## Московский Авиационный Институт

(Национальный Исследовательский Университет)

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

## Лабораторная работа №2 по курсу «Операционные системы»

Группа: М80-206Б-20

Студент: Кочев Д.О.

Преподаватель: Миронов Е.С.

Оценка: \_\_\_\_\_

Дата: 01.12.2023

```
$ strace -f ./parent
execve("./parent", ["./parent"], 0x7ffd95cc05e8 /* 36 vars */) = 0
                       = 0x556b2bc64000
brk(NULL)
arch prctl(0x3001 /* ARCH ??? */, 0x7ffc089c41f0) = -1 EINVAL (Invalid argument)
mmap(NULL, 8192, PROT READ|PROT WRITE, MAP PRIVATE|MAP ANONYMOUS, -1,
0) = 0x7f9a09803000
access("/etc/ld.so.preload", R_OK) = -1 ENOENT (No such file or directory)
openat(AT FDCWD, "/etc/ld.so.cache", O RDONLY|O CLOEXEC) = 3
newfstatat(3, "", {st mode=S IFREG|0644, st size=18151, ...}, AT EMPTY PATH) = 0
mmap(NULL, 18151, PROT READ, MAP PRIVATE, 3, 0) = 0x7f9a097fe000
close(3)
                      = 0
openat(AT FDCWD, "/lib/x86 64-linux-qnu/libc.so.6", O RDONLY|O CLOEXEC) = 3
pread64(3, "\4\0\0\0 \0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\0\0\0\0\0\0\0\0"..., 48, 848) = 48
pread64(3,
"\4\0\0\0\24\0\0\0\33\0\0\0GNU\0\244;\374\204(\337f#\315I\214\234\f\256\271\32"..., 68, 896)
newfstatat(3, "", {st_mode=S_IFREG|0755, st_size=2216304, ...}, AT_EMPTY_PATH) = 0
mmap(NULL, 2260560, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x7f9a095d6000
mmap(0x7f9a095fe000, 1658880, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x28000) = 0x7f9a095fe000
mmap(0x7f9a09793000, 360448, PROT READ,
MAP PRIVATE MAP FIXED MAP DENYWRITE, 3, 0x1bd000) = 0x7f9a09793000
mmap(0x7f9a097eb000, 24576, PROT READ|PROT WRITE,
MAP PRIVATE MAP FIXED MAP DENYWRITE, 3, 0x214000) = 0x7f9a097eb000
mmap(0x7f9a097f1000, 52816, PROT_READ|PROT_WRITE,
MAP PRIVATE MAP FIXED MAP ANONYMOUS, -1, 0) = 0x7f9a097f1000
                      = 0
close(3)
mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS,
-1, 0) = 0x7f9a095d3000
arch prctl(ARCH SET FS, 0x7f9a095d3740) = 0
set tid address(0x7f9a095d3a10)
set robust list(0x7f9a095d3a20, 24)
rseq(0x7f9a095d40e0, 0x20, 0, 0x53053053) = 0
mprotect(0x7f9a097eb000, 16384, PROT READ) = 0
mprotect(0x556b2ab99000, 4096, PROT READ) = 0
mprotect(0x7f9a0983d000, 8192, PROT READ) = 0
prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) =
0
munmap(0x7f9a097fe000, 18151)
                                = 0
getrandom("\xac\x8d\xc6\x8c\xd7\x6c\x03\xc7", 8, GRND_NONBLOCK) = 8
brk(NULL)
                       = 0x556b2bc64000
brk(0x556b2bc85000)
                           = 0x556b2bc85000
newfstatat(0, "", {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0x4), ...},
AT EMPTY PATH) = 0
```

```
read(0, aaaa
"aaaa\n", 1024)
openat(AT FDCWD, "aaaa", O WRONLY|O CREAT|O TRUNC, 0666) = 3
read(0, bbbb
"bbbb\n", 1024)
                        = 5
openat(AT FDCWD, "bbbb", O WRONLY|O CREAT|O TRUNC, 0666) = 4
openat(AT_FDCWD, "first_mmf.txt", O_RDWR|O_CREAT|O_TRUNC, 0777) = 5
ftruncate(5, 2000)
                             = 0
mmap(NULL, 2000, PROT READ|PROT WRITE, MAP SHARED, 5, 0) = 0x7f9a0983c000
openat(AT FDCWD, "second mmf.txt", O RDWRIO CREATIO TRUNC, 0777) = 6
                             = 0
