

Московский Авиационный Институт
(Национальный Исследовательский Университет)

Факультет информационных технологий и прикладной математики
Кафедра вычислительной математики и программирования

Лабораторная работа
по курсу «Операционные системы»
III Семестр

Задание 1
Вариант 6

Студент:	Синявский А.В
Группа:	М80-208Б-18
Преподаватель:	Миронов Е.С
Оценка:	
Дата:	

1. Описание задания

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

Я выделяю жирным шрифтом соответствующие строки в каждом трейсе.

2. Strace

2.1. lab 2

```
anri@andrew-HP-250-G6:~/Documents/Github_repositories/OS_lab2/build$ strace ./OS_lab2
execve("./OS_lab2", ["/OS_lab2"], 0x7ffd2aa0ba80 /* 68 vars */) = 0
brk(NULL)                               = 0x562d09dc5000
access("/etc/ld.so.nohwcap", F_OK)      = -1 ENOENT (No such file or directory)
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=124454, ...}) = 0
mmap(NULL, 124454, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7f58d25ea000
close(3)                                = 0
access("/etc/ld.so.nohwcap", F_OK)      = -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\0\3\0>\0\1\0\0\0\260\34\2\0\0\0\0\0"... , 832) = 832
fstat(3, {st_mode=S_IFREG|0755, st_size=2030544, ...}) = 0
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0)
= 0x7f58d25e8000
mmap(NULL, 4131552, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_DENYWRITE, 3, 0)
= 0x7f58d1ff1000
mprotect(0x7f58d21d8000, 2097152, PROT_NONE) = 0
mmap(0x7f58d23d8000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 3, 0x1e7000) = 0x7f58d23d8000
mmap(0x7f58d23de000, 15072, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_ANONYMOUS, -1, 0) = 0x7f58d23de000
close(3)                                = 0
arch_prctl(ARCH_SET_FS, 0x7f58d25e94c0) = 0
mprotect(0x7f58d23d8000, 16384, PROT_READ) = 0
mprotect(0x562d082a1000, 4096, PROT_READ) = 0
mprotect(0x7f58d2609000, 4096, PROT_READ) = 0
munmap(0x7f58d25ea000, 124454)           = 0
pipe([3, 4])                            = 0
fstat(0, {st_mode=S_IFCHR|0620, st_rdev=makedev(136, 0), ...}) = 0
brk(NULL)                               = 0x562d09dc5000
brk(0x562d09de6000)                     = 0x562d09de6000
read(0, ls
"ls\n", 1024)                           = 3
clone(child_stack=NULL, flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|
SIGCHLD, child_tidptr=0x7f58d25e9790) = 2717
close(4)                                = 0
```

```

read(3, "C", 1) = 1
fstat(1, {st_mode=S_IFCHR|0620, st_rdev=makedev(136, 0), ...}) = 0
read(3, "M", 1) = 1
read(3, "a", 1) = 1
read(3, "k", 1) = 1
--- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=2717, si_uid=1000,
si_status=0, si_utime=0, si_stime=0} ---
read(3, "e", 1) = 1
read(3, "C", 1) = 1
read(3, "a", 1) = 1
read(3, "c", 1) = 1
read(3, "h", 1) = 1
read(3, "e", 1) = 1
read(3, ".", 1) = 1
read(3, "t", 1) = 1
read(3, "x", 1) = 1
read(3, "t", 1) = 1
read(3, "\n", 1) = 1
write(1, "CMAKECACHE.TXT\n", 15CMAKECACHE.TXT
) = 15
read(3, "C", 1) = 1
read(3, "M", 1) = 1
read(3, "a", 1) = 1
read(3, "k", 1) = 1
read(3, "e", 1) = 1
read(3, "F", 1) = 1
read(3, "i", 1) = 1
read(3, "l", 1) = 1
read(3, "e", 1) = 1
read(3, "s", 1) = 1
read(3, "\n", 1) = 1
write(1, "CMAKEFILES\n", 11CMAKEFILES
) = 11
read(3, "c", 1) = 1
read(3, "m", 1) = 1
read(3, "a", 1) = 1
read(3, "k", 1) = 1
read(3, "e", 1) = 1
read(3, "_", 1) = 1
read(3, "i", 1) = 1
read(3, "n", 1) = 1
read(3, "s", 1) = 1
read(3, "t", 1) = 1
read(3, "a", 1) = 1
read(3, "l", 1) = 1
read(3, "l", 1) = 1
read(3, ".", 1) = 1
read(3, "c", 1) = 1
read(3, "m", 1) = 1
read(3, "a", 1) = 1
read(3, "k", 1) = 1
read(3, "e", 1) = 1

