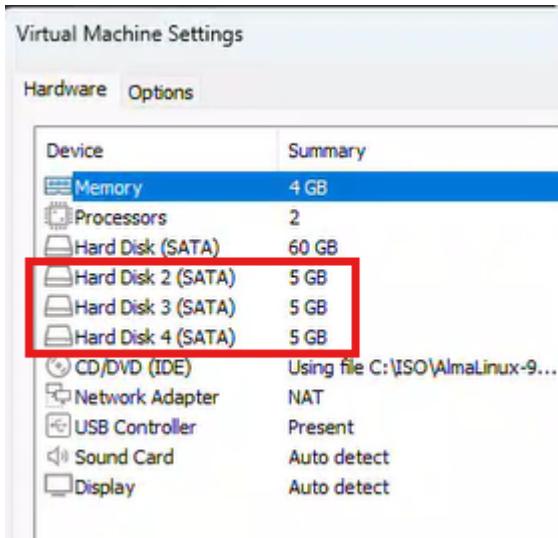


Exercise 1 – Disk Management with LVM

Tasks to Perform on AlmaLinux:

- Add three **SATA** drives to your AlmaLinux virtual machine (**5 GB** each).



- Open a Shell terminal and type the **sudo -su** command to work with the **root** account.
- Check that all three disks are added.

`sudo su -`

`lsblk`

```
[mperez@server1 ~]$ su -
Password:
[root@server1 ~]# lsblk
NAME   MAJ:MIN RM  SIZE RO TYPE MOUNTPOINTS
sda     8:0    0   60G  0 disk
|---sda1  8:1    0   2M  0 part
|---sda2  8:2    0   1G  0 part /boot
|---sda3  8:3    0   40G 0 part /
|---sda4  8:4    0   1K  0 part
|---sda5  8:5    0   8G  0 part /var
|---sda6  8:6    0   4G  0 part [SWAP]
sdb     8:16   0   5G  0 disk
|---sdc   8:32   0   5G  0 disk
|---sdd   8:48   0   5G  0 disk
sr0    11:0    1 10.6G 0 rom  /run/media/mperez/AlmaLinux-9-5-x86_64-dvd
[root@server1 ~]#
```

- For each disk, create a **physical volume** (total of **3 PV**).

`pvcreate /dev/sdb`

`pvcreate /dev/sdc`

`pvcreate /dev/sdd`

Lab 4 – LVM Storage-Quota Management

```
[root@server1 ~]# pvcreate /dev/sdb
[root@server1 ~]# Physical volume "/dev/sdb" successfully created.
Creating devices file /etc/lvm/devices/system.devices
[root@server1 ~]# pvcreate /dev/sdc
Physical volume "/dev/sdc" successfully created.
[root@server1 ~]# pvcreate /dev/sdd
Physical volume "/dev/sdd" successfully created.
[root@server1 ~]#
```

5. Check that the three physical volumes are created correctly.

[pvdisplay](#)

```
[root@server1 ~]# pvdisplay
[root@server1 ~]# pvdisplay
"/dev/sdb" is a new physical volume of "5.00 GiB"
--- NEW Physical volume ---
PV Name          /dev/sdb ←
VG Name
PV Size         5.00 GiB
Allocatable     NO
PE Size          0
Total PE        0
Free PE         0
Allocated PE    0
PV UUID         WAjjWh-z1Cf-KSq2-SMRE-063K-mPTk-jRYDDw

"/dev/sdc" is a new physical volume of "5.00 GiB"
--- NEW Physical volume ---
PV Name          /dev/sdc ←
VG Name
PV Size         5.00 GiB
Allocatable     NO
PE Size          0
Total PE        0
Free PE         0
Allocated PE    0
PV UUID         zrrl8N-4UCZ-znwt-xV0A-UPxd-nXrr-GQFYnn

"/dev/sdd" is a new physical volume of "5.00 GiB"
--- NEW Physical volume ---
PV Name          /dev/sdd ←
VG Name
PV Size         5.00 GiB
Allocatable     NO
PE Size          0
Total PE        0
Free PE         0
Allocated PE    0
PV UUID         50gfQo-nzuv-Idde-8mDa-rEpU-LtIh-uYeVCG

[root@server1 ~]#
```

6. Create a **Volume Group** using only two physical volumes, and name it **LAB4_VG**.

[vgcreate LAB4_VG /dev/sdb /dev/sdc](#)

```
[root@server1 ~]# vgcreate LAB4_VG /dev/sdb /dev/sdc
Volume group "LAB4_VG" successfully created
[root@server1 ~]#
```

7. Verify that the volume group **LAB4_VG** is created.

vgdisplay

```
[root@server1 ~]# [root@server1 ~]# vgdisplay
--- Volume group ---
VG Name          LAB4_VG
System ID
Format           lvm2
Metadata Areas   2
Metadata Sequence No 1
VG Access        read/write
VG Status         resizable
MAX LV            0
Cur LV            0
Open LV            0
Max PV            0
Cur PV            2
Act PV            2
VG Size           9.99 GiB
PE Size           4.00 MiB
Total PE          2558
Alloc PE / Size  0 / 0
Free  PE / Size  2558 / 9.99 GiB
VG UUID          LB0GwK-PwcS-4Cyz-voM4-lFWH-KQeD-LyMpIj
[root@server1 ~]#
```

