

Презентация по лабораторной работе №15

Управление логическими томами

Агдjabекова Эся Рустамовна

21 ноября 2025

Российский университет дружбы народов, Москва, Россия

Цели и задачи работы

Цель работы

Получить навыки управления логическими томами в LVM.

Ход выполнения работы

Создание физического тома

```
root@eragdzhabekova:/home/eragdzhabekova# fdisk /dev/sdb

Welcome to fdisk (util-linux 2.40.2).
Changes will remain in memory only, until you decide to write them.
Be careful before using the write command.

Command (m for help): n
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):
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.
```

```
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@eragdzhabekova:/home/eragdzhabekova# partprobe /dev/sdb
root@eragdzhabekova:/home/eragdzhabekova# pvcreate /dev/sdb1
  Physical volume "/dev/sdb1" successfully created.
```

```
root@eragdzhabekova:/home/eragdzhabekova# pvs
  PV          VG      Fmt Attr PSize  PFree
  /dev/sda3    rl_vbox lvm2 a--  <39.00g     0
  /dev/sdb1          lvm2 ---  300.00m 300.00m
root@eragdzhabekova:/home/eragdzhabekova#
```

Создание физического тома

```
root@eragdzhabekova:/home/eragdzhabekova# pvs
  PV          VG      Fmt Attr PSize   PFree
  /dev/sda3  rl_vbox lvm2 a--  <39.00g     0
  /dev/sdb1            lvm2 --- 300.00m 300.00m
root@eragdzhabekova:/home/eragdzhabekova# vgcreate vgdata /dev/sdb1
  Volume group "vgdata" successfully created
root@eragdzhabekova:/home/eragdzhabekova# 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@eragdzhabekova:/home/eragdzhabekova# 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@eragdzhabekova:/home/eragdzhabekova# lvcreate -m lvdata -l 50%FREE vgdata
  Invalid argument for --mirrors: lvdata
  Error during parsing of command line.
root@eragdzhabekova:/home/eragdzhabekova# lvcreate -n lvdata -l 50%FREE vgdata
  Logical volume "lvdata" created.
root@eragdzhabekova:/home/eragdzhabekova# lvs
  LV    VG      Attr       LSize   Pool Origin Data%  Meta%  Move Log Cpy%Sync Convert
  root  rl_vbox -wi-ao--- 36.95g
  swap  rl_vbox -wi-ao--- 2.04g
  lvdata vgdata -wi-a---- 148.00m
root@eragdzhabekova:/home/eragdzhabekova# mkfs.ext4 /dev/vgdata/lvdata ]
mkfs.ext4 1.47.1 (20-May-2024)
mkfs.ext4: invalid blocks '[' or device '/dev/vgdata/lvdata'
root@eragdzhabekova:/home/eragdzhabekova# mkfs.ext4 /dev/vgdata/lvdata
mkfs.ext4 1.47.1 (20-May-2024)
Creating filesystem with 151552 1k blocks and 37848 inodes
Filesystem UUID: 996dffb2-9d0a-49a6-9e40-85b87c18fbdf
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
```

Создание группы томов и логического тома

```
#  
# /etc/fstab  
# Created by anaconda on Tue Sep  2 13:36:12 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=8b2472dc-425d-41d8-8467-33d0d494721c / xfs defaults 0 0  
UUID=cb3af6cd-5f59-4910-b434-e468636a28fc /boot xfs defaults 0 0  
UUID=b5b1c162-96da-4267-9a89-79cba6d2cf63 none swap defaults 0 0  
/dev/vgdata/lvdata /mnt/data ext4 defaults 1 2  
  
#UUID=d8a7ec27-4205-4145-8538-1374cd68c774 /mnt/data xfs defaults 1 2  
#UUID=ccc57e1a-c39d-474c-9d11-1d998b392ba0 /mnt/data-ext ext4 defaults 1 2  
#UUID=cf9a09f5-02d0-4ae4-92fe-0c3f703aeaee none swap defaults 1 2
```

