

### Part1. Quota allocation mechanism.

Employing commands from presentation #4.6, create a new user, say, *utest*. Based on the quota mechanism, limit the available disk space for this user to **soft**: 100M and **hard**: 150M.

```
denis@denis-VirtualBox:~$ sudo addgroup utest
[sudo] password for denis:
Adding group `utest' (GID 1002) ...
Done.

denis@denis-VirtualBox:~$ sudo useradd -g utest -s /bin/bash -d /home/utest -m u
test
denis@denis-VirtualBox:~$ sudo passwd utest

denis@denis-VirtualBox:~$ sudo passwd utest
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
denis@denis-VirtualBox:~$

denis@denis-VirtualBox:~/test$ sudo quotacheck -cvum /home/denis/test
[sudo] password for denis:
quotacheck: Your kernel probably supports journaled quota but you are not using
it. Consider switching to journaled quota to avoid running quotacheck after an u
nclean shutdown.
quotacheck: Scanning /dev/sdb [/home/denis/test] done
quotacheck: Cannot stat old user quota file /home/denis/test/aquota.user: No suc
h file or directory. Usage will not be subtracted.
quotacheck: Old group file name could not be determined. Usage will not be sub
tracted.
quotacheck: Checked 3 directories and 0 files
quotacheck: Old file not found.
denis@denis-VirtualBox:~/test$

denis@denis-VirtualBox:~/test$ sudo edquota -u utest
GNU nano 2.9.3 /tmp//EdP.a2xwLYg Modified
Disk quotas for user utest (uid 1002):
Filesystem          blocks      soft    hard    inodes     soft     hard
/dev/sdb              0    100000  150000         0         0         0
```

[Ctrl] C Stopped

```
denis@denis-VirtualBox:~/test$ sudo quotaon /home/denis/test
[sudo] password for denis:
```

```
mc [utest@denis-VirtualBox]:/home/denis
File Edit View Search Terminal Help
Left File Command Options Right
<- /home/denis .[^]> <- /home/denis/test .[^]>
.n Name Size Modify time .n Name Size Modify time
*.bash_history 4482 kbi 23 18:13 /.. UP--DIR kbi 23 17:30
*.bash_logout 220 6ep 24 17:00 /lost+found 16384 kbi 23 16:53
*.bashrc 3771 6ep 24 17:00 aquota.user 7168 kbi 23 17:37
*.profile kbi 3 13:44
*.sudo_as~ce
Copy
Error
Cannot write target file "/home/denis/test/ubuntu.tar"
Disk quota exceeded (122)
[ Skip ] [ Skip all ] [ Retry ] [ Abort ]
*.vboxcli
*.vboxcli
*.vboxcli
*.viminfo
*examples
*nginx.ta
*root_ent
*script.s
*setuid.txt
*ubuntu.tar
*ubuntu.tar 1947M/10G (19%) aquota.user 657M/976M (67%)
Hint: Want your plain shell? Press C-o, and get back to MC with C-o again.
utest@denis-VirtualBox:/home/denis$
1Help 2Menu 3View 4Edit 5Copy 6RenMov 7Mkdir 8Delete 9PullDn 10Quit
```

Then, using Midnight Commander (since MC shows warnings about exceeding the limits of available to a user disk space), copy content of /usr directory to utest's home directory (actually, /usr isn't mandatory, you are free to copy any other data, the only condition is sufficient total size of the files to copy).

## Part2. Access Control Lists, ACLs

In what follows, we assume that there are two users: *guest* (included into the list of sudoers) and *utest*. None of the users is the superuser (i.e. UIDs of the users differ from 0).

```
denis@denis-VirtualBox:~$ sudo addgroup guest
[sudo] password for denis:
Adding group `guest' (GID 1003) ...
Done.

denis@denis-VirtualBox:~$ sudo useradd -g guest -s /bin/bash -d /home/guest -m g
uest
denis@denis-VirtualBox:~$ sudo passwd guest
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
denis@denis-VirtualBox:~$
denis@denis-VirtualBox:~$ sudo usermod -aG sudo guest
```

**The most task:** to allow user *utest* visit *guest*'s home directory.

```
guest@denis-VirtualBox:/$ sudo chmod 770 /home/guest
[sudo] password for guest:
guest@denis-VirtualBox:/$ setfacl -m u:utest:rwx /home/guest
guest@denis-VirtualBox:/$ cd /home/guest
guest@denis-VirtualBox:~$ getfacl .
# file: .
# owner: guest
# group: guest
user::rwx
user:utest:rwx
group::rwx
mask::rwx
other:---
```

**The average task:** to acquaint yourself with the basics of ACL and verify the fact that ACL privileges override the **chmod** ones.