8. In the new volume group, create these **two logical volumes**:

lvcreate -L 6G -n LV1 LAB4_VG

lvcreate -L 3G -n LV2 LAB4_VG

Name	Size
LV1	6 GB
LV2	3 GB

lvcreate -L 6G -n LV1 LAB4_VG

lvcreate -L 3G -n LV2 LAB4_VG

Lab 4 – LVM Storage-Quota Management

```
[root@server1 ~]# lvcreate -L 6G -n LV1 LAB4_VG
Logical volume "LV1" created.
[root@server1 ~]# lvcreate -L 3G -n LV2 LAB4_VG
Logical volume "LV2" created.
[root@server1 ~]#
```

9. Check that the two logical volumes are created correctly.

lvdisplay

```
[root@server1 ~]# lvdisplay
--- Logical volume ---
LV Path          /dev/LAB4_VG/LV1
LV Name          LV1
VG Name          LAB4_VG
LV UUID          84aasC-5q9K-Lxu8-W35k-8Mr3-29JL-M0Mkt0
LV Write Access   read/write
LV Creation host, time server1, 2025-03-27 12:12:16 -0400
LV Status         available
# open            0
LV Size          6.00 GiB
Current LE        1536
Segments          2
Allocation        inherit
Read ahead sectors auto
- currently set to 256
Block device     253:0

--- Logical volume ---
LV Path          /dev/LAB4_VG/LV2
LV Name          LV2
VG Name          LAB4_VG
LV UUID          FrdcKd-g2Qt-39UK-geqj-jds7-dRa5-T8ds2p
LV Write Access   read/write
LV Creation host, time server1, 2025-03-27 12:12:35 -0400
LV Status         available
# open            0
LV Size          3.00 GiB
Current LE        768
Segments          1
Allocation        inherit
Read ahead sectors auto
- currently set to 256
Block device     253:1

[root@server1 ~]#
```

10. Format **LV1** and **LV2** as **ext4**.

`mkfs.ext4 /dev/LAB4_VG/LV1`

`mkfs.ext4 /dev/LAB4_VG/LV2`

Lab 4 – LVM Storage-Quota Management

```
[root@server1 ~]# mkfs.ext4 /dev/LAB4_VG/LV1
mke2fs 1.46.5 (30-Dec-2021)
Creating filesystem with 1572864 4k blocks and 393216 inodes
Filesystem UUID: b9bd55fa-9500-4341-9c20-96fbe52f83b5
Superblock backups stored on blocks:
    32768, 98304, 163840, 229376, 294912, 819200, 884736

Allocating group tables: done
Writing inode tables: done
Creating journal (16384 blocks): done
Writing superblocks and filesystem accounting information: done

[root@server1 ~]# mkfs.ext4 /dev/LAB4_VG/LV2
mke2fs 1.46.5 (30-Dec-2021)
Creating filesystem with 786432 4k blocks and 196608 inodes
Filesystem UUID: 10d8bdbab-3f04-458e-a80e-8da7579d8950
Superblock backups stored on blocks:
    32768, 98304, 163840, 229376, 294912

Allocating group tables: done
Writing inode tables: done
Creating journal (16384 blocks): done
Writing superblocks and filesystem accounting information: done

[root@server1 ~]#
```

11. Check that the LV1 and LV2 are properly formatted.

lsblk -f

```
[root@server1 ~]#
[root@server1 ~]# lsblk -f
NAME   FSTYPE   FSVER     LABEL           UUID                                     FSAVAIL FSUSE% MOUNTPOINTS
sda
├─sda1
├─sda2   xfs
├─sda3   xfs
├─sda4
├─sda5   xfs
└─sda6   swap    1          LVM2_member  3e93212d-ed19-48ec-956a-c7ee2c69ddcd  7.4G    7% /var
[swap]
sdb
└─LAB4_VG-LV1 ext4    1.0        LVM2_member  7cd889d3-7c5c-4634-a073-c1222a35b797  514.6M  46% /boot
                               682e9718-e2d2-4752-88b6-8ea3eb088c93  34.9G  13% /
                               WAjJwh-z1CF-KSq2-SMRE-063K-mPTk-JRYDdw
                               b9bd55fa-9500-4341-9c20-96fbe52f83b5
                               zrrl8N-4UCZ-znwt-xV0A-UPxd-nXr-GOFYnn
                               b9bd55fa-9500-4341-9c20-96fbe52f83b5
                               10d8bdbab-3f04-458e-a80e-8da7579d8950
                               50gf0o-nzuv-Idde-8mDa-rEpU-LtIh-uYeVCG
                               0         100% /run/media/mperez/AlmaLinux-9-5-x86_64-dvd
sr0      iso9660
[root@server1 ~]# lsblk
```

12. Create the /Docs directory.

mkdir /Docs

```
root
[root@server1 ~]# mkdir /Docs
[root@server1 ~]#
```

13. Create the /home/<your_user>/volume directory.

mkdir -p /home/mperez/volume

```
[root@server1 ~]# mkdir -p /home/mperez/volume
[root@server1 ~]# ll /home/mperez/
total 0
drwxr-xr-x. 2 mperez mperez 6 Mar 24 14:21 Desktop
drwxr-xr-x. 2 mperez mperez 6 Mar 24 14:21 Documents
drwxr-xr-x. 2 mperez mperez 6 Mar 24 14:21 Downloads
drwxr-xr-x. 2 mperez mperez 6 Mar 24 14:21 Music
drwxr-xr-x. 2 mperez mperez 6 Mar 24 14:21 Pictures
drwxr-xr-x. 2 mperez mperez 6 Mar 24 14:21 Public
drwxr-xr-x. 2 mperez mperez 6 Mar 24 14:21 Templates
drwxr-xr-x. 2 mperez mperez 6 Mar 24 14:21 Videos
drwxr-xr-x. 2 root   root   6 Mar 27 18:18 volume
[root@server1 ~]#
```

