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Факультет информационных технологий и прикладной математики

Кафедра вычислительной математики и программирования

**Лабораторная работа №1 по курсу**

**«Операционные системы»**

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## **Задание**

Цель работы — приобретение практических навыков диагностики работы программного обеспечения.

# **Strace**

**Strace** показывает все системные вызовы программы, которые она отправляет к системе во время выполнения, а также их параметры и результат выполнения. При необходимости можно подключиться к уже запущенному процессу.

Strace имеет следующие(и не только) ключи

* **-i** — выводить указатель на инструкцию во время выполнения системного вызова
* **-o** — выводить всю информацию о системных вызовах не в стандартный поток ошибок, а в файл
* **-r** — выводить временную метку для каждого системного вызова
* **-T** — выводить длительность выполнения каждого системного вызова
* **-b** — если указанный системный вызов обнаружен, трассировка прекращается
* **-l** — позволяет блокировать реакцию нажатия Ctrl+C и Ctrl+Z
* **-f** — отслеживать дочерние процессы и создаваемые потоки

execve(...) - запускает программу  
brk(...) - устанавливает конец сегмента данных в значение NULL  
access(...) - проверяет права доступа к файлу, возвращает -1 как код ошибки  
openat(...) - открывает файл, имеет в качестве возвращаемого значения файловый дескриптор  
fstat(...) - собирает информацию из файла  
**mmap(...)** - отображает файл на память  
mprotect(...) - контролирует доступ к памяти  
close(...) - закрывает файловый дескриптор  
read(...) - считывает из файлового дескриптора  
arch\_prctl(...) - устанавливает специфичное для архитектуры значение ядра  
**munmap(...)** - освобождает память, отведенную для отображения файла  
write(...) - пишет в консоль  
ftruncate(...) - увеличивает размер файла до n байтов  
clone(...) - создает новый процесс  
unlink(...) - удаляет файл  
lseek(...) - устанавливает смещение для позиционирования операций чтения/записи

**Лабораторная работа №2**

**Лабораторная работа №3**

ann@ann:~/os/lab3$ strace ./a.out 4 <test.txt

execve("./a.out", ["./a.out", "4"], 0x7ffc5ed400d8 /\* 63 vars \*/) = 0

brk(NULL) = 0x558aa21db000

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=79721, ...}) = 0

mmap(NULL, 79721, PROT\_READ, MAP\_PRIVATE, 3, 0) = 0x7fc166b0c000

close(3) = 0

access("/etc/ld.so.nohwcap", F\_OK) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "/usr/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\220\304\10\0\0\0\0\0"..., 832) = 832

fstat(3, {st\_mode=S\_IFREG|0644, st\_size=1594864, ...}) = 0

mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7fc166b0a000

mmap(NULL, 3702848, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7fc16656e000

mprotect(0x7fc1666e7000, 2097152, PROT\_NONE) = 0

mmap(0x7fc1668e7000, 49152, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x179000) = 0x7fc1668e7000

mmap(0x7fc1668f3000, 12352, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7fc1668f3000

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/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\300\*\0\0\0\0\0\0"..., 832) = 832

fstat(3, {st\_mode=S\_IFREG|0644, st\_size=96616, ...}) = 0

mmap(NULL, 2192432, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7fc166356000

mprotect(0x7fc16636d000, 2093056, PROT\_NONE) = 0

mmap(0x7fc16656c000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x16000) = 0x7fc16656c000

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\0"..., 832) = 832

fstat(3, {st\_mode=S\_IFREG|0755, st\_size=144976, ...}) = 0

mmap(NULL, 2221184, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7fc166137000

mprotect(0x7fc166151000, 2093056, PROT\_NONE) = 0

mmap(0x7fc166350000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x19000) = 0x7fc166350000

mmap(0x7fc166352000, 13440, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7fc166352000

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\20\35\2\0\0\0\0\0"..., 832) = 832

fstat(3, {st\_mode=S\_IFREG|0755, st\_size=2030928, ...}) = 0

mmap(NULL, 4131552, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7fc165d46000

mprotect(0x7fc165f2d000, 2097152, PROT\_NONE) = 0

mmap(0x7fc16612d000, 24576, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1e7000) = 0x7fc16612d000

mmap(0x7fc166133000, 15072, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7fc166133000

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/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\200\272\0\0\0\0\0\0"..., 832) = 832

fstat(3, {st\_mode=S\_IFREG|0644, st\_size=1700792, ...}) = 0

mmap(NULL, 3789144, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7fc1659a8000

mprotect(0x7fc165b45000, 2093056, PROT\_NONE) = 0

mmap(0x7fc165d44000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x19c000) = 0x7fc165d44000

close(3) = 0

mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7fc166b08000

mmap(NULL, 12288, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7fc166b05000

arch\_prctl(ARCH\_SET\_FS, 0x7fc166b05740) = 0

mprotect(0x7fc16612d000, 16384, PROT\_READ) = 0

mprotect(0x7fc165d44000, 4096, PROT\_READ) = 0

mprotect(0x7fc166350000, 4096, PROT\_READ) = 0

mprotect(0x7fc16656c000, 4096, PROT\_READ) = 0

mprotect(0x7fc1668e7000, 40960, PROT\_READ) = 0

mprotect(0x558aa1a97000, 4096, PROT\_READ) = 0

mprotect(0x7fc166b20000, 4096, PROT\_READ) = 0

munmap(0x7fc166b0c000, 79721) = 0

set\_tid\_address(0x7fc166b05a10) = 4040

set\_robust\_list(0x7fc166b05a20, 24) = 0

rt\_sigaction(SIGRTMIN, {sa\_handler=0x7fc16613ccb0, sa\_mask=[], sa\_flags=SA\_RESTORER|SA\_SIGINFO, sa\_restorer=0x7fc166149980}, NULL, 8) = 0

rt\_sigaction(SIGRT\_1, {sa\_handler=0x7fc16613cd50, sa\_mask=[], sa\_flags=SA\_RESTORER|SA\_RESTART|SA\_SIGINFO, sa\_restorer=0x7fc166149980}, 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

brk(NULL) = 0x558aa21db000

brk(0x558aa21fc000) = 0x558aa21fc000

futex(0x7fc1668f409c, FUTEX\_WAKE\_PRIVATE, 2147483647) = 0

futex(0x7fc1668f40a8, FUTEX\_WAKE\_PRIVATE, 2147483647) = 0

fstat(1, {st\_mode=S\_IFCHR|0620, st\_rdev=makedev(136, 0), ...}) = 0

write(1, "Max threads number is 4\n", 24Max threads number is 4

) = 24

write(1, "Enter vector for sorting:\n", 26Enter vector for sorting:

) = 26

fstat(0, {st\_mode=S\_IFREG|0664, st\_size=1944, ...}) = 0

read(0, "95 665 998 -56 867 713 682 771 9"..., 4096) = 1944

read(0, "", 4096) = 0

write(1, "Size = 500\n", 11Size = 500

) = 11

write(1, "MINRUN = 63\n", 12MINRUN = 63

) = 12

mmap(NULL, 8392704, PROT\_NONE, MAP\_PRIVATE|MAP\_ANONYMOUS|MAP\_STACK, -1, 0) = 0x7fc1651a7000

mprotect(0x7fc1651a8000, 8388608, PROT\_READ|PROT\_WRITE) = 0

**clone(child\_stack=0x7fc1659a6fb0, flags=CLONE\_VM|CLONE\_FS|CLONE\_FILES|CLONE\_SIGHAND|CLONE\_THREAD|CLONE\_SYSVSEM|CLONE\_SETTLS|CLONE\_PARENT\_SETTID|CLONE\_CHILD\_CLEARTID, parent\_tidptr=0x7fc1659a79d0, tls=0x7fc1659a7700, child\_tidptr=0x7fc1659a79d0) = 4041**

**mmap(NULL, 8392704, PROT\_NONE, MAP\_PRIVATE|MAP\_ANONYMOUS|MAP\_STACK, -1, 0) = 0x7fc1649a6000**

**mprotect(0x7fc1649a7000, 8388608, PROT\_READ|PROT\_WRITE) = 0**

**clone(child\_stack=0x7fc1651a5fb0, flags=CLONE\_VM|CLONE\_FS|CLONE\_FILES|CLONE\_SIGHAND|CLONE\_THREAD|CLONE\_SYSVSEM|CLONE\_SETTLS|CLONE\_PARENT\_SETTID|CLONE\_CHILD\_CLEARTID, parent\_tidptr=0x7fc1651a69d0, tls=0x7fc1651a6700, child\_tidptr=0x7fc1651a69d0) = 4042**

