Московский Авиационный Институт

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Институт №8 "Компьютерные науки и прикладная математика"

Кафедра №806 "Вычислительная математика и программирование"

Лабораторная работа №1 по курсу

«Операционные системы»

Группа: М8О-209БВ-24

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Постановка задачи

Вариант 18.

Составить и отладить программу на языке Си, осуществляющую работу с процессами и взаимодействие между ними в одной из двух операционных систем. В результате работы программа (основной процесс) должен создать для решение задачи один или несколько дочерних процессов. Взаимодействие между процессами осуществляется через системные сигналы/события и/или каналы (pipe). Необходимо обрабатывать системные ошибки, которые могут возникнуть в результате работы.

Группа вариантов 5: родительский процесс создает два дочерних процесса. Первой строкой пользователь в консоль родительского процесса вводит имя файла, которое будет использовано для открытия File с таким именем на запись для child1. Аналогично для второй строки и процесса child2. Родительский и дочерний процесс должны быть представлены разными программами. Родительский процесс принимает от пользователя строки произвольной длины и пересылает их в pipe1 или в pipe2 в зависимости от правила фильтрации. Процесс child1 и child2 производят работу над строками. Процессы пишут результаты своей работы в стандартный вывод.

Вариант 18: правило фильтрации: нечетные строки отправляются в pipe1, четные в pipe2. Дочерние процессы удаляют все гласные из строк.

Общий метод и алгоритм решения

Использованные системные вызовы:

- fork() — создает новый процесс; используется дважды для создания двух дочерних процессов child1 и child2
- pipe() — создает канал для межпроцессного взаимодействия; используется дважды для создания pipe1 (child1) и pipe2 (child2)
- dup2() — переназначает файловые дескрипторы; дочерние процессы перенаправляют стандартный ввод на свои каналы
- execl() — заменяет код текущего процесса новой программой child, которая удаляет гласные из строк
- waitpid() — приостанавливает родительский процесс до завершения дочерних
- write() — записывает данные в канал; родитель отправляет строки дочерним процессам
- getline() — читает строки произвольной длины от пользователя и из каналов
- open() — открывает выходные файлы для записи обработанных строк
- close() — закрывает неиспользуемые концы каналов, сигнализируя о завершении передачи
- exit() — завершает процессы с кодом возврата

Алгоритм:

Родитель создает два канала через pipe() и два дочерних процесса через fork()

1. Каждый дочерний процесс перенаправляет свой стандартный ввод на соответствующий канал с помощью dup2() и запускает программу child через execl()
2. Родитель читает строки от пользователя с помощью getline() и отправляет нечетные строки в pipe1, четные — в pipe2 через write()
3. Дочерние процессы читают строки из стандартного ввода (перенаправленного канала), удаляют гласные буквы и записывают результат в свои файлы
4. После завершения ввода (EOF) родитель закрывает каналы с помощью close() и ожидает завершения дочерних процессов через waitpid()
5. Родитель выводит статус завершения и содержимое результирующих файлов, затем завершает работу

Код программы

parent.c

```c
#include <stdio.h>

#include <stdlib.h>

#include <unistd.h>

#include <sys/wait.h>

#include <string.h>

#include <errno.h>


static ssize_t write_all(int fd, const void *buf, size_t count) {

    const char *p = buf;

    size_t left = count;

    while (left > 0) {

        ssize_t w = write(fd, p, left);

        if (w < 0) {

            if (errno == EINTR) continue;

            return -1;

        }

        left -= (size_t)w;

        p += w;

    }

    return (ssize_t)count;
```

```c
    }

int main() {
    char *filename1 = NULL, *filename2 = NULL;
    size_t fncap = 0;
    ssize_t r;

    printf("Введите имя файла для child1: ");
    fflush(stdout);
    r = getline(&filename1, &fncap, stdin);
    if (r <= 0) {
        perror("Ошибка чтения имени файла 1");
        free(filename1);
        return 1;
    }
    if (filename1[r-1] == '\n') filename1[r-1] = '\0';

    printf("Введите имя файла для child2: ");
    fflush(stdout);
    fncap = 0;
    r = getline(&filename2, &fncap, stdin);
    if (r <= 0) {
        perror("Ошибка чтения имени файла 2");
        free(filename1);
        free(filename2);
        return 1;
    }
    if (filename2[r-1] == '\n') filename2[r-1] = '\0';

    int pipe1[2], pipe2[2];
```

```c
if (pipe(pipe1) == -1) {
    perror("Ошибка создания pipe1");
    free(filename1);
    free(filename2);
    return 1;
}
if (pipe(pipe2) == -1) {
    perror("Ошибка создания pipe2");
    close(pipe1[0]);
    close(pipe1[1]);
    free(filename1);
    free(filename2);
    return 1;
}


printf("\n=== Начало обработки строк ===\n");
printf("Вводите строки (Ctrl+D для завершения ввода):\n");
printf("------------------------------------------\n");


pid_t pid1 = fork();
if (pid1 < 0) {
    perror("Ошибка fork для child1");
    close(pipe1[0]); close(pipe1[1]); close(pipe2[0]); close(pipe2[1]);
    free(filename1); free(filename2);
    return 1;
}


if (pid1 == 0) {
    if (dup2(pipe1[0], STDIN_FILENO) == -1) {
        perror("child1: ошибка dup2");
```

```c
        _exit(1);
    }

    close(pipe1[0]); close(pipe1[1]);
    close(pipe2[0]); close(pipe2[1]);


    execl("./child", "child", filename1, (char *)NULL);
    perror("child1: ошибка execl");
    _exit(1);
}


close(pipe1[0]);


pid_t pid2 = fork();
if (pid2 < 0) {
    perror("Ошибка fork для child2");
    close(pipe1[1]); close(pipe2[0]); close(pipe2[1]);
    free(filename1); free(filename2);
    return 1;
}


if (pid2 == 0) {
    if (dup2(pipe2[0], STDIN_FILENO) == -1) {
        perror("child2: ошибка dup2");
        _exit(1);
    }
    close(pipe2[0]); close(pipe2[1]);
    close(pipe1[0]); close(pipe1[1]);


    execl("./child", "child", filename2, (char *)NULL);
    perror("child2: ошибка execl");
```

```c
        _exit(1);
    }

    close(pipe2[0]);

    char *line = NULL;
    size_t linecap = 0;
    long lineno = 0;

    while (getline(&line, &linecap, stdin) != -1) {
        ++lineno;

        int target_fd = (lineno % 2 == 1) ? pipe1[1] : pipe2[1];
        const char *child_name = (lineno % 2 == 1) ? "child1" : "child2";

        if (write_all(target_fd, line, strlen(line)) == -1) {
            fprintf(stderr, "Ошибка записи в %s: %s\n", child_name, strerror(errno));
        }

        size_t len = strlen(line);
        if (len > 0 && line[len-1] == '\n') line[len-1] = '\0';
        printf("[%s] Строка %ld: %s\n", child_name, lineno, line);
    }

    free(line);

    printf("\n[INFO] Конец ввода (EOF)\n");
    printf("\n-----------------------------------------\n");
    printf("Ожидание завершения дочерних процессов...\n");
```

```c
    close(pipe1[1]);
    close(pipe2[1]);


    int status1, status2;
    if (waitpid(pid1, &status1, 0) == -1) perror("Ошибка waitpid для child1");
    if (waitpid(pid2, &status2, 0) == -1) perror("Ошибка waitpid для child2");


    printf("\n=== РЕЗУЛЬТАТЫ РАБОТЫ ===\n");
    printf("child1 завершился с кодом: %d\n", WEXITSTATUS(status1));
    printf("child2 завершился с кодом: %d\n", WEXITSTATUS(status2));
    printf("\nРезультаты записаны в файлы:\n");
    printf("• %s (child1, нечетные строки)\n", filename1);
    printf("• %s (child2, четные строки)\n", filename2);


    printf("\n--- Содержимое %s ---\n", filename1);
    char cmd[1024];
    snprintf(cmd, sizeof(cmd), "cat %s 2>/dev/null", filename1);
    system(cmd);


    printf("\n--- Содержимое %s ---\n", filename2);
    snprintf(cmd, sizeof(cmd), "cat %s 2>/dev/null", filename2);
    system(cmd);


    free(filename1);
    free(filename2);
    printf("\nРодительский процесс завершен.\n");
    return 0;
}
```


child.c

```c
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <ctype.h>

int is_vowel(char c) {
    c = tolower(c);
    return (c == 'a' || c == 'e' || c == 'i' ||
        c == 'o' || c == 'u' || c == 'y');
}

void remove_vowels(char *str) {
    char *src = str;
    char *dst = str;

    while (*src) {
        if (!is_vowel(*src)) {
            *dst = *src;
            dst++;
        }
        src++;
    }
    *dst = '\0';
}

int main(int argc, char *argv[]) {
    if (argc < 2) {
        fprintf(stderr, "Использование: %s output_filename\n", argv[0]);
        return 1;
    }
```

```c
const char *outname = argv[1];
FILE *out = fopen(outname, "w");
if (!out) {
    perror("Ошибка открытия файла");
    return 1;
}


char *line = NULL;
size_t cap = 0;


while (getline(&line, &cap, stdin) != -1) {
    size_t len = strlen(line);
    if (len > 0 && line[len-1] == '\n') {
        line[len-1] = '\0';
        len--;
    }

    char original[1024];
    if (len >= sizeof(original)) len = sizeof(original) - 1;
    strncpy(original, line, len);
    original[len] = '\0';

    remove_vowels(line);

    printf("%s\n", line);
    fflush(stdout);

    fprintf(out, "%s\n", line);
    fflush(out);
```

```
    }


    free(line);

    fclose(out);

    return 0;

}
```

Протокол работы программы

Тестирование:

$ make

gcc -Wall -Wextra -std=c99 -D_POSIX_C_SOURCE=200809L parent.c -o parent

gcc -Wall -Wextra -std=c99 -D_POSIX_C_SOURCE=200809L child.c -o child

$ ./parent

Введите имя файла для child1: file01.txt

Введите имя файла для child2: file02.txt

=== Начало обработки строк ===

Вводите строки (Ctrl+D для завершения ввода):

Hello World

[child1] Строка 1: Hello World

Hll Wrld

Operating System

[child2] Строка 2: Operating System

prtng Sstm

Test String

[child1] Строка 3: Test String

Tst Strng

[INFO] Конец ввода (EOF)

Ожидание завершения дочерних процессов...

