Московский Авиационный Институт

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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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Дата: \_\_\_\_\_\_\_\_\_\_

Подпись: \_\_\_\_\_\_\_\_\_\_

Москва, 2021.

**Постановка задачи**

**Цель работы**

Приобретение практических навыков диагностики работы программного обеспечения на примере 4 лабораторной работы.

**Задание**

Провести диагностику работы 4 лабораторной работы при помощи strace, объяснить результат работы strace.

Вариант 12: Child1 переводит строки в верхний регистр. Child2 убирает все задвоенные пробелы.

**Описание работы strace**

Strace - это утилита, которая отслеживает системные вызовы, которые представляют собой механизм трансляции, обеспечивающий интерфейс между процессом и операционной системой (ядром).

**Вывод strace**

den@DESKTOP-1B5EV3F:/mnt/c/Users/danst/OneDrive/Документы/GitHub/OC/lab4$ strace -f ./a.out

execve("./a.out", ["./a.out"], 0x7fffd262ae48 /\* 20 vars \*/) = 0

brk(NULL) = 0x7fffce02a000

arch\_prctl(0x3001 /\* ARCH\_??? \*/, 0x7fffd4d66870) = -1 EINVAL (Invalid argument)

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=30760, ...}) = 0

mmap(NULL, 30760, PROT\_READ, MAP\_PRIVATE, 3, 0) = 0x7fa91e218000

close(3) = 0

openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libc.so.6", O\_RDONLY|O\_CLOEXEC) = 3

read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\360q\2\0\0\0\0\0"..., 832) = 832

pread64(3, "\6\0\0\0\4\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0"..., 784, 64) = 784

pread64(3, "\4\0\0\0\20\0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0\0", 32, 848) = 32

pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\t\233\222%\274\260\320\31\331\326\10\204\276X>\263"..., 68, 880) = 68

fstat(3, {st\_mode=S\_IFREG|0755, st\_size=2029224, ...}) = 0

mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7fa91e210000

pread64(3, "\6\0\0\0\4\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0"..., 784, 64) = 784

pread64(3, "\4\0\0\0\20\0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0\0", 32, 848) = 32

pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\t\233\222%\274\260\320\31\331\326\10\204\276X>\263"..., 68, 880) = 68

mmap(NULL, 2036952, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7fa91e010000

mprotect(0x7fa91e035000, 1847296, PROT\_NONE) = 0

mmap(0x7fa91e035000, 1540096, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x25000) = 0x7fa91e035000

mmap(0x7fa91e1ad000, 303104, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x19d000) = 0x7fa91e1ad000

mmap(0x7fa91e1f8000, 24576, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1e7000) = 0x7fa91e1f8000

mmap(0x7fa91e1fe000, 13528, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7fa91e1fe000

close(3) = 0

arch\_prctl(ARCH\_SET\_FS, 0x7fa91e211580) = 0

mprotect(0x7fa91e1f8000, 12288, PROT\_READ) = 0

mprotect(0x7fa91e254000, 4096, PROT\_READ) = 0

mprotect(0x7fa91e24d000, 4096, PROT\_READ) = 0

munmap(0x7fa91e218000, 30760) = 0

fstat(1, {st\_mode=S\_IFCHR|0660, st\_rdev=makedev(0x4, 0x1), ...}) = 0

ioctl(1, TCGETS, {B38400 opost isig icanon echo ...}) = 0

brk(NULL) = 0x7fffce02a000

brk(0x7fffce04b000) = 0x7fffce04b000

write(1, "Enter name of memory file\n", 26Enter name of memory file

) = 26

fstat(0, {st\_mode=S\_IFCHR|0660, st\_rdev=makedev(0x4, 0x1), ...}) = 0

ioctl(0, TCGETS, {B38400 opost isig icanon echo ...}) = 0

read(0, test

"test\n", 4096) = 5

write(1, "Enter name of out file\n", 23Enter name of out file

) = 23

read(0, text

"text\n", 4096) = 5

openat(AT\_FDCWD, "text", O\_WRONLY|O\_CREAT, 0600) = 3

openat(AT\_FDCWD, "test", O\_RDWR|O\_CREAT, 0600) = 4

ftruncate(4, 100) = 0

mmap(NULL, 103, PROT\_READ|PROT\_WRITE, MAP\_SHARED, 4, 0) = 0x7fa91e250000

close(4) = 0

clone(child\_stack=NULL, flags=CLONE\_CHILD\_CLEARTID|CLONE\_CHILD\_SETTID|SIGCHLDstrace: Process 640 attached