14. Mount **LV1** in **/Docs**

```
mount /dev/LAB4_VG/LV1 /Docs
```

15. Mount **LV2** in **/home/<your_user>/volume**.

```
mount /dev/LAB4_VG/LV2 /home/mperez/volume
```

```
[root@server1 ~]# mount /dev/LAB4_VG/LV1 /Docs
[root@server1 ~]#
[root@server1 ~]# mount /dev/LAB4_VG/LV2 /home/mperez/volume/
[root@server1 ~]#
```

16. Check that the two logical volumes **LV1** and **LV2** are mounted correctly.

```
df -h
```

```
[root@server1 ~]# df -h
Filesystem      Size  Used Avail Use% Mounted on
/devtmpfs        4.0M   0    4.0M  0% /dev
tmpfs           1.8G   0    1.8G  0% /dev/shm
tmpfs           726M  9.7M  716M  2% /run
/dev/sda3        40G  5.1G  35G  13% /
/dev/sda5        8.0G 540M  7.5G  7% /var
/dev/sda2       960M 446M  515M  47% /boot
tmpfs           363M 108K  363M  1% /run/user/1000
/dev/sr0         11G  11G   0 100% /run/media/mperez/AlmaLinux-9-5-x86_64-dvd
/dev/mapper/LAB4_VG-LV1  5.9G  24K  5.6G  1% /Docs
/dev/mapper/LAB4_VG-LV2  2.9G  24K  2.8G  1% /home/mperez/volume
[root@server1 ~]#
```

17. Add the **3rd physical disk** to the **LAB4_VG volume group**.

```
pvcreate /dev/sdd
```

```
vgextend LAB4_VG /dev/sdd
```

```
[root@server1 ~]#
[root@server1 ~]# # Add a new disk or partition. Initialize disk as a physical volume.
[root@server1 ~]# pvcreate /dev/sdd
  Physical volume "/dev/sdd" successfully created.
[root@server1 ~]# # Add the new disk to our volume
[root@server1 ~]# ## The third disk is added to the volume group
[root@server1 ~]# vgextend LAB4_VG /dev/sdd
  Volume group "LAB4_VG" successfully extended
[root@server1 ~]#
```

18. Extend the size of the **LV1** by **5 GB** more, for a total size of **11 GB**.

```
umount /Docs
```

```
lvresize --resizelfs --size +5G /dev/LAB4_VG/LV1
```

Lab 4 – LVM Storage-Quota Management

```
[root@server1 ~]# ## To resize a logical volume , it is necessary to
[root@server1 ~]# ## umount the file system before
[root@server1 ~]# umount /Docs
[root@server1 ~]# lvresize --resizelfs --size +5G /dev/LAB4_VG/LV1
  Size of logical volume LAB4_VG/LV1 changed from 6.00 GiB (1536 extents) to 11.00 GiB (2816 extents).
  File system ext4 found on LAB4_VG/LV1.
  File system fsck will be run before extend.
  Extending file system ext4 to 11.00 GiB (11811160064 bytes) on LAB4_VG/LV1...
e2fsck /dev/LAB4_VG/LV1
/dev/LAB4_VG/LV1: 11/393216 files (0.0% non-contiguous), 47214/1572864 blocks
e2fsck done
resize2fs /dev/LAB4_VG/LV1
resize2fs 1.46.5 (30-Dec-2021)
Resizing the filesystem on /dev/LAB4_VG/LV1 to 2883584 (4k) blocks.
The filesystem on /dev/LAB4_VG/LV1 is now 2883584 (4k) blocks long.

resize2fs done
  Extended file system ext4 on LAB4_VG/LV1.
  Logical volume LAB4_VG/LV1 successfully resized.
[root@server1 ~]#
```

[mount /dev/LAB4_VG/LV1 /Docs](#)

```
[root@server1 ~]#
[root@server1 ~]# mount /dev/LAB4_VG/LV1 /Docs
[root@server1 ~]# █
```

19. Decrease the size of the **LV2** by **250 MB**.

a. umount LV2

[umount /dev/LAB4_VG/LV2 /home/mperez/volume](#)

b. Resize by 250

Sets the new size to 2.75 GB (subtracting 250 MB from the original size).[mount /dev/LAB4_VG/LV2](#)

