

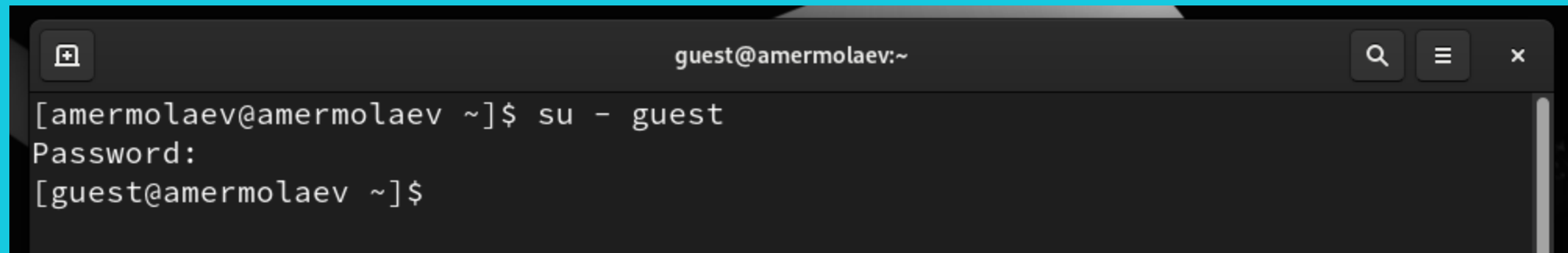
Презентация к лабораторной работе №5

Цель работы

- Изучить механизмы изменения идентификаторов, применения SetUID- и Sticky-битов.
- Получить практический навык работы в консоли с дополнительными атрибутами.
- Рассмотреть работу механизма смены идентификатора процессов пользователей, а также влияние бита Sticky на запись и удаление файлов.

Выполнение работы

Вход под пользователем guest



```
guest@amermolaev:~  
[amermolaev@amermolaev ~]$ su - guest  
Password:  
[guest@amermolaev ~]$
```

The image shows a terminal window with a dark background. The title bar at the top reads 'guest@amermolaev:~'. The terminal content shows a user running the command 'su - guest', prompted for a password, and then successfully switching to the 'guest' user, indicated by the prompt changing from '[amermolaev@amermolaev ~]\$' to '[guest@amermolaev ~]\$'.

Программа simpleid.c



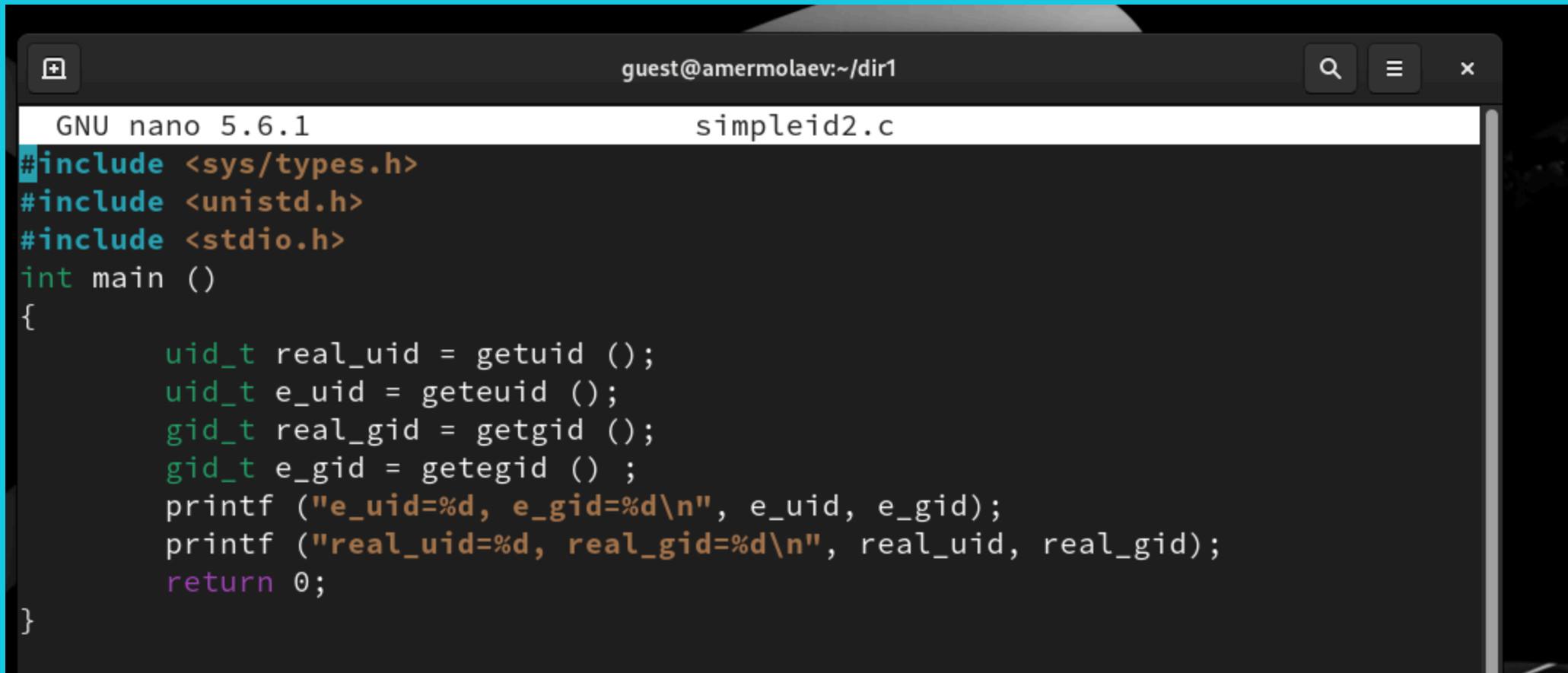
```
guest@amermolaev:~/dir1
GNU nano 5.6.1 simpleid.c
#include <sys/types.h>
#include <unistd.h>
#include <stdio.h>
int main ()
{
    uid_t uid = geteuid ();
    gid_t gid = getegid ();
    printf ("uid=%d, gid=%d\n", uid, gid);
    return 0;
}
```

