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Факультет информационных технологий и прикладной математики
Кафедра вычислительной математики и программирования

Лабораторная работа №8 по курсу
«Утилита strace»

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Оценка: _____
Дата: _____
Подпись: _____

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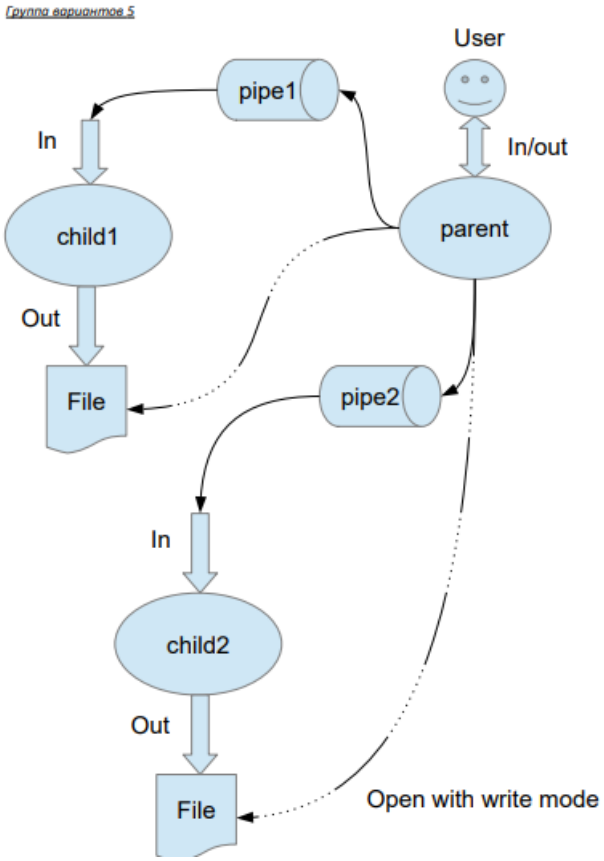
Лабораторная работа №1

Задача: составить и отладить программу на языке Си, осуществляющую работу с процессами и взаимодействие между ними в одной из двух операционных систем. В результате работы программа (основной процесс) должен создать для решение задачи один или несколько дочерних процессов. Взаимодействие между процессами осуществляется через системные сигналы/события и/или каналы (pipe). Необходимо обрабатывать системные ошибки, которые могут возникнуть в результате работ




```
execve("./parent", ["./parent"], 0x7ffc4c19d440 /* 75 vars */) = 0
brk(NULL)                               = 0x5a587e06a000
mmap(NULL, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7e5f1a6d6000
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=87915, ...}) = 0
mmap(NULL, 87915, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7e5f1a6c0000
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) = 0x7e5f1a400000
mmap(0x7e5f1a428000, 1605632, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x28000) =
0x7e5f1a428000
mmap(0x7e5f1a5b0000, 323584, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1b0000) =
0x7e5f1a5b0000
mmap(0x7e5f1a5ff000, 24576, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1fe000) =
0x7e5f1a5ff000
mmap(0x7e5f1a605000, 52624, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x7e5f1a605000
close(3)                                = 0
mmap(NULL, 12288, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7e5f1a6bd000
arch_prctl(ARCH_SET_FS, 0x7e5f1a6bd740) = 0
set_tid_address(0x7e5f1a6bda10)         = 918927
set_robust_list(0x7e5f1a6bda20, 24)     = 0
rseq(0x7e5f1a6be060, 0x20, 0, 0x53053053) = 0
mprotect(0x7e5f1a5ff000, 16384, PROT_READ) = 0
mprotect(0x5a587c55f000, 4096, PROT_READ) = 0
mprotect(0x7e5f1a70e000, 8192, PROT_READ) = 0
prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024,
rlim_max=RLIM64_INFINITY}) = 0
munmap(0x7e5f1a6c0000, 87915)           = 0
pipe2([3, 4], 0)                        = 0
pipe2([5, 6], 0)                        = 0
fstat(1, {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0x1), ...}) = 0
getrandom("\x34\x6b\x64\x5e\xd0\x3c\xc8\xe8", 8, GRND_NONBLOCK) = 8
brk(NULL)                               = 0x5a587e06a000
brk(0x5a587e08b000)                     = 0x5a587e08b000
fstat(0, {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0x1), ...}) = 0
write(1, "Enter filename for child1: ", 27) = 27
read(0, "test1.txt\n", 1024)            = 10
write(1, "Enter filename for child2: ", 27) = 27
read(0, "test2.txt\n", 1024)            = 10
clone(child_stack=NULL,
flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD,
child_tidptr=0x7e5f1a6bda10) = 918968
clone(child_stack=NULL,
```

```
flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD,
child_tidptr=0x7e5f1a6bda10) = 918969
close(3)                        = 0
close(5)                        = 0
read(0, "\321\207\321\221\321\202\320\275\320\276\320\265\n", 1024) = 13
write(4, "\321\207\321\221\321\202\320\275\320\276\320\265\n\0", 14) = 14
read(0,
"\320\275\320\265\321\207\321\221\321\202\320\275\320\276\320\265\320\265\n
", 1024) = 19
write(6,
"\320\275\320\265\321\207\321\221\321\202\320\275\320\276\320\265\320\265\n
\0", 20) = 20
read(0, 0x5a587e06a6b0, 1024)          = ? ERESTARTSYS (To be restarted if
SA_RESTART is set)
--- SIGINT {si_signo=SIGINT, si_code=SI_KERNEL} ---
+++ killed by SIGINT +++
```

Лабораторная работа №2

Постановка задачи

Составить программу на языке Си, обрабатывающую данные в многопоточном режиме. При обработки использовать стандартные средства создания потоков операционной системы (Windows/Unix). Ограничение максимального количества потоков, работающих в один момент времени, должно быть задано ключом запуска вашей программы.

Вариант 4: отсортировать массив целых чисел при помощи TimSort

Общие сведения о программе

Сначала программа делит весь массив на маленькие кусочки (minrun), а потом сортирует каждый из них в отдельном потоке. Потом эти кусочки сливаются вместе, тоже в разных потоках, пока весь массив не станет отсортированным. Суть в том, чтобы использовать несколько потоков для ускорения процесса сортировки

```
execve("./monte_carlo_simulation", ["./monte_carlo_simulation", "4", "100000"],
0x7ffd7e61d8c0 /* 75 vars */) = 0
brk(NULL)                               = 0x577ac3cb3000
mmap(NULL, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x799e07a23000
```

