

# LVM

Abstraktionsschicht, um Partitionen flexibel über mehrere physische Devices zu bilden. Fasst eine oder mehrere Disks zu einem Logical Volume zusammen. Mehrere Physical Volumes (Platten) bilden eine Volume Group. In der Volume Group werden Logical Volumes gebildet. In den LV werden die Dateisysteme angelegt.

```
Dateisystem (mkfs)
^^
Logical Volume (LV)
^^
Volume Group (VG)
^^
Physical Volume (PV, HDD1 -- HDD2)
```

## **pvdisplay zeigt alle Physical Volumes und die physischen Devices, auf denen sie liegen**

```
root@tarapiroe /mnt # pvdisplay
--- Physical volume ---
PV Name                /dev/md3
VG Name                data1
PV Size                <2,66 TiB / not usable 2,31 MiB
Allocatable           yes
PE Size               4,00 MiB
Total PE              696964
Free PE               364164
Allocated PE          332800
PV UUID               JGWU94-FLRS-zV60-ZAzg-gRvE-ifmR-qLIIdMs

--- Physical volume ---
PV Name                /dev/nbd0p5
VG Name                ffes-vg
PV Size                19,52 GiB / not usable 2,00 MiB
Allocatable           yes (but full)
PE Size               4,00 MiB
Total PE              4997
Free PE               0
Allocated PE          4997
PV UUID               jqhYf1-VhUf-ApgM-vPtW-aLD3-EFkZ-etDGgz
```

## **vgdisplay zeigt die Volume Groups**

```
root@tarapiroe /mnt # pvdisplay
--- Physical volume ---
PV Name                /dev/md3
VG Name                data1
PV Size                <2,66 TiB / not usable 2,31 MiB
Allocatable           yes
PE Size               4,00 MiB
```

```
Total PE          696964
Free PE           364164
Allocated PE      332800
PV UUID           JGWU94-FLRS-zV60-ZAzg-gRvE-ifmR-qLIIdMs

--- Physical volume ---
PV Name           /dev/nbd0p5
VG Name           ffes-vg
PV Size           19,52 GiB / not usable 2,00 MiB
Allocatable       yes (but full)
PE Size           4,00 MiB
Total PE          4997
Free PE           0
Allocated PE      4997
PV UUID           jqhYf1-VhUf-ApgM-vPtW-aLD3-EFkZ-etDGgz
```

### lvddisplay zeigt die logical volumes in der Volume Group

```
root@tarapiroe /mnt # lvdisplay
--- Logical volume ---
LV Path           /dev/data1/VMs
LV Name           VMs
VG Name           data1
LV UUID           ccDAJ2-sN1H-lRYL-fQFf-q11k-FtSB-7nSSQ0
LV Write Access   read/write
LV Creation host, time ,
LV Status         available
# open            1
LV Size           300,00 GiB
Current LE        76800
Segments          1
Allocation        inherit
Read ahead sectors auto
- currently set to 256
Block device      253:0

--- Logical volume ---
LV Path           /dev/data1/Backup
LV Name           Backup
VG Name           data1
LV UUID           2aABCv-Dwp0-W9Wu-0SpK-Xrwy-fHVF-pDEpge
LV Write Access   read/write
LV Creation host, time ,
LV Status         available
# open            1
LV Size           1000,00 GiB
Current LE        256000
Segments          1
Allocation        inherit
Read ahead sectors auto
- currently set to 256
```

```

Block device          253:1

--- Logical volume ---
LV Path                /dev/ffes-vg/root
LV Name                root
VG Name                ffes-vg
LV UUID                A9CTeG-Da3f-CtnJ-Hgkd-Yp6r-NpJ0-yaiwLT
LV Write Access        read/write
LV Creation host, time ffes, 2017-11-22 10:33:21 +0100
LV Status              available
# open                 0
LV Size                <17,52 GiB
Current LE             4485
Segments               1
Allocation             inherit
Read ahead sectors     auto
- currently set to    256
Block device          253:2

--- Logical volume ---
LV Path                /dev/ffes-vg/swap_1
LV Name                swap_1
VG Name                ffes-vg
LV UUID                tTYpH9-jJsi-0HsE-twF2-3Ut0-NZQB-UWepLj
LV Write Access        read/write
LV Creation host, time ffes, 2017-11-22 10:33:21 +0100
LV Status              available
# open                 0
LV Size                2,00 GiB
Current LE             512
Segments               1
Allocation             inherit
Read ahead sectors     auto
- currently set to    256
Block device          253:3