```

```

read(3, "\n", 1)          = 1
write(1, "CMAKE_INSTALL.CMAKE\n", 20CMAKE_INSTALL.CMAKE
) = 20
read(3, "M", 1)           = 1
read(3, "a", 1)           = 1
read(3, "k", 1)           = 1
read(3, "e", 1)           = 1
read(3, "f", 1)           = 1
read(3, "i", 1)           = 1
read(3, "l", 1)           = 1
read(3, "e", 1)           = 1
read(3, "\n", 1)          = 1
write(1, "MAKEFILE\n", 9MAKEFILE
) = 9
read(3, "O", 1)           = 1
read(3, "S", 1)           = 1
read(3, "_", 1)           = 1
read(3, "l", 1)           = 1
read(3, "a", 1)           = 1
read(3, "b", 1)           = 1
read(3, "2", 1)           = 1
read(3, "\n", 1)          = 1
write(1, "OS_LAB2\n", 8OS_LAB2
) = 8
read(3, "\377", 1)        = 1
close(3)                  = 0
exit_group(0)             = ?
+++ exited with 0 +++
anri@andrew-HP-250-G6:~/Documents/Github_repositories/OS_lab2/build$

```

2.2. lab 3

```

anri@andrew-HP-250-G6:~/Documents/Github_repositories/OS_labs/lab3/src/build$ strace -f
./OS_lab3
execve("./OS_lab3", ["/OS_lab3"], 0x7ffd45fcc618 /* 64 vars */) = 0
brk(NULL) = 0x5555c996f000
access("/etc/ld.so.nohwcap", F_OK) = -1 ENOENT (No such file or directory)
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=126345, ...}) = 0
mmap(NULL, 126345, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7fa86f094000
close(3) = 0
access("/etc/ld.so.nohwcap", F_OK) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libpthread.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\0000b\0\0\0\0\0"... , 832) = 832
fstat(3, {st_mode=S_IFREG|0755, st_size=144976, ...}) = 0
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0)
= 0x7fa86f092000
mmap(NULL, 2221184, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_DENYWRITE, 3, 0)
= 0x7fa86ec6d000
mprotect(0x7fa86ec87000, 2093056, PROT_NONE) = 0

```

```

mmap(0x7fa86ee86000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 3, 0x19000) = 0x7fa86ee86000
mmap(0x7fa86ee88000, 13440, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_ANONYMOUS, -1, 0) = 0x7fa86ee88000
close(3) = 0
access("/etc/ld.so.nohwcap", F_OK) = -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\260\34\2\0\0\0\0"... , 832) = 832
fstat(3, {st_mode=S_IFREG|0755, st_size=2030544, ...}) = 0
mmap(NULL, 4131552, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_DENYWRITE, 3, 0)
= 0x7fa86e87c000
mprotect(0x7fa86ea63000, 2097152, PROT_NONE) = 0
mmap(0x7fa86ec63000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 3, 0x1e7000) = 0x7fa86ec63000
mmap(0x7fa86ec69000, 15072, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_ANONYMOUS, -1, 0) = 0x7fa86ec69000
close(3) = 0
mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1,
0) = 0x7fa86f08f000
arch_prctl(ARCH_SET_FS, 0x7fa86f08f740) = 0
mprotect(0x7fa86ec63000, 16384, PROT_READ) = 0
mprotect(0x7fa86ee86000, 4096, PROT_READ) = 0
mprotect(0x5555c7ce5000, 4096, PROT_READ) = 0
mprotect(0x7fa86f0b3000, 4096, PROT_READ) = 0
munmap(0x7fa86f094000, 126345) = 0
set_tid_address(0x7fa86f08fa10) = 8280
set_robust_list(0x7fa86f08fa20, 24) = 0
rt_sigaction(SIGRTMIN, {sa_handler=0x7fa86ec72cb0, sa_mask=[], sa_flags=SA_RESTORER|
SA_SIGINFO, sa_restorer=0x7fa86ec7f890}, NULL, 8) = 0
rt_sigaction(SIGRT_1, {sa_handler=0x7fa86ec72d50, sa_mask=[], sa_flags=SA_RESTORER|
SA_RESTART|SA_SIGINFO, sa_restorer=0x7fa86ec7f890}, NULL, 8) = 0
rt_sigprocmask(SIG_UNBLOCK, [RTMIN RT_1], NULL, 8) = 0
prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) =
0
fstat(1, {st_mode=S_IFCHR|0620, st_rdev=makedev(136, 0), ...}) = 0
brk(NULL) = 0x5555c996f000
brk(0x5555c9990000) = 0x5555c9990000
write(1, "Enter summary points of player 1"... , 102Enter summary points of player 1 and 2, how
many rounds will be in the game and what round it is now:
) = 102
fstat(0, {st_mode=S_IFCHR|0620, st_rdev=makedev(136, 0), ...}) = 0
read(0, 0 0 1 1
"0 0 1 1\n", 1024) = 8
write(1, "Oh, yes, number of tests please:"..., 33Oh, yes, number of tests please: ) = 33
read(0, 3
"3\n", 1024) = 2
mmap(NULL, 8392704, PROT_NONE, MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK, -1,
0) = 0x7fa86e07b000
mprotect(0x7fa86e07c000, 8388608, PROT_READ|PROT_WRITE) = 0
clone(child_stack=0x7fa86e87afb0, flags=CLONE_VM|CLONE_FS|CLONE_FILES|
CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|

