Московский авиационный институт (национальный исследовательский университет)

Факультет информационных технологий и прикладной математики

Кафедра вычислительной математики и программирования

Лабораторная работа №2 по курсу «Операционные системы»

Управление процессами ОС. Обеспечение обмена данных между процессами посредством каналов.

Студент:	С. А. Арапов
Преподаватель:	Е. С Миронов
Группа:	М8О-208Б-19
Дата: Оценка:	
Подпись:	

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Лабораторная работа №2

Тема: Приобритение практических навыков в:

- Управлении процессами в ОС

- Обеспечение обмена данных между процессами посредством каналов

Задача: 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 №1: Родительский процесс создает дочерний процесс. Первой строчкой пользователь в консоль родительского процесса пишет имя файла, которое будет передано при создании дочернего процесса. Родительский и дочерний процесс должны быть представлены разными программами. Родительский процесс передает команды пользователя через pipe1, который связан с стандартным входным потоком дочернего процесса. Дочерний процесс принеобходимости передает данные в родительский процесс через pipe2. Результаты своей работы дочерний процесс пишет в созданный им файл. Допускается просто открыть файл и писать туда, не перенаправляя стандартный поток вывода.

Вариант №4: Пользователь вводит команды вида: «число число число<endline>». Далее эти числа передаются от родительского процесса в дочерний. Дочерний процесс производит деление первого числа, на последующие, а результат выводит в файл. Если происходит деление на 0, то тогда дочерний и родительский процесс завершают свою работу. Проверка деления на 0 должна осуществляться на стороне дочернего процесса. Числа имеют тип float.

1   Описание программы

Код программы написан на языке Си, в ОС на базе ядра Linux. Во время выполнения программы создаётся дочерний процесс, в который перенаправляются входные данные из родительского процесса с помощью pipe. В дочернем процессе принимается три целых числа, затем считается их сумма, после чего результат записывается в файл.

2 Алгоритм решения

Для начала создаётся pipe, с помощью которого будет происходить обмен данными между дочерним и исходным процессами. Затем считывается имя файла из стандартного ввода пользователем, далее это имя передастся в дочерний процесс. Создаётся дочерний процесс с помощью функции fork(). Поток стандартного ввода заменяется на поток вывода из pipe. Теперь дочерний процесс может считывать входные данные из pipe'а. Затем с помощью функции execl() вызывается дочерняя программа sum, в которую передаётся имя файла. В программе divison считываются первое число строки, а затем считается следующее число из строки и счиается их частное. Делаем это пока не наткнёмся на конец строки, или конец файла, или ноль. Если конец строки то записываем результат в файл, если конец файла то записываем результат в файл и заканчиваем работу. Если же 0 то просто заканчиваем работу. При этом родительский процесс получает на вход данные из стандартного ввода и передаёт их через pipe.

3 Исходный код

main.c

```
1  #include "stdio.h"
2  #include "unistd.h"
3  #include "string.h"
4
5  int main(){
6      int fd[2]; // file descriptors [0]-for read, [1]-for write
7      pipe(fd);
8
9      // getting filename from stdin
10     char* filename = NULL;
11     size_t sizename = 0;
12     getline(&filename, &sizename, stdin);
13     filename[strlen(filename) - 1] = '\0';
14
15     pid_t pid = fork(); // new process
16
17     if (pid == -1){ // error in fork
18         printf("Error fork()");
19         return -1;
20     }
21     // child
22     else if (pid == 0){
23         close(fd[1]);
24         dup2(fd[0], 0);
25         execl("./child", "child", filename, (char*) NULL);
```

```
26          }
27          // parent
28          else {
29              close(fd[0]);
30              char ch;
31              while (scanf("%c", &ch) != EOF){
32                  write(fd[1], &ch, sizeof(ch));
33              }
34              close(fd[1]);
35          }
36
37          return 0;
38      }
```

division.c

```
1   #include "stdio.h"
2   #include "string.h"
3
4   int main(int argc, char **argv){
5       if(argc != 2){
6           return -1;
7       }
8       float result;
9       float num;
10      char ch;
11      FILE *file;
12      file = fopen(argv[1], "w");
13      scanf("%f ", &result);
14      while(scanf("%f%c", &num, &ch) != EOF){
15          if(num == 0){
16              fclose(file);
17              return -2;
18          }
19          result /= num;
20          if(ch == '\n'){
21              fprintf(file, "%f\n", result);
22              scanf("%f ", &result);
23          }
24      }
25      fprintf(file, "%f\n", result);
26      fclose(file);
27      return 0;
28  }
```

makefile

```
1   CC = gcc
2   CFLAGS = -c -Wall
3
4   all: parent child
```

3

```
 5
 6  parent: main.o
 7    $(CC) main.o -o parent
 8  parent.o: main.c
 9    $(CC) $(CFLAGS) main.c
10  child: division.o
11    $(CC) division.o -o child
12  division.o: division.c
13    $(CC) $(CFLAGS) division.c
14  clean:
15    rm -r *.o
16    rm -r parent
17    rm -r child
```