Before proceeding to the task execution, please, visit the [linux.org](https://linuxconfig.org/how-to-manage-acls-on-linux) page describing ACL, <https://linuxconfig.org/how-to-manage-acls-on-linux>.

Every step of execution should be stored into some file **/var/log** directory (use logger, please).

1. Based on given in presentation #4.7 instructions, turn on and set up the ACL. *Caution!* The fact that a file system has been mounted with the “acl” flag on by default, doesn’t mean that the ACL package is installed.

Prior to any action, it is advised to check if the “acl” flag is on, using

**tune2fs -l /dev/sda\***

```
guest@denis-VirtualBox:~$ sudo tune2fs -l /dev/sda1 | logger -t homwrk47
```

(a particular name of the device file *sda\**, is to be determined by calling to **blkid**, invoke it twice:

- (i) on behalf of *guest* (i.e. without the superuser privileges);
- (ii) with **sudo** (i.e. with the superuser privileges). Note the level of details provided by different **blkid** outputs).

2. Log in as *guest*. Create in */tmp* a directory called *acl\_test*. By means of **chmod**, allow user *utest* to perform all possible operations (rwx) with respect to *acl\_test*. Verify that user *utest* is indeed capable of implementing granted him (her) privileges. For example, after logging in as *utest*, create a file in */tmp/acl\_test*, say, *utest.txt* with the aid of **touch**. Query information about the directory and file by calling to

```
guest@denis-VirtualBox:/tmp$ mkdir acl_test
guest@denis-VirtualBox:/tmp$ sudo chmod 777 acl_test
guest@denis-VirtualBox:/tmp$ sudo login
denis-VirtualBox login: utest
Password:
```

```
utest@denis-VirtualBox:~$ touch /tmp/acl_test/utest.txt
utest@denis-VirtualBox:~$ cd /tmp/acl_test/
utest@denis-VirtualBox:/tmp/acl_test$
```

ls -ld /tmp/acl\_test

```
utest@denis-VirtualBox:/tmp/acl_test$ ls -ld /tmp/acl_test | logger -t homwrk47
```

ls -l /tmp/acl\_test

```
utest@denis-VirtualBox:/tmp/acl_test$ ls -l /tmp/acl_test | logger -t homwrk47
```

To check ACL permissions do:

getfacl /tmp/acl\_test

```
utest@denis-VirtualBox:/tmp/acl_test$ getfacl /tmp/acl_test | logger -t homwrk47
getfacl: Removing leading '/' from absolute path names
```

getfacl /tmp/acl\_test/utest.txt

```
utest@denis-VirtualBox:/tmp/acl_test$ getfacl /tmp/acl_test/utest.txt | logger -t homwrk47
getfacl: Removing leading '/' from absolute path names
```

3. Employ ACL to block any activity except for reading, for user *utest* with respect to directory */tmp/acl\_test* (hint: use **setfacl**). Test if the actions are effectively prohibited

```
guest@denis-VirtualBox:/tmp$ setfacl -m u:utest:r-- /tmp/acl_test
guest@denis-VirtualBox:/tmp$
```

```
utest@denis-VirtualBox:~$ getfacl /tmp/acl_test
getfacl: Removing leading '/' from absolute path names
# file: tmp/acl_test
# owner: guest
# group: guest
user::rwx
user:utest:r--
group::rwx
mask::rwx
other::rwx
```

touch /tmp/acl\_test/prohibited.txt

```
utest@denis-VirtualBox:~$ touch /tmp/acl_test/prohibited.txt | logger -t homwrk47
touch: cannot touch '/tmp/acl_test/prohibited.txt': Permission denied
```

echo "new content" > /tmp/acl\_test/utest.txt

```
utest@denis-VirtualBox:~$ echo "new content" > /tmp/acl_test/utest.txt | logger -t homwrk47
-bash: /tmp/acl_test/utest.txt: Permission denied
```

4. Consider a situation when at the ACL level user *utest* is allowed to have all possible privileges with respect to */tmp/acl\_test*, while no action is allowed with **chmod** (conventional mechanism). (Hint: repeat step 3, but given the new context).

```

guest@denis-VirtualBox:/tmp$ sudo chmod 000 acl_test
guest@denis-VirtualBox:/tmp$ setfacl -m u:utest:rwX /tmp/acl_test

utest@denis-VirtualBox:~$ touch /tmp/acl_test/prohibited.txt | logger -t homwrk47
utest@denis-VirtualBox:~$ echo "new content" > /tmp/acl_test/utest.txt | logger -t homwrk47
utest@denis-VirtualBox:~$