**mmap(NULL, 8392704, PROT\_NONE, MAP\_PRIVATE|MAP\_ANONYMOUS|MAP\_STACK, -1, 0) = 0x7fc1641a5000**

**mprotect(0x7fc1641a6000, 8388608, PROT\_READ|PROT\_WRITE) = 0**

**clone(child\_stack=0x7fc1649a4fb0, flags=CLONE\_VM|CLONE\_FS|CLONE\_FILES|CLONE\_SIGHAND|CLONE\_THREAD|CLONE\_SYSVSEM|CLONE\_SETTLS|CLONE\_PARENT\_SETTID|CLONE\_CHILD\_CLEARTID, parent\_tidptr=0x7fc1649a59d0, tls=0x7fc1649a5700, child\_tidptr=0x7fc1649a59d0) = 4043**

**mmap(NULL, 8392704, PROT\_NONE, MAP\_PRIVATE|MAP\_ANONYMOUS|MAP\_STACK, -1, 0) = 0x7fc15f7ff000**

**mprotect(0x7fc15f800000, 8388608, PROT\_READ|PROT\_WRITE) = 0**

**clone(child\_stack=0x7fc15fffefb0, flags=CLONE\_VM|CLONE\_FS|CLONE\_FILES|CLONE\_SIGHAND|CLONE\_THREAD|CLONE\_SYSVSEM|CLONE\_SETTLS|CLONE\_PARENT\_SETTID|CLONE\_CHILD\_CLEARTID, parent\_tidptr=0x7fc15ffff9d0, tls=0x7fc15ffff700, child\_tidptr=0x7fc15ffff9d0) = 4044**

**clone(child\_stack=0x7fc15fffefb0, flags=CLONE\_VM|CLONE\_FS|CLONE\_FILES|CLONE\_SIGHAND|CLONE\_THREAD|CLONE\_SYSVSEM|CLONE\_SETTLS|CLONE\_PARENT\_SETTID|CLONE\_CHILD\_CLEARTID, parent\_tidptr=0x7fc15ffff9d0, tls=0x7fc15ffff700, child\_tidptr=0x7fc15ffff9d0) = 4045**

**clone(child\_stack=0x7fc1649a4fb0, flags=CLONE\_VM|CLONE\_FS|CLONE\_FILES|CLONE\_SIGHAND|CLONE\_THREAD|CLONE\_SYSVSEM|CLONE\_SETTLS|CLONE\_PARENT\_SETTID|CLONE\_CHILD\_CLEARTID, parent\_tidptr=0x7fc1649a59d0, tls=0x7fc1649a5700, child\_tidptr=0x7fc1649a59d0) = 4046**

**clone(child\_stack=0x7fc1651a5fb0, flags=CLONE\_VM|CLONE\_FS|CLONE\_FILES|CLONE\_SIGHAND|CLONE\_THREAD|CLONE\_SYSVSEM|CLONE\_SETTLS|CLONE\_PARENT\_SETTID|CLONE\_CHILD\_CLEARTID, parent\_tidptr=0x7fc1651a69d0, tls=0x7fc1651a6700, child\_tidptr=0x7fc1651a69d0) = 4047**

**clone(child\_stack=0x7fc1659a6fb0, flags=CLONE\_VM|CLONE\_FS|CLONE\_FILES|CLONE\_SIGHAND|CLONE\_THREAD|CLONE\_SYSVSEM|CLONE\_SETTLS|CLONE\_PARENT\_SETTID|CLONE\_CHILD\_CLEARTID, parent\_tidptr=0x7fc1659a79d0, tls=0x7fc1659a7700, child\_tidptr=0x7fc1659a79d0) = 4048**

**clone(child\_stack=0x7fc1659a6fb0, flags=CLONE\_VM|CLONE\_FS|CLONE\_FILES|CLONE\_SIGHAND|CLONE\_THREAD|CLONE\_SYSVSEM|CLONE\_SETTLS|CLONE\_PARENT\_SETTID|CLONE\_CHILD\_CLEARTID, parent\_tidptr=0x7fc1659a79d0, tls=0x7fc1659a7700, child\_tidptr=0x7fc1659a79d0) = 4049**

**clone(child\_stack=0x7fc1651a5fb0, flags=CLONE\_VM|CLONE\_FS|CLONE\_FILES|CLONE\_SIGHAND|CLONE\_THREAD|CLONE\_SYSVSEM|CLONE\_SETTLS|CLONE\_PARENT\_SETTID|CLONE\_CHILD\_CLEARTID, parent\_tidptr=0x7fc1651a69d0, tls=0x7fc1651a6700, child\_tidptr=0x7fc1651a69d0) = 4050**

**clone(child\_stack=0x7fc1649a4fb0, flags=CLONE\_VM|CLONE\_FS|CLONE\_FILES|CLONE\_SIGHAND|CLONE\_THREAD|CLONE\_SYSVSEM|CLONE\_SETTLS|CLONE\_PARENT\_SETTID|CLONE\_CHILD\_CLEARTID, parent\_tidptr=0x7fc1649a59d0, tls=0x7fc1649a5700, child\_tidptr=0x7fc1649a59d0) = 4051**

**clone(child\_stack=0x7fc15fffefb0, flags=CLONE\_VM|CLONE\_FS|CLONE\_FILES|CLONE\_SIGHAND|CLONE\_THREAD|CLONE\_SYSVSEM|CLONE\_SETTLS|CLONE\_PARENT\_SETTID|CLONE\_CHILD\_CLEARTID, parent\_tidptr=0x7fc15ffff9d0, tls=0x7fc15ffff700, child\_tidptr=0x7fc15ffff9d0) = 4052**

**futex(0x7fc15ffff9d0, FUTEX\_WAIT, 4052, NULL) = 0**

**clone(child\_stack=0x7fc15fffefb0, flags=CLONE\_VM|CLONE\_FS|CLONE\_FILES|CLONE\_SIGHAND|CLONE\_THREAD|CLONE\_SYSVSEM|CLONE\_SETTLS|CLONE\_PARENT\_SETTID|CLONE\_CHILD\_CLEARTID, parent\_tidptr=0x7fc15ffff9d0, tls=0x7fc15ffff700, child\_tidptr=0x7fc15ffff9d0) = 4053**

**clone(child\_stack=0x7fc1649a4fb0, flags=CLONE\_VM|CLONE\_FS|CLONE\_FILES|CLONE\_SIGHAND|CLONE\_THREAD|CLONE\_SYSVSEM|CLONE\_SETTLS|CLONE\_PARENT\_SETTID|CLONE\_CHILD\_CLEARTID, parent\_tidptr=0x7fc1649a59d0, tls=0x7fc1649a5700, child\_tidptr=0x7fc1649a59d0) = 4054**

futex(0x7fc15ffff9d0, FUTEX\_WAIT, 4053, NULL) = 0

clone(child\_stack=0x7fc1649a4fb0, flags=CLONE\_VM|CLONE\_FS|CLONE\_FILES|CLONE\_SIGHAND|CLONE\_THREAD|CLONE\_SYSVSEM|CLONE\_SETTLS|CLONE\_PARENT\_SETTID|CLONE\_CHILD\_CLEARTID, parent\_tidptr=0x7fc1649a59d0, tls=0x7fc1649a5700, child\_tidptr=0x7fc1649a59d0) = 4055

futex(0x7fc1649a59d0, FUTEX\_WAIT, 4055, NULL) = 0

write(1, "Time: 5028 microseconds\n", 24Time: 5028 microseconds

) = 24

write(1, "Sorted vector:\n", 15Sorted vector:

) = 15

write(1, "-100 -99 -95 -93 -93 -92 -92 -90"..., 1024-100 -99 -95 -93 -93 -92 -92 -90 -89 -83 -80 -80 -76 -71 -67 -66 -65 -62 -60 -59 -56 -53 -52 -52 -52 -50 -47 -41 -41 -41 -27 -24 -20 -19 -15 -15 -14 -14 -9 0 3 4 9 9 10 12 19 22 23 23 25 26 28 29 31 31 32 32 34 34 36 37 38 39 39 39 42 45 46 48 56 56 59 62 62 64 64 66 68 71 74 77 77 79 80 80 83 87 95 101 104 108 114 116 117 117 118 119 120 120 124 129 138 139 143 143 144 144 145 148 151 151 152 153 155 155 162 164 167 168 172 176 177 177 183 185 186 187 187 189 189 190 192 192 195 196 199 200 201 203 203 204 206 207 210 210 212 215 226 231 232 233 233 234 238 242 243 244 244 250 252 256 264 266 268 270 272 272 272 282 287 289 297 298 299 300 306 306 307 312 312 313 316 317 318 326 327 329 329 331 332 333 340 340 342 342 342 351 355 356 358 361 366 367 367 371 376 377 381 393 395 396 398 402 402 408 409 409 410 411 411 419 419 424 424 426 428 429 431 432 434 438 439 443 443 448 452 457 457 465 466 466 468 470 474 475 480 484 484 489 489 491 493 494 498 500 503 506 506 507 510 511 515 520 524 531 534 536 536 537) = 1024

write(1, " 539 542 544 544 545 547 548 551"..., 922 539 542 544 544 545 547 548 551 553 560 560 562 564 564 564 567 573 575 577 578 579 580 584 593 593 595 602 603 605 606 608 610 611 611 613 614 614 619 619 620 620 620 621 623 624 625 625 626 626 629 633 635 637 639 639 643 645 646 646 647 648 653 655 658 660 662 662 663 663 665 667 670 679 681 682 684 685 688 692 693 694 696 709 710 713 713 715 716 717 720 720 722 722 723 724 726 727 729 730 731 732 732 740 745 749 749 752 754 756 758 758 761 761 762 764 764 766 769 771 776 776 783 783 784 786 786 787 788 800 802 802 805 806 807 808 808 809 810 812 813 816 816 817 820 822 824 825 826 828 831 831 836 838 843 843 854 857 857 858 860 860 861 861 864 864 866 867 867 868 869 874 875 876 877 878 878 884 889 894 897 897 899 900 902 902 903 903 906 909 917 918 918 925 929 929 932 936 938 938 939 939 942 944 944 945 947 949 950 950 955 955 956 959 959 962 963 964 970 975 983 984 987 989 990 996 996 997 998 998 998

) = 922

exit\_group(0) = ?

+++ exited with 0 +++

**Лабораторная работа №4**

**mmap** – memory map – отражение в память, флаг MAP\_SHARED показывает, что память разделяемая

ann@ann:~/os/lab4$ strace ./main

execve("./main", ["./main"], 0x7ffd00177910 /\* 63 vars \*/) = 0

brk(NULL) = 0x55b70b0d0000

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=79721, ...}) = 0

mmap(NULL, 79721, PROT\_READ, MAP\_PRIVATE, 3, 0) = 0x7f47f948a000

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\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) = 0x7f47f9488000

mmap(NULL, 2221184, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f47f9056000

mprotect(0x7f47f9070000, 2093056, PROT\_NONE) = 0

mmap(0x7f47f926f000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x19000) = 0x7f47f926f000

mmap(0x7f47f9271000, 13440, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f47f9271000

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/librt.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=31680, ...}) = 0

mmap(NULL, 2128864, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f47f8e4e000

mprotect(0x7f47f8e55000, 2093056, PROT\_NONE) = 0

mmap(0x7f47f9054000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x6000) = 0x7f47f9054000

close(3) = 0

access("/etc/ld.so.nohwcap", F\_OK) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "/usr/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\220\304\10\0\0\0\0\0"..., 832) = 832

fstat(3, {st\_mode=S\_IFREG|0644, st\_size=1594864, ...}) = 0

mmap(NULL, 3702848, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f47f8ac5000

mprotect(0x7f47f8c3e000, 2097152, PROT\_NONE) = 0

mmap(0x7f47f8e3e000, 49152, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x179000) = 0x7f47f8e3e000

mmap(0x7f47f8e4a000, 12352, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f47f8e4a000

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\20\35\2\0\0\0\0\0"..., 832) = 832

fstat(3, {st\_mode=S\_IFREG|0755, st\_size=2030928, ...}) = 0

mmap(NULL, 4131552, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f47f86d4000

mprotect(0x7f47f88bb000, 2097152, PROT\_NONE) = 0

mmap(0x7f47f8abb000, 24576, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1e7000) = 0x7f47f8abb000

mmap(0x7f47f8ac1000, 15072, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f47f8ac1000

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/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\200\272\0\0\0\0\0\0"..., 832) = 832

fstat(3, {st\_mode=S\_IFREG|0644, st\_size=1700792, ...}) = 0

mmap(NULL, 3789144, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f47f8336000

mprotect(0x7f47f84d3000, 2093056, PROT\_NONE) = 0

mmap(0x7f47f86d2000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x19c000) = 0x7f47f86d2000

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/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\300\*\0\0\0\0\0\0"..., 832) = 832

fstat(3, {st\_mode=S\_IFREG|0644, st\_size=96616, ...}) = 0

mmap(NULL, 2192432, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f47f811e000

mprotect(0x7f47f8135000, 2093056, PROT\_NONE) = 0

mmap(0x7f47f8334000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x16000) = 0x7f47f8334000

close(3) = 0

mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f47f9486000

mmap(NULL, 12288, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f47f9483000

arch\_prctl(ARCH\_SET\_FS, 0x7f47f9483740) = 0

mprotect(0x7f47f8abb000, 16384, PROT\_READ) = 0

mprotect(0x7f47f8334000, 4096, PROT\_READ) = 0

mprotect(0x7f47f86d2000, 4096, PROT\_READ) = 0

mprotect(0x7f47f8e3e000, 40960, PROT\_READ) = 0

mprotect(0x7f47f926f000, 4096, PROT\_READ) = 0

mprotect(0x7f47f9054000, 4096, PROT\_READ) = 0

mprotect(0x55b70935b000, 4096, PROT\_READ) = 0

mprotect(0x7f47f949e000, 4096, PROT\_READ) = 0

munmap(0x7f47f948a000, 79721) = 0

set\_tid\_address(0x7f47f9483a10) = 26737

set\_robust\_list(0x7f47f9483a20, 24) = 0

rt\_sigaction(SIGRTMIN, {sa\_handler=0x7f47f905bcb0, sa\_mask=[], sa\_flags=SA\_RESTORER|SA\_SIGINFO, sa\_restorer=0x7f47f9068980}, NULL, 8) = 0

rt\_sigaction(SIGRT\_1, {sa\_handler=0x7f47f905bd50, sa\_mask=[], sa\_flags=SA\_RESTORER|SA\_RESTART|SA\_SIGINFO, sa\_restorer=0x7f47f9068980}, 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

brk(NULL) = 0x55b70b0d0000

brk(0x55b70b0f1000) = 0x55b70b0f1000

futex(0x7f47f8e4b09c, FUTEX\_WAKE\_PRIVATE, 2147483647) = 0

futex(0x7f47f8e4b0a8, FUTEX\_WAKE\_PRIVATE, 2147483647) = 0

fstat(1, {st\_mode=S\_IFCHR|0620, st\_rdev=makedev(136, 0), ...}) = 0

fstat(0, {st\_mode=S\_IFCHR|0620, st\_rdev=makedev(136, 0), ...}) = 0

write(1, "Enter the name of file for answe"..., 36Enter the name of file for answers: ) = 36

read(0, 1.txt

"1.txt\n", 1024) = 6

write(1, "Enter numerous:\n", 16Enter numerous:

) = 16

read(0, 67 5 6

"67 5 6\n", 1024) = 7

read(0, 34 7 8

"34 7 8\n", 1024) = 7

read(0, "", 1024) = 0

statfs("/dev/shm/", {f\_type=TMPFS\_MAGIC, f\_bsize=4096, f\_blocks=494308, f\_bfree=411429, f\_bavail=411429, f\_files=494308, f\_ffree=493960, f\_fsid={val=[0, 0]}, f\_namelen=255, f\_frsize=4096, f\_flags=ST\_VALID|ST\_NOSUID|ST\_NODEV}) = 0

futex(0x7f47f9274370, FUTEX\_WAKE\_PRIVATE, 2147483647) = 0

openat(AT\_FDCWD, "/dev/shm/like\_a\_pipe", O\_RDWR|O\_CREAT|O\_NOFOLLOW|O\_CLOEXEC, 0644) = 3

openat(AT\_FDCWD, "/dev/shm/sem.my\_semaphore", O\_RDWR|O\_NOFOLLOW) = -1 ENOENT (No such file or directory)

getpid() = 26737

lstat("/dev/shm/RxIaDn", 0x7ffefdff24f0) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "/dev/shm/RxIaDn", O\_RDWR|O\_CREAT|O\_EXCL, 0644) = 4

write(4, "\1\0\0\0\0\0\0\0\200\0\0\0e\_a\_\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0", 32) = 32

mmap(NULL, 32, PROT\_READ|PROT\_WRITE, MAP\_SHARED, 4, 0) = 0x7f47f949d000

link("/dev/shm/RxIaDn", "/dev/shm/sem.my\_semaphore") = 0

fstat(4, {st\_mode=S\_IFREG|0644, st\_size=32, ...}) = 0

unlink("/dev/shm/RxIaDn") = 0

close(4) = 0

ftruncate(3, 15) = 0

mmap(NULL, 15, PROT\_READ|PROT\_WRITE, MAP\_SHARED, 3, 0) = 0x7f47f949c000

clone(child\_stack=NULL, flags=CLONE\_CHILD\_CLEARTID|CLONE\_CHILD\_SETTID|SIGCHLD, child\_tidptr=0x7f47f9483a10) = 26869

futex(0x7f47f949d000, FUTEX\_WAIT\_BITSET|FUTEX\_CLOCK\_REALTIME, 0, NULL, 0xffffffff) = 0

--- SIGCHLD {si\_signo=SIGCHLD, si\_code=CLD\_EXITED, si\_pid=26869, si\_uid=1000, si\_status=0, si\_utime=0, si\_stime=0} ---

exit\_group(0) = ?

