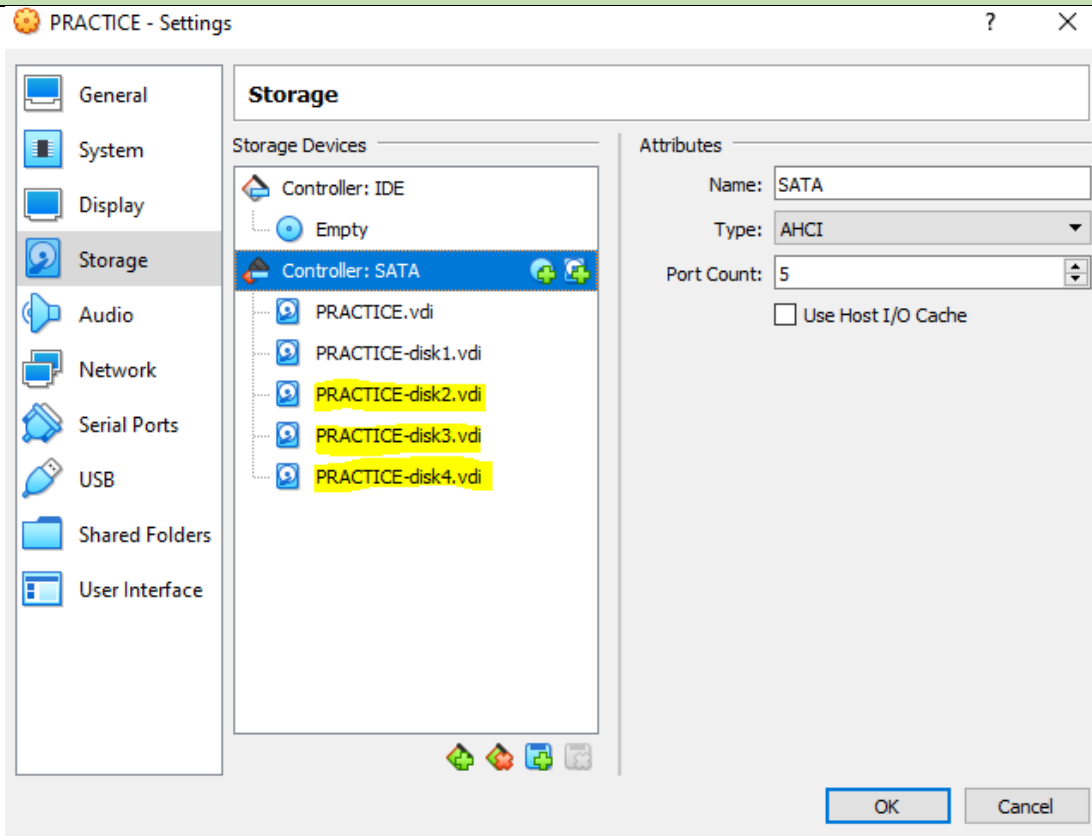




10-14-2020

<https://youtu.be/AneCZr5-tLA>

LVM – Logical Volume Manager



11-15-2020

<https://youtu.be/3oC5SgcoBf0>



Logical Volume Group – zmpt1
48GB

Accounting 4GB	Finance 6GB	HR 2GB	HR +6G	Recruiting 4 GB	Free space 26GB
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LVM stand for Logical Volume Management, it's a system of managing logical volumes or file systems, that is much more **advanced** and **flexible** than the traditional method of partitioning a disk into one or more segments and formatting that partition with filesystem.

File system – ext4 or xfs

```
[root@zmpt01 ~]# lsblk
NAME      MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
sda       8:0  0 16G  0 disk
├─sda1    8:1  0   1G  0 part /boot
├─sda2    8:2  0 15G  0 part
│ └─centos-root 253:0  0 13.4G  0 lvm /
│ └─centos-swap 253:1  0  1.6G  0 lvm [SWAP]
sdb       8:16  0 16G  0 disk
├─sdb1    8:17  0   8G  0 part
├─sdb2    8:18  0   4G  0 part
└─sdb3    8:19  0   2G  0 part
sdc       8:32  0   8G  0 disk
sdd       8:48  0 16G  0 disk
sde       8:64  0 24G  0 disk
```

```
[root@zmpt01 ~]# pvcreate /dev/sdc /dev/sdd /dev/sde
Physical volume "/dev/sdc" successfully created.
Physical volume "/dev/sdd" successfully created.
Physical volume "/dev/sde" successfully created.
```