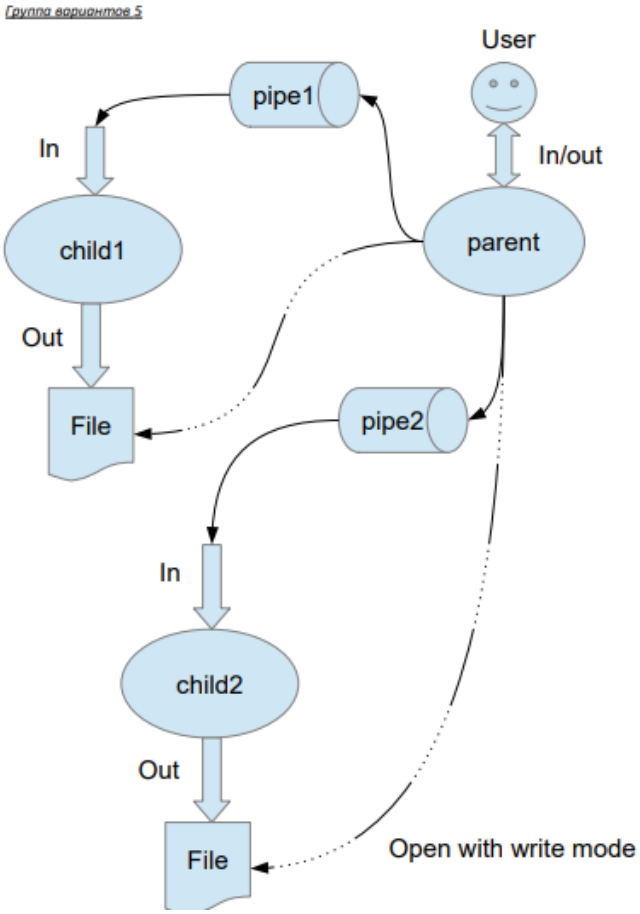
```
access("/etc/ld.so.preload", R_OK)      = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3
fstat(3, {st_mode=S_IFREG|0644, st_size=87915, ...}) = 0
mmap(NULL, 87915, PROT_READ, MAP_PRIVATE, 3, 0) = 0x799e07a0d000
close(3)                                = 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) = 0x799e07600000
mmap(0x799e07628000, 1605632, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x28000) =
0x799e07628000
mmap(0x799e077b0000, 323584, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1b0000) =
0x799e077b0000
mmap(0x799e077ff000, 24576, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1fe000) =
0x799e077ff000
mmap(0x799e07805000, 52624, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x799e07805000
close(3)                                = 0
mmap(NULL, 12288, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x799e07a0a000
arch_prctl(ARCH_SET_FS, 0x799e07a0a740) = 0
set_tid_address(0x799e07a0aa10)         = 919710
set_robust_list(0x799e07a0aa20, 24)     = 0
rseq(0x799e07a0b060, 0x20, 0, 0x53053053) = 0
mprotect(0x799e077ff000, 16384, PROT_READ) = 0
mprotect(0x577ac20bb000, 4096, PROT_READ) = 0
mprotect(0x799e07a5b000, 8192, PROT_READ) = 0
prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024,
rlim_max=RLIM64_INFINITY}) = 0
munmap(0x799e07a0d000, 87915)           = 0
rt_sigaction(SIGRT_1, {sa_handler=0x799e07699520, sa_mask=[],
sa_flags=SA_RESTORER|SA_ONSTACK|SA_RESTART|SA_SIGINFO,
sa_restorer=0x799e07645320}, NULL, 8) = 0
rt_sigprocmask(SIG_UNBLOCK, [RTMIN RT_1], NULL, 8) = 0
mmap(NULL, 8392704, PROT_NONE,
```

```
MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK, -1, 0) = 0x799e06c00000
mprotect(0x799e06c01000, 8388608, PROT_READ|PROT_WRITE) = 0
getrandom("\xad\xaf\x10\x0d\xdf\x14\xd2\x4e", 8, GRND_NONBLOCK) = 8
brk(NULL)                               = 0x577ac3cb3000
brk(0x577ac3cd4000)                     = 0x577ac3cd4000
rt_sigprocmask(SIG_BLOCK, ~[], [], 8)   = 0
clone3({flags=CLONE_VM|CLONE_FS|CLONE_FILES|CLONE_SIGHAND|CL
ONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|CLONE_PARENT_SET
TID|CLONE_CHILD_CLEARTID, child_tid=0x799e07400990,
parent_tid=0x799e07400990, exit_signal=0, stack=0x799e06c00000,
stack_size=0x7fff80, tls=0x799e074006c0} => {parent_tid=[919711]}, 88) =
919711
rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0
mmap(NULL, 8392704, PROT_NONE,
MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK, -1, 0) = 0x799e06200000
mprotect(0x799e06201000, 8388608, PROT_READ|PROT_WRITE) = 0
rt_sigprocmask(SIG_BLOCK, ~[], [], 8)   = 0
clone3({flags=CLONE_VM|CLONE_FS|CLONE_FILES|CLONE_SIGHAND|CL
ONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|CLONE_PARENT_SET
TID|CLONE_CHILD_CLEARTID, child_tid=0x799e06a00990,
parent_tid=0x799e06a00990, exit_signal=0, stack=0x799e06200000,
stack_size=0x7fff80, tls=0x799e06a006c0} => {parent_tid=[919712]}, 88) =
919712
rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0
mmap(NULL, 8392704, PROT_NONE,
MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK, -1, 0) = 0x799e05800000
mprotect(0x799e05801000, 8388608, PROT_READ|PROT_WRITE) = 0
rt_sigprocmask(SIG_BLOCK, ~[], [], 8)   = 0
clone3({flags=CLONE_VM|CLONE_FS|CLONE_FILES|CLONE_SIGHAND|CL
ONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|CLONE_PARENT_SET
TID|CLONE_CHILD_CLEARTID, child_tid=0x799e06000990,
parent_tid=0x799e06000990, exit_signal=0, stack=0x799e05800000,
stack_size=0x7fff80, tls=0x799e060006c0} => {parent_tid=[919713]}, 88) =
919713
rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0
mmap(NULL, 8392704, PROT_NONE,
MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK, -1, 0) = 0x799e04e00000
mprotect(0x799e04e01000, 8388608, PROT_READ|PROT_WRITE) = 0
rt_sigprocmask(SIG_BLOCK, ~[], [], 8)   = 0
clone3({flags=CLONE_VM|CLONE_FS|CLONE_FILES|CLONE_SIGHAND|CL
ONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|CLONE_PARENT_SET
TID|CLONE_CHILD_CLEARTID, child_tid=0x799e05600990,
parent_tid=0x799e05600990, exit_signal=0, stack=0x799e04e00000,
stack_size=0x7fff80, tls=0x799e056006c0} => {parent_tid=[919714]}, 88) =
919714
```

rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0
futex(0x799e07400990, FUTEX_WAIT_BITSET|FUTEX_CLOCK_REALTIME, 919711, NULL, FUTEX_BITSET_MATCH_ANY) = 0
fstat(1, {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0x1), ...}) = 0
write(1, "Probability of matching top two "..., 49) = 49
exit_group(0)   = ?
+++ exited with 0 +++

Лабораторная работа №3

Задача: реализовать программу, в которой родительский процесс создает два дочерних процесса. Межпроцессорное взаимодействие осуществляется посредством отображаемых файлов (memory-mapped files).



