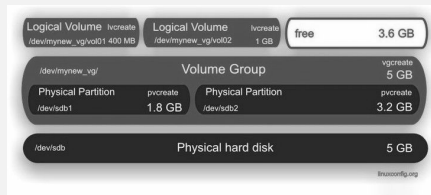


LVM - schema



Example of an LVM layout.

LVM - terminology

PE - physical extents The smallest unit of disk space that can be managed by LVM. It's set when you create a volume group. It determines the "granularity" of of disk space allocation. All physical volumes in a volume group will use the same extent size.

LE - logical extents The same as PE but for Logical Volumes

PV - physical volume Disks, partitions, RAID volumes

VG - volume group Group of one or more physical volumes

LV - logical volume Entity that contains information, store on physical volumes, grouped within a volume group

LVM - commands and components

lvm pseudo shell for LVM

lvmconfig prints LVM configuration from /etc/lvm/lvm.conf

LVM - commands and components (cont)

lvmdisplay-kscan prints devices that could be used as physical volumes

lvmddump dumps LVM configuration to tar file

lvmddmetad caching service for LVM metadata

LVM - important files

/etc/lvm/ LVM configuration directory

/etc/lvm/lvm.conf LVM configuration file

/etc/lvm/{archive|backup} Backup and archive of LVM configuration

/etc/lvm/profile A set of selected customizable configuration settings that can be used to achieve certain characteristics in various environments or uses. Normally, the name of the profile should reflect that environment or use. An LVM profile overrides existing configuration.

LVM - Physical Volume

pvcreate create PV

pvchange change attributes of PV

pvs|pvdisplay display information about PV

pvmove moves extents from one PV to another

pvremove removes a PV

pvresize resizes a PV

pvcscan scans for changes in PV configuration and size

LVM - Volume Group

vgs|vgdisplay displays VG information

vgmknodes create the special files for VG devices in /dev

vgck check VG consistency

vgcfbackup make a backup of VG metadata

vgcfrestore restore VG metadata from backup

vgrename rename a VG

vgsplit move PVs to a new or existing VG

vgconvert change VG metadata format

LVM - Volume Group (cont)

vgimport register exported VG in the system

vgexport unregister VG from the system

vgimportclone import a VG from cloned PVs

vgcreate create VG from one or more PVs

vgremove remove VG

vgreduce remove PVs from VG

vgchange change VG attributes

vgextend extend VG with one or more PVs

vgmerge merge VGs

vgscan scan VGs for changes in metadata and size

LVM - Logical Volume

lvs|lvdisplay print LV metadata

lvchange change attributes of LV

lvcreate create a new LV

lvextend extend size of LV

lvreduce reduce size of LV (offline!)

lvresize change size of LV

LVM - Logical Volume (cont)

lvrename	rename a LV
lvconvert	change layout of LVM
lvscan	scan LVs for metadata changes and size
lvremove	remove LV

LVM - create PV

pvcreate	create a new PV from device
/dev/<disk_device>	device
<i>pvcreate /dev/sdb</i>	

To create a PV you need a usable storage device.
Try **lvmdiskscan** command.

LVM - create VG

vgcreate	create a volume groups that consists of one or more PVs
<VG>	
<PV>	
<PV>	
<i>vgcreate data_vg /dev/sdb /dev/sdc</i>	

To create a VG you need one or more PVs.

LVM - create LV

lvcreate -n <LV_NAME> -L <SIZE> <VG>	create a LV of a given size in a VG
<i>lvcreate -n data_lv -L 100G data_vg</i>	
lvcreate -n <LV_NAME> -l 100%FREE <VG>	create a LV that fills 100% of free space in VG

LVM - create LV (cont)

lvcreate -n data_lv -l 100%FREE data_vg

To create an LV you need a volume group.

