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[illegible]

9. \*

1. LVM boot:
  - a. , , , .
  - b. - , .
  - c. , , , , LVM — , LVM.
  - d. — ( LVM - LVM).
  - e. ( LVM) ( ) .
  - f. ( ) ( ), , . LVM - .
2. boot.

- , :

- , , , ( , swap).
- , (. (swap): ). , , LVM.

$$\vdots$$

- 32.
- :
  - lvs ( LVM-).
  - LVM.
  - - /boot /dev/sda1 ext2 243. , boot LVM - boot LVM .
    - (extended) sda2, :
      - sda5, LVM. sda5 sda2 LVM, sda5:
        - /root LVM ( root);
        - /home LVM ( home);
        - (swap) LVM ( swap\_1).

•

```
lsblk
```

| NAME | MAJ:MIN | RM | SIZE  | RO | TYPE | MOUNTPOINT |
|------|---------|----|-------|----|------|------------|
| sda  | 8:0     | 0  | 32G   | 0  | disk |            |
| sda1 | 8:1     |    | 243M  | 0  | part | /boot      |
| sda2 | 8:2     | 0  | 1K    | 0  | part |            |
| sda5 | 8:5     | 0  | 31,3G | 0  | part |            |

- sda1 - /boot, 243
- sda2 - ;
- sda5 - LVM, 31.3, LVM root, home, swap\_1, , /root, /home ( lsblk LVM , , ).

LVS, sda5:

```
sudo pvs
```

| PV        | VG     | Fmt  | Attr | PSize  | PFree |
|-----------|--------|------|------|--------|-------|
| /dev/sda5 | lvs-vg | lvm2 | a--  | 31,76g | 0     |

LVS:

```
sudo vgs
```

---

| VG     | #PV | #LV | #SN | Attr   | VSize  | VFree |
|--------|-----|-----|-----|--------|--------|-------|
| lvs-vg | 1   | 3   | 0   | wz--n- | 31,76g | 0     |

LVS:

```
sudo lvs
```

| LV     | VG     | Attr       | LSize | Pool | Origin | Data% | Meta% | Move | Log | Cpy% |
|--------|--------|------------|-------|------|--------|-------|-------|------|-----|------|
| home   | lvs-vg | -wi-ao---- | 16,68 |      |        |       |       |      |     |      |
| g      |        |            |       |      |        |       |       |      |     |      |
| root   | lvs-vg | -wi-ao---- | 11,08 |      |        |       |       |      |     |      |
| g      |        |            |       |      |        |       |       |      |     |      |
| swap_1 | lvs-vg | -wi-ao---- | 4,00g |      |        |       |       |      |     |      |

```
sudo pvs -v --segments /dev/sda5
```

---

```
Wiping internal VG cache
Wiping cache of LVM-capable devices
PV          VG          Fmt  Attr PSize  PFree Start  SSize LV          Start
Type  PE Ranges
/dev/sda5  lvs-vg  lvm2 a--  31,76g    0      0  2836 root          0 linear
/dev/sda5:0-2835
/dev/sda5  lvs-vg  lvm2 a--  31,76g    0  2836  1023 swap_1        0 linear
/dev/sda5:2836-3858
/dev/sda5  lvs-vg  lvm2 a--  31,76g    0  3859  4271 home          0 linear
/dev/sda5:3859-8129
```



swap\_1 root home, , .



, live-USB (. [USB flash drive](#) [ALP-live \(Live-CD/Live-USB\)](#) [Astra Linux](#)), /boot . , , .



1. :

```
sudo swapon
```

| NAME      | TYPE      | SIZE | USED | PRI0 |
|-----------|-----------|------|------|------|
| /dev/dm-1 | partition | 4G   | 0B   | -2   |

```
sudo swapoff /dev/dm-1
```

:

```
sudo swapoff -a
```

2. ( /etc/fstab):

```
#/dev/mapper/lvs--vg-swap_1 none swap sw 0 0
```

3. swap\_1:

```
sudo lvremove /dev/`hostname`-vg/swap_1
```

```
Do you really want to remove active logical volume lvs-vg/swap_1? [y/n]: y
Logical volume "swap_1" successfully removed
```

4. , , , /etc/initramfs-tools/conf.d/resume :

```
#RESUME=/dev/mapper/lvs--vg-swap_1
```

:

```
sudo update-initramfs -t -u -k `uname -r`
sudo update-grub
```

- .