4   Запуск программы и демонстрация работы

```
ogrocket@LAPTOP-ADULJM7A:/mnt/d/OS/os_lab2$ ls
division.c  main.c  makefile  test_in
ogrocket@LAPTOP-ADULJM7A:/mnt/d/OS/os_lab2$ pwd
/mnt/d/OS/os_lab2
ogrocket@LAPTOP-ADULJM7A:/mnt/d/OS/os_lab2$ make
gcc -c -Wall    -c -o main.o main.c
gcc main.o -o parent
gcc -c -Wall division.c
gcc division.o -o child
ogrocket@LAPTOP-ADULJM7A:/mnt/d/OS/os_lab2$ strace -f -e trace="read,write,dup2,pipe"
-o log1 ./parent <test_in
ogrocket@LAPTOP-ADULJM7A:/mnt/d/OS/os_lab2$ strace -f -e trace="read,write,dup2,pipe"
-o log2 ./parent <test_in
ogrocket@LAPTOP-ADULJM7A:/mnt/d/OS/os_lab2$ cat test1
-0.040650
0.015627
0.000000
0.000900
-0.448994
-1234.000000
0.001715
-0.000000
-0.875986
0.000014
0.004251
ogrocket@LAPTOP-ADULJM7A:/mnt/d/OS/os_lab2$ cat log1
```

```
808    read(3,"77ELF>60q"...,832) = 832
808    pipe([3,4])                    = 0
808    read(0,"test11.2 2.4 3 -4.14 5 6 12 32"...,4096) = 197
808    write(4,"1",1)                 = 1
809    dup2(3,0 <unfinished ...>
808    write(4,".",1 <unfinished ...>
809    <... dup2 resumed>)            = 0
808    <... write resumed>)           = 1
808    write(4,"2",1)                 = 1
808    write(4," ",1)                 = 1
808    write(4,"2",1)                 = 1
808    write(4,".",1)                 = 1
808    write(4,"4",1)                 = 1
808    write(4," ",1)                 = 1
808    write(4,"3",1)                 = 1
808    write(4," ",1)                 = 1
808    write(4,"-",1)                 = 1
808    write(4,"4",1)                 = 1
808    write(4,".",1)                 = 1
808    write(4,"1",1)                 = 1
808    write(4,"",1)              = 1
808    write(4,"4",1)                 = 1
808    write(4," ",1)                 = 1
808    write(4,"5",1)                 = 1
808    write(4," ",1)                 = 1
808    write(4,"6",1)                 = 1
808    write(4," ",1)                 = 1
808    write(4,"1",1 <unfinished ...>
809    read(4, <unfinished ...>
808    <... write resumed>)           = 1
809    <... read resumed>"77ELF>60q"...,832) = 832
808    write(4,"2",1)                 = 1
808    write(4," ",1)                 = 1
808    write(4,"3",1)                 = 1
808    write(4,"2",1)                 = 1
808    write(4," ",1)                 = 1
808    write(4,"0",1)                 = 1
808    write(4,".",1)                 = 1
808    write(4,"1",1)                 = 1
808    write(4,"1",1)                 = 1
808    write(4,"1",1)                 = 1
```

```
808   write(4,"1",1)                    = 1
808   write(4," ",1)                    = 1
808   write(4,"0",1)                    = 1
808   write(4,".",1)                    = 1
808   write(4,"2",1)                    = 1
808   write(4,"",1)                  = 1
808   write(4,"0",1)                    = 1
808   write(4," ",1)                    = 1
808   write(4,"1",1)                    = 1
808   write(4," ",1)                    = 1
808   write(4,"1",1)                    = 1
808   write(4,"2",1)                    = 1
808   write(4," ",1)                    = 1
808   write(4,"1",1)                    = 1
808   write(4,"4",1)                    = 1
808   write(4,"",1)                  = 1
808   write(4,"1",1)                    = 1
808   write(4,"1",1)                    = 1
808   write(4,"1",1)                    = 1
808   write(4," ",1)                    = 1
808   write(4,"1",1)                    = 1
808   write(4,"1",1)                    = 1
808   write(4,"1",1 <unfinished ...>
809   read(0, <unfinished ...>
808   <... write resumed>)              = 1
809   <... read resumed>"1.2 2.4 3 -4.14 5 6 12 32 0.111"...,4096) = 55
808   write(4," ",1)                    = 1
808   write(4,"1",1)                    = 1
808   write(4,"1",1)                    = 1
809   read(0, <unfinished ...>
808   write(4,"1",1 <unfinished ...>
809   <... read resumed>" 11",4096)     = 3
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,".",1 <unfinished ...>
809   <... read resumed>"1",4096)       = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,"1",1 <unfinished ...>
809   <... read resumed>".",4096)       = 1
808   <... write resumed>)              = 1
```

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```
809   read(0, <unfinished ...>
808   write(4,"1",1 <unfinished ...>
809   <... read resumed>"1",4096)        = 1
808   <... write resumed>)               = 1
809   read(0, <unfinished ...>
808   write(4,"1",1 <unfinished ...>
809   <... read resumed>"1",4096)        = 1
808   <... write resumed>)               = 1
809   read(0, <unfinished ...>
808   write(4," ",1 <unfinished ...>
809   <... read resumed>"1",4096)        = 1
808   <... write resumed>)               = 1
809   read(0, <unfinished ...>
808   write(4,"1",1 <unfinished ...>
809   <... read resumed>" ",4096)        = 1
808   <... write resumed>)               = 1
809   read(0, <unfinished ...>
808   write(4,"0",1 <unfinished ...>
809   <... read resumed>"1",4096)        = 1
808   <... write resumed>)               = 1
809   read(0, <unfinished ...>
808   write(4,"",1 <unfinished ...>
809   <... read resumed>"0",4096)        = 1
808   <... write resumed>)               = 1
809   read(0, <unfinished ...>
808   write(4,"-",1 <unfinished ...>
809   <... read resumed>"",4096)      = 1
808   <... write resumed>)               = 1
809   read(0, <unfinished ...>
808   write(4,"7",1 <unfinished ...>
809   <... read resumed>"-",4096)        = 1
808   <... write resumed>)               = 1
809   read(0, <unfinished ...>
808   write(4," ",1 <unfinished ...>
809   <... read resumed>"7",4096)        = 1
808   <... write resumed>)               = 1
809   read(0, <unfinished ...>
808   write(4,"8",1 <unfinished ...>
809   <... read resumed>" ",4096)        = 1
808   <... write resumed>)               = 1
809   read(0, <unfinished ...>
```