```

CLONE_PARENT_SETTID|CLONE_CHILD_CLEARTID, parent_tidptr=0x7fa86e87b9d0, tls=0x7fa86e87b700, child_tidptr=0x7fa86e87b9d0) = 8282

strace: Process 8282 attached

```
[pid 8280] write(1, "start waiting for thread signal\n", 32start waiting for thread signal
<unfinished ...>
[pid 8282] set_robust_list(0x7fa86e87b9e0, 24 <unfinished ...>
[pid 8280] <... write resumed> )    = 32
[pid 8282] <... set_robust_list resumed> ) = 0
[pid 8280] futex(0x5555c7ce60a8, FUTEX_WAIT_PRIVATE, 0, NULL <unfinished ...>
[pid 8282] write(1, "thread start\n", 13thread start
) = 13
[pid 8282] futex(0x5555c7ce60a8, FUTEX_WAKE_PRIVATE, 1 <unfinished ...>
[pid 8280] <... futex resumed> )    = 0
[pid 8282] <... futex resumed> )    = 1
[pid 8280] write(1, "stop waiting\n", 13stop waiting
<unfinished ...>
[pid 8282] futex(0x7fa86ec698c0, FUTEX_WAIT_PRIVATE, 2, NULL <unfinished ...>
[pid 8280] <... write resumed> )    = 13
[pid 8280] futex(0x7fa86ec698c0, FUTEX_WAKE_PRIVATE, 1) = 1
[pid 8282] <... futex resumed> )    = 0
[pid 8280] futex(0x5555c7ce60c0, FUTEX_WAKE_PRIVATE, 1 <unfinished ...>
[pid 8282] write(1, "thread end\n", 11thread end
<unfinished ...>
[pid 8280] <... futex resumed> )    = 0
[pid 8282] <... write resumed> )    = 11
[pid 8280] mmap(NULL, 8392704, PROT_NONE, MAP_PRIVATE|MAP_ANONYMOUS|
MAP_STACK, -1, 0 <unfinished ...>
[pid 8282] futex(0x7fa86ec698c0, FUTEX_WAKE_PRIVATE, 1 <unfinished ...>
[pid 8280] <... mmap resumed> )    = 0x7fa86d87a000
[pid 8282] <... futex resumed> )    = 0
[pid 8280] mprotect(0x7fa86d87b000, 8388608, PROT_READ|PROT_WRITE <unfinished ...>
[pid 8282] madvise(0x7fa86e07b000, 8368128, MADV_DONTNEED <unfinished ...>
[pid 8280] <... mprotect resumed> ) = 0
[pid 8282] <... madvise resumed> ) = 0
[pid 8280] clone( <unfinished ...>
[pid 8282] exit(0strace: Process 8283 attached
<unfinished ...>
[pid 8280] <... clone resumed> child_stack=0x7fa86e079fb0, flags=CLONE_VM|CLONE_FS|
CLONE_FILES|CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|
CLONE_SETTLS|CLONE_PARENT_SETTID|CLONE_CHILD_CLEARTID,
parent_tidptr=0x7fa86e07a9d0, tls=0x7fa86e07a700, child_tidptr=0x7fa86e07a9d0) = 8283
[pid 8282] <... exit resumed>)      = ?
[pid 8280] write(1, "start waiting for thread signal\n", 32start waiting for thread signal
<unfinished ...>
[pid 8282] +++ exited with 0 +++
[pid 8280] <... write resumed> )    = 32
[pid 8280] futex(0x5555c7ce60ac, FUTEX_WAIT_PRIVATE, 0, NULL <unfinished ...>
[pid 8283] set_robust_list(0x7fa86e07a9e0, 24) = 0
[pid 8283] write(1, "thread start\n", 13thread start
) = 13
[pid 8283] futex(0x5555c7ce60ac, FUTEX_WAKE_PRIVATE, 1 <unfinished ...>
[pid 8280] <... futex resumed> )    = 0
```

```