=== РЕЗУЛЬТАТЫ РАБОТЫ ===

child1 завершился с кодом: 0

child2 завершился с кодом: 0

Результаты записаны в файлы:

• file01.txt (child1, нечетные строки)

• file02.txt (child2, четные строки)

--- Содержимое file01.txt ---

Hll Wrld

Tst Strng

--- Содержимое file02.txt ---

prtng Sstm

Родительский процесс завершен.

Strace:

```
$ strace -f ./parent
execve("./parent", ["./parent"], 0x7ffc10cd9a28 /* 27 vars */) = 0
brk(NULL)                               = 0x646315eb6000
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7472697ca000
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=41635, ...}) = 0
mmap(NULL, 41635, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7472697bf000
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\220\243\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
fstat(3, {st_mode=S_IFREG|0755, st_size=2125328, ...}) = 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, 2170256, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) = 0x747269400000
mmap(0x747269428000, 1605632, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x28000) = 0x747269428000
```

```
      mmap(0x7472695b0000, 323584, PROT_READ, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3,
0x1b0000) = 0x7472695b0000
      mmap(0x7472695ff000, 24576, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE,
3, 0x1fe000) = 0x7472695ff000
      mmap(0x747269605000, 52624, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS,
-1, 0) = 0x747269605000
      close(3)                                = 0
      mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7472697bc000
      arch_prctl(ARCH_SET_FS, 0x7472697bc740) = 0
      set_tid_address(0x7472697bca10)         = 430
      set_robust_list(0x7472697bca20, 24)     = 0
      rseq(0x7472697bd060, 0x20, 0, 0x53053053) = 0
      mprotect(0x7472695ff000, 16384, PROT_READ) = 0
      mprotect(0x646307470000, 4096, PROT_READ) = 0
      mprotect(0x747269802000, 8192, PROT_READ) = 0
      prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 0
      munmap(0x7472697bf000, 41635)           = 0
      fstat(1, {st_mode=S_IFIFO|0600, st_size=0, ...}) = 0
      getrandom("\x4d\xf2\x81\xd3\x9e\xbf\x8a\xa2", 8, GRND_NONBLOCK) = 8
      brk(NULL)                               = 0x646315eb6000
      brk(0x646315ed7000)                     = 0x646315ed7000
      write(1, "\320\222\320\262\320\265\320\264\320\270\321\202\320\265
\320\270\320\274\321\217 \321\204\320\260\320\271\320\273\320\260"..., 48Введите имя файла
для child1: ) = 48
      fstat(0, {st_mode=S_IFCHR|0620, st_rdev=makedev(0x88, 0), ...}) = 0
      read(0, "\320\260\321file_1.txt\n", 1024) = 14
      write(1, "\320\222\320\262\320\265\320\264\320\270\321\202\320\265
\320\270\320\274\321\217 \321\204\320\260\320\271\320\273\320\260"..., 48Введите имя файла
для child2: ) = 48
      read(0, "file_2.txt\n", 1024)           = 11
      pipe2([3, 4], 0)                        = 0
      pipe2([5, 6], 0)                        = 0
      clone(child_stack=NULL, flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD,
child_tidptr=0x7472697bca10) = 435
      strace: Process 435 attached
      [pid   430] close(3 <unfinished ...>
      [pid   435] set_robust_list(0x7472697bca20, 24 <unfinished ...>
      [pid   430] <... close resumed>)        = 0
      [pid   435] <... set_robust_list resumed>) = 0
      [pid   430] clone(child_stack=NULL,
flags=CLONE_CHILD_CLEARTID|CLONE_CHILD_SETTID|SIGCHLD <unfinished ...>
      [pid   435] dup2(3, 0)                   = 0
      strace: Process 436 attached
      [pid   435] close(3 <unfinished ...>
      [pid   430] <... clone resumed>, child_tidptr=0x7472697bca10) = 436
      [pid   436] set_robust_list(0x7472697bca20, 24 <unfinished ...>
      [pid   435] <... close resumed>)         = 0
      [pid   430] close(5 <unfinished ...>
      [pid   436] <... set_robust_list resumed>) = 0
      [pid   430] <... close resumed>)         = 0
      [pid   435] close(4 <unfinished ...>
      [pid   430] read(0,  <unfinished ...>
      [pid   436] dup2(5, 0 <unfinished ...>
      [pid   435] <... close resumed>)         = 0
```

```
[pid   436] <... dup2 resumed>)          = 0
[pid   435] close(5 <unfinished ...>
[pid   436] close(5 <unfinished ...>
[pid   435] <... close resumed>)         = 0
[pid   436] <... close resumed>)         = 0
[pid   436] close(6 <unfinished ...>
[pid   435] close(6 <unfinished ...>
[pid   436] <... close resumed>)         = 0
[pid   435] <... close resumed>)         = 0
[pid   436] close(3 <unfinished ...>
[pid   435] execve("./child", ["child", "\320\260\321file_1.txt"], 0x7fffcde32678 /* 27
vars */ <unfinished ...>
[pid   436] <... close resumed>)         = -1 EBADF (Bad file descriptor)
[pid   436] close(4)                     = 0
[pid   436] execve("./child", ["child", "file_2.txt"], 0x7fffcde32678 /* 27 vars */) =
0
[pid   435] <... execve resumed>)        = 0
[pid   436] brk(NULL <unfinished ...>
[pid   435] brk(NULL <unfinished ...>
[pid   436] <... brk resumed>)           = 0x618ae7bbc000
[pid   435] <... brk resumed>)           = 0x5810ffcb7000
[pid   436] mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0
<unfinished ...>
[pid   435] mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0
<unfinished ...>
[pid   436] <... mmap resumed>)          = 0x7ad6eb49c000
[pid   435] <... mmap resumed>)          = 0x72c27fcad000
[pid   436] access("/etc/ld.so.preload", R_OK <unfinished ...>
[pid   435] access("/etc/ld.so.preload", R_OK <unfinished ...>
[pid   436] <... access resumed>)        = -1 ENOENT (No such file or directory)
[pid   435] <... access resumed>)        = -1 ENOENT (No such file or directory)
[pid   436] openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC <unfinished ...>
[pid   435] openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC <unfinished ...>
[pid   436] <... openat resumed>)        = 3
[pid   435] <... openat resumed>)        = 3
[pid   436] fstat(3,  <unfinished ...>
[pid   435] fstat(3,  <unfinished ...>
[pid   436] <... fstat resumed>{st_mode=S_IFREG|0644, st_size=41635, ...}) = 0
[pid   435] <... fstat resumed>{st_mode=S_IFREG|0644, st_size=41635, ...}) = 0
[pid   436] mmap(NULL, 41635, PROT_READ, MAP_PRIVATE, 3, 0 <unfinished ...>
[pid   435] mmap(NULL, 41635, PROT_READ, MAP_PRIVATE, 3, 0 <unfinished ...>
[pid   436] <... mmap resumed>)          = 0x7ad6eb491000
[pid   435] <... mmap resumed>)          = 0x72c27fca2000
[pid   436] close(3 <unfinished ...>
[pid   435] close(3 <unfinished ...>
[pid   436] <... close resumed>)         = 0
[pid   435] <... close resumed>)         = 0
[pid   436] openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libc.so.6", O_RDONLY|O_CLOEXEC
<unfinished ...>
[pid   435] openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libc.so.6", O_RDONLY|O_CLOEXEC
<unfinished ...>
[pid   436] <... openat resumed>)        = 3
```

```
    [pid   435] <... openat resumed>)      = 3
    [pid   436] read(3,  <unfinished ...>
    [pid   435] read(3,  <unfinished ...>
    [pid   436] <... read
resumed>"\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\220\243\2\0\0\0\0\0"..., 832) = 832
    [pid   435] <... read
resumed>"\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\220\243\2\0\0\0\0\0"..., 832) = 832
    [pid   436] pread64(3,  <unfinished ...>
    [pid   435] pread64(3,  <unfinished ...>
    [pid   436] <... pread64
resumed>"\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
    [pid   435] <... pread64