ftruncate(6, 2000)
mmap(NULL, 2000, PROT_READ|PROT_WRITE, MAP_SHARED, 6, 0) = 0x7f9a09802000
clone(child stack=NULL,
flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLDstrace: Process 4208
attached
, child tidptr=0x7f9a095d3a10) = 4208
[pid 4208] set_robust_list(0x7f9a095d3a20, 24 <unfinished ...>
[pid 4189] clone(child stack=NULL,
flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD < unfinished ...>
[pid 4208] <... set robust list resumed>) = 0
[pid 4208] dup2(3, 1strace: Process 4209 attached
<unfinished ...>
[pid 4189] <... clone resumed>, child tidptr=0x7f9a095d3a10) = 4209
[pid 4208] <... dup2 resumed>)
[pid 4189] read(0, <unfinished ...>
[pid 4209] set_robust_list(0x7f9a095d3a20, 24 <unfinished ...>
[pid 4208] execve("./child", ["./child", "5"], 0x7ffc089c43c8 /* 36 vars */ <unfinished ...>
[pid 4209] <... set_robust_list resumed>) = 0
[pid 4209] dup2(4, 1)
[pid 4209] execve("./child", ["./child", "6"], 0x7ffc089c43c8 /* 36 vars */) = 0
[pid 4209] brk(NULL < unfinished ... >
                                  = 0
[pid 4208] <... execve resumed>)
[pid 4209] <... brk resumed>)
                                 = 0x55b5200db000
[pid 4209] arch_prctl(0x3001 /* ARCH_??? */, 0x7ffd5eee27f0) = -1 EINVAL (Invalid
argument)
[pid 4209] mmap(NULL, 8192, PROT READ|PROT WRITE,
MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7fefe252e000
[pid 4209] access("/etc/ld.so.preload", R OK) = -1 ENOENT (No such file or directory)
[pid 4209] openat(AT FDCWD, "/etc/ld.so.cache", O RDONLY|O CLOEXEC) = 7
[pid 4209] newfstatat(7, "", {st_mode=S_IFREG|0644, st_size=18151, ...},
AT\_EMPTY\_PATH) = 0
[pid 4209] mmap(NULL, 18151, PROT READ, MAP PRIVATE, 7, 0 <unfinished ...>
[pid 4208] brk(NULL < unfinished ...>
[pid 4209] <... mmap resumed>)
                                   = 0x7fefe2529000
[pid 4208] <... brk resumed>)
                                 = 0x55c86e4af000
[pid 4209] close(7)
[pid 4208] arch_prctl(0x3001 /* ARCH_??? */, 0x7ffe45e420d0 <unfinished ...>
```

```
[pid 4209] openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libc.so.6", O_RDONLY|O_CLOEXEC
<unfinished ...>
[pid 4208] <... arch prctl resumed>) = -1 EINVAL (Invalid argument)
[pid 4209] <... openat resumed>)
[pid 4208] mmap(NULL, 8192, PROT READ|PROT WRITE,
MAP_PRIVATE|MAP_ANONYMOUS, -1, 0 <unfinished ...>
[pid 4209] read(7, <unfinished ...>
[pid 4208] <... mmap resumed>)
                              = 0x7fded8be3000
[pid 4209] < ... read
[pid 4208] access("/etc/ld.so.preload", R_OK <unfinished ...>
[pid 4209] pread64(7, <unfinished ...>
[pid 4208] <... access resumed>)
                              = -1 ENOENT (No such file or directory)
[pid 4209] < ... pread64
[pid 4208] openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC <unfinished
[pid 4209] pread64(7, <unfinished ...>
[pid 4208] <... openat resumed>)
[pid 4209] < ... pread64 resumed>"\4\0\0\0
[pid 4208] newfstatat(7, "", <unfinished ...>
[pid 4209] pread64(7, <unfinished ...>
[pid 4208] <... newfstatat resumed>{st_mode=S_IFREG|0644, st_size=18151, ...},
AT\_EMPTY\_PATH) = 0
[pid 4209] < ... pread64
resumed>"\4\0\0\0\24\0\0\0\3\0\0\GNU\0\244;\374\204(\337f#\315I\214\234\f\256\271\32"...