, child\_tidptr=0x7fa91e211850) = 640

[pid 639] read(0, ewkjfwekf;

"ewkjfwekf;\n", 4096) = 11

[pid 639] dup2(3, 1) = 1

[pid 639] write(1, "ewkjfwekf;\n", 11) = 11

[pid 639] read(0, weflwekf.

"weflwekf.\n", 4096) = 10

[pid 639] dup2(3, 1) = 1

[pid 639] write(1, "weflwekf.\n", 10) = 10

[pid 639] read(0, wefhkjwef

"wefhkjwef\n", 4096) = 10

[pid 639] dup2(3, 1) = 1

[pid 639] write(1, "ERROR\n", 6) = 6

[pid 639] read(0, "", 4096) = 0

[pid 640] munmap(0x7fa91e250000, 100 <unfinished ...>

[pid 639] wait4(-1, <unfinished ...>

[pid 640] <... munmap resumed>) = 0

[pid 640] close(3) = 0

[pid 640] lseek(0, -1, SEEK\_CUR) = -1 ESPIPE (Illegal seek)

[pid 640] exit\_group(0) = ?

[pid 640] +++ exited with 0 +++

<... wait4 resumed>NULL, 0, NULL) = 640

--- SIGCHLD {si\_signo=SIGCHLD, si\_code=CLD\_EXITED, si\_pid=640, si\_uid=1000, si\_status=0, si\_utime=0, si\_stime=0} ---

close(3) = 0

munmap(0x7fa91e250000, 100) = 0

close(3) = -1 EBADF (Bad file descriptor)

exit\_group(0) = ?

+++ exited with 0 +++

den@DESKTOP-1B5EV3F:/mnt/c/Users/danst/OneDrive/Документы/GitHub/OC/lab4$ strace -f ./a.out < text.txt

execve("./a.out", ["./a.out"], 0x7ffff8b4b438 /\* 20 vars \*/) = 0

brk(NULL) = 0x7fffe4c67000

arch\_prctl(0x3001 /\* ARCH\_??? \*/, 0x7fffed4ff800) = -1 EINVAL (Invalid argument)

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=30760, ...}) = 0

mmap(NULL, 30760, PROT\_READ, MAP\_PRIVATE, 3, 0) = 0x7f6ff19d8000

close(3) = 0

openat(AT\_FDCWD, "/lib/x86\_64-linux-gnu/libc.so.6", O\_RDONLY|O\_CLOEXEC) = 3

read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\360q\2\0\0\0\0\0"..., 832) = 832

pread64(3, "\6\0\0\0\4\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0"..., 784, 64) = 784

pread64(3, "\4\0\0\0\20\0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0\0", 32, 848) = 32

pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\t\233\222%\274\260\320\31\331\326\10\204\276X>\263"..., 68, 880) = 68

fstat(3, {st\_mode=S\_IFREG|0755, st\_size=2029224, ...}) = 0

mmap(NULL, 8192, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0x7f6ff1a10000

pread64(3, "\6\0\0\0\4\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0@\0\0\0\0\0\0\0"..., 784, 64) = 784

pread64(3, "\4\0\0\0\20\0\0\0\5\0\0\0GNU\0\2\0\0\300\4\0\0\0\3\0\0\0\0\0\0\0", 32, 848) = 32

pread64(3, "\4\0\0\0\24\0\0\0\3\0\0\0GNU\0\t\233\222%\274\260\320\31\331\326\10\204\276X>\263"..., 68, 880) = 68