execve("./parent", ["./parent"], 0x7ffd37ebd7e0 /* 75 vars */) = 0
brk(NULL)   = 0x63d9302b4000
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7fd380efe000
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=87915, ...}) = 0

```
mmap(NULL, 87915, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7fd380ee8000
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) = 0x7fd380c00000
mmap(0x7fd380c28000, 1605632, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x28000) =
0x7fd380c28000
mmap(0x7fd380db0000, 323584, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1b0000) =
0x7fd380db0000
mmap(0x7fd380dff000, 24576, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1fe000) =
0x7fd380dff000
mmap(0x7fd380e05000, 52624, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x7fd380e05000
close(3)                                = 0
mmap(NULL, 12288, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7fd380ee5000
arch_prctl(ARCH_SET_FS, 0x7fd380ee5740) = 0
set_tid_address(0x7fd380ee5a10)         = 920540
set_robust_list(0x7fd380ee5a20, 24)     = 0
rseq(0x7fd380ee6060, 0x20, 0, 0x53053053) = 0
mprotect(0x7fd380dff000, 16384, PROT_READ) = 0
mprotect(0x63d92fe24000, 4096, PROT_READ) = 0
mprotect(0x7fd380f36000, 8192, PROT_READ) = 0
prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024,
rlim_max=RLIM64_INFINITY}) = 0
munmap(0x7fd380ee8000, 87915)           = 0
rt_sigaction(SIGUSR2, {sa_handler=0x63d92fe22429, sa_mask=[],
sa_flags=SA_RESTORER, sa_restorer=0x7fd380c45320}, NULL, 8) = 0
rt_sigaction(SIGUSR1, {sa_handler=0x63d92fe22451, sa_mask=[],
sa_flags=SA_RESTORER, sa_restorer=0x7fd380c45320}, NULL, 8) = 0
rt_sigprocmask(SIG_BLOCK, [USR1], [], 8) = 0
fstat(1, {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0x1), ...}) = 0
getrandom("\xdb\x10\xb2\x32\x90\xe9\x7b\x38", 8, GRND_NONBLOCK) = 8
brk(NULL)                               = 0x63d9302b4000
```

```
brk(0x63d9302d5000)                     = 0x63d9302d5000
fstat(0, {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0x1), ...}) = 0
write(1, "Enter filename for child1: ", 27) = 27
read(0, "tests1.txt\n", 1024)           = 11
write(1, "Enter filename for child2: ", 27) = 27
read(0, "tests2.txt\n", 1024)           = 11
openat(AT_FDCWD, "/tmp/shared_memory_file", O_RDWR|O_CREAT, 0666) =
3
ftruncate(3, 1024)                      = 0
mmap(NULL, 1024, PROT_READ|PROT_WRITE, MAP_SHARED, 3, 0) =
0x7fd380efd000
close(3)                                = 0
clone(child_stack=NULL,
flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD,
child_tidptr=0x7fd380ee5a10) = 920603
rt_sigsuspend([], 8)                    = ? ERESTARTNOHAND (To be restarted if no
handler)
--- SIGUSR1 {si_signo=SIGUSR1, si_code=SI_USER, si_pid=920603,
si_uid=1000} ---
write(1,
"\320\240\320\276\320\264\320\270\321\202\320\265\320\273\321\214\321\201\3
20\272\320\270\320\271 \320\277\321\200\320\276\321"..., 63) = 63
rt_sigreturn({mask=[USR1]})             = -1 EINTR (Interrupted system call)
clone(child_stack=NULL,
flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD,
child_tidptr=0x7fd380ee5a10) = 920604
rt_sigsuspend([], 8)                    = ? ERESTARTNOHAND (To be restarted if no
handler)
--- SIGUSR1 {si_signo=SIGUSR1, si_code=SI_USER, si_pid=920604,
si_uid=1000} ---
write(1,
"\320\240\320\276\320\264\320\270\321\202\320\265\320\273\321\214\321\201\3
20\272\320\270\320\271 \320\277\321\200\320\276\321"..., 63) = 63
rt_sigreturn({mask=[USR1]})             = -1 EINTR (Interrupted system call)
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\321\203 (\320\264\320"..., 81) = 81
read(0, "\321\207\321\221\321\202\320\275\320\276\320\265\n", 1024) = 13
kill(920603, SIGUSR1)                   = 0
rt_sigsuspend([], 8)                    = ? ERESTARTNOHAND (To be restarted if no
handler)
--- SIGUSR2 {si_signo=SIGUSR2, si_code=SI_USER, si_pid=920603,
si_uid=1000} ---
write(1,
"\320\240\320\276\320\264\320\270\321\202\320\265\320\273\321\214\321\201\3
20\272\320\270\320\271 \320\277\321\200\320\276\321"..., 63) = 63
```

```
rt_sigreturn({mask=[USR1]})            = -1 EINTR (Interrupted system call)
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\321\203 (\320\264\320"..., 81) = 81
read(0,
"\320\275\320\265\321\207\320\265\321\202\320\275\320\276\320\265\320\265\n
", 1024) = 19
kill(920604, SIGUSR1)                  = 0
rt_sigsuspend([], 8)                   = ? ERESTARTNOHAND (To be restarted if no
handler)
--- SIGUSR2 {si_signo=SIGUSR2, si_code=SI_USER, si_pid=920604,
si_uid=1000} ---
write(1,
"\320\240\320\276\320\264\320\270\321\202\320\265\320\273\321\214\321\201\3
20\272\320\270\320\271 \320\277\321\200\320\276\321"..., 63) = 63
rt_sigreturn({mask=[USR1]})            = -1 EINTR (Interrupted system call)
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\321\203 (\320\264\320"..., 81) = 81
read(0, "quit\n", 1024)                = 5
kill(920603, SIGUSR1)                  = 0
rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0
--- SIGUSR2 {si_signo=SIGUSR2, si_code=SI_USER, si_pid=920603,
si_uid=1000} ---
write(1,
"\320\240\320\276\320\264\320\270\321\202\320\265\320\273\321\214\321\201\3
20\272\320\270\320\271 \320\277\321\200\320\276\321"..., 63) = 63
rt_sigreturn({mask=[]})                = 0
munmap(0x7fd380efd000, 1024)           = 0
--- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=920603,
si_uid=1000, si_status=0, si_utime=0, si_stime=0} ---
wait4(-1, NULL, 0, NULL)               = 920603
wait4(-1, NULL, 0, NULL)               = ? ERESTARTSYS (To be restarted if
SA_RESTART is set)
--- SIGINT {si_signo=SIGINT, si_code=SI_KERNEL} ---
+++ killed by SIGINT +++
```

Лабораторная работа №4

Задача: требуется создать динамические библиотеки, которые реализуют определенный функционал. Далее использовать данные библиотеки 2-мя способами:

1) Во время компиляции (на этапе «линковки»/linking)
2) Во время исполнения программы. Библиотеки загружаются в память с помощью интерфейса ОС для работы с динамическими библиотеками

В конечном итоге, в лабораторной работе необходимо получить следующие части:

- Динамические библиотеки, реализующие контракты, которые заданы вариантом;
- Тестовая программа (программа №1), которая используют одну из библиотек, используя

знания полученные на этапе компиляции;

