

CS 342 - Operating Systems

Homework #1

Vedat Eren Arıcan - 22002643

1 Installing Linux

I installed Ubuntu Server 22.04 on a QEMU virtual machine running on my Arch Linux system. From my investigations, I found that there is minimal difference between the Desktop and Server flavors for the requirements of this course. Both use the same kernel and the same kernel version, and also share the same package repository. The most significant difference is that the server flavor excludes bloat GUI packages such as the X server and a desktop environment, both of which can still be installed on demand, but aren't vital to me at the moment. I already have a personalized Linux desktop environment on my host machine.

As for the installation experience: I downloaded the ISO image through the official torrents. I created a 15 GB raw disk image for QEMU. Then after mounting the installation image, the rest of the process was straightforward with the provided menu.

At any rate, it is trivial to install Ubuntu at any time if needed.

1.1 10 Linux Commands

- **ls**: List directory
- **man**: Show the manual page for given concept
- **less**: A terminal pager to easily navigate outputs
- **passwd**: Allows modifying user password
- **sudo**: Allows running commands as another user
- **modprobe**: Add/remove modules from the Linux kernel
- **systemctl**: Control the system through the main *systemd* utility.
- **cat**: Concatenates files and prints onto standard output
- **curl**: Tool for data transmission between hosts
- **useradd**: Utility to interact with user information

2 Linux Kernel Location

The kernel executable resides at `/boot/vmlinuz-5.15.0-43-generic` on Ubuntu 22.04.

The output of `uname -r` is `5.15.0-43-generic`.

3 Linux Kernel Source

Minus the hidden files, the root directory of the kernel source contains the directories below:

arch/	Documentation/	init/	LICENSES/	scripts/	usr/
block/	drivers/	ipc/	mm/	security/	virt/
certs/	fs/	kernel/	net/	sound/	
crypto/	include/	lib/	samples/	tools/	

For the 64-bit x86 architecture, the system call table is located at:
arch/x86/entry/syscalls/syscall_64.tbl

The requested system call names are:

- **0:** read
- **1:** write
- **2:** open
- **3:** close
- **35:** nanosleep
- **110:** getppid
- **210:** io_cancel

4 The strace Utility

Output for man:

```
execve("/usr/bin/man", ["man", "strace"], 0x7ffc4a6a9bb8 /* 37 vars */) = 0
brk(NULL)                               = 0x555f30442000
arch_prctl(0x3001 /* ARCH.??? */, 0x7ffe34229760) = -1 EINVAL (Invalid argument)
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7f490f22c000
access("/etc/ld.so.preload", R_OK)      = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/usr/lib/man-db/glibc-hwcaps/x86-64-v3/libmandb-2.10.2.so", O_RDONLY|O_CLOEXEC) = -1
ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/usr/lib/man-db/glibc-hwcaps/x86-64-v3", 0x7ffe34228990, 0) = -1 ENOENT (No such
file or directory)
openat(AT_FDCWD, "/usr/lib/man-db/glibc-hwcaps/x86-64-v2/libmandb-2.10.2.so", O_RDONLY|O_CLOEXEC) = -1
ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/usr/lib/man-db/glibc-hwcaps/x86-64-v2", 0x7ffe34228990, 0) = -1 ENOENT (No such
file or directory)
openat(AT_FDCWD, "/usr/lib/man-db/tls/haswell/x86_64/libmandb-2.10.2.so", O_RDONLY|O_CLOEXEC) = -1
ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/usr/lib/man-db/tls/haswell/x86_64", 0x7ffe34228990, 0) = -1 ENOENT (No such file
or directory)
openat(AT_FDCWD, "/usr/lib/man-db/tls/haswell/libmandb-2.10.2.so", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No
such file or directory)
newfstatat(AT_FDCWD, "/usr/lib/man-db/tls/haswell", 0x7ffe34228990, 0) = -1 ENOENT (No such file or
directory)
openat(AT_FDCWD, "/usr/lib/man-db/tls/x86_64/libmandb-2.10.2.so", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No
such file or directory)
newfstatat(AT_FDCWD, "/usr/lib/man-db/tls/x86_64", 0x7ffe34228990, 0) = -1 ENOENT (No such file or
directory)
openat(AT_FDCWD, "/usr/lib/man-db/tls/libmandb-2.10.2.so", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such
file or directory)
newfstatat(AT_FDCWD, "/usr/lib/man-db/tls", 0x7ffe34228990, 0) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/usr/lib/man-db/haswell/x86_64/libmandb-2.10.2.so", O_RDONLY|O_CLOEXEC) = -1 ENOENT (
No such file or directory)
newfstatat(AT_FDCWD, "/usr/lib/man-db/haswell/x86_64", 0x7ffe34228990, 0) = -1 ENOENT (No such file or
directory)
openat(AT_FDCWD, "/usr/lib/man-db/haswell/libmandb-2.10.2.so", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such
file or directory)
```

```

newfstatat(AT_FDCWD, "/usr/lib/man-db/haswell", 0x7ffe34228990, 0) = -1 ENOENT (No such file or
directory)
openat(AT_FDCWD, "/usr/lib/man-db/x86_64/libmandb-2.10.2.so", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such
file or directory)
newfstatat(AT_FDCWD, "/usr/lib/man-db/x86_64", 0x7ffe34228990, 0) = -1 ENOENT (No such file or
directory)
openat(AT_FDCWD, "/usr/lib/man-db/libmandb-2.10.2.so", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0\0"... , 832) = 832
newfstatat(3, "", {st_mode=S_IFREG|0755, st_size=30504, ...}, AT_EMPTY_PATH) = 0
mmap(NULL, 33072, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f490f223000
mprotect(0x7f490f225000, 20480, PROT_NONE) = 0
mmap(0x7f490f225000, 12288, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) = 0
x7f490f225000
mmap(0x7f490f228000, 4096, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x5000) = 0x7f490f228000
mmap(0x7f490f22a000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x6000) = 0
x7f490f22a000
close(3) = 0
openat(AT_FDCWD, "/usr/lib/man-db/libman-2.10.2.so", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0\0"... , 832) = 832
newfstatat(3, "", {st_mode=S_IFREG|0755, st_size=196744, ...}, AT_EMPTY_PATH) = 0
mmap(NULL, 199712, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f490f1f2000
mprotect(0x7f490f1fc000, 151552, PROT_NONE) = 0
mmap(0x7f490f1fc000, 110592, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0xa000) = 0
x7f490f1fc000
mmap(0x7f490f217000, 36864, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x25000) = 0
x7f490f217000
mmap(0x7f490f221000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2e000) = 0
x7f490f221000
close(3) = 0
openat(AT_FDCWD, "/usr/lib/man-db/libz.so.1", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or
directory)
openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3
newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=125419, ...}, AT_EMPTY_PATH) = 0
mmap(NULL, 125419, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7f490f1d3000
close(3) = 0
openat(AT_FDCWD, "/usr/lib/libz.so.1", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0\0"... , 832) = 832
newfstatat(3, "", {st_mode=S_IFREG|0755, st_size=100184, ...}, AT_EMPTY_PATH) = 0
mmap(NULL, 102416, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f490f1b9000
mmap(0x7f490f1bc000, 57344, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x3000) = 0
x7f490f1bc000
mmap(0x7f490f1ca000, 28672, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x11000) = 0
x7f490f1ca000
mmap(0x7f490f1d1000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x17000) = 0
x7f490f1d1000
close(3) = 0
openat(AT_FDCWD, "/usr/lib/man-db/libpipeline.so.1", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or
directory)
openat(AT_FDCWD, "/usr/lib/libpipeline.so.1", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0\0"... , 832) = 832
newfstatat(3, "", {st_mode=S_IFREG|0755, st_size=46784, ...}, AT_EMPTY_PATH) = 0
mmap(NULL, 49608, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f490f1ac000
mmap(0x7f490f1af000, 24576, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x3000) = 0
x7f490f1af000
mmap(0x7f490f1b5000, 8192, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x9000) = 0x7f490f1b5000
mmap(0x7f490f1b7000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0xa000) = 0
x7f490f1b7000
close(3) = 0
openat(AT_FDCWD, "/usr/lib/man-db/libc.so.6", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or
directory)
openat(AT_FDCWD, "/usr/lib/libc.so.6", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0\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"... , 784, 64) = 784
newfstatat(3, "", {st_mode=S_IFREG|0755, st_size=1953472, ...}, AT_EMPTY_PATH) = 0
pread64(3, "\6\0\0\0\4\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0"... , 784, 64) = 784
mmap(NULL, 1994384, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f490efc5000
mmap(0x7f490efe7000, 1421312, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x22000) = 0
x7f490efe7000
mmap(0x7f490f142000, 356352, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x17d000) = 0
x7f490f142000
mmap(0x7f490f199000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1d4000) = 0
x7f490f199000
mmap(0x7f490f19f000, 52880, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0
x7f490f19f000
close(3) = 0
openat(AT_FDCWD, "/usr/lib/man-db/libgdbm.so.6", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or
directory)
openat(AT_FDCWD, "/usr/lib/man-db/libgdbm.so.6", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or
directory)
openat(AT_FDCWD, "/usr/lib/libgdbm.so.6", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0 @\0\0\0\0\0\0\0\0"... , 832) = 832
newfstatat(3, "", {st_mode=S_IFREG|0755, st_size=71648, ...}, AT_EMPTY_PATH) = 0
mmap(NULL, 73784, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f490efb2000
mmap(0x7f490efb6000, 40960, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x4000) = 0
x7f490efb6000
mmap(0x7f490efc0000, 12288, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0xe000) = 0x7f490efc0000
mmap(0x7f490efc3000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x10000) = 0
x7f490efc3000
close(3) = 0
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7f490efb0000
openat(AT_FDCWD, "/usr/lib/man-db/libseccomp.so.2", O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or
directory)
openat(AT_FDCWD, "/usr/lib/libseccomp.so.2", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\0\0\0\0\0\0\0\0\0"... , 832) = 832
newfstatat(3, "", {st_mode=S_IFREG|0755, st_size=124744, ...}, AT_EMPTY_PATH) = 0
mmap(NULL, 127072, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f490ef90000
mprotect(0x7f490ef92000, 114688, PROT_NONE) = 0
mmap(0x7f490ef92000, 57344, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x2000) = 0
x7f490ef92000