Компиляция, выполнение и команда id

```
guest@amermolaev:~/dir1
[guest@amermolaev dir1]$ gcc simpleid.c -o simpleid
[guest@amermolaev dir1]$ ls
file1  simpleid  simpleid.c
[guest@amermolaev dir1]$
```

```
guest@amermolaev:~/dir1
[guest@amermolaev dir1]$ ./simpleid
uid=1002, gid=1002
[guest@amermolaev dir1]$ id
uid=1002(guest) gid=1002(guest) groups=1002(guest) context=unconfined_u:unconfined_r:unconfined_t:s0-s0:c0.c1023
[guest@amermolaev dir1]$
```


Программа simpleid2.c



The image shows a terminal window with a dark background. The title bar at the top reads "guest@amermolaev:~/dir1". Below the title bar, the editor's status line shows "GNU nano 5.6.1" and the filename "simpleid2.c". The code is written in C and is as follows:

```
#include <sys/types.h>
#include <unistd.h>
#include <stdio.h>
int main ()
{
    uid_t real_uid = getuid ();
    uid_t e_uid = geteuid ();
    gid_t real_gid = getgid ();
    gid_t e_gid = getegid ();
    printf ("e_uid=%d, e_gid=%d\n", e_uid, e_gid);
    printf ("real_uid=%d, real_gid=%d\n", real_uid, real_gid);
    return 0;
}
```

Компиляция и запуск программы



```
guest@amermolaev:~/dir1
[guest@amermolaev dir1]$ gcc simpleid2.c -o simpleid2
[guest@amermolaev dir1]$ ls
file1  simpleid  simpleid2  simpleid2.c  simpleid.c
[guest@amermolaev dir1]$ ./simpleid2
e_uid=1002, e_gid=1002
real_uid=1002, real_gid=1002
[guest@amermolaev dir1]$
```

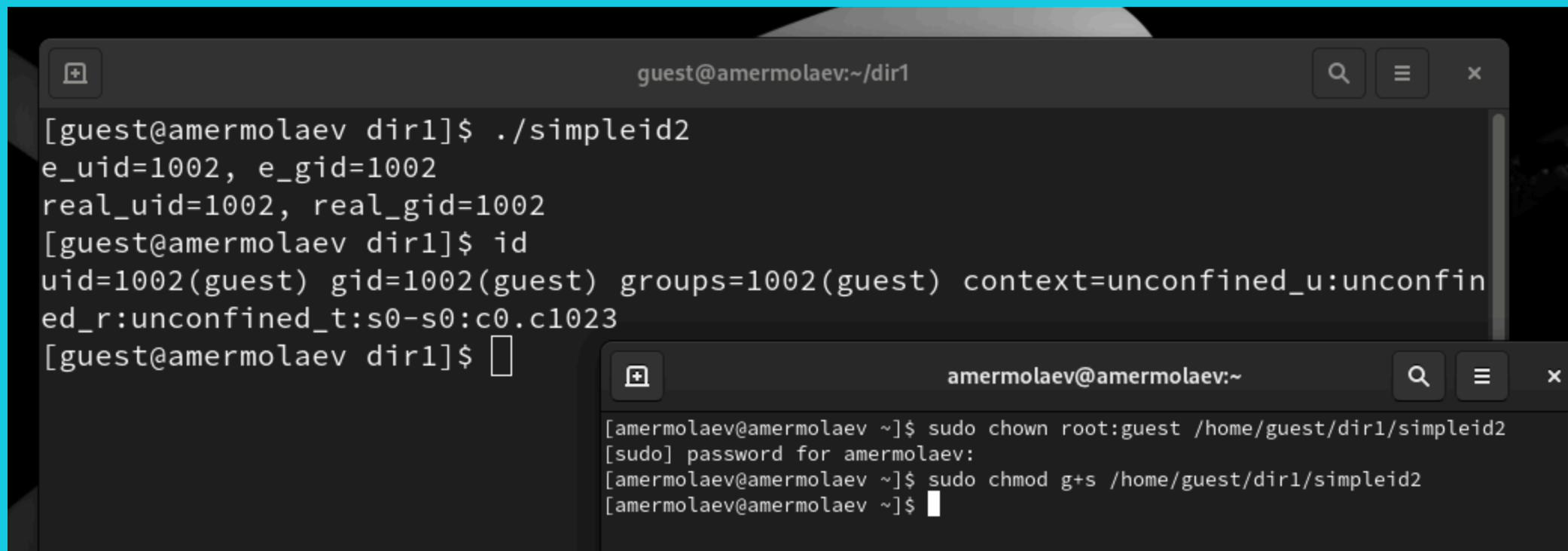
A terminal window with a dark background and light text. The window title bar shows 'guest@amermolaev:~/dir1' and standard window controls (search, menu, close). The terminal content shows the compilation of 'simpleid2.c' into 'simpleid2' using 'gcc'. The 'ls' command lists files in the directory, with 'simpleid' and 'simpleid2' highlighted in green. The execution of './simpleid2' displays two lines of output: 'e_uid=1002, e_gid=1002' and 'real_uid=1002, real_gid=1002'. The prompt returns to the shell.