- Тестовая программа (программа №2), которая загружает библиотеки, используя только их местоположение и контракты.

```
execve("./main_compile_time", ["./main_compile_time"], 0x7ffc27bc0fb0 /* 75 vars */) = 0
brk(NULL)                               = 0x625d12388000
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x735b069c1000
access("/etc/ld.so.preload", R_OK)      = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/home/cbf/MAI/TRASH/MAI_OS/lab_4_os/build/glibc-hwcaps/x86-64-v4/libderivative_first.so", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/home/cbf/MAI/TRASH/MAI_OS/lab_4_os/build/glibc-hwcaps/x86-64-v4/", 0x7fff6429ce00, 0) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/home/cbf/MAI/TRASH/MAI_OS/lab_4_os/build/glibc-hwcaps/x86-64-v3/libderivative_first.so", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/home/cbf/MAI/TRASH/MAI_OS/lab_4_os/build/glibc-hwcaps/x86-64-v3/", 0x7fff6429ce00, 0) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/home/cbf/MAI/TRASH/MAI_OS/lab_4_os/build/glibc-hwcaps/x86-64-v2/libderivative_first.so", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/home/cbf/MAI/TRASH/MAI_OS/lab_4_os/build/glibc-hwcaps/x86-64-v2/", 0x7fff6429ce00, 0) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/home/cbf/MAI/TRASH/MAI_OS/lab_4_os/build/libderivative_first.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|0775, st_size=15472, ...}) = 0
mmap(NULL, 16408, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x735b069bc000
mmap(0x735b069bd000, 4096, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1000) = 0x735b069bd000
mmap(0x735b069be000, 4096, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) = 0x735b069be000
mmap(0x735b069bf000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) = 0x735b069bf000
close(3)                                = 0
openat(AT_FDCWD, "/home/cbf/MAI/TRASH/MAI_OS/lab_4_os/build/libe_formule.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|0775, st_size=15528, ...}) = 0
mmap(NULL, 16408, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x735b069b7000
mmap(0x735b069b8000, 4096, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1000) = 0x735b069b8000
```

```
mmap(0x735b069b9000, 4096, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) = 0x735b069b9000
mmap(0x735b069ba000, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) = 0x735b069ba000
close(3)                                = 0
openat(AT_FDCWD, "/home/cbf/MAI/TRASH/MAI_OS/lab_4_os/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=87915, ...}) = 0
mmap(NULL, 87915, PROT_READ, MAP_PRIVATE, 3, 0) = 0x735b069a1000
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\0"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0644, st_size=2592144, ...}) = 0
mmap(NULL, 2605376, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x735b06600000
mmap(0x735b0669d000, 1310720, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x9d000) = 0x735b0669d000
mmap(0x735b067dd000, 581632, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1dd000) = 0x735b067dd000
mmap(0x735b0686b000, 57344, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x26b000) = 0x735b0686b000
mmap(0x735b06879000, 12608, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x735b06879000
close(3)                                = 0
openat(AT_FDCWD, "/home/cbf/MAI/TRASH/MAI_OS/lab_4_os/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) =
0x735b06200000
mmap(0x735b06228000, 1605632, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x28000) = 0x735b06228000
mmap(0x735b063b0000, 323584, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1b0000) = 0x735b063b0000
mmap(0x735b063ff000, 24576, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1fe000) = 0x735b063ff000
mmap(0x735b06405000, 52624, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x735b06405000
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
fstat(3, {st_mode=S_IFREG|0644, st_size=952616, ...}) = 0
mmap(NULL, 950296, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x735b068b8000
mmap(0x735b068c8000, 520192, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x10000) = 0x735b068c8000
mmap(0x735b06947000, 360448, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x8f000) = 0x735b06947000
```

```
mmap(0x735b0699f000, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0xe7000) = 0x735b0699f000
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"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0644, st_size=182944, ...}) = 0
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -
1, 0) = 0x735b068b6000
mmap(NULL, 181160, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x735b06889000
mmap(0x735b0688d000, 143360, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x4000) = 0x735b0688d000
mmap(0x735b068b0000, 16384, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x27000) = 0x735b068b0000
mmap(0x735b068b4000, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2b000) = 0x735b068b4000
close(3)                                = 0
mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -
1, 0) = 0x735b06886000
arch_prctl(ARCH_SET_FS, 0x735b06886740) = 0
set_tid_address(0x735b06886a10)         = 921534
set_robust_list(0x735b06886a20, 24)     = 0
rseq(0x735b06887060, 0x20, 0, 0x53053053) = 0
mprotect(0x735b063ff000, 16384, PROT_READ) = 0
mprotect(0x735b068b4000, 4096, PROT_READ) = 0
mprotect(0x735b0699f000, 4096, PROT_READ) = 0
mprotect(0x735b0686b000, 45056, PROT_READ) = 0
mprotect(0x735b069ba000, 4096, PROT_READ) = 0
mprotect(0x735b069bf000, 4096, PROT_READ) = 0
mprotect(0x625d10a35000, 4096, PROT_READ) = 0
mprotect(0x735b069f9000, 8192, PROT_READ) = 0
prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024,
rlim_max=RLIM64_INFINITY}) = 0
munmap(0x735b069a1000, 87915)           = 0
futex(0x735b068797bc, FUTEX_WAKE_PRIVATE, 2147483647) = 0
getrandom("\xe5\x74\x26\xec\x86\xae\xd2\x07", 8, GRND_NONBLOCK) = 8
brk(NULL)                               = 0x625d12388000
brk(0x625d123a9000)                     = 0x625d123a9000
fstat(1, {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0x1), ...}) = 0
write(1, "Enter command (1 for Derivative,"..., 54) = 54
fstat(0, {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0x1), ...}) = 0
read(0, "1\n", 1024)                    = 2
write(1, "Enter A and deltaX: ", 20)    = 20
read(0, "1 3\n", 1024)                  = 4
write(1, "Derivative at 1 with deltaX 3 is"..., 43) = 43
write(1, "Enter command (1 for Derivative,"..., 54) = 54
read(0, "2\n", 1024)                    = 2
write(1, "Enter x: ", 9)                = 9
read(0, "5\n", 1024)                    = 2
write(1, "E(5) = 2.48832\n", 15)        = 15
write(1, "Enter command (1 for Derivative,"..., 54) = 54
read(0, "0\n", 1024)                    = 2
```

```
lseek(0, -1, SEEK_CUR)                  = -1 ESPIPE (Illegal seek)
exit_group(0)                           = ?
+++ exited with 0 +++


execve("./main_runtime", ["./main_runtime"], 0x7fff823de990 /* 75 vars */) = 0
brk(NULL)                               = 0x58e9756d3000
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -
1, 0) = 0x70bcbd303000
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=87915, ...}) = 0
mmap(NULL, 87915, PROT_READ, MAP_PRIVATE, 3, 0) = 0x70bcbd2ed000
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=2592144, ...}) = 0
mmap(NULL, 2605376, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x70bcbd000000
mmap(0x70bcbd09d000, 1310720, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x9d000) = 0x70bcbd09d000
mmap(0x70bcbd1dd000, 581632, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1dd000) = 0x70bcbd1dd000
mmap(0x70bcbd26b000, 57344, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x26b000) = 0x70bcbd26b000
mmap(0x70bcbd279000, 12608, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x70bcbd279000
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) =
0x70bcbcc00000
mmap(0x70bcbcc28000, 1605632, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x28000) = 0x70bcbcc28000
mmap(0x70bcbcdb0000, 323584, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1b0000) = 0x70bcbcdb0000
mmap(0x70bcbcdff000, 24576, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1fe000) = 0x70bcbcdff000
mmap(0x70bcbce05000, 52624, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x70bcbce05000
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"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0644, st_size=952616, ...}) = 0
mmap(NULL, 950296, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x70bcbcf17000
mmap(0x70bcbcf27000, 520192, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x10000) = 0x70bcbcf27000
mmap(0x70bcbcfa6000, 360448, PROT_READ,
```

```
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x8f000) = 0x70bcbcfa6000
mmap(0x70bcbcffe000, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0xe7000) = 0x70bcbcffe000
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"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0644, st_size=182944, ...}) = 0
mmap(NULL, 181160, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x70bcbd2c0000
mmap(0x70bcbd2c4000, 143360, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x4000) = 0x70bcbd2c4000
mmap(0x70bcbd2e7000, 16384, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x27000) = 0x70bcbd2e7000
mmap(0x70bcbd2eb000, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2b000) = 0x70bcbd2eb000
close(3)                                = 0
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -
1, 0) = 0x70bcbd2be000
arch_prctl(ARCH_SET_FS, 0x70bcbd2bf500) = 0
set_tid_address(0x70bcbd2bf7d0)         = 921575
set_robust_list(0x70bcbd2bf7e0, 24)     = 0
rseq(0x70bcbd2bfe20, 0x20, 0, 0x53053053) = 0
mprotect(0x70bcbcdff000, 16384, PROT_READ) = 0
mprotect(0x70bcbd2eb000, 4096, PROT_READ) = 0
mprotect(0x70bcbcffe000, 4096, PROT_READ) = 0
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -
1, 0) = 0x70bcbd2bc000
mprotect(0x70bcbd26b000, 45056, PROT_READ) = 0
mprotect(0x58e973d3f000, 4096, PROT_READ) = 0
mprotect(0x70bcbd33b000, 8192, PROT_READ) = 0
prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024,
rlim_max=RLIM64_INFINITY}) = 0
munmap(0x70bcbd2ed000, 87915)           = 0
futex(0x70bcbd2797bc, FUTEX_WAKE_PRIVATE, 2147483647) = 0
getrandom("\x13\x8b\xfd\x53\x48\xb3\x9f\x6c", 8, GRND_NONBLOCK) = 8
brk(NULL)                               = 0x58e9756d3000
brk(0x58e9756f4000)                     = 0x58e9756f4000
openat(AT_FDCWD, "./libderivative_first.so", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0775, st_size=15472, ...}) = 0
getcwd("/home/cbf/MAI/TRASH/MAI_OS/lab_4_os/build", 128) = 42
mmap(NULL, 16408, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x70bcbd2fe000
mmap(0x70bcbd2ff000, 4096, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1000) = 0x70bcbd2ff000
mmap(0x70bcbd300000, 4096, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) = 0x70bcbd300000
mmap(0x70bcbd301000, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) = 0x70bcbd301000
close(3)                                = 0
mprotect(0x70bcbd301000, 4096, PROT_READ) = 0
openat(AT_FDCWD, "./libe_formule.so", O_RDONLY|O_CLOEXEC) = 3
```

```
read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0775, st_size=15528, ...}) = 0
getcwd("/home/cbf/MAI/TRASH/MAI_OS/lab_4_os/build", 128) = 42
mmap(NULL, 16408, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x70bcbd2f9000
mmap(0x70bcbd2fa000, 4096, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1000) = 0x70bcbd2fa000
mmap(0x70bcbd2fb000, 4096, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) = 0x70bcbd2fb000
mmap(0x70bcbd2fc000, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) = 0x70bcbd2fc000
close(3)                                = 0
mprotect(0x70bcbd2fc000, 4096, PROT_READ) = 0
fstat(1, {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0x1), ...}) = 0
write(1, "Enter command (1 for Derivative,"..., 68) = 68
fstat(0, {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0x1), ...}) = 0
read(0, "1\n", 1024)                    = 2
write(1, "Enter A and deltaX: ", 20)    = 20
read(0, "1 3\n", 1024)                  = 4
write(1, "Derivative at 1 with deltaX 3 is"..., 43) = 43
write(1, "Enter command (1 for Derivative,"..., 68) = 68
read(0, "2\n", 1024)                    = 2
write(1, "Enter x: ", 9)                = 9
read(0, "5\n", 1024)                    = 2
write(1, "E(5) = 2.48832\n", 15)        = 15
write(1, "Enter command (1 for Derivative,"..., 68) = 68
read(0, "0\n", 1024)                    = 2
munmap(0x70bcbd2fe000, 16408)           = 0
munmap(0x70bcbd2f9000, 16408)           = 0
openat(AT_FDCWD, "./libderivative_second.so", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0775, st_size=15472, ...}) = 0
getcwd("/home/cbf/MAI/TRASH/MAI_OS/lab_4_os/build", 128) = 42
mmap(NULL, 16408, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x70bcbd2fe000
mmap(0x70bcbd2ff000, 4096, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1000) = 0x70bcbd2ff000
mmap(0x70bcbd300000, 4096, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) = 0x70bcbd300000
mmap(0x70bcbd301000, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) = 0x70bcbd301000
close(3)                                = 0
mprotect(0x70bcbd301000, 4096, PROT_READ) = 0
openat(AT_FDCWD, "./libe_series.so", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0775, st_size=15368, ...}) = 0
getcwd("/home/cbf/MAI/TRASH/MAI_OS/lab_4_os/build", 128) = 42
mmap(NULL, 16408, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x70bcbd2f9000
mmap(0x70bcbd2fa000, 4096, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1000) = 0x70bcbd2fa000
mmap(0x70bcbd2fb000, 4096, PROT_READ,
```

```
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) = 0x70bcbd2fb000
mmap(0x70bcbd2fc000, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) = 0x70bcbd2fc000
close(3)                                = 0
mprotect(0x70bcbd2fc000, 4096, PROT_READ) = 0
write(1, "Switched to derivative_second an"..., 53) = 53
write(1, "Enter command (1 for Derivative,"..., 68) = 68
read(0, "1\n", 1024)                    = 2
write(1, "Enter A and deltaX: ", 20)    = 20
read(0, "1 3\n", 1024)                  = 4
write(1, "Derivative at 1 with deltaX 3 is"..., 44) = 44
write(1, "Enter command (1 for Derivative,"..., 68) = 68
read(0, "2\n", 1024)                    = 2
write(1, "Enter x: ", 9)                = 9
read(0, "5\n", 1024)                    = 2
write(1, "E(5) = 2.71667\n", 15)        = 15
write(1, "Enter command (1 for Derivative,"..., 68) = 68
read(0, "-1\n", 1024)                   = 3
munmap(0x70bcbd2fe000, 16408)           = 0
munmap(0x70bcbd2f9000, 16408)           = 0
lseek(0, -1, SEEK_CUR)                  = -1 ESPIPE (Illegal seek)
exit_group(0)                           = ?
+++ exited with 0 +++
```