Command	Disk1	Disk 2	Disk 3
Pvcreate	/dev/sdc	/dev/sdd	/dev/sde

```
[root@zmpt01 ~]# blkid
/dev/sdc: UUID="pYcEYd-WWPb-cwhu-7dn5-IMIk-vWhk-7B9x6x" TYPE="LVM2_member"
/dev/sdd: UUID="MnAGcr-jORK-JhHN-1vBB-xFtf-ECl6-uWYRS3" TYPE="LVM2_member"
/dev/sde: UUID="FpAXdB-xeBK-Hdrq-HKZa-rmF0-IOPF-sK1sGt" TYPE="LVM2_member"
```

```
[root@zmpt01 ~]# pvs
PV    VG   Fmt Attr PSize  PFree
/dev/sda2 centos lvm2 a-- <15.00g  0
/dev/sdc    lvm2 ---  8.00g  8.00g
/dev/sdd    lvm2 ---  16.00g 16.00g
/dev/sde    lvm2 ---  24.00g 24.00g
```

```
[root@zmpt01 ~]# vgcreate zmpt1 /dev/sdc /dev/sdd /dev/sde
Volume group "zmpt1" successfully created
```

zmpt1 now acts as a single disk

Command	Volume group name	Disk 1	Disk 2	Disk 3
vgcreate	zmpt1	/dev/sdc	/dev/sdd	/dev/sde

```
[root@zmpt01 ~]# vgs
VG   #PV #LV #SN Attr   VSize  VFree
centos 1  2  0 wz--n- <15.00g  0
zmpt1  3  0  0 wz--n- <47.99g <47.99g
```

```
[root@zmpt01 ~]# vgdisplay zmpt1
--- Volume group ---
VG Name      zmpt1
System ID
Format       lvm2
Metadata Areas  3
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      3
Act PV      3
VG Size      <47.99 GiB
PE Size      4.00 MiB
Total PE     12285
```



Alloc PE / Size 0 / 0 Free PE / Size 12285 / <47.99 GiB VG UUID pC41AQ-xwrj-NIkE-3B1i-eXcl-tTEF-NedVpe																	
<table border="1"> <tr> <td>Accounting</td> <td>4GB</td> </tr> <tr> <td>Finance</td> <td>6GB</td> </tr> <tr> <td>HR</td> <td>2GB</td> </tr> <tr> <td>Recruiting</td> <td>4GB</td> </tr> </table>						Accounting	4GB	Finance	6GB	HR	2GB	Recruiting	4GB				
Accounting	4GB																
Finance	6GB																
HR	2GB																
Recruiting	4GB																
<pre>[root@zmpt01 ~]# lvcreate -n Accounting -L 4G zmpt1 Logical volume "Accounting" created.</pre> <table border="1"> <thead> <tr> <th>command</th> <th>New</th> <th>Logical volume name</th> <th>Logical</th> <th>Size</th> <th>Volume Group</th> </tr> </thead> <tbody> <tr> <td>lvcreate</td> <td>-n</td> <td>Accounting</td> <td>-L</td> <td>4G</td> <td>Zmpt1</td> </tr> </tbody> </table>						command	New	Logical volume name	Logical	Size	Volume Group	lvcreate	-n	Accounting	-L	4G	Zmpt1
command	New	Logical volume name	Logical	Size	Volume Group												
lvcreate	-n	Accounting	-L	4G	Zmpt1												
<pre>[root@zmpt01 ~]# vgs VG #PV #LV #SN Attr VSize VFree centos 1 2 0 wz--n- <15.00g 0 zmpt1 3 1 0 wz--n- <47.99g <43.99g</pre>																	
<pre>[root@zmpt01 ~]# lvdisplay zmpt1 --- Logical volume --- LV Path /dev/zmpt1/Accounting LV Name Accounting VG Name zmpt1 LV UUID EnuV1G-5Suf-PfYM-KMAH-XY3O-as1A-K2rTOW LV Write Access read/write LV Creation host, time zmpt01.prod.zmprotech.com, 2020-11-15 16:23:14 -0500 LV Status available # open 0 LV Size 4.00 GiB Current LE 1024 Segments 1 Allocation inherit Read ahead sectors auto - currently set to 8192</pre>																	