```

5. For user *utest*, set default ACLs to the directory */tmp/acl\_test* which allow read-only access (hint: use the *-d* option of the **setfacl** command). Being logged in as *utest*, invoke **touch** to create the file *utest2.txt* in the */tmp/acl\_test* directory. Query permissions on this file using **getfacl**.

```

guest@denis-VirtualBox:/tmp$ setfacl -d -m u:utest:r-- /tmp/acl_test

utest@denis-VirtualBox:~$ getfacl /tmp/acl_test/utest2.txt | logger -t homwrk47
getfacl: Removing leading '/' from absolute path names
getfacl: Removing leading '/' from absolute path names
# file: tmp/acl_test/utest2.txt
# owner: utest
# group: utest
user::---
user:utest:r--
group::rwx
mask::rwx
other::---
#effective:rw-

```

6. Set the maximum permissions mask on the */tmp/acl\_test/utest.txt* file in such a way as to allow read-only access. Check permissions with **getfacl**.

```

guest@denis-VirtualBox:/tmp$ setfacl -m m::r /tmp/acl_test

guest@denis-VirtualBox:/tmp$ getfacl /tmp/acl_test | logger -t homwrk47
getfacl: Removing leading '/' from absolute path names
getfacl: Removing leading '/' from absolute path names
# file: tmp/acl_test
# owner: guest
# group: guest
user::---
user:utest:r--
group::rwx
mask::r--
other::---
#effective:r--
default:user::---
default:user:utest:r--
default:group::rwx
default:mask::rwx
default:other::---

```

7. Delete all ACL entries relative to the */tmp/acl\_test* directory.

```

guest@denis-VirtualBox:/tmp$ setfacl -b /tmp/acl_test | logger -t homwrk47

```



```

guest@denis-VirtualBox:~$ sudo grep "homwrk47" /var/log/syslog > ~/homework_log.txt
guest@denis-VirtualBox:~$ cd ~
guest@denis-VirtualBox:~$ ls
Desktop Documents Downloads examples.desktop homework_log.txt Music Pictures Public Templates Videos
guest@denis-VirtualBox:~$ cat homework_log.txt
Apr 24 15:44:54 denis-VirtualBox homwrk47: tune2fs 1.44.1 (24-Mar-2018)
Apr 24 15:44:54 denis-VirtualBox homwrk47: Filesystem volume name: <none>
Apr 24 15:44:54 denis-VirtualBox homwrk47: Last mounted on: /
Apr 24 15:44:54 denis-VirtualBox homwrk47: Filesystem UUID: 25dd9719-65c3-4eac-bb35-390a74c7d510
Apr 24 15:44:54 denis-VirtualBox homwrk47: Filesystem magic number: 0xEF53
Apr 24 15:44:54 denis-VirtualBox homwrk47: Filesystem revision #: 1 (dynamic)
Apr 24 15:44:54 denis-VirtualBox homwrk47: Filesystem features: has_journal ext_attr resize_inode dir_index filetype
tra_isize metadata_csum
Apr 24 15:44:54 denis-VirtualBox homwrk47: Filesystem flags: signed_directory_hash
Apr 24 15:44:54 denis-VirtualBox homwrk47: Default mount options: user_xattr acl
Apr 24 15:44:54 denis-VirtualBox homwrk47: Filesystem state: clean
Apr 24 15:44:54 denis-VirtualBox homwrk47: Errors behavior: Continue
Apr 24 15:44:54 denis-VirtualBox homwrk47: Filesystem OS type: Linux
Apr 24 15:44:54 denis-VirtualBox homwrk47: Inode count: 655360
Apr 24 15:44:54 denis-VirtualBox homwrk47: Block count: 2620928
Apr 24 15:44:54 denis-VirtualBox homwrk47: Reserved block count: 131046
Apr 24 15:44:54 denis-VirtualBox homwrk47: Free blocks: 647255
Apr 24 15:44:54 denis-VirtualBox homwrk47: Free inodes: 467515
Apr 24 15:44:54 denis-VirtualBox homwrk47: First block: 0
Apr 24 15:44:54 denis-VirtualBox homwrk47: Block size: 4096
Apr 24 15:44:54 denis-VirtualBox homwrk47: Fragment size: 4096
Apr 24 15:44:54 denis-VirtualBox homwrk47: Group descriptor size: 64
Apr 24 15:44:54 denis-VirtualBox homwrk47: Reserved GDT blocks: 1024
Apr 24 15:44:54 denis-VirtualBox homwrk47: Blocks per group: 32768
Apr 24 15:44:54 denis-VirtualBox homwrk47: Fragments per group: 32768
Apr 24 15:44:54 denis-VirtualBox homwrk47: Inodes per group: 8192
Apr 24 15:44:54 denis-VirtualBox homwrk47: Inode blocks per group: 512
Apr 24 15:44:54 denis-VirtualBox homwrk47: Flex block group size: 16
Apr 24 15:44:54 denis-VirtualBox homwrk47: Filesystem created: Tue Mar 24 16:55:17 2020
Apr 24 15:44:54 denis-VirtualBox homwrk47: Last mount time: Fri Apr 24 15:05:09 2020
Apr 24 15:44:54 denis-VirtualBox homwrk47: Last write time: Fri Apr 24 15:05:04 2020
Apr 24 15:44:54 denis-VirtualBox homwrk47: Mount count: 31

