????

Logical Volume - LV

```
# 顯示所有 LV 使用狀況
lvdisplay -C

# 新增 LV
lvcreate -L 10G -n LV_name VG_name

# 刪除 LV
lvremove /dev/VG_name>/LV_name

# 更名 LV
lvrename /dev/VG-name/old-LV-name /dev/VG-name/new-LV-name

# 顯示 LV 狀況
lvs
lvs -a -o name,copy_percent,devices
lvs -a -o name,copy_percent,devices <vg-name>
lvs -a --segments -o +devices

# 擴充 LV 使用空間
lvextend -L +2G /dev/vg/lv
lvextend -l +100%FREE /dev/vg_db2v9/lv_root   將剩餘空間都加上

ext2online /dev/vg/lv (RHEL v4)
resize2fs /dev/vg/lv (RHEL v5,6)
xfs_growfs /dev/vg/lv (RHEL v7 with XFS filesystem)
btrfs filesystem resize max <mount-point>  (Fedora 40)

# 縮小 LV 空間 (RHEL v4)
#說明: 445GB -> 2GB
umount /worktmp
e2fsck -f /dev/rootVG/worktmpLV
```

```
resize2fs /dev/rootVG/worktmpLV 1843M
lvreduce -L 2GB /dev/rootVG/worktmpLV
resize2fs /dev/rootVG/worktmpLV
mount /worktmp
#註: 1843MB 大約是要 2GB 的 90%, 這裡的指令也能使用單位 GB

# Shrinking LV (RHEL 5/6)
#100 GB -> 5GB
umount /opt/oracle/arclog
lvreduce -L 5G /dev/VolGroup00/arclogLV
resize2fs /dev/VolGroup00/arclogLV 5G
e2fsck -f /dev/VolGroup00/arclogLV
mount /opt/oracle/arclog
```

Volume Group - VG

```
# 顯示 VG 使用狀況
vgdisplay -C

# 啟動/關閉 VG
vgchange -a y VG_name
vgchange -a n VG_name
#註: 關閉後, 執行 vgdisplay 仍會顯示, 但 /dev/*** 已不存在。

# 新建 VG
vgcreate VG_name /dev/pv1 /dev/pv2

# 更名 VG
vgrename vg_esxa01db01 vg_root

# 刪除 VG
vgremove VG_name

# 增加 PV 到 VG
vgextend VG_name /dev/pv3

# 從 VG 中移除 PV
#NOTE: PV 必須沒有任何資料(檢查指令 pvs -o+pv_used)
vgreduce VG_name /dev/mypv
```

Physical Volume - PV

```
# 顯示 PV 使用狀況
pvdisplay -C

# 檢查所有 PV 的空間使用狀況
pvs -o+pv_used

# 新增 PV
pvcreate /dev/hdd1

# 刪除 PV
pvremove /dev/hdd1

# 如果整個 disk 都要作為 PV，該磁碟不能建立任何磁區，要清除舊磁區可以執行
dd if=/dev/zero of=/dev/sdd bs=512 count=1

# 既有的 LUN Disk 增加磁碟空間後，還需要執行
pvresize /dev/sd[X]
```

LVM ???????

> ? RHEL 8 ???? LVM ??????????:
>
> Do you want to remove the signature? [Y]es/[N]o:
>
> ??: ????? N???????????????
>
> ??: ??? LVM ????????????????????? reboot ???
>
> pvs
>
> ???????? PV disk??????????