Изменение прав доступа и запуск программы

```
amermolaev@amermolaev:~  
[amermolaev@amermolaev ~]$ sudo chown root:guest /home/guest/dir1/simpleid2  
[amermolaev@amermolaev ~]$ sudo chmod u+s /home/guest/dir1/simpleid2  
[amermolaev@amermolaev ~]$ ls -l /home/guest/dir1/simpleid2  
ls: cannot access '/home/guest/dir1/simpleid2': Permission denied  
[amermolaev@amermolaev ~]$ sudo ls -l /home/guest/dir1/simpleid2  
-rwsr-xr-x. 1 root guest 24488 Sep 30 21:52 /home/guest/dir1/simpleid2  
[amermolaev@amermolaev ~]$
```

```
guest@amermolaev:~/dir1  
[guest@amermolaev dir1]$ ./simpleid2  
e_uid=0, e_gid=1002  
real_uid=1002, real_gid=1002  
[guest@amermolaev dir1]$ id  
uid=1002(guest) gid=1002(guest) groups=1002(guest) context=unconfined_u:unconfined_r:unconfined_t:s0-s0:c0.c1023  
[guest@amermolaev dir1]$
```

Добавление SetGID-бита

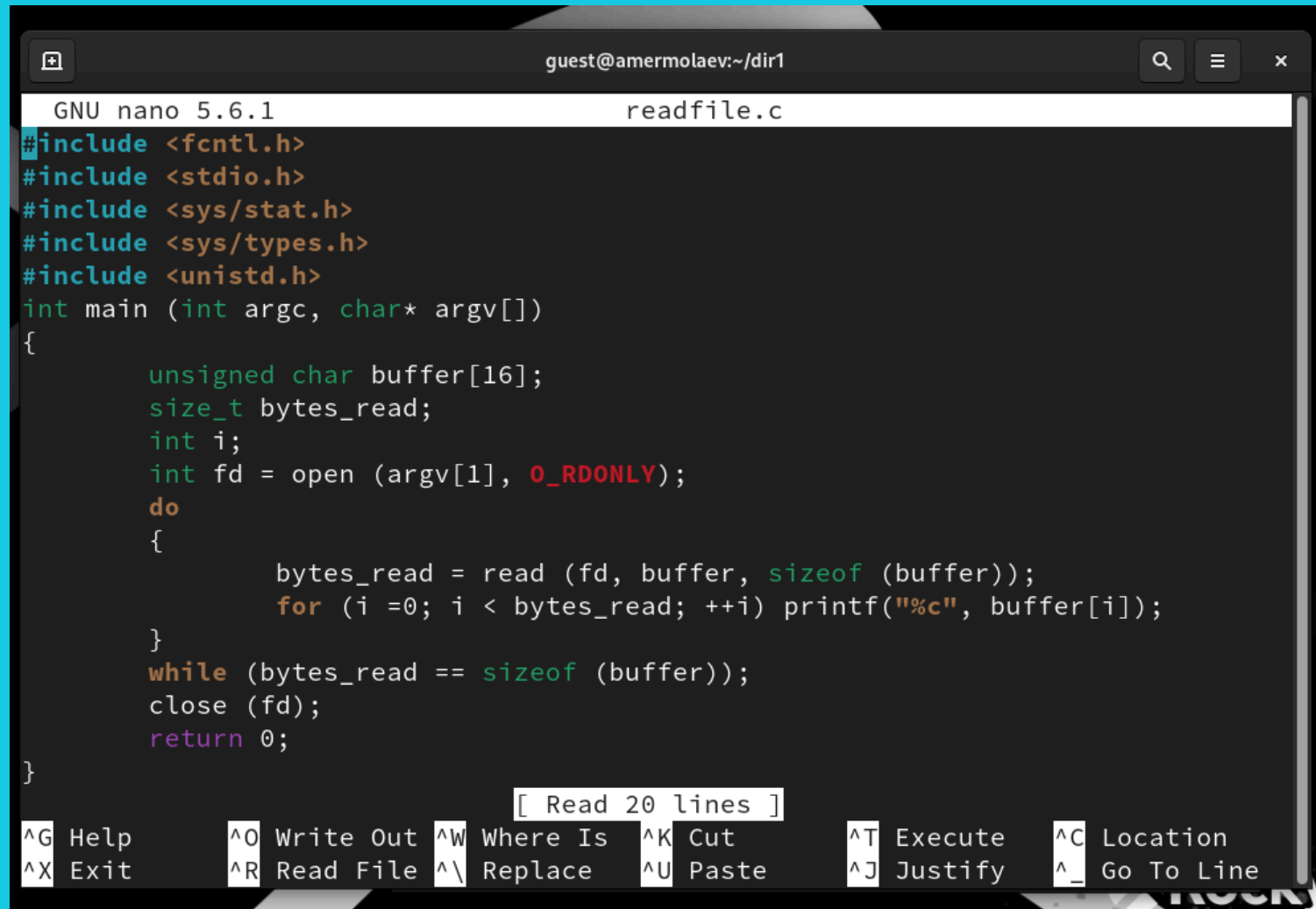


The image shows two terminal windows. The top window is titled 'guest@amermolaev:~/dir1' and shows the execution of a program named 'simpleid2' and the output of the 'id' command. The bottom window is titled 'amermolaev@amermolaev:~' and shows the execution of 'sudo chown root:guest /home/guest/dir1/simpleid2' and 'sudo chmod g+s /home/guest/dir1/simpleid2'.

```
guest@amermolaev:~/dir1
[guest@amermolaev dir1]$ ./simpleid2
e_uid=1002, e_gid=1002
real_uid=1002, real_gid=1002
[guest@amermolaev dir1]$ id