Block device	253:2
<pre>[root@zmpt01 ~]# lvs zmpt1 LV VG Attr LSize Pool Origin Data% Meta% Move Log Cpy%Sync Convert Accounting zmpt1 -wi-a----- 4.00g</pre>	
<p>Mount the LVM partition</p> <pre>[root@zmpt01 ~]# mkdir /accounting [root@zmpt01 ~]# mount /dev/zmpt1/Accounting /accounting [root@zmpt01 ~]# df -h /dev/mapper/zmpt1-Accounting 4.0G 33M 4.0G 1% /accounting</pre>	
<pre>[root@zmpt01 ~]# lvcreate -n Finance -L 6G zmpt1 Logical volume "Finance" created. [root@zmpt01 ~]# lvcreate -n HR -L 2G zmpt1 Logical volume "HR" created. [root@zmpt01 ~]# lvcreate -n Recruiting -L 4G zmpt1 Logical volume "Recruiting" created.</pre>	
<pre>[root@zmpt01 ~]# mkdir /finance [root@zmpt01 ~]# mkdir /hr [root@zmpt01 ~]# mkdir /recruiting</pre>	
<pre>[root@zmpt01 ~]# mkfs.xfs /dev/zmpt1/Finance [root@zmpt01 ~]# mkfs.xfs /dev/zmpt1/HR [root@zmpt01 ~]# mkfs.xfs /dev/zmpt1/Recruiting</pre>	
<pre>[root@zmpt01 ~]# mount /dev/zmpt1/Finance /finance/ [root@zmpt01 ~]# mount /dev/zmpt1/HR /hr/ [root@zmpt01 ~]# mount /dev/zmpt1/Recruiting /recruiting/</pre>	
<pre>[root@zmpt01 ~]# df -h /dev/mapper/zmpt1-Accounting 4.0G 33M 4.0G 1% /accounting /dev/mapper/zmpt1-Finance 6.0G 33M 6.0G 1% /finance /dev/mapper/zmpt1-HR 2.0G 33M 2.0G 2% /hr /dev/mapper/zmpt1-Recruiting 4.0G 33M 4.0G 1% /recruiting</pre>	

The partitions are created randomly

```
[root@zmpt01 ~]# lsblk
sdc          8:32 0   8G 0 disk
├─zmpt1-Accounting 253:2 0   4G 0 lvm /accounting
└─zmpt1-HR      253:4 0   2G 0 lvm /hr
sdd          8:48 0  16G 0 disk
├─zmpt1-Finance 253:3 0   6G 0 lvm /finance
└─zmpt1-Recruiting 253:5 0   4G 0 lvm /recruiting
sde          8:64 0  24G 0 disk
```

```
[root@zmpt01 ~]# vi /etc/fstab
```

```
/dev/mapper/zmpt1-Accounting /accounting xfs defaults 0 0
/dev/mapper/zmpt1-Finance /finance xfs defaults 0 0
/dev/mapper/zmpt1-HR /hr xfs defaults 0 0
/dev/mapper/zmpt1-Recruiting /recruiting xfs defaults 0 0
```

```
[root@zmpt01 ~]# mount -a
```

```
[root@zmpt01 ~]# init 6
```

```
[root@zmpt01 ~]# df -h
```

Filesystem	Size	Used	Avail	Use%	Mounted on
devtmpfs	484M	0	484M	0%	/dev
tmpfs	496M	0	496M	0%	/dev/shm
tmpfs	496M	6.8M	489M	2%	/run
tmpfs	496M	0	496M	0%	/sys/fs/cgroup
/dev/mapper/centos-root	14G	1.8G	12G	14%	/
/dev/mapper/zmpt1-Accounting	4.0G	33M	4.0G	1%	/accounting
/dev/mapper/zmpt1-HR	2.0G	33M	2.0G	2%	/hr
/dev/mapper/zmpt1-Recruiting	4.0G	33M	4.0G	1%	/recruiting
/dev/mapper/zmpt1-Finance	6.0G	33M	6.0G	1%	/finance
/dev/sda1	1014M	136M	879M	14%	/boot
tmpfs	100M	0	100M	0%	/run/user/0

Extending the Logical Volume

Simulate the disk is full HR

```
[root@zmpt01 hr]# dd if=/dev/zero of=zafar1 bs=4096 count=+2G
/dev/mapper/zmpt1-HR 2.0G 2.0G 20K 100% /hr
```

