

**МОСКОВСКИЙ АВИАЦИОННЫЙ ИНСТИТУТ  
(НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ УНИВЕРСИТЕТ)**

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Кафедра 806 «Вычислительная математика и программирование»**

**Лабораторная работа №6  
по курсу «Операционные системы»**

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## Условие

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

## Цель работы

Приобретение практических навыков диагностики работы программного обеспечения.

## Задание

Составить отчет с анализом системных вызовов, использованных во всех лабораторных работах

## Вариант

-1

## Анализ системных вызовов

### Методология анализа

Для анализа работы программ использовалась утилита `strace`, которая позволяет отслеживать системные вызовы, выполняемые процессом. Ниже представлен детальный анализ логов системных вызовов для каждой лабораторной работы.

## Лабораторная работа 1: Анализ межпроцессного взаимодействия

### Анализ логов с использованием каналов (Pipes)

#### 1. Инициализация родительского процесса:

```
274130 execve("./parent", ["./parent"], 0x7ffcd3e49d68 /* 36 vars */) = 0
```

Процесс запускается с помощью `execve()`.

#### 2. Создание каналов связи:

```
274130 pipe2([3,4],0) = 0
274130 pipe2([5,6],0) = 0
```

Из вывода `strace` видно создание двух каналов с дескрипторами [3,4] и [5,6].

#### 3. Создание дочерних процессов:

```
274130 clone(child_stack=NULL, flags=CLONE_CHILD_CLEARTID |
CLONE_CHILD_SETTID | SIGCHLD,
child_tidptr=0x79c2f68f1a10) = 274150
```

Родительский процесс создает дочерние процессы через `clone()`.

#### 4. Запуск дочерних программ:

```
274150 execve("./child", ["/child", "child1", "file1", "3"],  
0x7ffd73be59b8 /* 36 vars */)
```

Дочерний процесс запускает отдельную программу с параметрами.

### Анализ протокола работы с разделяемой памятью

#### 1. Создание объектов разделяемой памяти:

```
302509 openat(AT_FDCWD, "/dev/shm/child1_shm",  
O_RDWR|O_CREAT|O_NOFOLLOW|O_CLOEXEC, 0666) = 3  
302509 ftruncate(3, 4160) = 0  
302509 mmap(NULL, 4160, PROT_READ|PROT_WRITE, MAP_SHARED, 3, 0)  
= 0x7ed6942c9000
```

**Запись системных вызовов** показывает создание и отображение объектов разделяемой памяти.

#### 2. Синхронизация процессов:

```
302535 futex(0x7381a264a000, FUTEX_WAIT_BITSET|FUTEX_CLOCK_REALTIME,  
0, NULL, FUTEX_BITSET_MATCH_ANY) = 0
```

Процессы используют `futex()` для синхронизации доступа к разделяемой памяти.

#### 3. Пробуждение процессов:

```
302509 futex(0x7ed6942ca000, FUTEX_WAKE, 1) = 1
```

Родительский процесс пробуждает дочерние после записи данных.

## Лабораторная работа 2: Анализ параллельной сортировки

### Анализ логов многопоточного приложения

#### 1. Выделение памяти для массива:

```
mmap(NULL, 40001536, PROT_READ|PROT_WRITE,  
MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7e806e3da000
```

Программа выделяет 40 МБ памяти для массива из 10 миллионов элементов.

#### 2. Создание потоков:

```
clone3({flags=CLONE_VM|CLONE_FS|CLONE_FILES|CLONE_SIGHAND|
CLONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|
CLONE_PARENT_SETTID|CLONE_CHILD_CLEARTID,
child_tid=0x7e806e3d9990,parent_tid=0x7e806e3d9990,
exit_signal=0,stack=0x7e806dbd9000,
stack_size=0x7fff80,tls=0x7e806e3d96c0}
=>{parent_tid=[124453]},88) = 124453
```

Создается поток с флагом CLONE\_THREAD, что указывает на создание потока, а не процесса.

### 3. Выделение стеков для потоков:

```
mmap(NULL,8392704,PROT_NONE,MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK,
-1,0) = 0x7e806dbd9000
mprotect(0x7e806dbda000,8388608,PROT_READ|PROT_WRITE) = 0
```

Для каждого потока выделяется отдельный стек.

### 4. Ожидание завершения потоков:

```
futex(0x7e806e3d9990,FUTEX_WAIT_BITSET|FUTEX_CLOCK_REALTIME,
124453,NULL,FUTEX_BITSET_MATCH_ANY) = 0
```

Главный поток ожидает завершения рабочих потоков.

## Лабораторная работа 4: Анализ работы с динамическими библиотеками

### Анализ логов статически линкованного приложения

#### 1. Загрузка локальной библиотеки:

```
openat(AT_FDCWD,"/home/daalginichev/OS/Lab_4/build/libcontract1.so",
O_RDONLY|O_CLOEXEC) = 3
read(3,"\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0"... ,832)
= 832
mmap(NULL,20632,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,3,0)
= 0x7be415b8e000
```

Библиотека загружается из абсолютного пути в директории сборки.

#### 2. Отображение секций библиотеки:

```
mmap(0x7be415b90000,4096,PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0x2000) = 0x7be415b90000
mmap(0x7be415b91000,4096,PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0x3000) = 0x7be415b91000
```

Различные секции библиотеки отображаются с соответствующими правами доступа.

## Анализ логов динамически загружаемого приложения

### 1. Динамическая загрузка библиотеки:

```
openat(AT_FDCWD, "./libcontract1.so", O_RDONLY|O_CLOEXEC) = 3
mmap(NULL, 20632, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0)
= 0x725ea6601000
```

Библиотека загружается из относительного пути ./libcontract1.so.

### 2. Замена библиотеки во время выполнения:

```
read(0, "./libcontract2.so\n", 1024) = 18
munmap(0x725ea6601000, 20632) = 0
openat(AT_FDCWD, "./libcontract2.so", O_RDONLY|O_CLOEXEC) = 3
mmap(NULL, 20640, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0)
= 0x725ea6601000
```

Программа выгружает текущую библиотеку через munmap() и загружает новую.

### 3. Завершение программы:

```
munmap(0x725ea6601000, 20640) = 0
```

Перед завершением программа выгружает библиотеку из памяти.

## Выводы

Анализ системных вызовов с помощью утилиты strace позволил получить глубокое практическое понимание работы операционной системы Linux.

### Ключевые выводы:

- Межпроцессное взаимодействие** — изучены различные механизмы IPC: от простых pipes до разделяемой памяти с синхронизацией через futex. Практически подтверждены различия в производительности и сложности реализации.
- Архитектура процессов/потоков** — на уровне системных вызовов увидел разницу между процессами (clone()) и потоками (clone() с CLONE\_THREAD). Понял преимущества потоков для параллельных вычислений.
- Динамические библиотеки** — проанализирован процесс загрузки и выполнения ELF-файлов, разница между статической и динамической линковкой, возможности горячей замены библиотек.
- Инструментарий** — освоил использование strace как мощного средства отладки, позволяющего понять реальное поведение программ на уровне ядра ОС.

Полученные знания формируют прочную основу для разработки эффективных системных приложений и понимания внутренней работы операционных систем.

## Системные вызовы лаб. 1

```
274130 execve("./parent",["./parent"],0x7ffcd3e49d68 /* 36 vars */) = 0
274130 brk(NULL) = 0x63bd01b85000
274130 mmap(NULL,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_ANONYMOUS,-1,0)
= 0x79c2f692d000
274130 access("/etc/ld.so.preload",R_OK) = -1 ENOENT (No such file or directory)
274130 openat(AT_FDCWD,"/etc/ld.so.cache",O_RDONLY|O_CLOEXEC) = 3
274130 fstat(3,{st_mode=S_IFREG|0644,st_size=33163,...}) = 0
274130 mmap(NULL,33163,PROT_READ,MAP_PRIVATE,3,0) = 0x79c2f6924000
274130 close(3) = 0
274130 openat(AT_FDCWD,"/lib/x86_64-linux-gnu/libstdc++.so.6",O_RDONLY|O_CLOEXEC)
= 3
274130 read(3,"\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0"... ,832
= 832
274130 fstat(3,{st_mode=S_IFREG|0644,st_size=2592224,...}) = 0
274130 mmap(NULL,2609472,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,3,0) = 0x79c2f6600000
274130 mmap(0x79c2f669d000,1343488,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENY
= 0x79c2f669d000
274130 mmap(0x79c2f67e5000,552960,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0x1
= 0x79c2f67e5000
274130 mmap(0x79c2f686c000,57344,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWR
= 0x79c2f686c000
274130 mmap(0x79c2f687a000,12608,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_ANONY
= 0x79c2f687a000
274130 close(3) = 0
274130 openat(AT_FDCWD,"/lib/x86_64-linux-gnu/libgcc_s.so.1",O_RDONLY|O_CLOEXEC)
= 3
274130 read(3,"\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0"... ,832
= 832
274130 fstat(3,{st_mode=S_IFREG|0644,st_size=183024,...}) = 0
274130 mmap(NULL,185256,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,3,0) = 0x79c2f68f6000
274130 mmap(0x79c2f68fa000,147456,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENYWR
= 0x79c2f68fa000
274130 mmap(0x79c2f691e000,16384,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0x28
= 0x79c2f691e000
274130 mmap(0x79c2f6922000,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWR
= 0x79c2f6922000
274130 close(3) = 0
274130 openat(AT_FDCWD,"/lib/x86_64-linux-gnu/libc.so.6",O_RDONLY|O_CLOEXEC)
= 3
274130 read(3,"\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\220\243\2\0\0\0\0\0"...
= 832
274130 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"... ,7
= 784
274130 fstat(3,{st_mode=S_IFREG|0755,st_size=2125328,...}) = 0
274130 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"... ,7
= 784
274130 mmap(NULL,2170256,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,3,0) = 0x79c2f6200000
```

```

274130 mmap(0x79c2f6228000,1605632,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0) = 0x79c2f6228000
274130 mmap(0x79c2f63b0000,323584,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0) = 0x79c2f63b0000
274130 mmap(0x79c2f63ff000,24576,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0) = 0x79c2f63ff000
274130 mmap(0x79c2f6405000,52624,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,3,0) = 0x79c2f6405000
274130 close(3) = 0
274130 openat(AT_FDCWD,"/lib/x86_64-linux-gnu/libm.so.6",O_RDONLY|O_CLOEXEC) = 3
274130 read(3,"\177ELF\2\1\1\3\0\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
274130 fstat(3,{st_mode=S_IFREG|0644,st_size=952616,...}) = 0
274130 mmap(NULL,950296,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,3,0) = 0x79c2f6517000
274130 mmap(0x79c2f6527000,520192,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0) = 0x79c2f6527000
274130 mmap(0x79c2f65a6000,360448,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0) = 0x79c2f65a6000
274130 mmap(0x79c2f65fe000,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0) = 0x79c2f65fe000
274130 close(3) = 0
274130 mmap(NULL,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_ANONYMOUS,-1,0) = 0x79c2f68f4000
274130 mmap(NULL,12288,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_ANONYMOUS,-1,0) = 0x79c2f68f1000
274130 arch_prctl(ARCH_SET_FS,0x79c2f68f1740) = 0
274130 set_tid_address(0x79c2f68f1a10) = 274130
274130 set_robust_list(0x79c2f68f1a20,24) = 0
274130 rseq(0x79c2f68f2060,0x20,0,0x53053053) = 0
274130 mprotect(0x79c2f63ff000,16384,PROT_READ) = 0
274130 mprotect(0x79c2f65fe000,4096,PROT_READ) = 0
274130 mprotect(0x79c2f6922000,4096,PROT_READ) = 0
274130 mprotect(0x79c2f686c000,45056,PROT_READ) = 0
274130 mprotect(0x63bcc532c000,4096,PROT_READ) = 0
274130 mprotect(0x79c2f6965000,8192,PROT_READ) = 0
274130 prlimit64(0,RLIMIT_STACK,NULL,{rlim_cur=8192*1024,rlim_max=RLIM64_INFINITY}) = 0
274130 munmap(0x79c2f6924000,33163) = 0
274130 futex(0x79c2f687a7bc,FUTEX_WAKE_PRIVATE,2147483647) = 0
274130 getrandom("\x2c\x58\x54\xd0\x53\xf6\x8a\x94",8,GRND_NONBLOCK) = 8
274130 brk(NULL) = 0x63bd01b85000
274130 brk(0x63bd01ba6000) = 0x63bd01ba6000
274130 fstat(1,{st_mode=S_IFCHR|0620,st_rdev=makedev(0x88,0x5),...}) = 0
274130 write(1,"\320\222\320\262\320\265\320\264\320\270\321\202\320\265 \320\270\320\321\204\320\260\320\271\320\273\320\260"... ,48) = 48
274130 fstat(0,{st_mode=S_IFCHR|0620,st_rdev=makedev(0x88,0x5),...}) = 0
274130 read(0,"file1\n",1024) = 6

