

Лабораторная работа №15

Управление логическими томами

Анастасия Мазуркевич

23 ноября 2025

Российский университет дружбы народов, Москва, Россия

Цель работы

Получить практические навыки создания, управления и масштабирования логических томов в Linux с использованием LVM.

Ход выполнения

Создание физического тома

```
Partition type
  p   primary (0 primary, 0 extended, 4 free)
  e   extended (container for logical partitions)
Select (default p): p
Partition number (1-4, default 1): 1
First sector (2048-3145727, default 2048):
Last sector, +/-sectors or +/-size{K,M,G,T,P} (2048-3145727, default 3145727): +300M
```

Created a new partition 1 of type 'Linux' and of size 300 MiB.

Partition #1 contains a xfs signature.

Do you want to remove the signature? [Y]es/[N]o: Y

The signature will be removed by a write command.

```
Command (m for help): t
Selected partition 1
Hex code or alias (type L to list all): 8e
Changed type of partition 'Linux' to 'Linux LVM'.
```

```
Command (m for help): w
The partition table has been altered.
Calling ioctl() to re-read partition table.
Syncing disks.
```

```
root@admazurkevich:/home/admazurkevich# partprobe /dev/sdb
```

```
root@admazurkevich:/home/admazurkevich# pvcreate /dev/sdb1
```

Physical volume "/dev/sdb1" successfully created.

```
root@admazurkevich:/home/admazurkevich# pvs
```

PV	VG	Fmt	Attr	PSize	PFree
/dev/sda3	rl_vbox	lvm2	a--	<39.00g	0
/dev/sdb1		lvm2	---	300.00m	300.00m

```
root@admazurkevich:/home/admazurkevich#
```

```
root@admazurkevich:/home/admazurkevich#  
root@admazurkevich:/home/admazurkevich# pvs  
PV          VG      Fmt Attr PSize  PFree  
/dev/sda3   rl_vbox lvm2 a-- <39.00g    0  
/dev/sdb1           lvm2 --- 300.00m 300.00m  
root@admazurkevich:/home/admazurkevich# vgcreate vgdata /dev/sdb1  
Volume group "vgdata" successfully created  
root@admazurkevich:/home/admazurkevich# vgs  
VG      #PV #LV #SN Attr   VSize  VFree  
rl_vbox  1  2  0 wz--n- <39.00g    0  
vgdata   1  0  0 wz--n- 296.00m 296.00m  
root@admazurkevich:/home/admazurkevich# pvs  
PV          VG      Fmt Attr PSize  PFree  
/dev/sda3   rl_vbox lvm2 a-- <39.00g    0  
/dev/sdb1   vgdata  lvm2 a-- 296.00m 296.00m  
root@admazurkevich:/home/admazurkevich#
```

Рис. 2: Физический том /dev/sdb1

```
root@admazurkevich:/home/admazurkevich#
root@admazurkevich:/home/admazurkevich# lvcreate -n lvdata -l 50%FREE vgdata
Logical volume "lvdata" created.
root@admazurkevich:/home/admazurkevich# lvs
LV      VG      Attr      LSize   Pool Origin Data%  Meta%   Move Log Cpy%Sync Convert
root    rl_vbox  -wi-ao---- 35.05g
swap    rl_vbox  -wi-ao---- <3.95g
lvdata   vgdata  -wi-a----- 148.00m
root@admazurkevich:/home/admazurkevich# mkfs.ext4 /dev/vgdata/lvdata
mke2fs 1.47.1 (20-May-2024)
Creating filesystem with 151552 1k blocks and 37848 inodes
Filesystem UUID: dbec4a19-4e00-485a-bedd-c727373ef240
Superblock backups stored on blocks:
    8193, 24577, 40961, 57345, 73729

Allocating group tables: done
Writing inode tables: done
Creating journal (4096 blocks): done
Writing superblocks and filesystem accounting information: done

root@admazurkevich:/home/admazurkevich# mkdir -p /mnt/data
root@admazurkevich:/home/admazurkevich#
```