[lvresize --resizelfs --size 2750M /dev/LAB4_VG/LV2](#)

c. Re mount

[mount /dev/LAB4_VG/LV2 /home/mperez/volume](#)

```
[root@server1 ~]# # umount LV2 before size reduction
[root@server1 ~]# umount /dev/LAB4_VG/LV2 /home/mperez/volume/
umount: /home/mperez/volume/: not mounted.
[root@server1 ~]# # resize by 250
[root@server1 ~]# lvresize --resizelfs --size 2750M /dev/LAB4_VG/LV2
  Rounding size to boundary between physical extents: <2.69 GiB.
  File system ext4 found on LAB4_VG/LV2.
  File system size (3.00 GiB) is larger than the requested size (<2.69 GiB).
  File system reduce is required using resize2fs.
  File system fsck will be run before reduce.
  Reducing file system ext4 to <2.69 GiB (2885681152 bytes) on LAB4_VG/LV2...
e2fsck /dev/LAB4_VG/LV2
/dev/LAB4_VG/LV2: 11/196668 files (0.0% non-contiguous), 31036/786432 blocks
e2fsck done
resize2fs /dev/LAB4_VG/LV2 2818048k
resize2fs 1.46.5 (30-Dec-2021)
Resizing the filesystem on /dev/LAB4_VG/LV2 to 704512 (4k) blocks.
The filesystem on /dev/LAB4_VG/LV2 is now 704512 (4k) blocks long.

resize2fs done
  Reduced file system ext4 on LAB4_VG/LV2.
  Size of logical volume LAB4_VG/LV2 changed from 3.00 GiB (768 extents) to <2.69 GiB (688 extents).
  Logical volume LAB4_VG/LV2 successfully resized.
[root@server1 ~]# # mount LV2 after size reduction
[root@server1 ~]# mount /dev/LAB4_VG/LV2 /home/mperez/volume/
[root@server1 ~]#
```

20. Check that the size of the **LV1** and **LV2** have changed.

[lvdisplay](#)

Lab 4 – LVM Storage-Quota Management

df -h

lsblk

```
[root@server1 ~]# 
[root@server1 ~]# mount /dev/LAB4_VG/LV1 /Docs
[root@server1 ~]#
[root@server1 ~]#
[root@server1 ~]#
[root@server1 ~]# df -h
Filesystem      Size  Used Avail Use% Mounted on
/devtmpfs        4.0M   0   4.0M  0% /dev
tmpfs           1.8G   0   1.8G  0% /dev/shm
tmpfs           726M  14M  713M  2% /run
/dev/sda3        40G  5.1G  35G  13% /
/dev/sda5        8.0G  540M  7.5G  7% /var
/dev/sda2       960M  446M  515M  47% /boot
tmpfs           363M 108K  363M  1% /run/user/1000
/dev/sr0          11G   1G   0 100% /run/media/mperez/AlmaLinux-9-5-x86_64-dvd
/dev/mapper/LAB4_VG-LV2  2.6G  24K  2.5G  1% /home/mperez/volume
/dev/mapper/LAB4_VG-LV1  11G  24K  11G  1% /Docs
```

```
[root@server1 ~]# lvdisplay
--- Logical volume ---
LV Path          /dev/LAB4_VG/LV1
LV Name          LV1
VG Name          LAB4_VG
LV UUID          84aasC-5q9K-Lxu8-W35k-8Mr3-29JL-MOMKt0
LV Write Access  read/write
LV Creation host, time server1, 2025-03-27 12:12:16 -0400
LV Status        available
# open           1
LV Size          11.00 GiB
Current LE       2816
Segments         4
Allocation       inherit
Read ahead sectors auto
- currently set to 256
Block device     253:0

--- Logical volume ---
LV Path          /dev/LAB4_VG/LV2
LV Name          LV2
VG Name          LAB4_VG
LV UUID          FrdcKd-g2Qt-39UK-geqj-jds7-dRa5-T8ds2p
LV Write Access  read/write
LV Creation host, time server1, 2025-03-27 12:12:35 -0400
LV Status        available
# open           1
LV Size          <2.69 GiB
Current LE       688
Segments         1
Allocation       inherit
Read ahead sectors auto
- currently set to 256
Block device     253:1
```

Lab 4 – LVM Storage-Quota Management

```
[root@server1 ~]# lsblk
[...]
[redacted]
[redacted]
```

21. Delete the **LV2** logical volume. (*Remember to unmount it the volume before*).

```
umount /home/mperez/volume
```

```
lvremove /dev/LAB4_VG/LV2
```

```
[root@server1 ~]#
[root@server1 ~]# umount /home/mperez/volume/
[root@server1 ~]# lvremove /dev/LAB4_VG/LV2
Do you really want to remove active logical volume LAB4_VG/LV2? [y/n]: y
  Logical volume "LV2" successfully removed.
[root@server1 ~]#
```

22. Check that the logical volume **LV2** has been deleted.

```
lvdisplay
```

```
[root@server1 ~]# lvdisplay
  Logical volume "LV2" successfully removed.
[redacted]
[redacted]
```

23. Unmount the **/Docs** directory.

```
umount /Docs
```

```
[root@server1 ~]# umount /Docs  
[root@server1 ~]# █
```

Exercise 2 – Limiting Storage Space Usage with Quotas

Tasks to Perform on AlmaLinux:

1. Continue working using the **root** account.
2. Check that the **quota** system is installed on your machine

```
[root@server1 ~]# dnf list quota  
Last metadata expiration check: 0:55:29 ago on Thu 27 Mar 2025 08:41:07 PM.  
Installed Packages  
quota.x86_64  
    1:4.09-2.el9
```