```

```

274130 write(1,"\320\222\320\262\320\265\320\264\320\270\321\202\320\265 \320\270\320
\321\204\320\260\320\271\320\273\320\260"... ,48) = 48
274130 read(0,"file2\n",1024) = 6
274130 pipe2([3,4],0) = 0
274130 pipe2([5,6],0) = 0
274130 clone(child_stack=NULL,flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD,c
= 274150
274150 set_robust_list(0x79c2f68f1a20,24 <unfinished ...>
274130 close(3 <unfinished ...>
274150 <... set_robust_list resumed>) = 0
274130 <... close resumed>) = 0
274150 close(4 <unfinished ...>
274130 clone(child_stack=NULL,flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD
<unfinished ...>
274150 <... close resumed>) = 0
274150 execve("./child",["./child","child1","file1","3"],0x7ffd73be59b8 /*
36 vars */ <unfinished ...>
274130 <... clone resumed>,child_tidptr=0x79c2f68f1a10) = 274151
274130 close(5 <unfinished ...>
274151 set_robust_list(0x79c2f68f1a20,24 <unfinished ...>
274130 <... close resumed>) = 0
274151 <... set_robust_list resumed>) = 0
274130 close(3 <unfinished ...>
274150 <... execve resumed>) = 0
274130 <... close resumed>) = -1 EBADF (Bad file descriptor)
274151 close(6 <unfinished ...>
274150 brk(NULL <unfinished ...>
274130 close(5 <unfinished ...>
274151 <... close resumed>) = 0
274150 <... brk resumed>) = 0x575e53eab000
274130 <... close resumed>) = -1 EBADF (Bad file descriptor)
274151 execve("./child",["./child","child2","file2","5"],0x7ffd73be59b8 /*
36 vars */ <unfinished ...>
274150 mmap(NULL,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_ANONYMOUS,-1,0 <unfinished
...>
274130 read(0, <unfinished ...>
274150 <... mmap resumed>) = 0x709cf5de7000
274150 access("/etc/ld.so.preload",R_OK <unfinished ...>
274151 <... execve resumed>) = 0
274150 <... access resumed>) = -1 ENOENT (No such file or directory)
274151 brk(NULL <unfinished ...>
274150 openat(AT_FDCWD,"/etc/ld.so.cache",O_RDONLY|O_CLOEXEC <unfinished ...>
274151 <... brk resumed>) = 0x5cc3d829f000
274150 <... openat resumed>) = 4
274150 fstat(4, <unfinished ...>
274151 mmap(NULL,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_ANONYMOUS,-1,0)
= 0x77760c0ae000
274150 <... fstat resumed>{st_mode=S_IFREG|0644,st_size=33163,...}) = 0

```



[illegible]

```
<unfinished ...>  
274151 mmap(0x77760bfe5000,552960,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0x1  
<unfinished ...>  
274150 <... mmap resumed>) = 0x709cf5c7a000  
274151 <... mmap resumed>) = 0x77760bfe5000  
274150 close(4 <unfinished ...>  
274151 mmap(0x77760c06c000,57344,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYW  
<unfinished ...>  
274150 <... close resumed>) = 0  
274151 <... mmap resumed>) = 0x77760c06c000  
274150 openat(AT_FDCWD,"/lib/x86_64-linux-gnu/libgcc_s.so.1",O_RDONLY|O_CLOEXEC  
<unfinished ...>  
274151 mmap(0x77760c07a000,12608,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_ANONY  
<unfinished ...>  
274150 <... openat resumed>) = 4  
274151 <... mmap resumed>) = 0x77760c07a000  
274150 read(4, <unfinished ...>  
274151 close(3 <unfinished ...>  
274150 <... read resumed>"\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\  
= 832  
274151 <... close resumed>) = 0  
274150 fstat(4, <unfinished ...>  
274151 openat(AT_FDCWD,"/lib/x86_64-linux-gnu/libgcc_s.so.1",O_RDONLY|O_CLOEXEC  
<unfinished ...>  
274150 <... fstat resumed>{st_mode=S_IFREG|0644,st_size=183024,...}) = 0  
274151 <... openat resumed>) = 3  
274151 read(3, <unfinished ...>  
274150 mmap(NULL,185256,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,4,0 <unfinished  
...>  
274151 <... read resumed>"\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\  
= 832  
274150 <... mmap resumed>) = 0x709cf5db0000  
274151 fstat(3, <unfinished ...>  
274150 mmap(0x709cf5db4000,147456,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENYW  
<unfinished ...>  
274151 <... fstat resumed>{st_mode=S_IFREG|0644,st_size=183024,...}) = 0  
274150 <... mmap resumed>) = 0x709cf5db4000  
274151 mmap(NULL,185256,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,3,0 <unfinished  
...>  
274150 mmap(0x709cf5dd8000,16384,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,4,0x28  
<unfinished ...>  
274151 <... mmap resumed>) = 0x77760bdd2000  
274150 <... mmap resumed>) = 0x709cf5dd8000  
274151 mmap(0x77760bdd6000,147456,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENYW  
<unfinished ...>  
274150 mmap(0x709cf5ddc000,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWR  
<unfinished ...>  
274151 <... mmap resumed>) = 0x77760bdd6000
```

```

274150 <... mmap resumed>) = 0x709cf5ddc000
274151 mmap(0x77760bdfa000,16384,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0x28
<unfinished ...>
274150 close(4 <unfinished ...>
274151 <... mmap resumed>) = 0x77760bdfa000
274150 <... close resumed>) = 0
274151 mmap(0x77760bdfe000,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWR
<unfinished ...>
274150 openat(AT_FDCWD,"/lib/x86_64-linux-gnu/libc.so.6",O_RDONLY|O_CLOEXEC
<unfinished ...>
274151 <... mmap resumed>) = 0x77760bdfe000
274150 <... openat resumed>) = 4
274151 close(3 <unfinished ...>
274150 read(4, <unfinished ...>
274151 <... close resumed>) = 0
274150 <... read resumed>"\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\220\243\2\0\
= 832
274151 openat(AT_FDCWD,"/lib/x86_64-linux-gnu/libc.so.6",O_RDONLY|O_CLOEXEC
<unfinished ...>
274150 pread64(4, <unfinished ...>
274151 <... openat resumed>) = 3
274150 <... 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\
= 784
274151 read(3, <unfinished ...>
274150 fstat(4, <unfinished ...>
274151 <... read resumed>"\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\220\243\2\0\
= 832
274150 <... fstat resumed>{st_mode=S_IFREG|0755,st_size=2125328,...}) = 0
274151 pread64(3, <unfinished ...>
274150 pread64(4, <unfinished ...>
274151 <... 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\
= 784
274150 <... 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\
= 784
274151 fstat(3, <unfinished...>
274150 mmap(NULL,2170256,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,4,0 <unfinished
...>
274151 <... fstat resumed>{st_mode=S_IFREG|0755,st_size=2125328,...}) = 0
274150 <... mmap resumed>) = 0x709cf5600000
274151 pread64(3, <unfinished ...>
274150 mmap(0x709cf5628000,1605632,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENY
<unfinished ...>
274151 <... 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\
= 784
274150 <... mmap resumed>) = 0x709cf5628000
274151 mmap(NULL,2170256,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,3,0 <unfinished
...>
274150 mmap(0x709cf57b0000,323584,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,4,0x1