,68,896) = 68
[pid 4208] mmap(NULL, 18151, PROT_READ, MAP_PRIVATE, 7, 0 <unfinished ...>
[pid 4209] newfstatat(7, "", <unfinished ...>
[pid 4208] <... mmap resumed>)
                              = 0x7fded8bde000
[pid 4209] <... newfstatat resumed>{st_mode=S_IFREG|0755, st_size=2216304, ...},
AT EMPTY PATH) = 0
[pid 4208] close(7 < unfinished ... >
[pid 4209] pread64(7, <unfinished ...>
[pid 4208] <... close resumed>)
[pid 4209] <... pread64
[pid 4208] openat(AT FDCWD, "/lib/x86 64-linux-gnu/libc.so.6", O RDONLY|O CLOEXEC
<unfinished ...>
[pid 4209] mmap(NULL, 2260560, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 7, 0
<unfinished ...>
[pid 4208] <... openat resumed>)
                              = 7
[pid 4209] <... mmap resumed>)
                              = 0x7fefe2301000
[pid 4208] read(7, <unfinished ...>
[pid 4209] mmap(0x7fefe2329000, 1658880, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 7, 0x28000 <unfinished ...>
```

```
[pid 4208] < ... read
[pid 4209] <... mmap resumed>)
                              = 0x7fefe2329000
[pid 4208] pread64(7, <unfinished ...>
[pid 4209] mmap(0x7fefe24be000, 360448, PROT READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 7, 0x1bd000 <unfinished ...>
[pid 4208] < ... pread64
[pid 4209] <... mmap resumed>)
                              = 0x7fefe24be000
[pid 4208] pread64(7, <unfinished ...>
[pid 4209] mmap(0x7fefe2516000, 24576, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 7, 0x214000 <unfinished ...>
[pid 4208] <... pread64 resumed>"\4\0\0\0
[pid 4209] <... mmap resumed>)
                              = 0x7fefe2516000
[pid 4208] pread64(7, <unfinished ...>
[pid 4209] mmap(0x7fefe251c000, 52816, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0 <unfinished ...>
[pid 4208] <... pread64
resumed>"\4\0\0\0\24\0\0\0\3\0\0\GNU\0\244;\374\204(\337f#\315I\214\234\f\256\271\32"...
,68,896) = 68
[pid 4209] <... mmap resumed>)
                              = 0x7fefe251c000
[pid 4208] newfstatat(7, "", <unfinished ...>
[pid 4209] close(7 < unfinished ...>
[pid 4208] <... newfstatat resumed>{st_mode=S_IFREG|0755, st_size=2216304, ...},
AT EMPTY PATH) = 0
[pid 4209] <... close resumed>)
                             = 0
[pid 4208] pread64(7, <unfinished ...>
[pid 4209] mmap(NULL, 12288, PROT_READ|PROT_WRITE,
MAP PRIVATE|MAP ANONYMOUS, -1, 0 <unfinished ...>
[pid 4208] < ... pread64
[pid 4209] <... mmap resumed>)
                              = 0x7fefe22fe000
[pid 4208] mmap(NULL, 2260560, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 7, 0
<unfinished ...>
[pid 4209] arch prctl(ARCH SET FS, 0x7fefe22fe740 <unfinished ...>
[pid 4208] <... mmap resumed>)
                              = 0x7fded89b6000
[pid 4209] <... arch prctl resumed>) = 0
[pid 4208] mmap(0x7fded89de000, 1658880, PROT READ|PROT EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 7, 0x28000 <unfinished ...>
[pid 4209] set_tid_address(0x7fefe22fea10 <unfinished ...>
[pid 4208] <... mmap resumed>)
                              = 0x7fded89de000
[pid 4209] < ... set tid address resumed>) = 4209
[pid 4208] mmap(0x7fded8b73000, 360448, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 7, 0x1bd000 <unfinished ...>
[pid 4209] set_robust_list(0x7fefe22fea20, 24 <unfinished ...>
[pid 4208] <... mmap resumed>)
                              = 0x7fded8b73000
[pid 4209] <... set robust list resumed>) = 0
```

```
[pid 4208] mmap(0x7fded8bcb000, 24576, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 7, 0x214000 <unfinished ...>
[pid 4209] rseq(0x7fefe22ff0e0, 0x20, 0, 0x53053053 <unfinished ...>
[pid 4208] <... mmap resumed>)
                                   = 0x7fded8bcb000