3. Activate the **quota** system on the logical volume **/dev/LAB4_VG/LV1**:

```
mkfs.ext4 -O quota /dev/LAB4_VG/LV1
```

```
mount /dev/LAB4_VG/LV1 /Docs
```

```
quotaon /Docs
```

```
[root@server1 ~]#  
[root@server1 ~]# mkfs.ext4 -O quota /dev/LAB4_VG/LV1  
mke2fs 1.46.5 (30-Dec-2021)  
/dev/LAB4_VG/LV1 contains a ext4 file system  
    last mounted on Thu Mar 27 20:35:12 2025  
Proceed anyway? (y,N) y  
Creating filesystem with 2883584 4k blocks and 720896 inodes  
Filesystem UUID: c3c0ad3f-d75f-4d75-8ae4-a78c0a813baa  
Superblock backups stored on blocks:  
    32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208  
Allocating group tables: done  
Writing inode tables: done  
Creating journal (16384 blocks): done  
Writing superblocks and filesystem accounting information: done  
  
[root@server1 ~]# mount /dev/LAB4_VG/LV1 /Docs/  
[root@server1 ~]# quotaon /Docs  
[root@server1 ~]# █
```

4. Create the user **antoine** with the password **alma**.

```
useradd antoine
```

```
passwd Antoine
```

```
[root@server1 ~]# useradd antoine  
[root@server1 ~]# pass  
pass:      passt.avx2 passwd  
[root@server1 ~]# passwd antoine  
Changing password for user antoine.  
New password:  
BAD PASSWORD: The password is shorter than 8 characters  
Retype new password:  
passwd: all authentication tokens updated successfully.  
[root@server1 ~]#
```

5. Assign **antoine** as owner of the folder **/Docs**.

```
chown antoine:antoin /Docs
```

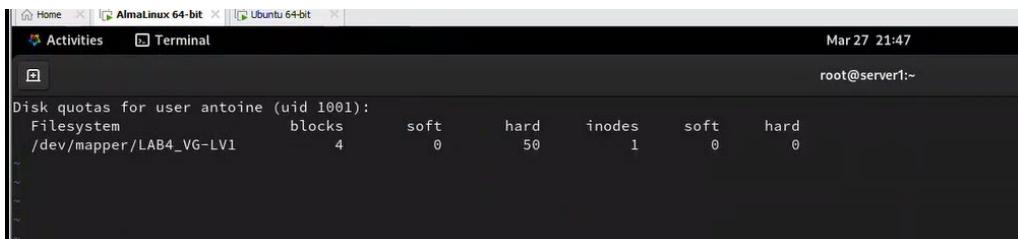
Lab 4 – LVM Storage-Quota Management

```
[root@server1 ~]# ll /
total 28
dr-xr-xr-x. 2 root root 6 Oct 2 17:00 afs
lrwxrwxrwx. 1 root root 7 Oct 2 17:00 bin -> usr/bin
dr-xr-xr-x. 5 root root 4096 Mar 24 16:52 boot
drwxrwxr-x. 20 root root 2580 Mar 27 21:10 dev
drwxr-xr-x. 3 antoine antoine 4096 Mar 27 21:39 Docs
drwxr-xr-x. 139 root root 8192 Mar 27 21:41 etc
drwxr-xr-x. 4 root root 35 Mar 27 21:41 home
lrwxrwxrwx. 1 root root 7 Oct 2 17:00 lib -> usr/lib
lrwxrwxrwx. 1 root root 9 Oct 2 17:00 lib64 -> usr/lib64
drwxr-xr-x. 2 root root 6 Oct 2 17:00 media
drwxr-xr-x. 3 root root 18 Mar 24 14:13 mnt
drwxr-xr-x. 2 root root 6 Oct 2 17:00 opt
dr-xr-xr-x. 378 root root 0 Mar 24 16:51 proc
dr-xr-x---. 4 root root 4096 Mar 27 11:41 root
drwxr-xr-x. 48 root root 1260 Mar 27 06:53 run
lrwxrwxrwx. 1 root root 8 Oct 2 17:00 sbin -> usr/sbin
drwxr-xr-x. 2 root root 6 Oct 2 17:00 srv
dr-xr-xr-x. 13 root root 0 Mar 24 16:51 sys
drwxrwxrwt. 21 root root 4096 Mar 27 21:37 tmp
drwxr-xr-x. 12 root root 144 Mar 24 14:12 usr
drwxr-xr-x. 20 root root 279 Mar 24 14:21 var
```

6. Modify the quota of **antoine** on the **/Docs** directory with the following configuration:

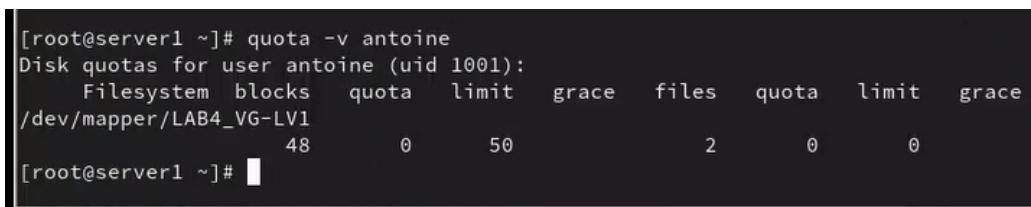
soft Blocks	hard blocks	soft inode	hard Inode
0	50	0	0

edquota -u antoine



```
Disk quotas for user antoine (uid 1001):
Filesystem      blocks   soft    hard   inodes   soft    hard
/dev/mapper/LAB4_VG-LV1      4       0     50       1       0       0
```

quota -v antoine



```
Disk quotas for user antoine (uid 1001):
  Filesystem blocks  quota  limit  grace  files  quota  limit  grace
/dev/mapper/LAB4_VG-LV1      48       0     50           2       0       0       0
```

7. Switch to user antoine: **su – antoine**

```
[root@server1 ~]#
[root@server1 ~]# su - antoine
[antoine@server1 ~]$
```