LVM - Snapshots

lvcreate -L <SIZE> -s -n <NAME_OF_SNAPSHOT> <PATH_TO_LV> Create a snapshot of an LV

lvcreate -L 4G -s -n data_lv-snapshot /dev/mapper/data--vg--data--lv

lvremove <PATH_TO_SNAPSHOT> Remove snapshot

lvremove /dev/mapper/data--vg--data--lv

lvextend -L <SIZE> <PATH_TO_LV> Extend snapshot

lvextend -L +10G /dev/mapper/data--vg--data--lv

lvconvert --merge <PATH_TO_SNAPSHOT> Restore data from snapshot

lvconvert --merge /dev/mapper/data--vg--data--lv

LVM - Snapshots (cont)

modify **snapshot_autoextend_threshold** and **snapshot_autoextend_percent** in `lvm.conf` Enable automatic extension of snapshots by adjusting the values

Snapshots contain differences from the point a given LV has been created - not the real data. If the size of a snapshot is exceeded it becomes useless and there is no way to restore data from it.

Old state of an LV can be restored from a snapshot, but please remember to unmount the filesystem first.

Useful storage commands (Bonus)

lsblk -o name,mountpoint,label,size,uuid	List block devices with useful information
multipathd show maps status	Print path status of multipath devices
lvs -o +devices	Print LVs, VGs and device paths
vgs -o +lv_size,lv_name	Print information about LVs, VGs, sizes and attributes
mkfs.ext4 <FS>	Format a filesystem for EXT4
mkfs.xfs <FS>	Format a filesystem for XFS

Useful storage commands (Bonus) (cont)

mount <PATH_TO_LV> <MOUNTPOINT>	Mount a filesystem in a given location
mount -a	Mount all filesystems listed in <code>/etc/fstab</code>

Useful in many situations when you need to manipulate storage devices and layout.

LVM - extend PV

rescan-scsi-bus.sh | echo 1 > /sys/block/<DEVICE>/device/rescan Rescan underlying storage to detect change in disk size

rescan-scsi-bus.sh | echo 1 > /sys/block/sdb/device/rescan

partprobe Detect changes in partition size (if necessary)

pvresize <PV> Resize PV to the maximum possible size of partition or disk/LUN

pvresize /dev/sdb

To resize a PV you'll need to know the underlying storage and know how to rescan its size. All steps can be performed online.

LVM - Extend VG

vgextend Extend existing
<VG> VG with one or
<PV> more PVs
<PV>

```
vgextend data_vg /dev/sdb  
/dev/sdc
```

To extend a VG you need a VG and one or more PVs that are not assigned to any PVs yet.

LVM - extend LV

lvextend -L extend logical
<SIZE> volume by given
/dev/m- size (add 10GB to
apper<- existing size)
PATH_T-
O_LV>

```
lvextend -L +10G /dev/mapper/  
data--vg_data--lv
```

lvextend -r extend logical
-L <SIZE> volume and its
/dev/m- filesystem by
apper<- given size (add
PATH_T- 10GB to existing
O_LV> size)

```
lvextend -r -L +10G /dev/mapp-  
er/data--vg_data--lv
```

To extend an LV you need its path. Use **df** command. In most cases you'll also want to extend the underlying filesystem, so use **-r** option to do it.

Extend filesystem (bonus)

umount <FS> Unmount
filesystem

```
umount /data
```

e2fsck -f Check and fix
<PATH_TO_- potential errors
LV>

Extend filesystem (bonus) (cont)

```
e2fsck -f /dev/mapper/data--vg_  
data--lv
```

resize2fs <PA- Reduce size
TH_TO_LV> of filesystem
<SIZE>

```
resize2fs /dev/mapper/data--v-  
g_data--lv 10G
```

lvreduce -L <SI- Reduce size
ZE> <PATH_- of LV
TO_LV>

```
lvreduce -L 10G /dev/mapper/-  
data--vg_data--lv
```

e2fsck -f <PA- Check for
TH_TO_LV> errors once
more

```
e2fsck -f /dev/mapper/data--vg_  
data--lv
```

mount <FS> Mount
filesystem

```
mount /data
```

Remember to make sure the size of both: FS (filesystem) and LV (logical volume) are the same and there are no errors. Reducing the size can ONLY be done OFFLINE. The filesystem must be unmounted. Not all filesystems can be reduced at all.