Рис. 3: Создание LV, mkfs и монтирование

Изменение размера логических томов

```
root@eragdzhabekova:/home/eragdzhabekova# fdisk /dev/sdb -l
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: 0x5ea7d019

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
root@eragdzhabekova:/home/eragdzhabekova# pvcreate /dev/sdb2
Physical volume "/dev/sdb2" successfully created.
root@eragdzhabekova:/home/eragdzhabekova# vgextend vgdata /dev/sdb2
Volume group "vgdata" successfully extended
root@eragdzhabekova:/home/eragdzhabekova# 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@eragdzhabekova:/home/eragdzhabekova# lvs
  LV    VG     Attr       LSize   Pool Origin Data%  Meta%  Move Log Cpy%Sync Convert
  root  rl_vbox -wi-ao---- 36.95g
  swap  rl_vbox -wi-ao----  2.04g
  lvdata vgdata -wi-ao---- 148.00m
root@eragdzhabekova:/home/eragdzhabekova# df -h
Filesystem            Size  Used Avail Use% Mounted on
/dev/mapper/rl_vbox-root 37G  31G   6.1G  17% /
devtmpfs              4.0M   0    4.0M   0% /dev
tmpfs                 853M  84K  853M   1% /dev/shm
tmpfs                 342M  7.0M  335M   3% /run
tmpfs                 1.0M   0   1.0M   0% /run/credentials/systemd-journald.service
/dev/sda2              960M 377M 584M  40% /boot
tmpfs                 171M 148K 171M   1% /run/user/1000
/dev/sr0                59M   59M   0 100% /run/media/eragdzhabekova/VBox_GAs_7.1.12
tmpfs                 171M 60K 171M   1% /run/user/0
/dev/mapper/vgdata-lvdata 134M 14K 123M   1% /mnt/data
root@eragdzhabekova#
```

Изменение размера логических томов

```
root@eragdzhabekova:/home/eragdzhabekova#
root@eragdzhabekova:/home/eragdzhabekova# 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@eragdzhabekova:/home/eragdzhabekova# lvs
  LV      VG     Attr       LSize   Pool Origin Data%  Meta%  Move Log Cpy%Sync Convert
  root    rl_vbox -wi-ao---- 36.95g
  swap    rl_vbox -wi-ao---- 2.04g
  lvdata  vgdata  -wi-ao---- 372.00m
root@eragdzhabekova:/home/eragdzhabekova# df -h
Filesystem            Size  Used Avail Use% Mounted on
/dev/mapper/rl_vbox-root 37G  6.1G  31G  17% /
devtmpfs              4.0M   0  4.0M   0% /dev
tmpfs                 853M  84K  853M  1% /dev/shm
tmpfs                 342M  7.0M  335M  3% /run
tmpfs                 1.0M   0  1.0M   0% /run/credentials/systemd-journald.service
/dev/sda2              960M 377M 584M  40% /boot
tmpfs                 171M 148K 171M  1% /run/user/1000
/dev/sr0                59M  59M   0 100% /run/media/eragdzhabekova/VBox_GAs_7.1.12
tmpfs                 171M  60K 171M  1% /run/user/0
/dev/mapper/vgdata-lvdata 344M  14K 324M  1% /mnt/data
root@eragdzhabekova#
```

Рис. 5: Проверка размеров после увеличения

Уменьшение размера логического тома

```
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 324.00 MiB (81 extents).
Logical volume vgdata/lvdata successfully resized.
root@eragdzhabekova:/home/eragdzhabekova# lvs
  LV   VG     Attr   LSize  Origin  Data%  Meta%  Move Log Cpy%Sync Convert
  root  rl_vbox -wi-ao---- 36.95g
  swap  rl_vbox -wi-ao---- 2.04g
  lvdata vgdata -wi-ao---- 324.00m
root@eragdzhabekova:/home/eragdzhabekova# df -h
Filesystem           Size  Used Avail Use% Mounted on
/dev/mapper/rl_vbox-root  37G  6.1G  31G  17% /
devtmpfs              4.0M    0  4.0M  0% /dev
tmpfs                 853M  84K  853M  1% /dev/shm
tmpfs                 342M  8.5M  333M  3% /run
tmpfs                 1.0M    0  1.0M  0% /run/credentials/systemd-journald.service
/dev/sda2              960M 377M  584M  40% /boot
tmpfs                 171M 148K  171M  1% /run/user/1000
/dev/sr0                59M   59M    0 100% /run/media/eragdzhabekova/VBox_GAs_7.1.12
tmpfs                 171M  60K  171M  1% /run/user/0
/dev/mapper/vgdata-lvdata 298M  14K  280M  1% /mnt/data
root@eragdzhabekova:/home/eragdzhabekova# █
```

Рис. 6: Уменьшение размера логического тома

Самостоятельная работа

Создание новой группы томов vggroup

```
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):
First sector (2048-3145727, default 2048):
Last sector, +/-sectors or +/-size{K,M,G,T,P} (2048-3145727, default 3145727): +400M

Created a new partition 1 of type 'Linux' and of size 400 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): 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: 0xc5c942f7

Device      Boot Start    End Sectors  Size Id Type
/dev/sdc1        2048 821247  819200  400M 83 Linux

Filesystem/RAID signature on partition 1 will be wiped.

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

Создание новой группы томов vggroup