8. Try to copy the /etc/services file to /Docs.

`cp /etc/services /Docs`

```
[antoine@server1 ~]$ cp /etc/services /Docs
[antoine@server1 ~]$ dm-0: write failed, user block limit reached.
[antoine@server1 ~]$ cp: error writing '/Docs/services': Disk quota exceeded
[antoine@server1 ~]$
```

9. Can you do that? Why?

No - The file copy fails because the 50 hard block quota (approximately 50 KB) for user is exceeded by the size of /etc/services

```
[root@server1 ~]# su - antoine
[antoine@server1 ~]$ ll /etc/services
-rw-r--r--. 1 root root 692252 Jun 23 2020 /etc/services
[antoine@server1 ~]$
```

10. List the **quota** used by the **antoine** user.

`quota -u antoine`

```
[antoine@server1 ~]$ quota -u antoine
Disk quotas for user antoine (uid 1001):
  Filesystem blocks   quota   limit   grace   files   quota   limit   grace
/dev/mapper/LAB4_VG-LV1        48       0      50           2       0       0
[antoine@server1 ~]$
```

11. Did he exceed his quota?

No

From the output of quota -u antoine in your terminal, **antoine has not exceeded his quota yet.**

1. **Blocks Used:**

- o blocks: 48 (used space)
- o **Hard Limit:** 50
- o Since 48 is below the hard limit of 50, the quota has not been exceeded.

2. **Inodes Used:**

- o **Files Used:** 2
- o **Hard Limit:** 0

Lab 4 – LVM Storage-Quota Management

- There's no inode limit defined (both soft and hard limits are 0), so there's no restriction on inode usage.

12. Return to your **root** session: **exit**

```
[antoine@server1 ~]$ exit  
logout  
[root@server1 ~]#
```

13. View a **quota usage report**.

```
repquota -a
```

```
[root@server1 ~]# repquota -a  
*** Report for user quotas on device /dev/mapper/LAB4_VG-LV1  
Block grace time: 7days; Inode grace time: 7days  
      Block limits          File limits  
User        used    soft    hard grace   used    soft    hard grace  
-----  
root      --     16      0      0           1      0      0  
antoine   --     48      0     50           2      0      0  
[root@server1 ~]#
```

14. Modify again the quota of **antoine** on the **/Docs** directory with the following configuration:

Soft Blocks	Strict blocks	Soft inode	Strict Inode
0	0	0	8

```
edquota antoine
```

```
Activities Terminal Mar 27 22:13  
root@server1:~  
Disk quotas for user antoine (uid 1001):  
  Filesystem blocks  soft  hard  inodes  soft  hard  
  /dev/mapper/LAB4_VG-LV1      48      0      0         2      0      8
```

```
quota -v antoine
```

```
[root@server1 ~]# quota -v antoine  
Disk quotas for user antoine (uid 1001):  
  Filesystem blocks  quota  limit  grace  files  quota  limit  grace  
  /dev/mapper/LAB4_VG-LV1      48      0      0             2      0      8  
[root@server1 ~]#
```

15. Switch to user antoine: **su – antoine**

```
[root@server1 ~]#  
[root@server1 ~]# su - antoine  
[antoine@server1 ~]$
```

To direct input to this VM, move the mouse pointer inside or press Ctrl+G

16. Create 5 files in **/Docs**.

```
touch /Docs/file{1..5}
```

```
[root@server1 ~]# touch /Docs/file{1..5}  
[root@server1 ~]# ll  
total 0  
[root@server1 ~]# ll /Docs  
total 60  
-rw-r--r--. 1 antoine antoine 0 Mar 27 22:16 file1  
-rw-r--r--. 1 antoine antoine 0 Mar 27 22:16 file2  
-rw-r--r--. 1 antoine antoine 0 Mar 27 22:16 file3  
-rw-r--r--. 1 antoine antoine 0 Mar 27 22:16 file4  
-rw-r--r--. 1 antoine antoine 0 Mar 27 22:16 file5  
drwx----- 2 root root 16384 Mar 27 21:39 lost+found  
-rw-r--r--. 1 antoine antoine 45056 Mar 27 22:01 services  
[root@server1 ~]$
```

17. Can you do that? Why?

Yes, because the hard inode limit is set to 8, and creating 5 files does not exceed this limit.

18. Create 5 more files in **/Docs**.

```
touch /Docs/file{6..10}
```

```
[root@server1 ~]# touch /Docs/file{6..10}  
dm-0: write failed, user file limit reached.  
touch: cannot touch '/Docs/file7': Disk quota exceeded  
touch: cannot touch '/Docs/file8': Disk quota exceeded  
touch: cannot touch '/Docs/file9': Disk quota exceeded  
touch: cannot touch '/Docs/file10': Disk quota exceeded  
[root@server1 ~]$
```

II /Docs

```
[root@server1 ~]# ll /Docs  
total 60  
-rw-r--r--. 1 antoine antoine 0 Mar 27 22:16 file1  
-rw-r--r--. 1 antoine antoine 0 Mar 27 22:16 file2  
-rw-r--r--. 1 antoine antoine 0 Mar 27 22:16 file3  
-rw-r--r--. 1 antoine antoine 0 Mar 27 22:16 file4  
-rw-r--r--. 1 antoine antoine 0 Mar 27 22:16 file5  
-rw-r--r--. 1 antoine antoine 0 Mar 27 22:17 file6  
drwx----- 2 root root 16384 Mar 27 21:39 lost+found  
-rw-r--r--. 1 antoine antoine 45056 Mar 27 22:01 services  
[root@server1 ~]$
```

Lab 4 – LVM Storage-Quota Management

19. Can you do that? Why?

No, because the hard inode limit of 8 will be exceeded by creating more than 8 files.