Лабораторная работа №5-7:
Постановка задачи

Реализовать распределенную систему по асинхронной обработке запросов. В данной распределенной системе должно существовать 2 вида узлов: «управляющий» и «вычислительный». Необходимо объединить данные узлы в соответствии с той топологией, которая определена вариантом. Связь между узлами необходимо осуществить при помощи технологии очередей сообщений. Также в данной системе необходимо предусмотреть проверку доступности узлов в соответствии с вариантом. При убийстве («kill -9») любого вычислительного узла система должна пытаться максимально сохранять свою работоспособность, а именно все дочерние узлы убитого узла могут стать недоступными, но родительские узлы должны сохранить
свою работоспособность.

- Управляющий узел отвечает за ввод команд от пользователя и отправку этих команд на вычислительные узлы. Список основных поддерживаемых команд:
- Создание нового узла
- Удаление существующего узла
- Выполнение функции

- Проверка доступности узлов

Общие сведения о программе

Все вычислительные узлы хранятся в бинарном дереве поиска. [parent] — является необязательным параметром.

Набор команд (подсчет суммы n чисел):

Формат команды: exec id n k1 ... kn
id – целочисленный идентификатор вычислительного узла, на который отправляется команда

n – количество складываемых чисел (от 1 до 108)
k1 ... kn – складываемые числа

Формат команды: heartbit time

Каждый узел начинает сообщать раз в time миллисекунд о том, что он работоспособен. Если от узла нет сигнала в течении 4*time миллисекунд, то должна выводится пользователю строка: «Heartbit: node id is unavailable now», где id – идентификатор недоступного вычислительного узла.

```
execve("./server", ["./server"], 0x7fff0b371940 /* 74 vars */) = 0
brk(NULL)                               = 0x645aec98a000
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -
1, 0) = 0x75eef31dd000
access("/etc/ld.so.preload", R_OK)      = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/opt/homebrew/lib/glibc-hwcaps/x86-64-v4/libzmq.so.5",
O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/opt/homebrew/lib/glibc-hwcaps/x86-64-v4/", 0x7fff187aece0, 0) = -1
ENOENT (No such file or directory)
openat(AT_FDCWD, "/opt/homebrew/lib/glibc-hwcaps/x86-64-v3/libzmq.so.5",
O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/opt/homebrew/lib/glibc-hwcaps/x86-64-v3/", 0x7fff187aece0, 0) = -1
ENOENT (No such file or directory)
openat(AT_FDCWD, "/opt/homebrew/lib/glibc-hwcaps/x86-64-v2/libzmq.so.5",
O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/opt/homebrew/lib/glibc-hwcaps/x86-64-v2/", 0x7fff187aece0, 0) = -1
ENOENT (No such file or directory)
openat(AT_FDCWD, "/opt/homebrew/lib/libzmq.so.5", O_RDONLY|O_CLOEXEC) = -1
ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/opt/homebrew/lib/", 0x7fff187aece0, 0) = -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=87915, ...}) = 0
mmap(NULL, 87915, PROT_READ, MAP_PRIVATE, 3, 0) = 0x75eef31c7000
```

```
close(3)                                = 0
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libzmq.so.5", 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|0644, st_size=663584, ...}) = 0
mmap(NULL, 661336, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x75eef3125000
mmap(0x75eef313e000, 425984, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x19000) = 0x75eef313e000
mmap(0x75eef31a6000, 98304, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x81000) = 0x75eef31a6000
mmap(0x75eef31be000, 36864, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x99000) = 0x75eef31be000
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=2592144, ...}) = 0
mmap(NULL, 2605376, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x75eef2e00000
mmap(0x75eef2e9d000, 1310720, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x9d000) = 0x75eef2e9d000
mmap(0x75eef2fdd000, 581632, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1dd000) = 0x75eef2fdd000
mmap(0x75eef306b000, 57344, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x26b000) = 0x75eef306b000
mmap(0x75eef3079000, 12608, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x75eef3079000
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"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0644, st_size=182944, ...}) = 0
mmap(NULL, 181160, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x75eef30f8000
mmap(0x75eef30fc000, 143360, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x4000) = 0x75eef30fc000
mmap(0x75eef311f000, 16384, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x27000) = 0x75eef311f000
mmap(0x75eef3123000, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2b000) = 0x75eef3123000
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) =
0x75eef2a00000
mmap(0x75eef2a28000, 1605632, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x28000) = 0x75eef2a28000
mmap(0x75eef2bb0000, 323584, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1b0000) = 0x75eef2bb0000
mmap(0x75eef2bff000, 24576, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1fe000) = 0x75eef2bff000
```

```
mmap(0x75eef2c05000, 52624, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x75eef2c05000
close(3)                                = 0
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libbsd.so.0", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0644, st_size=80888, ...}) = 0
mmap(NULL, 86208, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x75eef30e2000
mmap(0x75eef30e6000, 49152, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x4000) = 0x75eef30e6000
mmap(0x75eef30f2000, 12288, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x10000) = 0x75eef30f2000
mmap(0x75eef30f5000, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x12000) = 0x75eef30f5000
mmap(0x75eef30f7000, 192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x75eef30f7000
close(3)                                = 0
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libsodium.so.23", 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|0644, st_size=355040, ...}) = 0
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -
1, 0) = 0x75eef30e0000
mmap(NULL, 353336, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x75eef3089000
mmap(0x75eef3095000, 233472, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0xc000) = 0x75eef3095000
mmap(0x75eef30ce000, 65536, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x45000) = 0x75eef30ce000
mmap(0x75eef30de000, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x55000) = 0x75eef30de000
close(3)                                = 0
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libpgm-5.3.so.0", O_RDONLY|O_CLOEXEC) =
3
read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0644, st_size=285568, ...}) = 0
mmap(NULL, 301040, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x75eef2db6000
mmap(0x75eef2dba000, 159744, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x4000) = 0x75eef2dba000
mmap(0x75eef2de1000, 102400, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2b000) = 0x75eef2de1000
mmap(0x75eef2dfa000, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x44000) = 0x75eef2dfa000
mmap(0x75eef2dfc000, 14320, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x75eef2dfc000
close(3)                                = 0
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libnorm.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"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0644, st_size=366760, ...}) = 0
mmap(NULL, 1092032, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x75eef2cab000
```

```
mmap(0x75eef2cb4000, 274432, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x9000) = 0x75eef2cb4000
mmap(0x75eef2cf7000, 45056, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x4c000) = 0x75eef2cf7000
mmap(0x75eef2d02000, 16384, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x56000) = 0x75eef2d02000
mmap(0x75eef2d06000, 719296, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x75eef2d06000
close(3)                                = 0
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libgssapi_krb5.so.2", O_RDONLY|O_CLOEXEC)
= 3
read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0644, st_size=338696, ...}) = 0
mmap(NULL, 341080, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x75eef2c57000
mmap(0x75eef2c63000, 237568, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0xc000) = 0x75eef2c63000
mmap(0x75eef2c9d000, 40960, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x46000) = 0x75eef2c9d000
mmap(0x75eef2ca7000, 16384, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x4f000) = 0x75eef2ca7000
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
fstat(3, {st_mode=S_IFREG|0644, st_size=952616, ...}) = 0
mmap(NULL, 950296, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x75eef2917000
mmap(0x75eef2927000, 520192, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x10000) = 0x75eef2927000
mmap(0x75eef29a6000, 360448, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x8f000) = 0x75eef29a6000