uid=1002(guest) gid=1002(guest) groups=1002(guest) context=unconfined_u:unconfined_r:unconfined_t:s0-s0:c0.c1023
[guest@amermolaev dir1]$

amermolaev@amermolaev:~
[amermolaev@amermolaev ~]$ sudo chown root:guest /home/guest/dir1/simpleid2
[sudo] password for amermolaev:
[amermolaev@amermolaev ~]$ sudo chmod g+s /home/guest/dir1/simpleid2
[amermolaev@amermolaev ~]$
```

Программа readfile.c

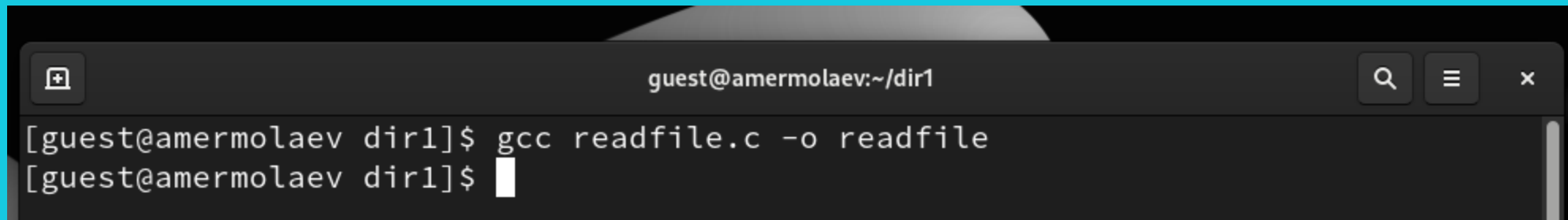


```
GNU nano 5.6.1 readfile.c
#include <fcntl.h>
#include <stdio.h>
#include <sys/stat.h>
#include <sys/types.h>
#include <unistd.h>
int main (int argc, char* argv[])
{
    unsigned char buffer[16];
    size_t bytes_read;
    int i;
    int fd = open (argv[1], O_RDONLY);
    do
    {
        bytes_read = read (fd, buffer, sizeof (buffer));
        for (i = 0; i < bytes_read; ++i) printf("%c", buffer[i]);
    }
    while (bytes_read == sizeof (buffer));
    close (fd);
    return 0;
}
```

[Read 20 lines]

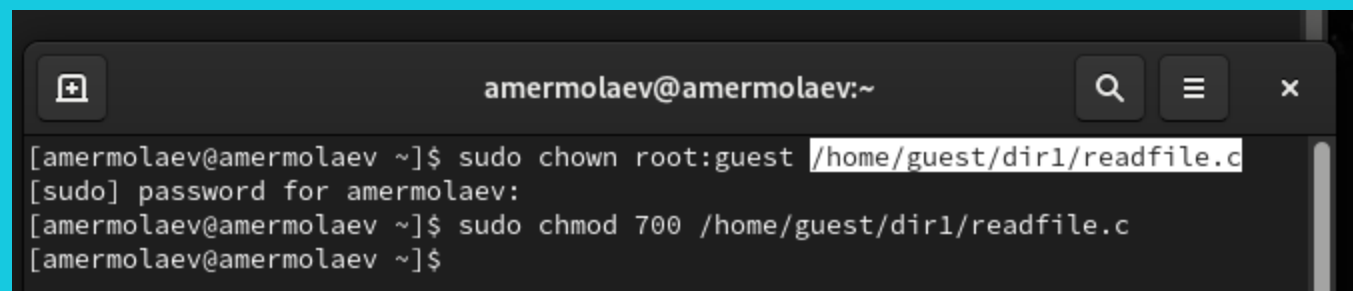
^G Help	^O Write Out	^W Where Is	^K Cut	^T Execute	^C Location
^X Exit	^R Read File	^_\ Replace	^U Paste	^J Justify	^_ Go To Line

Компиляция

A terminal window with a dark background and light text. The title bar at the top shows a window icon, the text 'guest@amermolaev:~/dir1', and search, menu, and close buttons. The terminal content shows two lines of text: the first line is '[guest@amermolaev dir1]\$ gcc readfile.c -o readfile' and the second line is '[guest@amermolaev dir1]\$' followed by a white cursor.