resumed>"\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
    [pid   436] fstat(3,  <unfinished ...>
    [pid   435] fstat(3,  <unfinished ...>
    [pid   436] <... fstat resumed>{st_mode=S_IFREG|0755, st_size=2125328, ...}) = 0
    [pid   435] <... fstat resumed>{st_mode=S_IFREG|0755, st_size=2125328, ...}) = 0
    [pid   436] pread64(3,  <unfinished ...>
    [pid   435] pread64(3,  <unfinished ...>
    [pid   436] <... pread64
resumed>"\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
    [pid   435] <... pread64
resumed>"\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
...>  [pid   436] mmap(NULL, 2170256, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0 <unfinished
...>  [pid   435] mmap(NULL, 2170256, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0 <unfinished
    [pid   436] <... mmap resumed>)        = 0x7ad6eb200000
    [pid   435] <... mmap resumed>)        = 0x72c27fa00000
    [pid   436] mmap(0x7ad6eb228000, 1605632, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x28000 <unfinished ...>
    [pid   435] mmap(0x72c27fa28000, 1605632, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x28000 <unfinished ...>
    [pid   436] <... mmap resumed>)        = 0x7ad6eb228000
    [pid   435] <... mmap resumed>)        = 0x72c27fa28000
    [pid   436] mmap(0x7ad6eb3b0000, 323584, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1b0000 <unfinished ...>
    [pid   435] mmap(0x72c27fbb0000, 323584, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1b0000 <unfinished ...>
    [pid   436] <... mmap resumed>)        = 0x7ad6eb3b0000
    [pid   435] <... mmap resumed>)        = 0x72c27fbb0000
    [pid   436] mmap(0x7ad6eb3ff000, 24576, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1fe000 <unfinished ...>
    [pid   435] mmap(0x72c27fbff000, 24576, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1fe000 <unfinished ...>
    [pid   436] <... mmap resumed>)        = 0x7ad6eb3ff000
    [pid   435] <... mmap resumed>)        = 0x72c27fbff000
    [pid   436] mmap(0x7ad6eb405000, 52624, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0 <unfinished ...>
    [pid   435] mmap(0x72c27fc05000, 52624, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0 <unfinished ...>
    [pid   436] <... mmap resumed>)        = 0x7ad6eb405000
    [pid   435] <... mmap resumed>)        = 0x72c27fc05000
    [pid   436] close(3 <unfinished ...>
    [pid   435] close(3 <unfinished ...>
    [pid   436] <... close resumed>)       = 0
    [pid   435] <... close resumed>)       = 0
    [pid   436] mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0
<unfinished ...>
```

```
       [pid   435] mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0
<unfinished ...>
       [pid   436] <... mmap resumed>)          = 0x7ad6eb48e000
       [pid   435] <... mmap resumed>)          = 0x72c27fc9f000
       [pid   436] arch_prctl(ARCH_SET_FS, 0x7ad6eb48e740 <unfinished ...>
       [pid   435] arch_prctl(ARCH_SET_FS, 0x72c27fc9f740 <unfinished ...>
       [pid   436] <... arch_prctl resumed>)    = 0
       [pid   435] <... arch_prctl resumed>)    = 0
       [pid   436] set_tid_address(0x7ad6eb48ea10 <unfinished ...>
       [pid   435] set_tid_address(0x72c27fc9fa10 <unfinished ...>
       [pid   436] <... set_tid_address resumed>) = 436
       [pid   435] <... set_tid_address resumed>) = 435
       [pid   436] set_robust_list(0x7ad6eb48ea20, 24 <unfinished ...>
       [pid   435] set_robust_list(0x72c27fc9fa20, 24 <unfinished ...>
       [pid   436] <... set_robust_list resumed>) = 0
       [pid   435] <... set_robust_list resumed>) = 0
       [pid   436] rseq(0x7ad6eb48f060, 0x20, 0, 0x53053053 <unfinished ...>
       [pid   435] rseq(0x72c27fca0060, 0x20, 0, 0x53053053 <unfinished ...>
       [pid   436] <... rseq resumed>)          = 0
       [pid   435] <... rseq resumed>)          = 0
       [pid   436] mprotect(0x7ad6eb3ff000, 16384, PROT_READ <unfinished ...>
       [pid   435] mprotect(0x72c27fbff000, 16384, PROT_READ <unfinished ...>
       [pid   436] <... mprotect resumed>)      = 0
       [pid   435] <... mprotect resumed>)      = 0
       [pid   436] mprotect(0x618ade20a000, 4096, PROT_READ <unfinished ...>
       [pid   435] mprotect(0x5810de128000, 4096, PROT_READ <unfinished ...>
       [pid   436] <... mprotect resumed>)      = 0
       [pid   435] <... mprotect resumed>)      = 0
       [pid   436] mprotect(0x7ad6eb4d4000, 8192, PROT_READ <unfinished ...>
       [pid   435] mprotect(0x72c27fce5000, 8192, PROT_READ <unfinished ...>
       [pid   436] <... mprotect resumed>)      = 0
       [pid   435] <... mprotect resumed>)      = 0
       [pid   436] prlimit64(0, RLIMIT_STACK, NULL,  <unfinished ...>
       [pid   435] prlimit64(0, RLIMIT_STACK, NULL,  <unfinished ...>
       [pid   436] <... prlimit64 resumed>{rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 0
       [pid   435] <... prlimit64 resumed>{rlim_cur=8192*1024, rlim_max=RLIM64_INFINITY}) = 0
       [pid   436] munmap(0x7ad6eb491000, 41635 <unfinished ...>
       [pid   435] munmap(0x72c27fca2000, 41635 <unfinished ...>
       [pid   436] <... munmap resumed>)        = 0
       [pid   435] <... munmap resumed>)        = 0
       [pid   436] getrandom( <unfinished ...>
       [pid   435] getrandom( <unfinished ...>
       [pid   436] <... getrandom resumed>"\xa0\x8c\x8a\x17\x4c\xf5\x73\xcb", 8,
GRND_NONBLOCK) = 8
       [pid   435] <... getrandom resumed>"\x4f\x7c\x5c\x43\xba\x5f\xd4\xf2", 8,
GRND_NONBLOCK) = 8
       [pid   436] brk(NULL)                    = 0x618ae7bbc000
       [pid   435] brk(NULL <unfinished ...>
       [pid   436] brk(0x618ae7bdd000 <unfinished ...>
       [pid   435] <... brk resumed>)           = 0x5810ffcb7000
       [pid   436] <... brk resumed>)           = 0x618ae7bdd000
```

```
      [pid   435] brk(0x5810ffcd8000 <unfinished ...>
...>  [pid   436] openat(AT_FDCWD, "file_2.txt", O_WRONLY|O_CREAT|O_TRUNC, 0666 <unfinished
      [pid   435] <... brk resumed>)          = 0x5810ffcd8000
<unfinished ...>
      [pid   435] openat(AT_FDCWD, "\320\260\321file_1.txt", O_WRONLY|O_CREAT|O_TRUNC, 0666
      [pid   436] <... openat resumed>)       = 3
      [pid   436] fstat(0, {st_mode=S_IFIFO|0600, st_size=0, ...}) = 0
      [pid   436] read(0,  <unfinished ...>
      [pid   435] <... openat resumed>)       = 3
      [pid   435] fstat(0, {st_mode=S_IFIFO|0600, st_size=0, ...}) = 0
      [pid   435] read(0,  <unfinished ...>
      [pid   430] <... read resumed>"hello world\n", 1024) = 12
      [pid   430] write(4, "hello world\n", 12) = 12
      [pid   435] <... read resumed>"hello world\n", 4096) = 12
      [pid   430] read(0,  <unfinished ...>
      [pid   435] fstat(1, {st_mode=S_IFIFO|0600, st_size=0, ...}) = 0
      [pid   435] write(1, "hll wrld\n", 9hll wrld
      )   = 9
      [pid   435] fstat(3, {st_mode=S_IFREG|0777, st_size=0, ...}) = 0
      [pid   435] write(3, "hll wrld\n", 9)    = 9
      [pid   435] read(0,  <unfinished ...>
      [pid   430] <... read resumed>"test\n", 1024) = 5
      [pid   430] write(6, "test\n", 5)        = 5
      [pid   436] <... read resumed>"test\n", 4096) = 5
      [pid   430] read(0,  <unfinished ...>
      [pid   436] fstat(1, {st_mode=S_IFIFO|0600, st_size=0, ...}) = 0
      [pid   436] write(1, "tst\n", 4tst
      )       = 4
      [pid   436] fstat(3, {st_mode=S_IFREG|0777, st_size=0, ...}) = 0
      [pid   436] write(3, "tst\n", 4)         = 4
      [pid   436] read(0,  <unfinished ...>