mmap(0x75eef29fe000, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0xe7000) = 0x75eef29fe000
close(3)                                = 0
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libmd.so.0", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0644, st_size=55536, ...}) = 0
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -
1, 0) = 0x75eef3087000
mmap(NULL, 57448, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x75eef2c48000
mmap(0x75eef2c4a000, 36864, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) = 0x75eef2c4a000
mmap(0x75eef2c53000, 8192, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0xb000) = 0x75eef2c53000
mmap(0x75eef2c55000, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0xc000) = 0x75eef2c55000
close(3)                                = 0
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libkrb5.so.3", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0644, st_size=823488, ...}) = 0
mmap(NULL, 822032, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
```

```
0x75eef284e000
mmap(0x75eef286e000, 397312, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x20000) = 0x75eef286e000
mmap(0x75eef28cf000, 233472, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x81000) = 0x75eef28cf000
mmap(0x75eef2908000, 61440, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0xba000) = 0x75eef2908000
close(3)                                = 0
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libk5crypto.so.3", O_RDONLY|O_CLOEXEC) =
3
read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0644, st_size=178648, ...}) = 0
mmap(NULL, 176392, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x75eef2c1c000
mmap(0x75eef2c20000, 110592, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x4000) = 0x75eef2c20000
mmap(0x75eef2c3b000, 45056, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1f000) = 0x75eef2c3b000
mmap(0x75eef2c46000, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2a000) = 0x75eef2c46000
close(3)                                = 0
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libcom_err.so.2", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0644, st_size=18504, ...}) = 0
mmap(NULL, 20552, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x75eef3081000
mmap(0x75eef3083000, 4096, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) = 0x75eef3083000
mmap(0x75eef3084000, 4096, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x3000) = 0x75eef3084000
mmap(0x75eef3085000, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x3000) = 0x75eef3085000
close(3)                                = 0
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libkrb5support.so.0", O_RDONLY|O_CLOEXEC)
= 3
read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0644, st_size=47904, ...}) = 0
mmap(NULL, 50128, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x75eef2841000
mmap(0x75eef2844000, 24576, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x3000) = 0x75eef2844000
mmap(0x75eef284a000, 8192, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x9000) = 0x75eef284a000
mmap(0x75eef284c000, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0xa000) = 0x75eef284c000
close(3)                                = 0
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libkeyutils.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"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0644, st_size=22600, ...}) = 0
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -
1, 0) = 0x75eef307f000
mmap(NULL, 24592, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
```

```
0x75eef2c15000
mmap(0x75eef2c17000, 8192, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) = 0x75eef2c17000
mmap(0x75eef2c19000, 4096, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x4000) = 0x75eef2c19000
mmap(0x75eef2c1a000, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x4000) = 0x75eef2c1a000
close(3)                                = 0
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libresolv.so.2", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0644, st_size=68104, ...}) = 0
mmap(NULL, 75912, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x75eef282e000
mmap(0x75eef2831000, 40960, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x3000) = 0x75eef2831000
mmap(0x75eef283b000, 8192, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0xd000) = 0x75eef283b000
mmap(0x75eef283d000, 8192, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0xf000) = 0x75eef283d000
mmap(0x75eef283f000, 6280, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x75eef283f000
close(3)                                = 0
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -
1, 0) = 0x75eef307d000
mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -
1, 0) = 0x75eef2c12000
arch_prctl(ARCH_SET_FS, 0x75eef2c129c0) = 0
set_tid_address(0x75eef2c12c90)         = 923974
set_robust_list(0x75eef2c12ca0, 24)     = 0
rseq(0x75eef2c132e0, 0x20, 0, 0x53053053) = 0
mprotect(0x75eef2bff000, 16384, PROT_READ) = 0
mprotect(0x75eef283d000, 4096, PROT_READ) = 0
mprotect(0x75eef2c1a000, 4096, PROT_READ) = 0
mprotect(0x75eef284c000, 4096, PROT_READ) = 0
mprotect(0x75eef3085000, 4096, PROT_READ) = 0
mprotect(0x75eef2c46000, 4096, PROT_READ) = 0
mprotect(0x75eef2908000, 53248, PROT_READ) = 0
mprotect(0x75eef2c55000, 4096, PROT_READ) = 0
mprotect(0x75eef29fe000, 4096, PROT_READ) = 0
mprotect(0x75eef2ca7000, 8192, PROT_READ) = 0
mprotect(0x75eef3123000, 4096, PROT_READ) = 0
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -
1, 0) = 0x75eef282c000
mprotect(0x75eef306b000, 45056, PROT_READ) = 0
mprotect(0x75eef2d02000, 12288, PROT_READ) = 0
mprotect(0x75eef2dfa000, 4096, PROT_READ) = 0
mprotect(0x75eef30de000, 4096, PROT_READ) = 0
mprotect(0x75eef30f5000, 4096, PROT_READ) = 0
mprotect(0x75eef31be000, 32768, PROT_READ) = 0
mprotect(0x645aebc0e000, 4096, PROT_READ) = 0
mprotect(0x75eef3215000, 8192, PROT_READ) = 0
prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024,
```

```
rlim_max=RLIM64_INFINITY}) = 0
munmap(0x75eef31c7000, 87915)           = 0
futex(0x75eef30797bc, FUTEX_WAKE_PRIVATE, 2147483647) = 0
getrandom("\xa4\xa6\x12\x7a\x96\x8d\xee\xdb", 8, GRND_NONBLOCK) = 8
brk(NULL)                               = 0x645aec98a000
brk(0x645aec9ab000)                     = 0x645aec9ab000
rt_sigaction(SIGINT, {sa_handler=0x645aebc050c7, sa_mask=[INT],
sa_flags=SA_RESTORER|SA_RESTART, sa_restorer=0x75eef2a45320},
{sa_handler=SIG_DFL, sa_mask=[], sa_flags=0}, 8) = 0
rt_sigaction(SIGSEGV, {sa_handler=0x645aebc050c7, sa_mask=[SEGV],
sa_flags=SA_RESTORER|SA_RESTART, sa_restorer=0x75eef2a45320},
{sa_handler=SIG_DFL, sa_mask=[], sa_flags=0}, 8) = 0
rt_sigaction(SIGTERM, {sa_handler=0x645aebc050c7, sa_mask=[TERM],
sa_flags=SA_RESTORER|SA_RESTART, sa_restorer=0x75eef2a45320},
{sa_handler=SIG_DFL, sa_mask=[], sa_flags=0}, 8) = 0
openat(AT_FDCWD, "/sys/devices/system/cpu/online", O_RDONLY|O_CLOEXEC) = 3
read(3, "0-15\n", 1024)                 = 5
close(3)                                = 0
openat(AT_FDCWD, "/sys/devices/system/cpu/possible", O_RDONLY|O_CLOEXEC) = 3
read(3, "0-15\n", 1024)                 = 5
close(3)                                = 0
getpid()                                = 923974
sched_getaffinity(923974, 128, [0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15]) = 8
newfstatat(AT_FDCWD, "/etc/nsswitch.conf", {st_mode=S_IFREG|0644, st_size=569, ...}, 0) =
0
newfstatat(AT_FDCWD, "/", {st_mode=S_IFDIR|0755, st_size=4096, ...}, 0) = 0
openat(AT_FDCWD, "/etc/nsswitch.conf", O_RDONLY|O_CLOEXEC) = 3
fstat(3, {st_mode=S_IFREG|0644, st_size=569, ...}) = 0
read(3, "# /etc/nsswitch.conf\n#\n# Example"..., 4096) = 569
read(3, "", 4096)                       = 0
fstat(3, {st_mode=S_IFREG|0644, st_size=569, ...}) = 0
close(3)                                = 0
openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3
fstat(3, {st_mode=S_IFREG|0644, st_size=87915, ...}) = 0
mmap(NULL, 87915, PROT_READ, MAP_PRIVATE, 3, 0) = 0x75eef31c7000
close(3)                                = 0
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/glibc-hwcaps/x86-64-v4/libnss_db.so.2",
O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/lib/x86_64-linux-gnu/glibc-hwcaps/x86-64-v4/", 0x7fff187aa9e0, 0)
= -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/glibc-hwcaps/x86-64-v3/libnss_db.so.2",
O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/lib/x86_64-linux-gnu/glibc-hwcaps/x86-64-v3/", 0x7fff187aa9e0, 0)
= -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/glibc-hwcaps/x86-64-v2/libnss_db.so.2",
O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/lib/x86_64-linux-gnu/glibc-hwcaps/x86-64-v2/", 0x7fff187aa9e0, 0)
= -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libnss_db.so.2", O_RDONLY|O_CLOEXEC) = -1
ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/lib/x86_64-linux-gnu/", {st_mode=S_IFDIR|0755, st_size=126976,
...}, 0) = 0
```