Рис. 3: Создание VG vgdata

```
GNU nano 8.1 /etc/fstab

#
# /etc/fstab
# Created by anaconda on Tue Sep  9 17:21:22 2025
#
# Accessible filesystems, by reference, are maintained under '/dev/disk/'.
# See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info.
#
# After editing this file, run 'systemctl daemon-reload' to update systemd
# units generated from this file.
#
UUID=545c5a15-4989-4cc0-ae18-f090649fd991 / xfs defaults 0 0
UUID=3e4d95ea-28f8-4363-bb2f-9248dcacfce9 /boot xfs defaults 0 0
UUID=bfed141b-af25-4a45-8f41-0eb8866bcfd3 none swap defaults 0 0
/dev/vgdata/lvdata /mnt/data ext4 defaults 1 2

#UUID=e06ff9c9-d49b-4a0a-858b-7a982361a83e /mnt/data xfs defaults 1 2
#UUID=5b29e34b-432b-45a9-9225-a7d9460745b9 /mnt/data-ext ext4 defaults 1 2
#UUID=0a09f865-107e-42e9-8e3f-d17d1ee2dac6 none swap defaults 0 0
```

Рис. 4: Создание ФС ext4 на lvdata


```
root@admazurkevich:/home/admazurkevich#  
root@admazurkevich:/home/admazurkevich# mount -a  
mount: (hint) your fstab has been modified, but systemd still uses  
the old version; use 'systemctl daemon-reload' to reload.  
root@admazurkevich:/home/admazurkevich# mount | grep mnt  
/dev/mapper/vgdata-lvdata on /mnt/data type ext4 (rw,relatime,seclabel)  
root@admazurkevich:/home/admazurkevich#
```

Рис. 5: Проверка монтирования /mnt/data

```
Command (m for help): t
Partition number (1,2, default 2): 2
Hex code or alias (type L to list all): 8e

Changed type of partition 'Linux' to 'Linux LVM'.

Command (m for help): p
Disk /dev/sdb: 1.5 GiB, 1610612736 bytes, 3145728 sectors
Disk model: VBOX HARDDISK
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: dos
Disk identifier: 0xb6d11d99

Device      Boot  Start      End  Sectors  Size Id Type
/dev/sdb1                2048  616447   614400  300M 8e Linux LVM
/dev/sdb2             616448 1230847   614400  300M 8e Linux LVM

Command (m for help): w
The partition table has been altered.
Syncing disks.

root@admazurkevich:/home/admazurkevich#
```

Расширение группы томов

```
root@admazurkevich:/home/admazurkevich# pvcreate /dev/sdb2
WARNING: dos signature detected on /dev/sdb2 at offset 510. Wipe it? [y/n]: y
Wiping dos signature on /dev/sdb2.
Physical volume "/dev/sdb2" successfully created.
root@admazurkevich:/home/admazurkevich# vgextend vgdata /dev/sdb2
Volume group "vgdata" successfully extended
root@admazurkevich:/home/admazurkevich# vgs
VG      #PV #LV #SN Attr   VSize   VFree
rl_vbox 1  2  0 wz--n- <39.00g  0
vgdata  2  1  0 wz--n- 592.00m 444.00m
root@admazurkevich:/home/admazurkevich# lvs
LV      VG      Attr   LSize   Pool Origin Data%  Meta%   Move Log Cpy%Sync Convert
root    rl_vbox -wi-ao---- 35.05g
swap    rl_vbox -wi-ao---- <3.95g
lvdata  vgdata  -wi-ao---- 148.00m
root@admazurkevich:/home/admazurkevich# df -h
Filesystem                Size      Used Avail Use% Mounted on
/dev/mapper/rl_vbox-root    35G        6.1G    29G   18% /
devtmpfs                   4.0M         0   4.0M    0% /dev
tmpfs                       1.8G        84K   1.8G    1% /dev/shm
tmpfs                       731M        9.3M   722M    2% /run
tmpfs                       1.0M         0   1.0M    0% /run/credentials/systemd-journald.service
/dev/sda2                   960M       377M   584M   40% /boot
tmpfs                       366M       140K   366M    1% /run/user/1000
tmpfs                       366M        60K   366M    1% /run/user/0
/dev/mapper/vgdata-lvdata   134M        14K   123M    1% /mnt/data
root@admazurkevich:/home/admazurkevich#
```