, pvs "" :

```
sudo pvs -v --segments /dev/sda5
```

```
Wiping internal VG cache
Wiping cache of LVM-capable devices
PV          VG          Fmt Attr PSize  PFree Start  SSize LV      Start Type   PE
Ranges
/dev/sda5   lvs-vg   lvm2 a--  31,76g 4,00g    0   2836 root      0 linear /dev
/sda5:0-2835
/dev/sda5   lvs-vg   lvm2 a--  31,76g 4,00g  2836   1023      0
free
/dev/sda5   lvs-vg   lvm2 a--  31,76g 4,00g  3859   4271 home     0 linear /dev
/sda5:3859-8129
```

, , 1023, home 4271,, home, .

## LVM

LVM , , .

, (. "").



live-USB . , /home, :

1. ;
2. (Ctrl+Alt+F1);
3. , :

```
cd /
```

4. /home:

```
sudo umount /home
```

5. (Ctrl+Alt+F7) ( , ).
6. .
7. :

```
sudo mount /home
```

, , . root, root, live-USB .

, LVM, :

```
sudo pvmove --alloc anywhere /dev/sda5:XXXX+YYY /dev/sda5:ZZZZ+YYY
```

+YYY - (. sudo pvs -v --segmens ), ZZZZ+YYY - , (. "").

LVM, pvmove :

```
sudo pvmove --alloc anywhere /dev/sda5:3859-8129
```

```
Insufficient free space: 4271 extents needed, but only 1023 available
Unable to allocate mirror extents for lvs-vg/pvmove0.
Failed to convert pvmove LV to mirrored
```

, . 1023, :

```
sudo pvmove --alloc anywhere /dev/sda5:3859+1000 /dev/sda5:2836+1000
```



**sudo pvs -v --segments /dev/sda5**

```
Wiping internal VG cache
Wiping cache of LVM-capable devices
PV          VG      Fmt  Attr PSize  PFree Start  SSize LV    Start Type  PE Ranges
/dev/sda5   lvs-vg  lvm2 a--  31,76g 4,00g    0  2836 root    0 linear /dev/sda5:0-2835
/dev/sda5   lvs-vg  lvm2 a--  31,76g 4,00g  2836  1001 home    0 linear /dev/sda5:2836-3836
/dev/sda5   lvs-vg  lvm2 a--  31,76g 4,00g  3837   1023      0 free
/dev/sda5   lvs-vg  lvm2 a--  31,76g 4,00g  4860  3270 home   1001 linear /dev/sda5:4860-8129
```

```
sudo pvmove --alloc anywhere /dev/sda5:4860+1000 /dev/sda5:3837+1000
sudo pvmove --alloc anywhere /dev/sda5:5861+1000 /dev/sda5:4838+1000
sudo pvmove --alloc anywhere /dev/sda5:6862+1000 /dev/sda5:5839+1000
sudo pvmove --alloc anywhere /dev/sda5:7863- /dev/sda5:6840-
```

**sudo pvs -v --segments /dev/sda5**

```
sudo pvs -v --segments /dev/sda5
Wiping internal VG cache
Wiping cache of LVM-capable devices
PV          VG      Fmt  Attr PSize  PFree Start  SSize LV    Start Type  PE
Ranges
/dev/sda5   lvs-vg  lvm2 a--  31,76g 4,00g    0  2836 root    0 linear
/dev/sda5:0-2835
/dev/sda5   lvs-vg  lvm2 a--  31,76g 4,00g  2836  4271 home    0 linear
/dev/sda5:2836-7106
/dev/sda5   lvs-vg  lvm2 a--  31,76g 4,00g  7107   1023      0
free
```



16. . . .