Determine the free space available



```
[root@zmpt01 ~]# vgs
VG   #PV #LV #SN Attr   VSize  VFree
centos 1 2 0 wz--n- <15.00g  0
zmpt1  3 4 0 wz--n- <47.99g <31.99g  < ----available disk space
```

```
[root@zmpt01 ~]# vgdisplay zmpt1
Alloc PE / Size   4096 / 16.00 GiB
Free PE / Size    8189 / <31.99 GiB      < ---available disk space
```

```
[root@zmpt01 ~]# lvextend -L +6G /dev/mapper/zmpt1-HR
Size of logical volume zmpt1/HR changed from 2.00 GiB (512 extents) to 8.00 GiB (2048 extents).
Logical volume zmpt1/HR successfully resized.
```

Command	Logical	Size	Logical Volume
lvextend	-L	+6G	/dev/mapper/zmpt1-HR

```
[root@zmpt01 ~]# xfs_growfs /dev/mapper/zmpt1-HR
```

```
[root@zmpt01 ~]# df -h
```

```
/dev/mapper/zmpt1-HR      8.0G 2.0G 6.0G 25% /hr      < ---now you can see the new size
```

```
[root@zmpt01 ~]# lvcreate -n LVSWAP -L 4G zmpt1
Logical volume "LVSWAP" created.
```

```
[root@zmpt01 ~]# mkswap /dev/zmpt1/LVSWAP
Setting up swap space version 1, size = 4194300 KiB
no label, UUID=e0908f33-9f5f-461f-9ed1-f702ff06160d
```

```
[root@zmpt01 ~]# free -h
      total    used    free   shared  buff/cache   available
Mem:    991M    137M    75M     6.8M    777M     702M
Swap:   1.6G     0B     1.6G
```

```
[root@zmpt01 ~]# swapon /dev/mapper/zmpt1-LVSWAP
```

```
[root@zmpt01 ~]# free -h
      total    used    free   shared  buff/cache   available
```



Mem: 991M 141M 72M 6.8M 777M 699M
Swap: 5.6G 0B 5.6G

Make entry into /etc/fstab

Adding Physical Disk

Add 40GB disk

PRACTICE - Settings

Storage

Storage Devices

- Controller: IDE
 - Empty
- Controller: SATA
 - PRACTICE.vdi
 - PRACTICE-disk1.vdi
 - PRACTICE-disk2.vdi
 - PRACTICE-disk3.vdi
 - PRACTICE-disk4.vdi
 - PRACTICE-disk5.vdi**

Attributes

Hard Disk: SATA Port 5

Solid-state Drive
 Hot-pluggable

Information

Type (Format): Normal (VDI)
Virtual Size: 40.00 GB
Actual Size: 2.00 MB
Details: Dynamically allocated stor
Location: C:\Users\Newname01\Vir
Attached to: --
Encrypted with key: --

OK Cancel

11-22-2020

https://youtu.be/bs0FE_VAUvs

```
[root@zmp01 ~]# lsblk
NAME        MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
sda          8:0  0  16G  0 disk
├─sda1       8:1  0   1G  0 part /boot
└─sda2       8:2  0  15G  0 part
```




```

└─centos-root 253:0 0 13.4G 0 lvm /
└─centos-swap 253:1 0 1.6G 0 lvm [SWAP]
sdb          8:16 0 16G 0 disk
└─sdb1       8:17 0 8G 0 part
└─sdb2       8:18 0 4G 0 part
└─sdb3       8:19 0 2G 0 part
sdc          8:32 0 8G 0 disk
└─zmpt1-Accounting 253:2 0 4G 0 lvm /accounting
└─zmpt1-HR    253:4 0 8G 0 lvm /hr
sdd          8:48 0 16G 0 disk
└─zmpt1-Finance 253:3 0 6G 0 lvm /finance
└─zmpt1-HR    253:4 0 8G 0 lvm /hr
└─zmpt1-Recruiting 253:5 0 4G 0 lvm /recruiting
sde          8:64 0 24G 0 disk
└─zmpt1-LVSWAP 253:6 0 4G 0 lvm
sdf          8:80 0 40G 0 disk
sr0         11:0 1 1024M 0 rom
    
```