Рис. 7: Расширенная VG vgdata

Увеличение логического тома

```
root@admazurkevich:/home/admazurkevich#
root@admazurkevich:/home/admazurkevich# lvextend -r -l +50%FREE /dev/vgdata/lvdata
File system ext4 found on vgdata/lvdata mounted at /mnt/data.
Size of logical volume vgdata/lvdata changed from 148.00 MiB (37 extents) to 372.00 MiB (93 extents).
Extending file system ext4 to 372.00 MiB (390070272 bytes) on vgdata/lvdata...
resize2fs /dev/vgdata/lvdata
resize2fs 1.47.1 (20-May-2024)
Filesystem at /dev/vgdata/lvdata is mounted on /mnt/data; on-line resizing required
old_desc_blocks = 2, new_desc_blocks = 3
The filesystem on /dev/vgdata/lvdata is now 380928 (1k) blocks long.

resize2fs done
Extended file system ext4 on vgdata/lvdata.
Logical volume vgdata/lvdata successfully resized.
root@admazurkevich:/home/admazurkevich# lvs
LV      VG      Attr      LSize   Pool Origin Data%  Meta%   Move Log Cpy%Sync Convert
root    rl_vbox  -wi-ao---- 35.05g
swap    rl_vbox  -wi-ao---- <3.95g
lvdata   vgdata  -wi-ao---- 372.00m
root@admazurkevich:/home/admazurkevich# df -h
Filesystem                Size      Used Avail Use% Mounted on
/dev/mapper/rl_vbox-root  35G        6.1G   29G  18% /
devtmpfs                   4.0M         0   4.0M   0% /dev
tmpfs                      1.8G        84K   1.8G   1% /dev/shm
tmpfs                      731M       9.3M   722M   2% /run
tmpfs                      1.0M         0    1.0M   0% /run/credentials/systemd-journald.service
/dev/sda2                  960M       377M   584M  40% /boot
tmpfs                      366M       140K   366M   1% /run/user/1000
tmpfs                      366M        60K   366M   1% /run/user/0
/dev/mapper/vgdata-lvdata  344M       14K    324M   1% /mnt/data
root@admazurkevich:/home/admazurkevich#
```

Рис. 8: Расширение lvdata

Уменьшение логического тома

```
Resizing the filesystem on /dev/vgdata/lvdata to 229376 (1k) blocks.
The filesystem on /dev/vgdata/lvdata is now 229376 (1k) blocks long.

resize2fs done
remount /dev/vgdata/lvdata /mnt/data
mount: (hint) your fstab has been modified, but systemd still uses
       the old version; use 'systemctl daemon-reload' to reload.
remount done
Reduced file system ext4 on vgdata/lvdata.
Size of logical volume vgdata/lvdata changed from 372.00 MiB (93 extents) to 224.00 MiB (56 extents).
Logical volume vgdata/lvdata successfully resized.
root@admazurkevich:/home/admazurkevich# lvs
LV      VG      Attr      LSize   Pool Origin Data%  Meta%   Move Log Cpy%Sync Convert
root    rl_vbox -wi-ao---- 35.05g
swap    rl_vbox -wi-ao---- <3.95g
lvdata   vgdata  -wi-ao---- 224.00m
root@admazurkevich:/home/admazurkevich# df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/mapper/rl_vbox-root 35G  6.1G  29G  18% /
devtmpfs        4.0M   0  4.0M   0% /dev
tmpfs           1.8G  84K  1.8G   1% /dev/shm
tmpfs           731M  9.3M  722M   2% /run
tmpfs           1.0M   0  1.0M   0% /run/credentials/systemd-journald.service
/dev/sda2       960M  377M  584M  40% /boot
tmpfs           366M  140K  366M   1% /run/user/1000
tmpfs           366M   60K  366M   1% /run/user/0
/dev/mapper/vgdata-lvdata 205M  14K  191M   1% /mnt/data
root@admazurkevich:/home/admazurkevich#
```