( )

( - LVM) live-USB gparted (" - " - " Gparted"). pvresize:

**sudo pvresize -v --setphysicalvolumesize 32778240K /dev/sda5**

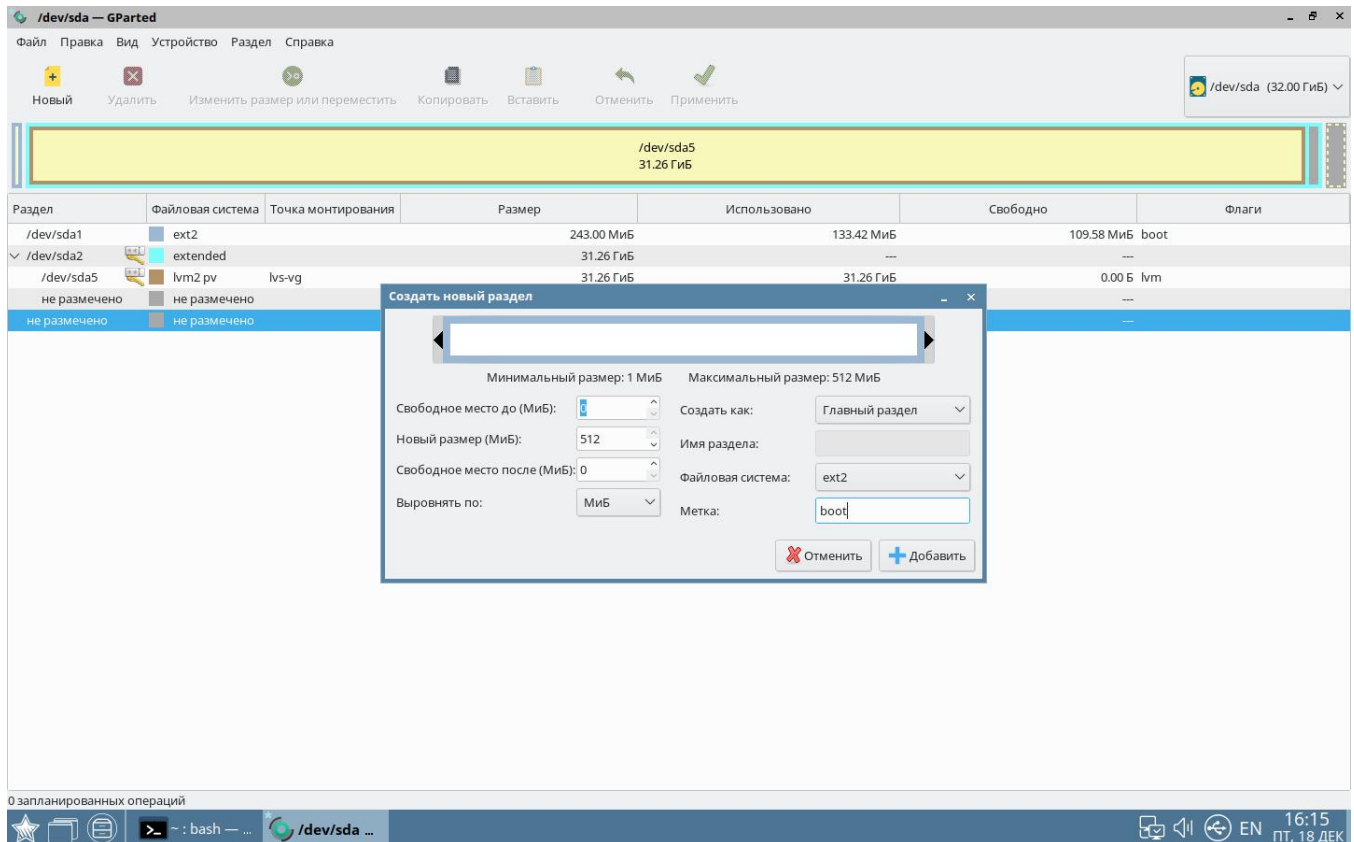
boot

1. live-USB;
2. gparted.

live-USB ( live-USB Astra Linux) LVM, LVM, "".

, " ", .

boot:



ext2, boot, (boot ).

:

1. parted:

```
sudo parted
```

```
GNU Parted 3.2
Using /dev/sda
Welcome to GNU Parted! Type 'help' to view a list of commands.
(parted)
```

2. print (2, extended):

```
(parted) print
Model: ATA VBOX HARDDISK (scsi)
Disk /dev/sda: 34,4GB
Sector size (logical/physical): 512B/512B
Partition Table: msdos
Disk Flags:

Number  Start   End     Size    Type     File system  Flags
 1      1049kB  256MB   255MB   primary  ext2          boot
 2      257MB   34,4GB  34,1GB   extended
 5      257MB   33,8GB  33,6GB   logical              lvm
```

3. :

```
(print) resizepart 2 33.8G
```

- :
- 2 - ;
  - 33.8G - ( );
4. ( ):

```
(print) mkpart primary ext2 33.8G 34.4G
```

5. :

```
(parted) print
Model: ATA VBOX HARDDISK (scsi)
Disk /dev/sda: 34,4GB
Sector size (logical/physical): 512B/512B
Partition Table: msdos
Disk Flags:

Number  Start   End     Size    Type     File system  Flags
  1      1049kB  256MB   255MB   primary  ext2
  2      257MB   33,8GB  33,6GB   extended
  5      257MB   33,8GB  33,6GB   logical
  3      33,8GB  34,4GB  537MB   primary  ext2      lvm
                                         boot
```

6. boot:

```
(print) toggle 3 boot
```

7. parted:

```
q
```

8. :

- a. :

```
lsblk

NAME MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
sda   8:0    0   32G  0 disk
sda1  8:1    0   243M  0 part
sda3  8:3    0   512M  0 part /boot
sda5  8:5    0 31,3G  0 part
```

- b. "boot" ( ):

```
sudo e2label /dev/sda5 boot
```

## boot

live-USB, , :

1. :

```
lsblk
```

| NAME | MAJ:MIN | RM | SIZE  | RO | TYPE | MOUNTPOINT |
|------|---------|----|-------|----|------|------------|
| sda  | 8:0     | 0  | 32G   | 0  | disk |            |
| sda1 | 8:1     |    | 243M  | 0  | part | /boot      |
| sda2 | 8:2     | 0  | 1K    | 0  | part |            |
| sda3 | 8:3     |    | 512M  | 0  | part |            |
| sda5 | 8:5     | 0  | 31,3G | 0  | part |            |

sda3, 512M

2. , :

```
sudo mount /dev/sda3 /mnt
```

3. boot boot:

```
sudo cp -R /boot/* /mnt
```

4. , boot , :  
a. :

```
sudo blkid
```

```
/dev/sda1: UUID="86418b1a-525a-4614-a600-749403a542b2" TYPE="ext2"
PARTUUID="9326d1ae-01"
/dev/sda3: LABEL="boot" UUID="7fb61205-3f42-44ff-8886-
a394991bfac0" TYPE="ext2" PARTUUID="9326d1ae-03"
/dev/sda5: UUID="Xqsuis-3sj7-VEHQ-uUXX-RzJu-lozK-0kbqN9" TYPE="
LVM2_member" PARTUUID="9326d1ae-05"
/dev/mapper/lvs--vg-root: UUID="589855d1-25f5-4151-bfa4-
8d1d1861a954" TYPE="ext4"
/dev/mapper/lvs--vg-home: UUID="88356e6b-7920-4357-a21e-
733435f1aa72" TYPE="ext4"
```

b. /etc/fstab boot, , blkid:

|                                                 |      |          |   |   |
|-------------------------------------------------|------|----------|---|---|
| UUID=7fb61205-3f42-44ff-8886-a394991bfac0 /boot | ext2 | defaults | 0 | 2 |
|-------------------------------------------------|------|----------|---|---|

, , :

|                  |      |          |   |   |
|------------------|------|----------|---|---|
| LABEL=boot /boot | ext2 | defaults | 0 | 2 |
|------------------|------|----------|---|---|

c. boot :

```
sudo umount /boot
sudo mount /boot
```

d. , , , /etc/initramfs-tools/conf.d/resume :

```
#RESUME=/dev/mapper/lvs--vg-swap_1
```