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openat(AT_FDCWD, "/usr/lib/x86_64-linux-gnu/glibc-hwcaps/x86-64-v4/libnss_db.so.2",
O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/usr/lib/x86_64-linux-gnu/glibc-hwcaps/x86-64-v4/", 0x7fff187aa9e0,
0) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/usr/lib/x86_64-linux-gnu/glibc-hwcaps/x86-64-v3/libnss_db.so.2",
O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/usr/lib/x86_64-linux-gnu/glibc-hwcaps/x86-64-v3/", 0x7fff187aa9e0,
0) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/usr/lib/x86_64-linux-gnu/glibc-hwcaps/x86-64-v2/libnss_db.so.2",
O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/usr/lib/x86_64-linux-gnu/glibc-hwcaps/x86-64-v2/", 0x7fff187aa9e0,
0) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/usr/lib/x86_64-linux-gnu/libnss_db.so.2", O_RDONLY|O_CLOEXEC)
= -1 ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/usr/lib/x86_64-linux-gnu/", {st_mode=S_IFDIR|0755,
st_size=126976, ...}, 0) = 0
openat(AT_FDCWD, "/lib/glibc-hwcaps/x86-64-v4/libnss_db.so.2",
O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/lib/glibc-hwcaps/x86-64-v4/", 0x7fff187aa9e0, 0) = -1 ENOENT
(No such file or directory)
openat(AT_FDCWD, "/lib/glibc-hwcaps/x86-64-v3/libnss_db.so.2",
O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/lib/glibc-hwcaps/x86-64-v3/", 0x7fff187aa9e0, 0) = -1 ENOENT
(No such file or directory)
openat(AT_FDCWD, "/lib/glibc-hwcaps/x86-64-v2/libnss_db.so.2",
O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/lib/glibc-hwcaps/x86-64-v2/", 0x7fff187aa9e0, 0) = -1 ENOENT
(No such file or directory)
openat(AT_FDCWD, "/lib/libnss_db.so.2", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No
such file or directory)
newfstatat(AT_FDCWD, "/lib/", {st_mode=S_IFDIR|0755, st_size=4096, ...}, 0) = 0
openat(AT_FDCWD, "/usr/lib/glibc-hwcaps/x86-64-v4/libnss_db.so.2",
O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/usr/lib/glibc-hwcaps/x86-64-v4/", 0x7fff187aa9e0, 0) = -1 ENOENT
(No such file or directory)
openat(AT_FDCWD, "/usr/lib/glibc-hwcaps/x86-64-v3/libnss_db.so.2",
O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/usr/lib/glibc-hwcaps/x86-64-v3/", 0x7fff187aa9e0, 0) = -1 ENOENT
(No such file or directory)
openat(AT_FDCWD, "/usr/lib/glibc-hwcaps/x86-64-v2/libnss_db.so.2",
O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/usr/lib/glibc-hwcaps/x86-64-v2/", 0x7fff187aa9e0, 0) = -1 ENOENT
(No such file or directory)
openat(AT_FDCWD, "/usr/lib/libnss_db.so.2", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No
such file or directory)
newfstatat(AT_FDCWD, "/usr/lib/", {st_mode=S_IFDIR|0755, st_size=4096, ...}, 0) = 0
munmap(0x75eef31c7000, 87915)           = 0
openat(AT_FDCWD, "/etc/protocols", O_RDONLY|O_CLOEXEC) = 3
fstat(3, {st_mode=S_IFREG|0644, st_size=3144, ...}) = 0
lseek(3, 0, SEEK_SET)                   = 0
read(3, "# Internet (IP) protocols\n#\n# Up"..., 4096) = 3144
read(3, "", 4096)                       = 0
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close(3)                        = 0
eventfd2(0, EFD_CLOEXEC)                = 3
fcntl(3, F_GETFL)                       = 0x2 (flags O_RDWR)
fcntl(3, F_SETFL, O_RDWR|O_NONBLOCK)    = 0
fcntl(3, F_GETFL)                       = 0x802 (flags O_RDWR|O_NONBLOCK)
fcntl(3, F_SETFL, O_RDWR|O_NONBLOCK)    = 0
getpid()                        = 923974
getpid()                        = 923974
getrandom("\xcc\xee\xc5\x75\xdd\x4a\x80\x4c\xd6\x20\x7c\x90\x62\x52\x00\x2c", 16, 0) = 16
getrandom("\x04\x86\xa0\xfb\xdc\x66\x25\x23\x62\x76\x35\x7f\xb1\x0b\x71\xed", 16, 0) = 16
getpid()                        = 923974
eventfd2(0, EFD_CLOEXEC)                = 4
fcntl(4, F_GETFL)                       = 0x2 (flags O_RDWR)
fcntl(4, F_SETFL, O_RDWR|O_NONBLOCK)    = 0
fcntl(4, F_GETFL)                       = 0x802 (flags O_RDWR|O_NONBLOCK)
fcntl(4, F_SETFL, O_RDWR|O_NONBLOCK)    = 0
getpid()                        = 923974
epoll_create1(EPOLL_CLOEXEC)            = 5
epoll_ctl(5, EPOLL_CTL_ADD, 4, {events=0, data={u32=3969500656,
u64=110341679334896}}) = 0
epoll_ctl(5, EPOLL_CTL_MOD, 4, {events=EPOLLIN, data={u32=3969500656,
u64=110341679334896}}) = 0
getpid()                        = 923974
rt_sigaction(SIGRT_1, {sa_handler=0x75eef2a99520, sa_mask=[],
sa_flags=SA_RESTORER|SA_ONSTACK|SA_RESTART|SA_SIGINFO,
sa_restorer=0x75eef2a45320}, NULL, 8) = 0
rt_sigprocmask(SIG_UNBLOCK, [RTMIN RT_1], NULL, 8) = 0
mmap(NULL, 8392704, PROT_NONE,
MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK, -1, 0) = 0x75eef2000000
mprotect(0x75eef2001000, 8388608, PROT_READ|PROT_WRITE) = 0
rt_sigprocmask(SIG_BLOCK, ~[], [], 8)   = 0
clone3({flags=CLONE_VM|CLONE_FS|CLONE_FILES|CLONE_SIGHAND|CLONE_THRE
AD|CLONE_SYSVSEM|CLONE_SETTLS|CLONE_PARENT_SETTID|CLONE_CHILD_CL
EARTID, child_tid=0x75eef2800990, parent_tid=0x75eef2800990, exit_signal=0,
stack=0x75eef2000000, stack_size=0x7ffd00, tls=0x75eef28006c0} => {parent_tid=[923976]},
88) = 923976
rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0
eventfd2(0, EFD_CLOEXEC)                = 6
fcntl(6, F_GETFL)                       = 0x2 (flags O_RDWR)
fcntl(6, F_SETFL, O_RDWR|O_NONBLOCK)    = 0
fcntl(6, F_GETFL)                       = 0x802 (flags O_RDWR|O_NONBLOCK)
fcntl(6, F_SETFL, O_RDWR|O_NONBLOCK)    = 0
getpid()                        = 923974
epoll_create1(EPOLL_CLOEXEC)            = 7
epoll_ctl(7, EPOLL_CTL_ADD, 6, {events=0, data={u32=3969501408,
u64=110341679335648}}) = 0
epoll_ctl(7, EPOLL_CTL_MOD, 6, {events=EPOLLIN, data={u32=3969501408,
u64=110341679335648}}) = 0
mmap(NULL, 8392704, PROT_NONE,
MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK, -1, 0) = 0x75eef1600000
mprotect(0x75eef1601000, 8388608, PROT_READ|PROT_WRITE) = 0
rt_sigprocmask(SIG_BLOCK, ~[], [], 8)   = 0
```