```
808    write(4,".",1 <unfinished ...>
809    <... read resumed>"8",4096)       = 1
808    <... write resumed>)                 = 1
809    read(0, <unfinished ...>
808    write(4,"1",1 <unfinished ...>
809    <... read resumed>".",4096)       = 1
808    <... write resumed>)                 = 1
809    read(0, <unfinished ...>
808    write(4,"2",1 <unfinished ...>
809    <... read resumed>"1",4096)       = 1
808    <... write resumed>)                 = 1
809    read(0, <unfinished ...>
808    write(4," ",1 <unfinished ...>
809    <... read resumed>"2",4096)       = 1
808    <... write resumed>)                 = 1
809    read(0, <unfinished ...>
808    write(4,"8",1 <unfinished ...>
809    <... read resumed>" ",4096)       = 1
808    <... write resumed>)                 = 1
809    read(0, <unfinished ...>
808    write(4," ",1 <unfinished ...>
809    <... read resumed>"8",4096)       = 1
808    <... write resumed>)                 = 1
809    read(0, <unfinished ...>
808    write(4,"1",1 <unfinished ...>
809    <... read resumed>" ",4096)       = 1
808    <... write resumed>)                 = 1
809    read(0, <unfinished ...>
808    write(4,"0",1 <unfinished ...>
809    <... read resumed>"1",4096)       = 1
808    <... write resumed>)                 = 1
809    read(0, <unfinished ...>
808    write(4," ",1 <unfinished ...>
809    <... read resumed>"0",4096)       = 1
808    <... write resumed>)                 = 1
809    read(0, <unfinished ...>
808    write(4,"0",1 <unfinished ...>
809    <... read resumed>" ",4096)       = 1
808    <... write resumed>)                 = 1
809    read(0, <unfinished ...>
808    write(4,".",1 <unfinished ...>
```

```
809   <... read resumed>"0",4096)        = 1
808   <... write resumed>)                = 1
809   read(0, <unfinished ...>
808   write(4,"1",1 <unfinished ...>
809   <... read resumed>".",4096)        = 1
808   <... write resumed>)                = 1
809   read(0, <unfinished ...>
808   write(4," ",1 <unfinished ...>
809   <... read resumed>"1",4096)        = 1
808   <... write resumed>)                = 1
809   read(0, <unfinished ...>
808   write(4,"0",1 <unfinished ...>
809   <... read resumed>" ",4096)        = 1
808   <... write resumed>)                = 1
809   read(0, <unfinished ...>
808   write(4,".",1 <unfinished ...>
809   <... read resumed>"0",4096)        = 1
808   <... write resumed>)                = 1
809   read(0, <unfinished ...>
808   write(4,"2",1 <unfinished ...>
809   <... read resumed>".",4096)        = 1
808   <... write resumed>)                = 1
809   read(0, <unfinished ...>
808   write(4," ",1 <unfinished ...>
809   <... read resumed>"2",4096)        = 1
808   <... write resumed>)                = 1
809   read(0, <unfinished ...>
808   write(4,"1",1 <unfinished ...>
809   <... read resumed>" ",4096)        = 1
808   <... write resumed>)                = 1
809   read(0, <unfinished ...>
808   write(4,".",1 <unfinished ...>
809   <... read resumed>"1",4096)        = 1
808   <... write resumed>)                = 1
809   read(0, <unfinished ...>
808   write(4,"2",1 <unfinished ...>
809   <... read resumed>".",4096)        = 1
808   <... write resumed>)                = 1
809   read(0, <unfinished ...>
808   write(4,"",1 <unfinished ...>
809   <... read resumed>"2",4096)        = 1
```

9

```
808   <... write resumed>)                = 1
809   read(0, <unfinished ...>
808   write(4,"1",1 <unfinished ...>
809   <... read resumed>"",4096)     = 1
808   <... write resumed>)                = 1
809   read(0, <unfinished ...>
808   write(4,"2",1 <unfinished ...>
809   <... read resumed>"1",4096)     = 1
808   <... write resumed>)                = 1
809   read(0, <unfinished ...>
808   write(4,"3",1 <unfinished ...>
809   <... read resumed>"2",4096)     = 1
808   <... write resumed>)                = 1
809   read(0, <unfinished ...>
808   write(4,"4",1 <unfinished ...>
809   <... read resumed>"3",4096)     = 1
808   <... write resumed>)                = 1
809   read(0, <unfinished ...>
808   write(4," ",1 <unfinished ...>
809   <... read resumed>"4",4096)     = 1
808   <... write resumed>)                = 1
809   read(0, <unfinished ...>
808   write(4,"1",1 <unfinished ...>
809   <... read resumed>" ",4096)     = 1
808   <... write resumed>)                = 1
809   read(0, <unfinished ...>
808   write(4," ",1 <unfinished ...>
809   <... read resumed>"1",4096)     = 1
808   <... write resumed>)                = 1
809   read(0, <unfinished ...>
808   write(4,"-",1 <unfinished ...>
809   <... read resumed>" ",4096)     = 1
808   <... write resumed>)                = 1
809   read(0, <unfinished ...>
808   write(4,"1",1 <unfinished ...>
809   <... read resumed>"-",4096)     = 1
808   <... write resumed>)                = 1
809   read(0, <unfinished ...>
808   write(4," ",1 <unfinished ...>
809   <... read resumed>"1",4096)     = 1
808   <... write resumed>)                = 1
```

