Презентация по лабораторной работе №15

Управление логическими томами (LVM)

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Цели и задачи работы

Получить практические навыки:
- создания физических томов;
- формирования групп томов;
- управления логическими томами;
- изменения размера LVM и файловых систем.

Основные задачи

1. Подготовить диски и создать физические тома
2. Создать VG и LV
3. Сформировать файловую систему и настроить монтирование
4. Расширить группу томов и логический том
5. Проверить корректность изменений
6. Выполнить самостоятельное задание по созданию и расширению LV

Ход выполнения

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

Создание физического тома

```
pvcreate /dev/sdb1
```


Рис. 2: Проверка PV

```
root@aasaenko:/home/aasaenko# lvcreate -n lvdata -l 50%FREE vgdata
  Logical volume "lvdata" created.
root@aasaenko:/home/aasaenko# 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@aasaenko:/home/aasaenko# mkfs.ext4 /dev/vgdata/lvdata
mke2fs 1.47.1 (20-May-2024)
Creating filesystem with 151552 1k blocks and 37848 inodes
Filesystem UUID: a1c06e58-f943-409a-b19c-ea3118c5eb3d
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@aasaenko:/home/aasaenko# mkdir -p /mnt/data
root@aasaenko:/home/aasaenko# 
```

Рис. 3: Создание VG и LV

Рис. 4: Настройка fstab

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

Рис. 5: Проверка монтирования

```
Using default response p.
Partition number (2-4, default 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):
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: 0x34d537ef

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@aasaenko:/home/aasaenko#
```

```
root@aasaenko:/home/aasaenko#
root@aasaenko:/home/aasaenko# 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@aasaenko:/home/aasaenko# vgextend vgdata /dev/sdb2
  Volume group "vgdata" successfully extended
root@aasaenko:/home/aasaenko# 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@aasaenko:/home/aasaenko# 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@aasaenko:/home/aasaenko# 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  144K  366M   1% /run/user/1000
/dev/sr0                59M   59M     0 100% /run/media/aasaenko/VBox_GAs_7.1.12
tmpfs                  366M   60K  366M   1% /run/user/0
/dev/mapper/vgdata-lvdata 134M   14K  123M   1% /mnt/data
root@aasaenko:/home/aasaenko#
```

Рис. 7: Расширение VG

```
root@aasaenko:/home/aasaenko#
root@aasaenko:/home/aasaenko# 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@aasaenko:/home/aasaenko# 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@aasaenko:/home/aasaenko# 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  144K  366M   1% /run/user/1000
/dev/sr0                    59M   59M     0 100% /run/media/aasaenko/VBox_GAs_7.1.12
tmpfs                      366M   60K  366M   1% /run/user/0
/dev/mapper/vgdata-lvdata  344M   14K  324M   1% /mnt/data
root@aasaenko:/home/aasaenko#
```

Рис. 8: Увеличение LV

```
Resizing the filesystem on /dev/vgdata/lvdata to 331776 (1k) blocks.
The filesystem on /dev/vgdata/lvdata is now 331776 (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 324.00 MiB (81 extents).
  Logical volume vgdata/lvdata successfully resized.
root@aasaenko:/home/aasaenko# 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---- 324.00m
root@aasaenko:/home/aasaenko# 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  144K  366M   1% /run/user/1000
/dev/sr0                  59M   59M     0 100% /run/media/aasaenko/VBox_GAs_7.1.12
tmpfs                    366M   60K  366M   1% /run/user/0
/dev/mapper/vgdata-lvdata 298M   14K  280M   1% /mnt/data
root@aasaenko:/home/aasaenko#
```

Рис. 9: Уменьшение LV

Самостоятельная работа

```
Command (m for help): n
Partition type
   p   primary (0 primary, 0 extended, 4 free)
   e   extended (container for logical partitions)
Select (default p):

Using default response 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): 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: 0x12eb6085

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

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

root@aasaenko:/home/aasaenko#
```

```
root@aasaenko:/home/aasaenko# pvcreate /dev/sdc1
  Physical volume "/dev/sdc1" successfully created.
root@aasaenko:/home/aasaenko# vgcreate vggroup /dev/sdc1
  Volume group "vggroup" successfully created
root@aasaenko:/home/aasaenko# lvcreate -n lvgroup -l 100%FREE vggroup
  Logical volume "lvgroup" created.
root@aasaenko:/home/aasaenko# 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
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@aasaenko:/home/aasaenko# mkdir -p /mnt/groups
root@aasaenko:/home/aasaenko#
```

Рис. 11: Создание PV, VG и LV

Рис. 12: Проверка томов

Добавление записи в fstab

Рис. 13: fstab

Рис. 14: Монтирование

```
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):
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: 0x12eb6085

Device     Boot    Start      End  Sectors  Size Id Type
/dev/sdb1           2048  1230847  1228800  600M 8e Linux LVM
/dev/sdb2        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.
Syncing disks.

root@aasaenko:/home/aasaenko#
```

Рис. 16: Расширение VG и LV

```
root@aasaenko:/home/aasaenko#
root@aasaenko:/home/aasaenko# pvs
  PV         VG       Fmt  Attr PSize   PFree
  /dev/sda3  rl_vbox  lvm2 a--  <39.00g      0
  /dev/sdb1  vggroup  lvm2 a--  596.00m      0
  /dev/sdb2  vggroup  lvm2 a--  448.00m      0
  /dev/sdc1  vgdata   lvm2 a--  296.00m      0
  /dev/sdc2  vgdata   lvm2 a--  296.00m 268.00m
root@aasaenko:/home/aasaenko# 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-  <1.02g       0
root@aasaenko:/home/aasaenko# 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---- 324.00m
  lvgroup  vggroup  -wi-ao----  <1.02g
root@aasaenko:/home/aasaenko# 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     298M   14K  280M   1% /mnt/data
tmpfs                         366M  140K  366M   1% /run/user/1000
/dev/sr0                       59M   59M     0 100% /run/media/aasaenko/VBox_GAs_7.1.12
tmpfs                         366M   60K  366M   1% /run/user/0
root@aasaenko:/home/aasaenko#
```

Рис. 17: Проверка размеров

Выводы по проделанной работе

Основные результаты

В ходе лабораторной работы были освоены:

- создание физических томов (PV);
- формирование групп томов (VG);
- создание и управление логическими томами (LV);
- настройка файловых систем и монтирования;
- изменение размера LVM и online-расширение файловых систем;
- проверка конфигурации с помощью pvs, vgs, lvs, df.