Extend PV Disk: /dev/sda2 50GB to 100GB

```
[root@my-db2v11fp7 ~]# lsblk
NAME               MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
sda                  8:0    0  100G  0 disk
```

```
├─sda1               8:1    0    1G  0 part /boot
└─sda2               8:2    0   49G  0 part
  ├─rootvg-root    253:0    0   15G  0 lvm  /
  ├─rootvg-swap    253:1    0    4G  0 lvm  [SWAP]
  └─rootvg-worktmp 253:2    0  512M  0 lvm  /worktmp
sr0                 11:0    1 1024M  0 rom

[root@my-db2v11fp7 ~]# pvs
  PV         VG     Fmt  Attr PSize   PFree
  /dev/sda2  rootvg lvm2 a--  <49.00g <29.50g

[root@my-db2v11fp7 ~]# fdisk -ul /dev/sda
Command (m for help): p

Disk /dev/sda: 107.4 GB, 107374182400 bytes, 209715200 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk label type: dos
Disk identifier: 0x000def6b

   Device Boot      Start         End      Blocks   Id  System
/dev/sda1   *        2048     2099199     1048576   83  Linux
/dev/sda2         2099200   104857599    51379200   8e  Linux LVM

Command (m for help): d
Partition number (1,2, default 2): 2
Partition 2 is deleted

Command (m for help): p

Disk /dev/sda: 107.4 GB, 107374182400 bytes, 209715200 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk label type: dos
Disk identifier: 0x000def6b

   Device Boot      Start         End      Blocks   Id  System
/dev/sda1   *        2048     2099199     1048576   83  Linux
```

```
Command (m for help): n
Partition type:
   p   primary (1 primary, 0 extended, 3 free)
   e   extended
Select (default p): p
Partition number (2-4, default 2): 2
First sector (2099200-209715199, default 2099200):
Using default value 2099200
Last sector, +sectors or +size{K,M,G} (2099200-209715199, default 209715199):
Using default value 209715199
Partition 2 of type Linux and of size 99 GiB is set

Command (m for help): t
Partition number (1,2, default 2): 2
Hex code (type L to list all codes): 8e
Changed type of partition 'Linux' to 'Linux LVM'

Command (m for help): p

Disk /dev/sda: 107.4 GB, 107374182400 bytes, 209715200 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk label type: dos
Disk identifier: 0x000def6b

   Device Boot      Start         End      Blocks   Id  System
/dev/sda1   *        2048     2099199     1048576   83  Linux
/dev/sda2         2099200   209715199   103808000   8e  Linux LVM

Command (m for help): w
The partition table has been altered!

Calling ioctl() to re-read partition table.

WARNING: Re-reading the partition table failed with error 16: Device or resource busy.
The kernel still uses the old table. The new table will be used at
the next reboot or after you run partprobe(8) or kpartx(8)
Syncing disks.
```

```
[root@my-db2v11fp7 ~]# reboot



[root@my-db2v11fp7 ~]# lsblk
NAME               MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
sda                  8:0    0  100G  0 disk
├─sda1               8:1    0    1G  0 part /boot
└─sda2               8:2    0   99G  0 part
  ├─rootvg-root    253:0    0   15G  0 lvm  /
  ├─rootvg-swap    253:1    0    4G  0 lvm  [SWAP]
  └─rootvg-worktmp 253:2    0  512M  0 lvm  /worktmp
sr0                 11:0    1 1024M  0 rom

[root@my-db2v11fp7 ~]# pvresize /dev/sda2
  Physical volume "/dev/sda2" changed
  1 physical volume(s) resized or updated / 0 physical volume(s) not resized
[root@my-db2v11fp7 ~]# pvs
  PV         VG     Fmt  Attr PSize   PFree
  /dev/sda2  rootvg lvm2 a--  <99.00g <79.50g
```

?????

LVM

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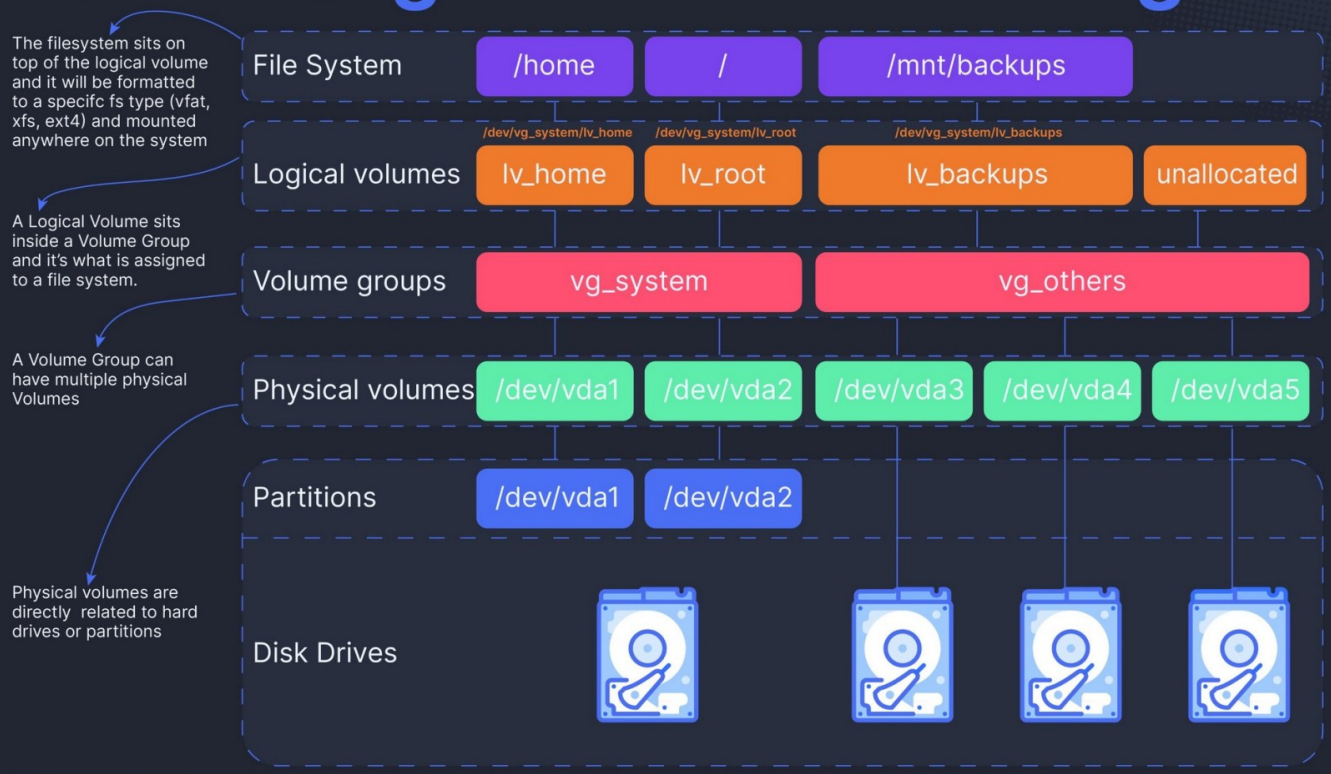
Linux Logical Volume Manager



Volume Group Management Commands

Command	Description
vgcreate	Create a volume group
vgscan	Search for all volume groups
vgdsiplay, vgs	Display information about vgs
vgextend	Add physical volumes to a vg
vgremove	Remove volume group(s)
vgrename	Rename a volume group
vgchange	Change volume group attributes
vgck	Check the consistency of vgs
vgmerge	Merge volume groups
vgsplit	Move pvs into a new or existing vg
vgcfgbackup	Backup vg configuration(s)
vgcfgrestore	Restore vg configuration
vgconvert	Convert vg metadata format
vgexport	Unregister vgs from the system
vgimport	Register exported vg with system
vgimportclone	Import a vg from cloned pvs
vgmknodes	Create the special files for vg devices in /dev

Physical Volume Management Commands

Command	Description
pvcreate	Initialize a disk or partition for use as a physical volume
pvscan	Scan all disks for pvs
pvdisplay, pvs	Display information about pvs
pvresize	resize a physical volume
pvmove	Move extents from one physical volume to another
pvck	Check metadata on pvs
pvremove	Remove LVM label(s) from pvs
pvchange	Change attributes of physical volumes

Logical Volume Management Commands

Command	Description
lvcreate	Create a logical volume
lvscan	Scan (all disks) for lvs
lvdsiplay, lvs	Display info about lvs
lvextend	Extend size of a lv
lvremove	Remove a logical volume
lvrename	Rename a logical volume
lvchange	Change attributes of a lv
lvreduce, lvresize	Reduce and resize the size of a logical volume
lvconvert	Convert a logical volume from linear to mirrored

Examples

Create Pyhical Volumes

```
$ sudo pvcreate /dev/vda1 /dev/vda2 /dev/vda3 /dev/vda3 /dev/vda5
```

Create Volume groups

```
$ sudo vgcreate vg_system /dev/vda1 /dev/vda2
$ sudo vgcreate vg_others /dev/vda3 /dev/vda3 /dev/vda5
```

Create Logical Volumes

```
$ sudo lvcreate -L 20GB -n lv_home vg_system
$ sudo lvcreate -L 35GB -n lv_root vg_system
$ sudo lvcreate -L 70GB -n lv_backups vg_others
```

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Revision #12
Created 2022-03-18 01:24:25 CST by A-Lang (Admin)
Updated 2026-04-30 09:47:21 CST by A-Lang (Admin)