[pid 8283] <... futex resumed> )    = 1
[pid 8280] futex(0x7fa86ec698c0, FUTEX_WAIT_PRIVATE, 2, NULL <unfinished ...>
[pid 8283] write(1, "thread end\n", 11thread end
) = 11
[pid 8283] futex(0x7fa86ec698c0, FUTEX_WAKE_PRIVATE, 1 <unfinished ...>
[pid 8280] <... futex resumed> )    = 0
[pid 8283] <... futex resumed> )    = 1
[pid 8280] write(1, "stop waiting\n", 13 <unfinished ...>
[pid 8283] madvise(0x7fa86d87a000, 8368128, MADV_DONTNEEDstop waiting
<unfinished ...>
[pid 8280] <... write resumed> )    = 13
[pid 8283] <... madvise resumed> )  = 0
[pid 8280] futex(0x7fa86ec698c0, FUTEX_WAKE_PRIVATE, 1 <unfinished ...>
[pid 8283] exit(0 <unfinished ...>
[pid 8280] <... futex resumed> )    = 0
[pid 8283] <... exit resumed>)      = ?
[pid 8280] futex(0x5555c7ce60c0, FUTEX_WAKE_PRIVATE, 1 <unfinished ...>
[pid 8283] +++ exited with 0 +++
<... futex resumed> )              = 0
mmap(NULL, 8392704, PROT_NONE, MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK, -1,
0) = 0x7fa86d079000
mprotect(0x7fa86d07a000, 8388608, PROT_READ|PROT_WRITE) = 0
clone(child_stack=0x7fa86d878fb0,          flags=CLONE_VM|CLONE_FS|CLONE_FILES|
CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|
CLONE_PARENT_SETTID|CLONE_CHILD_CLEARTID, parent_tidptr=0x7fa86d8799d0,
tls=0x7fa86d879700, child_tidptr=0x7fa86d8799d0) = 8284
write(1, "start waiting for thread signal\n", 32start waiting for thread signal
) = 32
futex(0x5555c7ce60a8, FUTEX_WAIT_PRIVATE, 0, NULLstrace: Process 8284 attached
<unfinished ...>
[pid 8284] set_robust_list(0x7fa86d8799e0, 24) = 0
[pid 8284] write(1, "thread start\n", 13thread start
) = 13
[pid 8284] futex(0x5555c7ce60a8, FUTEX_WAKE_PRIVATE, 1) = 1
[pid 8280] <... futex resumed> )    = 0
[pid 8280] write(1, "stop waiting\n", 13stop waiting
) = 13
[pid 8280] futex(0x5555c7ce60c0, FUTEX_WAKE_PRIVATE, 1) = 0
[pid 8280] futex(0x7fa86d8799d0, FUTEX_WAIT, 8284, NULL <unfinished ...>
[pid 8284] write(1, "thread end\n", 11thread end
) = 11
[pid 8284] madvise(0x7fa86d079000, 8368128, MADV_DONTNEED) = 0
[pid 8284] exit(0)                  = ?
[pid 8280] <... futex resumed> )    = 0
[pid 8280] write(1, "Probabilities:\n", 15Probabilities:
) = 15
[pid 8280] write(1, "\tfirst person wins - 0.333, seco"..., 43 first person wins - 0.333, second - 0.667
) = 43
[pid 8280] write(1, "\tDraw - 0.000\n", 14    Draw - 0.000
) = 14
[pid 8280] write(1, " Based on 3 tests.\n", 19 Based on 3 tests.
) = 19

```

```
[pid 8284] +++ exited with 0 +++
lseek(0, -1, SEEK_CUR)          = -1 ESPIPE (Illegal seek)
exit_group(0)                   = ?
+++ exited with 0 +++
anri@andrew-HP-250-G6:~/Documents/Github_repositories/OS_labs/lab3/src/build$
```