```
root@eragdzhabekova:/home/eragdzhabekova# mkdir -p /mnt/groups
root@eragdzhabekova:/home/eragdzhabekova# vgcreate vggroup /dev/sdc1
Physical volume "/dev/sdc1" successfully created.
Volume group "vggroup" successfully created
root@eragdzhabekova:/home/eragdzhabekova# pvs
PV      VG      Fmt Attr PSize  PFree
/dev/sda3  rl_vbox lvm2 a--  <39.00g    0
/dev/sdb1  vgdata  lvm2 a--  296.00m   0
/dev/sdb2  vgdata  lvm2 a--  296.00m 268.00m
/dev/sdc1  vggroup lvm2 a--  396.00m 396.00m
root@eragdzhabekova:/home/eragdzhabekova# 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 268.00m
vggroup  1   0   0 wz--n  396.00m 396.00m
root@eragdzhabekova:/home/eragdzhabekova# lvcreate -n lvgroup -l 100%FREE vggroup
Logical volume "lvgroup" created.
root@eragdzhabekova:/home/eragdzhabekova# lvs
LV      VG      Attr      LSize  Pool Origin Data%  Meta%  Move Log Cpy%Sync Convert
root    rl_vbox -wi-ao---- 36.95g
swap    rl_vbox -wi-ao----  2.04g
lvdata  vgdata  -wi-ao---- 324.00m
lvgroup vggroup -wi-a---- 396.00m
root@eragdzhabekova:/home/eragdzhabekova# mkfs.xfs /dev/vg
vga_arbiter vgdata/    vggroup/
root@eragdzhabekova:/home/eragdzhabekova# mkfs.xfs /dev/vggroup/lvgroup
meta-data=/dev/vggroup/lvgroup isize=512  agcount=4, agsize=25344 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=101376, 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@eragdzhabekova:/home/eragdzhabekova#
```

Создание новой группы томов vggroup

```
GNU nano 8.1                               /etc/fstab

#
# /etc/fstab
# Created by anaconda on Tue Sep  2 13:36:12 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=8b2472dc-425d-41d8-8467-33d0d494721c /          xfs    defaults      0 0
UUID=cb3af6cd-5f59-4910-b434-e468636a28fc /boot       xfs    defaults      0 0
UUID=b5b1c162-96da-4267-9a89-79cba6d2cf63 none     swap   defaults      0 0
/dev/vgdata/lvdata        /mnt/data       ext4   defaults      1 2
/dev/vggroup/lvgroup      /mnt/groups    xfs    defaults      1 2
#
#UUID=d8a7ec27-4205-4145-8538-1374cd68c774 /mnt/data
#UUID=ccc57ela-c39d-474c-9d11-1d998b392ba0 /mnt/data-ext
#UUID=cf9a09f5-02d0-4ae4-92fe-0c3f703aeaee none     swap   defaults      1 2
```

Рис. 9: Запись в fstab

Создание новой группы томов vggroup

```
root@eragdzhabekova:/home/eragdzhabekova# mount -a
mount: (hint) your fstab has been modified, but systemd still uses
      the old version; use 'systemctl daemon-reload' to reload.
root@eragdzhabekova:/home/eragdzhabekova# mount | grep mnt
/dev/mapper/vgdata-lvdata on /mnt/data type ext4 (rw,relatime,seclabel)
/dev/mapper/vggroup-lvgroup on /mnt/groups type xfs (rw,relatime,seclabel,attr2,inode64,logbufs=8,logbsize=32k,noquota)
root@eragdzhabekova:/home/eragdzhabekova# df -h
Filesystem            Size  Used Avail Use% Mounted on
/dev/mapper/rl_vbox-root    37G   6.1G  31G  17% /
devtmpfs              4.0M     0  4.0M   0% /dev
tmpfs                 853M   84K  853M   1% /dev/shm
tmpfs                 342M   8.5M  333M   3% /run
tmpfs                 1.0M     0  1.0M   0% /run/credentials/systemd-journald.service
/dev/sda2              960M  377M  584M  40% /boot
tmpfs                 171M  148K  171M   1% /run/user/1000
/dev/sr0                59M    59M     0 100% /run/media/eragdzhabekova/VBox_GAs_7.1.12
tmpfs                 171M   60K  171M   1% /run/user/0
/dev/mapper/vgdata-lvdata   298M   14K  280M   1% /mnt/data
/dev/mapper/vggroup-lvgroup  332M   27M  306M   8% /mnt/groups
root@eragdzhabekova#
```

Рис. 10: Проверка монтирования

Расширение группы томов и логического тома

```
Device      Boot Start     End Sectors  Size Id Type
/dev/sdcl          2048 821247  819200 400M 83 Linux

Command (m for help): n
Partition type
    p    primary (1 primary, 0 extended, 3 free)
    e    extended (container for logical partitions)
Select (default p): p
Partition number (2-4, default 2):
First sector (821248-3145727, default 821248):
Last sector, +/-sectors or +/-size{K,M,G,T,P} (821248-3145727, default 3145727): +300M

Created a new partition 2 of type 'Linux' and of size 300 MiB.

