

# **answer to labrotary work 10**

**Discipline: Computer Architecture**

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# **1 Work Goal**

Acquiring skills in writing programs for working with files.

## **2 Assignment**

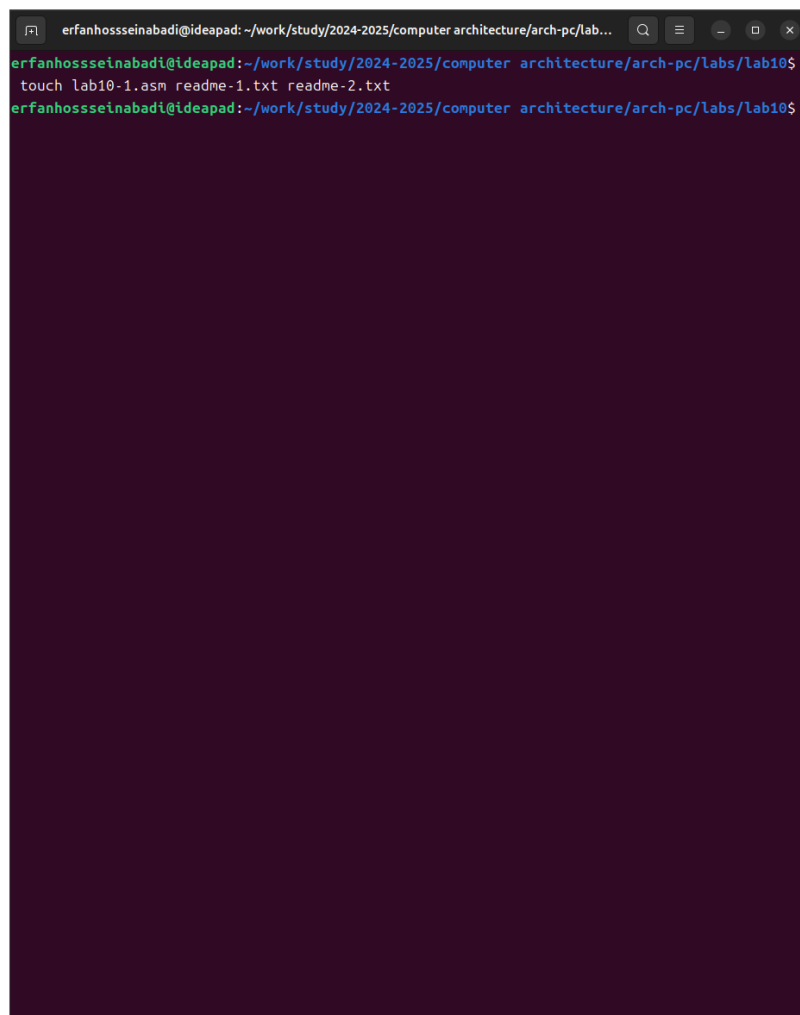
1. Creating files in programs.
2. Changing file permissions for different user groups.
3. Completing independent assignments based on the materials of the laboratory work.

## **3 Theoretical Introduction**

The GNU/Linux OS is a multi-user operating system. To protect the data of one user from the actions of other users, special mechanisms for access control to files exist. Besides access restriction, this mechanism allows other users access to data for collaborative work.

## 4 Performing the Laboratory Work

I create a directory for the programs of laboratory work No. 10 (Fig. -fig. 4.1).

A terminal window with a dark purple background. The title bar shows the user 'erfanhosseinabadi@ideapad' and the current directory path. The terminal shows the user at a shell prompt in the directory '/work/study/2024-2025/computer architecture/arch-pc/labs/lab10'. The user enters the command 'touch lab10-1.asm readme-1.txt readme-2.txt' to create three files. The prompt returns, indicating the command was successful.

```
erfanhosseinabadi@ideapad: ~/work/study/2024-2025/computer architecture/arch-pc/lab...  
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$  
touch lab10-1.asm readme-1.txt readme-2.txt  
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$
```

Fig. 4.1: Creating a working directory

I enter the program from the first listing into the created file (Fig. -fig. 4.2).



```
~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10/lab10-1.asm - Mousepad
File Edit Search View Document Help
%include 'in_out.asm'

SECTION .data
filename db 'readme-1.txt', 0h
msg db 'enter a string to write in the file: ', 0h

SECTION .bss
contents resb 255

SECTION .text
global _start
_start:
mov eax, msg
call sprint
mov ecx, contents
mov edx, 255
call sread

mov eax, 2
mov ebx, filename
mov ecx, 5
int 80h

mov esi, eax
mov eax, contents
call slen

mov edx, eax
mov ecx, contents
mov ebx, esi
mov eax, 4
int 80h

mov ebx, esi
mov eax, 6
int 80h

call quit
```

Fig. 4.2: Program of the first listing

I run the program; it prompts for a string input, after which it creates a text file with the string entered by the user (Fig. -fig. 4.3).

```
erfanhosseinabadi@ideapad: ~/work/study/2024-2025/computer architecture/arch-pc/lab...
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$
mousepad lab10-1.asm

(mousepad:17381): GLib-CRITICAL **: 19:24:56.015: g_strjoinv: assertion 'str_array != NULL'
failed

(mousepad:17381): GLib-CRITICAL **: 19:24:56.015: g_strjoinv: assertion 'str_array != NULL'
failed
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$
nasm -f elf -g -l lab10-1.lst lab10-1.asm
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$
ld -m elf_i386 -o lab10-1 lab10-1.o
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$
./lab10-1
enter a string to write in the file: erfan
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$
ls -l
total 52
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 3773 Nov 12 22:00 in_out.asm
-rwxrwxr-x 1 erfanhosseinabadi erfanhosseinabadi 9768 Dec 13 19:25 lab10-1
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 786 Dec 13 19:25 lab10-1.asm
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 13020 Dec 13 19:25 lab10-1.lst
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 2576 Dec 13 19:25 lab10-1.o
drwxrwxr-x 3 erfanhosseinabadi erfanhosseinabadi 4096 Nov 12 22:00 presentation
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 6 Dec 13 19:25 readme-1.txt
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 0 Dec 13 19:14 readme-2.txt
drwxrwxr-x 5 erfanhosseinabadi erfanhosseinabadi 4096 Nov 12 22:00 report
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$
cat readme-1.txt
erfan
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$
```

Fig. 4.3: Running the program of the first listing

I change the owner's permissions, prohibiting the execution of the file, after which the system refuses to execute the file because I, the owner, have prohibited myself from executing the program (Fig. -fig. 4.4).

```
erfanhosseinabadi@ideapad: ~/work/study/2024-2025/computer architecture/arch-pc/labs...
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$
ls -l
total 52
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 3773 Nov 12 22:00 in_out.asm
-rwxrwxr-x 1 erfanhosseinabadi erfanhosseinabadi 9768 Dec 13 19:25 lab10-1
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 786 Dec 13 19:25 lab10-1.asm
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 13020 Dec 13 19:25 lab10-1.lst
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 2576 Dec 13 19:25 lab10-1.o
drwxrwxr-x 3 erfanhosseinabadi erfanhosseinabadi 4096 Nov 12 22:00 presentation
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 6 Dec 13 19:25 readme-1.txt
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 0 Dec 13 19:14 readme-2.txt
drwxrwxr-x 5 erfanhosseinabadi erfanhosseinabadi 4096 Nov 12 22:00 report
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$
chmod u-x lab10-1
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$
ls -l
total 52
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 3773 Nov 12 22:00 in_out.asm
-rwxrwxr-x 1 erfanhosseinabadi erfanhosseinabadi 9768 Dec 13 19:25 lab10-1
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 786 Dec 13 19:25 lab10-1.asm
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 13020 Dec 13 19:25 lab10-1.lst
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 2576 Dec 13 19:25 lab10-1.o
drwxrwxr-x 3 erfanhosseinabadi erfanhosseinabadi 4096 Nov 12 22:00 presentation
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 6 Dec 13 19:25 readme-1.txt
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 0 Dec 13 19:14 readme-2.txt
drwxrwxr-x 5 erfanhosseinabadi erfanhosseinabadi 4096 Nov 12 22:00 report
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$
./lab10-1
bash: ./lab10-1: Permission denied
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$
```

Fig. 4.4: Demonstration of the chmod command

I add the execution permission to the owner for the source program file; the executable text file interprets each line as a command. Since none of the lines are bash commands, the program does absolutely nothing (Fig. -fig. 4.5).

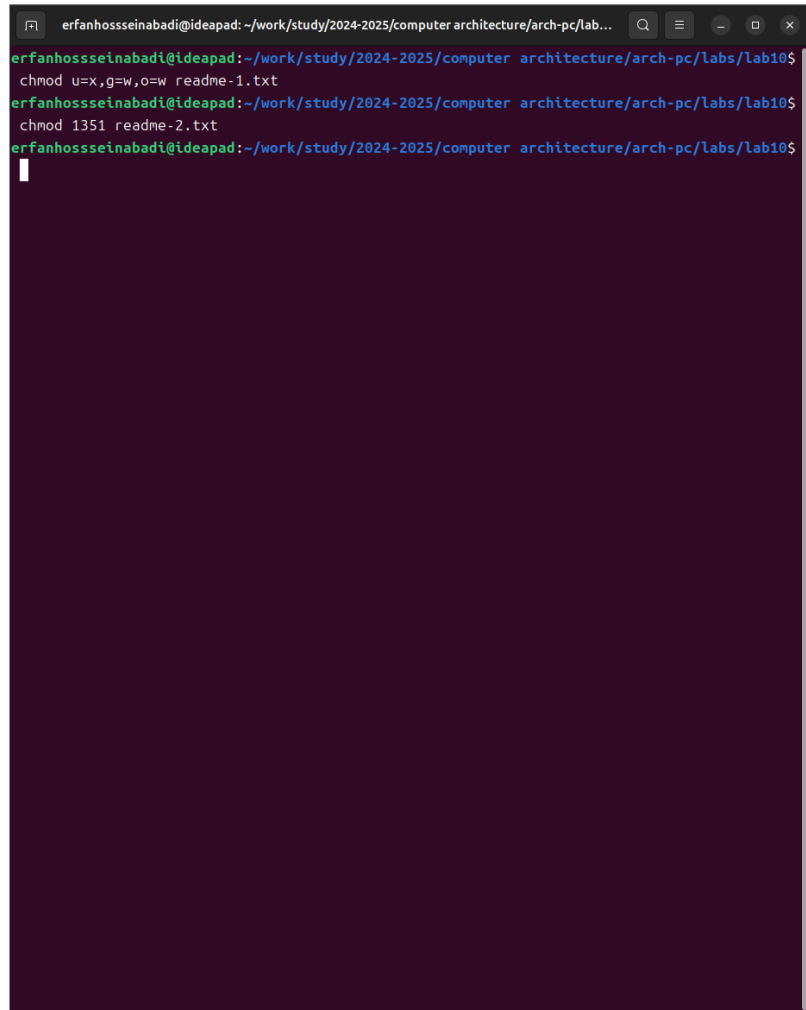
```
erfanhosseinabadi@ideapad: ~/work/study/2024-2025/computer architecture/arch-pc/lab...
ls -l
total 52
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 3773 Nov 12 22:00 in_out.asm
-rwxrwxr-x 1 erfanhosseinabadi erfanhosseinabadi 9768 Dec 13 19:25 lab10-1
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 786 Dec 13 19:25 lab10-1.asm
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 13020 Dec 13 19:25 lab10-1.lst
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 2576 Dec 13 19:25 lab10-1.o
drwxrwxr-x 3 erfanhosseinabadi erfanhosseinabadi 4096 Nov 12 22:00 presentation
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 6 Dec 13 19:25 readme-1.txt
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 0 Dec 13 19:14 readme-2.txt
drwxrwxr-x 5 erfanhosseinabadi erfanhosseinabadi 4096 Nov 12 22:00 report
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$
chmod u-x lab10-1
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$
ls -l
total 52
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 3773 Nov 12 22:00 in_out.asm
-rwxrwxr-x 1 erfanhosseinabadi erfanhosseinabadi 9768 Dec 13 19:25 lab10-1
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 786 Dec 13 19:25 lab10-1.asm
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 13020 Dec 13 19:25 lab10-1.lst
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 2576 Dec 13 19:25 lab10-1.o
drwxrwxr-x 3 erfanhosseinabadi erfanhosseinabadi 4096 Nov 12 22:00 presentation
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 6 Dec 13 19:25 readme-1.txt
-rw-rw-r-- 1 erfanhosseinabadi erfanhosseinabadi 0 Dec 13 19:14 readme-2.txt
drwxrwxr-x 5 erfanhosseinabadi erfanhosseinabadi 4096 Nov 12 22:00 report
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$
./lab10-1
bash: ./lab10-1: Permission denied
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$
chmod u+x lab10-1
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$
./lab10-1.asm
bash: ./lab10-1.asm: Permission denied
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$
```