```
clone3({flags=CLONE_VM|CLONE_FS|CLONE_FILES|CLONE_SIGHAND|CLONE_THRE
AD|CLONE_SYSVSEM|CLONE_SETTLS|CLONE_PARENT_SETTID|CLONE_CHILD_CL
EARTID, child_tid=0x75eef1e00990, parent_tid=0x75eef1e00990, exit_signal=0,
stack=0x75eef1600000, stack_size=0x7ffd00, tls=0x75eef1e006c0} => {parent_tid=[923977]},
88) = 923977
rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0
eventfd2(0, EFD_CLOEXEC)                = 8
fcntl(8, F_GETFL)                       = 0x2 (flags O_RDWR)
fcntl(8, F_SETFL, O_RDWR|O_NONBLOCK)    = 0
fcntl(8, F_GETFL)                       = 0x802 (flags O_RDWR|O_NONBLOCK)
fcntl(8, F_SETFL, O_RDWR|O_NONBLOCK)    = 0
getpid()                                = 923974
getpid()                                = 923974
poll([{fd=8, events=POLLIN}], 1, 0)     = 0 (Timeout)
unlink("child_publisher_left_923974")   = -1 ENOENT (No such file or directory)
socket(AF_UNIX, SOCK_STREAM|SOCK_CLOEXEC, 0) = 9
bind(9, {sa_family=AF_UNIX, sun_path="child_publisher_left_923974"}, 29) = 0
listen(9, 100)                          = 0
getsockname(9, {sa_family=AF_UNIX, sun_path="child_publisher_left_923974"}, [128 => 30])
= 0
getpid()                                = 923974
write(6, "\1\0\0\0\0\0\0\0", 8)         = 8
getpid()                                = 923974
write(8, "\1\0\0\0\0\0\0\0", 8)         = 8
mmap(NULL, 8392704, PROT_NONE,
MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK, -1, 0) = 0x75eef0c00000
mprotect(0x75eef0c01000, 8388608, PROT_READ|PROT_WRITE) = 0
rt_sigprocmask(SIG_BLOCK, ~[], [], 8)   = 0
clone3({flags=CLONE_VM|CLONE_FS|CLONE_FILES|CLONE_SIGHAND|CLONE_THRE
AD|CLONE_SYSVSEM|CLONE_SETTLS|CLONE_PARENT_SETTID|CLONE_CHILD_CL
EARTID, child_tid=0x75eef1400990, parent_tid=0x75eef1400990, exit_signal=0,
stack=0x75eef0c00000, stack_size=0x7ffd00, tls=0x75eef14006c0} => {parent_tid=[923978]},
88) = 923978
rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0
getpid()                                = 923974
fstat(1, {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0x1), ...}) = 0
write(1, "923974 server started correctly!"..., 33) = 33
fstat(0, {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0x1), ...}) = 0
read(0, "exec 10 3 1 2 3\n", 1024)      = 16
futex(0x75eef3124230, FUTEX_WAKE_PRIVATE, 2147483647) = 0
write(1, "Error: node 10 doesn't exist\n", 29) = 29
read(0, "heartbit 200\n", 1024)         = 13
mmap(NULL, 8392704, PROT_NONE,
MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK, -1, 0) = 0x75eef0200000
mprotect(0x75eef0201000, 8388608, PROT_READ|PROT_WRITE) = 0
rt_sigprocmask(SIG_BLOCK, ~[], [], 8)   = 0
clone3({flags=CLONE_VM|CLONE_FS|CLONE_FILES|CLONE_SIGHAND|CLONE_THRE
AD|CLONE_SYSVSEM|CLONE_SETTLS|CLONE_PARENT_SETTID|CLONE_CHILD_CL
EARTID, child_tid=0x75eef0a00990, parent_tid=0x75eef0a00990, exit_signal=0,
stack=0x75eef0200000, stack_size=0x7ffd00, tls=0x75eef0a006c0} => {parent_tid=[924075]},
88) = 924075
rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0
```

```
read(0, "quit\n", 1024)                 = 5
write(1, "invalid command\n", 16)       = 16
read(0, 0x645aec9a45b0, 1024)           = ? ERESTARTSYS (To be restarted if SA_RESTART is
set)
--- SIGINT {si_signo=SIGINT, si_code=SI_KERNEL} ---
getpid()                                = 923974
poll([{fd=8, events=POLLIN}], 1, 0)     = 0 (Timeout)
getpid()                                = 923974
write(6, "\1\0\0\0\0\0\0\0", 8)         = 8
clock_nanosleep(CLOCK_REALTIME, 0, {tv_sec=1, tv_nsec=0}, 0x7fff187aacf0) = 0
getpid()                                = 923974
poll([{fd=8, events=POLLIN}], 1, 0)     = 0 (Timeout)
getpid()                                = 923974
write(6, "\1\0\0\0\0\0\0\0", 8)         = 8
clock_nanosleep(CLOCK_REALTIME, 0, {tv_sec=1, tv_nsec=0}, 0x7fff187aacf0) = 230
+++ killed by SIGHUP +++
```

Вывод: Я изучил работу утилиты strace, которая показывается взаимодействие с системными вызовами в ОС. Это очень полезная утилита, чтобы разобраться в поведении приложения на низком уровне. В общем, strace является невероятно полезным инструментом, который расширяет возможности отладки и анализа приложений