```

```
<unfinished ...>  
274151 <... mmap resumed>) = 0x77760ba00000  
274150 <... mmap resumed>) = 0x709cf57b0000  
274151 mmap(0x77760ba28000,1605632,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,  
<unfinished ...>  
274150 mmap(0x709cf57ff000,24576,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,  
<unfinished ...>  
274151 <... mmap resumed>) = 0x77760ba28000  
274150 <... mmap resumed>) = 0x709cf57ff000  
274151 mmap(0x77760bbb0000,323584,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0x1,  
<unfinished ...>  
274150 mmap(0x709cf5805000,52624,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,  
<unfinished ...>  
274151 <... mmap resumed>) = 0x77760bbb0000  
274150 <... mmap resumed>) = 0x709cf5805000  
274151 mmap(0x77760bbbf000,24576,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,  
<unfinished ...>  
274150 close(4 <unfinished ...>  
274151 <... mmap resumed>) = 0x77760bbbf000  
274150 <... close resumed>) = 0  
274151 mmap(0x77760bc05000,52624,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,  
<unfinished ...>  
274150 openat(AT_FDCWD,"/lib/x86_64-linux-gnu/libm.so.6",O_RDONLY|O_CLOEXEC,  
<unfinished ...>  
274151 <... mmap resumed>) = 0x77760bc05000  
274150 <... openat resumed>) = 4  
274151 close(3 <unfinished ...>  
274150 read(4, <unfinished ...>  
274151 <... close resumed>) = 0  
274150 <... read resumed>"\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\  
= 832  
274151 openat(AT_FDCWD,"/lib/x86_64-linux-gnu/libm.so.6",O_RDONLY|O_CLOEXEC,  
<unfinished ...>  
274150 fstat(4, <unfinished ...>  
274151 <... openat resumed>) = 3  
274150 <... fstat resumed>{st_mode=S_IFREG|0644,st_size=952616,...}) = 0  
274151 read(3, <unfinished ...>  
274150 mmap(NULL,950296,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,4,0 <unfinished  
...>  
274151 <... read resumed>"\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\  
= 832  
274150 <... mmap resumed>) = 0x709cf5cc7000  
274151 fstat(3, <unfinished ...>  
274150 mmap(0x709cf5cd7000,520192,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,  
<unfinished ...>  
274151 <... fstat resumed>{st_mode=S_IFREG|0644,st_size=952616,...}) = 0  
274150 <... mmap resumed>) = 0x709cf5cd7000  
274151 mmap(NULL,950296,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,3,0 <unfinished
```

```

...>
274150 mmap(0x709cf5d56000,360448,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,4,0x8
<unfinished ...>
274151 <... mmap resumed>) = 0x77760bce9000
274150 <... mmap resumed>) = 0x709cf5d56000
274151 mmap(0x77760bcf9000,520192,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENYWR
<unfinished ...>
274150 mmap(0x709cf5dae000,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWR
<unfinished ...>
274151 <... mmap resumed>) = 0x77760bcf9000
274150 <... mmap resumed>) = 0x709cf5dae000
274151 mmap(0x77760bd78000,360448,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0x8
<unfinished ...>
274150 close(4 <unfinished ...>
274151 <... mmap resumed>) = 0x77760bd78000
274150 <... close resumed>) = 0
274151 mmap(0x77760bdd0000,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWR
<unfinished ...>
274150 mmap(NULL,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_ANONYMOUS,-1,0 <unfinished
...>
274151 <... mmap resumed>) = 0x77760bdd0000
274150 <... mmap resumed>) = 0x709cf5cc5000
274151 close(3 <unfinished ...>
274150 mmap(NULL,12288,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_ANONYMOUS,-1,0
<unfinished ...>
274151 <... close resumed>) = 0
274150 <... mmap resumed>) = 0x709cf5cc2000
274151 mmap(NULL,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_ANONYMOUS,-1,0 <unfinished
...>
274150 arch_prctl(ARCH_SET_FS,0x709cf5cc2740 <unfinished ...>
274151 <... mmap resumed>) = 0x77760c0a3000
274150 <... arch_prctl resumed>) = 0
274151 mmap(NULL,12288,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_ANONYMOUS,-1,0
<unfinished ...>
274150 set_tid_address(0x709cf5cc2a10 <unfinished ...>
274151 <... mmap resumed>) = 0x77760c0a0000
274150 <... set_tid_address resumed>) = 274150
274151 arch_prctl(ARCH_SET_FS,0x77760c0a0740 <unfinished ...>
274150 set_robust_list(0x709cf5cc2a20,24 <unfinished ...>
274151 <... arch_prctl resumed>) = 0
274150 <... set_robust_list resumed>) = 0
274151 set_tid_address(0x77760c0a0a10 <unfinished ...>
274150 rseq(0x709cf5cc3060,0x20,0,0x53053053 <unfinished ...>
274151 <... set_tid_address resumed>) = 274151
274150 <... rseq resumed>) = 0
274151 set_robust_list(0x77760c0a0a20,24) = 0
274150 mprotect(0x709cf57ff000,16384,PROT_READ <unfinished ...>
274151 rseq(0x77760c0a1060,0x20,0,0x53053053 <unfinished ...>

```

```

274150 <... mprotect resumed>) = 0
274151 <... rseq resumed>) = 0
274150 mprotect(0x709cf5dae000,4096,PROT_READ <unfinished ...>
274151 mprotect(0x77760bbff000,16384,PROT_READ <unfinished ...>
274150 <... mprotect resumed>) = 0
274151 <... mprotect resumed>) = 0
274150 mprotect(0x709cf5ddc000,4096,PROT_READ <unfinished ...>
274151 mprotect(0x77760bdd0000,4096,PROT_READ <unfinished ...>
274150 <... mprotect resumed>) = 0
274151 <... mprotect resumed>) = 0
274151 mprotect(0x77760bdfe000,4096,PROT_READ) = 0
274150 mprotect(0x709cf5c6c000,45056,PROT_READ) = 0
274151 mprotect(0x77760c06c000,45056,PROT_READ <unfinished ...>
274150 mprotect(0x575e22ada000,4096,PROT_READ <unfinished ...>
274151 <... mprotect resumed>) = 0
274150 <... mprotect resumed>) = 0
274151 mprotect(0x5cc39ee78000,4096,PROT_READ <unfinished ...>
274150 mprotect(0x709cf5e1f000,8192,PROT_READ <unfinished ...>
274151 <... mprotect resumed>) = 0
274150 <... mprotect resumed>) = 0
274151 mprotect(0x77760c0e6000,8192,PROT_READ <unfinished ...>
274150 prlimit64(0,RLIMIT_STACK,NULL, <unfinished ...>
274151 <... mprotect resumed>) = 0
274150 <... prlimit64 resumed>{rlim_cur=8192*1024,rlim_max=RLIM64_INFINITY})
= 0
274151 prlimit64(0,RLIMIT_STACK,NULL,{rlim_cur=8192*1024,rlim_max=RLIM64_INFINITY})
= 0
274150 munmap(0x709cf5dde000,33163 <unfinished ...>
274151 munmap(0x77760c0a5000,33163 <unfinished ...>
274150 <... munmap resumed>) = 0
274151 <... munmap resumed>) = 0
274150 futex(0x709cf5c7a7bc,FUTEX_WAKE_PRIVATE,2147483647) = 0
274151 futex(0x77760c07a7bc,FUTEX_WAKE_PRIVATE,2147483647) = 0
274150 getrandom("\xcd\xa7\x97\x3c\x1d\x9a\xd8\x81",8,GRND_NONBLOCK) = 8
274151 getrandom( <unfinished ...>
274150 brk(NULL <unfinished ...>
274151 <... getrandom resumed>"\xf5\x9d\xac\xba\x11\xff\xdd\xc4",8,GRND_NONBLOCK)
= 8
274150 <... brk resumed>) = 0x575e53eab000
274151 brk(NULL <unfinished ...>
274150 brk(0x575e53ecc000 <unfinished ...>
274151 <... brk resumed>) = 0x5cc3d829f000
274150 <... brk resumed>) = 0x575e53ecc000
274151 brk(0x5cc3d82c0000) = 0x5cc3d82c0000
274150 fstat(1, <unfinished ...>
274151 fstat(1, <unfinished ...>
274150 <... fstat resumed>{st_mode=S_IFCHR|0620,st_rdev=makedev(0x88,0x5),...})
= 0

```

```

274151 <... fstat resumed>{st_mode=S_IFCHR|0620,st_rdev=makedev(0x88,0x5),...})
= 0
274150 write(1,"child1: \320\267\320\260\320\277\321\203\321\211\320\265\320\275
\321\201 \321\204\320\260\320\271"... ,45 <unfinished ...>
274151 write(1,"child2: \320\267\320\260\320\277\321\203\321\211\320\265\320\275
\321\201 \321\204\320\260\320\271"... ,45 <unfinished ...>
274150 <... write resumed>) = 45
274151 <... write resumed>) = 45
274150 openat(AT_FDCWD,"file1",O_WRONLY|O_CREAT|O_TRUNC,0644 <unfinished ...>
274151 openat(AT_FDCWD,"file2",O_WRONLY|O_CREAT|O_TRUNC,0644) = 3
274150 <... openat resumed>) = 4
274151 read(5, <unfinished ...>
274150 read(3, <unfinished ...>
274130 <... read resumed>"hello\n",1024) = 6
274130 write(4,"hello",5) = 5
274150 <... read resumed>"hello",255) = 5
274130 write(4,"\n",1 <unfinished ...>
274150 write(4,"olleh",5 <unfinished ...>
274130 <... write resumed>) = 1
274150 <... write resumed>) = 5
274130 read(0, <unfinished ...>
274150 read(3,"\n",255) = 1
274150 write(4,"\n",1) = 1
274150 read(3, <unfinished ...>
274130 <... read resumed>"rabbit\n",1024) = 7
274130 write(6,"rabbit",6) = 6
274151 <... read resumed>"rabbit",255) = 6
274130 write(6,"\n",1) = 1
274151 write(3,"tibbar",6 <unfinished ...>
274130 read(0, <unfinished ...>
274151 <... write resumed>) = 6
274151 read(5,"\n",255) = 1
274151 write(3,"\n",1) = 1
274151 read(5, <unfinished ...>
274130 <... read resumed>"dig\n",1024) = 4
274130 write(4,"dig",3) = 3
274150 <... read resumed>"dig",255) = 3
274130 write(4,"\n",1 <unfinished ...>
274150 write(4,"gid",3 <unfinished ...>
274130 <... write resumed>) = 1
274150 <... write resumed>) = 3
274130 read(0, <unfinished ...>
274150 read(3,"\n",255) = 1
274150 write(4,"\n",1) = 1
274150 read(3, <unfinished ...>
274130 <... read resumed>"big\n",1024) = 4
274130 write(6,"big",3) = 3
274151 <... read resumed>"big",255) = 3

```

```

274130 write(6,"\n",1 <unfinished ...>
274151 write(3,"gib",3 <unfinished ...>
274130 <... write resumed>) = 1
274151 <... write resumed>) = 3
274130 read(0, <unfinished ...>
274151 read(5,"\n",255) = 1
274151 write(3,"\n",1) = 1
274151 read(5, <unfinished ...>
274130 <... read resumed>0x63bd01b976c0,1024) = ? ERESTARTSYS (To be restarted
if SA_RESTART is set)
274151 <... read resumed>0x7fffc9869d0,255) = ? ERESTARTSYS (To be restarted
if SA_RESTART is set)
274150 <... read resumed>0x7ffc28419ee0,255) = ? ERESTARTSYS (To be restarted
if SA_RESTART is set)
274130 ---SIGINT {si_signo=SIGINT,si_code=SI_KERNEL} ---
274151 ---SIGINT {si_signo=SIGINT,si_code=SI_KERNEL} ---
274150 ---SIGINT {si_signo=SIGINT,si_code=SI_KERNEL} ---
274130 +++ killed by SIGINT +++
274151 +++ killed by SIGINT +++
274150 +++ killed by SIGINT +++

