

Презентация по лабораторной работе №15

Управление логическими томами

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Цели и задачи работы

Получить навыки управления логическими томами в LVM.

Ход выполнения работы

Создание физического тома

```
root@eragdzhabekova:/home/eragdzhabekova#  
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 ]
mke2fs 1.47.1 (20-May-2024)
mkfs.ext4: invalid blocks ']' on device '/dev/vgdata/lvdata'
root@eragdzhabekova: /home/eragdzhabekova# mkfs.ext4 /dev/vgdata/lvdata
mke2fs 1.47.1 (20-May-2024)
Creating filesystem with 151552 1k blocks and 37848 inodes
Filesystem UUID: 996dff62-9d0a-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-0c3f703aeaae none           swap    defaults    1 2
```

Рис. 3: Создание LV, mkfs и монтирование

Изменение размера логических томов

```
root@eragdzhabekova:/home/eragdzhabekova#
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  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 134M   14K  123M   1% /mnt/data
root@eragdzhabekova:/home/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         0   59M   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:/home/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   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
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 nrext64=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 vgggroup

```
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/vgggroup/lvggroup /mnt/groups  xfs     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-0c3f703aeaae 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:/home/eragdzhabekova#
```

Рис. 10: Проверка монтирования

Расширение группы томов и логического тома

```
Device      Boot Start    End Sectors  Size Id Type
/dev/sdc1           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/sdc1           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@eraqdzhabekova:/home/eraqdzhabekova#
```


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 "vgggroup" successfully extended
root@eragdzhabekova:/home/eragdzhabekova# lvextend -r -l +100%FREE /dev/vgggroup/lvggroup
File system xfs found on vgggroup/lvggroup mounted at /mnt/groups.
Size of logical volume vgggroup/lvggroup 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/lvggroup...
xfs_growfs /dev/vgggroup/lvggroup
meta-data=/dev/mapper/vgggroup-lvggroup 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/lvggroup.
Logical volume vgggroup/lvggroup 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   vggroup  lvm2  a--  396.00m  0  
/dev/sdc2   vggroup  lvm2  a--  296.00m  0  
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 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 vggroup -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/vggroup-lvgroup 628M   33M   596M    6% /mnt/groups  
root@eragdzhabekova:/home/eragdzhabekova#
```

Итоги работы

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.