< ---New Disk Added

/dev/sdf is not part of any group yet

```

[root@zmpt01 ~]# vgs
VG   #PV #LV #SN Attr VSize VFree
centos 1 2 0 wz--n- <15.00g 0
zmpt1 3 5 0 wz--n- <47.99g <21.99g
[root@zmpt01 ~]# pvs
PV    VG   Fmt Attr PSize PFree
/dev/sda2 centos lvm2 a-- <15.00g 0
/dev/sdc  zmpt1 lvm2 a-- <8.00g 0
/dev/sdd  zmpt1 lvm2 a-- <16.00g 1.99g
/dev/sde  zmpt1 lvm2 a-- <24.00g <20.00g
    
```

Make /dev/sdf LVM formattable

```

[root@zmpt01 ~]# pvcreate /dev/sdf
Physical volume "/dev/sdf" successfully created.
[root@zmpt01 ~]# pvs
PV    VG   Fmt Attr PSize PFree
/dev/sda2 centos lvm2 a-- <15.00g 0
/dev/sdc  zmpt1 lvm2 a-- <8.00g 0
/dev/sdd  zmpt1 lvm2 a-- <16.00g 1.99g
/dev/sde  zmpt1 lvm2 a-- <24.00g <20.00g
/dev/sdf  lvm2 --- 40.00g 40.00g
    
```

< ---formatted as LVM, but not part of vg –

Volume Group

Add /dev/sdf to the VG – zmpt1

```
[root@zmpt01 ~]# vgextend zmpt1 /dev/sdf
Volume group "zmpt1" successfully extended
```

```
[root@zmpt01 ~]# pvs
```

```
PV    VG   Fmt Attr PSize  PFree
/dev/sda2 centos lvm2 a-- <15.00g  0
/dev/sdc  zmpt1 lvm2 a-- <8.00g   0
/dev/sdd  zmpt1 lvm2 a-- <16.00g  1.99g
/dev/sde  zmpt1 lvm2 a-- <24.00g <20.00g
/dev/sdf  zmpt1 lvm2 a-- <40.00g <40.00g
```

< ----/dev/sdf is part of zmpt1

```
[root@zmpt01 ~]# vgs
```

```
VG   #PV #LV #SN Attr VSize VFree
centos 1 2 0 wz--n- <15.00g  0
zmpt1 4 5 0 wz--n- 87.98g 61.98g
```

/dev/sdd is corrupted – it need to be removed

```
[root@zmpt01 ~]# lsblk
```

```
NAME            MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
sda              8:0  0  16G  0 disk
├─sda1           8:1  0   1G  0 part /boot
└─sda2           8:2  0  15G  0 part
   ├─centos-root 253:0  0 13.4G  0 lvm /
   └─centos-swap 253:1  0  1.6G  0 lvm [SWAP]
sdb              8:16  0  16G  0 disk
├─sdb1           8:17  0   8G  0 part
├─sdb2           8:18  0   4G  0 part
└─sdb3           8:19  0   2G  0 part
sdc              8:32  0   8G  0 disk
├─zmpt1-Accounting 253:2  0   4G  0 lvm /accounting
└─zmpt1-HR       253:4  0   8G  0 lvm /hr
sdd              8:48  0  16G  0 disk
├─zmpt1-Finance 253:3  0   6G  0 lvm /finance
├─zmpt1-HR       253:4  0   8G  0 lvm /hr
└─zmpt1-Recruiting 253:5  0   4G  0 lvm /recruiting
sde              8:64  0  24G  0 disk
└─zmpt1-LVSWAP  253:6  0   4G  0 lvm
sdf              8:80  0  40G  0 disk
sr0             11:0  1 1024M  0 rom
```