```

```

mmap(0x7f490efa0000, 53248, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x10000) = 0
x7f490efa0000
mmap(0x7f490efae000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1d000) = 0
x7f490efae000
close(3) = 0
mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7f490ef8d000
arch_prctl(ARCH_SET_FS, 0x7f490ef8d740) = 0
set_tid_address(0x7f490ef8da10) = 16586
set_robust_list(0x7f490ef8da20, 24) = 0
rseq(0x7f490ef8e060, 0x20, 0, 0x53053053) = 0
mprotect(0x7f490f199000, 16384, PROT_READ) = 0
mprotect(0x7f490efae000, 4096, PROT_READ) = 0
mprotect(0x7f490efc3000, 4096, PROT_READ) = 0
mprotect(0x7f490f1b7000, 4096, PROT_READ) = 0
mprotect(0x7f490f1d1000, 4096, PROT_READ) = 0
mprotect(0x7f490f221000, 4096, PROT_READ) = 0
mprotect(0x7f490f22a000, 4096, PROT_READ) = 0
mprotect(0x555f2f034000, 4096, PROT_READ) = 0
mprotect(0x7f490f25f000, 8192, PROT_READ) = 0
prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 0
munmap(0x7f490f1d3000, 125419) = 0
getrandom("\x8c\x2d\x19\x5b\xed\x9f\x2a\x02", 8, GRND_NONBLOCK) = 8
brk(NULL) = 0x555f30442000
brk(0x555f30463000) = 0x555f30463000
openat(AT_FDCWD, "/etc/ld.so.preload", O_RDONLY) = -1 ENOENT (No such file or directory)
prctl(PR_GET_SECCOMP) = 0
seccomp(SECCOMP_SET_MODE_STRICT, 0x1, NULL) = -1 EINVAL (Invalid argument)
seccomp(SECCOMP_SET_MODE_FILTER, SECCOMP_FILTER_FLAG_TSSYNC, NULL) = -1 EFAULT (Bad address)
seccomp(SECCOMP_SET_MODE_FILTER, SECCOMP_FILTER_FLAG_LOG, NULL) = -1 EFAULT (Bad address)
seccomp(SECCOMP_GET_ACTION_AVAIL, 0, [SECCOMP_RET_LOG]) = 0
seccomp(SECCOMP_GET_ACTION_AVAIL, 0, [SECCOMP_RET_KILL_PROCESS]) = 0
seccomp(SECCOMP_SET_MODE_FILTER, SECCOMP_FILTER_FLAG_SPEC_ALLOW, NULL) = -1 EFAULT (Bad address)
seccomp(SECCOMP_SET_MODE_FILTER, SECCOMP_FILTER_FLAG_NEW_LISTENER, NULL) = -1 EFAULT (Bad address)
seccomp(SECCOMP_GET_NOTIF_SIZES, 0, {seccomp_notif=80, seccomp_notif_resp=24, seccomp_data=64}) = 0
seccomp(SECCOMP_SET_MODE_FILTER, SECCOMP_FILTER_FLAG_TS_SYNC_ESRCH, NULL) = -1 EFAULT (Bad address)
brk(0x555f30484000) = 0x555f30484000
brk(0x555f304a5000) = 0x555f304a5000
prctl(PR_GET_SECCOMP) = 0
brk(0x555f304c6000) = 0x555f304c6000
brk(0x555f304e7000) = 0x555f304e7000
umask(022) = 022
openat(AT_FDCWD, "/usr/lib/locale/locale-archive", O_RDONLY|O_CLOEXEC) = 3
newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=5861584, ...}, AT_EMPTY_PATH) = 0
mmap(NULL, 5861584, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7f490e800000
close(3) = 0
fcntl(0, F_GETFD) = 0
fcntl(1, F_GETFD) = 0
fcntl(2, F_GETFD) = 0
getuid() = 1000
geteuid() = 1000
getgid() = 1000
getegid() = 1000
rt_sigaction(SIGHUP, NULL, {sa_handler=SIG_DFL, sa_mask=[], sa_flags=0}, 8) = 0
rt_sigaction(SIGHUP, {sa_handler=0x7f490f1fe0c0, sa_mask=[], sa_flags=SA_RESTORER, sa_restorer=0x7f490effda00}, {sa_handler=SIG_DFL, sa_mask=[], sa_flags=0}, 8) = 0
rt_sigaction(SIGINT, NULL, {sa_handler=SIG_DFL, sa_mask=[], sa_flags=0}, 8) = 0
rt_sigaction(SIGINT, {sa_handler=0x7f490f1fe0c0, sa_mask=[], sa_flags=SA_RESTORER, sa_restorer=0x7f490effda00}, {sa_handler=SIG_DFL, sa_mask=[], sa_flags=0}, 8) = 0
rt_sigaction(SIGTERM, NULL, {sa_handler=SIG_DFL, sa_mask=[], sa_flags=0}, 8) = 0
rt_sigaction(SIGTERM, {sa_handler=0x7f490f1fe0c0, sa_mask=[], sa_flags=SA_RESTORER, sa_restorer=0x7f490effda00}, {sa_handler=SIG_DFL, sa_mask=[], sa_flags=0}, 8) = 0
openat(AT_FDCWD, "/home/ved/.manpath", O_RDONLY) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/etc/man-db.conf", O_RDONLY) = 3
newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=5205, ...}, AT_EMPTY_PATH) = 0
brk(0x555f30508000) = 0x555f30508000
read(3, "# man-db.conf\n#\n# This file is u"... , 4096) = 4096
read(3, "arity, and will be concatenated "... , 4096) = 1109
read(3, "", 4096) = 0
close(3) = 0
ioctl(1, TCGETS, {B38400 opost isig icanon echo ...}) = 0
ioctl(0, TCGETS, {B38400 opost isig icanon echo ...}) = 0
getpid() = 16586
newfstatat(AT_FDCWD, "/usr/local/sbin/less", {st_mode=S_IFDIR|0755, st_size=4096, ...}, 0) = -1 ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/usr/local/bin/less", {st_mode=S_IFDIR|0755, st_size=4096, ...}, 0) = -1 ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/usr/bin/less", {st_mode=S_IFREG|0755, st_size=207624, ...}, 0) = 0
openat(AT_FDCWD, "/usr/share/locale/locale.alias", O_RDONLY|O_CLOEXEC) = 3
newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=2998, ...}, AT_EMPTY_PATH) = 0
read(3, "# Locale name alias data base.\n#"... , 4096) = 2998
read(3, "", 4096) = 0
close(3) = 0
openat(AT_FDCWD, "/usr/share/locale/en_US.UTF-8/LC_MESSAGES/man-db.mo", O_RDONLY) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/usr/share/locale/en_US.utf8/LC_MESSAGES/man-db.mo", O_RDONLY) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/usr/share/locale/en_US/LC_MESSAGES/man-db.mo", O_RDONLY) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/usr/share/locale/en.UTF-8/LC_MESSAGES/man-db.mo", O_RDONLY) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/usr/share/locale/en.utf8/LC_MESSAGES/man-db.mo", O_RDONLY) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/usr/share/locale/en/LC_MESSAGES/man-db.mo", O_RDONLY) = -1 ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/usr/local/man", {st_mode=S_IFDIR|0755, st_size=4096, ...}, 0) = 0
newfstatat(AT_FDCWD, "/usr/local/share/man", {st_mode=S_IFDIR|0755, st_size=4096, ...}, 0) = 0
newfstatat(AT_FDCWD, "/usr/share/man", {st_mode=S_IFDIR|0755, st_size=4096, ...}, 0) = 0
newfstatat(AT_FDCWD, "/home/ved/.dotnet/man", {st_mode=S_IFDIR|0755, st_size=4096, ...}, 0) = -1 ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/home/ved/.dotnet/tools/man", {st_mode=S_IFDIR|0755, st_size=4096, ...}, 0) = -1 ENOENT (No such file or directory)