2.3. lab 4

```
anri@andrew-HP-250-G6:~/Documents/Github_repositories/OS_labs/lab4/src/build$ strace -f -e
trace=mmap,clone ./OS_lab4
mmap(NULL, 126176, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7fecaad9000
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0)
= 0x7fecaad7000
mmap(NULL, 2221184, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_DENYWRITE, 3, 0)
= 0x7fecaab2000
mmap(0x7fecaacb000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 3, 0x19000) = 0x7fecaacb000
mmap(0x7fecaacd000, 13440, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_ANONYMOUS, -1, 0) = 0x7fecaacd000
mmap(NULL, 4131552, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_DENYWRITE, 3, 0)
= 0x7feca6c1000
mmap(0x7fecaaa8000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 3, 0x1e7000) = 0x7fecaaa8000
mmap(0x7fecaaae000, 15072, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_ANONYMOUS, -1, 0) = 0x7fecaaae000
mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1,
0) = 0x7fecaad4000
pwd
clone(strace: Process 9198 attached
child_stack=NULL, flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|
SIGCHLD, child_tidptr=0x7fecaad4a10) = 9198
trying to enter parent...
now in child
[pid 9198] mmap(NULL, 126176, PROT_READ, MAP_PRIVATE, 4, 0) = 0x7f2e6772e000
[pid 9198] mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|
MAP_ANONYMOUS, -1, 0) = 0x7f2e6772c000
[pid 9198] mmap(NULL, 4131552, PROT_READ|PROT_EXEC, MAP_PRIVATE|
MAP_DENYWRITE, 4, 0) = 0x7f2e67135000
[pid 9198] mmap(0x7f2e6751c000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|
MAP_FIXED|MAP_DENYWRITE, 4, 0x1e7000) = 0x7f2e6751c000
[pid 9198] mmap(0x7f2e67522000, 15072, PROT_READ|PROT_WRITE, MAP_PRIVATE|
MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x7f2e67522000
[pid 9198] mmap(NULL, 10281936, PROT_READ, MAP_PRIVATE, 4, 0) = 0x7f2e66766000
[pid 9198] +++ exited with 0 +++
--- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=9198, si_uid=1000,
si_status=0, si_etime=0, si_stime=0} ---
now in parent
mmap(NULL, 64, PROT_READ|PROT_WRITE, MAP_SHARED, 3, 0) = 0x7fecaaef7000
/~/ANRI/DOCUMENTS/GITHUB_REPOSITORIES/OS_LABS/LAB4/SRC/BUILD
clone(strace: Process 9199 attached
```



```

child_stack=NULL, flags=CLONE_PARENT_SETTID|SIGCHLD, parent_tidptr=0x7ffe451f376c)
= 9199
[pid 9199] mmap(NULL, 126176, PROT_READ, MAP_PRIVATE, 4, 0) = 0x7fe997d85000
[pid 9199] mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|
MAP_ANONYMOUS, -1, 0) = 0x7fe997d83000
[pid 9199] mmap(NULL, 4131552, PROT_READ|PROT_EXEC, MAP_PRIVATE|
MAP_DENYWRITE, 4, 0) = 0x7fe99778c000
[pid 9199] mmap(0x7fe997b73000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|
MAP_FIXED|MAP_DENYWRITE, 4, 0x1e7000) = 0x7fe997b73000
[pid 9199] mmap(0x7fe997b79000, 15072, PROT_READ|PROT_WRITE, MAP_PRIVATE|
MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x7fe997b79000
[pid 9199] clone(child_stack=NULL, flags=CLONE_CHILD_CLEARTID|
CLONE_CHILD_SETTID|SIGCHLD, child_tidptr=0x7fe997d84810) = 9200
strace: Process 9200 attached
[pid 9200] mmap(NULL, 126176, PROT_READ, MAP_PRIVATE, 4, 0) = 0x7f8db61cc000
[pid 9200] mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|
MAP_ANONYMOUS, -1, 0) = 0x7f8db61ca000
[pid 9200] mmap(NULL, 4131552, PROT_READ|PROT_EXEC, MAP_PRIVATE|
MAP_DENYWRITE, 4, 0) = 0x7f8db5bd3000
[pid 9200] mmap(0x7f8db5fba000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|
MAP_FIXED|MAP_DENYWRITE, 4, 0x1e7000) = 0x7f8db5fba000
[pid 9200] mmap(0x7f8db5fc0000, 15072, PROT_READ|PROT_WRITE, MAP_PRIVATE|
MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x7f8db5fc0000
[pid 9200] mmap(NULL, 10281936, PROT_READ, MAP_PRIVATE, 4, 0) = 0x7f8db5204000
[pid 9200] +++ exited with 0 +++
[pid 9199] --- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=9200,
si_uid=1000, si_status=0, si_utime=0, si_stime=0} ---
[pid 9199] +++ exited with 0 +++
--- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=9199, si_uid=1000,
si_status=0, si_utime=0, si_stime=0} ---
+++ exited with 0 +++
anri@andrew-HP-250-G6:~/Documents/Github_repositories/OS_labs/lab4/src/build$