20. List the **quota** used by the **antoine** user.

`quota -u antoine`

```
[root@server1 ~]# [antoine@server1 ~]$ quota -u antoine
Disk quotas for user antoine (uid 1001):
  Filesystem  blocks   quota   limit   grace   files   quota   limit   grace
  /dev/mapper/LAB4_VG-LV1
                48       0       0          8*
                0       0       8
[antoine@server1 ~]$
```

21. Did **antoine** exceed his quota?

Yes, the user `antoine` has exceeded the file quota. From the output we can see that the user has used 8* files, which matches the hard inode limit of 8 inodes set for the quota on the `/Docs` directory. This means that no additional files can be created by `antoine` in this directory.

The asterisk (`*`) next to the number of files in the output indicates that the quota limit has been reached or exceeded.

22. Return to the **root** session.

`exit`

```
[antoine@server1 ~]$ exit
logout
[root@server1 ~]#
```

23. View a quota usage report of your system.

`repquota -a`

```
[root@server1 ~]# [root@server1 ~]# repquota -a
*** Report for user quotas on device /dev/mapper/LAB4_VG-LV1
Block grace time: 7days; Inode grace time: 7days
      Block limits                      File limits
User        used    soft    hard grace     used    soft    hard grace
-----
root      --      16      0      0            1      0      0
antoine   --      48      0      0            8      0      8

[root@server1 ~]#
```

Exercise 3 – Delete Logical Volumes

Lab 4 – LVM Storage-Quota Management

1. Unmount the **/Docs** directory.
2. Delete logical volume **LV1**.
3. Delete the volume group **LAB4_VG**.

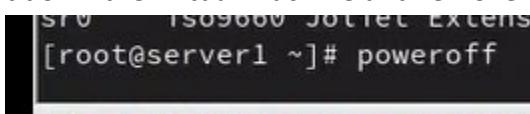
```
[root@server1 ~]#  
[root@server1 ~]# umount /Docs  
[root@server1 ~]# lvremove /dev/LAB4_VG/LV1  
Do you really want to remove active logical volume LAB4_VG/LV1? [y/n]: y  
Logical volume "LV1" successfully removed.  
[root@server1 ~]# vgremove LAB4_VG  
Volume group "LAB4_VG" successfully removed  
[root@server1 ~]#  
[root@server1 ~]# vgreduce  
[root@server1 ~]# lvdiskdisplay  
[root@server1 ~]#
```