```

## Системные вызовы лаб. 2

```

execve("./quicksort",["./quicksort","-t","16"],0x7ffefb84d840 /* 36 vars */)
= 0
brk(NULL) = 0x56ee2ba14000
mmap(NULL,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_ANONYMOUS,-1,0) = 0x7e807114a000
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=33423,...}) = 0
mmap(NULL,33423,PROT_READ,MAP_PRIVATE,3,0) = 0x7e8071141000
close(3) = 0
openat(AT_FDCWD,"/lib/x86_64-linux-gnu/libstdc++.so.6",O_RDONLY|O_CLOEXEC)
= 3
read(3,"\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0"... ,832)
= 832
fstat(3,{st_mode=S_IFREG|0644,st_size=2592224,...}) = 0
mmap(NULL,2609472,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,3,0) = 0x7e8070e00000
mmap(0x7e8070e9d000,1343488,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,
= 0x7e8070e9d000
mmap(0x7e8070fe5000,552960,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0x1e5000)
= 0x7e8070fe5000
mmap(0x7e807106c000,57344,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,
= 0x7e807106c000
mmap(0x7e807107a000,12608,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,-1,
= 0x7e807107a000
close(3) = 0
openat(AT_FDCWD,"/lib/x86_64-linux-gnu/libgcc_s.so.1",O_RDONLY|O_CLOEXEC) =
3

```



```

read(3,"\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0"... ,832)
= 832
fstat(3,{st_mode=S_IFREG|0644,st_size=183024,...}) = 0
mmap(NULL,185256,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,3,0) = 0x7e8071113000
mmap(0x7e8071117000,147456,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0)
= 0x7e8071117000
mmap(0x7e807113b000,16384,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0x28000)
= 0x7e807113b000
mmap(0x7e807113f000,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0)
= 0x7e807113f000
close(3) = 0
openat(AT_FDCWD,"/lib/x86_64-linux-gnu/libc.so.6",O_RDONLY|O_CLOEXEC) = 3
read(3,"\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\220\243\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=2125328,...}) = 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,2170256,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,3,0) = 0x7e8070a00000
mmap(0x7e8070a28000,1605632,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0)
= 0x7e8070a28000
mmap(0x7e8070bb0000,323584,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0x1b0000)
= 0x7e8070bb0000
mmap(0x7e8070bff000,24576,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0)
= 0x7e8070bff000
mmap(0x7e8070c05000,52624,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,-1,0)
= 0x7e8070c05000
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\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0"... ,832)
= 832
fstat(3,{st_mode=S_IFREG|0644,st_size=952616,...}) = 0
mmap(NULL,950296,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,3,0) = 0x7e8070d17000
mmap(0x7e8070d27000,520192,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0)
= 0x7e8070d27000
mmap(0x7e8070da6000,360448,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0x8f000)
= 0x7e8070da6000
mmap(0x7e8070dfe000,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0)
= 0x7e8070dfe000
close(3) = 0
mmap(NULL,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_ANONYMOUS,-1,0) = 0x7e8071111000
mmap(NULL,12288,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_ANONYMOUS,-1,0) = 0x7e807110e000
arch_prctl(ARCH_SET_FS,0x7e807110e740) = 0
set_tid_address(0x7e807110ea10) = 124392
set_robust_list(0x7e807110ea20,24) = 0
rseq(0x7e807110f060,0x20,0,0x53053053) = 0
mprotect(0x7e8070bff000,16384,PROT_READ) = 0

```

```

mprotect(0x7e8070dfe000,4096,PROT_READ) = 0
mprotect(0x7e807113f000,4096,PROT_READ) = 0
mprotect(0x7e807106c000,45056,PROT_READ) = 0
mprotect(0x56ee12f62000,4096,PROT_READ) = 0
mprotect(0x7e8071182000,8192,PROT_READ) = 0
prlimit64(0,RLIMIT_STACK,NULL,{rlim_cur=8192*1024,rlim_max=RLIM64_INFINITY})
= 0
munmap(0x7e8071141000,33423) = 0
futex(0x7e807107a7bc,FUTEX_WAKE_PRIVATE,2147483647) = 0
getrandom("\xc7\x11\x9a\x6a\xd2\xd0\x26\xdb",8,GRND_NONBLOCK) = 8
brk(NULL) = 0x56ee2ba14000
brk(0x56ee2ba35000) = 0x56ee2ba35000
fstat(1,{st_mode=S_IFCHR|0620,st_rdev=makedev(0x88,0x6),...}) = 0
write(1,"Enter the size of the array: ",29) = 29
fstat(0,{st_mode=S_IFCHR|0620,st_rdev=makedev(0x88,0x6),...}) = 0
read(0,"10000000\n",1024) = 9
write(1,"Generating random array of size "...,44) = 44
mmap(NULL,40001536,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_ANONYMOUS,-1,0) = 0x7e806e3da
write(1,"First 10 elements: 8020 511 5953"... ,69) = 69
rt_sigaction(SIGRT_1,{sa_handler=0x7e8070a99530,sa_mask=[],sa_flags=SA_RESTORER|SA_ON
= 0
rt_sigprocmask(SIG_UNBLOCK,[RTMIN RT_1],NULL,8) = 0
mmap(NULL,8392704,PROT_NONE,MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK,-1,0) = 0x7e806dbd900
mprotect(0x7e806dbda000,8388608,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|
=>{parent_tid=[124453]},88) = 124453
rt_sigprocmask(SIG_SETMASK,[],NULL,8) = 0
mmap(NULL,8392704,PROT_NONE,MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK,-1,0) = 0x7e806d3d800
mprotect(0x7e806d3d9000,8388608,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|
=>{parent_tid=[124454]},88) = 124454
rt_sigprocmask(SIG_SETMASK,[],NULL,8) = 0
mmap(NULL,8392704,PROT_NONE,MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK,-1,0) = 0x7e806cbd700
mprotect(0x7e806cbd8000,8388608,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|
=>{parent_tid=[124455]},88) = 124455
rt_sigprocmask(SIG_SETMASK,[],NULL,8) = 0
mmap(NULL,8392704,PROT_NONE,MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK,-1,0) = 0x7e806c3d600
mprotect(0x7e806c3d7000,8388608,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|
=>{parent_tid=[124456]},88) = 124456
rt_sigprocmask(SIG_SETMASK,[],NULL,8) = 0
mmap(NULL,8392704,PROT_NONE,MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK,-1,0) = 0x7e806bbd500
mprotect(0x7e806bbd6000,8388608,PROT_READ|PROT_WRITE) = 0

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rt_sigprocmask(SIG_BLOCK,~[],[],8) = 0
clone3({flags=CLONE_VM|CLONE_FS|CLONE_FILES|CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|
=>{parent_tid=[124457]},88) = 124457
rt_sigprocmask(SIG_SETMASK,[],NULL,8) = 0
mmap(NULL,8392704,PROT_NONE,MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK,-1,0) = 0x7e806b3d4000
mprotect(0x7e806b3d5000,8388608,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|
=>{parent_tid=[124458]},88) = 124458
rt_sigprocmask(SIG_SETMASK,[],NULL,8) = 0
mmap(NULL,8392704,PROT_NONE,MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK,-1,0) = 0x7e806abd3000
mprotect(0x7e806abd4000,8388608,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|
=>{parent_tid=[124459]},88) = 124459
rt_sigprocmask(SIG_SETMASK,[],NULL,8) = 0
mmap(NULL,8392704,PROT_NONE,MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK,-1,0) = 0x7e806a3d2000
mprotect(0x7e806a3d3000,8388608,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|
=>{parent_tid=[124460]},88) = 124460
rt_sigprocmask(SIG_SETMASK,[],NULL,8) = 0
mmap(NULL,8392704,PROT_NONE,MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK,-1,0) = 0x7e8069bd1000
mprotect(0x7e8069bd2000,8388608,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|
=>{parent_tid=[124461]},88) = 124461
rt_sigprocmask(SIG_SETMASK,[],NULL,8) = 0
mmap(NULL,8392704,PROT_NONE,MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK,-1,0) = 0x7e80693d0000
mprotect(0x7e80693d1000,8388608,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|
=>{parent_tid=[124462]},88) = 124462
rt_sigprocmask(SIG_SETMASK,[],NULL,8) = 0
mmap(NULL,8392704,PROT_NONE,MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK,-1,0) = 0x7e8068bcbf0000
mprotect(0x7e8068bd0000,8388608,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|
=>{parent_tid=[124463]},88) = 124463
rt_sigprocmask(SIG_SETMASK,[],NULL,8) = 0
mmap(NULL,8392704,PROT_NONE,MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK,-1,0) = 0x7e80683ce00000
mprotect(0x7e80683cf000,8388608,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|
=>{parent_tid=[124464]},88) = 124464
rt_sigprocmask(SIG_SETMASK,[],NULL,8) = 0
mmap(NULL,8392704,PROT_NONE,MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK,-1,0) = 0x7e8067bcd00000
mprotect(0x7e8067bce000,8388608,PROT_READ|PROT_WRITE) = 0

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rt_sigprocmask(SIG_BLOCK,~[],[],8) = 0
clone3({flags=CLONE_VM|CLONE_FS|CLONE_FILES|CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|
=>{parent_tid=[124465]},88) = 124465
rt_sigprocmask(SIG_SETMASK,[],NULL,8) = 0
mmap(NULL,8392704,PROT_NONE,MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK,-1,0) = 0x7e80673cc000
mprotect(0x7e80673cd000,8388608,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|
=>{parent_tid=[124466]},88) = 124466
rt_sigprocmask(SIG_SETMASK,[],NULL,8) = 0
mmap(NULL,8392704,PROT_NONE,MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK,-1,0) = 0x7e8066bcb000
mprotect(0x7e8066bcc000,8388608,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|
=>{parent_tid=[124467]},88) = 124467
rt_sigprocmask(SIG_SETMASK,[],NULL,8) = 0
mmap(NULL,8392704,PROT_NONE,MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK,-1,0) = 0x7e80663ca000
mprotect(0x7e80663cb000,8388608,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|
=>{parent_tid=[124468]},88) = 124468
rt_sigprocmask(SIG_SETMASK,[],NULL,8) = 0
futex(0x7e806e3d9990,FUTEX_WAIT_BITSET|FUTEX_CLOCK_REALTIME,124453,NULL,FUTEX_BITSET_
= 0
futex(0x7e806cbd6990,FUTEX_WAIT_BITSET|FUTEX_CLOCK_REALTIME,124456,NULL,FUTEX_BITSET_
= 0
futex(0x7e806c3d5990,FUTEX_WAIT_BITSET|FUTEX_CLOCK_REALTIME,124457,NULL,FUTEX_BITSET_
= 0
munmap(0x7e806dbd9000,8392704) = 0
munmap(0x7e806d3d8000,8392704) = 0
munmap(0x7e806cbd7000,8392704) = 0
munmap(0x7e806c3d6000,8392704) = 0
munmap(0x7e806bbd5000,8392704) = 0
munmap(0x7e806b3d4000,8392704) = 0
munmap(0x7e806abd3000,8392704) = 0
munmap(0x7e806a3d2000,8392704) = 0
munmap(0x7e8069bd1000,8392704) = 0
munmap(0x7e80693d0000,8392704) = 0
munmap(0x7e8068bcf000,8392704) = 0
futex(0x7e8066bca990,FUTEX_WAIT_BITSET|FUTEX_CLOCK_REALTIME,124468,NULL,FUTEX_BITSET_
= 0
munmap(0x7e80683ce000,8392704) = 0
mmap(NULL,40001536,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_ANONYMOUS,-1,0) = 0x7e806bdb4000
munmap(0x7e806bdb4000,40001536) = 0
write(1,"\n",1) = 1
write(1,"=== Performance Metrics ===\n",28) = 28
write(1,"Maximum threads specified: 16\n",30) = 30
write(1,"Array size: 10000000\n",21) = 21

