 -> PrimeCount\n", 17) = 17
write(1, " 2 -> Pi\n", 9) = 9
write(1, "-1 -> Exit\n", 11) = 11
newfstatat(0, "", {st_mode=S_IFIFO|0600, st_size=0, ...}, AT_EMPTY_PATH) = 0
read(0, "\1\n0 10\n2\n100\n-1\n", 4096) = 16
write(1, "Enter A and B: PrimeCount(0, 10)"..., 37) = 37
write(1, "Input program code:\n", 20) = 20
write(1, " 1 -> PrimeCount\n", 17) = 17
write(1, " 2 -> Pi\n", 9) = 9
write(1, "-1 -> Exit\n", 11) = 11
write(1, "Enter K: Pi(100) = 3.131593\n", 28) = 28
write(1, "Input program code:\n", 20) = 20
write(1, " 1 -> PrimeCount\n", 17) = 17

```

```

write(1, " 2 -> Pi\n", 9)          = 9
write(1, "-1 -> Exit\n", 11)       = 11
lseek(0, -1, SEEK_CUR)              = -1 ESPIPE (Illegal seek)
exit_group(0)                       = ?
+++ exited with 0 +++

```

test_dynamic.c:

```

execve("./test_dynamic", [ "./test_dynamic" ], 0x7ffe7c042fc0 /* 34 vars */) = 0
brk(NULL)                             = 0x563b25b55000
arch_prctl(0x3001 /* ARCH_??? */, 0x7ffcd595b920) = -1 EINVAL (Invalid argument)
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7f84073e2000
access("/etc/ld.so.preload", R_OK)     = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3
newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=22187, ...}, AT_EMPTY_PATH) = 0
mmap(NULL, 22187, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7f84073dc000
close(3)                               = 0
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libc.so.6", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\3\0>\0\1\0\0\0P\237\2\0\0\0\0"... , 832) = 832
pread64(3, "\6\0\0\0\4\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0"... , 784, 64) = 784
pread64(3, "\4\0\0\0 \0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0\0"... , 48, 848) = 48
pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0I\17\357\204\3$\f\221\2039x\324\224\323\236S"... , 68, 896) = 68
newfstatat(3, "", {st_mode=S_IFREG|0755, st_size=2220400, ...}, AT_EMPTY_PATH) = 0
pread64(3, "\6\0\0\0\4\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0"... , 784, 64) = 784
mmap(NULL, 2264656, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f84071b3000
mprotect(0x7f84071db000, 2023424, PROT_NONE) = 0
mmap(0x7f84071db000, 1658880, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x28000) =
0x7f84071db000
mmap(0x7f8407370000, 360448, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1bd000) = 0x7f8407370000
mmap(0x7f84073c9000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x215000) =
0x7f84073c9000
mmap(0x7f84073cf000, 52816, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) =
0x7f84073cf000
close(3)                               = 0
mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7f84071b0000
arch_prctl(ARCH_SET_FS, 0x7f84071b0740) = 0
set_tid_address(0x7f84071b0a10)        = 62096
set_robust_list(0x7f84071b0a20, 24)    = 0
rseq(0x7f84071b10e0, 0x20, 0, 0x53053053) = 0
mprotect(0x7f84073c9000, 16384, PROT_READ) = 0
mprotect(0x563b11e2d000, 4096, PROT_READ) = 0
mprotect(0x7f840741c000, 8192, PROT_READ) = 0
prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 0
munmap(0x7f84073dc000, 22187)          = 0
getrandom("\xa2\x51\x02\x5f\x26\xb4\x3a\x43", 8, GRND_NONBLOCK) = 8
brk(NULL)                             = 0x563b25b55000
brk(0x563b25b76000)                   = 0x563b25b76000
openat(AT_FDCWD, "./libImpl1.so", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"... , 832) = 832
newfstatat(3, "", {st_mode=S_IFREG|0777, st_size=15648, ...}, AT_EMPTY_PATH) = 0
getcwd("/mnt/d/Projects/egorka_os/lab4/src", 128) = 35
mmap(NULL, 16432, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f84073dd000
mmap(0x7f84073de000, 4096, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1000) =
0x7f84073de000
mmap(0x7f84073df000, 4096, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) = 0x7f84073df000

```