```


7

```
Iseek(3, 0, SEEK_CUR) = 0  
read(3, "\37\213\10\0\0\0\0\2\3\355|iW\33\307\225\350\347\364\257\250'&O\300\30\200\270h\261\344"...  
      , 8192) = 8192  
read(3, "\254\331\263\202\250\7\261\256S|\334J5\33\275\365\224\3347\361\v  
      &\224\341\330|\247\353\200\305\236M"... , 8192) = 8192  
read(3, "\204\247\257\v\255\337\216\216\24;\274d\253\6\33\n\20\341DN\354\231H\362'pf|58\350!"... , 8192)  
= 641  
read(3, "", 7551) = 0  
close(3) = 0  
openat(AT_FDCWD, "/usr/local/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3  
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446910, f_bavail  
            =48535986, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xe167aeel]}, f_namelen  
            =255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0  
close(3) = 0  
openat(AT_FDCWD, "/usr/share/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3  
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446910, f_bavail  
            =48535986, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xe167aeel]}, f_namelen  
            =255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0  
close(3) = 0  
openat(AT_FDCWD, "/var/cache/man/index.db", O_RDONLY) = 3  
newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=4255744, ...}, AT_EMPTY_PATH) = 0  
fcntl(3, LOCK_SH|LOCK_NB) = 0  
read(3, "\317\232w\23\0\20\0\0\0\20\0\0\0\0\0\0\20\0\0\t\0\0\0\0\20\0\0\246\0\0\0"... , 40) = 40  
read(3, "\374\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0..." , 4056) = 4056  
lseek(3, 4096, SEEK_SET) = 4096  
read(3, "\0\300\1\0\0\0\0\0\0\0\0\300\1\0\0\0\0\0\0\0\0\320\1\0\0\0\0\0\0\320\1\0\0\0\0\0\0..." , 4096) = 4096  
newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=4255744, ...}, AT_EMPTY_PATH) = 0  
mmap(NULL, 4255744, PROT_READ, MAP_SHARED, 3, 0) = 0x7f490e200000  
munmap(0x7f490e200000, 4255744) = 0  
fcntl(3, LOCK_UN) = 0  
close(3) = 0  
openat(AT_FDCWD, "/usr/local/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3  
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446910, f_bavail  
            =48535986, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xe167aeel]}, f_namelen  
            =255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0  
close(3) = 0  
openat(AT_FDCWD, "/usr/share/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3  
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446910, f_bavail  
            =48535986, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xe167aeel]}, f_namelen  
            =255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0  
close(3) = 0  
openat(AT_FDCWD, "/usr/local/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3  
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446910, f_bavail  
            =48535986, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xe167aeel]}, f_namelen  
            =255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0  
close(3) = 0  
openat(AT_FDCWD, "/usr/share/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3  
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446910, f_bavail  
            =48535986, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xe167aeel]}, f_namelen  
            =255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0  
close(3) = 0  
openat(AT_FDCWD, "/usr/local/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3  
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446910, f_bavail  
            =48535986, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xe167aeel]}, f_namelen  
            =255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0  
close(3) = 0  
openat(AT_FDCWD, "/usr/share/man/man8", O_RDONLY|O_NONBLOCK|O_CLOEXEC|O_DIRECTORY) = 3  
newfstatat(3, "", {st_mode=S_IFDIR|0755, st_size=36864, ...}, AT_EMPTY_PATH) = 0  
getdents64(3, 0x555f305375c0 /* 812 entries */, 32768) = 32760  
getdents64(3, 0x555f305375c0 /* 173 entries */, 32768) = 7040  
getdents64(3, 0x555f305375c0 /* 0 entries */, 32768) = 0  
close(3) = 0  
openat(AT_FDCWD, "/usr/share/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3  
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446909, f_bavail  
            =48535985, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xe167aeel]}, f_namelen  
            =255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0  
close(3) = 0  
openat(AT_FDCWD, "/usr/local/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3  
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446909, f_bavail  
            =48535985, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xe167aeel]}, f_namelen  
            =255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0  
close(3) = 0  
openat(AT_FDCWD, "/usr/share/man/man3", O_RDONLY|O_NONBLOCK|O_CLOEXEC|O_DIRECTORY) = 3  
newfstatat(3, "", {st_mode=S_IFDIR|0755, st_size=958464, ...}, AT_EMPTY_PATH) = 0  
getdents64(3, 0x555f30541f60 /* 674 entries */, 32768) = 32720  
brk(0x555f3056b000) = 0x555f3056b000  
getdents64(3, 0x555f30541f60 /* 669 entries */, 32768) = 32760  
getdents64(3, 0x555f30541f60 /* 667 entries */, 32768) = 32760  
getdents64(3, 0x555f30541f60 /* 672 entries */, 32768) = 32752  
getdents64(3, 0x555f30541f60 /* 664 entries */, 32768) = 32760  
brk(0x555f3058c000) = 0x555f3058c000  
getdents64(3, 0x555f30541f60 /* 665 entries */, 32768) = 32744  
getdents64(3, 0x555f30541f60 /* 669 entries */, 32768) = 32736  
getdents64(3, 0x555f30541f60 /* 668 entries */, 32768) = 32760  
getdents64(3, 0x555f30541f60 /* 663 entries */, 32768) = 32752  
brk(0x555f305ad000) = 0x555f305ad000  
getdents64(3, 0x555f30541f60 /* 673 entries */, 32768) = 32720  
getdents64(3, 0x555f30541f60 /* 672 entries */, 32768) = 32744  
getdents64(3, 0x555f30541f60 /* 671 entries */, 32768) = 32728  
getdents64(3, 0x555f30541f60 /* 672 entries */, 32768) = 32744  
mmap(NULL, 135168, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7f490ef6c000  
getdents64(3, 0x555f30541f60 /* 669 entries */, 32768) = 32720  
getdents64(3, 0x555f30541f60 /* 664 entries */, 32768) = 32736  
getdents64(3, 0x555f30541f60 /* 670 entries */, 32768) = 32760  
brk(0x555f305ce000) = 0x555f305ce000  
getdents64(3, 0x555f30541f60 /* 665 entries */, 32768) = 32768  
getdents64(3, 0x555f30541f60 /* 676 entries */, 32768) = 32736  
getdents64(3, 0x555f30541f60 /* 661 entries */, 32768) = 32760  
getdents64(3, 0x555f30541f60 /* 675 entries */, 32768) = 32760
```



```

getdents64(3, 0x555f30541f60 /* 665 entries */, 32768) = 32760
brk(0x555f305ef000) = 0x555f305ef000
getdents64(3, 0x555f30541f60 /* 662 entries */, 32768) = 32752
getdents64(3, 0x555f30541f60 /* 669 entries */, 32768) = 32744
getdents64(3, 0x555f30541f60 /* 666 entries */, 32768) = 32752
getdents64(3, 0x555f30541f60 /* 658 entries */, 32768) = 32712
mremap(0x7f490ef6c000, 135168, 266240, MREMAP_MAYMOVE) = 0x7f490ef2b000
getdents64(3, 0x555f30541f60 /* 661 entries */, 32768) = 32744
brk(0x555f30610000) = 0x555f30610000
getdents64(3, 0x555f30541f60 /* 666 entries */, 32768) = 32768
getdents64(3, 0x555f30541f60 /* 342 entries */, 32768) = 16544
getdents64(3, 0x555f30541f60 /* 0 entries */, 32768) = 0
mmap(NULL, 147456, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7f490ef07000
munmap(0x7f490ef07000, 147456) = 0
close(3) = 0
openat(AT_FDCWD, "/usr/share/man/man3p", O_RDONLY|O_NONBLOCK|O_CLOEXEC|O_DIRECTORY) = 3
newfstatat(3, "", {st_mode=S_IFDIR|0755, st_size=36864, ...}, AT_EMPTY_PATH) = 0
getdents64(3, 0x555f305ff1c0 /* 831 entries */, 32768) = 32736
getdents64(3, 0x555f305ff1c0 /* 53 entries */, 32768) = 1992
getdents64(3, 0x555f305ff1c0 /* 0 entries */, 32768) = 0
close(3) = 0
openat(AT_FDCWD, "/usr/share/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446909, f_bavail=48535985, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xel67aeel]}, f_namelen=255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0
close(3) = 0
openat(AT_FDCWD, "/usr/local/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446908, f_bavail=48535984, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xel67aeel]}, f_namelen=255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0
close(3) = 0
openat(AT_FDCWD, "/usr/share/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446908, f_bavail=48535984, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xel67aeel]}, f_namelen=255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0
close(3) = 0
openat(AT_FDCWD, "/usr/local/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446908, f_bavail=48535984, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xel67aeel]}, f_namelen=255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0
close(3) = 0
openat(AT_FDCWD, "/usr/share/man/man0p", O_RDONLY|O_NONBLOCK|O_CLOEXEC|O_DIRECTORY) = 3
newfstatat(3, "", {st_mode=S_IFDIR|0755, st_size=4096, ...}, AT_EMPTY_PATH) = 0
brk(0x555f30631000) = 0x555f30631000
getdents64(3, 0x555f30608930 /* 84 entries */, 32768) = 3232
getdents64(3, 0x555f30608930 /* 0 entries */, 32768) = 0
close(3) = 0
openat(AT_FDCWD, "/usr/share/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446908, f_bavail=48535984, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xel67aeel]}, f_namelen=255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0
close(3) = 0
openat(AT_FDCWD, "/usr/local/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446908, f_bavail=48535984, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xel67aeel]}, f_namelen=255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0
close(3) = 0
openat(AT_FDCWD, "/usr/share/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446908, f_bavail=48535984, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xel67aeel]}, f_namelen=255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0
close(3) = 0
openat(AT_FDCWD, "/usr/local/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446908, f_bavail=48535984, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xel67aeel]}, f_namelen=255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0
close(3) = 0
openat(AT_FDCWD, "/usr/share/man/man2", O_RDONLY|O_NONBLOCK|O_CLOEXEC|O_DIRECTORY) = 3
newfstatat(3, "", {st_mode=S_IFDIR|0755, st_size=20480, ...}, AT_EMPTY_PATH) = 0
getdents64(3, 0x555f30608930 /* 518 entries */, 32768) = 19256
getdents64(3, 0x555f30608930 /* 0 entries */, 32768) = 0
close(3) = 0
openat(AT_FDCWD, "/usr/share/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446908, f_bavail=48535984, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xel67aeel]}, f_namelen=255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0
close(3) = 0
openat(AT_FDCWD, "/usr/local/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446908, f_bavail=48535984, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xel67aeel]}, f_namelen=255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0
close(3) = 0
openat(AT_FDCWD, "/usr/share/man/man5", O_RDONLY|O_NONBLOCK|O_CLOEXEC|O_DIRECTORY) = 3
newfstatat(3, "", {st_mode=S_IFDIR|0755, st_size=16384, ...}, AT_EMPTY_PATH) = 0
getdents64(3, 0x555f30611720 /* 304 entries */, 32768) = 12064
getdents64(3, 0x555f30611720 /* 0 entries */, 32768) = 0
close(3) = 0
openat(AT_FDCWD, "/usr/share/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446907, f_bavail=48535983, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xel67aeel]}, f_namelen=255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0
close(3) = 0
openat(AT_FDCWD, "/usr/local/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446907, f_bavail=48535983, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xel67aeel]}, f_namelen=255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0
close(3) = 0
openat(AT_FDCWD, "/usr/share/man/man4", O_RDONLY|O_NONBLOCK|O_CLOEXEC|O_DIRECTORY) = 3
newfstatat(3, "", {st_mode=S_IFDIR|0755, st_size=4096, ...}, AT_EMPTY_PATH) = 0