```





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302509 arch_prctl(ARCH_SET_FS,0x7ed69428f740) = 0
302509 set_tid_address(0x7ed69428fa10) = 302509
302509 set_robust_list(0x7ed69428fa20,24) = 0
302509 rseq(0x7ed694290060,0x20,0,0x53053053) = 0
302509 mprotect(0x7ed693dff000,16384,PROT_READ) = 0
302509 mprotect(0x7ed693ffe000,4096,PROT_READ) = 0
302509 mprotect(0x7ed6942c0000,4096,PROT_READ) = 0
302509 mprotect(0x7ed69426c000,45056,PROT_READ) = 0
302509 mprotect(0x63528af0a000,4096,PROT_READ) = 0
302509 mprotect(0x7ed694303000,8192,PROT_READ) = 0
302509 prlimit64(0,RLIMIT_STACK,NULL,{rlim_cur=8192*1024,rlim_max=RLIM64_INFINITY})
= 0
302509 munmap(0x7ed6942c2000,33863) = 0
302509 futex(0x7ed69427a7bc,FUTEX_WAKE_PRIVATE,2147483647) = 0
302509 getrandom("\xcf\x4\x84\x7c\x0a\xc0\xd8\xe9",8,GRND_NONBLOCK) = 8
302509 brk(NULL) = 0x6352a142f000
302509 brk(0x6352a1450000) = 0x6352a1450000
302509 fstat(1,{st_mode=S_IFCHR|0620,st_rdev=makedev(0x88,0x6),...}) = 0
302509 write(1,"\320\222\320\262\320\265\320\264\320\270\321\202\320\265 \320\270\320
\321\204\320\260\320\271\320\273\320\260 \320\264\320\273\321\217 child1: ",48)
= 48
302509 fstat(0,{st_mode=S_IFCHR|0620,st_rdev=makedev(0x88,0x6),...}) = 0
302509 read(0,"file1\n",1024) = 6
302509 write(1,"\320\222\320\262\320\265\320\264\320\270\321\202\320\265 \320\270\320
\321\204\320\260\320\271\320\273\320\260 \320\264\320\273\321\217 child2: ",48)
= 48
302509 read(0,"file2\n",1024) = 6
302509 openat(AT_FDCWD,"/dev/shm/child1_shm",O_RDWR|O_CREAT|O_NOFOLLOW|O_CLOEXEC,0666
= 3
302509 ftruncate(3,4160) = 0
302509 mmap(NULL,4160,PROT_READ|PROT_WRITE,MAP_SHARED,3,0) = 0x7ed6942c9000
302509 openat(AT_FDCWD,"/dev/shm/child2_shm",O_RDWR|O_CREAT|O_NOFOLLOW|O_CLOEXEC,0666
= 4
302509 ftruncate(4,4160) = 0
302509 mmap(NULL,4160,PROT_READ|PROT_WRITE,MAP_SHARED,4,0) = 0x7ed6942c7000
302509 clone(child_stack=NULL,flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD,c
= 302535
302535 set_robust_list(0x7ed69428fa20,24 <unfinished ...>
302509 clone(child_stack=NULL,flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD
<unfinished ...>
302535 <... set_robust_list resumed>) = 0
302535 execve("./child",["./child","child1","/child1_shm","file1"],0x7ffc7a5af818
/* 36 vars */ <unfinished ...>
302509 <... clone resumed>,child_tidptr=0x7ed69428fa10) = 302536
302536 set_robust_list(0x7ed69428fa20,24 <unfinished ...>
302509 clock_nanosleep(CLOCK_REALTIME,0,{tv_sec=10,tv_nsec=0}, <unfinished
...>
302536 <... set_robust_list resumed>) = 0

```

[illegible]



[illegible]

[illegible]

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302536 <... read resumed>"\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\220\243\2\0\
\0\0\0\0\0\0\0\0\0\0\0\0\08\0\16\0@ \0@ \0? \0\6\0\0\0\4\0\0\0@ \0\0\0\0\0\0\0\0@ \0\0\0\0\0\0\0\0@
\0\0\0\0\0\0) \0\0\0\0\0\0) \0\0\0\0\0\0@ \2\0\0\0\0\0\0\0@ \2\0\0\0\0\0\0\0\10\0\0\0\0\0\0\0\4
= 832
302535 openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libc.so.6", O_RDONLY|O_CLOEXEC
<unfinished ...>
302536 pread64(3, <unfinished ...>
302535 <... openat resumed>) = 3
302536 <... 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\
\0\0\0\0\0\0) \0\0\0\0\0\0) \0\0\0\0\0\0@ \2\0\0\0\0\0\0\0@ \2\0\0\0\0\0\0\0\10\0\0\0\0\0\0\0\4
= 784
302535 read(3, <unfinished ...>
302536 fstat(3, <unfinished ...>
302535 <... read resumed>"\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\220\243\2\0\
\0\0\0\0\0\0\0\0\0\0\0\0\08\0\16\0@ \0@ \0? \0\6\0\0\0\4\0\0\0@ \0\0\0\0\0\0\0\0@ \0\0\0\0\0\0\0\0@
\0\0\0\0\0\0) \0\0\0\0\0\0) \0\0\0\0\0\0@ \2\0\0\0\0\0\0\0@ \2\0\0\0\0\0\0\0\10\0\0\0\0\0\0\0\4
= 832
302536 <... fstat resumed>{st_mode=S_IFREG|0755,st_size=2125328,...}) = 0
302535 pread64(3, <unfinished ...>
302536 pread64(3, <unfinished ...>
302535 <... 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\
\0\0\0\0\0\0) \0\0\0\0\0\0) \0\0\0\0\0\0@ \2\0\0\0\0\0\0\0@ \2\0\0\0\0\0\0\0\10\0\0\0\0\0\0\0\4
= 784
302536 <... 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\
\0\0\0\0\0\0) \0\0\0\0\0\0) \0\0\0\0\0\0@ \2\0\0\0\0\0\0\0@ \2\0\0\0\0\0\0\0\10\0\0\0\0\0\0\0\4
= 784
302535 fstat(3, <unfinished ...>
302536 mmap(NULL,2170256,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,3,0 <unfinished
...>
302535 <... fstat resumed>{st_mode=S_IFREG|0755,st_size=2125328,...}) = 0
302536 <... mmap resumed>) = 0x767eede00000
302535 pread64(3, <unfinished ...>
302536 mmap(0x767eede28000,1605632,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENY
<unfinished ...>
302535 <... 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\
\0\0\0\0\0\0) \0\0\0\0\0\0) \0\0\0\0\0\0@ \2\0\0\0\0\0\0\0@ \2\0\0\0\0\0\0\0\10\0\0\0\0\0\0\0\4
= 784
302536 <... mmap resumed>) = 0x767eede28000
302535 mmap(NULL,2170256,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,3,0 <unfinished
...>
302536 mmap(0x767eedfb0000,323584,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0x1
<unfinished ...>
302535 <... mmap resumed>) = 0x7381a1e00000
302536 <... mmap resumed>) = 0x767eedfb0000
302536 mmap(0x767eedfff000,24576,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYW
<unfinished ...>
302535 mmap(0x7381a1e28000,1605632,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENY
<unfinished ...>

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302536 <... mmap resumed>) = 0x767eedfff000
302535 <... mmap resumed>) = 0x7381a1e28000
302536 mmap(0x767eee005000,52624,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,3,0) = 0x767eee005000
<unfinished ...>
302535 mmap(0x7381a1fb0000,323584,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0) = 0x7381a1fb0000
<unfinished ...>
302536 <... mmap resumed>) = 0x767eee005000
302535 <... mmap resumed>) = 0x7381a1fb0000
302536 close(3 <unfinished ...>) = 0
302535 mmap(0x7381a1fff000,24576,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0) = 0x7381a1fff000
<unfinished ...>
302536 <... close resumed>) = 0
302535 <... mmap resumed>) = 0x7381a1fff000
302536 openat(AT_FDCWD,"/lib/x86_64-linux-gnu/libm.so.6",O_RDONLY|O_CLOEXEC,0) = 3
<unfinished ...>
302535 mmap(0x7381a2005000,52624,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,3,0) = 0x7381a2005000
<unfinished ...>
302536 <... openat resumed>) = 3
302535 <... mmap resumed>) = 0x7381a2005000
302536 read(3, <unfinished ...>) = 832
302535 close(3 <unfinished ...>) = 0
302536 fstat(3, <unfinished ...>) = 0
302535 openat(AT_FDCWD,"/lib/x86_64-linux-gnu/libm.so.6",O_RDONLY|O_CLOEXEC,0) = 3
<unfinished ...>
302536 <... fstat resumed>{st_mode=S_IFREG|0644,st_size=952616,...}) = 0
302535 <... openat resumed>) = 3
302536 mmap(NULL,950296,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,3,0 <unfinished ...>) = 0x767eee0e9000
302535 read(3, <unfinished ...>) = 832
302536 <... mmap resumed>) = 0x767eee0e9000
302535 <... read resumed>"\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\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0\0\2\200\0\300\4\0\0\0\1\0\0\0\0\0\0\0" = 832
302536 mmap(0x767eee0f9000,520192,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0) = 0x767eee0f9000
<unfinished ...>
302535 fstat(3, <unfinished ...>) = 0
302536 <... mmap resumed>) = 0x767eee0f9000
302535 <... fstat resumed>{st_mode=S_IFREG|0644,st_size=952616,...}) = 0
302536 mmap(0x767eee178000,360448,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0) = 0x767eee178000
<unfinished ...>
302535 mmap(NULL,950296,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,3,0 <unfinished ...>) = 0x767eee178000
302536 <... mmap resumed>) = 0x767eee178000
302535 <... mmap resumed>) = 0x7381a252b000

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302536 mmap(0x767eee1d0000,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWR
<unfinished ...>
302535 mmap(0x7381a253b000,520192,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENYWR
<unfinished ...>
302536 <... mmap resumed>) = 0x767eee1d0000
302535 <... mmap resumed>) = 0x7381a253b000
302536 close(3 <unfinished ...>
302535 mmap(0x7381a25ba000,360448,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0x8
<unfinished ...>
302536 <... close resumed>) = 0
302535 <... mmap resumed>) = 0x7381a25ba000
302536 mmap(NULL,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_ANONYMOUS,-1,0 <unfinished
...>
302535 mmap(0x7381a2612000,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWR
<unfinished ...>
302536 <... mmap resumed>) = 0x767eee482000
302535 <... mmap resumed>) = 0x7381a2612000
302536 mmap(NULL,12288,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_ANONYMOUS,-1,0
<unfinished ...>
302535 close(3 <unfinished ...>
302536 <... mmap resumed>) = 0x767eee47f000
302535 <... close resumed>) = 0
302536 arch_prctl(ARCH_SET_FS,0x767eee47f740 <unfinished ...>
302535 mmap(NULL,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_ANONYMOUS,-1,0 <unfinished
...>
302536 <... arch_prctl resumed>) = 0
302535 <... mmap resumed>) = 0x7381a2529000
302536 set_tid_address(0x767eee47fa10 <unfinished ...>
302535 mmap(NULL,12288,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_ANONYMOUS,-1,0
<unfinished ...>
302536 <... set_tid_address resumed>) = 302536
302535 <... mmap resumed>) = 0x7381a2526000
302536 set_robust_list(0x767eee47fa20,24 <unfinished ...>
302535 arch_prctl(ARCH_SET_FS,0x7381a2526740 <unfinished ...>
302536 <... set_robust_list resumed>) = 0
302535 <... arch_prctl resumed>) = 0
302536 rseq(0x767eee480060,0x20,0,0x53053053 <unfinished ...>
302535 set_tid_address(0x7381a2526a10 <unfinished ...>
302536 <... rseq resumed>) = 0
302535 <... set_tid_address resumed>) = 302535
302535 set_robust_list(0x7381a2526a20,24 <unfinished ...>
302536 mprotect(0x767eedfff000,16384,PROT_READ <unfinished ...>
302535 <... set_robust_list resumed>) = 0
302536 <... mprotect resumed>) = 0
302535 rseq(0x7381a2527060,0x20,0,0x53053053 <unfinished ...>
302536 mprotect(0x767eee1d0000,4096,PROT_READ) = 0
302535 <... rseq resumed>) = 0
302536 mprotect(0x767eee1fe000,4096,PROT_READ) = 0

