LVM

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1 Logical volumes

Logical Volumes can sometimes offer a practical alternative to partitions:

- **Partitioning** can be considered as a **thick provisioning** of disk space.
- **Logical volumes** represent a **thin provisioning** of disk space.

Unlike partitoning, logical volumes are OS-dependent and their handling depends on the host OS in use.

1.1 Key concepts

- Volumes are created which appear to OS as a partition, which are then formatted and mounted in the usual way.
- Usually a single disk is used in its entirety:
  - Single large partition is created to hold the logical volumes.
  - Sometimes a small standard boot partition is required.
- Logical Volume manager can resize volumes:
  - For this to work non-destructively, file system must support resizing.
- May support snapshot/restore operations.

2 Linux LVM

Linux has an inbuilt Logical Volume Manager (LVM). LVM is built into the kernel and managed by a number of commands in `/usr/sbin`.

LVM takes over partitions on physical disks as physical volumes. Physical volumes are aggregated into volume groups. Logical Volumes, which act like a partition, are then provisioned on a volume group.

2.1 Partition layout

Physical disks appear to the system as block devices.

LVM partitions are created on the physical disk, usually 1 for entire disk.

2.2 Physical volumes

Physical volumes map to physical partitions. Commands dealing with physical volumes start with `pv`:

- Physical volumes are created on a partition using `pvcreate`.
- `pvdisplay` to show information about all physical volumes in the system.

2.3 Volume group

A volume group aggregates one or more physical volumes to create a virtual block device:

- This is conceptually the LVM equivalent of a hard disk.
- The volume group has a name / label, e.g. `vg01`.

Commands dealing with volume groups start with `vg`:

- Volume group is created on a Physical volume using `vgcreate`.
- Use `vgdisplay` to show information about volume groups in the system.

Once created, the volume group will then appear as a directory under `/dev`, e.g. `/dev/vg01`.

2.4 Logical volume

A logical volume is provisioned on the volume group, and acts as a virtual partition.

Commands dealing with logical volumes start with `lv`:

- Use `lvdisplay` to show information about logical volumes in the system.

Logical volumes will appear in `/dev` as a subfolder of their volume group:

- e.g. in the `/dev/vg01` folder as `/dev/vg01/vol_data`.

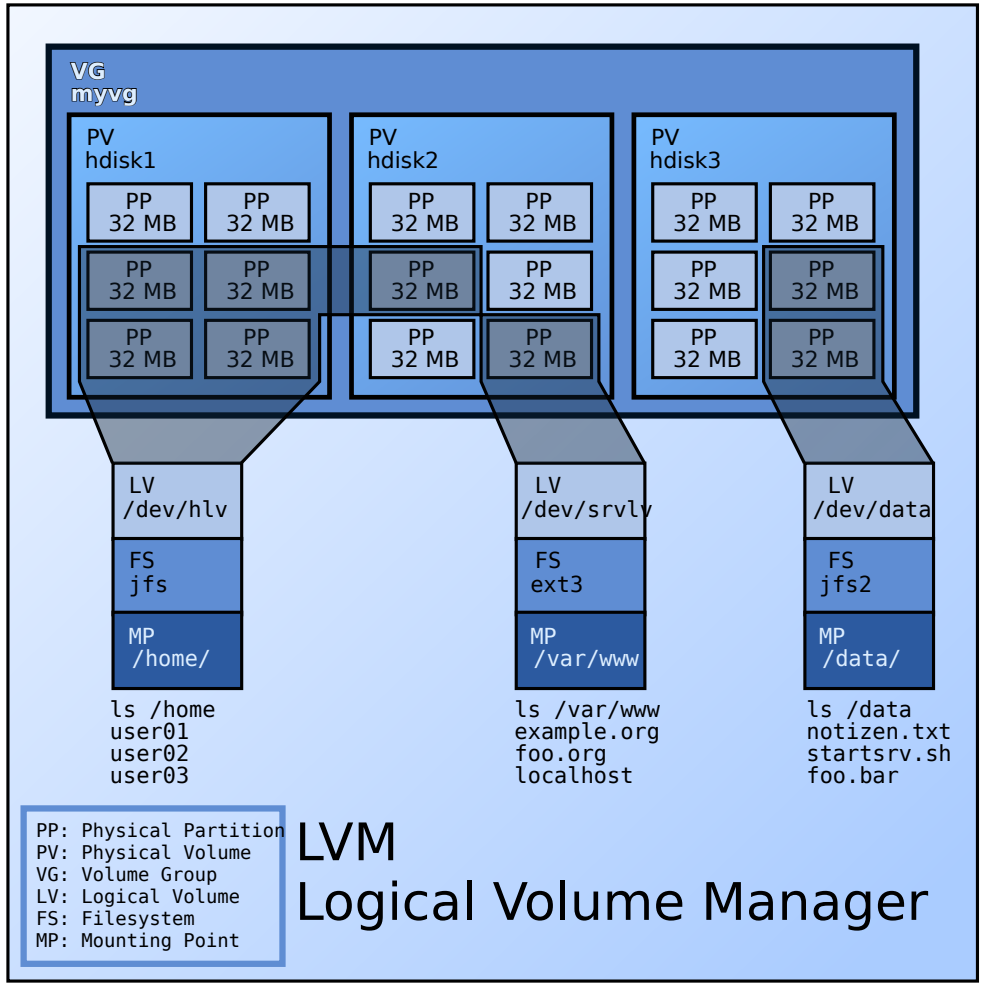
VG
myvg
PV
hdisk1
PV
hdisk2
PV
hdisk3
PP
32 MB
LV
/dev/hlv
FS
jfs
MP
/home/
LV
/dev/srvlv
FS
ext3
MP
/var/www
LV
/dev/data
FS
jfs2
MP
/data/
ls /home
user01
user02
user03
ls /var/www
example.org
foo.org
localhost
ls /data
notizen.txt
startsrv.sh
foo.bar
PP: Physical Partition
PV: Physical Volume
VG: Volume Group
LV: Logical Volume
FS: Filesystem
MP: Mounting Point
LVM
Logical Volume Manager

Figure 1: LVM

3 Useful links

- https://www.digitalocean.com/community/tutorials/an-introduction-to-lvm-concepts-t
- https://www.server-world.info/en/note?os=Ubuntu_17.04&p=iscsi&f=1
- https://en.wikipedia.org/wiki/Logical_volume_management