Рис. 9: Уменьшение размера lvdata

Самостоятельная работа

The signature will be removed by a write command.

Command (m for help): t

Partition number (1,2, default 2): 2

Hex code or alias (type L to list all): 8e

Changed type of partition 'Linux' to 'Linux LVM'.

Command (m for help): p

Disk /dev/sdc: 1.5 GiB, 1610612736 bytes, 3145728 sectors

Disk model: VBOX HARDDISK

Units: sectors of 1 * 512 = 512 bytes

Sector size (logical/physical): 512 bytes / 512 bytes

I/O size (minimum/optimal): 512 bytes / 512 bytes

Disklabel type: dos

Disk identifier: 0xe702655f

Device	Boot	Start	End	Sectors	Size	Id	Type
/dev/sdc1		2048	1230847	1228800	600M	8e	Linux LVM
/dev/sdc2		1230848	2152447	921600	450M	8e	Linux LVM

Filesystem/RAID signature on partition 2 will be wiped.

Command (m for help): w

The partition table has been altered.

Calling ioctl() to re-read partition table.

Syncing disks.

root@admazurkevich:/home/admazurkevich#

```
Device      Boot   Start      End Sectors  Size Id Type
/dev/sdc1                2048 1230847 1228800   600M 8e Linux LVM
/dev/sdc2          1230848 2152447   921600   450M 8e Linux LVM
root@admazurkevich:/home/admazurkevich#
root@admazurkevich:/home/admazurkevich#
root@admazurkevich:/home/admazurkevich# pvcreate /dev/sdc1
Physical volume "/dev/sdc1" successfully created.
root@admazurkevich:/home/admazurkevich# vgcreate vgggroup /dev/sdc1
Volume group "vgggroup" successfully created
root@admazurkevich:/home/admazurkevich# lvcreate -n lvgroup -l 100%FREE vgggroup
Logical volume "lvgroup" created.
root@admazurkevich:/home/admazurkevich# mkfs.xfs /dev/vgggroup/lvgroup
meta-data=/dev/vgggroup/lvgroup  isize=512    agcount=4, agsize=38144 blks
        =                       sectsz=512   attr=2, projid32bit=1
        =                       crc=1        finobt=1, sparse=1, rmapbt=1
        =                       reflink=1    bigtime=1 inobtcount=1 nrext64=1
        =                       exchange=0
data      =                       bsize=4096   blocks=152576, imaxpct=25
        =                       sunit=0      swidth=0 blks
naming    =version 2              bsize=4096   ascii-ci=0, ftype=1, parent=0
log       =internal log          bsize=4096   blocks=16384, version=2
        =                       sectsz=512   sunit=0 blks, lazy-count=1
realtime  =none                  extsz=4096   blocks=0, rtextents=0
root@admazurkevich:/home/admazurkevich#
```