```

```

302535 mprotect(0x7381a1fff000,16384,PROT_READ) = 0
302535 mprotect(0x7381a2612000,4096,PROT_READ) = 0
302536 mprotect(0x767eee46c000,45056,PROT_READ <unfinished ...>
302535 mprotect(0x7381a2640000,4096,PROT_READ <unfinished ...>
302536 <... mprotect resumed>) = 0
302535 <... mprotect resumed>) = 0
302536 mprotect(0x5f2d62e0e000,4096,PROT_READ) = 0
302536 mprotect(0x767eee4c5000,8192,PROT_READ) = 0
302535 mprotect(0x7381a246c000,45056,PROT_READ <unfinished ...>
302536 prlimit64(0,RLIMIT_STACK,NULL, <unfinished ...>
302535 <... mprotect resumed>) = 0
302536 <... prlimit64 resumed>{rlim_cur=8192*1024,rlim_max=RLIM64_INFINITY})
= 0
302535 mprotect(0x631649d6e000,4096,PROT_READ <unfinished ...>
302536 munmap(0x767eee484000,33863 <unfinished ...>
302535 <... mprotect resumed>) = 0
302536 <... munmap resumed>) = 0
302535 mprotect(0x7381a2683000,8192,PROT_READ) = 0
302536 futex(0x767eee47a7bc,FUTEX_WAKE_PRIVATE,2147483647 <unfinished ...>
302535 prlimit64(0,RLIMIT_STACK,NULL, <unfinished ...>
302536 <... futex resumed>) = 0
302535 <... prlimit64 resumed>{rlim_cur=8192*1024,rlim_max=RLIM64_INFINITY})
= 0
302536 getrandom( <unfinished ...>
302535 munmap(0x7381a2642000,33863 <unfinished ...>
302536 <... getrandom resumed>"\xab\x0\x44\x84\x13\xa0\xcd\x3a",8,GRND_NONBLOCK)
= 8
302536 brk(NULL <unfinished ...>
302535 <... munmap resumed>) = 0
302536 <... brk resumed>) = 0x5f2d70ae1000
302535 futex(0x7381a247a7bc,FUTEX_WAKE_PRIVATE,2147483647 <unfinished ...>
302536 brk(0x5f2d70b02000 <unfinished ...>
302535 <... futex resumed>) = 0
302536 <... brk resumed>) = 0x5f2d70b02000
302535 getrandom( <unfinished ...>
302536 fstat(1, <unfinished ...>
302535 <... getrandom resumed>"\x4e\x0b\xc4\x54\xdd\x83\xfa\xd3",8,GRND_NONBLOCK)
= 8
302536 <... fstat resumed>{st_mode=S_IFCHR|0620,st_rdev=makedev(0x88,0x6),...})
= 0
302535 brk(NULL <unfinished ...>
302536 write(1,"child2: \320\267\320\260\320\277\321\203\321\211\320\265\320\275
\321\201 shared memory /child2_shm \320\270 \320\262\321\213\321\205\320\276\320\264\
\321\204\320\260\320\271\320\273\320\276\320\274 file2\n",91 <unfinished ...>
302535 <... brk resumed>) = 0x631689272000
302536 <... write resumed>) = 91
302535 brk(0x631689293000 <unfinished ...>
302536 openat(AT_FDCWD,"/dev/shm/child2_shm",O_RDWR|O_NOFOLLOW|O_CLOEXEC <unfinished

```

```

...>
302535 <... brk resumed>) = 0x631689293000
302536 <... openat resumed>) = 3
302536 mmap(NULL,4160,PROT_READ|PROT_WRITE,MAP_SHARED,3,0 <unfinished ...>
302535 fstat(1, <unfinished ...>
302536 <... mmap resumed>) = 0x767eee48b000
302535 <... fstat resumed>{st_mode=S_IFCHR|0620,st_rdev=makedev(0x88,0x6),...})
= 0
302536 futex(0x767eee48c000,FUTEX_WAIT_BITSET|FUTEX_CLOCK_REALTIME,0,NULL,FUTEX_BITSE
<unfinished ...>
302535 write(1,"child1: \320\267\320\260\320\277\321\203\321\211\320\265\320\275
\321\201 shared memory /child1_shm \320\270 \320\262\321\213\321\205\320\276\320\264\
\321\204\320\260\320\271\320\273\320\276\320\274 file1\n",91) = 91
302535 openat(AT_FDCWD,"/dev/shm/child1_shm",O_RDWR|O_NOFOLLOW|O_CLOEXEC) =
3
302535 mmap(NULL,4160,PROT_READ|PROT_WRITE,MAP_SHARED,3,0) = 0x7381a2649000
302535 futex(0x7381a264a000,FUTEX_WAIT_BITSET|FUTEX_CLOCK_REALTIME,0,NULL,FUTEX_BITSE
<unfinished ...>
302509 <... clock_nanosleep resumed>0x7ffc7a5af570) = 0
302509 read(0,"hello\n",1024) = 6
302509 read(0,"big\n",1024) = 4
302509 read(0,"git\n",1024) = 4
302509 read(0,"create\n",1024) = 7
302509 read(0,"for\n",1024) = 4
302509 read(0,"down\n",1024) = 5
302509 read(0,"",1024) = 0
302509 futex(0x7ed6942ca000,FUTEX_WAKE,1) = 1
302535 <... futex resumed>) = 0
302509 futex(0x7ed6942c8000,FUTEX_WAKE,1 <unfinished ...>
302535 write(1,"child1: \320\277\320\276\320\273\321\203\321\207\320\265\320\275\320\
'hello\ngit\n",36 <unfinished ...>
302509 <... futex resumed>) = 1
302536 <... futex resumed>) = 0
302535 <... write resumed>) = 36
302509 write(1,"\320\224\320\260\320\275\320\275\321\213\320\265 \320\276\321\202\320\
\320\262 \320\264\320\276\321\207\320\265\321\200\320\275\320\270\320\265 \320\277\32
<unfinished ...>
302536 write(1,"child2: \320\277\320\276\320\273\321\203\321\207\320\265\320\275\320\
'big\ncreate\n",37 <unfinished ...>
302535 write(1,"for'\n",5 <unfinished ...>
302509 <... write resumed>) = 71
302536 <... write resumed>) = 37
302509 write(1,"\320\224\320\260\320\275\320\275\321\213\320\265 \320\276\320\261\321\
\320\264\320\276\321\207\320\265\321\200\320\275\320\270\320\274\320\270 \320\277\321
<unfinished ...>
302535 <... write resumed>) = 5
302536 write(1,"down'\n",6 <unfinished ...>
302509 <... write resumed>) = 70