      [pid   430] <... read resumed>"string\n", 1024) = 7
      [pid   430] write(4, "string\n", 7)      = 7
      [pid   435] <... read resumed>"string\n", 4096) = 7
      [pid   430] read(0,  <unfinished ...>
      [pid   435] write(1, "strng\n", 6strng
      )     = 6
      [pid   435] write(3, "strng\n", 6)       = 6
      [pid   435] read(0,  <unfinished ...>
      [pid   430] <... read resumed>"operating system\n", 1024) = 17
      [pid   430] write(6, "operating system\n", 17) = 17
      [pid   436] <... read resumed>"operating system\n", 4096) = 17
      [pid   430] read(0,  <unfinished ...>
      [pid   436] write(1, "prtng sstm\n", 11prtng sstm
      ) = 11
      [pid   436] write(3, "prtng sstm\n", 11) = 11
      [pid   436] read(0,  <unfinished ...>
      [pid   430] <... read resumed>"", 1024) = 0
      [pid   430] close(4)                     = 0
```

```
[pid   435] <... read resumed>"", 4096) = 0
[pid   430] close(6)                    = 0
[pid   435] close(3 <unfinished ...>
[pid   430] wait4(435,  <unfinished ...>
[pid   436] <... read resumed>"", 4096) = 0
[pid   436] close(3)                    = 0
[pid   435] <... close resumed>)        = 0
[pid   436] exit_group(0 <unfinished ...>
[pid   435] exit_group(0 <unfinished ...>
[pid   436] <... exit_group resumed>)   = ?
[pid   435] <... exit_group resumed>)   = ?
[pid   435] +++ exited with 0 +++
[pid   430] <... wait4 resumed>[{WIFEXITED(s) && WEXITSTATUS(s) == 0}], 0, NULL) = 435
[pid   430] --- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=435, si_uid=1000,
si_status=0, si_utime=0, si_stime=0} ---
[pid   430] wait4(436,  <unfinished ...>
[pid   436] +++ exited with 0 +++
<... wait4 resumed>[{WIFEXITED(s) && WEXITSTATUS(s) == 0}], 0, NULL) = 436
--- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=436, si_uid=1000,
si_status=0, si_utime=0, si_stime=0} ---
rt_sigaction(SIGINT, {sa_handler=SIG_IGN, sa_mask=[], sa_flags=SA_RESTORER,
sa_restorer=0x747269445330}, {sa_handler=SIG_DFL, sa_mask=[], sa_flags=0}, 8) = 0
rt_sigaction(SIGQUIT, {sa_handler=SIG_IGN, sa_mask=[], sa_flags=SA_RESTORER,
sa_restorer=0x747269445330}, {sa_handler=SIG_DFL, sa_mask=[], sa_flags=0}, 8) = 0
rt_sigprocmask(SIG_BLOCK, [CHLD], [], 8) = 0
mmap(NULL, 36864, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK, -1, 0) =
0x7472697c1000,
rt_sigprocmask(SIG_BLOCK, ~[], [CHLD], 8) = 0
clone3({flags=CLONE_VM|CLONE_VFORK|CLONE_CLEAR_SIGHAND, exit_signal=SIGCHLD,
stack=0x7472697c1000, stack_size=0x9000}, 88strace: Process 437 attached
 <unfinished ...>
[pid   437] rt_sigprocmask(SIG_BLOCK, NULL, ~[KILL STOP], 8) = 0
[pid   437] rt_sigaction(SIGINT, {sa_handler=SIG_DFL, sa_mask=[], sa_flags=SA_RESTORER,
sa_restorer=0x747269445330}, NULL, 8) = 0
[pid   437] rt_sigaction(SIGQUIT, {sa_handler=SIG_DFL, sa_mask=[],
sa_flags=SA_RESTORER, sa_restorer=0x747269445330}, NULL, 8) = 0
[pid   437] rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0
[pid   437] execve("/bin/sh", ["sh", "-c", "--", "cat \320\260\321file_1.txt
2>/dev/null"], 0x7fffcde32678 /* 27 vars */) <unfinished ...>
[pid   430] <... clone3 resumed>)       = 437
[pid   430] munmap(0x7472697c1000, 36864) = 0
[pid   430] rt_sigprocmask(SIG_SETMASK, [CHLD], NULL, 8) = 0
[pid   437] <... execve resumed>)       = 0
[pid   430] wait4(437,  <unfinished ...>
[pid   437] brk(NULL)                   = 0x5cd48bdf4000
[pid   437] mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7bd1b06be000
[pid   437] access("/etc/ld.so.preload", R_OK) = -1 ENOENT (No such file or directory)
[pid   437] openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3
[pid   437] fstat(3, {st_mode=S_IFREG|0644, st_size=41635, ...}) = 0
[pid   437] mmap(NULL, 41635, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7bd1b06b3000
[pid   437] close(3)                    = 0
[pid   437] openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libc.so.6", O_RDONLY|O_CLOEXEC) = 3
[pid   437] read(3,
"\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\220\243\2\0\0\0\0\0"..., 832) = 832
```

```
[pid    437] 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
[pid    437] fstat(3, {st_mode=S_IFREG|0755, st_size=2125328, ...}) = 0
[pid    437] 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
[pid    437] mmap(NULL, 2170256, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x7bd1b0400000
[pid    437] mmap(0x7bd1b0428000, 1605632, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x28000) = 0x7bd1b0428000
[pid    437] mmap(0x7bd1b05b0000, 323584, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1b0000) = 0x7bd1b05b0000
[pid    437] mmap(0x7bd1b05ff000, 24576, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1fe000) = 0x7bd1b05ff000
[pid    437] mmap(0x7bd1b0605000, 52624, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x7bd1b0605000
[pid    437] close(3)                    = 0
[pid    437] mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7bd1b06b0000
[pid    437] arch_prctl(ARCH_SET_FS, 0x7bd1b06b0740) = 0
[pid    437] set_tid_address(0x7bd1b06b0a10) = 437
[pid    437] set_robust_list(0x7bd1b06b0a20, 24) = 0
[pid    437] rseq(0x7bd1b06b1060, 0x20, 0, 0x53053053) = 0
[pid    437] mprotect(0x7bd1b05ff000, 16384, PROT_READ) = 0
[pid    437] mprotect(0x5cd479b1c000, 8192, PROT_READ) = 0
[pid    437] mprotect(0x7bd1b06f6000, 8192, PROT_READ) = 0
[pid    437] prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024,
rlim_max=RLIM64_INFINITY}) = 0
[pid    437] munmap(0x7bd1b06b3000, 41635) = 0
[pid    437] getuid()                    = 1000
[pid    437] getgid()                    = 1000
[pid    437] getpid()                    = 437
[pid    437] rt_sigaction(SIGCHLD, {sa_handler=0x5cd479b11cd0, sa_mask=~[RTMIN RT_1],
sa_flags=SA_RESTORER, sa_restorer=0x7bd1b0445330}, NULL, 8) = 0
[pid    437] geteuid()                   = 1000
[pid    437] getrandom("\xc7\x40\xba\x76\xe5\x3e\x00\xc9", 8, GRND_NONBLOCK) = 8
[pid    437] brk(NULL)                   = 0x5cd48bdf4000
[pid    437] brk(0x5cd48be15000)         = 0x5cd48be15000
[pid    437] getppid()                   = 430
[pid    437] newfstatat(AT_FDCWD, "/mnt/c/Dev/Projects/OS_Labs/lab1",
{st_mode=S_IFDIR|0777, st_size=4096, ...}, 0) = 0
[pid    437] newfstatat(AT_FDCWD, ".", {st_mode=S_IFDIR|0777, st_size=4096, ...}, 0) = 0
[pid    437] geteuid()                   = 1000
[pid    437] getegid()                   = 1000
[pid    437] rt_sigaction(SIGINT, NULL, {sa_handler=SIG_DFL, sa_mask=[], sa_flags=0}, 8)
= 0
[pid    437] rt_sigaction(SIGINT, {sa_handler=0x5cd479b11cd0, sa_mask=~[RTMIN RT_1],
sa_flags=SA_RESTORER, sa_restorer=0x7bd1b0445330}, NULL, 8) = 0
[pid    437] rt_sigaction(SIGQUIT, NULL, {sa_handler=SIG_DFL, sa_mask=[], sa_flags=0},
8) = 0
[pid    437] rt_sigaction(SIGQUIT, {sa_handler=SIG_DFL, sa_mask=~[RTMIN RT_1],
sa_flags=SA_RESTORER, sa_restorer=0x7bd1b0445330}, NULL, 8) = 0
[pid    437] rt_sigaction(SIGTERM, NULL, {sa_handler=SIG_DFL, sa_mask=[], sa_flags=0},
8) = 0
[pid    437] rt_sigaction(SIGTERM, {sa_handler=SIG_DFL, sa_mask=~[RTMIN RT_1],
sa_flags=SA_RESTORER, sa_restorer=0x7bd1b0445330}, NULL, 8) = 0
[pid    437] openat(AT_FDCWD, "/dev/null", O_WRONLY|O_CREAT|O_TRUNC, 0666) = 3
[pid    437] fcntl(2, F_DUPFD, 10)       = 10
[pid    437] close(2)                    = 0
[pid    437] fcntl(10, F_SETFD, FD_CLOEXEC) = 0
```

```
      [pid   437] dup2(3, 2)                   = 2
      [pid   437] close(3)                      = 0
      [pid   437] newfstatat(AT_FDCWD, "/usr/local/sbin/cat", 0x7fff849a3900, 0) = -1 ENOENT