+++ exited with 0 +++

**Лабораторная работа №5**

**openat** – открытие файла, в моём случае - библиотеки

ann@ann:~/os/lab5$ strace ./main1.out

execve("./main1.out", ["./main1.out"], 0x7ffdfb088fc0 /\* 63 vars \*/) = 0

brk(NULL) = 0x5589be797000

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, "./tls/haswell/x86\_64/libd1.so", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./tls/haswell/libd1.so", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./tls/x86\_64/libd1.so", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./tls/libd1.so", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./haswell/x86\_64/libd1.so", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./haswell/libd1.so", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./x86\_64/libd1.so", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./libd1.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`\5\0\0\0\0\0\0"..., 832) = 832

fstat(3, {st\_mode=S\_IFREG|0775, st\_size=7928, ...}) = 0

mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f130c3b8000

getcwd("/home/ann/os/lab5", 128) = 18

mmap(NULL, 2101296, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f130bf8f000

mprotect(0x7f130bf90000, 2093056, PROT\_NONE) = 0

mmap(0x7f130c18f000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0) = 0x7f130c18f000

close(3) = 0

openat(AT\_FDCWD, "./tls/haswell/x86\_64/libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./tls/haswell/libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./tls/x86\_64/libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./tls/libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./haswell/x86\_64/libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./haswell/libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./x86\_64/libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./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=79721, ...}) = 0

mmap(NULL, 79721, PROT\_READ, MAP\_PRIVATE, 3, 0) = 0x7f130c3a4000

close(3) = 0

access("/etc/ld.so.nohwcap", F\_OK) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "/usr/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\220\304\10\0\0\0\0\0"..., 832) = 832

fstat(3, {st\_mode=S\_IFREG|0644, st\_size=1594864, ...}) = 0

mmap(NULL, 3702848, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f130bc06000

mprotect(0x7f130bd7f000, 2097152, PROT\_NONE) = 0

mmap(0x7f130bf7f000, 49152, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x179000) = 0x7f130bf7f000

mmap(0x7f130bf8b000, 12352, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f130bf8b000

close(3) = 0

openat(AT\_FDCWD, "./tls/haswell/x86\_64/libc.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./tls/haswell/libc.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./tls/x86\_64/libc.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./tls/libc.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./haswell/x86\_64/libc.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./haswell/libc.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./x86\_64/libc.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./libc.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

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\20\35\2\0\0\0\0\0"..., 832) = 832

fstat(3, {st\_mode=S\_IFREG|0755, st\_size=2030928, ...}) = 0

mmap(NULL, 4131552, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f130b815000

mprotect(0x7f130b9fc000, 2097152, PROT\_NONE) = 0

mmap(0x7f130bbfc000, 24576, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1e7000) = 0x7f130bbfc000

mmap(0x7f130bc02000, 15072, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f130bc02000

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/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\200\272\0\0\0\0\0\0"..., 832) = 832

fstat(3, {st\_mode=S\_IFREG|0644, st\_size=1700792, ...}) = 0

mmap(NULL, 3789144, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f130b477000

mprotect(0x7f130b614000, 2093056, PROT\_NONE) = 0

mmap(0x7f130b813000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x19c000) = 0x7f130b813000

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/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\300\*\0\0\0\0\0\0"..., 832) = 832

fstat(3, {st\_mode=S\_IFREG|0644, st\_size=96616, ...}) = 0

mmap(NULL, 2192432, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f130b25f000

mprotect(0x7f130b276000, 2093056, PROT\_NONE) = 0

mmap(0x7f130b475000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x16000) = 0x7f130b475000

close(3) = 0

mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f130c3a2000

mmap(NULL, 12288, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f130c39f000

arch\_prctl(ARCH\_SET\_FS, 0x7f130c39f740) = 0

mprotect(0x7f130bbfc000, 16384, PROT\_READ) = 0

mprotect(0x7f130b475000, 4096, PROT\_READ) = 0

mprotect(0x7f130b813000, 4096, PROT\_READ) = 0

mprotect(0x7f130bf7f000, 40960, PROT\_READ) = 0

mprotect(0x7f130c18f000, 4096, PROT\_READ) = 0

mprotect(0x5589bca52000, 4096, PROT\_READ) = 0

mprotect(0x7f130c3ba000, 4096, PROT\_READ) = 0

munmap(0x7f130c3a4000, 79721) = 0

brk(NULL) = 0x5589be797000

brk(0x5589be7b8000) = 0x5589be7b8000

fstat(1, {st\_mode=S\_IFCHR|0620, st\_rdev=makedev(136, 0), ...}) = 0

write(1, "Enter command (1 or 2): ", 24Enter command (1 or 2): ) = 24

fstat(0, {st\_mode=S\_IFCHR|0620, st\_rdev=makedev(136, 0), ...}) = 0

read(0, 0x5589be7a9280, 1024) = ? ERESTARTSYS (To be restarted if SA\_RESTART is set)

--- SIGWINCH {si\_signo=SIGWINCH, si\_code=SI\_KERNEL} ---

read(0, 1

"1\n", 1024) = 2

write(1, "Enter A, B, e: ", 15Enter A, B, e: ) = 15

read(0, 1.5 1.6 0.01

"1.5 1.6 0.01\n", 1024) = 13

write(1, "Integral value 0.0999358\n", 25Integral value 0.0999358

) = 25

write(1, "Enter command (1 or 2): ", 24Enter command (1 or 2): ) = 24

read(0, 2

"2\n", 1024) = 2

write(1, "Enter A and B: ", 15Enter A and B: ) = 15

read(0, 34 78

"34 78\n", 1024) = 6

write(1, "PrimeCount in [a; b] 10\n", 24PrimeCount in [a; b] 10

) = 24

write(1, "Enter command (1 or 2): ", 24Enter command (1 or 2): ) = 24

read(0, "", 1024) = 0

exit\_group(0) = ?

+++ exited with 0 +++

**Strace2**

ann@ann:~/os/lab5$ strace ./main2.out

execve("./main2.out", ["./main2.out"], 0x7ffe89199cf0 /\* 63 vars \*/) = 0

brk(NULL) = 0x560921bbf000

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, "./tls/haswell/x86\_64/libdl.so.2", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./tls/haswell/libdl.so.2", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

**openat(AT\_FDCWD, "./tls/x86\_64/libdl.so.2", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)**

**openat(AT\_FDCWD, "./tls/libdl.so.2", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)**

**openat(AT\_FDCWD, "./haswell/x86\_64/libdl.so.2", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)**

**openat(AT\_FDCWD, "./haswell/libdl.so.2", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)**

**openat(AT\_FDCWD, "./x86\_64/libdl.so.2", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)**

**openat(AT\_FDCWD, "./libdl.so.2", 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=79721, ...}) = 0

mmap(NULL, 79721, PROT\_READ, MAP\_PRIVATE, 3, 0) = 0x7fb6f07a3000

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\0\3\0>\0\1\0\0\0P\16\0\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) = 0x7fb6f07a1000

mmap(NULL, 2109712, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7fb6f038a000

mprotect(0x7fb6f038d000, 2093056, PROT\_NONE) = 0

mmap(0x7fb6f058c000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x2000) = 0x7fb6f058c000

close(3) = 0

openat(AT\_FDCWD, "./tls/haswell/x86\_64/libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./tls/haswell/libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./tls/x86\_64/libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./tls/libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./haswell/x86\_64/libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./haswell/libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./x86\_64/libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./libstdc++.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

access("/etc/ld.so.nohwcap", F\_OK) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "/usr/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\220\304\10\0\0\0\0\0"..., 832) = 832

fstat(3, {st\_mode=S\_IFREG|0644, st\_size=1594864, ...}) = 0

mmap(NULL, 3702848, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7fb6f0001000

mprotect(0x7fb6f017a000, 2097152, PROT\_NONE) = 0

mmap(0x7fb6f037a000, 49152, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x179000) = 0x7fb6f037a000

mmap(0x7fb6f0386000, 12352, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7fb6f0386000

close(3) = 0

**openat(AT\_FDCWD, "./tls/haswell/x86\_64/libc.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)**

**openat(AT\_FDCWD, "./tls/haswell/libc.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)**

**openat(AT\_FDCWD, "./tls/x86\_64/libc.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)**

**openat(AT\_FDCWD, "./tls/libc.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)**

**openat(AT\_FDCWD, "./haswell/x86\_64/libc.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)**

**openat(AT\_FDCWD, "./haswell/libc.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)**

**openat(AT\_FDCWD, "./x86\_64/libc.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)**

**openat(AT\_FDCWD, "./libc.so.6", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)**

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\20\35\2\0\0\0\0\0"..., 832) = 832

fstat(3, {st\_mode=S\_IFREG|0755, st\_size=2030928, ...}) = 0

mmap(NULL, 4131552, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7fb6efc10000

mprotect(0x7fb6efdf7000, 2097152, PROT\_NONE) = 0

mmap(0x7fb6efff7000, 24576, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1e7000) = 0x7fb6efff7000

mmap(0x7fb6efffd000, 15072, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7fb6efffd000