```
809    read(0, <unfinished ...>
808    write(4,"1",1 <unfinished ...>
809    <... read resumed>" ",4096)        = 1
808    <... write resumed>)                = 1
809    read(0, <unfinished ...>
808    write(4,"0",1 <unfinished ...>
809    <... read resumed>"1",4096)         = 1
808    <... write resumed>)                = 1
809    read(0, <unfinished ...>
808    write(4," ",1 <unfinished ...>
809    <... read resumed>"0",4096)         = 1
808    <... write resumed>)                = 1
809    read(0, <unfinished ...>
808    write(4,"0",1 <unfinished ...>
809    <... read resumed>" ",4096)         = 1
808    <... write resumed>)                = 1
809    read(0, <unfinished ...>
808    write(4,".",1 <unfinished ...>
809    <... read resumed>"0",4096)         = 1
808    <... write resumed>)                = 1
809    read(0, <unfinished ...>
808    write(4,"1",1 <unfinished ...>
809    <... read resumed>".",4096)         = 1
808    <... write resumed>)                = 1
809    read(0, <unfinished ...>
808    write(4,"",1 <unfinished ...>
809    <... read resumed>"1",4096)         = 1
808    <... write resumed>)                = 1
809    read(0, <unfinished ...>
808    write(4,"3",1 <unfinished ...>
809    <... read resumed>"",4096)      = 1
808    <... write resumed>)                = 1
809    read(0, <unfinished ...>
808    write(4,"9",1 <unfinished ...>
809    <... read resumed>"3",4096)         = 1
808    <... write resumed>)                = 1
809    read(0, <unfinished ...>
808    write(4,"1",1 <unfinished ...>
809    <... read resumed>"9",4096)         = 1
808    <... write resumed>)                = 1
809    read(0, <unfinished ...>
```

```
808   write(4,"2",1 <unfinished ...>
809   <... read resumed>"1",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,"9",1 <unfinished ...>
809   <... read resumed>"2",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,"3",1 <unfinished ...>
809   <... read resumed>"9",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4," ",1 <unfinished ...>
809   <... read resumed>"3",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,"3",1 <unfinished ...>
809   <... read resumed>" ",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,"9",1 <unfinished ...>
809   <... read resumed>"3",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,"1",1 <unfinished ...>
809   <... read resumed>"9",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,"2",1 <unfinished ...>
809   <... read resumed>"1",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,"3",1 <unfinished ...>
809   <... read resumed>"2",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4," ",1 <unfinished ...>
809   <... read resumed>"3",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,"5",1 <unfinished ...>
```

```
809   <... read resumed>" ",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,"8",1 <unfinished ...>
809   <... read resumed>"5",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,"3",1 <unfinished ...>
809   <... read resumed>"8",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,"2",1 <unfinished ...>
809   <... read resumed>"3",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,"",1 <unfinished ...>
809   <... read resumed>"2",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,"8",1 <unfinished ...>
809   <... read resumed>"",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,"4",1 <unfinished ...>
809   <... read resumed>"8",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,"1",1 <unfinished ...>
809   <... read resumed>"4",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,"2",1 <unfinished ...>
809   <... read resumed>"1",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4," ",1 <unfinished ...>
809   <... read resumed>"2",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,"9",1 <unfinished ...>
809   <... read resumed>" ",4096)      = 1
```

13

```
808    <... write resumed>)              = 1
809    read(0, <unfinished ...>
808    write(4,"9",1 <unfinished ...>
809    <... read resumed>"9",4096)      = 1
808    <... write resumed>)              = 1
809    read(0, <unfinished ...>
808    write(4,"9",1 <unfinished ...>
809    <... read resumed>"9",4096)      = 1
808    <... write resumed>)              = 1
809    read(0, <unfinished ...>
808    write(4," ",1 <unfinished ...>
809    <... read resumed>"9",4096)      = 1
808    <... write resumed>)              = 1
809    read(0, <unfinished ...>
808    write(4,"-",1 <unfinished ...>
809    <... read resumed>" ",4096)      = 1
808    <... write resumed>)              = 1
809    read(0, <unfinished ...>
808    write(4,"3",1 <unfinished ...>
809    <... read resumed>"-",4096)      = 1
808    <... write resumed>)              = 1
809    read(0, <unfinished ...>
808    write(4,"9",1 <unfinished ...>
809    <... read resumed>"3",4096)      = 1
808    <... write resumed>)              = 1
809    read(0, <unfinished ...>
808    write(4,"1",1 <unfinished ...>
809    <... read resumed>"9",4096)      = 1
808    <... write resumed>)              = 1
809    read(0, <unfinished ...>
808    write(4,"3",1 <unfinished ...>
809    <... read resumed>"1",4096)      = 1
808    <... write resumed>)              = 1
809    read(0, <unfinished ...>
808    write(4,"9",1 <unfinished ...>
809    <... read resumed>"3",4096)      = 1
808    <... write resumed>)              = 1
809    read(0, <unfinished ...>
808    write(4,"1",1 <unfinished ...>
809    <... read resumed>"9",4096)      = 1
808    <... write resumed>)              = 1
```

