Лабораторная работа №15

Управление логическими томами

Сулейм Гамбердов

24 ноября 2025

Российский университет дружбы народов, Москва, Россия

Цель работы

Получить практические навыки создания, расширения и уменьшения логических томов в Linux с использованием LVM.

Выполнение работы

```
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@sigamberdov:/home/sigamberdov# partprobe /dev/sdb
root@sigamberdov:/home/sigamberdov# pvcreate /dev/sdb1
  Physical volume "/dev/sdb1" successfully created.
root@sigamberdov:/home/sigamberdov# pvs
  PV         VG      Fmt  Attr PSize   PFree
  /dev/sda3  rl_vbox lvm2 a--  <39.00g      0
  /dev/sdb1          lvm2 ---  300.00m 300.00m
root@sigamberdov:/home/sigamberdov#
```

Рис. 2: Создание VG и LV

Рис. 3: Создание ФС и каталога

```
#
# /etc/fstab
# Created by anaconda on Wed Sep 17 09:57:58 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=56362b30-55f8-4f4b-9a9b-2544717501fa /              xfs      defaults      0 0
UUID=eeeec4be-5545-4b77-be3e-c9b195fe2286 /boot          xfs      defaults      0 0
UUID=fc4eddc6-c4f4-4723-8f5d-faafa4784cda none           swap     defaults      0 0
/dev/vgdata/lvdata                        /mnt/data      ext4     defaults      1 2

#UUID=64b7dd76-1cc8-4235-8ad8-4f90d12c9605 /mnt/data      xfs      defaults      1 2
#UUID=a6678ce7-9195-4c69-89af-3fc1c3aab6a9 /mnt/data-ext           ext4    defaults       1 2
#UUID=dd15f474-b25a-4385-8bbe-a1ad82ed2852 none           swap     defaults      0 0
```

Рис. 4: Добавление записи в fstab

Рис. 5: Монтирование выполнено

```
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): 2
First sector (616448-3145727, default 616448):
Last sector, +/-sectors or +/-size{K,M,G,T,P} (616448-3145727, 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): 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: 0x1faebbf5


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@sigamberdov:/home/sigambardov#
```

```
root@sigamberdov:/home/sigamberdov#
root@sigamberdov:/home/sigamberdov# 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@sigamberdov:/home/sigamberdov# vgextend vgdata /dev/sdb2
  Volume group "vgdata" successfully extended
root@sigamberdov:/home/sigamberdov# 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@sigamberdov:/home/sigamberdov# 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@sigamberdov:/home/sigamberdov# df -h
Filesystem             Size  Used Avail Use% Mounted on
/dev/mapper/rl_vbox-root  35G  6.2G   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  148K  366M   1% /run/user/1000
tmpfs                  366M   60K  366M   1% /run/user/0
/dev/mapper/vgdata-lvdata 134M   14K  123M   1% /mnt/data
root@sigamberdov:/home/sigamberdov#
```

Рис. 7: Расширение PV, VG и LV

```
root@sigamberdov:/home/sigamberdov# lvextend -r -l +50%FREE /dev/vgdata/lv/data
  "vgdata/lv/data": Invalid path for Logical Volume.
root@sigamberdov:/home/sigamberdov# 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@sigamberdov:/home/sigamberdov# 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@sigamberdov:/home/sigamberdov# df -h
Filesystem               Size  Used Avail Use% Mounted on
/dev/mapper/rl_vbox-root  35G  6.2G   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  148K  366M   1% /run/user/1000
tmpfs                    366M   60K  366M   1% /run/user/0
/dev/mapper/vgdata-lvdata 344M   14K  324M   1% /mnt/data
root@sigamberdov:/home/sigamberdov#
```

```
unmount done
e2fsck /dev/vgdata/lvdata
/dev/vgdata/lvdata: 11/93624 files (0.0% non-contiguous), 29683/380928 blocks
e2fsck done
resize2fs /dev/vgdata/lvdata 229376k
resize2fs 1.47.1 (20-May-2024)
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@sigamberdov:/home/sigamberdov# 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@sigamberdov:/home/sigamberdov# 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  148K  366M   1% /run/user/1000
tmpfs                     366M   60K  366M   1% /run/user/0
/dev/mapper/vgdata-lvdata 205M   14K  191M   1% /mnt/data
root@sigamberdov:/home/sigamberdov#
```