```

```

302536 <... write resumed>                                = 6
302509 wait4(302535, <unfinished ...>
302536 openat(AT_FDCWD,"file2",O_WRONLY|O_CREAT|O_TRUNC,0666 <unfinished ...>
302535 openat(AT_FDCWD,"file1",O_WRONLY|O_CREAT|O_TRUNC,0666 <unfinished ...>
302536 <... openat resumed>)                                = 4
302535 <... openat resumed>)                                = 4
302536 write(4,"gib\n",4 <unfinished ...>
302535 write(4,"olleh\n",6 <unfinished ...>
302536 <... write resumed>)                                = 4
302535 <... write resumed>)                                = 6
302536 write(4,"etaerc\n",7 <unfinished ...>
302535 write(4,"tig\n",4 <unfinished ...>
302536 <... write resumed>)                                = 7
302535 <... write resumed>)                                = 4
302536 write(4,"nwod\n",5 <unfinished ...>
302535 write(4,"rof\n",4 <unfinished ...>
302536 <... write resumed>)                                = 5
302535 <... write resumed>)                                = 4
302536 write(1,"child2: \320\267\320\260\320\277\320\270\321\201\320\260\320\275\320\277\321\201\321\202\321\200\320\276\320\272 \320\262 file2\n",47 <unfinished
...>
302535 write(1,"child1: \320\267\320\260\320\277\320\270\321\201\320\260\320\275\320\277\321\201\321\202\321\200\320\276\320\272 \320\262 file1\n",47 <unfinished
...>
302536 <... write resumed>)                                = 47
302535 <... write resumed>)                                = 47
302536 close(4 <unfinished ...>
302535 close(4 <unfinished ...>
302536 <... close resumed>)                                = 0
302536 munmap(0x767eee48b000,4160)                        = 0
302535 <... close resumed>)                                = 0
302536 close(3 <unfinished ...>
302535 munmap(0x7381a2649000,4160 <unfinished ...>
302536 <... close resumed>)                                = 0
302535 <... munmap resumed>)                                = 0
302535 close(3)                                            = 0
302536 exit_group(0 <unfinished ...>
302535 exit_group(0 <unfinished ...>
302536 <... exit_group resumed>)                            = ?
302535 <... exit_group resumed>)                            = ?
302536 +++ exited with 0 +++
302535 +++ exited with 0 +++
302509 <... wait4 resumed>[{WIFEXITED(s) && WEXITSTATUS(s) == 0}],0,NULL) =
302535
302509 ---SIGCHLD {si_signo=SIGCHLD,si_code=CLD_EXITED,si_pid=302536,si_uid=1000,si_s
---
302509 wait4(302536,[{WIFEXITED(s) && WEXITSTATUS(s) == 0}],0,NULL) = 302536
302509 write(1,"\320\224\320\276\321\207\320\265\321\200\320\275\320\270\320\265

```



```

\320\277\321\200\320\276\321\206\320\265\321\201\321\201\321\213 \320\267\320\260\320
\321\200\320\260\320\261\320\276\321\202\321\203\n",66) = 66
302509 munmap(0x7ed6942c9000,4160) = 0
302509 close(3) = 0
302509 unlink("/dev/shm/child1_shm") = 0
302509 munmap(0x7ed6942c7000,4160) = 0
302509 close(4) = 0
302509 unlink("/dev/shm/child2_shm") = 0
302509 exit_group(0) = ?
302509 +++ exited with 0 +++

```

## Системные вызовы лаб. 4

### Системные вызовы статической библиотеки

```

execve("./program1",["./program1"],0x7ffd9a10e080 /* 36 vars */) = 0
brk(NULL) = 0x55a72a072000
mmap(NULL,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_ANONYMOUS,-1,0) = 0x7be415b94000
access("/etc/ld.so.preload",R_OK) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD,"/home/daalginichev/OS/Lab_4/build/glibc-hwcaps/x86-64-v3/libcontract
= -1 ENOENT (No such file or directory)
newfstatat(AT_FDCWD,"/home/daalginichev/OS/Lab_4/build/glibc-hwcaps/x86-64-v3/",0x7ff
= -1 ENOENT (No such file or directory)
openat(AT_FDCWD,"/home/daalginichev/OS/Lab_4/build/glibc-hwcaps/x86-64-v2/libcontract
= -1 ENOENT (No such file or directory)
newfstatat(AT_FDCWD,"/home/daalginichev/OS/Lab_4/build/glibc-hwcaps/x86-64-v2/",0x7ff
= -1 ENOENT (No such file or directory)
openat(AT_FDCWD,"/home/daalginichev/OS/Lab_4/build/libcontract1.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"... ,832)
= 832
fstat(3,{st_mode=S_IFREG|0755,st_size=22160,...}) = 0
mmap(NULL,20632,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,3,0) = 0x7be415b8e000
mmap(0x7be415b90000,4096,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0x
= 0x7be415b90000
mmap(0x7be415b91000,4096,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0x3000)
= 0x7be415b91000
mmap(0x7be415b92000,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0
= 0x7be415b92000
close(3) = 0
openat(AT_FDCWD,"/home/daalginichev/OS/Lab_4/build/libstdc++.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=34331,...}) = 0
mmap(NULL,34331,PROT_READ,MAP_PRIVATE,3,0) = 0x7be415b85000
close(3) = 0
openat(AT_FDCWD,"/lib/x86_64-linux-gnu/libstdc++.so.6",O_RDONLY|O_CLOEXEC)
= 3
read(3,"\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0"... ,832)
= 832

```

```

fstat(3,{st_mode=S_IFREG|0644,st_size=2592224,...}) = 0
mmap(NULL,2609472,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,3,0) = 0x7be415800000
mmap(0x7be41589d000,1343488,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0) = 0x7be41589d000
mmap(0x7be4159e5000,552960,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0x1e5000) = 0x7be4159e5000
mmap(0x7be415a6c000,57344,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0) = 0x7be415a6c000
mmap(0x7be415a7a000,12608,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,-1,0) = 0x7be415a7a000
close(3) = 0
openat(AT_FDCWD,"/home/daalginichev/OS/Lab_4/build/libc.so.6",O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD,"/lib/x86_64-linux-gnu/libc.so.6",O_RDONLY|O_CLOEXEC) = 3
read(3,"\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\220\243\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=2125328,...}) = 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,2170256,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,3,0) = 0x7be415400000
mmap(0x7be415428000,1605632,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0) = 0x7be415428000
mmap(0x7be4155b0000,323584,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0x1b0000) = 0x7be4155b0000
mmap(0x7be4155ff000,24576,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0) = 0x7be4155ff000
mmap(0x7be415605000,52624,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,-1,0) = 0x7be415605000
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\0"... ,832) = 832
fstat(3,{st_mode=S_IFREG|0644,st_size=952616,...}) = 0
mmap(NULL,950296,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,3,0) = 0x7be415a9c000
mmap(0x7be415aac000,520192,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0) = 0x7be415aac000
mmap(0x7be415b2b000,360448,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0x8f000) = 0x7be415b2b000
mmap(0x7be415b83000,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0) = 0x7be415b83000
close(3) = 0
openat(AT_FDCWD,"/lib/x86_64-linux-gnu/libgcc_s.so.1",O_RDONLY|O_CLOEXEC) = 3
read(3,"\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0\0"... ,832) = 832
fstat(3,{st_mode=S_IFREG|0644,st_size=183024,...}) = 0

```

```

mmap(NULL,185256,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,3,0) = 0x7be4157d2000
mmap(0x7be4157d6000,147456,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0) = 0x7be4157d6000
mmap(0x7be4157fa000,16384,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0x28000) = 0x7be4157fa000
mmap(0x7be4157fe000,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0) = 0x7be4157fe000
close(3) = 0
mmap(NULL,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_ANONYMOUS,-1,0) = 0x7be415a9a000
mmap(NULL,12288,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_ANONYMOUS,-1,0) = 0x7be415a97000
arch_prctl(ARCH_SET_FS,0x7be415a97740) = 0
set_tid_address(0x7be415a97a10) = 40263
set_robust_list(0x7be415a97a20,24) = 0
rseq(0x7be415a98060,0x20,0,0x53053053) = 0
mprotect(0x7be4155ff000,16384,PROT_READ) = 0
mprotect(0x7be4157fe000,4096,PROT_READ) = 0
mprotect(0x7be415b83000,4096,PROT_READ) = 0
mprotect(0x7be415a6c000,45056,PROT_READ) = 0
mprotect(0x7be415b92000,4096,PROT_READ) = 0
mprotect(0x55a72456e000,4096,PROT_READ) = 0
mprotect(0x7be415bcc000,8192,PROT_READ) = 0
prlimit64(0,RLIMIT_STACK,NULL,{rlim_cur=8192*1024,rlim_max=RLIM64_INFINITY}) = 0
munmap(0x7be415b85000,34331) = 0
futex(0x7be415a7a7bc,FUTEX_WAKE_PRIVATE,2147483647) = 0
getrandom("\xf4\x58\xc1\xde\x95\xd0\x9b\xe",8,GRND_NONBLOCK) = 8
brk(NULL) = 0x55a72a072000
brk(0x55a72a093000) = 0x55a72a093000
fstat(1,{st_mode=S_IFCHR|0620,st_rdev=makedev(0x88,0x5),...}) = 0
write(1,"\320\222\320\262\320\265\320\264\320\270\321\202\320\265,\321\207\321\202\320\265\320\276\321\202\320\270\321"... ,51) = 51
write(1,"0 \320\232\320\276\320\275\320\265\321\206 \320\277\321\200\320\276\320\263\320\264\320\265\320\276\321\202\320\270\321"... ,51) = 32
write(1,"1 \320\237\321\200\320\276\320\270\320\267\320\262\320\276\320\264\320\275\320\265\320\276\321\200\320\276\320\270\321"... ,51) = 25
write(1,"2 \320\241\320\276\321\200\321\202\320\270\321\200\320\276\320\262\320\272\320\265\320\276\321\200\320\276\320\270\321"... ,51) = 23
fstat(0,{st_mode=S_IFCHR|0620,st_rdev=makedev(0x88,0x5),...}) = 0
read(0,"1\n",1024) = 2
write(1,"\320\222\320\262\320\265\320\264\320\270\321\202\320\265 \321\202\320\276\320\265\320\276\321\202\320\270\321"... ,51) = 26
read(0,"0\n",1024) = 2
write(1,"\320\222\320\262\320\265\320\264\320\270\321\202\320\265 \320\276\321\202\320\265\320\276\321\202\320\270\321"... ,51) = 36
read(0,"0.00000001\n",1024) = 11
write(1,"0\n",2) = 2
write(1,"\320\222\320\262\320\265\320\264\320\270\321\202\320\265,\321\207\321\202\320\265\320\276\321\202\320\270\321"... ,51) = 51