[pid 4209] <... rseq resumed>)
                                 = 0
[pid 4208] mmap(0x7fded8bd1000, 52816, PROT READ|PROT WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0 <unfinished ...>
[pid 4209] mprotect(0x7fefe2516000, 16384, PROT READ <unfinished ...>
[pid 4208] <... mmap resumed>)
                                   = 0x7fded8bd1000
[pid 4209] <... mprotect resumed>)
                                   = 0
[pid 4209] mprotect(0x55b51fdc9000, 4096, PROT_READ <unfinished ...>
[pid 4208] close(7 < unfinished ... >
[pid 4209] <... mprotect resumed>)
                                   = 0
[pid 4208] <... close resumed>)
                                 = 0
[pid 4209] mprotect(0x7fefe2568000, 8192, PROT READ <unfinished ...>
[pid 4208] mmap(NULL, 12288, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_ANONYMOUS, -1, 0 <unfinished ...>
[pid 4209] <... mprotect resumed>)
[pid 4208] <... mmap resumed>)
                                   = 0x7fded89b3000
[pid 4209] prlimit64(0, RLIMIT_STACK, NULL, <unfinished ...>
[pid 4208] arch prctl(ARCH SET FS, 0x7fded89b3740 <unfinished ...>
[pid 4209] <... prlimit64 resumed>{rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 0
[pid 4208] <... arch prctl resumed>) = 0
[pid 4209] munmap(0x7fefe2529000, 18151 < unfinished ...>
[pid 4208] set tid address(0x7fded89b3a10 <unfinished ...>
[pid 4209] <... munmap resumed>)
[pid 4208] < ... set tid address resumed>) = 4208
[pid 4209] mmap(NULL, 2000, PROT READ|PROT WRITE, MAP SHARED, 6, 0
<unfinished ...>
[pid 4208] set robust list(0x7fded89b3a20, 24 <unfinished ...>
[pid 4209] <... mmap resumed>)
                                   = 0x7fefe2567000
[pid 4208] <... set_robust_list resumed>) = 0
[pid 4209] rt sigaction(SIGUSR1, {sa handler=0x55b51fdc7229, sa mask=[USR1],
sa_flags=SA_RESTORER|SA_RESTART, sa_restorer=0x7fefe2343520}, <unfinished ...>
[pid 4208] rseq(0x7fded89b40e0, 0x20, 0, 0x53053053 <unfinished ...>
[pid 4209] <... rt_sigaction resumed>{sa_handler=SIG_DFL, sa_mask=[], sa_flags=0}, 8) =
[pid 4208] < ... rseq resumed>)
                                 = 0
[pid 4209] rt sigaction(SIGUSR2, {sa handler=0x55b51fdc7339, sa mask=[USR2],
sa flags=SA RESTORER|SA RESTART, sa restorer=0x7fefe2343520},
{sa_handler=SIG_DFL, sa_mask=[], sa_flags=0}, 8) = 0
[pid 4208] mprotect(0x7fded8bcb000, 16384, PROT_READ) = 0
[pid 4208] mprotect(0x55c86c89b000, 4096, PROT READ) = 0
[pid 4208] mprotect(0x7fded8c1d000, 8192, PROT_READ) = 0
[pid 4208] prlimit64(0, RLIMIT STACK, NULL, {rlim cur=8192*1024,
rlim_max=RLIM64_INFINITY}) = 0
[pid 4208] munmap(0x7fded8bde000, 18151) = 0
```

```
[pid 4208] mmap(NULL, 2000, PROT_READ|PROT_WRITE, MAP_SHARED, 5, 0) =
0x7fded8c1c000
[pid 4208] rt sigaction(SIGUSR1, {sa handler=0x55c86c899229, sa mask=[USR1],
sa_flags=SA_RESTORER|SA_RESTART, sa_restorer=0x7fded89f8520},
{sa handler=SIG DFL, sa mask=[], sa flags=0}, 8) = 0
[pid 4208] rt sigaction(SIGUSR2, {sa handler=0x55c86c899339, sa mask=[USR2],
sa_flags=SA_RESTORER|SA_RESTART, sa_restorer=0x7fded89f8520},
{sa handler=SIG DFL, sa mask=[], sa flags=0}, 8) = 0
gwertyuuutrttt
[pid 4189] <... read resumed>"qwertyuuutrttt\n", 1024) = 15
[pid 4189] msync(0x7f9a0983c000, 2000, MS_SYNC|MS_INVALIDATE) = 0
[pid 4189] kill(4208, SIGUSR1)
                                   = 0
[pid 4208] --- SIGUSR1 {si_signo=SIGUSR1, si_code=SI_USER, si_pid=4189, si_uid=1000}
[pid 4189] read(0, <unfinished ...>
[pid 4208] write(1, "q", 1)
                               = 1
[pid 4208] write(1, "w", 1)
                               = 1
[pid 4208] write(1, "r", 1)
                               = 1
[pid 4208] write(1, "t", 1)