(No such file or directory)
      [pid   437] newfstatat(AT_FDCWD, "/usr/local/bin/cat", 0x7fff849a3900, 0) = -1 ENOENT
(No such file or directory)
      [pid   437] newfstatat(AT_FDCWD, "/usr/sbin/cat", 0x7fff849a3900, 0) = -1 ENOENT (No
such file or directory)
      [pid   437] newfstatat(AT_FDCWD, "/usr/bin/cat", {st_mode=S_IFREG|0755, st_size=39384,
...}, 0) = 0
      [pid   437] rt_sigprocmask(SIG_SETMASK, ~[RTMIN RT_1], NULL, 8) = 0
      [pid   437] vfork(strace: Process 438 attached
       <unfinished ...>
      [pid   438] rt_sigprocmask(SIG_SETMASK, [], ~[KILL STOP RTMIN RT_1], 8) = 0
      [pid   438] execve("/usr/bin/cat", ["cat", "\320\260\321file_1.txt"], 0x5cd48bdf49e8 /*
27 vars */ <unfinished ...>
      [pid   437] <... vfork resumed>)          = 438
      [pid   437] rt_sigprocmask(SIG_SETMASK, [], ~[KILL STOP RTMIN RT_1], 8) = 0
      [pid   438] <... execve resumed>)         = 0
      [pid   437] wait4(-1,  <unfinished ...>
      [pid   438] brk(NULL)                     = 0x5dc0dc685000
      [pid   438] mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x77ab666b7000
      [pid   438] access("/etc/ld.so.preload", R_OK) = -1 ENOENT (No such file or directory)
      [pid   438] openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3
      [pid   438] fstat(3, {st_mode=S_IFREG|0644, st_size=41635, ...}) = 0
      [pid   438] mmap(NULL, 41635, PROT_READ, MAP_PRIVATE, 3, 0) = 0x77ab666ac000
      [pid   438] close(3)                      = 0
      [pid   438] openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libc.so.6", O_RDONLY|O_CLOEXEC) = 3
      [pid   438] read(3,
"\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\220\243\2\0\0\0\0\0"..., 832) = 832
      [pid   438] 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
      [pid   438] fstat(3, {st_mode=S_IFREG|0755, st_size=2125328, ...}) = 0
      [pid   438] 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
      [pid   438] mmap(NULL, 2170256, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x77ab66400000
      [pid   438] mmap(0x77ab66428000, 1605632, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x28000) = 0x77ab66428000
      [pid   438] mmap(0x77ab665b0000, 323584, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1b0000) = 0x77ab665b0000
      [pid   438] mmap(0x77ab665ff000, 24576, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1fe000) = 0x77ab665ff000
      [pid   438] mmap(0x77ab66605000, 52624, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x77ab66605000
      [pid   438] close(3)                      = 0
      [pid   438] mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x77ab666a9000
      [pid   438] arch_prctl(ARCH_SET_FS, 0x77ab666a9740) = 0
      [pid   438] set_tid_address(0x77ab666a9a10) = 438
      [pid   438] set_robust_list(0x77ab666a9a20, 24) = 0
      [pid   438] rseq(0x77ab666aa060, 0x20, 0, 0x53053053) = 0
      [pid   438] mprotect(0x77ab665ff000, 16384, PROT_READ) = 0
      [pid   438] mprotect(0x5dc09cc33000, 4096, PROT_READ) = 0
      [pid   438] mprotect(0x77ab666ef000, 8192, PROT_READ) = 0
      [pid   438] prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024,
rlim_max=RLIM64_INFINITY}) = 0
      [pid   438] munmap(0x77ab666ac000, 41635) = 0
```

```
       [pid   438] getrandom("\x9b\xad\xd9\x3c\xce\x32\x3c\x61", 8, GRND_NONBLOCK) = 8
       [pid   438] brk(NULL)                    = 0x5dc0dc685000
       [pid   438] brk(0x5dc0dc6a6000)          = 0x5dc0dc6a6000
       [pid   438] openat(AT_FDCWD, "/usr/lib/locale/locale-archive", O_RDONLY|O_CLOEXEC) = -1
ENOENT (No such file or directory)
       [pid   438] openat(AT_FDCWD, "/usr/share/locale/locale.alias", O_RDONLY|O_CLOEXEC) = 3
       [pid   438] fstat(3, {st_mode=S_IFREG|0644, st_size=2996, ...}) = 0
       [pid   438] read(3, "# Locale name alias data base.\n#"..., 4096) = 2996
       [pid   438] read(3, "", 4096)            = 0
       [pid   438] close(3)                     = 0
       [pid   438] openat(AT_FDCWD, "/usr/lib/locale/C.UTF-8/LC_IDENTIFICATION",
O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
       [pid   438] openat(AT_FDCWD, "/usr/lib/locale/C.utf8/LC_IDENTIFICATION",
O_RDONLY|O_CLOEXEC) = 3
       [pid   438] fstat(3, {st_mode=S_IFREG|0644, st_size=258, ...}) = 0
       [pid   438] mmap(NULL, 258, PROT_READ, MAP_PRIVATE, 3, 0) = 0x77ab666b6000
       [pid   438] close(3)                     = 0
       [pid   438] openat(AT_FDCWD, "/usr/lib/x86_64-linux-gnu/gconv/gconv-modules.cache",
O_RDONLY|O_CLOEXEC) = 3
       [pid   438] fstat(3, {st_mode=S_IFREG|0644, st_size=27028, ...}) = 0
       [pid   438] mmap(NULL, 27028, PROT_READ, MAP_SHARED, 3, 0) = 0x77ab666af000
       [pid   438] close(3)                     = 0
       [pid   438] futex(0x77ab6660472c, FUTEX_WAKE_PRIVATE, 2147483647) = 0
       [pid   438] openat(AT_FDCWD, "/usr/lib/locale/C.UTF-8/LC_MEASUREMENT",
O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
       [pid   438] openat(AT_FDCWD, "/usr/lib/locale/C.utf8/LC_MEASUREMENT",
O_RDONLY|O_CLOEXEC) = 3
       [pid   438] fstat(3, {st_mode=S_IFREG|0644, st_size=23, ...}) = 0
       [pid   438] mmap(NULL, 23, PROT_READ, MAP_PRIVATE, 3, 0) = 0x77ab666ae000
       [pid   438] close(3)                     = 0
       [pid   438] openat(AT_FDCWD, "/usr/lib/locale/C.UTF-8/LC_TELEPHONE",
O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
       [pid   438] openat(AT_FDCWD, "/usr/lib/locale/C.utf8/LC_TELEPHONE", O_RDONLY|O_CLOEXEC)
= 3
       [pid   438] fstat(3, {st_mode=S_IFREG|0644, st_size=47, ...}) = 0
       [pid   438] mmap(NULL, 47, PROT_READ, MAP_PRIVATE, 3, 0) = 0x77ab666ad000
       [pid   438] close(3)                     = 0
       [pid   438] openat(AT_FDCWD, "/usr/lib/locale/C.UTF-8/LC_ADDRESS", O_RDONLY|O_CLOEXEC)
= -1 ENOENT (No such file or directory)
       [pid   438] openat(AT_FDCWD, "/usr/lib/locale/C.utf8/LC_ADDRESS", O_RDONLY|O_CLOEXEC) =
3
       [pid   438] fstat(3, {st_mode=S_IFREG|0644, st_size=127, ...}) = 0
       [pid   438] mmap(NULL, 127, PROT_READ, MAP_PRIVATE, 3, 0) = 0x77ab666ac000
       [pid   438] close(3)                     = 0
       [pid   438] openat(AT_FDCWD, "/usr/lib/locale/C.UTF-8/LC_NAME", O_RDONLY|O_CLOEXEC) =
-1 ENOENT (No such file or directory)
       [pid   438] openat(AT_FDCWD, "/usr/lib/locale/C.utf8/LC_NAME", O_RDONLY|O_CLOEXEC) = 3
       [pid   438] fstat(3, {st_mode=S_IFREG|0644, st_size=62, ...}) = 0
       [pid   438] mmap(NULL, 62, PROT_READ, MAP_PRIVATE, 3, 0) = 0x77ab666a8000
       [pid   438] close(3)                     = 0
       [pid   438] openat(AT_FDCWD, "/usr/lib/locale/C.UTF-8/LC_PAPER", O_RDONLY|O_CLOEXEC) =
-1 ENOENT (No such file or directory)
       [pid   438] openat(AT_FDCWD, "/usr/lib/locale/C.utf8/LC_PAPER", O_RDONLY|O_CLOEXEC) = 3
       [pid   438] fstat(3, {st_mode=S_IFREG|0644, st_size=34, ...}) = 0
       [pid   438] mmap(NULL, 34, PROT_READ, MAP_PRIVATE, 3, 0) = 0x77ab666a7000
       [pid   438] close(3)                     = 0
```

```
= -1 ENOENT (No such file or directory)
[pid   438] openat(AT_FDCWD, "/usr/lib/locale/C.UTF-8/LC_MESSAGES", O_RDONLY|O_CLOEXEC)

[pid   438] openat(AT_FDCWD, "/usr/lib/locale/C.utf8/LC_MESSAGES", O_RDONLY|O_CLOEXEC)
= 3

[pid   438] fstat(3, {st_mode=S_IFDIR|0755, st_size=4096, ...}) = 0
[pid   438] close(3)                    = 0
[pid   438] openat(AT_FDCWD, "/usr/lib/locale/C.utf8/LC_MESSAGES/SYS_LC_MESSAGES",
O_RDONLY|O_CLOEXEC) = 3
[pid   438] fstat(3, {st_mode=S_IFREG|0644, st_size=48, ...}) = 0
[pid   438] mmap(NULL, 48, PROT_READ, MAP_PRIVATE, 3, 0) = 0x77ab666a6000
[pid   438] close(3)                    = 0
[pid   438] openat(AT_FDCWD, "/usr/lib/locale/C.UTF-8/LC_MONETARY", O_RDONLY|O_CLOEXEC)
= -1 ENOENT (No such file or directory)
[pid   438] openat(AT_FDCWD, "/usr/lib/locale/C.utf8/LC_MONETARY", O_RDONLY|O_CLOEXEC)
= 3
[pid   438] fstat(3, {st_mode=S_IFREG|0644, st_size=270, ...}) = 0
[pid   438] mmap(NULL, 270, PROT_READ, MAP_PRIVATE, 3, 0) = 0x77ab666a5000
[pid   438] close(3)                    = 0
[pid   438] openat(AT_FDCWD, "/usr/lib/locale/C.UTF-8/LC_COLLATE", O_RDONLY|O_CLOEXEC)
= -1 ENOENT (No such file or directory)
[pid   438] openat(AT_FDCWD, "/usr/lib/locale/C.utf8/LC_COLLATE", O_RDONLY|O_CLOEXEC) =
3
[pid   438] fstat(3, {st_mode=S_IFREG|0644, st_size=1406, ...}) = 0
[pid   438] mmap(NULL, 1406, PROT_READ, MAP_PRIVATE, 3, 0) = 0x77ab666a4000
[pid   438] close(3)                    = 0
[pid   438] openat(AT_FDCWD, "/usr/lib/locale/C.UTF-8/LC_TIME", O_RDONLY|O_CLOEXEC) =
-1 ENOENT (No such file or directory)
[pid   438] openat(AT_FDCWD, "/usr/lib/locale/C.utf8/LC_TIME", O_RDONLY|O_CLOEXEC) = 3
[pid   438] fstat(3, {st_mode=S_IFREG|0644, st_size=3360, ...}) = 0
[pid   438] mmap(NULL, 3360, PROT_READ, MAP_PRIVATE, 3, 0) = 0x77ab666a3000
[pid   438] close(3)                    = 0
[pid   438] openat(AT_FDCWD, "/usr/lib/locale/C.UTF-8/LC_NUMERIC", O_RDONLY|O_CLOEXEC)
= -1 ENOENT (No such file or directory)
[pid   438] openat(AT_FDCWD, "/usr/lib/locale/C.utf8/LC_NUMERIC", O_RDONLY|O_CLOEXEC) =
3
[pid   438] fstat(3, {st_mode=S_IFREG|0644, st_size=50, ...}) = 0
[pid   438] mmap(NULL, 50, PROT_READ, MAP_PRIVATE, 3, 0) = 0x77ab666a2000
[pid   438] close(3)                    = 0
[pid   438] openat(AT_FDCWD, "/usr/lib/locale/C.UTF-8/LC_CTYPE", O_RDONLY|O_CLOEXEC) =
-1 ENOENT (No such file or directory)
[pid   438] openat(AT_FDCWD, "/usr/lib/locale/C.utf8/LC_CTYPE", O_RDONLY|O_CLOEXEC) = 3
[pid   438] fstat(3, {st_mode=S_IFREG|0644, st_size=360460, ...}) = 0
[pid   438] mmap(NULL, 360460, PROT_READ, MAP_PRIVATE, 3, 0) = 0x77ab66649000
[pid   438] close(3)                    = 0
[pid   438] fstat(1, {st_mode=S_IFIFO|0600, st_size=0, ...}) = 0
[pid   438] openat(AT_FDCWD, "\320\260\321file_1.txt", O_RDONLY) = 3
[pid   438] fstat(3, {st_mode=S_IFREG|0777, st_size=15, ...}) = 0
[pid   438] fadvise64(3, 0, 0, POSIX_FADV_SEQUENTIAL) = 0
[pid   438] mmap(NULL, 139264, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0)
= 0x77ab66627000
[pid   438] read(3, "hll wrld\nstrng\n", 131072) = 15
[pid   438] write(1, "hll wrld\nstrng\n", 15hll wrld
strng
) = 15
[pid   438] read(3, "", 131072)         = 0
[pid   438] munmap(0x77ab66627000, 139264) = 0
```

```
[pid   438] close(3)                   = 0
[pid   438] close(1)                   = 0
[pid   438] close(2)                   = 0
[pid   438] exit_group(0)              = ?
[pid   438] +++ exited with 0 +++
[pid   437] <... wait4 resumed>[{WIFEXITED(s) && WEXITSTATUS(s) == 0}], 0, NULL) = 438
[pid   437] --- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=438, si_uid=1000,
si_status=0, si_utime=0, si_stime=0} ---
[pid   437] rt_sigreturn({mask=[]})    = 438
[pid   437] wait4(-1, 0x7fff849a385c, WNOHANG, NULL) = -1 ECHILD (No child processes)
[pid   437] dup2(10, 2)                = 2
[pid   437] close(10)                  = 0
[pid   437] exit_group(0)              = ?
[pid   437] +++ exited with 0 +++
<... wait4 resumed>[{WIFEXITED(s) && WEXITSTATUS(s) == 0}], 0, NULL) = 437
rt_sigaction(SIGINT, {sa_handler=SIG_DFL, sa_mask=[], sa_flags=SA_RESTORER,
sa_restorer=0x747269445330}, NULL, 8) = 0
rt_sigaction(SIGQUIT, {sa_handler=SIG_DFL, sa_mask=[], sa_flags=SA_RESTORER,
sa_restorer=0x747269445330}, NULL, 8) = 0
rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0
--- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=437, si_uid=1000,
si_status=0, si_utime=0, si_stime=0} ---
rt_sigaction(SIGINT, {sa_handler=SIG_IGN, sa_mask=[], sa_flags=SA_RESTORER,
sa_restorer=0x747269445330}, {sa_handler=SIG_DFL, sa_mask=[], sa_flags=SA_RESTORER,
sa_restorer=0x747269445330}, 8) = 0
rt_sigaction(SIGQUIT, {sa_handler=SIG_IGN, sa_mask=[], sa_flags=SA_RESTORER,
sa_restorer=0x747269445330}, {sa_handler=SIG_DFL, sa_mask=[], sa_flags=SA_RESTORER,
sa_restorer=0x747269445330}, 8) = 0
rt_sigprocmask(SIG_BLOCK, [CHLD], [], 8) = 0
mmap(NULL, 36864, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS|MAP_STACK, -1, 0) =
0x7472697c1000
rt_sigprocmask(SIG_BLOCK, ~[], [CHLD], 8) = 0
clone3({flags=CLONE_VM|CLONE_VFORK|CLONE_CLEAR_SIGHAND, exit_signal=SIGCHLD,
stack=0x7472697c1000, stack_size=0x9000}, 88strace: Process 439 attached
 <unfinished ...>
[pid   439] rt_sigprocmask(SIG_BLOCK, NULL, ~[KILL STOP], 8) = 0
[pid   439] rt_sigaction(SIGINT, {sa_handler=SIG_DFL, sa_mask=[], sa_flags=SA_RESTORER,
sa_restorer=0x747269445330}, NULL, 8) = 0
[pid   439] rt_sigaction(SIGQUIT, {sa_handler=SIG_DFL, sa_mask=[],
sa_flags=SA_RESTORER, sa_restorer=0x747269445330}, NULL, 8) = 0
[pid   439] rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0
[pid   439] execve("/bin/sh", ["sh", "-c", "--", "cat file_2.txt 2>/dev/null"],
0x7fffcde32678 /* 27 vars */ <unfinished ...>
[pid   430] <... clone3 resumed>)      = 439
[pid   430] munmap(0x7472697c1000, 36864) = 0
[pid   439] <... execve resumed>)      = 0
[pid   430] rt_sigprocmask(SIG_SETMASK, [CHLD], NULL, 8) = 0
[pid   439] brk(NULL <unfinished ...>
[pid   430] wait4(439,  <unfinished ...>
[pid   439] <... brk resumed>)         = 0x59a9128f3000
[pid   439] mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x729b74cb0000
[pid   439] access("/etc/ld.so.preload", R_OK) = -1 ENOENT (No such file or directory)
[pid   439] openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3
[pid   439] fstat(3, {st_mode=S_IFREG|0644, st_size=41635, ...}) = 0
[pid   439] mmap(NULL, 41635, PROT_READ, MAP_PRIVATE, 3, 0) = 0x729b74ca5000
[pid   439] close(3)                   = 0
[pid   439] openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libc.so.6", O_RDONLY|O_CLOEXEC) = 3
```

```
[pid   439] read(3,
"\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\220\243\2\0\0\0\0\0"..., 832) = 832
[pid   439] 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
[pid   439] fstat(3, {st_mode=S_IFREG|0755, st_size=2125328, ...}) = 0
[pid   439] 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
[pid   439] mmap(NULL, 2170256, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x729b74a00000
[pid   439] mmap(0x729b74a28000, 1605632, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x28000) = 0x729b74a28000
[pid   439] mmap(0x729b74bb0000, 323584, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1b0000) = 0x729b74bb0000
[pid   439] mmap(0x729b74bff000, 24576, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1fe000) = 0x729b74bff000
[pid   439] mmap(0x729b74c05000, 52624, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x729b74c05000
[pid   439] close(3)                     = 0
[pid   439] mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x729b74ca2000
[pid   439] arch_prctl(ARCH_SET_FS, 0x729b74ca2740) = 0
[pid   439] set_tid_address(0x729b74ca2a10) = 439
[pid   439] set_robust_list(0x729b74ca2a20, 24) = 0
[pid   439] rseq(0x729b74ca3060, 0x20, 0, 0x53053053) = 0
[pid   439] mprotect(0x729b74bff000, 16384, PROT_READ) = 0
[pid   439] mprotect(0x59a8e422f000, 8192, PROT_READ) = 0
[pid   439] mprotect(0x729b74ce8000, 8192, PROT_READ) = 0
[pid   439] prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024,
rlim_max=RLIM64_INFINITY}) = 0
[pid   439] munmap(0x729b74ca5000, 41635) = 0
[pid   439] getuid()                     = 1000
[pid   439] getgid()                     = 1000
[pid   439] getpid()                     = 439
[pid   439] rt_sigaction(SIGCHLD, {sa_handler=0x59a8e4224cd0, sa_mask=~[RTMIN RT_1],
sa_flags=SA_RESTORER, sa_restorer=0x729b74a45330}, NULL, 8) = 0
[pid   439] geteuid()                    = 1000
[pid   439] getrandom("\x4b\xb7\xf7\x37\x43\xb9\x51\xdb", 8, GRND_NONBLOCK) = 8
[pid   439] brk(NULL)                    = 0x59a9128f3000
[pid   439] brk(0x59a912914000)          = 0x59a912914000
[pid   439] getppid()                    = 430
[pid   439] newfstatat(AT_FDCWD, "/mnt/c/Dev/Projects/OS_Labs/lab1",
{st_mode=S_IFDIR|0777, st_size=4096, ...}, 0) = 0
[pid   439] newfstatat(AT_FDCWD, ".", {st_mode=S_IFDIR|0777, st_size=4096, ...}, 0) = 0
[pid   439] geteuid()                    = 1000
[pid   439] getegid()                    = 1000
[pid   439] rt_sigaction(SIGINT, NULL, {sa_handler=SIG_DFL, sa_mask=[], sa_flags=0}, 8)
= 0
[pid   439] rt_sigaction(SIGINT, {sa_handler=0x59a8e4224cd0, sa_mask=~[RTMIN RT_1],
sa_flags=SA_RESTORER, sa_restorer=0x729b74a45330}, NULL, 8) = 0
[pid   439] rt_sigaction(SIGQUIT, NULL, {sa_handler=SIG_DFL, sa_mask=[], sa_flags=0},
8) = 0
[pid   439] rt_sigaction(SIGQUIT, {sa_handler=SIG_DFL, sa_mask=~[RTMIN RT_1],
sa_flags=SA_RESTORER, sa_restorer=0x729b74a45330}, NULL, 8) = 0
[pid   439] rt_sigaction(SIGTERM, NULL, {sa_handler=SIG_DFL, sa_mask=[], sa_flags=0},
8) = 0
[pid   439] rt_sigaction(SIGTERM, {sa_handler=SIG_DFL, sa_mask=~[RTMIN RT_1],
sa_flags=SA_RESTORER, sa_restorer=0x729b74a45330}, NULL, 8) = 0
[pid   439] openat(AT_FDCWD, "/dev/null", O_WRONLY|O_CREAT|O_TRUNC, 0666) = 3
[pid   439] fcntl(2, F_DUPFD, 10)        = 10
[pid   439] close(2)                     = 0
```

```
    [pid   439] fcntl(10, F_SETFD, FD_CLOEXEC) = 0
    [pid   439] dup2(3, 2)                  = 2
    [pid   439] close(3)                    = 0
    [pid   439] newfstatat(AT_FDCWD, "/usr/local/sbin/cat", 0x7ffe44539090, 0) = -1 ENOENT
(No such file or directory)
    [pid   439] newfstatat(AT_FDCWD, "/usr/local/bin/cat", 0x7ffe44539090, 0) = -1 ENOENT
(No such file or directory)
    [pid   439] newfstatat(AT_FDCWD, "/usr/sbin/cat", 0x7ffe44539090, 0) = -1 ENOENT (No
such file or directory)
    [pid   439] newfstatat(AT_FDCWD, "/usr/bin/cat", {st_mode=S_IFREG|0755, st_size=39384,
...}, 0) = 0
    [pid   439] rt_sigprocmask(SIG_SETMASK, ~[RTMIN RT_1], NULL, 8) = 0
    [pid   439] vfork(strace: Process 440 attached
     <unfinished ...>
    [pid   440] rt_sigprocmask(SIG_SETMASK, [], ~[KILL STOP RTMIN RT_1], 8) = 0
    [pid   440] execve("/usr/bin/cat", ["cat", "file_2.txt"], 0x59a9128f39e8 /* 27 vars */
<unfinished ...>
    [pid   439] <... vfork resumed>)        = 440
    [pid   439] rt_sigprocmask(SIG_SETMASK, [], ~[KILL STOP RTMIN RT_1], 8) = 0
    [pid   440] <... execve resumed>)       = 0
    [pid   439] wait4(-1,  <unfinished ...>
    [pid   440] brk(NULL)                   = 0x571ee0e63000
    [pid   440] mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7c6cc261d000
    [pid   440] access("/etc/ld.so.preload", R_OK) = -1 ENOENT (No such file or directory)
    [pid   440] openat(AT_FDCWD, "/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3
    [pid   440] fstat(3, {st_mode=S_IFREG|0644, st_size=41635, ...}) = 0
    [pid   440] mmap(NULL, 41635, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7c6cc2612000
    [pid   440] close(3)                    = 0
    [pid   440] openat(AT_FDCWD, "/lib/x86_64-linux-gnu/libc.so.6", O_RDONLY|O_CLOEXEC) = 3
    [pid   440] read(3,
"\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0\220\243\2\0\0\0\0\0"..., 832) = 832
    [pid   440] 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
    [pid   440] fstat(3, {st_mode=S_IFREG|0755, st_size=2125328, ...}) = 0
    [pid   440] 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
    [pid   440] mmap(NULL, 2170256, PROT_READ, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x7c6cc2200000
    [pid   440] mmap(0x7c6cc2228000, 1605632, PROT_READ|PROT_EXEC,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x28000) = 0x7c6cc2228000
    [pid   440] mmap(0x7c6cc23b0000, 323584, PROT_READ,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1b0000) = 0x7c6cc23b0000
    [pid   440] mmap(0x7c6cc23ff000, 24576, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1fe000) = 0x7c6cc23ff000
    [pid   440] mmap(0x7c6cc2405000, 52624, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x7c6cc2405000
    [pid   440] close(3)                    = 0
    [pid   440] mmap(NULL, 12288, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7c6cc260f000
    [pid   440] arch_prctl(ARCH_SET_FS, 0x7c6cc260f740) = 0
    [pid   440] set_tid_address(0x7c6cc260fa10) = 440
    [pid   440] set_robust_list(0x7c6cc260fa20, 24) = 0
    [pid   440] rseq(0x7c6cc2610060, 0x20, 0, 0x53053053) = 0
    [pid   440] mprotect(0x7c6cc23ff000, 16384, PROT_READ) = 0
    [pid   440] mprotect(0x571ea677f000, 4096, PROT_READ) = 0
    [pid   440] mprotect(0x7c6cc2655000, 8192, PROT_READ) = 0
    [pid   440] prlimit64(0, RLIMIT_STACK, NULL, {rlim_cur=8192*1024,
rlim_max=RLIM64_INFINITY}) = 0
```

```
[pid    440] munmap(0x7c6cc2612000, 41635) = 0
[pid    440] getrandom("\x9a\xf3\x6f\x41\xd2\x3e\xd0\xf5", 8, GRND_NONBLOCK) = 8
[pid    440] brk(NULL)                    = 0x571ee0e63000
[pid    440] brk(0x571ee0e84000)          = 0x571ee0e84000
[pid    440] openat(AT_FDCWD, "/usr/lib/locale/locale-archive", O_RDONLY|O_CLOEXEC) = -1
ENOENT (No such file or directory)
[pid    440] openat(AT_FDCWD, "/usr/share/locale/locale.alias", O_RDONLY|O_CLOEXEC) = 3
[pid    440] fstat(3, {st_mode=S_IFREG|0644, st_size=2996, ...}) = 0
[pid    440] read(3, "# Locale name alias data base.\n#"..., 4096) = 2996
[pid    440] read(3, "", 4096)            = 0
[pid    440] close(3)                     = 0
[pid    440] openat(AT_FDCWD, "/usr/lib/locale/C.UTF-8/LC_IDENTIFICATION",
O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
[pid    440] openat(AT_FDCWD, "/usr/lib/locale/C.utf8/LC_IDENTIFICATION",
O_RDONLY|O_CLOEXEC) = 3
[pid    440] fstat(3, {st_mode=S_IFREG|0644, st_size=258, ...}) = 0
[pid    440] mmap(NULL, 258, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7c6cc261c000
[pid    440] close(3)                     = 0
[pid    440] openat(AT_FDCWD, "/usr/lib/x86_64-linux-gnu/gconv/gconv-modules.cache",
O_RDONLY|O_CLOEXEC) = 3
[pid    440] fstat(3, {st_mode=S_IFREG|0644, st_size=27028, ...}) = 0
[pid    440] mmap(NULL, 27028, PROT_READ, MAP_SHARED, 3, 0) = 0x7c6cc2615000
[pid    440] close(3)                     = 0
[pid    440] futex(0x7c6cc240472c, FUTEX_WAKE_PRIVATE, 2147483647) = 0
[pid    440] openat(AT_FDCWD, "/usr/lib/locale/C.UTF-8/LC_MEASUREMENT",
O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
[pid    440] openat(AT_FDCWD, "/usr/lib/locale/C.utf8/LC_MEASUREMENT",
O_RDONLY|O_CLOEXEC) = 3
[pid    440] fstat(3, {st_mode=S_IFREG|0644, st_size=23, ...}) = 0
[pid    440] mmap(NULL, 23, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7c6cc2614000
[pid    440] close(3)                     = 0
[pid    440] openat(AT_FDCWD, "/usr/lib/locale/C.UTF-8/LC_TELEPHONE",
O_RDONLY|O_CLOEXEC) = -1 ENOENT (No such file or directory)
[pid    440] openat(AT_FDCWD, "/usr/lib/locale/C.utf8/LC_TELEPHONE", O_RDONLY|O_CLOEXEC)