```

2.4. lab 5

```

anri@andrew-HP-250-G6:~/Documents/Github_repositories/OS_labs/lab5/src$ strace ./runtime
execve("./runtime", [".runtime"], 0x7ffc5ba70b50 /* 64 vars */) = 0
brk(NULL) = 0x55f850fc8000
access("/etc/ld.so.nohwcap", F_OK) = -1 ENOENT (No such file or directory)
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=126345, ...}) = 0
mmap(NULL, 126345, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7efefec85000
close(3) = 0
access("/etc/ld.so.nohwcap", F_OK) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libdl.so.2", 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\0P\16\0\0\0\0\0"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0644, st_size=14560, ...}) = 0
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0)
= 0x7efefec83000

```

```

mmap(NULL, 2109712, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_DENYWRITE, 3, 0)
= 0x7efefe879000
mprotect(0x7efefe87c000, 2093056, PROT_NONE) = 0
mmap(0x7efefea7b000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 3, 0x2000) = 0x7efefea7b000
close(3) = 0
access("/etc/ld.so.nohwcap", F_OK) = -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, "\177ELF2\1\1\3\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\260\34\2\0\0\0\0"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0755, st_size=2030544, ...}) = 0
mmap(NULL, 4131552, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_DENYWRITE, 3, 0)
= 0x7efefe488000
mprotect(0x7efefe66f000, 2097152, PROT_NONE) = 0
mmap(0x7efefe86f000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 3, 0x1e7000) = 0x7efefe86f000
mmap(0x7efefe875000, 15072, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_ANONYMOUS, -1, 0) = 0x7efefe875000
close(3) = 0
mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1,
0) = 0x7efefec80000
arch_prctl(ARCH_SET_FS, 0x7efefec80740) = 0
mprotect(0x7efefe86f000, 16384, PROT_READ) = 0
mprotect(0x7efefea7b000, 4096, PROT_READ) = 0
mprotect(0x55f850db7000, 4096, PROT_READ) = 0
mprotect(0x7efefeca4000, 4096, PROT_READ) = 0
munmap(0x7efefec85000, 126345) = 0
brk(NULL) = 0x55f850fc8000
brk(0x55f850fe9000) = 0x55f850fe9000
openat(AT_FDCWD, "./f_deque.so", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF2\1\1\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\20\10\0\0\0\0\0"..., 832) = 832
fstat(3, {st_mode=S_IFREG|0775, st_size=12488, ...}) = 0
getcwd("/home/anri/Documents/Github_repositories/OS_labs/lab5/src", 128) = 58
mmap(NULL, 2105448, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_DENYWRITE, 3, 0)
= 0x7efefe285000
mprotect(0x7efefe286000, 2097152, PROT_NONE) = 0
mmap(0x7efefe486000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|
MAP_DENYWRITE, 3, 0x1000) = 0x7efefe486000
close(3) = 0
mprotect(0x7efefe486000, 4096, PROT_READ) = 0
fstat(1, {st_mode=S_IFCHR|0620, st_rdev=makedev(136, 0), ...}) = 0
write(1, "Can`t pop from back, it`s empty."..., 33Can`t pop from back, it`s empty.
) = 33
write(1, "Can`t pop from front, it`s empty"..., 34Can`t pop from front, it`s empty.
) = 34
write(1, "Can`t print, it`s empty.\n", 25Can`t print, it`s empty.
) = 25
write(1, "12.340000\n", 1012.340000
) = 10
write(1, "12.340000\n", 1012.340000
) = 10
write(1, "90.120000, 12.340000, 56.78000"..., 3490.120000, 12.340000, 56.780000
) = 34

```

```

write(1, "12.340000\n", 1012.340000
)      = 10
write(1, "Can`t print, it`s empty.\n", 25Can`t print, it`s empty.
) = 25
munmap(0x7efefe285000, 2105448)      = 0
exit_group(0)      = ?
+++ exited with 0 +++
anri@andrew-HP-250-G6:~/Documents/Github_repositories/OS_labs/lab5/src$