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/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\200\272\0\0\0\0\0\0"..., 832) = 832

fstat(3, {st\_mode=S\_IFREG|0644, st\_size=1700792, ...}) = 0

mmap(NULL, 3789144, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7fb6ef872000

mprotect(0x7fb6efa0f000, 2093056, PROT\_NONE) = 0

mmap(0x7fb6efc0e000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x19c000) = 0x7fb6efc0e000

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/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\300\*\0\0\0\0\0\0"..., 832) = 832

fstat(3, {st\_mode=S\_IFREG|0644, st\_size=96616, ...}) = 0

mmap(NULL, 2192432, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7fb6ef65a000

mprotect(0x7fb6ef671000, 2093056, PROT\_NONE) = 0

mmap(0x7fb6ef870000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x16000) = 0x7fb6ef870000

close(3) = 0

mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7fb6f079f000

mmap(NULL, 12288, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7fb6f079c000

arch\_prctl(ARCH\_SET\_FS, 0x7fb6f079c740) = 0

mprotect(0x7fb6efff7000, 16384, PROT\_READ) = 0

mprotect(0x7fb6ef870000, 4096, PROT\_READ) = 0

mprotect(0x7fb6efc0e000, 4096, PROT\_READ) = 0

mprotect(0x7fb6f037a000, 40960, PROT\_READ) = 0

mprotect(0x7fb6f058c000, 4096, PROT\_READ) = 0

mprotect(0x560920fa2000, 4096, PROT\_READ) = 0

mprotect(0x7fb6f07b7000, 4096, PROT\_READ) = 0

munmap(0x7fb6f07a3000, 79721) = 0

brk(NULL) = 0x560921bbf000

brk(0x560921be0000) = 0x560921be0000

fstat(1, {st\_mode=S\_IFCHR|0620, st\_rdev=makedev(136, 0), ...}) = 0

write(1, "Enter num library: ", 19Enter num library: ) = 19

fstat(0, {st\_mode=S\_IFCHR|0620, st\_rdev=makedev(136, 0), ...}) = 0

read(0, 1

"1\n", 1024) = 2

openat(AT\_FDCWD, "./tls/haswell/x86\_64/libd1.so", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

**openat(AT\_FDCWD, "./tls/haswell/libd1.so", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)**

**openat(AT\_FDCWD, "./tls/x86\_64/libd1.so", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)**

**openat(AT\_FDCWD, "./tls/libd1.so", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)**

**openat(AT\_FDCWD, "./haswell/x86\_64/libd1.so", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)**

**openat(AT\_FDCWD, "./haswell/libd1.so", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)**

**openat(AT\_FDCWD, "./x86\_64/libd1.so", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)**

**openat(AT\_FDCWD, "./libd1.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`\5\0\0\0\0\0\0"..., 832) = 832

fstat(3, {st\_mode=S\_IFREG|0775, st\_size=7928, ...}) = 0

getcwd("/home/ann/os/lab5", 128) = 18

mmap(NULL, 2101296, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7fb6ef458000

mprotect(0x7fb6ef459000, 2093056, PROT\_NONE) = 0

mmap(0x7fb6ef658000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0) = 0x7fb6ef658000

close(3) = 0

mprotect(0x7fb6ef658000, 4096, PROT\_READ) = 0

write(1, "Enter command: 0, 1 or 2: ", 26Enter command: 0, 1 or 2: ) = 26

read(0, 1

"1\n", 1024) = 2

write(1, "Enter A, B, e: ", 15Enter A, B, e: ) = 15

read(0, 1.4 1.5 0.001

"1.4 1.5 0.001\n", 1024) = 14

write(1, "Integral value 0.0982371\n", 25Integral value 0.0982371

) = 25

write(1, "Enter command: 0, 1 or 2: ", 26Enter command: 0, 1 or 2: ) = 26

read(0, 0

"0\n", 1024) = 2

munmap(0x7fb6ef458000, 2101296) = 0

openat(AT\_FDCWD, "./tls/haswell/x86\_64/libd2.so", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./tls/haswell/libd2.so", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./tls/x86\_64/libd2.so", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./tls/libd2.so", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./haswell/x86\_64/libd2.so", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./haswell/libd2.so", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./x86\_64/libd2.so", O\_RDONLY|O\_CLOEXEC) = -1 ENOENT (No such file or directory)

openat(AT\_FDCWD, "./libd2.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\30\0\0\0\0\0\0"..., 832) = 832

fstat(3, {st\_mode=S\_IFREG|0775, st\_size=19464, ...}) = 0

getcwd("/home/ann/os/lab5", 128) = 18

mmap(NULL, 2109792, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7fb6ef456000

mprotect(0x7fb6ef459000, 2093056, PROT\_NONE) = 0

mmap(0x7fb6ef658000, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x2000) = 0x7fb6ef658000

close(3) = 0

mprotect(0x7fb6ef658000, 4096, PROT\_READ) = 0

write(1, "Change library\n", 15Change library

) = 15

write(1, "Enter command: 0, 1 or 2: ", 26Enter command: 0, 1 or 2: ) = 26

read(0, 2

"2\n", 1024) = 2

write(1, "Enter A and B: ", 15Enter A and B: ) = 15

read(0, 2 7

"2 7\n", 1024) = 4

write(1, "PrimeCount in [a; b] 4\n", 23PrimeCount in [a; b] 4

) = 23

write(1, "Enter command: 0, 1 or 2: ", 26Enter command: 0, 1 or 2: ) = 26

read(0, "", 1024) = 0

munmap(0x7fb6ef456000, 2109792) = 0

exit\_group(0) = ?

+++ exited with 0 +++

**Лабораторная работа №6-8**

Ниже представлена работа с очередью сообщений, основанной на сокетах

poll([{fd=8, events=POLLIN}], 1, 0) = 0 (Timeout)

socket(AF\_NETLINK, SOCK\_RAW|SOCK\_CLOEXEC, NETLINK\_ROUTE) = 9

bind(9, {sa\_family=AF\_NETLINK, nl\_pid=0, nl\_groups=00000000}, 12) = 0

getsockname(9, {sa\_family=AF\_NETLINK, nl\_pid=8955, nl\_groups=00000000}, [12]) = 0

sendto(9, {{len=20, type=RTM\_GETLINK, flags=NLM\_F\_REQUEST|NLM\_F\_DUMP, seq=1640791805, pid=0}, {ifi\_family=AF\_UNSPEC, ...}}, 20, 0, {sa\_family=AF\_NETLINK, nl\_pid=0, nl\_groups=00000000}, 12) = 20