```

Full:

```

Apr 24 15:44:54 denis-VirtualBox homwrk47: tune2fs 1.44.1 (24-Mar-2018)
Apr 24 15:44:54 denis-VirtualBox homwrk47: Filesystem volume name: <none>
Apr 24 15:44:54 denis-VirtualBox homwrk47: Last mounted on: /
Apr 24 15:44:54 denis-VirtualBox homwrk47: Filesystem UUID: 25dd9719-65c3-4eac-
bb35-390a74c7d510
Apr 24 15:44:54 denis-VirtualBox homwrk47: Filesystem magic number: 0xEF53
Apr 24 15:44:54 denis-VirtualBox homwrk47: Filesystem revision #: 1 (dynamic)
Apr 24 15:44:54 denis-VirtualBox homwrk47: Filesystem features: has_journal ext_attr
resize_inode dir_index filetype needs_recovery extent 64bit flex_bg sparse_super large_file
huge_file dir_nlink extra_isize metadata_csum
Apr 24 15:44:54 denis-VirtualBox homwrk47: Filesystem flags: signed_directory_hash
Apr 24 15:44:54 denis-VirtualBox homwrk47: Default mount options: user_xattr acl
Apr 24 15:44:54 denis-VirtualBox homwrk47: Filesystem state: clean
Apr 24 15:44:54 denis-VirtualBox homwrk47: Errors behavior: Continue
Apr 24 15:44:54 denis-VirtualBox homwrk47: Filesystem OS type: Linux
Apr 24 15:44:54 denis-VirtualBox homwrk47: Inode count: 655360
Apr 24 15:44:54 denis-VirtualBox homwrk47: Block count: 2620928
Apr 24 15:44:54 denis-VirtualBox homwrk47: Reserved block count: 131046
Apr 24 15:44:54 denis-VirtualBox homwrk47: Free blocks: 647255

```

Apr 24 15:44:54 denis-VirtualBox homwrk47: Free inodes: 467515  
Apr 24 15:44:54 denis-VirtualBox homwrk47: First block: 0  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Block size: 4096  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Fragment size: 4096  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Group descriptor size: 64  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Reserved GDT blocks: 1024  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Blocks per group: 32768  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Fragments per group: 32768  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Inodes per group: 8192  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Inode blocks per group: 512  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Flex block group size: 16  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Filesystem created: Tue Mar 24 16:55:17 2020  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Last mount time: Fri Apr 24 15:05:09 2020  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Last write time: Fri Apr 24 15:05:04 2020  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Mount count: 31  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Maximum mount count: -1  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Last checked: Tue Mar 24 16:55:17 2020  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Check interval: 0 (<none>)  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Lifetime writes: 9 GB  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Reserved blocks uid: 0 (user root)  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Reserved blocks gid: 0 (group root)  
Apr 24 15:44:54 denis-VirtualBox homwrk47: First inode: 11  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Inode size:#011 256  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Required extra isize: 32  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Desired extra isize: 32  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Journal inode: 8  
Apr 24 15:44:54 denis-VirtualBox homwrk47: First orphan inode: 425638  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Default directory hash: half\_md4  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Directory Hash Seed: 506c8169-b6e7-4add-8d01-0c286809f640  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Journal backup: inode blocks  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Checksum type: crc32c  
Apr 24 15:44:54 denis-VirtualBox homwrk47: Checksum: 0xab6788d8  
Apr 24 16:23:52 denis-VirtualBox homwrk47: drwxrwxrwx 2 guest guest 4096 κbi 24 16:21 /tmp/acl\_test  
Apr 24 16:23:57 denis-VirtualBox homwrk47: total 0  
Apr 24 16:23:57 denis-VirtualBox homwrk47: -rw-rw-r-- 1 utest utest 0 κbi 24 16:21 utest.txt