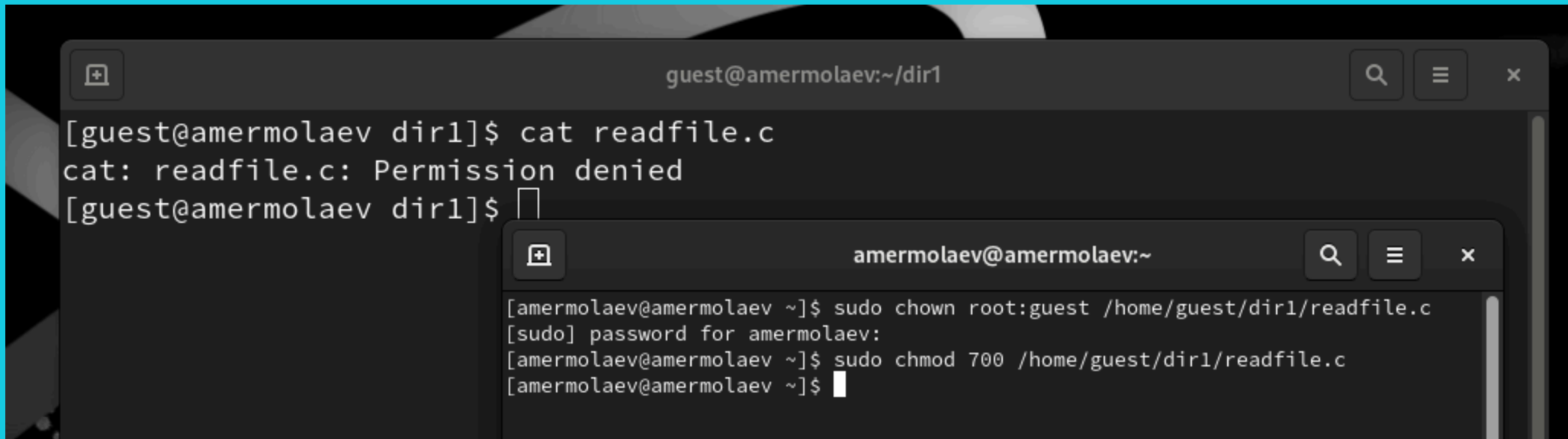
```
guest@amermolaev:~/dir1  
[guest@amermolaev dir1]$ gcc readfile.c -o readfile  
[guest@amermolaev dir1]$
```

Изменение прав доступа

A terminal window with a dark background and light text. The window title is 'amermolaev@amermolaev:~'. It contains four lines of text: a command to change ownership, a password prompt, a command to change permissions, and a final prompt.

```
amermolaev@amermolaev:~  
[amermolaev@amermolaev ~]$ sudo chown root:guest /home/guest/dir1/readfile.c  
[sudo] password for amermolaev:  
[amermolaev@amermolaev ~]$ sudo chmod 700 /home/guest/dir1/readfile.c  
[amermolaev@amermolaev ~]$
```

Добавление SetUID-бита

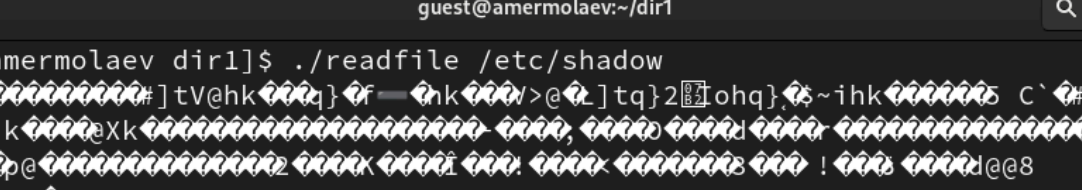


The image shows two terminal windows. The top window, titled 'guest@amermolaev:~/dir1', shows a user attempting to view a file with 'cat' but being denied permission. The bottom window, titled 'amermolaev@amermolaev:~', shows the root user using 'sudo' to change the ownership of 'readfile.c' to 'root:guest' and then setting permissions to '700' to add the SetUID bit.

```
guest@amermolaev:~/dir1
[guest@amermolaev dir1]$ cat readfile.c
cat: readfile.c: Permission denied
[guest@amermolaev dir1]$

amermolaev@amermolaev:~
[amermolaev@amermolaev ~]$ sudo chown root:guest /home/guest/dir1/readfile.c
[sudo] password for amermolaev:
[amermolaev@amermolaev ~]$ sudo chmod 700 /home/guest/dir1/readfile.c
[amermolaev@amermolaev ~]$
```

Чтение файлов

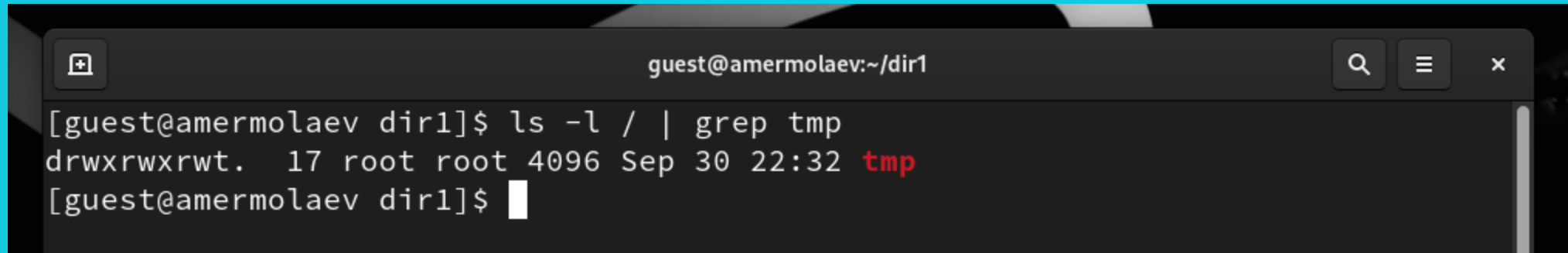
[illegible]

```

[guest@amermolaev dir1]$ ./readfile /etc/shadow
#####]tV@hk#####f—#nk#####>@_[]tq}2[]ohq}~ihk##### C`#]t#####
_L]tp@`k#####eXk#####,#####
pI]t#####2#####!#####d@8
#####
#####m##### C3q0#####>x86_64./readfile/etc/shadowSHELL=/bin/bashHISTCON
TROL=ignoredupsHISTSIZ=1000HOSTNAME=amermolaevPWD=/home/guest/dir1LOGNAME=gues
tXAUTHORITY=/home/guest/.xauthlqytjXHOME=/home/guestLANG=en_GB.UTF-8LS_COLORS=r
s=0:di=01;34:ln=01;36:mh=00:pi=40;33:so=01;35:do=01;35:bd=40;33;01:cd=40;33;01:
or=40;31;01:mi=01;37;41:su=37;41:sg=30;43:ca=30;41:tw=30;42:ow=34;42:st=37;44:e
x=01;32:*.tar=01;31:*.tgz=01;31:*.arc=01;31:*.arj=01;31:*.taz=01;31:*.lha=01;31
:*.lz4=01;31:*.lzh=01;31:*.lzma=01;31:*.tlz=01;31:*.txz=01;31:*.tzo=01;31:*.t7z
=01;31:*.zip=01;31:*.z=01;31:*.dz=01;31:*.gz=01;31:*.lrz=01;31:*.lz=01;31:*.lzo
=01;31:*.xz=01;31:*.zst=01;31:*.tzst=01;31:*.bz2=01;31:*.bz=01;31:*.tbz=01;31:*
.tbz2=01;31:*.tz=01;31:*.deb=01;31:*.rpm=01;31:*.jar=01;31:*.war=01;31:*.ear=01