                              = 1
[pid 4208] write(1, "t", 1)
                              = 1
[pid 4208] write(1, "r", 1)
                               = 1
[pid 4208] write(1, "t", 1)
                              = 1
[pid 4208] write(1, "t", 1)
                              = 1
[pid 4208] write(1, "t", 1)
                              = 1
[pid 4208] write(1, "\n", 1)
[pid 4208] rt_sigreturn(\{mask=[]\}) = 0
ddkkkdkoooi
[pid 4189] <... read resumed>"ddkkkdkoooi\n", 1024) = 12
[pid 4189] msync(0x7f9a09802000, 2000, MS_SYNC|MS_INVALIDATE) = 0
[pid 4189] kill(4209, SIGUSR1)
[pid 4209] --- SIGUSR1 {si_signo=SIGUSR1, si_code=SI_USER, si_pid=4189, si_uid=1000}
[pid 4189] read(0, <unfinished ...>
[pid 4209] write(1, "d", 1)
[pid 4209] write(1, "d", 1)
                               = 1
[pid 4209] write(1, "k", 1)
                               = 1
                               = 1
[pid 4209] write(1, "k", 1)
[pid 4209] write(1, "k", 1)
                               = 1
[pid 4209] write(1, "d", 1)
                               = 1
[pid 4209] write(1, "k", 1)
                               = 1
[pid 4209] write(1, "\n", 1)
                               = 1
[pid 4209] rt_sigreturn(\{mask=[]\}) = 0
wertdffooi
[pid 4189] <... read resumed>"wertdffooi\n", 1024) = 11
[pid 4189] msync(0x7f9a0983c000, 2000, MS_SYNC|MS_INVALIDATE) = 0
[pid 4189] kill(4208, SIGUSR1)
                                   = 0
[pid 4208] --- SIGUSR1 {si_signo=SIGUSR1, si_code=SI_USER, si_pid=4189, si_uid=1000}
```

```
[pid 4189] read(0, <unfinished ...>
[pid 4208] write(1, "w", 1)
[pid 4208] write(1, "r", 1)
                                = 1
[pid 4208] write(1, "t", 1)
                                = 1
[pid 4208] write(1, "d", 1)
                                = 1
[pid 4208] write(1, "f", 1)
                                = 1
[pid 4208] write(1, "f", 1)
                                = 1
[pid 4208] write(1, "\n", 1)
                                = 1
[pid 4208] rt_sigreturn({mask=[]}) = 0
qwerrteeeaannnnn
[pid 4189] <... read resumed>"qwerrteeeaannnnn\n", 1024) = 17
[pid 4189] msync(0x7f9a09802000, 2000, MS_SYNC|MS_INVALIDATE) = 0
[pid 4189] kill(4209, SIGUSR1)
[pid 4209] --- SIGUSR1 {si_signo=SIGUSR1, si_code=SI_USER, si_pid=4189, si_uid=1000}
[pid 4189] read(0, <unfinished ...>
[pid 4209] write(1, "q", 1)
[pid 4209] write(1, "w", 1)
                                 = 1
[pid 4209] write(1, "r", 1)
                                = 1
[pid 4209] write(1, "r", 1)
                                = 1
[pid 4209] write(1, "t", 1)
                                = 1
[pid 4209] write(1, "n", 1)
                                = 1
[pid 4209] write(1, "\n", 1)
                                = 1
[pid 4209] rt sigreturn({mask=[]})
[pid 4189] < ... read resumed > "", 1024) = 0
[pid 4189] kill(4208, SIGUSR2)
[pid 4208] --- SIGUSR2 {si_signo=SIGUSR2, si_code=SI_USER, si_pid=4189, si_uid=1000}
[pid 4189] kill(4209, SIGUSR2)
                                     = 0
[pid 4209] --- SIGUSR2 {si_signo=SIGUSR2, si_code=SI_USER, si_pid=4189, si_uid=1000}
[pid 4208] exit_group(0 <unfinished ...>
[pid 4189] unlink("first_mmf.txt" <unfinished ...>
[pid 4209] exit_group(0 <unfinished ...>
[pid 4208] < ... exit group resumed>) = ?
[pid 4209] <... exit group resumed>) = ?
[pid 4208] +++ exited with 0 +++
[pid 4209] +++ exited with 0 +++
<... unlink resumed>)
                                 = 0
--- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=4208, si_uid=1000,
si status=0, si utime=2508, si stime=1} ---
unlink("second_mmf.txt")
                                  = 0
                              = ?
exit_group(0)
+++ exited with 0 +++
```