```

```

getdents64(3, 0x555f30611720 /* 50 entries */, 32768) = 1664
getdents64(3, 0x555f30611720 /* 0 entries */, 32768) = 0
close(3) = 0
openat(AT_FDCWD, "/usr/share/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446907, f_bavail=48535983, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xe167aeel]}, f_namelen=255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0
close(3) = 0
openat(AT_FDCWD, "/usr/local/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446907, f_bavail=48535983, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xe167aeel]}, f_namelen=255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0
close(3) = 0
openat(AT_FDCWD, "/usr/share/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446907, f_bavail=48535983, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xe167aeel]}, f_namelen=255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0
close(3) = 0
openat(AT_FDCWD, "/usr/local/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446907, f_bavail=48535983, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xe167aeel]}, f_namelen=255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0
close(3) = 0
openat(AT_FDCWD, "/usr/share/man/man6", O_RDONLY|O_NONBLOCK|O_CLOEXEC|O_DIRECTORY) = 3
newfstatat(3, "", {st_mode=S_IFDIR|0755, st_size=4096, ...}, AT_EMPTY_PATH) = 0
getdents64(3, 0x555f30611720 /* 3 entries */, 32768) = 80
getdents64(3, 0x555f30611720 /* 0 entries */, 32768) = 0
close(3) = 0
openat(AT_FDCWD, "/usr/share/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446907, f_bavail=48535983, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xe167aeel]}, f_namelen=255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0
close(3) = 0
openat(AT_FDCWD, "/usr/local/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446907, f_bavail=48535983, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xe167aeel]}, f_namelen=255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0
close(3) = 0
openat(AT_FDCWD, "/usr/share/man/man7", O_RDONLY|O_NONBLOCK|O_CLOEXEC|O_DIRECTORY) = 3
newfstatat(3, "", {st_mode=S_IFDIR|0755, st_size=12288, ...}, AT_EMPTY_PATH) = 0
getdents64(3, 0x555f30611720 /* 326 entries */, 32768) = 12408
getdents64(3, 0x555f30611720 /* 0 entries */, 32768) = 0
close(3) = 0
openat(AT_FDCWD, "/usr/share/man", O_RDONLY|O_PATH|O_DIRECTORY) = 3
fstatfs(3, {f_type=EXT2_SUPER_MAGIC, f_bsize=4096, f_blocks=56946287, f_bfree=51446906, f_bavail=48535982, f_files=14540800, f_ffree=14258148, f_fsid={val=[0xebf6314b, 0xe167aeel]}, f_namelen=255, f_frsize=4096, f_flags=ST_VALID|ST_RELATIME}) = 0
close(3) = 0
access("/usr/share/man/man1/strace.1.gz", R_OK) = 0
newfstatat(AT_FDCWD, "/usr/share/man/man1/strace.1.gz", {st_mode=S_IFREG|0644, st_size=17025, ...}, AT_SYMLINK_NOFOLLOW) = 0
newfstatat(AT_FDCWD, "/usr/share/man/man1/strace.1.gz", {st_mode=S_IFREG|0644, st_size=17025, ...}, 0) = 0
newfstatat(AT_FDCWD, "/usr/share/man/man1/strace.1.gz", {st_mode=S_IFREG|0644, st_size=17025, ...}, 0) = 0
openat(AT_FDCWD, "/usr/share/man/man1/strace.1.gz", O_RDONLY) = 3
lseek(3, 0, SEEK_CUR) = 0
read(3, "\37\213\10\0\0\0\0\0\2\3\355}iw\33\307\225\350\347\364\257\250'\&O\300\30\200\270h\261\344"...
, 8192) = 8192
read(3, "\254\331\263\202\250\7\261\256S]\334J5\33\275\365\224\334?\361\v
&\224\341\330[\247\353\200\305\236M"... , 8192) = 8192
read(3, "\204\247\257\v\255\337\216\216\24;\274d\253\6\33\n\20\341DN\354\231H\362'pf]58\350!"... , 8192)
= 641
read(3, "", 7551) = 0
close(3) = 0
newfstatat(AT_FDCWD, "/usr/share/man/man1/strace.1.gz", {st_mode=S_IFREG|0644, st_size=17025, ...}, 0) = 0
newfstatat(AT_FDCWD, "/usr/share/man/cat1/strace.1.gz", 0x7ffe342294c0, 0) = -1 ENOENT (No such file or
directory)
newfstatat(AT_FDCWD, "/usr/share/man/man1/strace.1.gz", {st_mode=S_IFREG|0644, st_size=17025, ...}, 0) = 0
newfstatat(AT_FDCWD, "/usr/local/sbin/gpreconv", 0x7ffe342293d0, 0) = -1 ENOENT (No such file or
directory)
newfstatat(AT_FDCWD, "/usr/local/bin/gpreconv", 0x7ffe342293d0, 0) = -1 ENOENT (No such file or
directory)
newfstatat(AT_FDCWD, "/usr/bin/gpreconv", 0x7ffe342293d0, 0) = -1 ENOENT (No such file or directory)
newfstatat(AT_FDCWD, "/home/ved/.dotnet/tools/gpreconv", 0x7ffe342293d0, 0) = -1 ENOENT (No such file
or directory)
newfstatat(AT_FDCWD, "/usr/lib/jvm/default/bin/gpreconv", 0x7ffe342293d0, 0) = -1 ENOENT (No such file
or directory)
newfstatat(AT_FDCWD, "/usr/bin/site-perl/gpreconv", 0x7ffe342293d0, 0) = -1 ENOENT (No such file or
directory)
newfstatat(AT_FDCWD, "/usr/bin/vendor-perl/gpreconv", 0x7ffe342293d0, 0) = -1 ENOENT (No such file or
directory)
newfstatat(AT_FDCWD, "/usr/bin/core-perl/gpreconv", 0x7ffe342293d0, 0) = -1 ENOENT (No such file or
directory)
newfstatat(AT_FDCWD, "/usr/local/sbin/preconv", 0x7ffe342293d0, 0) = -1 ENOENT (No such file or
directory)
newfstatat(AT_FDCWD, "/usr/local/bin/preconv", 0x7ffe342293d0, 0) = -1 ENOENT (No such file or
directory)
newfstatat(AT_FDCWD, "/usr/bin/preconv", {st_mode=S_IFREG|0755, st_size=47112, ...}, 0) = 0
rt_sigaction(SIGCHLD, {sa_handler=0x7f490f1af880, sa_mask=[HUP INT TERM CHLD], sa_flags=SA_RESTORER|
SA_RESTART|SA_NOCLDSTOP, sa_restorer=0x7f490effda00}, NULL, 8) = 0
rt_sigprocmask(SIG_BLOCK, [CHLD], [], 8) = 0
rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0
openat(AT_FDCWD, "/usr/share/man/man1/strace.1.gz", O_RDONLY) = 3
pipe2([4, 5], 0) = 0
rt_sigprocmask(SIG_BLOCK, [CHLD], [], 8) = 0