Рис. 11: Создание PV /dev/sdc1


```
root@admazurkevich: /home/admazurkevich# pvs
PV          VG      Fmt Attr PSize  PFree
/dev/sda3   rl_vbox  lvm2 a--  <39.00g  0
/dev/sdb1   vgdata   lvm2 a--  296.00m  72.00m
/dev/sdb2   vgdata   lvm2 a--  296.00m  296.00m
/dev/sdc1   vggroup  lvm2 a--  596.00m  0

root@admazurkevich: /home/admazurkevich# vgs
VG          #PV #LV #SN Attr   VSize  VFree
rl_vbox     1  2  0 wz--n-  <39.00g  0
vgdata      2  1  0 wz--n-  592.00m  368.00m
vggroup     1  1  0 wz--n-  596.00m  0

root@admazurkevich: /home/admazurkevich# lvs
LV          VG      Attr      LSize   Pool Origin Data%  Meta%   Move Log Cpy%Sync Convert
root        rl_vbox -wi-ao---- 35.05g
swap        rl_vbox -wi-ao----  <3.95g
lvdata      vgdata  -wi-ao---- 224.00m
lvgroup     vggroup -wi-a----- 596.00m

root@admazurkevich: /home/admazurkevich#
```

Рис. 12: Создание VG и LV

```
GNU nano 8.1 /etc/fstab

#
# /etc/fstab
# Created by anaconda on Tue Sep  9 17:21:22 2025
#
# Accessible filesystems, by reference, are maintained under '/dev/disk/'.
# See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info.
#
# After editing this file, run 'systemctl daemon-reload' to update systemd
# units generated from this file.
#
UUID=545c5a15-4989-4cc0-ae18-f090649fd991 / xfs defaults 0 0
UUID=3e4d95ea-28f8-4363-bb2f-9248dcacfce9 /boot xfs defaults 0 0
UUID=bfed141b-af25-4a45-8f41-0eb8866bcfd3 none swap defaults 0 0
/dev/vgdata/lvdata /mnt/data ext4 defaults 1 2
/dev/vggroup/lvgroup /mnt/groups xfs defaults 1 2

#UUID=e06ff9c9-d49b-4a0a-858b-7a982361a83e /mnt/data xfs defaults 1 2
#UUID=5b29e34b-432b-45a9-9225-a7d9460745b9 /mnt/data-ext ext4 defaults 1 2
#UUID=0a09f865-107e-42e9-8e3f-d17d1ee2dac6 none swap defaults 0 0
```

Рис. 13: Конфигурация fstab

```
root@admazurkevich:/home/admazurkevich#  
root@admazurkevich:/home/admazurkevich# mount | grep mnt  
/dev/mapper/vggroup-lvgroup on /mnt/groups type xfs (rw,relatime,seclabel,attr2,inode64,logbufs=8,logsize=32k,noquota)  
/dev/mapper/vgdata-lvdata on /mnt/data type ext4 (rw,relatime,seclabel)  
root@admazurkevich:/home/admazurkevich#  
root@admazurkevich:/home/admazurkevich# df -h  
Filesystem      Size  Used Avail Use% Mounted on  
/dev/mapper/rl_vbox-root    35G   6.1G   29G  18% /  
devtmpfs         4.0M    0   4.0M   0% /dev  
tmpfs            1.8G   84K   1.8G   1% /dev/shm  
tmpfs            731M   9.3M   722M   2% /run  
tmpfs            1.0M    0   1.0M   0% /run/credentials/systemd-journald.service  
/dev/mapper/vggroup-lvgroup 532M   41M   492M   8% /mnt/groups  
/dev/sda2        960M  377M   584M  40% /boot  
/dev/mapper/vgdata-lvdata  205M   14K   191M   1% /mnt/data  
tmpfs            366M  140K   366M   1% /run/user/1000  
tmpfs            366M   60K   366M   1% /run/user/0  
root@admazurkevich:/home/admazurkevich#
```