```

2.5. lab 6

В данном примере я использовал ключ -f, чтобы отображалась только информация о новых процессах, чтобы не перегружать отчёт кучей лишних логов.

```

anri@andrew-HP-250-G6:~/Documents/Github_repositories/OS_labs/lab6/src/build$ strace -f -e
trace=clone ./control_node
clone(strace: Process 24331 attached
child_stack=0x7faca69e4b70, flags=CLONE_VM|CLONE_FS|CLONE_FILES|
CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|
CLONE_PARENT_SETTID|CLONE_CHILD_CLEARTID, parent_tidptr=0x7faca69e59d0,
tls=0x7faca69e5700, child_tidptr=0x7faca69e59d0) = 24331
[pid 24330] clone(strace: Process 24332 attached
child_stack=0x7faca61e3b70, flags=CLONE_VM|CLONE_FS|CLONE_FILES|
CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|
CLONE_PARENT_SETTID|CLONE_CHILD_CLEARTID, parent_tidptr=0x7faca61e49d0,
tls=0x7faca61e4700, child_tidptr=0x7faca61e49d0) = 24332
create 1 -1
[pid 24330] clone(child_stack=NULL, flags=CLONE_CHILD_CLEARTID|
CLONE_CHILD_SETTID|SIGCHLD, child_tidptr=0x7faca89b5e50) = 24339
strace: Process 24339 attached
[pid 24339] clone(strace: Process 24340 attached
child_stack=0x7f3f57fdb70, flags=CLONE_VM|CLONE_FS|CLONE_FILES|
CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|
CLONE_PARENT_SETTID|CLONE_CHILD_CLEARTID, parent_tidptr=0x7f3f57fdb9d0,
tls=0x7f3f57fdb700, child_tidptr=0x7f3f57fdb9d0) = 24340
[pid 24339] clone(strace: Process 24341 attached
child_stack=0x7f3f577d9b70, flags=CLONE_VM|CLONE_FS|CLONE_FILES|
CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|
CLONE_PARENT_SETTID|CLONE_CHILD_CLEARTID, parent_tidptr=0x7f3f577da9d0,
tls=0x7f3f577da700, child_tidptr=0x7f3f577da9d0) = 24341
[pid 24339] clone(strace: Process 24342 attached
child_stack=0x7f3f56fd8b70, flags=CLONE_VM|CLONE_FS|CLONE_FILES|
CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|
CLONE_PARENT_SETTID|CLONE_CHILD_CLEARTID, parent_tidptr=0x7f3f56fd99d0,
tls=0x7f3f56fd9700, child_tidptr=0x7f3f56fd99d0) = 24342
[pid 24339] clone(strace: Process 24343 attached
child_stack=0x7f3f567d7b70, flags=CLONE_VM|CLONE_FS|CLONE_FILES|
CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|
CLONE_PARENT_SETTID|CLONE_CHILD_CLEARTID, parent_tidptr=0x7f3f567d89d0,
tls=0x7f3f567d8700, child_tidptr=0x7f3f567d89d0) = 24343