```

```

clone(child_stack=NULL, flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD, child_tidptr=
x7f490ef8da10) = 16587
close(3) = 0
close(5) = 0
rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0
read(4, "\\\" Copyright (c) 1991, 1992 Pau\"..., 4096) = 4096
access(\"/usr/share/man/mandb.nfmt\", X_OK) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, \"/dev/tty\", O_RDONLY) = 3
ioctl(3, TIOCGWINSZ, {ws.row=29, ws.col=127, ws.xpixel=1918, ws.ypixel=1030}) = 0
close(3) = 0
ioctl(1, TCGETS, {B38400 opost isig icanon echo ...}) = 0
newfstatat(AT_FDCWD, \"/usr/share/man/man1/strace.1.gz\", {st.mode=S_IFREG|0644, st.size=17025, ...}, 0)
= 0
access(\"/usr/share/man/man1/strace.1.gz\", R_OK) = 0
ioctl(1, TCGETS, {B38400 opost isig icanon echo ...}) = 0
ioctl(1, TCGETS, {B38400 opost isig icanon echo ...}) = 0
ioctl(1, TCGETS, {B38400 opost isig icanon echo ...}) = 0
rt_sigprocmask(SIG_BLOCK, [CHLD], [], 8) = 0
rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0
pipe2([3, 5], 0) = 0
pipe2([6, 7], 0) = 0
rt_sigprocmask(SIG_BLOCK, [CHLD], [], 8) = 0
clone(child_stack=NULL, flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD, child_tidptr=
x7f490ef8da10) = 16588
close(3) = 0
close(7) = 0
rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0
pipe2([3, 7], 0) = 0
rt_sigprocmask(SIG_BLOCK, [CHLD], [], 8) = 0
clone(child_stack=NULL, flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD, child_tidptr=
x7f490ef8da10) = 16589
close(6) = 0
close(7) = 0
rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0
— SIGCHLD {si.signo=SIGCHLD, si.code=CLD_EXITED, si.pid=16587, si.uid=1000, si.status=0, si.utime=0,
si.stime=0} —
wait4(-1, [{WIFEXITED(s) && WEXITSTATUS(s) == 0}], WNOHANG, NULL) = 16587
wait4(-1, 0x7ffe34228734, WNOHANG, NULL) = 0
rt_sigreturn({mask=[]}) = 0
pipe2([6, 7], 0) = 0
rt_sigprocmask(SIG_BLOCK, [CHLD], [], 8) = 0
clone(child_stack=NULL, flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD, child_tidptr=
x7f490ef8da10) = 16590
close(3) = 0
close(7) = 0
rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0
pipe2([3, 7], 0) = 0
rt_sigprocmask(SIG_BLOCK, [CHLD], [], 8) = 0
clone(child_stack=NULL, flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD, child_tidptr=
x7f490ef8da10) = 16591
close(6) = 0
close(7) = 0
rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0
pipe2([6, 7], 0) = 0
rt_sigprocmask(SIG_BLOCK, [CHLD], [], 8) = 0
clone(child_stack=NULL, flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD, child_tidptr=
x7f490ef8da10) = 16592
close(3) = 0
close(7) = 0
rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0
rt_sigaction(SIGINT, {sa.handler=SIG_IGN, sa.mask=[], sa.flags=SA_RESTORER, sa.restorer=0x7f490effda00
}, {sa.handler=0x7f490f1fe0c0, sa.mask=[], sa.flags=SA_RESTORER, sa.restorer=0x7f490effda00}, 8) =
0
rt_sigaction(SIGQUIT, {sa.handler=SIG_IGN, sa.mask=[], sa.flags=SA_RESTORER, sa.restorer=0x7f490effda00
}, {sa.handler=SIG_DFL, sa.mask=[], sa.flags=0}, 8) = 0
rt_sigprocmask(SIG_BLOCK, [CHLD], [], 8) = 0
rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0
pipe2([3, 7], 0) = 0
pipe2([8, 9], 0) = 0
rt_sigprocmask(SIG_BLOCK, [CHLD], [], 8) = 0
clone(child_stack=NULL, flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD, child_tidptr=
x7f490ef8da10) = 16593
close(3) = 0
close(9) = 0
rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0
rt_sigprocmask(SIG_BLOCK, [CHLD], [], 8) = 0
clone(child_stack=NULL, flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD, child_tidptr=
x7f490ef8da10) = 16594
close(8) = 0
rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0
fcntl(4, F_GETFL) = 0 (flags O_RDONLY)
fcntl(4, F_SETFL, O_RDONLY|O_NONBLOCK) = 0
fcntl(5, F_GETFL) = 0x1 (flags O_WRONLY)
fcntl(5, F_SETFL, O_WRONLY|O_NONBLOCK) = 0
fcntl(6, F_GETFL) = 0 (flags O_RDONLY)
fcntl(6, F_SETFL, O_RDONLY|O_NONBLOCK) = 0
fcntl(7, F_GETFL) = 0x1 (flags O_WRONLY)
fcntl(7, F_SETFL, O_WRONLY|O_NONBLOCK) = 0
rt_sigaction(SIGPIPE, {sa.handler=SIG_IGN, sa.mask=[], sa.flags=SA_RESTORER, sa.restorer=0x7f490effda00
}, {sa.handler=SIG_DFL, sa.mask=[], sa.flags=0}, 8) = 0
rt_sigaction(SIGCHLD, NULL, {sa.handler=0x7f490f1af880, sa.mask=[HUP INT TERM CHLD], sa.flags=
SA_RESTORER|SA_RESTART|SA_NOCLDSTOP, sa.restorer=0x7f490effda00}, 8) = 0
rt_sigaction(SIGCHLD, {sa.handler=0x7f490f1af880, sa.mask=[HUP INT TERM CHLD], sa.flags=SA_RESTORER|
SA_NOCLDSTOP, sa.restorer=0x7f490effda00}, NULL, 8) = 0
pselect6(8, [4 6], [5 7], NULL, NULL, NULL) = 3 (in [4], out [5 7])
read(4, \"YS (To be restarted)\n— SIGALRM\"..., 4096) = 4096
write(5, "\\\" Copyright (c) 1991, 1992 Pau\"..., 8192) = 8192
pselect6(7, [4 6], [5], NULL, NULL, NULL) = 2 (in [4], out [5])
read(4, \"\nUsing an exclamation mark nega\"..., 4096) = 4096