Apr 24 16:27:38 denis-VirtualBox homwrk47: # file: tmp/acl\_test  
Apr 24 16:27:38 denis-VirtualBox homwrk47: # owner: guest  
Apr 24 16:27:38 denis-VirtualBox homwrk47: # group: guest  
Apr 24 16:27:38 denis-VirtualBox homwrk47: user::rwx  
Apr 24 16:27:38 denis-VirtualBox homwrk47: group::rwx  
Apr 24 16:27:38 denis-VirtualBox homwrk47: other::rwx  
Apr 24 16:27:38 denis-VirtualBox homwrk47:  
Apr 24 16:28:33 denis-VirtualBox homwrk47: # file: tmp/acl\_test/utest.txt  
Apr 24 16:28:33 denis-VirtualBox homwrk47: # owner: utest  
Apr 24 16:28:33 denis-VirtualBox homwrk47: # group: utest  
Apr 24 16:28:33 denis-VirtualBox homwrk47: user::rw-  
Apr 24 16:28:33 denis-VirtualBox homwrk47: group::rw-  
Apr 24 16:28:33 denis-VirtualBox homwrk47: other::r--  
Apr 24 16:28:33 denis-VirtualBox homwrk47:  
Apr 24 16:44:17 denis-VirtualBox homwrk47: # file: tmp/acl\_test  
Apr 24 16:44:17 denis-VirtualBox homwrk47: # owner: guest  
Apr 24 16:44:17 denis-VirtualBox homwrk47: # group: guest  
Apr 24 16:44:17 denis-VirtualBox homwrk47: user::rwx  
Apr 24 16:44:17 denis-VirtualBox homwrk47: user:utest:r--  
Apr 24 16:44:17 denis-VirtualBox homwrk47: group::rwx  
Apr 24 16:44:17 denis-VirtualBox homwrk47: mask::rwx  
Apr 24 16:44:17 denis-VirtualBox homwrk47: other::rwx  
Apr 24 16:44:17 denis-VirtualBox homwrk47:  
Apr 24 17:11:15 denis-VirtualBox homwrk47: # file: tmp/acl\_test/utest2.txt  
Apr 24 17:11:15 denis-VirtualBox homwrk47: # owner: utest  
Apr 24 17:11:15 denis-VirtualBox homwrk47: # group: utest  
Apr 24 17:11:15 denis-VirtualBox homwrk47: user::---  
Apr 24 17:11:15 denis-VirtualBox homwrk47: user:utest:r--  
Apr 24 17:11:15 denis-VirtualBox homwrk47: group::rwx#011#effective:rw-  
Apr 24 17:11:15 denis-VirtualBox homwrk47: mask::rw-  
Apr 24 17:11:15 denis-VirtualBox homwrk47: other::---  
Apr 24 17:11:15 denis-VirtualBox homwrk47:  
Apr 24 17:20:12 denis-VirtualBox homwrk47: # file: tmp/acl\_test  
Apr 24 17:20:12 denis-VirtualBox homwrk47: # owner: guest  
Apr 24 17:20:12 denis-VirtualBox homwrk47: # group: guest  
Apr 24 17:20:12 denis-VirtualBox homwrk47: user::---  
Apr 24 17:20:12 denis-VirtualBox homwrk47: user:utest:r--  
Apr 24 17:20:12 denis-VirtualBox homwrk47: group::rwx#011#effective:r--



Apr 24 17:20:12 denis-VirtualBox homwrk47: mask::r--  
Apr 24 17:20:12 denis-VirtualBox homwrk47: other::---  
Apr 24 17:20:12 denis-VirtualBox homwrk47: default:user::---  
Apr 24 17:20:12 denis-VirtualBox homwrk47: default:user:utest:r--  
Apr 24 17:20:12 denis-VirtualBox homwrk47: default:group::rwx  
Apr 24 17:20:12 denis-VirtualBox homwrk47: default:mask::rwx  
Apr 24 17:20:12 denis-VirtualBox homwrk47: default:other::---  
Apr 24 17:20:12 denis-VirtualBox homwrk47: