

- Data at rest
- Data in motion

LVM(LOGIC VOLUME MANAGEMENT)→ens permet ampliar sense necessitat de saber com es diuen

Es convinen en grups de volums esta dividit en un o mes volums logics i utilitzen els mateixos sistemes de fitxers.

```
isx47320900@i12:~$ dd if=/dev/zero of=disk01.img bs=1k count=100K
102400+0 records in
102400+0 records out
104857600 bytes (105 MB, 100 MiB) copied, 0.195543 s, 536 MB/s
isx47320900@i12:~$ dd if=/dev/zero of=disk02.img bs=1k count=100K
102400+0 records in
102400+0 records out
104857600 bytes (105 MB, 100 MiB) copied, 0.204695 s, 512 MB/s
isx47320900@i12:~$ dd if=/dev/zero of=disk03.img bs=1k count=100K
102400+0 records in
102400+0 records out
104857600 bytes (105 MB, 100 MiB) copied, 0.197206 s, 532 MB/s
```

```
isx47320900@i12:~$ sudo losetup /dev/loop0 disk01.img
isx47320900@i12:~$ sudo losetup /dev/loop1 disk02.img
isx47320900@i12:~$ sudo losetup /dev/loop2 disk03.img
isx47320900@i12:~$ sudo losetup -a
/dev/loop1: [66306]:6956940 (/home/users/inf/hisx2/isx47320900/disk02.img)
/dev/loop2: [66306]:6956941 (/home/users/inf/hisx2/isx47320900/disk03.img)
/dev/loop0: [66306]:6956856 (/home/users/inf/hisx2/isx47320900/disk01.img)
```

Creem com si fosin 3 disc o 3 particions

```
isx47320900@i12:~$ sudo pvcreate /dev/loop0 /dev/loop1 /dev/loop2
Physical volume "/dev/loop0" successfully created.
Physical volume "/dev/loop1" successfully created.
Physical volume "/dev/loop2" successfully created.
```

es declaren com volums fisics

```
isx47320900@i12:~$ sudo pvdisplay /dev/loop0
"/dev/loop0" is a new physical volume of "100.00 MiB"
--- NEW Physical volume ---
PV Name                /dev/loop0
VG Name
PV Size                100.00 MiB
Allocatable            NO
PE Size                0
Total PE               0
Free PE                0
Allocated PE           0
PV UUID                d60hh8-phhW-7MTb-tMP9-ond0-L0ct-tBsPGE
```

Mostra els dispositius fisics

```
isx47320900@i12:~$ sudo vgcreate diskedt /dev/loop0 /dev/loop1
Volume group "diskedt" successfully created
isx47320900@i12:~$ sudo vgsdisplay diskedt
--- Volume group ---
VG Name                diskedt
System ID
Format                 lvm2
Metadata Areas         2
Metadata Sequence No   1
VG Access               read/write
VG Status               resizable
MAX LV                 0
Cur LV                 0
Open LV                 0
Max PV                 0
Cur PV                 2
Act PV                 2
VG Size                 192.00 MiB
PE Size                 4.00 MiB
Total PE                48
Alloc PE / Size        0 / 0
Free PE / Size          48 / 192.00 MiB
VG UUID                 BJWN5N-zXK6-skb7-bWxi-h99D-bcwA-fG9swY
```

Creem una unitat de disc a partir de un volum group i veiem que te 2 metadata areas que son els fragments del que esta format y e lliure 192MiB

```
isx47320900@i12:~$ sudo pvdisplay /dev/loop0
--- Physical volume ---
PV Name                /dev/loop0
VG Name                diskedt
PV Size                 100.00 MiB / not usable 4.00 MiB
Allocatable             yes
PE Size                 4.00 MiB
Total PE                24
Free PE                 24
Allocated PE            0
PV UUID                 d60hh8-phhW-7MTb-tMP9-ond0-L0ct-tBsPGE
```

La unitat basica d'assignacio son els Pe(espai restant 4*24 96(ens ha tret un 4%)) y crea una mena d'estanteria d'informació

```
isx47320900@i12:/var/tmp/imatges$ sudo lvcreate -L 50M -n sistema /dev/diskedt
Rounding up size to full physical extent 52.00 MiB
Logical volume "sistema" created.
isx47320900@i12:/var/tmp/imatges$ sudo lvcreate -L 150M -n dades /dev/diskedt
Rounding up size to full physical extent 152.00 MiB
Volume group "diskedt" has insufficient free space (35 extents): 38 required.
```

particions logicas Logical volume(LV)

no podem fer els 100 perque com es divideix en blocs de 4 no deixa mirar -l

```
isx47320900@i12:/var/tmp/imatges$ sudo lvdisplay
--- Logical volume ---
LV Path                /dev/diskedt/sistema
LV Name                 sistema
VG Name                 diskedt
LV UUID                NEygGN-L06s-WrNG-eGh7-jC30-ZKRF-u6YJC0
LV Write Access         read/write
LV Creation host, time i12, 2022-02-10 12:32:49 +0100
LV Status                available
# open                  0
LV Size                 52.00 MiB
Current LE              13
Segments                1
Allocation               inherit
Read ahead sectors      auto
- currently set to     256
Block device            254:0

isx47320900@i12:/var/tmp/imatges$ sudo lvcreate -l100%FREE -n dades /dev/diskedt
Logical volume "dades" created.

--- Logical volume ---
LV Path                /dev/diskedt/dades
LV Name                 dades
VG Name                 diskedt
LV UUID                P9rglw-CojD-U2Hc-LCKB-GLHD-Deqy-IlSlSX
LV Write Access         read/write
LV Creation host, time i12, 2022-02-10 12:37:03 +0100
LV Status                available
# open                  0
LV Size                 140.00 MiB
Current LE              35
Segments                2
Allocation               inherit
Read ahead sectors      auto
- currently set to     256
Block device            254:1
```

sistema cap en 1 volum i daes necessita espai dels 2

```
isx47320900@i12:/var/tmp/imatges$ sudo mkfs -t ext4 /dev/diskedt/sistema
mke2fs 1.46.2 (28-Feb-2021)
Discarding device blocks: done
Creating filesystem with 53248 1k blocks and 13328 inodes
Filesystem UUID: 2800898a-23e3-42fb-8f30-c0c1a48607fd
Superblock backups stored on blocks:
    8193, 24577, 40961

Allocating group tables: done
Writing inode tables: done
Creating journal (4096 blocks): done
Writing superblocks and filesystem accounting information: done
```

```
isx47320900@i12:/var/tmp/imatges$ sudo mount /dev/diskedt/sistema /mnt/sistema/
isx47320900@i12:/var/tmp/imatges$ sudo mount /dev/diskedt/sistema /mnt/
dades/      nfs_share/ sistema/
isx47320900@i12:/var/tmp/imatges$ sudo mount /dev/diskedt/dades /mnt/dades/
```

```
isx47320900@i12:/var/tmp/imatges$ sudo cp /bin/?? /mnt/sistema/
isx47320900@i12:/var/tmp/imatges$ ls /mnt/sistema/
7z  ar  bc  cp  df  ex  gs  id  jq  ln          lp  mc  mv  nl  od  ps  rm  sh  su  ul  wc
ab  as  cc  dd  du  gc  hd  ip  ld  lost+found  ls  mt  nc  nm  pr  ri  sg  ss  tr  vi  xz
```

```
isx47320900@i12:/var/tmp/imatges$ df -H
Filesystem                Size      Used Avail Use% Mounted on
udev                      8.3G         0   8.3G   0% /dev
tmpfs                     1.7G       1.9M   1.7G   1% /run
/dev/nvme0n1p5            196G       28G   159G  15% /
tmpfs                     8.4G       63M   8.3G   1% /dev/shm
tmpfs                     5.3M       4.1k   5.3M   1% /run/lock
tmpfs                     1.7G      914k   1.7G   1% /run/user/103054
gandhi:/groups            1.0T     343G   658G  35% /home/groups
/dev/mapper/diskedt-sistema  48M       16M    29M  35% /mnt/sistema
/dev/mapper/diskedt-dades  137M       15k   127M   1% /mnt/dades
```

```
isx47320900@i12:/var/tmp/imatges$ sudo blkid
/dev/nvme0n1p5: LABEL="DEBIAN_MATI" UUID="db4c5dc5-09bd-4d7c-b924-e25c9aed0801" BLOCK_SIZE="4096" TYPE="ext4" PARTUUID="35896dcb-05"
/dev/nvme0n1p6: LABEL="DEBIAN_TARDA" UUID="07ec6457-68d9-4b72-9b6c-69f694b44a21" BLOCK_SIZE="4096" TYPE="ext4" PARTUUID="35896dcb-06"
/dev/nvme0n1p7: UUID="0fd74991-b88d-4bec-af4-c1d73aef80b3" TYPE="swap" PARTUUID="35896dcb-07"
/dev/loop1: UUID="8sgAba-dd9y-cmzw-R5G3-Jn9Z-FbPm-cLt0dc" TYPE="LVM2_member"
/dev/loop2: UUID="Gd65oB-ZBp1-dWxy-anZk-M5Sj-MN1u-kGw4c0" TYPE="LVM2_member"
/dev/loop3: UUID="4tuXWF-zbKZ-3zZI-NmI4-d2Ko-Z8xD-4Ls7UZ" TYPE="LVM2_member"
/dev/mapper/diskedt-sistema: UUID="2800898a-23e3-42fb-8f30-c0c1a48607fd" BLOCK_SIZE="1024" TYPE="ext4"
/dev/mapper/diskedt-dades: UUID="97c1f64b-788c-4f25-bf9d-a8b6277ac0dd" BLOCK_SIZE="1024" TYPE="ext4"
```

```
isx47320900@i12:/var/tmp/imatges$ lsblk
NAME                                MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
loop1                               7:1      0   100M  0 loop
└─diskedt-sistema                  254:0    0    52M  0 lvm  /mnt/sistema
└─diskedt-dades                    254:1    0   140M  0 lvm  /mnt/dades
loop2                               7:2      0   100M  0 loop
└─diskedt-dades                    254:1    0   140M  0 lvm  /mnt/dades
loop3                               7:3      0   100M  0 loop
nvme0n1                             259:0    0 465.8G  0 disk
├─nvme0n1p1                       259:1    0     1K  0 part
├─nvme0n1p5                       259:2    0 186.3G  0 part /
├─nvme0n1p6                       259:3    0 186.3G  0 part
└─nvme0n1p7                       259:4    0   4.7G  0 part [SWAP]
```

```
isx47320900@i12:/var/tmp/imatges$ sudo cp /bin/?? /mnt/dades/
```

```
isx47320900@i12:/var/tmp/imatges$ lsblk
NAME                                MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
loop1                               7:1      0   100M  0 loop
└─diskedt-sistema                  254:0    0    52M  0 lvm  /mnt/sistema
└─diskedt-dades                    254:1    0   140M  0 lvm  /mnt/dades
loop2                               7:2      0   100M  0 loop
└─diskedt-dades                    254:1    0   140M  0 lvm  /mnt/dades
loop3                               7:3      0   100M  0 loop
nvme0n1                             259:0    0 465.8G  0 disk
├─nvme0n1p1                       259:1    0     1K  0 part
├─nvme0n1p5                       259:2    0 186.3G  0 part /
├─nvme0n1p6                       259:3    0 186.3G  0 part
└─nvme0n1p7                       259:4    0   4.7G  0 part [SWAP]
```

```
isx47320900@i12:/var/tmp/imatges$ df -H
Filesystem                Size      Used Avail Use% Mounted on
udev                      8.3G         0   8.3G   0% /dev
tmpfs                      1.7G       1.9M   1.7G   1% /run
/dev/nvme0n1p5            196G       28G   158G  15% /
tmpfs                      8.4G       76M   8.3G   1% /dev/shm
tmpfs                      5.3M       4.1k   5.3M   1% /run/lock
tmpfs                      1.7G      914k   1.7G   1% /run/user/103054
gandhi:/groups            1.0T     343G   658G  35% /home/groups
/dev/mapper/diskedt-sistema  48M       16M    29M  35% /mnt/sistema
/dev/mapper/diskedt-dades  137M      16M   111M  12% /mnt/dades
```

afegim dades per veure el comportament

```
isx47320900@i12:/var/tmp/imatges$ sudo vgextend diskedt /dev/loop3
```

```
Volume group "diskedt" successfully extended
```

```
isx47320900@i12:/var/tmp/imatges$ sudo vdisplay diskedt
```

```
--- Volume group ---
```

VG Name	diskedt
System ID	
Format	lvm2
Metadata Areas	3
Metadata Sequence No	4
VG Access	read/write
VG Status	resizable
MAX LV	0
Cur LV	2
Open LV	2
Max PV	0
Cur PV	3
Act PV	3
VG Size	288.00 MiB
PE Size	4.00 MiB
Total PE	72
Alloc PE / Size	48 / 192.00 MiB
Free PE / Size	24 / 96.00 MiB
VG UUID	VblPwF-dqQU-knX7-8uHN-0spg-cTaL-fkk1QL

ara afegirem un disc mes en calent

```
isx47320900@i12:/var/tmp/imatges$ sudo lvextend -L +30M /dev/diskedt/dades
```

```
Rounding size to boundary between physical extents: 32.00 MiB.
```

```
Size of logical volume diskedt/dades changed from 140.00 MiB (35 extents) to 172.00 MiB (43 extents).
```

```
Logical volume diskedt/dades successfully resized.
```

ara fem mes gran un volum logic

```
isx47320900@i12:/var/tmp/imatges$ sudo lvdisplay /dev/diskedt/dades
```

```
--- Logical volume ---
```

LV Path	/dev/diskedt/dades
LV Name	dades
VG Name	diskedt
LV UUID	P9rglw-CojD-U2Hc-LCkB-GLHD-Deqy-IlSlx
LV Write Access	read/write
LV Creation host, time	i12, 2022-02-10 12:37:03 +0100
LV Status	available
# open	1
LV Size	172.00 MiB
Current LE	43
Segments	3
Allocation	inherit
Read ahead sectors	auto
- currently set to	256
Block device	254:1


```
isx47320900@i12:/var/tmp/imatges$ df -h
Filesystem                Size      Used Avail Use% Mounted on
udev                      7.8G         0   7.8G   0% /dev
tmpfs                     1.6G       1.8M   1.6G   1% /run
/dev/nvme0n1p5            183G       26G   148G  15% /
tmpfs                     7.8G        78M   7.7G   1% /dev/shm
tmpfs                     5.0M       4.0K   5.0M   1% /run/lock
tmpfs                     1.6G       892K   1.6G   1% /run/user/103054
gandhi:/groups            931G       319G   612G  35% /home/groups
/dev/mapper/diskedt-sistema 46M        15M    28M  35% /mnt/sistema
/dev/mapper/diskedt-dades  131M        15M   106M  12% /mnt/dades
```

Com veiem no ha canviat el volum en el sistema de fichers

```
isx47320900@i12:/var/tmp/imatges$ sudo resize2fs /dev/diskedt/dades
resize2fs 1.46.2 (28-Feb-2021)
Filesystem at /dev/diskedt/dades is mounted on /mnt/dades; on-line resizing required
old_desc_blocks = 2, new_desc_blocks = 2
The filesystem on /dev/diskedt/dades is now 176128 (1k) blocks long.
```

així el resize

```
isx47320900@i12:/var/tmp/imatges$ df -h
Filesystem                Size      Used Avail Use% Mounted on
udev                      7.8G         0   7.8G   0% /dev
tmpfs                     1.6G       1.8M   1.6G   1% /run
/dev/nvme0n1p5            183G       26G   148G  15% /
tmpfs                     7.8G        77M   7.7G   1% /dev/shm
tmpfs                     5.0M       4.0K   5.0M   1% /run/lock
tmpfs                     1.6G       892K   1.6G   1% /run/user/103054
gandhi:/groups            931G       319G   612G  35% /home/groups
/dev/mapper/diskedt-sistema 46M        15M    28M  35% /mnt/sistema
/dev/mapper/diskedt-dades  163M        16M   136M  11% /mnt/dades
```

--- Logical volume ---

```
LV Path                  /dev/diskedt/dades
LV Name                  dades
VG Name                  diskedt
LV UUID                  P9rglw-CojD-U2Hc-LCkB-GLHD-Deqy-IlSlx
LV Write Access          read/write
LV Creation host, time   i12, 2022-02-10 12:37:03 +0100
LV Status                 available
# open                   1
LV Size                  172.00 MiB
Current LE               43
Segments                 3
Allocation                inherit
Read ahead sectors       auto
- currently set to      256
Block device             254:1
```

ja ha canviat!!

```
isx47320900@i12:/var/tmp/imatges$ sudo lvcreate -L 60M -n services /dev/diskedt
Logical volume "services" created.
```

creem un nou volum

```
--- Logical volume ---
LV Path                /dev/diskedt/services
LV Name                services
VG Name                diskedt
LV UUID                CVINGI-d55v-0EMQ-J5Q3-2tlb-yZHK-PkgLhA
LV Write Access        read/write
LV Creation host, time i12, 2022-02-10 12:53:03 +0100
LV Status              available
# open                 0
LV Size                60.00 MiB
Current LE             15
Segments               1
Allocation             inherit
Read ahead sectors     auto
- currently set to    256
Block device           254:2
```

veiem que solament ocupa 1 com el primer

```
isx47320900@i12:/var/tmp/imatges$ sudo resize2fs /dev/diskedt/sistema 30M
resize2fs 1.46.2 (28-Feb-2021)
Filesystem at /dev/diskedt/sistema is mounted on /mnt/sistema; on-line resizing required
resize2fs: On-line shrinking not supported
```

no es pot fer petit en calent!!!!!!

```
isx47320900@i12:/var/tmp/imatges$ sudo e2fsck -f /dev/diskedt/sistema
e2fsck 1.46.2 (28-Feb-2021)
Pass 1: Checking inodes, blocks, and sizes
Pass 2: Checking directory structure
Pass 3: Checking directory connectivity
Pass 4: Checking reference counts
Pass 5: Checking group summary information
/dev/diskedt/sistema: 52/13328 files (3.8% non-contiguous), 21573/53248 blocks
isx47320900@i12:/var/tmp/imatges$ sudo resize2fs /dev/diskedt/sistema 30M
resize2fs 1.46.2 (28-Feb-2021)
Resizing the filesystem on /dev/diskedt/sistema to 30720 (1k) blocks.
The filesystem on /dev/diskedt/sistema is now 30720 (1k) blocks long.
```

el resize del filesistem

```
isx47320900@i12:/var/tmp/imatges$ sudo lvreduce -L 30M /dev/diskedt/sistema
Rounding size to boundary between physical extents: 32.00 MiB.
WARNING: Reducing active logical volume to 32.00 MiB.
THIS MAY DESTROY YOUR DATA (filesystem etc.)
Do you really want to reduce diskedt/sistema? [y/n]: n
Logical volume diskedt/sistema NOT reduced.
isx47320900@i12:/var/tmp/imatges$ sudo lvreduce -L 32M /dev/diskedt/sistema
WARNING: Reducing active logical volume to 32.00 MiB.
THIS MAY DESTROY YOUR DATA (filesystem etc.)
Do you really want to reduce diskedt/sistema? [y/n]: y
Size of logical volume diskedt/sistema changed from 52.00 MiB (13 extents) to 32.00 MiB (8 extents).
Logical volume diskedt/sistema successfully resized.
```

resize de la particio


```
isx47320900@i12:/var/tmp/imatges$ sudo mount /dev/diskedt/sistema /mnt/sistema/
isx47320900@i12:/var/tmp/imatges$ df -h
Filesystem                Size      Used Avail Use% Mounted on
udev                      7.8G         0   7.8G   0% /dev
tmpfs                     1.6G       1.8M   1.6G   1% /run
/dev/nvme0n1p5            183G       26G   148G  15% /
tmpfs                     7.8G        85M   7.7G   2% /dev/shm
tmpfs                     5.0M        4.0K   5.0M   1% /run/lock
tmpfs                     1.6G       892K   1.6G   1% /run/user/103054
gandhi:/groups            931G       319G   612G  35% /home/groups
/dev/mapper/diskedt-dades  163M        16M   136M  11% /mnt/dades
/dev/mapper/diskedt-sistema 26M         16M    7.8M  67% /mnt/sistema
```

el montem i ho veiem que s'ha reduït

```
isx47320900@i12:/var/tmp/imatges$ sudo umount /mnt/sistema
```

desmontem

```
isx47320900@i12:/var/tmp/imatges$ sudo lvreduce -L 25M -r /dev/diskedt/sistema
Rounding size to boundary between physical extents: 28.00 MiB.
fsck from util-linux 2.36.1
/dev/mapper/diskedt-sistema: 52/7616 files (3.8% non-contiguous), 20595/30720 blocks
resize2fs 1.46.2 (28-Feb-2021)
resize2fs: New size smaller than minimum (29288)

fsadm: ext4 resize failed.
/sbin/fsadm failed: 1
Filesystem resize failed.
```

fem mes petit d'1

```
isx47320900@i12:/var/tmp/imatges$ dd if=/dev/zero of=disk04.img bs=1k count=500k
512000+0 records in
512000+0 records out
524288000 bytes (524 MB, 500 MiB) copied, 0.717785 s, 730 MB/s
```

```
isx47320900@i12:/var/tmp/imatges$ sudo losetup /dev/loop5 disk04.img
```

```
isx47320900@i12:/var/tmp/imatges$ sudo pvcreate /dev/loop5
Physical volume "/dev/loop5" successfully created.
```

```
isx47320900@i12:/var/tmp/imatges$ sudo vgextend diskedt /dev/loop5
Volume group "diskedt" successfully extended
```

creem el volum i l'afegim a edt

```
isx47320900@i12:/var/tmp/imatges$ sudo pvmove /dev/loop1
/dev/loop1: Moved: 26.32%
/dev/loop1: Moved: 100.00%
```

ho mou a on trova espai ara hem de treure de el volum group

```
isx47320900@i12:/var/tmp/imatges$ sudo vgreduce diskedt /dev/loop1
Removed "/dev/loop1" from volume_group "diskedt"
```

```
isx47320900@i12:/var/tmp/imatges$ sudo pvremove /dev/loop1
Labels on physical volume "/dev/loop1" successfully wiped.
```

ara borramos 2 y 3

```

isx47320900@i12:/var/tmp/imatges$ sudo pvmove /dev/loop2
/dev/loop2: Moved: 75.00%
isx47320900@i12:/var/tmp/imatges$ sudo vgreduce diskedt /dev/loop2
Removed "/dev/loop2" from volume group "diskedt"
isx47320900@i12:/var/tmp/imatges$ sudo pvremove /dev/loop2
Labels on physical volume "/dev/loop2" successfully wiped.
isx47320900@i12:/var/tmp/imatges$ sudo pvmove /dev/loop3
/dev/loop3: Moved: 17.39%
/dev/loop3: Moved: 100.00%
isx47320900@i12:/var/tmp/imatges$ sudo vgreduce diskedt /dev/loop3
Removed "/dev/loop3" from volume group "diskedt"
isx47320900@i12:/var/tmp/imatges$ sudo pvremove /dev/loop3
Labels on physical volume "/dev/loop3" successfully wiped.

isx47320900@i12:/var/tmp/imatges$ sudo lvextend -L +200M -r /dev/diskedt/dades
Size of logical volume diskedt/dades changed from 172.00 MiB (43 extents) to 372.00 MiB (93 extents).
Logical volume diskedt/dades successfully resized.
resize2fs 1.46.2 (28-Feb-2021)
Filesystem at /dev/mapper/diskedt-dades is mounted on /mnt/dades; on-line resizing required
old_desc_blocks = 2, new_desc_blocks = 3
The filesystem on /dev/mapper/diskedt-dades is now 380928 (1k) blocks long.

```

fa un resize and update del fs

raid 0 escriu molt rapid y al llegir tarda mes no te seguretat ja que ens quedem penjats
raid 1 crea un mirall del altre exactament igual si peta un tenim l'altre llegeix mes rapid pero
escriu igual de rapid que a 1