```

```

write(5, ".\nUsing an exclamation mark nega"... , 4096) = 4096
pselect6(8, [4 6], [5 7], NULL, NULL, NULL) = 3 (in [4], out [5 7])
read(4, "S\n.TP 15\n.BR 1 \\", \" anywhere\nno "... , 4096) = 4096
write(5, "S\n.TP 15\n.BR 1 \\", \" anywhere\nno "... , 4096) = 4096
pselect6(7, [4 6], [5], NULL, NULL, NULL) = 2 (in [4], out [5])
read(4, "scalls that always succeed and h"... , 4096) = 4096
write(5, "scalls that always succeed and h"... , 4096) = 4096
pselect6(8, [4 6], [5 7], NULL, NULL, NULL) = 3 (in [4], out [5 7])
read(4, "system calls.\nThe syntax of the\n"... , 4096) = 4096
write(5, "system calls.\nThe syntax of the\n"... , 4096) = 4096
pselect6(7, [4 6], [5], NULL, NULL, NULL) = 2 (in [4], out [5])
read(4, ". pid\nform is used if\n.B \\-ff\nop"... , 4096) = 4096
write(5, ". pid\nform is used if\n.B \\-ff\nop"... , 4096) = 4096
pselect6(8, [4 6], [5 7], NULL, NULL, NULL) = 3 (in [4], out [5 7])
read(4, "de less than 32 or greater than "... , 4096) = 4096
write(5, "de less than 32 or greater than "... , 4096) = 4096
pselect6(7, [4 6], [5], NULL, NULL, NULL) = 2 (in [4], out [5])
read(4, " tracing system calls to\n.IR ove"... , 4096) = 4096
write(5, " tracing system calls to\n.IR ove"... , 4096) = 4096
pselect6(8, [4 6], [5 7], NULL, NULL, NULL) = 3 (in [4], out [5 7])
read(4, "e within 1.\\fBSIGRTMAX\\fR range"... , 4096) = 4096
write(5, "e within 1.\\fBSIGRTMAX\\fR range"... , 4096) = 4096
pselect6(7, [4 6], [5], NULL, NULL, NULL) = 2 (in [4], out [5])
read(4, ".\n.IP\nSpecification of syscall i"... , 4096) = 4096
write(5, ".\n.IP\nSpecification of syscall i"... , 4096) = 4096
pselect6(8, [4 6], [5 7], NULL, NULL, NULL) = 3 (in [4], out [5 7])
read(4, "cute it are restricted\nto those "... , 4096) = 4096
write(5, "cute it are restricted\nto those "... , 4096) = 4096
pselect6(7, [4 6], [5], NULL, NULL, NULL) = 2 (in [4], out [5])
read(4, "tart the system call.\n.LP\nAs\n.B "... , 4096) = 3080
write(5, "tart the system call.\n.LP\nAs\n.B "... , 3080) = 3080
pselect6(8, [4 6], [5 7], NULL, NULL, NULL) = 3 (in [4], out [5 7])
read(4, "", 4096) = 0
close(4) = 0
close(5) = 0
pselect6(7, [6], [], NULL, NULL, NULL) = ? ERESTARTNOHAND (To be restarted if no handler)
--- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=16588, si_uid=1000, si_status=0, si_utime=0, si_stime=0}
wait4(-1, [{WIFEXITED(s) && WEXITSTATUS(s) == 0}], WNOHANG, NULL) = 16588
wait4(-1, 0x7ffe34228934, WNOHANG, NULL) = 0
rt_sigreturn({mask=[]}) = -1 EINTR (Interrupted system call)
pselect6(7, [6], [], NULL, NULL, NULL) = ? ERESTARTNOHAND (To be restarted if no handler)
--- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=16589, si_uid=1000, si_status=0, si_utime=0, si_stime=0}
wait4(-1, [{WIFEXITED(s) && WEXITSTATUS(s) == 0}], WNOHANG, NULL) = 16589
wait4(-1, 0x7ffe34228934, WNOHANG, NULL) = 0
rt_sigreturn({mask=[]}) = -1 EINTR (Interrupted system call)
--- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=16590, si_uid=1000, si_status=0, si_utime=0, si_stime=0}
wait4(-1, [{WIFEXITED(s) && WEXITSTATUS(s) == 0}], WNOHANG, NULL) = 16590
wait4(-1, 0x7ffe34228934, WNOHANG, NULL) = 0
rt_sigreturn({mask=[]}) = -1 EINTR (Interrupted system call)
pselect6(7, [6], [], NULL, NULL, NULL) = ? ERESTARTNOHAND (To be restarted if no handler)
--- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=16591, si_uid=1000, si_status=0, si_utime=0, si_stime=0}
wait4(-1, [{WIFEXITED(s) && WEXITSTATUS(s) == 0}], WNOHANG, NULL) = 16591
wait4(-1, 0x7ffe34228934, WNOHANG, NULL) = 0
rt_sigreturn({mask=[]}) = -1 EINTR (Interrupted system call)
pselect6(7, [6], [], NULL, NULL, NULL) = 1 (in [6])
read(6, "STRACE(1)", "... , 4096) = 4096
pselect6(8, [6], [7], NULL, NULL, NULL) = 1 (out [7])
write(7, "STRACE(1)", "... , 4096) = 4096
pselect6(8, [6], [7], NULL, NULL, NULL) = 1 (out [7])
pselect6(7, [6], [], NULL, NULL, NULL) = 1 (in [6])
read(6, "be restarted)\n", "SIG"... , 4096) = 4096
pselect6(8, [6], [7], NULL, NULL, NULL) = 1 (out [7])
write(7, "be restarted)\n", "SIG"... , 4096) = 4096
pselect6(8, [6], [7], NULL, NULL, NULL) = 1 (out [7])
pselect6(7, [6], [], NULL, NULL, NULL) = 1 (in [6])
read(6, "ac\10ce\10e (or t\10t), a\10ab\10bb\10br\10re\10"... , 4096) = 4096
pselect6(8, [6], [7], NULL, NULL, NULL) = 1 (out [7])
write(7, "ac\10ce\10e (or t\10t), a\10ab\10bb\10br\10re\10"... , 4096) = 4096
pselect6(8, [6], [7], NULL, NULL, NULL) = 1 (out [7])
pselect6(7, [6], [], NULL, NULL, NULL) = 1 (in [6])
read(6, "ndchild in a separate process gr"... , 4096) = 4096
pselect6(8, [6], [7], NULL, NULL, NULL) = 1 (out [7])
write(7, "ndchild in a separate process gr"... , 4096) = 4096
pselect6(8, [6], [7], NULL, NULL, NULL) = 1 (out [7])
pselect6(7, [6], [], NULL, NULL, NULL) = 1 (in [6])
read(6, " /\10/\10r\10e\10g\10e\10x Trace"... , 4096) = 4096
pselect6(8, [6], [7], NULL, NULL, NULL) = 1 (out [7])
write(7, " /\10/\10r\10e\10g\10e\10x Trace"... , 4096) = 4096
pselect6(8, [6], [7], NULL, NULL, NULL) = 2 (in [6], out [7])
read(6, "c\10cl\10lo\10oc\10ck\10k Trace syst"... , 4096) = 4096
write(7, "c\10cl\10lo\10oc\10ck\10k Trace syst"... , 4096) = 4096
pselect6(8, [6], [7], NULL, NULL, NULL) = 1 (out [7])
pselect6(7, [6], [], NULL, NULL, NULL) = 1 (in [6])
read(6, "race system calls for which stra"... , 4096) = 4096
pselect6(8, [6], [7], NULL, NULL, NULL) = 1 (out [7])
write(7, "race system calls for which stra"... , 4096) = 4096
pselect6(8, [6], [7], NULL, NULL, NULL) = 1 (out [7])
pselect6(7, [6], [], NULL, NULL, NULL) = 1 (in [6])
read(6, "ele\342\200\220n ments:"... , 4096) = 4096
pselect6(8, [6], [7], NULL, NULL, NULL) = 1 (out [7])
write(7, "ele\342\200\220n ments:"... , 4096) = 4096
pselect6(8, [6], [7], NULL, NULL, NULL) = 1 (out [7])
pselect6(7, [6], [], NULL, NULL, NULL) = 1 (in [6])
read(6, "-\10--\10-o\10ou\10ut\10tp\10pu\10ut\10t-\10-a"... , 4096) = 4096
pselect6(8, [6], [7], NULL, NULL, NULL) = 1 (out [7])