recvmsg(9, {msg\_name={sa\_family=AF\_NETLINK, nl\_pid=0, nl\_groups=00000000}, msg\_namelen=12, msg\_iov=[{iov\_base=[{{len=1296, type=RTM\_NEWLINK, flags=NLM\_F\_MULTI, seq=1640791805, pid=8955}, {ifi\_family=AF\_UNSPEC, ifi\_type=ARPHRD\_LOOPBACK, ifi\_index=if\_nametoindex("lo"), ifi\_flags=IFF\_UP|IFF\_LOOPBACK|IFF\_RUNNING|0x10000, ifi\_change=0}, [{{nla\_len=7, nla\_type=IFLA\_IFNAME}, "lo"}, {{nla\_len=8, nla\_type=IFLA\_TXQLEN}, 1000}, {{nla\_len=5, nla\_type=IFLA\_OPERSTATE}, 0}, {{nla\_len=5, nla\_type=IFLA\_LINKMODE}, 0}, {{nla\_len=8, nla\_type=IFLA\_MTU}, 65536}, {{nla\_len=8, nla\_type=IFLA\_GROUP}, 0}, {{nla\_len=8, nla\_type=IFLA\_PROMISCUITY}, 0}, {{nla\_len=8, nla\_type=IFLA\_NUM\_TX\_QUEUES}, 1}, {{nla\_len=8, nla\_type=IFLA\_GSO\_MAX\_SEGS}, 65535}, {{nla\_len=8, nla\_type=IFLA\_GSO\_MAX\_SIZE}, 65536}, {{nla\_len=8, nla\_type=IFLA\_NUM\_RX\_QUEUES}, 1}, {{nla\_len=5, nla\_type=IFLA\_CARRIER}, 1}, {{nla\_len=12, nla\_type=IFLA\_QDISC}, "noqueue"}, {{nla\_len=8, nla\_type=IFLA\_CARRIER\_CHANGES}, 0}, {{nla\_len=5, nla\_type=IFLA\_PROTO\_DOWN}, 0}, {{nla\_len=8, nla\_type=0x2f /\* IFLA\_??? \*/}, "\x00\x00\x00\x00"}, {{nla\_len=8, nla\_type=0x30 /\* IFLA\_??? \*/}, "\x00\x00\x00\x00"}, {{nla\_len=36, nla\_type=IFLA\_MAP}, {mem\_start=0, mem\_end=0, base\_addr=0, irq=0, dma=0, port=0}}, {{nla\_len=10, nla\_type=IFLA\_ADDRESS}, "\x00\x00\x00\x00\x00\x00"}, {{nla\_len=10, nla\_type=IFLA\_BROADCAST}, "\x00\x00\x00\x00\x00\x00"}, {{nla\_len=196, nla\_type=IFLA\_STATS64}, {rx\_packets=13785, tx\_packets=13785, rx\_bytes=831821, tx\_bytes=831821, rx\_errors=0, tx\_errors=0, rx\_dropped=0, tx\_dropped=0, multicast=0, collisions=0, rx\_length\_errors=0, rx\_over\_errors=0, rx\_crc\_errors=0, rx\_frame\_errors=0, rx\_fifo\_errors=0, rx\_missed\_errors=0, tx\_aborted\_errors=0, tx\_carrier\_errors=0, tx\_fifo\_errors=0, tx\_heartbeat\_errors=0, tx\_window\_errors=0, rx\_compressed=0, tx\_compressed=0, rx\_nohandler=0}}, {{nla\_len=100, nla\_type=IFLA\_STATS}, {rx\_packets=13785, tx\_packets=13785, rx\_bytes=831821, tx\_bytes=831821, rx\_errors=0, tx\_errors=0, rx\_dropped=0, tx\_dropped=0, multicast=0, collisions=0, rx\_length\_errors=0, rx\_over\_errors=0, rx\_crc\_errors=0, rx\_frame\_errors=0, rx\_fifo\_errors=0, rx\_missed\_errors=0, tx\_aborted\_errors=0, tx\_carrier\_errors=0, tx\_fifo\_errors=0, tx\_heartbeat\_errors=0, tx\_window\_errors=0, rx\_compressed=0, tx\_compressed=0, rx\_nohandler=0}}, {{nla\_len=12, nla\_type=IFLA\_XDP}, {{nla\_len=5, nla\_type=IFLA\_XDP\_ATTACHED}, 0}}, {{nla\_len=756, nla\_type=IFLA\_AF\_SPEC}, "\x84\x00\x02\x00\x80\x00\x01\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x01\x00\x00\x00\x01\x00\x00\x00\x01\x00\x00\x00"...}]}, {{len=1304, type=RTM\_NEWLINK, flags=NLM\_F\_MULTI, seq=1640791805, pid=8955}, {ifi\_family=AF\_UNSPEC, ifi\_type=ARPHRD\_ETHER, ifi\_index=if\_nametoindex("eno1"), ifi\_flags=IFF\_UP|IFF\_BROADCAST|IFF\_MULTICAST, ifi\_change=0}, [{{nla\_len=9, nla\_type=IFLA\_IFNAME}, "eno1"}, {{nla\_len=8, nla\_type=IFLA\_TXQLEN}, 1000}, {{nla\_len=5, nla\_type=IFLA\_OPERSTATE}, 2}, {{nla\_len=5, nla\_type=IFLA\_LINKMODE}, 0}, {{nla\_len=8, nla\_type=IFLA\_MTU}, 1500}, {{nla\_len=8, nla\_type=IFLA\_GROUP}, 0}, {{nla\_len=8, nla\_type=IFLA\_PROMISCUITY}, 0}, {{nla\_len=8, nla\_type=IFLA\_NUM\_TX\_QUEUES}, 1}, {{nla\_len=8, nla\_type=IFLA\_GSO\_MAX\_SEGS}, 65535}, {{nla\_len=8, nla\_type=IFLA\_GSO\_MAX\_SIZE}, 65536}, {{nla\_len=8, nla\_type=IFLA\_NUM\_RX\_QUEUES}, 1}, {{nla\_len=5, nla\_type=IFLA\_CARRIER}, 0}, {{nla\_len=13, nla\_type=IFLA\_QDISC}, "fq\_codel"}, {{nla\_len=8, nla\_type=IFLA\_CARRIER\_CHANGES}, 1}, {{nla\_len=5, nla\_type=IFLA\_PROTO\_DOWN}, 0}, {{nla\_len=8, nla\_type=0x2f /\* IFLA\_??? \*/}, "\x00\x00\x00\x00"}, {{nla\_len=8, nla\_type=0x30 /\* IFLA\_??? \*/}, "\x01\x00\x00\x00"}, {{nla\_len=36, nla\_type=IFLA\_MAP}, {mem\_start=0, mem\_end=0, base\_addr=0, irq=0, dma=0, port=0}}, {{nla\_len=10, nla\_type=IFLA\_ADDRESS}, "\xb0\x0c\xd1\xea\x46\x8f"}, {{nla\_len=10, nla\_type=IFLA\_BROADCAST}, "\xff\xff\xff\xff\xff\xff"}, {{nla\_len=196, nla\_type=IFLA\_STATS64}, {rx\_packets=0, tx\_packets=0, rx\_bytes=0, tx\_bytes=0, rx\_errors=0, tx\_errors=0, rx\_dropped=0, tx\_dropped=0, multicast=0, collisions=0, rx\_length\_errors=0, rx\_over\_errors=0, rx\_crc\_errors=0, rx\_frame\_errors=0, rx\_fifo\_errors=0, rx\_missed\_errors=0, tx\_aborted\_errors=0, tx\_carrier\_errors=0, tx\_fifo\_errors=0, tx\_heartbeat\_errors=0, tx\_window\_errors=0, rx\_compressed=0, tx\_compressed=0, rx\_nohandler=0}}, {{nla\_len=100, nla\_type=IFLA\_STATS}, {rx\_packets=0, tx\_packets=0, rx\_bytes=0, tx\_bytes=0, rx\_errors=0, tx\_errors=0, rx\_dropped=0, tx\_dropped=0, multicast=0, collisions=0, rx\_length\_errors=0, rx\_over\_errors=0, rx\_crc\_errors=0, rx\_frame\_errors=0, rx\_fifo\_errors=0, rx\_missed\_errors=0, tx\_aborted\_errors=0, tx\_carrier\_errors=0, tx\_fifo\_errors=0, tx\_heartbeat\_errors=0, tx\_window\_errors=0, rx\_compressed=0, tx\_compressed=0, rx\_nohandler=0}}, {{nla\_len=12, nla\_type=IFLA\_XDP}, {{nla\_len=5, nla\_type=IFLA\_XDP\_ATTACHED}, 0}}, {{nla\_len=756, nla\_type=IFLA\_AF\_SPEC}, "\x84\x00\x02\x00\x80\x00\x01\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x01\x00\x00\x00\x01\x00\x00\x00\x01\x00\x00\x00"...}]}], iov\_len=4096}], msg\_iovlen=1, msg\_controllen=0, msg\_flags=0}, 0) = 2600