```

lvcreate legt neue Volumes in einer Volume Group an:

```
root@tokoeka ~ # lvcreate --name data2 --size 1.9T pve
```

Auf maximal verfügbare Grösse:

```
lvcreate -l 100%VG -n data2 pve
```

lvextend und lvreduce vergrößern und verkleinern die Volumes. lvscan zeigt alle Volumes in Kurzfassung:

```

root@tokoeka ~ # lvscan
ACTIVE          '/dev/pve/swap' [8.00 GiB] inherit
ACTIVE          '/dev/pve/root'  [100.00 GiB] inherit
ACTIVE          '/dev/pve/data'  [100.00 GiB] inherit

```

```
ACTIVE      '/dev/pve/vm-100-disk-0' [32.00 GiB] inherit
ACTIVE      '/dev/pve/vm-100-disk-1' [500.00 GiB] inherit
ACTIVE      '/dev/pve/backup' [1.00 TiB] inherit
ACTIVE      '/dev/pve/data2' [1.90 TiB] inherit
```

lvrename benennt ein lv um:

```
lvrename /dev/pve/data2 /dev/pve/backup
```

Allerdings haben sie noch kein Filesystem, das legt man mit mkfs.ext4 an.

```
root@tokoeka ~ # mkfs.ext4 /dev/pve/vm-100-disk-1
mke2fs 1.43.4 (31-Jan-2017)
Creating filesystem with 131072000 4k blocks and 32768000 inodes
Filesystem UUID: 3c17dd79-ea84-47b8-82ec-7e94b3f394c8
Superblock backups stored on blocks:
    32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632,
2654208,
    4096000, 7962624, 11239424, 20480000, 23887872, 71663616, 78675968,
102400000
```

```
Allocating group tables: done
Writing inode tables: done
Creating journal (262144 blocks): done
Writing superblocks and filesystem accounting information: done
```

Wenn man das lv vergrößert hat, muss man auch das Filesystem vergrößern:

```
resize2fs -p /dev/mapper/pve-data
```

Erst danach sind alle lv's als Block Devices für den Kernel verfügbar:

```
root@tokoeka ~ # blkid
/dev/sda1: UUID="1e90e1fa-fd6c-db99-55cd-6e2107fd3f55" UUID_SUB="043a0140-
ad1b-18d9-00e7-ff2cd6026917" LABEL="rescue:0" TYPE="linux_raid_member"
PARTUUID="7abb39f4-17f5-49aa-80d2-ba5de6088a15"
/dev/sda2: UUID="0acd374c-f1fb-7065-ae31-6e5a6e12ad1b"
UUID_SUB="6f1fe193-8a90-0f93-3d8a-e5633cf6e447" LABEL="rescue:1"
TYPE="linux_raid_member" PARTUUID="3a15509a-dba2-4c11-8f51-ee7efc9512de"
/dev/sdb1: UUID="1e90e1fa-fd6c-db99-55cd-6e2107fd3f55" UUID_SUB="814a4156-
e0ec-9058-7616-a77d0c82b134" LABEL="rescue:0" TYPE="linux_raid_member"
PARTUUID="c3fcddd4-f3a8-419c-b87a-9ae914a9f207"
/dev/sdb2: UUID="0acd374c-f1fb-7065-ae31-6e5a6e12ad1b"
UUID_SUB="1ca5f9db-589d-8dd1-23be-5561756d441c" LABEL="rescue:1"
TYPE="linux_raid_member" PARTUUID="c6b17ac2-9103-4e50-9d23-8ce033cd6d08"
/dev/md0: UUID="b954b02a-56ab-466a-8178-c4a888301676" TYPE="ext4"
/dev/md1: UUID="BW0yGZ-89CR-q1m5-9RSe-qRXM-hq5s-4MaUI5" TYPE="LVM2_member"
/dev/mapper/pve-root: UUID="63888efc-9c72-44fe-ac6c-ca29d45bbc4c"
TYPE="ext4"
/dev/mapper/pve-swap: UUID="82ea6ffd-47ef-4078-9130-9c4b2caf2aaa"
```

```

TYPE="swap"
/dev/sda3: PARTUUID="0f73648a-562b-4a93-bc6a-c596a743167a"
/dev/sdb3: PARTUUID="5031ce48-d15d-4b55-acbd-9bf05f460d17"
/dev/mapper/pve-vm--100--disk--0: PTUUID="cc0d01a6" PTTYTYPE="dos"
/dev/mapper/pve-vm--100--disk--1: UUID="3c17dd79-
ea84-47b8-82ec-7e94b3f394c8" TYPE="ext4"
/dev/mapper/pve-backup: UUID="b094a61f-6bee-4d36-97fb-29aed39ef2cc"
TYPE="ext4"
/dev/mapper/pve-data2: UUID="3050b5e7-b457-48d2-9070-ff11241ebcf4"
TYPE="ext4"