```

```

write(7, "      -\10--\10-o\10ou\10ut\10tp\10pu\10ut\10t-\10-a"... , 4096) = 4096
pselect6(8, [6], [7], NULL, NULL, NULL) = 1 (out [7])
pselect6(7, [6], [], NULL, NULL, NULL) = 1 (in [6])
read(6, "w the time spent in system calls"... , 4096) = 4096
pselect6(8, [6], [7], NULL, NULL, NULL) = 1 (out [7])
write(7, "w the time spent in system calls"... , 4096) = 4096
pselect6(8, [6], [7], NULL, NULL, NULL) = 2 (in [6], out [7])
read(6, "tion associated with file descri"... , 4096) = 4096
write(7, "tion associated with file descri"... , 4096) = 4096
pselect6(8, [6], [7], NULL, NULL, NULL) = 1 (out [7])
pselect6(7, [6], [], NULL, NULL, NULL) = 1 (in [6])
read(6, "duration.\n      c\10c"... , 4096) = 4096
pselect6(8, [6], [7], NULL, NULL, NULL) = 2 (in [6], out [7])
read(6, "      If :p\10po\10ok\10ke"... , 4096) = 4096
write(7, "      duration.\n      c\10c"... , 8192) = 8192
pselect6(8, [6], [7], NULL, NULL, NULL) = 1 (out [7])
pselect6(7, [6], [], NULL, NULL, NULL) = 1 (in [6])
read(6, "revious, but consider only sysca"... , 4096) = 4096
pselect6(8, [6], [7], NULL, NULL, NULL) = 1 (out [7])
write(7, "revious, but consider only sysca"... , 4096) = 4096
pselect6(8, [6], [7], NULL, NULL, NULL) = 1 (out [7])
pselect6(7, [6], [], NULL, NULL, NULL) = 1 (in [6])
read(6, "r\10rm\10ma\10at\10t:\10:c\10co\10om\10mp\10pa\10ac\10"... , 4096) = 4096
pselect6(8, [6], [7], NULL, NULL, NULL) = 1 (out [7])
write(7, "r\10rm\10ma\10at\10t:\10:c\10co\10om\10mp\10pa\10ac\10"... , 4096) = 4096
pselect6(8, [6], [7], NULL, NULL, NULL) = 1 (out [7])
pselect6(7, [6], [], NULL, NULL, NULL) = 1 (in [6])
read(6, "      \342\224\202 s390      "... , 4096) = 4096
pselect6(8, [6], [7], NULL, NULL, NULL) = 2 (in [6], out [7])
read(6, "10EI\10IN\10NT\10TR\10R return from the c"... , 4096) = 4096
write(7, "      \342\224\202 s390      "... , 8192) = 8192
pselect6(8, [6], [7], NULL, NULL, NULL) = 1 (out [7])
pselect6(7, [6], [], NULL, NULL, NULL) = 1 (in [6])
read(6, "      The complete list of s\10st\10tr"... , 4096) = 232
pselect6(8, [6], [7], NULL, NULL, NULL) = 1 (out [7])
write(7, "      The complete list of s\10st\10tr"... , 232) = 232
pselect6(8, [6], [7], NULL, NULL, NULL) = 1 (out [7])
pselect6(7, [6], [], NULL, NULL, NULL) = 1 (in [6])
--- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=16592, si_uid=1000, si_status=0, si_utime=0,
    si_stime=0} ---
wait4(-1, [{WIFEXITED(s) && WEXITSTATUS(s) == 0}], WNOHANG, NULL) = 16592
wait4(-1, 0x7ffe34228934, WNOHANG, NULL) = 0
rt_sigreturn({mask=[]}) = 1
read(6, "", 4096) = 0
close(6) = 0
close(7) = 0
rt_sigaction(SIGCHLD, NULL, {sa_handler=0x7f490f1af880, sa_mask=[HUP INT TERM CHLD], sa_flags=
    SA_RESTORER|SA_NOCLDSTOP, sa_restorer=0x7f490effda00}, 8) = 0
rt_sigaction(SIGCHLD, {sa_handler=0x7f490f1af880, sa_mask=[HUP INT TERM CHLD], sa_flags=SA_RESTORER|
    SA_RESTART|SA_NOCLDSTOP, sa_restorer=0x7f490effda00}, NULL, 8) = 0
rt_sigaction(SIGPIPE, {sa_handler=SIG_DFL, sa_mask=[], sa_flags=SA_RESTORER, sa_restorer=0x7f490effda00
    }, NULL, 8) = 0
wait4(-1, [{WIFEXITED(s) && WEXITSTATUS(s) == 0}], 0, NULL) = 16594
--- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=16594, si_uid=1000, si_status=0, si_utime=0,
    si_stime=0} ---
rt_sigreturn({mask=[]}) = 16594
--- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_KILLED, si_pid=16593, si_uid=1000, si_status=SIGPIPE,
    si_utime=0, si_stime=0} ---
rt_sigreturn({mask=[]}) = 16594
wait4(-1, [{WIFSIGNALED(s) && WTERMSIG(s) == SIGPIPE}], WNOHANG, NULL) = 16593
wait4(-1, 0x7ffe342293e4, WNOHANG, NULL) = -1 ECHILD (No child processes)
rt_sigaction(SIGINT, {sa_handler=0x7f490f1fe0c0, sa_mask=[], sa_flags=SA_RESTORER, sa_restorer=0
    x7f490effda00}, NULL, 8) = 0
rt_sigaction(SIGQUIT, {sa_handler=SIG_DFL, sa_mask=[], sa_flags=SA_RESTORER, sa_restorer=0x7f490effda00
    }, NULL, 8) = 0
getpid() = 16586
ioctl(0, SNDCTL_TMR_START or TCSETS, {B38400 opost isig icanon echo ...}) = 0
munmap(0x7f490ef2b000, 266240) = 0
exit_group(0) = ?
+++ exited with 0 +++

```

Output for ls:

```

execve("/usr/bin/ls", ["ls", "/"], 0x7ffed5c77758 /* 37 vars */) = 0
brk(NULL) = 0x55c1040a2000
arch_prctl(0x3001 /* ARCH.??? */, 0x7ffe9dd2df30) = -1 EINVAL (Invalid argument)
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7f62d2e58000
access("/etc/ld.so.preload", R_OK) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3
newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=125419, ...}, AT_EMPTY_PATH) = 0
mmap(NULL, 125419, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7f62d2e39000
close(3) = 0
openat(AT_FDCWD, "/usr/lib/libcap.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\0\300r\0\0\0\0\0"... , 832) = 832
newfstatat(3, "", {st_mode=S_IFREG|0755, st_size=42984, ...}, AT_EMPTY_PATH) = 0
mmap(NULL, 45128, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f62d2e2d000
mmap(0x7f62d2e30000, 20480, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x3000) = 0
    x7f62d2e30000
mmap(0x7f62d2e35000, 8192, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x8000) = 0x7f62d2e35000
mmap(0x7f62d2e37000, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x9000) = 0
    x7f62d2e37000
close(3) = 0
openat(AT_FDCWD, "/usr/lib/libc.so.6", 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\0\4\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"... , 784, 64) = 784
newfstatat(3, "", {st_mode=S_IFREG|0755, st_size=1953472, ...}, AT_EMPTY_PATH) = 0
pread64(3, "\6\0\0\0\4\0\0\0@\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0"... , 784, 64) = 784

```

```

mmap(NULL, 1994384, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7f62d2c46000
mmap(0x7f62d2c68000, 1421312, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x22000) = 0
x7f62d2c68000
mmap(0x7f62d2dc3000, 356352, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x17d000) = 0
x7f62d2dc3000
mmap(0x7f62d2e1a000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1d4000) = 0
x7f62d2e1a000
mmap(0x7f62d2e20000, 52880, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0
x7f62d2e20000
close(3) = 0
mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7f62d2c43000
arch_prctl(ARCH_SET_FS, 0x7f62d2c43740) = 0
set_tid_address(0x7f62d2c43a10) = 16466
set_robust_list(0x7f62d2c43a20, 24) = 0
rseq(0x7f62d2c44060, 0x20, 0, 0x53053053) = 0
mprotect(0x7f62d2e1a000, 16384, PROT_READ) = 0
mprotect(0x7f62d2e37000, 4096, PROT_READ) = 0
mprotect(0x55c102fb9000, 8192, PROT_READ) = 0
mprotect(0x7f62d2e8b000, 8192, PROT_READ) = 0
prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 0
munmap(0x7f62d2c39000, 125419) = 0
prctl(PR_CAPBSET_READ, CAP_MAC_OVERRIDE) = 1
prctl(PR_CAPBSET_READ, 0x30 /* CAP_??? */) = -1 EINVAL (Invalid argument)
prctl(PR_CAPBSET_READ, CAP_CHECKPOINT_RESTORE) = 1
prctl(PR_CAPBSET_READ, 0x2c /* CAP_??? */) = -1 EINVAL (Invalid argument)
prctl(PR_CAPBSET_READ, 0x2a /* CAP_??? */) = -1 EINVAL (Invalid argument)
prctl(PR_CAPBSET_READ, 0x29 /* CAP_??? */) = -1 EINVAL (Invalid argument)
getrandom("\xb3\xc0\xd1\xaf\xf2\x15\x43\xb2", 8, GRND_NONBLOCK) = 8
brk(NULL) = 0x55c1040a2000
brk(0x55c1040c3000) = 0x55c1040c3000
openat(AT_FDCWD, "/usr/lib/locale/locale-archive", O_RDONLY|O_CLOEXEC) = 3
newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=5861584, ...}, AT_EMPTY_PATH) = 0
mmap(NULL, 5861584, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7f62d2600000
close(3) = 0
ioctl(1, TCIOGWINSZ, {B38400 opost isig icanon echo ...}) = 0
ioctl(1, TIOCGWINSZ, {ws_row=29, ws_col=127, ws_xpixel=1918, ws_ypixel=1030}) = 0
statx(AT_FDCWD, "/", AT_STATX_SYNC_AS_STAT|AT_NO_AUTOMOUNT, STATX_MODE, {stx_mask=STATX_BASIC_STATS|
STATX_MNT_ID, stx_attributes=STATX_ATTR_MOUNT_ROOT, stx_mode=S_IFDIR|0755, stx_size=4096, ...}) = 0
openat(AT_FDCWD, "/", O_RDONLY|O_NONBLOCK|O_CLOEXEC|O_DIRECTORY) = 3
newfstatat(3, "", {st_mode=S_IFDIR|0755, st_size=4096, ...}, AT_EMPTY_PATH) = 0
getdents64(3, 0x55c1040a8730 /* 22 entries */, 32768) = 544
getdents64(3, 0x55c1040a8730 /* 0 entries */, 32768) = 0
close(3) = 0
newfstatat(1, "", {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0x2), ...}, AT_EMPTY_PATH) = 0
write(1, "bin boot dev\tefi etc home\tli"... , 108) = 108
close(1) = 0
close(2) = 0
exit_group(0) = ?
+++ exited with 0 +++