```
809   read(0, <unfinished ...>
808   write(4,"2",1 <unfinished ...>
809   <... read resumed>"1",4096)        = 1
808   <... write resumed>)               = 1
809   read(0, <unfinished ...>
808   write(4,"3",1 <unfinished ...>
809   <... read resumed>"2",4096)        = 1
808   <... write resumed>)               = 1
809   read(0, <unfinished ...>
808   write(4,"",1 <unfinished ...>
809   <... read resumed>"3",4096)        = 1
808   <... write resumed>)               = 1
809   read(0, <unfinished ...>
808   write(4,"7",1 <unfinished ...>
809   <... read resumed>"",4096)      = 1
808   <... write resumed>)               = 1
809   read(0, <unfinished ...>
808   write(4,"7",1 <unfinished ...>
809   <... read resumed>"7",4096)        = 1
808   <... write resumed>)               = 1
809   read(0, <unfinished ...>
808   write(4,"7",1 <unfinished ...>
809   <... read resumed>"7",4096)        = 1
808   <... write resumed>)               = 1
809   read(0, <unfinished ...>
808   write(4," ",1 <unfinished ...>
809   <... read resumed>"7",4096)        = 1
808   <... write resumed>)               = 1
809   read(0, <unfinished ...>
808   write(4,"-",1 <unfinished ...>
809   <... read resumed>" ",4096)        = 1
808   <... write resumed>)               = 1
809   read(0, <unfinished ...>
808   write(4,"8",1 <unfinished ...>
809   <... read resumed>"-",4096)        = 1
808   <... write resumed>)               = 1
809   read(0, <unfinished ...>
808   write(4,"8",1 <unfinished ...>
809   <... read resumed>"8",4096)        = 1
808   <... write resumed>)               = 1
809   read(0, <unfinished ...>
```

```
808   write(4,"7",1 <unfinished ...>
809   <... read resumed>"8",4096)      = 1
808   <... write resumed>)                 = 1
809   read(0, <unfinished ...>
808   write(4,"",1 <unfinished ...>
809   <... read resumed>"7",4096)      = 1
808   <... write resumed>)                 = 1
809   read(0, <unfinished ...>
808   write(4,"1",1 <unfinished ...>
809   <... read resumed>"",4096)     = 1
808   <... write resumed>)                 = 1
809   read(0, <unfinished ...>
808   write(4,"2",1 <unfinished ...>
809   <... read resumed>"1",4096)      = 1
808   <... write resumed>)                 = 1
809   read(0, <unfinished ...>
808   write(4," ",1 <unfinished ...>
809   <... read resumed>"2",4096)      = 1
808   <... write resumed>)                 = 1
809   read(0, <unfinished ...>
808   write(4,"9",1 <unfinished ...>
809   <... read resumed>" ",4096)      = 1
808   <... write resumed>)                 = 1
809   read(0, <unfinished ...>
808   write(4,"0",1 <unfinished ...>
809   <... read resumed>"9",4096)      = 1
808   <... write resumed>)                 = 1
809   read(0, <unfinished ...>
808   write(4," ",1 <unfinished ...>
809   <... read resumed>"0",4096)      = 1
808   <... write resumed>)                 = 1
809   read(0, <unfinished ...>
808   write(4,"9",1 <unfinished ...>
809   <... read resumed>" ",4096)      = 1
808   <... write resumed>)                 = 1
809   read(0, <unfinished ...>
808   write(4,"2",1 <unfinished ...>
809   <... read resumed>"9",4096)      = 1
808   <... write resumed>)                 = 1
809   read(0, <unfinished ...>
808   write(4,"1",1 <unfinished ...>
```

```
809   <... read resumed>"2",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,"3",1 <unfinished ...>
809   <... read resumed>"1",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,"",1 <unfinished ...>
809   <... read resumed>"3",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,"3",1 <unfinished ...>
809   <... read resumed>"",4096)     = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,"2",1 <unfinished ...>
809   <... read resumed>"3",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,"1",1 <unfinished ...>
809   <... read resumed>"2",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,"3",1 <unfinished ...>
809   <... read resumed>"1",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4," ",1 <unfinished ...>
809   <... read resumed>"3",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,"3",1 <unfinished ...>
809   <... read resumed>" ",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,"1",1 <unfinished ...>
809   <... read resumed>"3",4096)      = 1
808   <... write resumed>)              = 1
809   read(0, <unfinished ...>
808   write(4,"2",1 <unfinished ...>
809   <... read resumed>"1",4096)      = 1
```

```
808  <... write resumed>)                = 1
809  read(0, <unfinished ...>
808  write(4,"3",1 <unfinished ...>
809  <... read resumed>"2",4096)      = 1
808  <... write resumed>)                = 1
809  read(0, <unfinished ...>
808  write(4," ",1 <unfinished ...>
809  <... read resumed>"3",4096)      = 1
808  <... write resumed>)                = 1
809  read(0, <unfinished ...>
808  write(4,"1",1 <unfinished ...>
809  <... read resumed>" ",4096)      = 1
808  <... write resumed>)                = 1
809  read(0, <unfinished ...>
808  write(4,"1",1 <unfinished ...>
809  <... read resumed>"1",4096)      = 1
808  <... write resumed>)                = 1
809  read(0, <unfinished ...>
808  write(4," ",1 <unfinished ...>
809  <... read resumed>"1",4096)      = 1
808  <... write resumed>)                = 1
809  read(0, <unfinished ...>
808  write(4,"1",1 <unfinished ...>
809  <... read resumed>" ",4096)      = 1
808  <... write resumed>)                = 1
809  read(0, <unfinished ...>
808  write(4,"1",1 <unfinished ...>
809  <... read resumed>"1",4096)      = 1
808  <... write resumed>)                = 1
809  read(0, <unfinished ...>
808  write(4," ",1 <unfinished ...>
809  <... read resumed>"1",4096)      = 1
808  <... write resumed>)                = 1
809  read(0, <unfinished ...>
808  write(4,"1",1 <unfinished ...>
809  <... read resumed>" ",4096)      = 1
808  <... write resumed>)                = 1
809  read(0, <unfinished ...>
808  write(4," ",1 <unfinished ...>
809  <... read resumed>"1",4096)      = 1
808  <... write resumed>)                = 1
```