Fig. 4.5: Running the text file

According to my variant, I need to set the corresponding permissions to the text files created at the beginning of the laboratory work:

1. In symbolic form for the 1st readme file `-x -w- -w-`
2. In binary system for the 2nd readme file `001 011 101`

I convert the group of bits to the octal system; I adjust the symbolic notation to the syntax and obtain the necessary arguments for `chmod` (Fig. -fig. 4.6).



```
erfanhosseinabadi@ideapad: ~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$  
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$  
chmod u=x,g=w,o=w readme-1.txt  
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$  
chmod 1351 readme-2.txt  
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$
```

Fig. 4.6: Symbolic and numerical notations

## 4.1 Independent Work Assignment

I write a program, transliterate and compile it. The program should display a prompt, request input from the keyboard, and create a text file with the string specified in the program and the user's input.

I run the program, check the presence and content of the created text file; the program works correctly (Fig. -fig. 4.7).

```
erfanhosseinabadi@ideapad: ~/work/study/2024-2025/computer architecture/arch-pc/lab...
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$
mousepad lab10-2.asm

(mousepad:19257): GLib-CRITICAL **: 19:31:56.282: g_strjoinv: assertion 'str_array != NULL'
failed

(mousepad:19257): GLib-CRITICAL **: 19:31:56.282: g_strjoinv: assertion 'str_array != NULL'
failed
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$
nasm -f elf lab10-2.asm
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$
ld -m elf_i386 -o lab10-2 lab10-2.o
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$
./lab10-2
what is your name?erfan
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$
ls
in_out.asm lab10-1.asm lab10-1.o lab10-2.asm name.txt readme-1.txt report
lab10-1 lab10-1.lst lab10-2 lab10-2.o presentation readme-2.txt
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$
cat name.txt
my name erfan
erfanhosseinabadi@ideapad:~/work/study/2024-2025/computer architecture/arch-pc/labs/lab10$
```

Fig. 4.7: Demonstration of the program's operation

Program code:

```
%include 'in_out.asm'
```

```
SECTION .data
```

```
filename db 'name.txt', 0
```

```
prompt db 'what is your name?', 0
```

```
intro db 'my name is ', 0
```

```
SECTION .bss
```

```
name resb 255
```

```
SECTION .text
```

```
global _start
```

```
_start:
```

```
mov eax, prompt
```

```
call sprint
```

```
mov ecx, name
```

```
mov edx, 255
```

```
call sread
```

```
mov eax, 8
```

```
mov ebx, filename
```

```
mov ecx, 0744o
```

```
int 80h

mov esi, eax

mov eax, intro

call slen

mov edx, eax

mov ecx, intro

mov ebx, esi

mov eax, 4

int 80h

mov eax, name

call slen

mov edx, eax

mov ecx, name

mov ebx, esi

mov eax, 4
```



```
int 80h
```

```
mov ebx, esi
```

```
mov eax, 6
```

```
int 80h
```

```
call quit
```

## **5 Conclusions**

In the process of performing the laboratory work, I acquired skills in writing programs for working with files and learned how to edit file permissions.

## 6 References

1. Course on TUIS
2. Programming in NASM Assembler Language Stolyarov A. V.