This command will move LVM structure, Data and Block information from /dev/sdd to /dev/sdf – link cloning

```
[root@zmpt01 ~]# pvmove /dev/sdd /dev/sdf
```

```
/dev/sdd: Moved: 0.14%
/dev/sdd: Moved: 42.85%
/dev/sdd: Moved: 71.44%
/dev/sdd: Moved: 100.00%
```

```
[root@zmpt01 ~]# lsblk
NAME          MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
sda           8:0  0  16G  0 disk
├─sda1        8:1  0   1G  0 part /boot
├─sda2        8:2  0  15G  0 part
│   ├─centos-root 253:0  0 13.4G  0 lvm /
│   └─centos-swap 253:1  0  1.6G  0 lvm [SWAP]
sdb           8:16  0  16G  0 disk
├─sdb1        8:17  0   8G  0 part
├─sdb2        8:18  0   4G  0 part
└─sdb3        8:19  0   2G  0 part
sdc           8:32  0   8G  0 disk
├─zmpt1-Accounting 253:2  0   4G  0 lvm /accounting
└─zmpt1-HR     253:4  0   8G  0 lvm /hr
sdd           8:48  0  16G  0 disk
sde           8:64  0  24G  0 disk
└─zmpt1-LVSWAP 253:6  0   4G  0 lvm
sdf           8:80  0  40G  0 disk
├─zmpt1-Finance 253:3  0   6G  0 lvm /finance
├─zmpt1-HR     253:4  0   8G  0 lvm /hr
└─zmpt1-Recruiting 253:5  0   4G  0 lvm /recruiting
sr0           11:0  1 1024M  0 rom
```

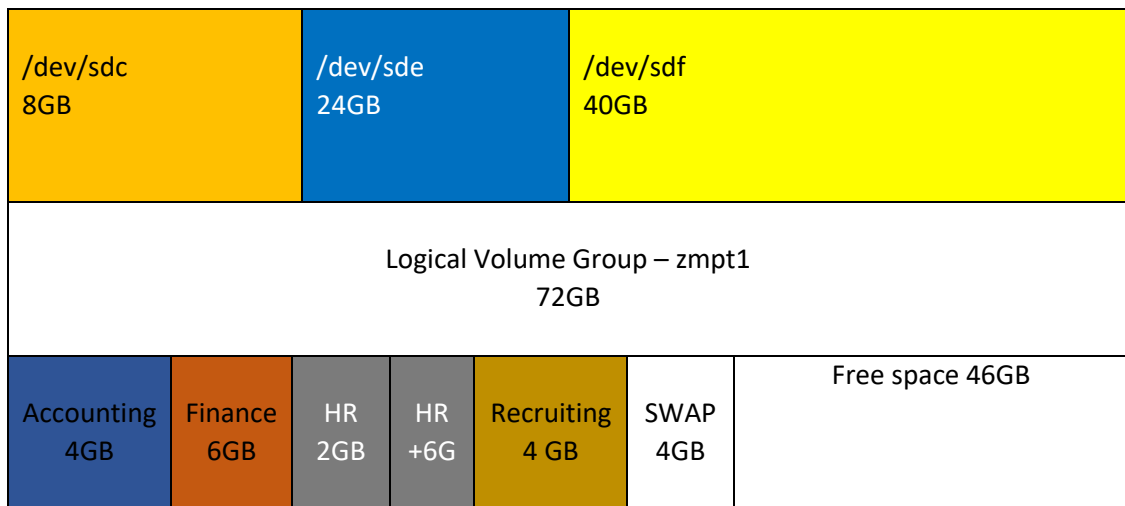
```
[root@zmpt01 ~]# lvs
LV VG Attr LSize Pool Origin Data% Meta% Move Log Cpy%Sync Convert
root centos -wi-ao---- 13.39g
swap centos -wi-ao---- 1.60g
Accounting zmpt1 -wi-ao---- 4.00g
Finance zmpt1 -wi-ao---- 6.00g
HR zmpt1 -wi-ao---- 8.00g
LVSWAP zmpt1 -wi-a----- 4.00g
Recruiting zmpt1 -wi-ao---- 4.00g
```

```
[root@zmpt01 ~]# pvs
PV VG Fmt Attr PSize PFree
/dev/sda2 centos lvm2 a-- <15.00g 0
/dev/sdc zmpt1 lvm2 a-- <8.00g 0 < --- Remove the corrupted disk
```



```
/dev/sdd zmpt1 lvm2 a-- <16.00g <16.00g
/dev/sde zmpt1 lvm2 a-- <24.00g <20.00g
/dev/sdf zmpt1 lvm2 a-- <40.00g 25.99g
```

```
[root@zmpt01 ~]# vgreduce zmpt1 /dev/sdd
Removed "/dev/sdd" from volume group "zmpt1"
[root@zmpt01 ~]# pvs
PV      VG      Fmt Attr PSize  PFree
/dev/sda2 centos lvm2 a-- <15.00g  0
/dev/sdc zmpt1 lvm2 a-- <8.00g  0
/dev/sdd      lvm2 --- 16.00g 16.00g      < --- Remove completed
/dev/sde zmpt1 lvm2 a-- <24.00g <20.00g
/dev/sdf zmpt1 lvm2 a-- <40.00g 25.99g
```