Command (m for help): t
Partition number (1,2, default 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: 0xc5c942f7

Device      Boot Start     End Sectors  Size Id Type
/dev/sdcl          2048 821247  819200 400M 83 Linux
/dev/sdc2        821248 1435647  614400 300M 8e Linux LVM

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

Syncing disks.
```

```
root@eragdzhabekova:/home/eragdzhabekova#
```

Расширение группы томов и логического тома

```
root@eragdzhabekova:/home/eragdzhabekova# pvcreate /dev/sdc2
Physical volume "/dev/sdc2" successfully created.
root@eragdzhabekova:/home/eragdzhabekova# vgextend vgggroup /dev/sdc2
Volume group "vggroup" successfully extended
root@eragdzhabekova:/home/eragdzhabekova# lvextend -r -l +100%FREE /dev/vgggroup/lvgroup
File system xfs found on vgggroup/lvgroup mounted at /mnt/groups.
Size of logical volume vgggroup/lvgroup changed from 396.00 MiB (99 extents) to 692.00 MiB (173 extents).
Extending file system xfs to 692.00 MiB (725614592 bytes) on vgggroup/lvgroup...
xfs_growfs /dev/vgggroup/lvgroup
meta-data=/dev/mapper/vgggroup-lvgroup isize=512    agcount=4, agsize=25344 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=101376, 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 101376 to 177152
xfs_growfs done
Extended file system xfs on vgggroup/lvgroup.
Logical volume vgggroup/lvgroup successfully resized.
root@eragdzhabekova:/home/eragdzhabekova#
```

Рис. 12: Расширение VG и LV, рост XFS

Расширение группы томов и логического тома

```
root@eragdzhabekova:/home/eragdzhabekova# 
root@eragdzhabekova:/home/eragdzhabekova# pvs
  PV      VG     Fmt Attr PSize  PFree
  /dev/sda3  rl_vbox lvm2 a-- <39.00g    0
  /dev/sdb1  vgdata  lvm2 a-- 296.00m    0
  /dev/sdb2  vgdata  lvm2 a-- 296.00m 268.00m
  /dev/sdc1  vgggroup lvm2 a-- 396.00m    0
  /dev/sdc2  vgggroup lvm2 a-- 296.00m    0
root@eragdzhabekova:/home/eragdzhabekova# vgs
  VG      #PV #LV #SN Attr   VSize   VFree
  rl_vbox  1   2   0 w--n- <39.00g    0
  vgdata   2   1   0 w--n- 592.00m 268.00m
  vgggroup 2   1   0 wz--n- 692.00m    0
root@eragdzhabekova:/home/eragdzhabekova# lvs
  LV      VG     Attr       LSize  Pool Origin  Data%  Meta%  Move Log Cpy%Sync Convert
  root    rl_vbox -wi-ao---- 36.95g
  swap    rl_vbox -wi-ao---- 2.04g
  lvdata  vgdata  -wi-ao---- 324.00m
  lvgroup vgggroup -wi-ao---- 692.00m
root@eragdzhabekova:/home/eragdzhabekova# df -h
Filesystem            Size  Used Avail Use% Mounted on
/dev/mapper/rl_vbox-root  37G  6.1G  31G  17% /
devtmpfs              4.0M   0  4.0M  0% /dev
tmpfs                 853M  84K  853M  1% /dev/shm
tmpfs                 342M  8.5M  333M  3% /run
tmpfs                 1.0M   0  1.0M  0% /run/credentials/systemd-journald.service
/dev/sda2              960M 377M  584M  40% /boot
tmpfs                 171M 148K  171M  1% /run/user/1000
/dev/sr0                59M   59M   0 100% /run/media/eragdzhabekova/VBox_GAs_7.1.12
tmpfs                 171M  60K  171M  1% /run/user/0
/dev/mapper/vgdata-lvdata 298M  14K  280M  1% /mnt/data
/dev/mapper/vgggroup-lvgroup 628M  33M  596M  6% /mnt/groups
root@eragdzhabekova:/home/eragdzhabekova# 
```

Итоги работы

Вывод

В ходе лабораторной работы были освоены основные приёмы управления логическими томами в LVM:

подготовка дисков и разделов, создание PV, VG и LV, форматирование и монтирование файловых систем, изменение размеров томов и онлайн-расширение XFS.

Получены практические навыки конфигурации постоянного монтирования через `/etc/fstab` и гибкого управления дисковым пространством в Linux.