```

Output for touch:

```

execve("/usr/bin/touch", ["touch", "tempfile"], 0x7ffefb7f5558 /* 37 vars */) = 0
brk(NULL) = 0x5583860d3000
arch_prctl(0x3001 /* ARCH_??? */, 0x7fff28431250) = -1 EINVAL (Invalid argument)
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7fc5aa1b000
access("/etc/ld.so.preload", R_OK) = -1 ENOENT (No such file or directory)
openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3
newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=125419, ...}, AT_EMPTY_PATH) = 0
mmap(NULL, 125419, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7fc5aa0fc000
close(3) = 0
openat(AT_FDCWD, "/usr/lib/libc.so.6", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\3\0>\0\1\0\0\0P4\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
newfstatat(3, "", {st_mode=S_IFREG|0755, st_size=1953472, ...}, AT_EMPTY_PATH) = 0
pread64(3, "\6\0\0\0\4\0\0\0@0\0\0\0\0\0\0@0\0\0\0\0\0\0@0\0\0\0\0\0\0"... , 784, 64) = 784
mmap(NULL, 1994384, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x7fc5a9f15000
mmap(0x7fc5a9f37000, 1421312, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x22000) = 0
x7fc5a9f37000
mmap(0x7fc5aa092000, 356352, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x17d000) = 0
x7fc5aa092000
mmap(0x7fc5aa0e9000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1d4000) = 0
x7fc5aa0e9000
mmap(0x7fc5aa0ef000, 52880, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0
x7fc5aa0ef000
close(3) = 0
mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) = 0x7fc5a9f12000
arch_prctl(ARCH_SET_FS, 0x7fc5a9f12740) = 0
set_tid_address(0x7fc5a9f12a10) = 16412
set_robust_list(0x7fc5a9f12a20, 24) = 0
rseq(0x7fc5a9f13060, 0x20, 0, 0x53053053) = 0
mprotect(0x7fc5aa0e9000, 16384, PROT_READ) = 0
mprotect(0x558385839000, 4096, PROT_READ) = 0
mprotect(0x7fc5aa14e000, 8192, PROT_READ) = 0
prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 0
munmap(0x7fc5aa0fc000, 125419) = 0
getrandom("\xa8\xde\xe8\x70\x4c\xb0\xd4\xda", 8, GRND_NONBLOCK) = 8
brk(NULL) = 0x5583860d3000
brk(0x5583860f4000) = 0x5583860f4000
openat(AT_FDCWD, "/usr/lib/locale/locale-archive", O_RDONLY|O_CLOEXEC) = 3
newfstatat(3, "", {st_mode=S_IFREG|0644, st_size=5861584, ...}, AT_EMPTY_PATH) = 0
mmap(NULL, 5861584, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7fc5a9800000
close(3) = 0
openat(AT_FDCWD, "tempfile", O_WRONLY|O_CREAT|O_NOCTTY|O_NONBLOCK, 0666) = 3
dup2(3, 0) = 0
close(3) = 0

```

```

utimensat(0, NULL, NULL, 0)      = 0
close(0)                          = 0
close(1)                          = 0
close(2)                          = 0
exit_group(0)                     = ?
+++ exited with 0 +++

```

5 The time Utility

The following are three distinct commands measured by `time`:

```
du . 0.03s user 0.22s system 45% cpu 0.549 total
```

```
man time 0.19s user 0.10s system 7% cpu 3.991 total
```

```
curl https://ipecho.net/plain 0.03s user 0.02s system 13% cpu 0.377 total
```

The *real* time is the most self-explanatory: It measures the total time passed while executing the program in terms of the clock on the wall. The *user* and *sys* are equal in characteristics, but differ in the trigger for their measurement. They both measure the amount of CPU time spent while executing the process, but disregard the time spent waiting for "blocked" calls such as I/O events. Their triggers are user-mode code (non-kernel) and kernel code, respectively.

6 C Programming

Source from `tree.c`:

```

#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <time.h>
#include <sys/time.h>

struct TreeNode {
    int val;
    struct TreeNode* left;
    struct TreeNode* right;
};

struct TreeNode* create_bst_node(int val) {
    struct TreeNode* node = malloc(sizeof(*node));
    node->left = node->right = 0;
    node->val = val;
    return node;
}

void insert_bst_node(struct TreeNode* root, int val) {
    struct TreeNode* node = root;

    while (node != 0) {
        if (node->val < val) {
            if (node->right == 0) {

```

```

        node->right = create_bst_node(val);
        return;
    }
    node = node->right;
} else {
    if (node->left == 0) {
        node->left = create_bst_node(val);
        return;
    }
    node = node->left;
}
}

root = create_bst_node(val);
}

void traverse_inorder(struct TreeNode* root) {
    if (root == 0) return;
    traverse_inorder(root->left);
    printf("%d ", root->val);
    traverse_inorder(root->right);
}

void free_tree(struct TreeNode* root) {
    if (root == 0) return;
    free_tree(root->left);
    free_tree(root->right);
    free(root);
}

long long get_microseconds() {
    struct timeval time;
    gettimeofday(&time, 0);
    return time.tv_sec * 1000000 + time.tv_usec;
}

int main(int argc, char *argv[]) {
    srand(time(0));

    const int NODECOUNT = 1000;
    const int NODEMIDPOINT = NODECOUNT / 2;

    // Keep a boolean table of used integers
    int table[NODECOUNT];
    memset(table, 0, sizeof(table));

    long long start_time = get_microseconds();

```



```

// Create the root node at the midpoint of the range
struct TreeNode* root = create_bst_node(NODE_MIDPOINT);
table[NODE_MIDPOINT] = 1;

printf("Starting to populate BST randomly (%d nodes):\n",
NODECOUNT);
for (int i = 0; i != NODECOUNT - 1; ++i) {
    int randomNumber;
    do {
        randomNumber = rand() % NODECOUNT;
    } while (table[randomNumber] != 0);
    table[randomNumber] = 1;

    printf("%d ", randomNumber);
    insert_bst_node(root, randomNumber);
}
printf("\n");

long long end_time = get_microseconds();
printf("microseconds elapsed: %lld\n", end_time - start_time
);

printf("\nValidate BST with inorder traversal:\n");
traverse_inorder(root);
printf("\n");

free_tree(root);
return 0;
}

```

And the Makefile:

```
CFLAGS=-g -Wall
```

```
SRCDIR=./src
```

```
OBJDIR=./obj
```

```
SRCS=tree.c
```

```
OBJS=$(subst .c,.o,$(SRCS))
```

```
FULLSRCS=$(addprefix $(SRCDIR)/,$(SRCS))
```

```
FULLOBJS=$(addprefix $(OBJDIR)/,$(OBJS))
```

```
all: $(FULLOBJS)
```

```
    gcc $(CFLAGS) -o tree $^
```

```
$(OBJDIR)/%.o: $(SRCDIR)/%.c | $(OBJDIR)
```

```
    gcc $(CFLAGS) -o $@ -c $<
```

```

$(OBJDIR) :
    mkdir -p $$

report-22002643.pdf: report-22002643.tex dump/man.txt dump/ls.
    txt dump/touch.txt src/tree.c Makefile
    latexmk -pdf

.PHONY: zip clean

clean :
    rm -f ./tree 22002643.tar.gz ./*.synctex.gz $(FULLOBSJS)
    rm -fr ./obj ./22002643
    latexmk -c

zip: report-22002643.pdf
    mkdir 22002643
    cp report-22002643.pdf 22002643/
    tar cvf 22002643.tar 22002643
    gzip 22002643.tar

```