```

Oder noch schöner mit lsblk

```

root@tokoeka ~ # lsblk
NAME                                MAJ:MIN RM  SIZE RO TYPE  MOUNTPOINT
sda                                  8:0    1   3.7T  0 disk
├─sda1                               8:1    1   512M  0 part
│   └─md0                            9:0    0 511.4M  0 raid1 /boot
├─sda2                               8:2    1   3.7T  0 part
│   └─md1                            9:1    0   3.7T  0 raid1
│       ├─pve-root                   253:0   0   100G  0 lvm  /
│       ├─pve-swap                   253:1   0    8G   0 lvm  [SWAP]
│       ├─pve-data_tmeta             253:2   0   100M  0 lvm
│       │   └─pve-data-tpool         253:4   0   100G  0 lvm
│       │       └─pve-data           253:5   0   100G  0 lvm
│       │           └─pve-vm--100--disk--0 253:6   0   32G   0 lvm
│       └─pve-data_tdata             253:3   0   100G  0 lvm
│           └─pve-data-tpool         253:4   0   100G  0 lvm
│               └─pve-data           253:5   0   100G  0 lvm
│                   └─pve-vm--100--disk--0 253:6   0   32G   0 lvm
├─pve-vm--100--disk--1             253:7   0  500G  0 lvm
├─pve-backup                       253:8   0    1T   0 lvm
└─pve-data2                        253:9   0   1.9T  0 lvm
sda3                                 8:3    1    1M   0 part
sdb                                  8:16   1   3.7T  0 disk
├─sdb1                               8:17   1   512M  0 part
│   └─md0                            9:0    0 511.4M  0 raid1 /boot
├─sdb2                               8:18   1   3.7T  0 part
│   └─md1                            9:1    0   3.7T  0 raid1
│       ├─pve-root                   253:0   0   100G  0 lvm  /
│       ├─pve-swap                   253:1   0    8G   0 lvm  [SWAP]
│       ├─pve-data_tmeta             253:2   0   100M  0 lvm
│       │   └─pve-data-tpool         253:4   0   100G  0 lvm
│       │       └─pve-data           253:5   0   100G  0 lvm
│       │           └─pve-vm--100--disk--0 253:6   0   32G   0 lvm
│       └─pve-data_tdata             253:3   0   100G  0 lvm
│           └─pve-data-tpool         253:4   0   100G  0 lvm
│               └─pve-data           253:5   0   100G  0 lvm
│                   └─pve-vm--100--disk--0 253:6   0   32G   0 lvm
├─pve-vm--100--disk--1             253:7   0  500G  0 lvm
└─pve-backup                       253:8   0    1T   0 lvm

```

	└─pve-data2	253:9	0	1.9T	0	lvm
	└─sdb3	8:19	1	1M	0	part

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