Рис. 14: Монтирование lvgroup

```
root@admazurkevich:/home/admazurkevich# pvcreate /dev/sdc2
Physical volume "/dev/sdc2" successfully created.
root@admazurkevich:/home/admazurkevich# vgextend vggrou /dev/sdc2
Volume group "vggroup" successfully extended
root@admazurkevich:/home/admazurkevich# lvextend -r -l +100%FREE /dev/vggrou/lvgrou
File system xfs found on vggrou/lvgrou mounted at /mnt/groups.
Size of logical volume vggrou/lvgrou changed from 596.00 MiB (149 extents) to <1.02 GiB (261 extents).
Extending file system xfs to <1.02 GiB (1094713344 bytes) on vggrou/lvgrou...
xfs_growfs /dev/vggrou/lvgrou
meta-data=/dev/mapper/vggrou-lvgrou isize=512    agcount=4, agsize=38144 blks
        =                       sectsz=512    attr=2, projid32bit=1
        =                       crc=1          finobt=1, sparse=1, rmapbt=1
        =                       reflink=1      bigtime=1 inobtcount=1 nnext64=1
        =                       exchange=0
data      =                       bsize=4096    blocks=152576, imaxpct=25
        =                       sunit=0        swidth=0 blks
naming    =version 2              bsize=4096    ascii-ci=0, ftype=1, parent=0
log       =internal log          bsize=4096    blocks=16384, version=2
        =                       sectsz=512    sunit=0 blks, lazy-count=1
realtime  =none                  extsz=4096    blocks=0, rtextents=0
data blocks changed from 152576 to 267264
xfs_growfs done
Extended file system xfs on vggrou/lvgrou.
Logical volume vggrou/lvgrou successfully resized.
root@admazurkevich:/home/admazurkevich#
```

Рис. 15: Расширение XFS

```
root@admazurkevich:/home/admazurkevich#
root@admazurkevich:/home/admazurkevich# pvs
  PV          VG      Fmt Attr PSize   PFree
  /dev/sda3   rl_vbox  lvm2 a--  <39.00g    0
  /dev/sdb1   vgdata   lvm2 a--  296.00m  72.00m
  /dev/sdb2   vgdata   lvm2 a--  296.00m  296.00m
  /dev/sdc1   vggroup  lvm2 a--  596.00m    0
  /dev/sdc2   vggroup  lvm2 a--  448.00m    0
root@admazurkevich:/home/admazurkevich# vgs
  VG      #PV #LV #SN Attr   VSize   VFree
  rl_vbox  1  2  0 wz--n- <39.00g    0
  vgdata   2  1  0 wz--n- 592.00m 368.00m
  vggroup  2  1  0 wz--n- <1.02g    0
root@admazurkevich:/home/admazurkevich# lvs
  LV      VG      Attr      LSize   Pool Origin Data%  Meta%   Move Log Cpy%Sync Convert
  root    rl_vbox -wi-ao---- 35.05g
  swap    rl_vbox -wi-ao---- <3.95g
  lvdata  vgdata  -wi-ao---- 224.00m
  lvgroup vggroup -wi-ao---- <1.02g
root@admazurkevich:/home/admazurkevich# df -h
Filesystem                Size      Used Avail Use% Mounted on
/dev/mapper/rl_vbox-root    35G        6.1G   29G   18% /
devtmpfs                   4.0M         0   4.0M    0% /dev
tmpfs                       1.8G        84K   1.8G    1% /dev/shm
tmpfs                       731M        9.3M   722M    2% /run
tmpfs                       1.0M         0   1.0M    0% /run/credentials/systemd-journald.service
/dev/mapper/vggroup-lvgroup 980M        50M   931M    6% /mnt/groups
/dev/sda2                   960M       377M   584M   40% /boot
/dev/mapper/vgdata-lvdata  205M       14K   191M    1% /mnt/data
tmpfs                       366M      140K   366M    1% /run/user/1000
tmpfs                       366M       60K   366M    1% /run/user/0
root@admazurkevich:/home/admazurkevich#
```

Выводы по проделанной работе

В ходе лабораторной работы были изучены и выполнены основные операции по созданию и управлению логическими томами LVM: разметка дисков, создание PV, VG и LV, работа с ext4 и XFS, а также динамическое изменение размеров томов и файловых систем. Полученные навыки позволяют уверенно работать с гибкой системой хранения данных, применяемой в серверных и корпоративных инфраструктурах.