```

Sticky-бит



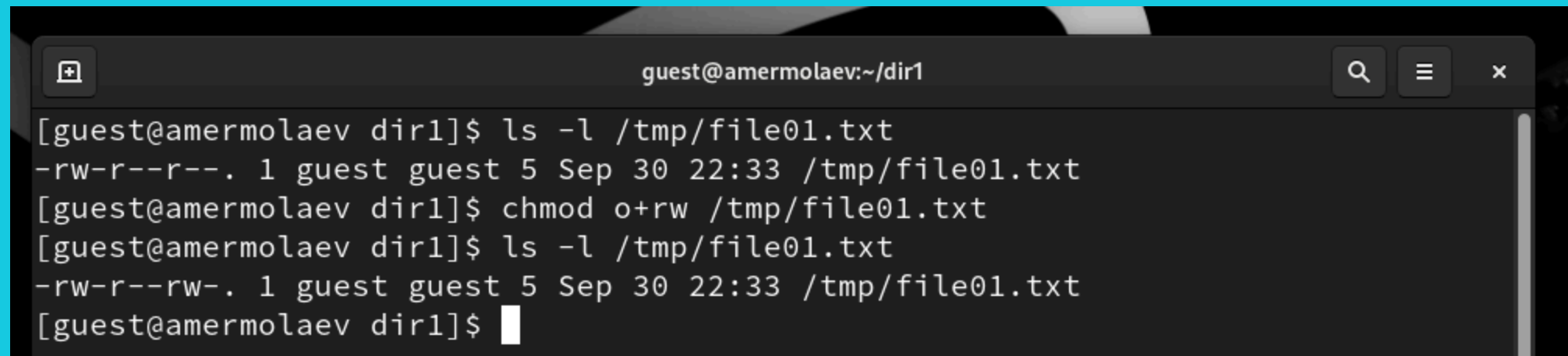
```
guest@amermolaev:~/dir1
[guest@amermolaev dir1]$ ls -l / | grep tmp
drwxrwxrwt. 17 root root 4096 Sep 30 22:32 tmp
[guest@amermolaev dir1]$
```

The image shows a terminal window with a dark background. The title bar at the top reads 'guest@amermolaev:~/dir1'. The terminal content shows a command being executed: '[guest@amermolaev dir1]\$ ls -l / | grep tmp'. The output of the command is 'drwxrwxrwt. 17 root root 4096 Sep 30 22:32 tmp', where 'tmp' is highlighted in red. The prompt '[guest@amermolaev dir1]\$' is followed by a white cursor bar.

Файл file01.txt

```
guest@amermolaev:~/dir1
[guest@amermolaev dir1]$ echo "test" > /tmp/file01.txt
[guest@amermolaev dir1]$ ls /tmp
file01.txt
systemd-private-5ec4b3a35a6d4ec29306967e1a7816c2-chrond.service-8Fu5nX
systemd-private-5ec4b3a35a6d4ec29306967e1a7816c2-colord.service-IXfxDZ
systemd-private-5ec4b3a35a6d4ec29306967e1a7816c2-dbus-broker.service-21Mvmg
systemd-private-5ec4b3a35a6d4ec29306967e1a7816c2-fwupd.service-cArJJj
systemd-private-5ec4b3a35a6d4ec29306967e1a7816c2-ModemManager.service-BhDSqF
systemd-private-5ec4b3a35a6d4ec29306967e1a7816c2-power-profiles-daemon.service-
mAL6Ke
systemd-private-5ec4b3a35a6d4ec29306967e1a7816c2-rtkit-daemon.service-3qtdyQ
systemd-private-5ec4b3a35a6d4ec29306967e1a7816c2-switcheroo-control.service-fti
gAx
systemd-private-5ec4b3a35a6d4ec29306967e1a7816c2-systemd-logind.service-1vEfq4
systemd-private-5ec4b3a35a6d4ec29306967e1a7816c2-upower.service-kjWEHt
[guest@amermolaev dir1]$
```

Предоставление прав доступа

A terminal window with a dark background and light text. The title bar at the top reads 'guest@amermolaev:~/dir1' and includes search, menu, and close icons. The terminal shows a sequence of commands and their outputs. First, 'ls -l /tmp/file01.txt' is executed, showing permissions '-rw-r--r--'. Then, 'chmod o+rw /tmp/file01.txt' is executed. Finally, 'ls -l /tmp/file01.txt' is executed again, showing the updated permissions '-rw-r--rw-'. The prompt '[guest@amermolaev dir1]\$' is followed by a cursor.