recvmsg(9, {msg\_name={sa\_family=AF\_NETLINK, nl\_pid=0, nl\_groups=00000000}, msg\_namelen=12, msg\_iov=[{iov\_base={{len=1296, type=RTM\_NEWLINK, flags=NLM\_F\_MULTI, seq=1640791805, pid=8955}, {ifi\_family=AF\_UNSPEC, ifi\_type=ARPHRD\_ETHER, ifi\_index=if\_nametoindex("wlo1"), ifi\_flags=IFF\_UP|IFF\_BROADCAST|IFF\_RUNNING|IFF\_MULTICAST|0x10000, ifi\_change=0}, [{{nla\_len=9, nla\_type=IFLA\_IFNAME}, "wlo1"}, {{nla\_len=8, nla\_type=IFLA\_TXQLEN}, 1000}, {{nla\_len=5, nla\_type=IFLA\_OPERSTATE}, 6}, {{nla\_len=5, nla\_type=IFLA\_LINKMODE}, 1}, {{nla\_len=8, nla\_type=IFLA\_MTU}, 1500}, {{nla\_len=8, nla\_type=IFLA\_GROUP}, 0}, {{nla\_len=8, nla\_type=IFLA\_PROMISCUITY}, 0}, {{nla\_len=8, nla\_type=IFLA\_NUM\_TX\_QUEUES}, 4}, {{nla\_len=8, nla\_type=IFLA\_GSO\_MAX\_SEGS}, 65535}, {{nla\_len=8, nla\_type=IFLA\_GSO\_MAX\_SIZE}, 65536}, {{nla\_len=8, nla\_type=IFLA\_NUM\_RX\_QUEUES}, 1}, {{nla\_len=5, nla\_type=IFLA\_CARRIER}, 1}, {{nla\_len=7, nla\_type=IFLA\_QDISC}, "mq"}, {{nla\_len=8, nla\_type=IFLA\_CARRIER\_CHANGES}, 2}, {{nla\_len=5, nla\_type=IFLA\_PROTO\_DOWN}, 0}, {{nla\_len=8, nla\_type=0x2f /\* IFLA\_??? \*/}, "\x01\x00\x00\x00"}, {{nla\_len=8, nla\_type=0x30 /\* IFLA\_??? \*/}, "\x01\x00\x00\x00"}, {{nla\_len=36, nla\_type=IFLA\_MAP}, {mem\_start=0, mem\_end=0, base\_addr=0, irq=0, dma=0, port=0}}, {{nla\_len=10, nla\_type=IFLA\_ADDRESS}, "\xd4\x3b\x04\x3a\xa7\x82"}, {{nla\_len=10, nla\_type=IFLA\_BROADCAST}, "\xff\xff\xff\xff\xff\xff"}, {{nla\_len=196, nla\_type=IFLA\_STATS64}, {rx\_packets=30530, tx\_packets=19500, rx\_bytes=25906404, tx\_bytes=4949527, rx\_errors=0, tx\_errors=0, rx\_dropped=0, tx\_dropped=0, multicast=0, collisions=0, rx\_length\_errors=0, rx\_over\_errors=0, rx\_crc\_errors=0, rx\_frame\_errors=0, rx\_fifo\_errors=0, rx\_missed\_errors=0, tx\_aborted\_errors=0, tx\_carrier\_errors=0, tx\_fifo\_errors=0, tx\_heartbeat\_errors=0, tx\_window\_errors=0, rx\_compressed=0, tx\_compressed=0, rx\_nohandler=0}}, {{nla\_len=100, nla\_type=IFLA\_STATS}, {rx\_packets=30530, tx\_packets=19500, rx\_bytes=25906404, tx\_bytes=4949527, rx\_errors=0, tx\_errors=0, rx\_dropped=0, tx\_dropped=0, multicast=0, collisions=0, rx\_length\_errors=0, rx\_over\_errors=0, rx\_crc\_errors=0, rx\_frame\_errors=0, rx\_fifo\_errors=0, rx\_missed\_errors=0, tx\_aborted\_errors=0, tx\_carrier\_errors=0, tx\_fifo\_errors=0, tx\_heartbeat\_errors=0, tx\_window\_errors=0, rx\_compressed=0, tx\_compressed=0, rx\_nohandler=0}}, {{nla\_len=12, nla\_type=IFLA\_XDP}, {{nla\_len=5, nla\_type=IFLA\_XDP\_ATTACHED}, 0}}, {{nla\_len=756, nla\_type=IFLA\_AF\_SPEC}, "\x84\x00\x02\x00\x80\x00\x01\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x01\x00\x00\x00\x01\x00\x00\x00\x01\x00\x00\x00"...}]}, iov\_len=4096}], msg\_iovlen=1, msg\_controllen=0, msg\_flags=0}, 0) = 1296

recvmsg(9, {msg\_name={sa\_family=AF\_NETLINK, nl\_pid=0, nl\_groups=00000000}, msg\_namelen=12, msg\_iov=[{iov\_base={{len=20, type=NLMSG\_DONE, flags=NLM\_F\_MULTI, seq=1640791805, pid=8955}, 0}, iov\_len=4096}], msg\_iovlen=1, msg\_controllen=0, msg\_flags=0}, 0) = 20

sendto(9, {{len=20, type=RTM\_GETADDR, flags=NLM\_F\_REQUEST|NLM\_F\_DUMP, seq=1640791806, pid=0}, {ifa\_family=AF\_UNSPEC, ...}}, 20, 0, {sa\_family=AF\_NETLINK, nl\_pid=0, nl\_groups=00000000}, 12) = 20

recvmsg(9, {msg\_name={sa\_family=AF\_NETLINK, nl\_pid=0, nl\_groups=00000000}, msg\_namelen=12, msg\_iov=[{iov\_base=[{{len=76, type=RTM\_NEWADDR, flags=NLM\_F\_MULTI, seq=1640791806, pid=8955}, {ifa\_family=AF\_INET, ifa\_prefixlen=8, ifa\_flags=IFA\_F\_PERMANENT, ifa\_scope=RT\_SCOPE\_HOST, ifa\_index=if\_nametoindex("lo")}, [{{nla\_len=8, nla\_type=IFA\_ADDRESS}, 127.0.0.1}, {{nla\_len=8, nla\_type=IFA\_LOCAL}, 127.0.0.1}, {{nla\_len=7, nla\_type=IFA\_LABEL}, "lo"}, {{nla\_len=8, nla\_type=IFA\_FLAGS}, IFA\_F\_PERMANENT}, {{nla\_len=20, nla\_type=IFA\_CACHEINFO}, {ifa\_prefered=4294967295, ifa\_valid=4294967295, cstamp=224, tstamp=224}}]}, {{len=88, type=RTM\_NEWADDR, flags=NLM\_F\_MULTI, seq=1640791806, pid=8955}, {ifa\_family=AF\_INET, ifa\_prefixlen=24, ifa\_flags=0, ifa\_scope=RT\_SCOPE\_UNIVERSE, ifa\_index=if\_nametoindex("wlo1")}, [{{nla\_len=8, nla\_type=IFA\_ADDRESS}, 192.168.1.64}, {{nla\_len=8, nla\_type=IFA\_LOCAL}, 192.168.1.64}, {{nla\_len=8, nla\_type=IFA\_BROADCAST}, 192.168.1.255}, {{nla\_len=9, nla\_type=IFA\_LABEL}, "wlo1"}, {{nla\_len=8, nla\_type=IFA\_FLAGS}, IFA\_F\_NOPREFIXROUTE}, {{nla\_len=20, nla\_type=IFA\_CACHEINFO}, {ifa\_prefered=79771, ifa\_valid=79771, cstamp=1205, tstamp=660738}}]}], iov\_len=4096}], msg\_iovlen=1, msg\_controllen=0, msg\_flags=0}, 0) = 164