e. :

```
sudo update-initramfs -t -u -k `uname -r`
sudo update-grub
```

## boot

boot :

```
sudo grub-install /dev/sda
```

1. , :

```
df -h
```

|                          | % C  |      |      |     |         |
|--------------------------|------|------|------|-----|---------|
| udev                     | 2,0G | 0    | 2,0G | 0%  | /dev    |
| tmpfs                    | 395M | 8,0M | 387M | 3%  | /run    |
| /dev/mapper/lvs--vg-root | 11G  | 3,9G | 6,4G | 38% | /       |
| tmpfs                    | 2,0G | 4,0K | 2,0G | 1%  | /dev    |
| /shm                     |      |      |      |     |         |
| tmpfs                    | 5,0M | 4,0K | 5,0M | 1%  | /run    |
| /lock                    |      |      |      |     |         |
| tmpfs                    | 2,0G | 0    | 2,0G | 0%  | /sys/fs |
| /cgroup                  |      |      |      |     |         |
| /dev/sda1                | 236M | 126M | 98M  | 57% | /boot   |
| /dev/mapper/lvs--vg-home | 17G  | 57M  | 16G  | 1%  | /home   |
| tmpfs                    | 395M | 0    | 395M | 0%  | /run    |
| /user/999                |      |      |      |     |         |
| tmpfs                    | 395M | 8,0K | 395M | 1%  | /run    |
| /user/1000               |      |      |      |     |         |

, /home, 17, 57 (,, ).

2. live-USB /home .

3. :

```
sudo e2fsck -ff /dev/mapper/lvs--vg-home
```

4. 2GB:

```
sudo resize2fs /dev/mapper/lvs--vg-home 2G
```

5. 2GB:

```
sudo lvreduce -L 2G /dev/mapper/lvs--vg-home
```

```
WARNING: Reducing active logical volume to 2,00 GiB.
THIS MAY DESTROY YOUR DATA (filesystem etc.)
Do you really want to reduce lvs-vg/home? [y/n]: y
Size of logical volume lvs-vg/home changed from 16,68 GiB (4271
extents) to 2,00 GiB (512 extents).
Logical volume lvs-vg/home successfully resized.
```

6. .

:

```
sudo pvs -v --segments /dev/sda5
```

```
Wiping internal VG cache
Wiping cache of LVM-capable devices
PV          VG          Fmt  Attr PSize  PFree  Start  SSize LV    Start Type  PE
Ranges
/dev/sda5   lvs-vg   lvm2 a--  31,76g 18,68g    0  2836 root    0 linear
/dev/sda5:0-2835
/dev/sda5   lvs-vg   lvm2 a--  31,76g 18,68g 2836  1023      0
free
/dev/sda5   lvs-vg   lvm2 a--  31,76g 18,68g 3859   512 home    0 linear
/dev/sda5:3859-4370
/dev/sda5   lvs-vg   lvm2 a--  31,76g 18,68g 4371  3759      0
free
```

, home , , :

```
sudo pvmove --alloc anywhere /dev/sda5:3859+512 /dev/sda5:2836+512
```

:

```
sudo pvs -v --segments /dev/sda5
```

```
Wiping internal VG cache
Wiping cache of LVM-capable devices
PV          VG          Fmt  Attr PSize  PFree  Start  SSize LV    Start Type  PE
Ranges
/dev/sda5   lvs-vg   lvm2 a--  31,76g 18,68g    0  2836 root    0 linear
/dev/sda5:0-2835
/dev/sda5   lvs-vg   lvm2 a--  31,76g 18,68g 2836   512 home    0 linear
/dev/sda5:2836-3347
/dev/sda5   lvs-vg   lvm2 a--  31,76g 18,68g 3348  4782      0
free
```

1. :

1. home ( - swap , home ):

```
sudo lvextend -l +4654 /dev/mapper/lvs--vg-home
```

2. - swap, :

```
sudo lvcreate -n swap_1 -L 4G lvs-vg
```

:

```
sudo pvs -v --segments /dev/sda5
```

```
Wiping internal VG cache
Wiping cache of LVM-capable devices
PV          VG          Fmt  Attr PSize  PFree  Start  SSize LV    Start Type  PE
Ranges
/dev/sda5   lvs-vg   lvm2 a--  31,26g    0    0  2836 root    0 linear /dev
```

```
/sda5:0-2835
```

```
/dev/sda5 lvs-vg lvm2 a-- 31,26g 0 2836 5166 home 0 linear /dev  
/sda5:2836-8001
```

```
live-USB - /home:
```

```
sudo mount /home
```

```
, .
```