Самостоятельная работа

```
Disk identifier: 0xbacad528
root@sigamberdov:/home/sigamberdov# fdisk /dev/sdc

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): +600M

Created a new partition 1 of type 'Linux' and of size 600 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@sigamberdov:/home/sigamberdov#
```

```
root@sigamberdov:/home/sigamberdov#
root@sigamberdov:/home/sigamberdov# pvcreate /dev/sdc1
  Physical volume "/dev/sdc1" successfully created.
root@sigamberdov:/home/sigamberdov# vgcreate vggroup /dev/sdc1
  Volume group "vggroup" successfully created
root@sigamberdov:/home/sigamberdov# lvcreate -n lvgroup -l 100%FREE vggroup
  Logical volume "lvgroup" created.
root@sigamberdov:/home/sigamberdov# 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@sigamberdov:/home/sigamberdov# 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@sigamberdov:/home/sigamberdov# 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@sigamberdov:/home/sigamberdov# mkfs.xfs /dev/vggroup/lvgroup
meta-data=/dev/vggroup/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
```

Рис. 12: fstab

```
sigamberdov@sigamberdov:~$ su
Password:
root@sigamberdov:/home/sigamberdov#
root@sigamberdov:/home/sigamberdov# mount | grep mnt
/dev/mapper/vggroup-lvgroup on /mnt/groups type xfs (rw,relatime,seclabel,attr2,inode64,logbufs=8,logbsize=3
2k,noquota)
/dev/mapper/vgdata-lvdata on /mnt/data type ext4 (rw,relatime,seclabel)
root@sigamberdov:/home/sigamberdov# df -h
Filesystem                      Size  Used Avail Use% Mounted on
/dev/mapper/rl_vbox-root         35G  6.2G   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/sdb2                       960M  377M  584M  40% /boot
/dev/mapper/vgdata-lvdata       205M   14K  191M   1% /mnt/data
tmpfs                           366M  144K  366M   1% /run/user/1000
tmpfs                           366M   60K  366M   1% /run/user/0
root@sigamberdov:/home/sigamberdov#
```

Рис. 13: Проверка после загрузки

```
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): 2
First sector (1230848-3145727, default 1230848):
Last sector, +/-sectors or +/-size{K,M,G,T,P} (1230848-3145727, default 3145727): +450M

Created a new partition 2 of type 'Linux' and of size 450 MiB.
Partition #2 contains a swap 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
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): w
The partition table has been altered.
Syncing disks.

root@sigamberdov:/home/sigamberdov#
```

Рис. 15: Расширение XFS

```
root@sigamberdov:/home/sigamberdov#
root@sigamberdov:/home/sigamberdov# pvs
  PV          VG       Fmt  Attr PSize    PFree
  /dev/sda1   vgdata   lvm2 a--  296.00m  72.00m
  /dev/sda2   vgdata   lvm2 a--  296.00m 296.00m
  /dev/sdb3   rl_vbox  lvm2 a--  <39.00g       0
  /dev/sdc1   vggroup  lvm2 a--  596.00m       0
  /dev/sdc2   vggroup  lvm2 a--  448.00m       0
root@sigamberdov:/home/sigamberdov# 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@sigamberdov:/home/sigamberdov# 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@sigamberdov:/home/sigamberdov# df -h
Filesystem                    Size  Used Avail Use% Mounted on
/dev/mapper/rl_vbox-root       35G  6.2G   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/sdb2                     960M  377M  584M  40% /boot
/dev/mapper/vgdata-lvdata     205M   14K  191M   1% /mnt/data
tmpfs                         366M  144K  366M   1% /run/user/1000
tmpfs                         366M   60K  366M   1% /run/user/0
root@sigamberdov:/home/sigamberdov#
```

Итоги работы

Вывод

В ходе выполнения работы были отработаны навыки управления LVM: создание и настройка физических томов, групп томов и логических томов, операции расширения и уменьшения томов, а также работа с файловыми системами. Полученный опыт позволяет эффективно управлять дисковыми ресурсами Linux.