recvmsg(9, {msg\_name={sa\_family=AF\_NETLINK, nl\_pid=0, nl\_groups=00000000}, msg\_namelen=12, msg\_iov=[{iov\_base=[{{len=72, type=RTM\_NEWADDR, flags=NLM\_F\_MULTI, seq=1640791806, pid=8955}, {ifa\_family=AF\_INET6, ifa\_prefixlen=128, ifa\_flags=IFA\_F\_PERMANENT, ifa\_scope=RT\_SCOPE\_HOST, ifa\_index=if\_nametoindex("lo")}, [{{nla\_len=20, nla\_type=IFA\_ADDRESS}, ::1}, {{nla\_len=20, nla\_type=IFA\_CACHEINFO}, {ifa\_prefered=4294967295, ifa\_valid=4294967295, cstamp=224, tstamp=224}}, {{nla\_len=8, nla\_type=IFA\_FLAGS}, IFA\_F\_PERMANENT}]}, {{len=72, type=RTM\_NEWADDR, flags=NLM\_F\_MULTI, seq=1640791806, pid=8955}, {ifa\_family=AF\_INET6, ifa\_prefixlen=128, ifa\_flags=0, ifa\_scope=RT\_SCOPE\_UNIVERSE, ifa\_index=if\_nametoindex("wlo1")}, [{{nla\_len=20, nla\_type=IFA\_ADDRESS}, 2a00:1370:8137:6796:1484:6013:4b01:bc7}, {{nla\_len=20, nla\_type=IFA\_CACHEINFO}, {ifa\_prefered=577, ifa\_valid=577, cstamp=1361, tstamp=661844}}, {{nla\_len=8, nla\_type=IFA\_FLAGS}, IFA\_F\_NOPREFIXROUTE}]}, {{len=72, type=RTM\_NEWADDR, flags=NLM\_F\_MULTI, seq=1640791806, pid=8955}, {ifa\_family=AF\_INET6, ifa\_prefixlen=64, ifa\_flags=IFA\_F\_SECONDARY, ifa\_scope=RT\_SCOPE\_UNIVERSE, ifa\_index=if\_nametoindex("wlo1")}, [{{nla\_len=20, nla\_type=IFA\_ADDRESS}, 2a00:1370:8137:6796:1dfd:c02b:dba8:950c}, {{nla\_len=20, nla\_type=IFA\_CACHEINFO}, {ifa\_prefered=311, ifa\_valid=311, cstamp=1202, tstamp=661844}}, {{nla\_len=8, nla\_type=IFA\_FLAGS}, IFA\_F\_SECONDARY}]}, {{len=72, type=RTM\_NEWADDR, flags=NLM\_F\_MULTI, seq=1640791806, pid=8955}, {ifa\_family=AF\_INET6, ifa\_prefixlen=64, ifa\_flags=0, ifa\_scope=RT\_SCOPE\_UNIVERSE, ifa\_index=if\_nametoindex("wlo1")}, [{{nla\_len=20, nla\_type=IFA\_ADDRESS}, 2a00:1370:8137:6796:ad39:a00d:5808:4400}, {{nla\_len=20, nla\_type=IFA\_CACHEINFO}, {ifa\_prefered=311, ifa\_valid=311, cstamp=1202, tstamp=661844}}, {{nla\_len=8, nla\_type=IFA\_FLAGS}, IFA\_F\_MANAGETEMPADDR|IFA\_F\_NOPREFIXROUTE}]}, {{len=72, type=RTM\_NEWADDR, flags=NLM\_F\_MULTI, seq=1640791806, pid=8955}, {ifa\_family=AF\_INET6, ifa\_prefixlen=64, ifa\_flags=IFA\_F\_SECONDARY, ifa\_scope=RT\_SCOPE\_UNIVERSE, ifa\_index=if\_nametoindex("wlo1")}, [{{nla\_len=20, nla\_type=IFA\_ADDRESS}, fd60:e320:1618:1:1dfd:c02b:dba8:950c}, {{nla\_len=20, nla\_type=IFA\_CACHEINFO}, {ifa\_prefered=311, ifa\_valid=311, cstamp=1202, tstamp=661844}}, {{nla\_len=8, nla\_type=IFA\_FLAGS}, IFA\_F\_SECONDARY}]}, {{len=72, type=RTM\_NEWADDR, flags=NLM\_F\_MULTI, seq=1640791806, pid=8955}, {ifa\_family=AF\_INET6, ifa\_prefixlen=64, ifa\_flags=0, ifa\_scope=RT\_SCOPE\_UNIVERSE, ifa\_index=if\_nametoindex("wlo1")}, [{{nla\_len=20, nla\_type=IFA\_ADDRESS}, fd60:e320:1618:1:a2d2:41d3:2efe:aa5e}, {{nla\_len=20, nla\_type=IFA\_CACHEINFO}, {ifa\_prefered=311, ifa\_valid=311, cstamp=1202, tstamp=661844}}, {{nla\_len=8, nla\_type=IFA\_FLAGS}, IFA\_F\_MANAGETEMPADDR|IFA\_F\_NOPREFIXROUTE}]}, {{len=72, type=RTM\_NEWADDR, flags=NLM\_F\_MULTI, seq=1640791806, pid=8955}, {ifa\_family=AF\_INET6, ifa\_prefixlen=64, ifa\_flags=IFA\_F\_PERMANENT, ifa\_scope=RT\_SCOPE\_LINK, ifa\_index=if\_nametoindex("wlo1")}, [{{nla\_len=20, nla\_type=IFA\_ADDRESS}, fe80::e44:a50:7435:c1b8}, {{nla\_len=20, nla\_type=IFA\_CACHEINFO}, {ifa\_prefered=4294967295, ifa\_valid=4294967295, cstamp=1000, tstamp=661844}}, {{nla\_len=8, nla\_type=IFA\_FLAGS}, IFA\_F\_PERMANENT|IFA\_F\_NOPREFIXROUTE}]}], iov\_len=4096}], msg\_iovlen=1, msg\_controllen=0, msg\_flags=0}, 0) = 504

recvmsg(9, {msg\_name={sa\_family=AF\_NETLINK, nl\_pid=0, nl\_groups=00000000}, msg\_namelen=12, msg\_iov=[{iov\_base={{len=20, type=NLMSG\_DONE, flags=NLM\_F\_MULTI, seq=1640791806, pid=8955}, 0}, iov\_len=4096}], msg\_iovlen=1, msg\_controllen=0, msg\_flags=0}, 0) = 20

close(9) = 0

socket(AF\_INET, SOCK\_STREAM|SOCK\_CLOEXEC, IPPROTO\_TCP) = 9

setsockopt(9, SOL\_SOCKET, SO\_REUSEADDR, [1], 4) = 0

bind(9, {sa\_family=AF\_INET, sin\_port=htons(3005), sin\_addr=inet\_addr("127.0.0.1")}, 16) = 0

listen(9, 100) = 0

getsockname(9, {sa\_family=AF\_INET, sin\_port=htons(3005), sin\_addr=inet\_addr("127.0.0.1")}, [128->16]) = 0

write(6, "\1\0\0\0\0\0\0\0", 8) = 8

write(8, "\1\0\0\0\0\0\0\0", 8) = 8

clone(child\_stack=NULL, flags=CLONE\_CHILD\_CLEARTID|CLONE\_CHILD\_SETTID|SIGCHLD, child\_tidptr=0x7fd9d73ece50) = 8998

futex(0x7fd9d69a1918, FUTEX\_WAKE\_PRIVATE, 1) = 1

poll([{fd=8, events=POLLIN}], 1, -1) = 1 ([{fd=8, revents=POLLIN}])

read(8, "\1\0\0\0\0\0\0\0", 8) = 8

poll([{fd=8, events=POLLIN}], 1, 0) = 0 (Timeout)

poll([{fd=8, events=POLLIN}], 1, -1) = 1 ([{fd=8, revents=POLLIN}])

read(8, "\1\0\0\0\0\0\0\0", 8) = 8

write(6, "\1\0\0\0\0\0\0\0", 8) = 8

poll([{fd=8, events=POLLIN}], 1, 0) = 0 (Timeout)

write(6, "\1\0\0\0\0\0\0\0", 8) = 8

write(1, "OK: 8998\n", 9OK: 8998

) = 9

write(1, "command:", 8command:) = 8

read(0, create 9

"create 9\n", 1024) = 9

poll([{fd=8, events=POLLIN}], 1, 0) = 0 (Timeout)

write(6, "\1\0\0\0\0\0\0\0", 8) = 8

poll([{fd=8, events=POLLIN}], 1, -1) = 1 ([{fd=8, revents=POLLIN}])

read(8, "\1\0\0\0\0\0\0\0", 8) = 8

poll([{fd=8, events=POLLIN}], 1, 0) = 0 (Timeout)

poll([{fd=8, events=POLLIN}], 1, -1) = 1 ([{fd=8, revents=POLLIN}])

read(8, "\1\0\0\0\0\0\0\0", 8) = 8

poll([{fd=8, events=POLLIN}], 1, 0) = 0 (Timeout)

write(1, "OK: 9049\n", 9OK: 9049

) = 9

write(1, "command:", 8command:) = 8

read(0, exec 9

"exec 9\n", 1024) = 7

read(0, qwertyhjklkjhgfd

"qwertyhjklkjhgfd\n", 1024) = 17

read(0, j

"j\n", 1024) = 2

poll([{fd=8, events=POLLIN}], 1, 0) = 0 (Timeout)

write(6, "\1\0\0\0\0\0\0\0", 8) = 8

poll([{fd=8, events=POLLIN}], 1, -1) = 1 ([{fd=8, revents=POLLIN}])

read(8, "\1\0\0\0\0\0\0\0", 8) = 8

poll([{fd=8, events=POLLIN}], 1, 0) = 0 (Timeout)

**Вывод**

Я познакомилась с работой утилиты strace, часто пользовалась флагом –f, который позволяет следить за всеми процессами, это очень помогает при работе с синхронизацией процессов. Также утилита может быть дополнением к отладчику, чтобы следить не только за изменением переменных, но и за системными вызовами. Уверена, эта утилита ещё не раз пригодится мне в учёбе.