```

```

write(1,"0 \320\232\320\276\320\275\320\265\321\206 \320\277\321\200\320\276\320\263\321\200
= 32
write(1,"1 \320\237\321\200\320\276\320\270\320\267\320\262\320\276\320\264\320\275\321\200
= 25
write(1,"2 \320\241\320\276\321\200\321\202\320\270\321\200\320\276\320\262\320\272\321\200
= 23
read(0,"2\n",1024) = 2
write(1,"\320\222\320\262\320\265\320\264\320\270\321\202\320\265 \321\200\320\260\321\200\320\274\320\260"...
,43) = 43
read(0,"5\n",1024) = 2
write(1,"\320\222\320\262\320\265\320\264\320\270\321\202\320\265 \321\215\320\273\321\200\320\274\320\260"...
,47) = 47
read(0,"5 4 3 2 1\n",1024) = 10
write(1,"1 2 3 4 5 \n",11) = 11
write(1,"\320\222\320\262\320\265\320\264\320\270\321\202\320\265,\321\207\321\202\320\265\321\205\320\276\321\202\320\270\321"...
,51) = 51
write(1,"0 \320\232\320\276\320\275\320\265\321\206 \320\277\321\200\320\276\320\263\321\200
= 32
write(1,"1 \320\237\321\200\320\276\320\270\320\267\320\262\320\276\320\264\320\275\321\200
= 25
write(1,"2 \320\241\320\276\321\200\321\202\320\270\321\200\320\276\320\262\320\272\321\200
= 23
read(0,"0\n",1024) = 2
lseek(0,-1,SEEK_CUR) = -1 ESPIPE (Illegal seek)
exit_group(0) = ?
+++ exited with 0 +++

```

## Системные вызовы динамических библиотек

```

execve("./program2",["./program2"],0x7ffffaf0efe10 /* 36 vars */) = 0
brk(NULL) = 0x60bbb5bf5000
mmap(NULL,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_ANONYMOUS,-1,0) = 0x725ea6607000
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=34331,...}) = 0
mmap(NULL,34331,PROT_READ,MAP_PRIVATE,3,0) = 0x725ea65fe000
close(3) = 0
openat(AT_FDCWD,"/lib/x86_64-linux-gnu/libstdc++.so.6",O_RDONLY|O_CLOEXEC) = 3
read(3,"\177ELF\2\1\1\3\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0"...
,832) = 832
fstat(3,{st_mode=S_IFREG|0644,st_size=2592224,...}) = 0
mmap(NULL,2609472,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,3,0) = 0x725ea6200000
mmap(0x725ea629d000,1343488,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0) = 0x725ea629d000
mmap(0x725ea63e5000,552960,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0x1e5000) = 0x725ea63e5000
mmap(0x725ea646c000,57344,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0) = 0x725ea646c000

```

```
mmap(0x725ea647a000,12608,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,-1
= 0x725ea647a000
close(3) = 0
openat(AT_FDCWD,"/lib/x86_64-linux-gnu/libgcc_s.so.1",O_RDONLY|O_CLOEXEC) =
3
read(3,"\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0"...,832)
= 832
fstat(3,{st_mode=S_IFREG|0644,st_size=183024,...}) = 0
mmap(NULL,185256,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,3,0) = 0x725ea65d0000
mmap(0x725ea65d4000,147456,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0)
= 0x725ea65d4000
mmap(0x725ea65f8000,16384,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0x28000)
= 0x725ea65f8000
mmap(0x725ea65fc000,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0)
= 0x725ea65fc000
close(3) = 0
openat(AT_FDCWD,"/lib/x86_64-linux-gnu/libc.so.6",O_RDONLY|O_CLOEXEC) = 3
read(3,"\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\220\243\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=2125328,...}) = 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,2170256,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,3,0) = 0x725ea5e00000
mmap(0x725ea5e28000,1605632,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0)
= 0x725ea5e28000
mmap(0x725ea5fb0000,323584,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0x1b0000)
= 0x725ea5fb0000
mmap(0x725ea5fff000,24576,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0)
= 0x725ea5fff000
mmap(0x725ea6005000,52624,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,-1)
= 0x725ea6005000
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"...,832)
= 832
fstat(3,{st_mode=S_IFREG|0644,st_size=952616,...}) = 0
mmap(NULL,950296,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,3,0) = 0x725ea64e7000
mmap(0x725ea64f7000,520192,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0)
= 0x725ea64f7000
mmap(0x725ea6576000,360448,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0x8f000)
= 0x725ea6576000
mmap(0x725ea65ce000,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0)
= 0x725ea65ce000
close(3) = 0
mmap(NULL,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_ANONYMOUS,-1,0) = 0x725ea64e5000
mmap(NULL,12288,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_ANONYMOUS,-1,0) = 0x725ea64e2000
```



```

= 36
read(0,"0.000000000001\n",1024)          = 14
write(1,"0\n",2)                          = 2
write(1,"\320\222\320\262\320\265\320\264\320\270\321\202\320\265,\321\207\321\202\320\265\321\205\320\276\321\202\320\270\321"... ,51) = 51
write(1,"-1 \320\232\320\276\320\275\320\265\321\206 \320\277\321\200\320\276\320\263\n",2) = 33
write(1,"0 \320\241\320\274\320\265\320\275\320\260 \320\261\320\270\320\261\320\273\n",2) = 34
write(1,"1 \320\237\321\200\320\276\320\270\320\267\320\262\320\276\320\264\320\275\320\263\n",2) = 25
write(1,"2 \320\241\320\276\321\200\321\202\320\270\321\200\320\276\320\262\320\272\320\263\n",2) = 23
read(0,"2\n",1024)                      = 2
write(1,"\320\222\320\262\320\265\320\264\320\270\321\202\320\265 \321\200\320\260\320\274\320\260"... ,43) = 43
read(0,"5\n",1024)                      = 2
write(1,"\320\222\320\262\320\265\320\264\320\270\321\202\320\265 \321\215\320\273\320\263\n",2) = 47
read(0,"5 4 3 2 1\n",1024)              = 10
write(1,"1 2 3 4 5 \n",11)              = 11
write(1,"\320\222\320\262\320\265\320\264\320\270\321\202\320\265,\321\207\321\202\320\265\321\205\320\276\321\202\320\270\321"... ,51) = 51
write(1,"-1 \320\232\320\276\320\275\320\265\321\206 \320\277\321\200\320\276\320\263\n",2) = 33
write(1,"0 \320\241\320\274\320\265\320\275\320\260 \320\261\320\270\320\261\320\273\n",2) = 34
write(1,"1 \320\237\321\200\320\276\320\270\320\267\320\262\320\276\320\264\320\275\320\263\n",2) = 25
write(1,"2 \320\241\320\276\321\200\321\202\320\270\321\200\320\276\320\262\320\272\320\263\n",2) = 23
read(0,"0\n",1024)                      = 2
write(1,"\320\222\320\262\320\265\320\264\320\270\321\202\320\265 \320\275\320\260\320\274\320\260"... ,53) = 53
read(0,"./libcontract2.so\n",1024)      = 18
munmap(0x725ea6601000,20632)             = 0
openat(AT_FDCWD,"./libcontract2.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"... ,832) = 832
fstat(3,{st_mode=S_IFREG|0755,st_size=22264,...}) = 0
getcwd("/home/daalginichev/OS/Lab_4/build",128) = 34
mmap(NULL,20640,PROT_READ,MAP_PRIVATE|MAP_DENYWRITE,3,0) = 0x725ea6601000
mmap(0x725ea6603000,4096,PROT_READ|PROT_EXEC,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0x725ea6603000) = 0x725ea6603000
mmap(0x725ea6604000,4096,PROT_READ,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0x725ea6604000) = 0x725ea6604000
mmap(0x725ea6605000,8192,PROT_READ|PROT_WRITE,MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,3,0x725ea6605000) = 0x725ea6605000

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```

close(3) = 0
mprotect(0x725ea6605000,4096,PROT_READ) = 0
write(1,"\320\222\320\262\320\265\320\264\320\270\321\202\320\265,\321\207\321\202\320\265\320\276\321\202\320\270\321"... ,51) = 51
write(1,"-1 \320\232\320\276\320\275\320\265\321\206 \320\277\321\200\320\276\320\263\n",1024) = 33
write(1,"0 \320\241\320\274\320\265\320\275\320\260 \320\261\320\270\320\261\320\273\n",1024) = 34
write(1,"1 \320\237\321\200\320\276\320\270\320\267\320\262\320\276\320\264\320\275\320\263\n",1024) = 25
write(1,"2 \320\241\320\276\321\200\321\202\320\270\321\200\320\276\320\262\320\272\320\263\n",1024) = 23
read(0,"1\n",1024) = 2
write(1,"\320\222\320\262\320\265\320\264\320\270\321\202\320\265 \321\202\320\276\320\263\n",1024) = 26
read(0,"0\n",1024) = 2
write(1,"\320\222\320\262\320\265\320\264\320\270\321\202\320\265 \320\276\321\202\320\263\n",1024) = 36
read(0,"0.0000001\n",1024) = 10
write(1,"0\n",2) = 2
write(1,"\320\222\320\262\320\265\320\264\320\270\321\202\320\265,\321\207\321\202\320\265\320\276\321\202\320\270\321"... ,51) = 51
write(1,"-1 \320\232\320\276\320\275\320\265\321\206 \320\277\321\200\320\276\320\263\n",1024) = 33
write(1,"0 \320\241\320\274\320\265\320\275\320\260 \320\261\320\270\320\261\320\273\n",1024) = 34
write(1,"1 \320\237\321\200\320\276\320\270\320\267\320\262\320\276\320\264\320\275\320\263\n",1024) = 25
write(1,"2 \320\241\320\276\321\200\321\202\320\270\321\200\320\276\320\262\320\272\320\263\n",1024) = 23
read(0,"2\n",1024) = 2
write(1,"\320\222\320\262\320\265\320\264\320\270\321\202\320\265 \321\200\320\260\320\274\320\260"... ,43) = 43
read(0,"5\n",1024) = 2
write(1,"\320\222\320\262\320\265\320\264\320\270\321\202\320\265 \321\215\320\273\320\263\n",1024) = 47
read(0,"5 4 3 2 1\n",1024) = 10
write(1,"1 2 3 4 5 \n",11) = 11
write(1,"\320\222\320\262\320\265\320\264\320\270\321\202\320\265,\321\207\321\202\320\265\320\276\321\202\320\270\321"... ,51) = 51
write(1,"-1 \320\232\320\276\320\275\320\265\321\206 \320\277\321\200\320\276\320\263\n",1024) = 33
write(1,"0 \320\241\320\274\320\265\320\275\320\260 \320\261\320\270\320\261\320\273\n",1024) = 34
write(1,"1 \320\237\321\200\320\276\320\270\320\267\320\262\320\276\320\264\320\275\320\263\n",1024) = 25
write(1,"2 \320\241\320\276\321\200\321\202\320\270\321\200\320\276\320\262\320\272\320\263\n",1024) = 23

```



read(0, "-1\n", 1024)	= 3
munmap(0x725ea6601000, 20640)	= 0
lseek(0, -1, SEEK_CUR)	= -1 ESPIPE (Illegal seek)
exit_group(0)	= ?
+++ exited with 0 +++	