mmap(NULL, 2036952, PROT\_READ, MAP\_PRIVATE|MAP\_DENYWRITE, 3, 0) = 0x7f6ff17e0000

mprotect(0x7f6ff1805000, 1847296, PROT\_NONE) = 0

mmap(0x7f6ff1805000, 1540096, PROT\_READ|PROT\_EXEC, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x25000) = 0x7f6ff1805000

mmap(0x7f6ff197d000, 303104, PROT\_READ, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x19d000) = 0x7f6ff197d000

mmap(0x7f6ff19c8000, 24576, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_DENYWRITE, 3, 0x1e7000) = 0x7f6ff19c8000

mmap(0x7f6ff19ce000, 13528, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_FIXED|MAP\_ANONYMOUS, -1, 0) = 0x7f6ff19ce000

close(3) = 0

arch\_prctl(ARCH\_SET\_FS, 0x7f6ff1a11380) = 0

mprotect(0x7f6ff19c8000, 12288, PROT\_READ) = 0

mprotect(0x7f6ff1a17000, 4096, PROT\_READ) = 0

mprotect(0x7f6ff1a0d000, 4096, PROT\_READ) = 0

munmap(0x7f6ff19d8000, 30760) = 0

fstat(1, {st\_mode=S\_IFCHR|0660, st\_rdev=makedev(0x4, 0x1), ...}) = 0

ioctl(1, TCGETS, {B38400 opost isig icanon echo ...}) = 0

brk(NULL) = 0x7fffe4c67000

brk(0x7fffe4c88000) = 0x7fffe4c88000

write(1, "Enter name of memory file\n", 26Enter name of memory file

) = 26

fstat(0, {st\_mode=S\_IFREG|0777, st\_size=44, ...}) = 0

read(0, "test\r\ntext\r\nwqjkdqjwdk;\r\nqwidjwq"..., 4096) = 44

write(1, "Enter name of out file\n", 23Enter name of out file

) = 23

openat(AT\_FDCWD, "text", O\_WRONLY|O\_CREAT, 0600) = 3

openat(AT\_FDCWD, "test", O\_RDWR|O\_CREAT, 0600) = 4

ftruncate(4, 100) = 0

mmap(NULL, 103, PROT\_READ|PROT\_WRITE, MAP\_SHARED, 4, 0) = 0x7f6ff17d0000

close(4) = 0

clone(child\_stack=NULL, flags=CLONE\_CHILD\_CLEARTID|CLONE\_CHILD\_SETTID|SIGCHLDstrace: Process 645 attached

, child\_tidptr=0x7f6ff1a11650) = 645

[pid 644] dup2(3, 1) = 1

[pid 644] write(1, "wqjkdqjwdk;\n", 12) = 12

[pid 644] dup2(3, 1) = 1

[pid 644] write(1, "qwidjwqd.\n", 10) = 10

[pid 644] read(0, "", 4096) = 0

[pid 644] dup2(3, 1) = 1

[pid 644] write(1, "ERROR\n", 6) = 6

[pid 645] munmap(0x7f6ff17d0000, 100 <unfinished ...>

[pid 644] wait4(-1, <unfinished ...>

[pid 645] <... munmap resumed>) = 0

[pid 645] close(3) = 0

[pid 645] lseek(0, -34, SEEK\_CUR) = 10

[pid 645] exit\_group(0) = ?

[pid 645] +++ exited with 0 +++

<... wait4 resumed>NULL, 0, NULL) = 645

--- SIGCHLD {si\_signo=SIGCHLD, si\_code=CLD\_EXITED, si\_pid=645, si\_uid=1000, si\_status=0, si\_utime=0, si\_stime=0} ---

close(3) = 0

munmap(0x7f6ff17d0000, 100) = 0

close(3) = -1 EBADF (Bad file descriptor)

exit\_group(0) = ?

+++ exited with 0 +++

**Вывод**

При помощи strace можно удобно анализировать работу программы, смотреть на различные системные вызовы их параметры, что каждый вызов возврщает, также можно смотреть системные вызовы по процессам, все это помогает искать неполадки в работе программы и устранять их.