= 3
[pid    440] fstat(3, {st_mode=S_IFREG|0644, st_size=47, ...}) = 0
[pid    440] mmap(NULL, 47, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7c6cc2613000
[pid    440] close(3)                     = 0
[pid    440] openat(AT_FDCWD, "/usr/lib/locale/C.UTF-8/LC_ADDRESS", O_RDONLY|O_CLOEXEC)
= -1 ENOENT (No such file or directory)
[pid    440] openat(AT_FDCWD, "/usr/lib/locale/C.utf8/LC_ADDRESS", O_RDONLY|O_CLOEXEC) =
3
[pid    440] fstat(3, {st_mode=S_IFREG|0644, st_size=127, ...}) = 0
[pid    440] mmap(NULL, 127, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7c6cc2612000
[pid    440] close(3)                     = 0
[pid    440] openat(AT_FDCWD, "/usr/lib/locale/C.UTF-8/LC_NAME", O_RDONLY|O_CLOEXEC) =
-1 ENOENT (No such file or directory)
[pid    440] openat(AT_FDCWD, "/usr/lib/locale/C.utf8/LC_NAME", O_RDONLY|O_CLOEXEC) = 3
[pid    440] fstat(3, {st_mode=S_IFREG|0644, st_size=62, ...}) = 0
[pid    440] mmap(NULL, 62, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7c6cc260e000
[pid    440] close(3)                     = 0
[pid    440] openat(AT_FDCWD, "/usr/lib/locale/C.UTF-8/LC_PAPER", O_RDONLY|O_CLOEXEC) =
-1 ENOENT (No such file or directory)
[pid    440] openat(AT_FDCWD, "/usr/lib/locale/C.utf8/LC_PAPER", O_RDONLY|O_CLOEXEC) = 3
[pid    440] fstat(3, {st_mode=S_IFREG|0644, st_size=34, ...}) = 0
[pid    440] mmap(NULL, 34, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7c6cc260d000
```

```
      [pid   440] close(3)                    = 0
      [pid   440] openat(AT_FDCWD, "/usr/lib/locale/C.UTF-8/LC_MESSAGES", O_RDONLY|O_CLOEXEC)
= -1 ENOENT (No such file or directory)
      [pid   440] openat(AT_FDCWD, "/usr/lib/locale/C.utf8/LC_MESSAGES", O_RDONLY|O_CLOEXEC)
= 3
      [pid   440] fstat(3, {st_mode=S_IFDIR|0755, st_size=4096, ...}) = 0
      [pid   440] close(3)                    = 0
      [pid   440] openat(AT_FDCWD, "/usr/lib/locale/C.utf8/LC_MESSAGES/SYS_LC_MESSAGES",
O_RDONLY|O_CLOEXEC) = 3
      [pid   440] fstat(3, {st_mode=S_IFREG|0644, st_size=48, ...}) = 0
      [pid   440] mmap(NULL, 48, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7c6cc260c000
      [pid   440] close(3)                    = 0
      [pid   440] openat(AT_FDCWD, "/usr/lib/locale/C.UTF-8/LC_MONETARY", O_RDONLY|O_CLOEXEC)
= -1 ENOENT (No such file or directory)
      [pid   440] openat(AT_FDCWD, "/usr/lib/locale/C.utf8/LC_MONETARY", O_RDONLY|O_CLOEXEC)
= 3
      [pid   440] fstat(3, {st_mode=S_IFREG|0644, st_size=270, ...}) = 0
      [pid   440] mmap(NULL, 270, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7c6cc260b000
      [pid   440] close(3)                    = 0
      [pid   440] openat(AT_FDCWD, "/usr/lib/locale/C.UTF-8/LC_COLLATE", O_RDONLY|O_CLOEXEC)
= -1 ENOENT (No such file or directory)
      [pid   440] openat(AT_FDCWD, "/usr/lib/locale/C.utf8/LC_COLLATE", O_RDONLY|O_CLOEXEC) =
3
      [pid   440] fstat(3, {st_mode=S_IFREG|0644, st_size=1406, ...}) = 0
      [pid   440] mmap(NULL, 1406, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7c6cc260a000
      [pid   440] close(3)                    = 0
      [pid   440] openat(AT_FDCWD, "/usr/lib/locale/C.UTF-8/LC_TIME", O_RDONLY|O_CLOEXEC) =
-1 ENOENT (No such file or directory)
      [pid   440] openat(AT_FDCWD, "/usr/lib/locale/C.utf8/LC_TIME", O_RDONLY|O_CLOEXEC) = 3
      [pid   440] fstat(3, {st_mode=S_IFREG|0644, st_size=3360, ...}) = 0
      [pid   440] mmap(NULL, 3360, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7c6cc2609000
      [pid   440] close(3)                    = 0
      [pid   440] openat(AT_FDCWD, "/usr/lib/locale/C.UTF-8/LC_NUMERIC", O_RDONLY|O_CLOEXEC)
= -1 ENOENT (No such file or directory)
      [pid   440] openat(AT_FDCWD, "/usr/lib/locale/C.utf8/LC_NUMERIC", O_RDONLY|O_CLOEXEC) =
3
      [pid   440] fstat(3, {st_mode=S_IFREG|0644, st_size=50, ...}) = 0
      [pid   440] mmap(NULL, 50, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7c6cc2608000
      [pid   440] close(3)                    = 0
      [pid   440] openat(AT_FDCWD, "/usr/lib/locale/C.UTF-8/LC_CTYPE", O_RDONLY|O_CLOEXEC) =
-1 ENOENT (No such file or directory)
      [pid   440] openat(AT_FDCWD, "/usr/lib/locale/C.utf8/LC_CTYPE", O_RDONLY|O_CLOEXEC) = 3
      [pid   440] fstat(3, {st_mode=S_IFREG|0644, st_size=360460, ...}) = 0
      [pid   440] mmap(NULL, 360460, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7c6cc25af000
      [pid   440] close(3)                    = 0
      [pid   440] fstat(1, {st_mode=S_IFIFO|0600, st_size=0, ...}) = 0
      [pid   440] openat(AT_FDCWD, "file_2.txt", O_RDONLY) = 3
      [pid   440] fstat(3, {st_mode=S_IFREG|0777, st_size=15, ...}) = 0
      [pid   440] fadvise64(3, 0, 0, POSIX_FADV_SEQUENTIAL) = 0
      [pid   440] mmap(NULL, 139264, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0)
= 0x7c6cc258d000
      [pid   440] read(3, "tst\nprtng sstm\n", 131072) = 15
      [pid   440] write(1, "tst\nprtng sstm\n", 15tst
prtng sstm
) = 15
      [pid   440] read(3, "", 131072)         = 0
```

```
[pid   440] munmap(0x7c6cc258d000, 139264) = 0
[pid   440] close(3)                    = 0
[pid   440] close(1)                    = 0
[pid   440] close(2)                    = 0
[pid   440] exit_group(0)               = ?
[pid   440] +++ exited with 0 +++
[pid   439] <... wait4 resumed>[{WIFEXITED(s) && WEXITSTATUS(s) == 0}], 0, NULL) = 440
[pid   439] --- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=440, si_uid=1000,
si_status=0, si_utime=0, si_stime=0} ---
[pid   439] rt_sigreturn({mask=[]})     = 440
[pid   439] wait4(-1, 0x7ffe44538fec, WNOHANG, NULL) = -1 ECHILD (No child processes)
[pid   439] dup2(10, 2)                 = 2
[pid   439] close(10)                   = 0
[pid   439] exit_group(0)               = ?
[pid   439] +++ exited with 0 +++
<... wait4 resumed>[{WIFEXITED(s) && WEXITSTATUS(s) == 0}], 0, NULL) = 439
rt_sigaction(SIGINT, {sa_handler=SIG_DFL, sa_mask=[], sa_flags=SA_RESTORER,
sa_restorer=0x747269445330}, NULL, 8) = 0
rt_sigaction(SIGQUIT, {sa_handler=SIG_DFL, sa_mask=[], sa_flags=SA_RESTORER,
sa_restorer=0x747269445330}, NULL, 8) = 0
rt_sigprocmask(SIG_SETMASK, [], NULL, 8) = 0
--- SIGCHLD {si_signo=SIGCHLD, si_code=CLD_EXITED, si_pid=439, si_uid=1000,
si_status=0, si_utime=0, si_stime=0} ---
write(1, "\n=== \320\235\320\260\321\207\320\260\320\273\320\276
\320\276\320\261\321\200\320\260\320\261\320\276\321\202"..., 914
=== Начало обработки строк ===
Вводите строки (Ctrl+D для завершения ввода):
--------------------------------------------
[child1] Строка 1: hello world
[child2] Строка 2: test
[child1] Строка 3: string
[child2] Строка 4: operating system


[INFO] Конец ввода (EOF)


--------------------------------------------
Ожидание завершения дочерних процессов...

=== РЕЗУЛЬТАТЫ РАБОТЫ ===
child1 завершился с кодом: 0
child2 завершился с кодом: 0


Результаты записаны в файлы:
• a file_1.txt (child1, нечетные строки)
• file_2.txt (child2, четные строки)


--- Содержимое a file_1.txt ---


--- Содержимое file_2.txt ---


Родительский процесс завершен.
) = 914
```

```
exit_group(0)                    = ?
+++ exited with 0 +++
```

Вывод

Лабораторная работа продемонстрировала использование системных вызовов для создания процессов и обмена данными через каналы. Родительский процесс создает двух дочерних, распределяет строки по четности, а дочерние процессы удаляют гласные буквы и записывают результаты в файлы. Программа демонстрирует корректное межпроцессное взаимодействие и обработку системных ошибок.