```

mmap(0x7f84073e0000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) =
0x7f84073e0000
close(3) = 0
openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3
newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=22187, ...}, AT_EMPTY_PATH) = 0
mmap(NULL, 22187, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7f84071aa000
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\3\0>\0\1\0\0\0\0\0\0\0\0\0"..., 832) = 832
newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=940560, ...}, AT_EMPTY_PATH) = 0
mmap(NULL, 942344, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f84070c3000
mmap(0x7f84070d1000, 507904, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0xe000) =
0x7f84070d1000
mmap(0x7f840714d000, 372736, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x8a000) = 0x7f840714d000
mmap(0x7f84071a8000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0xe4000) =
0x7f84071a8000
close(3) = 0
mprotect(0x7f84071a8000, 4096, PROT_READ) = 0
mprotect(0x7f84073e0000, 4096, PROT_READ) = 0
munmap(0x7f84071aa000, 22187) = 0
newfstatat(1, "", {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0x7), ...}, AT_EMPTY_PATH) = 0
write(1, "Input program code:\n", 20) = 20
write(1, " 0 -> Library switch\n", 21) = 21
write(1, " 1 -> PrimeCount\n", 17) = 17
write(1, " 2 -> Pi\n", 9) = 9
write(1, "-1 -> Exit\n", 11) = 11
newfstatat(0, "", {st_mode=S_IFIFO|0600, st_size=0, ...}, AT_EMPTY_PATH) = 0
read(0, "1\n1 10\n2\n100\n0\n1\n1 10\n2\n100\n0\n2\n"..., 4096) = 38
write(1, "Enter A and B: PrimeCount(1, 10)"..., 37) = 37
write(1, "Implementation used: ./libImpl1."..., 35) = 35
write(1, "Input program code:\n", 20) = 20
write(1, " 0 -> Library switch\n", 21) = 21
write(1, " 1 -> PrimeCount\n", 17) = 17
write(1, " 2 -> Pi\n", 9) = 9
write(1, "-1 -> Exit\n", 11) = 11
write(1, "Enter K: Pi(100) = 3.131593\n", 28) = 28
write(1, "Implementation used: ./libImpl1."..., 35) = 35
write(1, "Input program code:\n", 20) = 20
write(1, " 0 -> Library switch\n", 21) = 21
write(1, " 1 -> PrimeCount\n", 17) = 17
write(1, " 2 -> Pi\n", 9) = 9
write(1, "-1 -> Exit\n", 11) = 11
munmap(0x7f84073dd000, 16432) = 0
munmap(0x7f84070c3000, 942344) = 0
openat(AT_FDCWD, "./libImpl2.so", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\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
newfstatat(3, "", {st_mode=S_IFREG|0777, st_size=15672, ...}, AT_EMPTY_PATH) = 0
getcwd("/mnt/d/Projects/egorka_os/lab4/src", 128) = 35
mmap(NULL, 16432, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f84073dd000
mmap(0x7f84073de000, 4096, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1000) =
0x7f84073de000
mmap(0x7f84073df000, 4096, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) = 0x7f84073df000
mmap(0x7f84073e0000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) =
0x7f84073e0000

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close(3) = 0
mprotect(0x7f84073e0000, 4096, PROT_READ) = 0
write(1, "Library switched successfully!\n", 31) = 31
write(1, "Current lib: ./libImpl2.so\n", 27) = 27
write(1, "Input program code:\n", 20) = 20
write(1, " 0 -> Library switch\n", 21) = 21
write(1, " 1 -> PrimeCount\n", 17) = 17
write(1, " 2 -> Pi\n", 9) = 9
write(1, "-1 -> Exit\n", 11) = 11
write(1, "Enter A and B: PrimeCount(1, 10)"..., 37) = 37
write(1, "Implementation used: ./libImpl2."..., 35) = 35
write(1, "Input program code:\n", 20) = 20
write(1, " 0 -> Library switch\n", 21) = 21
write(1, " 1 -> PrimeCount\n", 17) = 17
write(1, " 2 -> Pi\n", 9) = 9
write(1, "-1 -> Exit\n", 11) = 11
write(1, "Enter K: Pi(100) = 3.133787\n", 28) = 28
write(1, "Implementation used: ./libImpl2."..., 35) = 35
write(1, "Input program code:\n", 20) = 20
write(1, " 0 -> Library switch\n", 21) = 21
write(1, " 1 -> PrimeCount\n", 17) = 17
write(1, " 2 -> Pi\n", 9) = 9
write(1, "-1 -> Exit\n", 11) = 11
munmap(0x7f84073dd000, 16432) = 0
openat(AT_FDCWD, "./libImpl1.so", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0\>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
newfstatat(3, "", {st_mode=S_IFREG|0777, st_size=15648, ...}, AT_EMPTY_PATH) = 0
getcwd("/mnt/d/Projects/egorka_os/lab4/src", 128) = 35
mmap(NULL, 16432, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f84073dd000
mmap(0x7f84073de000, 4096, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1000) =
0x7f84073de000
mmap(0x7f84073df000, 4096, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) = 0x7f84073df000
mmap(0x7f84073e0000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) =
0x7f84073e0000
close(3) = 0
openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3
newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=22187, ...}, AT_EMPTY_PATH) = 0
mmap(NULL, 22187, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7f84071aa000
close(3) = 0
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libm.so.6", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0\>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=940560, ...}, AT_EMPTY_PATH) = 0
mmap(NULL, 942344, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f84070c3000
mmap(0x7f84070d1000, 507904, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0xe000) =
0x7f84070d1000
mmap(0x7f840714d000, 372736, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x8a000) = 0x7f840714d000
mmap(0x7f84071a8000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0xe4000) =
0x7f84071a8000
close(3) = 0
mprotect(0x7f84071a8000, 4096, PROT_READ) = 0
mprotect(0x7f84073e0000, 4096, PROT_READ) = 0
munmap(0x7f84071aa000, 22187) = 0
write(1, "Library switched successfully!\n", 31) = 31
write(1, "Current lib: ./libImpl1.so\n", 27) = 27
write(1, "Input program code:\n", 20) = 20

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write(1, " 0 -> Library switch\n", 21) = 21
write(1, " 1 -> PrimeCount\n", 17)    = 17
write(1, " 2 -> Pi\n", 9)              = 9
write(1, "-1 -> Exit\n", 11)           = 11
write(1, "Enter K: Pi(100) = 3.131593\n", 28) = 28
write(1, "Implementation used: ./libImpl1..." , 35) = 35
write(1, "Input program code:\n", 20)   = 20
write(1, " 0 -> Library switch\n", 21) = 21
write(1, " 1 -> PrimeCount\n", 17)    = 17
write(1, " 2 -> Pi\n", 9)              = 9
write(1, "-1 -> Exit\n", 11)           = 11
read(0, "", 4096)                       = 0
munmap(0x7f84073dd000, 16432)            = 0
munmap(0x7f84070c3000, 942344)          = 0
exit_group(0)                           = ?
+++ exited with 0 +++

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Лабораторная работа №5-7

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