4. Delete the three physical volumes.

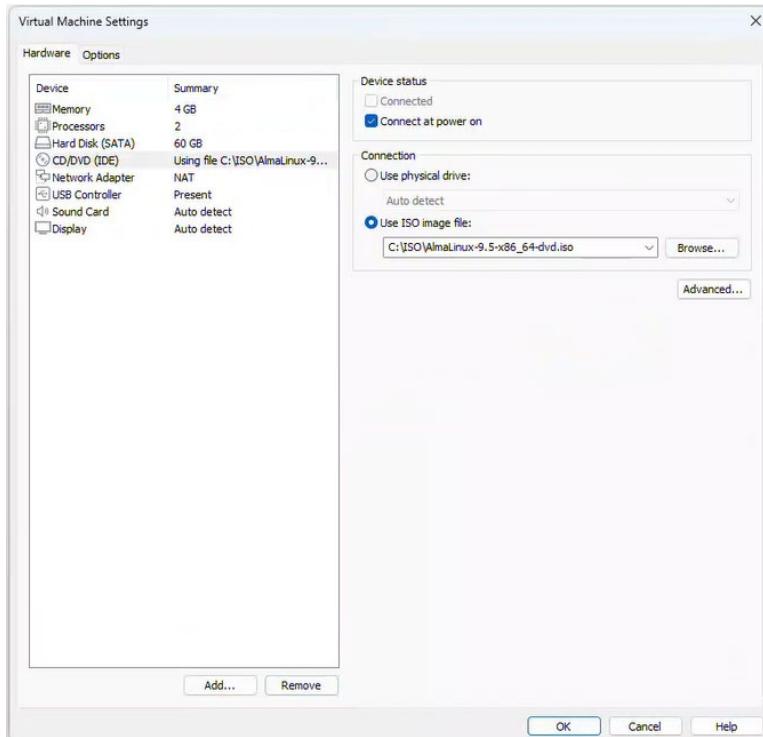
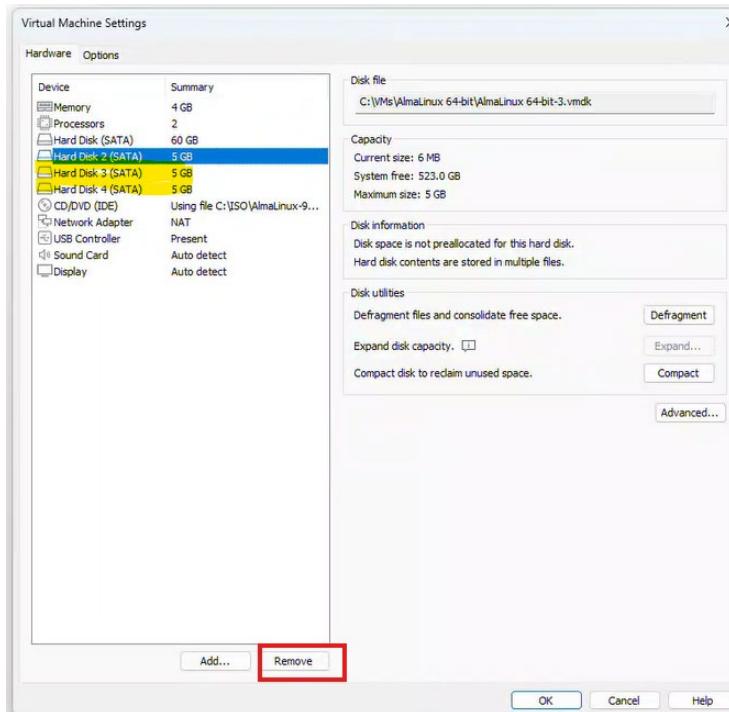
```
[root@server1 ~]#  
[root@server1 ~]# ### Delete three physical volumes  
[root@server1 ~]# pvremove /dev/sdb  
Labels on physical volume "/dev/sdb" successfully wiped.  
[root@server1 ~]# pvremove /dev/sdc  
Labels on physical volume "/dev/sdc" successfully wiped.  
[root@server1 ~]# pvremove /dev/sdd  
Labels on physical volume "/dev/sdd" successfully wiped.
```

```
[root@server1 ~]# df -h  
Filesystem      Size  Used Avail Use% Mounted on  
devtmpfs        4.0M   0  4.0M  0% /dev  
tmpfs          1.8G   0  1.8G  0% /dev/shm  
tmpfs          726M  16M  713M  2% /run  
/dev/sda3       400G  8.1G  391G  2% /  
/dev/sda5        8.0G  540M  7.5G  7% /var  
/dev/sda2       960G  446M  915G  47% /boot  
tmpfs          363M 112K  363M  1% /run/user/1000  
/dev/sr0         11G  11G   0 100% /run/media/mperez/AlmaLinux-9-5-x86_64-dvd  
[root@server1 ~]# lsblk -f  
NAME   MAJ:MIN RW  SIZE TYPE MOUNTPOINTS  
sda      8:0    0  60G  disk  
└─sda1   8:1    0  2G  part  
└─sda2   8:2    0  1G  part /boot  
└─sda3   8:3    0 400G part /  
└─sda4   8:4    0  1K  part /lost+found  
└─sda5   8:5    0  8G  part /var  
└─sda6   8:6    0  4G  part [SWAP]  
sdb      8:16   0  5G  disk  
└─sdb2   8:17   0  5G  part /boot  
sdc      8:32   0  5G  disk  
└─sdc2   8:33   0  5G  part /  
sr0     11:0    1 10.6G rom  /run/media/mperez/AlmaLinux-9-5-x86_64-dvd  
[root@server1 ~]# lsblk -f  
NAME   FSType FSVER LABEL           UUID                                     FSavail FSuse% MOUNTPOINTS  
sda  
└─sda1  
└─sda2 xfs  
└─sda3 xfs  
└─sda4  
└─sda5 xfs  
└─sda6 swap  1  
sdb  
sdc  
sdd  
sr0 iso9660 Joliet Extension AlmaLinux-9-5-x86_64-dvd 2024-11-13-09-58-50-00          0  100% /run/media/mperez/AlmaLinux-9-5-x86_64-dvd
```

5. Shut down the virtual machine and remove the three new disks from the VM.



Lab 4 – LVM Storage-Quota Management



Lab 4 – LVM Storage-Quota Management

```
[mperez@server1 ~]$ lsblk
NAME  MAJ:MIN RM  SIZE RO TYPE MOUNTPOINTS
sda    8:0    0   66G  0 disk
└─sda1  8:1    0   2M  0 part /boot
sda2   8:2    0   1G  0 part /
sda3   8:3    0  40G  0 part /
sda4   8:4    0   1K  0 part
sda5   8:5    0   8G  0 part /var
sda6   8:6    0   4G  0 part [SWAP]
sr0   11:0    1 10.6G 0 rom  /run/media/mperez/AlmaLinux-9-5-x86_64-dvd

[mperez@server1 ~]$ df -h
Filesystem      Size  Used Avail Use% Mounted on
devtmpfs        4.0M   0  4.0M  0% /dev
tmpfs          1.8G   0  1.8G  0% /dev/shm
tmpfs          726M  9.7M 716M  2% /run
/dev/sda3       40G  5.1G 35G  13% /
/dev/sda2      968M 446M 515M 47% /boot
/dev/sda5       8.8G 541M 7.5G  7% /var
tmpfs          363M  96K 363M  1% /run/user/1000
/dev/sr0        11G   1G  10G 100% /run/media/mperez/AlmaLinux-9-5-x86_64-dvd
[mperez@server1 ~]$ lsblk -f
NAME FSTYPE FSVER LABEL UUID                                     FSAVAIL FUSE% MOUNTPOINTS
sda
└─sda1
sda2   xfs
└─sda3   xfs
sda4
sda5   xfs
└─sda6   swap  1
sr0   iso966 Jolie AlmaLinux-9-5-x86_64-dvd 2024-11-13-09-58-00 0 100% /run/media/mperez/AlmaLinux-9-5-x86_64-dvd

[mperez@server1 ~]$
```