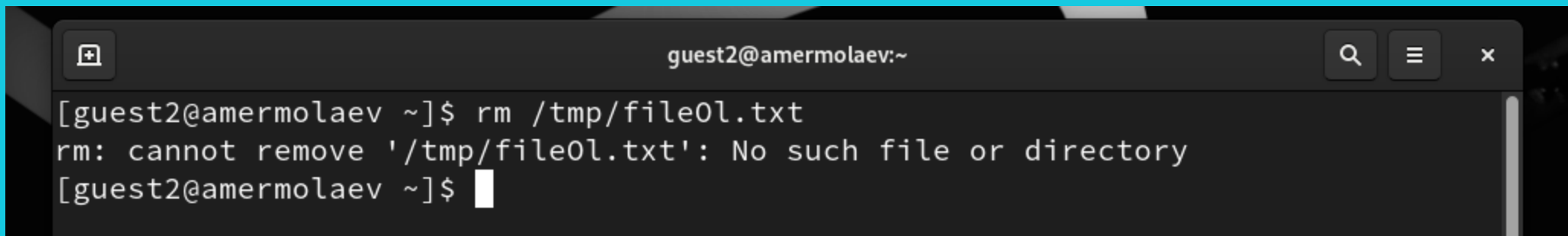
```
[guest@amermolaev dir1]$ ls -l /tmp/file01.txt
-rw-r--r--. 1 guest guest 5 Sep 30 22:33 /tmp/file01.txt
[guest@amermolaev dir1]$ chmod o+rw /tmp/file01.txt
[guest@amermolaev dir1]$ ls -l /tmp/file01.txt
-rw-r--rw-. 1 guest guest 5 Sep 30 22:33 /tmp/file01.txt
[guest@amermolaev dir1]$
```

Другие операции с файлом

```
guest2@amermolaev:~  
[guest2@amermolaev ~]$ cat /tmp/file01.txt  
test  
[guest2@amermolaev ~]$ echo "test2" > /tmp/file01.txt  
-bash: /tmp/file01.txt: Permission denied  
[guest2@amermolaev ~]$ cat /tmp/file01.txt  
test  
[guest2@amermolaev ~]$
```

```
guest2@amermolaev:~  
[guest2@amermolaev ~]$ echo "test3" > /tmp/file01.txt  
-bash: /tmp/file01.txt: Permission denied  
[guest2@amermolaev ~]$ cat /tmp/file01.txt  
test  
[guest2@amermolaev ~]$
```

Другие операции с файлом

A terminal window with a dark background and light gray text. The window title bar shows 'guest2@amermolaev:~' and standard window controls (search, menu, close). The terminal content shows a user attempting to remove a file with the 'rm' command, which fails because the file does not exist.

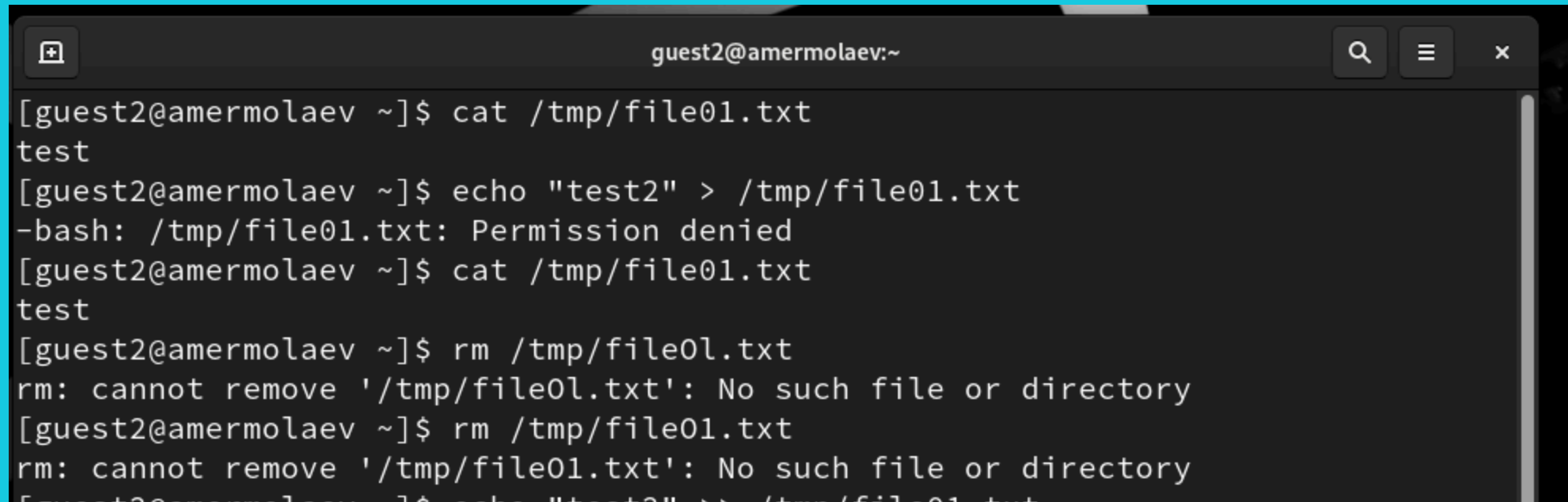
```
guest2@amermolaev:~  
[guest2@amermolaev ~]$ rm /tmp/file0l.txt  
rm: cannot remove '/tmp/file0l.txt': No such file or directory  
[guest2@amermolaev ~]$
```