```
809    read(0, <unfinished ...>
808    write(4,"1",1 <unfinished ...>
809    <... read resumed>" ",4096)        = 1
808    <... write resumed>)                = 1
809    read(0, <unfinished ...>
808    write(4," ",1 <unfinished ...>
809    <... read resumed>"1",4096)         = 1
808    <... write resumed>)                = 1
809    read(0, <unfinished ...>
808    write(4,"1",1 <unfinished ...>
809    <... read resumed>" ",4096)         = 1
808    <... write resumed>)                = 1
809    read(0, <unfinished ...>
808    write(4," ",1 <unfinished ...>
809    <... read resumed>"1",4096)         = 1
808    <... write resumed>)                = 1
809    read(0, <unfinished ...>
808    write(4,"1",1 <unfinished ...>
809    <... read resumed>" ",4096)         = 1
808    <... write resumed>)                = 1
809    read(0, <unfinished ...>
808    write(4," ",1 <unfinished ...>
809    <... read resumed>"1",4096)         = 1
808    <... write resumed>)                = 1
809    read(0, <unfinished ...>
808    write(4,"2",1 <unfinished ...>
809    <... read resumed>" ",4096)         = 1
808    <... write resumed>)                = 1
809    read(0, <unfinished ...>
808    read(0, <unfinished ...>
809    <... read resumed>"2",4096)         = 1
808    <... read resumed>"",4096)          = 0
809    read(0,"",4096)                     = 0
809    write(4,"-0.0406500.0156270.0000000.00"...,107) = 107
808    +++ exited with 0 +++
809    +++ exited with 0 +++

ogrocket@LAPTOP-ADULJM7A:/mnt/d/OS/os_lab2$ cat test2
-0.040650
0.015627
0.000000
```

```
0.000900
-0.448994
-1234.000000

ogrocket@LAPTOP-ADULJM7A:/mnt/d/OS/os_lab2$ cat log2
813   read(3,"77ELF>60q"...,832) = 832
813   pipe([3,4])                        = 0
813   read(0,"test21.2 2.4 3 -4.14 5 6 12 32"...,4096) = 199
813   write(4,"1",1 <unfinished ...>
814   dup2(3,0 <unfinished ...>
813   <... write resumed>)          = 1
814   <... dup2 resumed>)           = 0
813   write(4,".",1)                = 1
813   write(4,"2",1)                = 1
813   write(4," ",1)                = 1
813   write(4,"2",1)                = 1
813   write(4,".",1)                = 1
813   write(4,"4",1)                = 1
813   write(4," ",1)                = 1
813   write(4,"3",1)                = 1
813   write(4," ",1)                = 1
813   write(4,"-",1)                = 1
813   write(4,"4",1)                = 1
813   write(4,".",1)                = 1
813   write(4,"1",1)                = 1
813   write(4,"",1)                 = 1
814   read(4, <unfinished ...>
813   write(4,"4",1)                = 1
813   write(4," ",1 <unfinished ...>
814   <... read resumed>"77ELF>60q"...,832) = 832
813   <... write resumed>)          = 1
813   write(4,"5",1)                = 1
813   write(4," ",1)                = 1
813   write(4,"6",1)                = 1
813   write(4," ",1)                = 1
813   write(4,"1",1)                = 1
813   write(4,"2",1)                = 1
813   write(4," ",1)                = 1
813   write(4,"3",1)                = 1
813   write(4,"2",1)                = 1
813   write(4," ",1)                = 1
```

```
813   write(4,"0",1)                      = 1
813   write(4,".",1)                      = 1
813   write(4,"1",1)                      = 1
813   write(4,"1",1)                      = 1
813   write(4,"1",1)                      = 1
813   write(4,"1",1)                      = 1
813   write(4," ",1)                      = 1
813   write(4,"0",1)                      = 1
813   write(4,".",1)                      = 1
813   write(4,"2",1)                      = 1
813   write(4,"",1)                    = 1
813   write(4,"0",1)                      = 1
813   write(4," ",1)                      = 1
813   write(4,"1",1)                      = 1
813   write(4," ",1)                      = 1
813   write(4,"1",1)                      = 1
813   write(4,"2",1)                      = 1
813   write(4," ",1)                      = 1
813   write(4,"1",1)                      = 1
813   write(4,"4",1)                      = 1
813   write(4,"",1)                  = 1
813   write(4,"1",1)                      = 1
813   write(4,"1",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>"1.2 2.4 3 -4.14 5 6 12 32 0.111"...,4096) = 50
813   write(4,"1",1)                    = 1
813   write(4," ",1)                    = 1
813   write(4,"1",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>"1 1",4096)     = 3
813   write(4,"1",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>"1",4096)       = 1
813   write(4,"1",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>"1",4096)       = 1
813   write(4," ",1 <unfinished ...>
```