```

```

Ok:24339
create 2 1
[pid 24339] clone(strace: Process 24351 attached
child_stack=NULL, flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD,
child_tidptr=0x7f3f59fabe50) = 24351
[pid 24351] clone(strace: Process 24352 attached
child_stack=0x7fc893574b70, flags=CLONE_VM|CLONE_FS|CLONE_FILES|
CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|
CLONE_PARENT_SETTID|CLONE_CHILD_CLEARTID, parent_tidptr=0x7fc8935759d0,
tls=0x7fc893575700, child_tidptr=0x7fc8935759d0) = 24352
[pid 24351] clone(child_stack=0x7fc892d73b70, flags=CLONE_VM|CLONE_FS|CLONE_FILES|
CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|
CLONE_PARENT_SETTID|CLONE_CHILD_CLEARTID, parent_tidptr=0x7fc892d749d0,
tls=0x7fc892d74700, child_tidptr=0x7fc892d749d0) = 24353
[pid 24351] clone(strace: Process 24354 attached
strace: Process 24353 attached
child_stack=0x7fc892572b70, flags=CLONE_VM|CLONE_FS|CLONE_FILES|
CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|
CLONE_PARENT_SETTID|CLONE_CHILD_CLEARTID, parent_tidptr=0x7fc8925739d0,
tls=0x7fc892573700, child_tidptr=0x7fc8925739d0) = 24354
[pid 24351] clone(strace: Process 24355 attached
child_stack=0x7fc891d71b70, flags=CLONE_VM|CLONE_FS|CLONE_FILES|
CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|
CLONE_PARENT_SETTID|CLONE_CHILD_CLEARTID, parent_tidptr=0x7fc891d729d0,
tls=0x7fc891d72700, child_tidptr=0x7fc891d729d0) = 24355
Ok:24351
exec 1 qwerty we
Ok 1: 1
remove 2
[pid 24351] --- SIGTERM {si_signo=SIGTERM, si_code=SI_USER, si_pid=24339, si_uid=1000}
---
[pid 24355] +++ killed by SIGTERM +++
[pid 24354] +++ killed by SIGTERM +++
[pid 24353] +++ killed by SIGTERM +++
[pid 24352] +++ killed by SIGTERM +++
[pid 24351] +++ killed by SIGTERM +++
[pid 24339] --- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_KILLED, si_pid=24351,
si_uid=1000, si_status=SIGTERM, si_utime=0, si_stime=1} ---
Ok
heartbit
Recieved nodes 1
All nodes 1
create 2 1
[pid 24339] clone(strace: Process 24390 attached
child_stack=NULL, flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD,
child_tidptr=0x7f3f59fabe50) = 24390
[pid 24390] clone(strace: Process 24391 attached
child_stack=0x7ff72a908b70, flags=CLONE_VM|CLONE_FS|CLONE_FILES|
CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|
CLONE_PARENT_SETTID|CLONE_CHILD_CLEARTID, parent_tidptr=0x7ff72a9099d0,
tls=0x7ff72a909700, child_tidptr=0x7ff72a9099d0) = 24391
[pid 24390] clone(strace: Process 24392 attached

```

```

child_stack=0x7ff72a107b70, flags=CLONE_VM|CLONE_FS|CLONE_FILES|
CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|
CLONE_PARENT_SETTID|CLONE_CHILD_CLEARPID, parent_tidptr=0x7ff72a1089d0,
tls=0x7ff72a108700, child_tidptr=0x7ff72a1089d0) = 24392
[pid 24390] clone(strace: Process 24393 attached
child_stack=0x7ff729906b70, flags=CLONE_VM|CLONE_FS|CLONE_FILES|
CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|
CLONE_PARENT_SETTID|CLONE_CHILD_CLEARPID, parent_tidptr=0x7ff7299079d0,
tls=0x7ff729907700, child_tidptr=0x7ff7299079d0) = 24393
[pid 24390] clone(strace: Process 24394 attached
child_stack=0x7ff729105b70, flags=CLONE_VM|CLONE_FS|CLONE_FILES|
CLONE_SIGHAND|CLONE_THREAD|CLONE_SYSVSEM|CLONE_SETTLS|
CLONE_PARENT_SETTID|CLONE_CHILD_CLEARPID, parent_tidptr=0x7ff7291069d0,
tls=0x7ff729106700, child_tidptr=0x7ff7291069d0) = 24394
Ok:24390
heartbit
Recieved nodes 1 2
All nodes 1 2
exit
[pid 24390] --- SIGTERM {si_signo=SIGTERM, si_code=SI_USER, si_pid=24339, si_uid=1000}
---
[pid 24393] +++ killed by SIGTERM +++
[pid 24392] +++ killed by SIGTERM +++
[pid 24391] +++ killed by SIGTERM +++
[pid 24394] +++ killed by SIGTERM +++
[pid 24390] +++ killed by SIGTERM +++
[pid 24343] ????( <unfinished ...>
[pid 24343] +++ killed by SIGKILL +++
[pid 24342] +++ killed by SIGKILL +++
[pid 24341] +++ killed by SIGKILL +++
[pid 24340] +++ killed by SIGKILL +++
[pid 24339] +++ killed by SIGKILL +++
[pid 24330] --- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_KILLED, si_pid=24339,
si_uid=1000, si_status=SIGKILL, si_utime=0, si_stime=1} ---
[pid 24331] +++ exited with 0 +++
[pid 24332] +++ exited with 0 +++
+++ exited with 0 +++

```

Вывод

Выполняя лабораторные работы по данному курсу, я тесно познакомился с утилитой strace, научился более-менее вдумчиво читать её вывод, отлаживать с её помощью программы, работающие со множеством процессов, а также применять фильтры к выводу команды strace.