Снятие Sticky-бита

```
amermolaev@amermolaev:~  
[amermolaev@amermolaev ~]$ su -  
Password:  
[root@amermolaev ~]# chmod -t /tmp  
[root@amermolaev ~]# exit  
logout
```

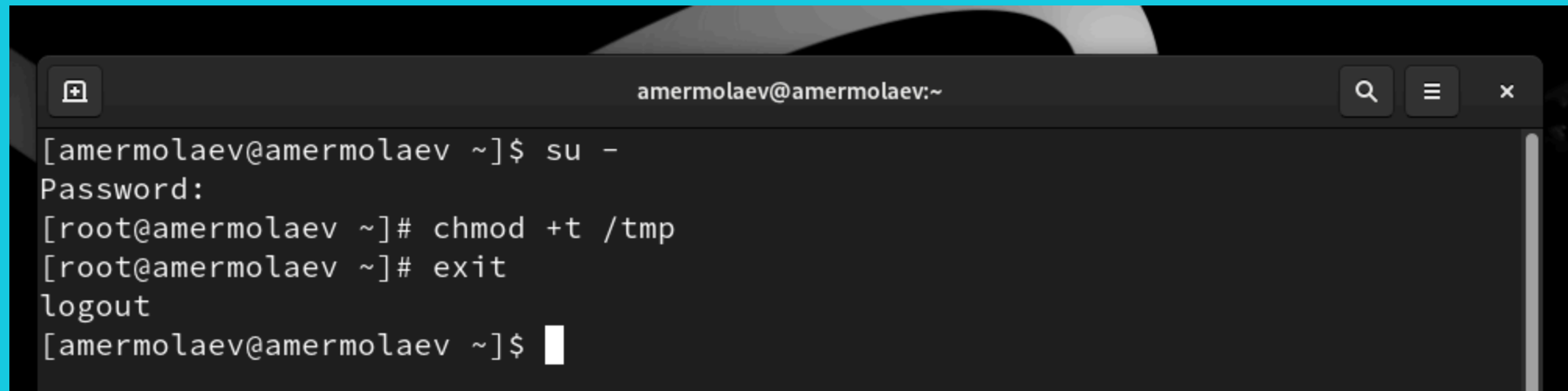
```
guest2@amermolaev:~  
[guest2@amermolaev ~]$ ls -l / | grep tmp  
drwxrwxrwx. 18 root root 4096 Sep 30 22:43 tmp  
[guest2@amermolaev ~]$
```

Повторение команд

A terminal window titled 'guest2@amermolaev:~' with search, menu, and close buttons in the title bar. The terminal shows a sequence of commands and their outputs. The user attempts to cat a file, echo to it, and then remove it, encountering a 'Permission denied' error and then 'No such file or directory' errors.

```
[guest2@amermolaev ~]$ cat /tmp/file01.txt
test
[guest2@amermolaev ~]$ echo "test2" > /tmp/file01.txt
-bash: /tmp/file01.txt: Permission denied
[guest2@amermolaev ~]$ cat /tmp/file01.txt
test
[guest2@amermolaev ~]$ rm /tmp/file01.txt
rm: cannot remove '/tmp/file01.txt': No such file or directory
[guest2@amermolaev ~]$ rm /tmp/file01.txt
rm: cannot remove '/tmp/file01.txt': No such file or directory
[guest2@amermolaev ~]$ echo "test2" > /tmp/file01.txt
```

Возвращение Sticky-бита



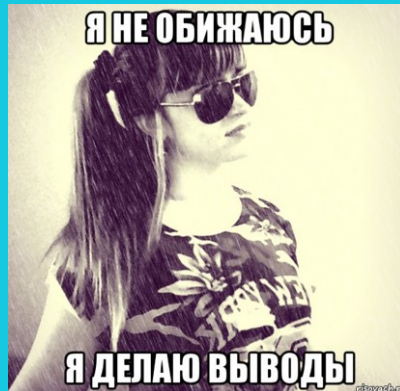
```
amermolaev@amermolaev:~  
[amermolaev@amermolaev ~]$ su -  
Password:  
[root@amermolaev ~]# chmod +t /tmp  
[root@amermolaev ~]# exit  
logout  
[amermolaev@amermolaev ~]$
```

The image shows a terminal window with a dark background and light text. The window title is 'amermolaev@amermolaev:~'. The user 'amermolaev' runs the command 'su -' to become root. A password prompt is shown. As root, the user runs 'chmod +t /tmp' to set the sticky bit on the /tmp directory. Then, the user runs 'exit' to return to the regular user shell. The prompt changes from '#' to '\$', and the word 'logout' is printed. The final prompt is '[amermolaev@amermolaev ~]\$' with a cursor.

Вывод

В рамках выполнения работы я

- Изучил механизмы изменения идентификаторов, применения SetUID- и Sticky-битов.
- Получил практический навык работы в консоли с дополнительными атрибутами.
- Рассмотрел работу механизма смены идентификатора процессов пользователей, а также влияние бита Sticky на запись и удаление файлов.



Финал