```
814    read(0, <unfinished ...>
813    <... write resumed>)              = 1
814    <... read resumed>" ",4096)       = 1
813    write(4,"1",1 <unfinished ...>
814    read(0, <unfinished ...>
813    <... write resumed>)              = 1
814    <... read resumed>"1",4096)       = 1
813    write(4,"1",1 <unfinished ...>
814    read(0, <unfinished ...>
813    <... write resumed>)              = 1
814    <... read resumed>"1",4096)       = 1
813    write(4,"1",1 <unfinished ...>
814    read(0, <unfinished ...>
813    <... write resumed>)              = 1
814    <... read resumed>"1",4096)       = 1
813    write(4,".",1 <unfinished ...>
814    read(0, <unfinished ...>
813    <... write resumed>)              = 1
814    <... read resumed>".",4096)       = 1
813    write(4,"1",1 <unfinished ...>
814    read(0, <unfinished ...>
813    <... write resumed>)              = 1
814    <... read resumed>"1",4096)       = 1
813    write(4,"1",1 <unfinished ...>
814    read(0, <unfinished ...>
813    <... write resumed>)              = 1
814    <... read resumed>"1",4096)       = 1
813    write(4,"1",1 <unfinished ...>
814    read(0, <unfinished ...>
813    <... write resumed>)              = 1
814    <... read resumed>"1",4096)       = 1
813    write(4," ",1 <unfinished ...>
814    read(0, <unfinished ...>
813    <... write resumed>)              = 1
814    <... read resumed>" ",4096)       = 1
813    write(4,"1",1 <unfinished ...>
814    read(0, <unfinished ...>
813    <... write resumed>)              = 1
814    <... read resumed>"1",4096)       = 1
813    write(4,"0",1 <unfinished ...>
814    read(0, <unfinished ...>
```

```
813   <... write resumed>)                = 1
814   <... read resumed>"0",4096)      = 1
813   write(4,"",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>"",4096)     = 1
813   write(4,"-",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>"-",4096)      = 1
813   write(4,"7",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>"7",4096)      = 1
813   write(4," ",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>" ",4096)      = 1
813   write(4,"8",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>"8",4096)      = 1
813   write(4,".",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>".",4096)      = 1
813   write(4,"1",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>"1",4096)      = 1
813   write(4,"2",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>"2",4096)      = 1
813   write(4," ",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>" ",4096)      = 1
813   write(4,"8",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
```

```
814   <... read resumed>"8",4096)        = 1
813   write(4," ",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>" ",4096)        = 1
813   write(4,"1",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>"1",4096)        = 1
813   write(4,"0",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>"0",4096)        = 1
813   write(4," ",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>" ",4096)        = 1
813   write(4,"0",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>"0",4096)        = 1
813   write(4,".",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>".",4096)        = 1
813   write(4,"1",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>"1",4096)        = 1
813   write(4," ",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>" ",4096)        = 1
813   write(4,"0",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>"0",4096)        = 1
813   write(4,".",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>".",4096)        = 1
```

```
813   write(4,"2",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)              = 1
814   <... read resumed>"2",4096)      = 1
813   write(4," ",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)              = 1
814   <... read resumed>" ",4096)      = 1
813   write(4,"1",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)              = 1
814   <... read resumed>"1",4096)      = 1
813   write(4,".",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)              = 1
814   <... read resumed>".",4096)      = 1
813   write(4,"2",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)              = 1
814   <... read resumed>"2",4096)      = 1
813   write(4,"",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)              = 1
814   <... read resumed>"",4096)      = 1
813   write(4,"1",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)              = 1
814   <... read resumed>"1",4096)      = 1
813   write(4,"2",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)              = 1
814   <... read resumed>"2",4096)      = 1
813   write(4,"3",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)              = 1
814   <... read resumed>"3",4096)      = 1
813   write(4,"4",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)              = 1
814   <... read resumed>"4",4096)      = 1
813   write(4," ",1 <unfinished ...>
```

```
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>" ",4096)      = 1
813   write(4,"1",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>"1",4096)      = 1
813   write(4," ",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>" ",4096)      = 1
813   write(4,"-",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>"-",4096)      = 1
813   write(4,"1",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>"1",4096)      = 1
813   write(4," ",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>" ",4096)      = 1
813   write(4,"1",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>"1",4096)      = 1
813   write(4,"0",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>"0",4096)      = 1
813   write(4," ",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>" ",4096)      = 1
813   write(4,"0",1 <unfinished ...>
814   read(0, <unfinished ...>
813   <... write resumed>)                = 1
814   <... read resumed>"0",4096)      = 1
813   write(4,".",1 <unfinished ...>
814   read(0, <unfinished ...>
```

```
813  <... write resumed>)              = 1
814  <... read resumed>".",4096)     = 1
813  write(4,"1",1 <unfinished ...>
814  read(0, <unfinished ...>
813  <... write resumed>)              = 1
814  <... read resumed>"1",4096)     = 1
813  write(4,"",1 <unfinished ...>
814  read(0, <unfinished ...>
813  <... write resumed>)              = 1
814  <... read resumed>"",4096)    = 1
813  write(4,"3",1 <unfinished ...>
814  read(0, <unfinished ...>
813  <... write resumed>)              = 1
814  <... read resumed>"3",4096)     = 1
813  write(4,"9",1 <unfinished ...>
814  read(0, <unfinished ...>
813  <... write resumed>)              = 1
814  <... read resumed>"9",4096)     = 1
813  write(4,"1",1 <unfinished ...>
814  read(0, <unfinished ...>
813  <... write resumed>)              = 1
814  <... read resumed>"1",4096)     = 1
813  write(4,"2",1 <unfinished ...>
814  read(0, <unfinished ...>
813  <... write resumed>)              = 1
814  <... read resumed>"2",4096)     = 1
813  write(4,"9",1 <unfinished ...>
814  read(0, <unfinished ...>
813  <... write resumed>)              = 1
814  <... read resumed>"9",4096)     = 1
813  write(4,"3",1 <unfinished ...>
814  read(0, <unfinished ...>
813  <... write resumed>)              = 1
814  <... read resumed>"3",4096)     = 1
813  write(4," ",1 <unfinished ...>
814  read(0, <unfinished ...>
813  <... write resumed>)              = 1
814  <... read resumed>" ",4096)     = 1
813  write(4,"3",1 <unfinished ...>
814  read(0, <unfinished ...>
813  <... write resumed>)              = 1
```

```
814    <... read resumed>"3",4096)        = 1
813    write(4,"9",1 <unfinished ...>
814    read(0, <unfinished ...>
813    <... write resumed>)               = 1
814    <... read resumed>"9",4096)        = 1
813    write(4,"1",1 <unfinished ...>
814    read(0, <unfinished ...>
813    <... write resumed>)               = 1
814    <... read resumed>"1",4096)        = 1
813    write(4,"2",1 <unfinished ...>
814    read(0, <unfinished ...>
813    <... write resumed>)               = 1
814    <... read resumed>"2",4096)        = 1
813    write(4,"3",1 <unfinished ...>
814    read(0, <unfinished ...>
813    <... write resumed>)               = 1
814    <... read resumed>"3",4096)        = 1
813    write(4," ",1 <unfinished ...>
814    read(0, <unfinished ...>
813    <... write resumed>)               = 1
814    <... read resumed>" ",4096)        = 1
813    write(4,"0",1 <unfinished ...>
814    read(0, <unfinished ...>
813    <... write resumed>)               = 1
814    <... read resumed>"0",4096)        = 1
813    write(4," ",1 <unfinished ...>
814    read(0, <unfinished ...>
813    <... write resumed>)               = 1
814    <... read resumed>" ",4096)        = 1
813    write(4,"5",1 <unfinished ...>
814    write(4,"-0.0406500.0156270.0000000.00"...,60 <unfinished ...>
813    <... write resumed>)               = 1
813    write(4,"8",1 <unfinished ...>
814    <... write resumed>)               = 60
813    <... write resumed>)               = 1
813    write(4,"3",1)                     = 1
813    write(4,"2",1)                     = 1
813    write(4,"",1)                      = 1
813    write(4,"8",1)                     = 1
813    write(4,"4",1)                     = 1
813    write(4,"1",1)                     = 1
```

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```
813    write(4,"2",1)                          = 1
813    write(4," ",1)                          = 1
813    write(4,"9",1)                          = 1
813    write(4,"9",1)                          = 1
813    write(4,"9",1)                          = 1
813    write(4," ",1)                          = 1
813    write(4,"-",1)                          = 1
813    write(4,"3",1)                          = 1
813    write(4,"9",1)                          = 1
813    write(4,"1",1)                          = 1
813    write(4,"3",1)                          = 1
813    write(4,"9",1)                          = 1
813    write(4,"1",1)                          = 1
813    write(4,"2",1)                          = 1
813    write(4,"3",1)                          = 1
813    write(4,"",1)                       = 1
813    write(4,"7",1)                          = 1
813    write(4,"7",1)                          = 1
813    write(4,"7",1)                          = 1
813    write(4," ",1)                          = 1
813    write(4,"-",1)                          = 1
813    write(4,"8",1)                          = 1
813    write(4,"8",1)                          = 1
813    write(4,"7",1)                          = 1
813    write(4,"",1)                       = 1
813    write(4,"1",1)                          = 1
813    write(4,"2",1)                          = 1
813    write(4," ",1)                          = 1
813    write(4,"9",1)                          = 1
813    write(4,"0",1)                          = 1
813    write(4," ",1)                          = 1
813    write(4,"9",1)                          = 1
813    write(4,"2",1)                          = 1
813    write(4,"1",1)                          = 1
813    write(4,"3",1)                          = 1
813    write(4,"",1)                       = 1
813    write(4,"3",1)                          = 1
813    write(4,"2",1)                          = 1
813    write(4,"1",1)                          = 1
813    write(4,"3",1)                          = 1
813    write(4," ",1)                          = 1
```

```
813   write(4,"3",1)                = 1
813   write(4,"1",1)                = 1
813   write(4,"2",1)                = 1
813   write(4,"3",1)                = 1
813   write(4," ",1)                = 1
813   write(4,"1",1)                = 1
813   write(4,"1",1)                = 1
813   write(4," ",1)                = 1
813   write(4,"1",1)                = 1
813   write(4,"1",1)                = 1
813   write(4," ",1)                = 1
813   write(4,"1",1)                = 1
813   write(4," ",1)                = 1
813   write(4,"1",1)                = 1
813   write(4," ",1)                = 1
813   write(4,"1",1)                = 1
813   write(4," ",1)                = 1
813   write(4,"1",1)                = 1
813   write(4," ",1)                = 1
813   write(4,"2",1)                = 1
813   read(0,"",4096)               = 0
813   +++ exited with 0 +++
814   +++ exited with 254 +++
```

5 Выводы

Выполнив данную лабораторную работу я познакомился с управлением процессами в операционной системе. Хотя в большинстве слушаев ОС работает с процессами автоматически, бывают случаи когда необходимо управлять этим процессом в ручную.

При подключении библиотеки unistd (для Unix-подобных ОС) язык Си обладает возможностью совершать системные вызовы, связанные с вводом или выводом данных, управлением файлами и каталогами, управлением процессами.

Это позволяет создавать дочерние процессы в ходе выполнения программы, который будет продолжать выполнение текущей программы одновременно с исходным процессом. Обеспечить связь родительского и дочернего процессов можно с помощью такого инструмента как pipe.