Increase inodes to xfs files system /dev/sdd1

```
[root@zmpt01 ~]# df -i /dev/sdc
Filesystem  Inodes IUsed IFree IUse% Mounted on
devtmpfs   123861  446 123415  1% /dev
```

```
[root@zmpt01 mnt]# df -i /dev/sdd1
Filesystem  Inodes IUsed IFree IUse% Mounted on
/dev/sdd1  1048576 10003 1038573  1% /mnt
```



```
[root@zmpt01 ~]# xfs_growfs -m 40 /dev/sdd1
```

```
[root@zmpt01 ~]# xfs_db -f -c "sb 0" -c "p" /dev/sdd1 | grep imax_pct  
imax_pct = 40
```

```
[root@zmpt01 ~]# df -i /dev/sdd1  
Filesystem  Inodes IUsed IFree IUse% Mounted on  
/dev/sdd1  1677720 10003 1667717 1% /mnt
```

There is no data loss

Delete LV and VG – decommissioning of Physical Hardware

```
[root@zmpt01 ~]# vgs  
VG  #PV #LV #SN Attr  VSize  VFree  
centos  1  2  0 wz--n- <15.00g  0  
zmpt1   3  5  0 wz--n- <71.99g <45.99g < ---Target LVM to delete
```

```
[root@zmpt01 ~]# pvs  
PV    VG  Fmt Attr PSize  PFree  
/dev/sda2 centos lvm2 a-- <15.00g  0  
/dev/sdc  zmpt1 lvm2 a-- <8.00g  0  
/dev/sde  zmpt1 lvm2 a-- <24.00g <20.00g  
/dev/sdf  zmpt1 lvm2 a-- <40.00g 25.99g
```

```
[root@zmpt01 ~]# umount -a
```

```
[root@zmpt01 ~]# vgremove zmpt1 -y  
Logical volume "Accounting" successfully removed  
Logical volume "Finance" successfully removed  
Logical volume "HR" successfully removed  
Logical volume "Recruiting" successfully removed  
Logical volume "LVSWAP" successfully removed  
Volume group "zmpt1" successfully removed
```

```
[root@zmpt01 ~]# blkid  
/dev/sda1: UUID="160e6caa-b0a9-468b-9de1-04189acc84ce" TYPE="xfs"  
/dev/sda2: UUID="oLnQZF-bJU0-02T3-t0wF-DhnB-2JI6-CQI9f2" TYPE="LVM2_member"  
/dev/sdb1: UUID="47d30ab1-92ee-4dc8-8c79-ef9dd898e1f0" TYPE="ext4"
```



```
/dev/sdb2: UUID="e5a18729-daf6-4c7b-89db-3a5979d3c254" TYPE="xfs"  
/dev/sdb3: UUID="7d459795-930e-4cc5-b737-a84b452ff04a" TYPE="swap"  
/dev/sdc: UUID="pYcEYd-WWPb-cwhu-7dn5-lMIk-vWhk-7B9x6x" TYPE="LVM2_member"  
/dev/sde: UUID="FpAXdB-xeBK-Hdrq-HKZa-rmF0-lOPF-sK1sGt" TYPE="LVM2_member"  
/dev/sdf: UUID="ZoCio8-qWEh-NG7u-HILR-hLph-Rpl5-d9x6mr" TYPE="LVM2_member"  
/dev/mapper/centos-root: UUID="5c79b16a-cfd4-4d5a-8e9c-b9b1a37b4936" TYPE="xfs"  
/dev/mapper/centos-swap: UUID="c7801c38-9828-49b2-8a12-7610376d8b8a" TYPE="swap"  
/dev/sdd1: UUID="5588ebda-0031-4b2b-b80e-a5a1a68e0bf7" TYPE="xfs"
```

```
[root@zmpt01 ~]# pvs  
PV    VG    Fmt Attr PSize  PFree  
/dev/sda2 centos lvm2 a-- <15.00g  0  
/dev/sdc    lvm2 ---  8.00g  8.00g  
/dev/sde    lvm2 --- 24.00g 24.00g  
/dev/sdf    lvm2 --- 40.00g 40.00g
```

```
[root@zmpt01 ~]# pvremove /dev/sdc /dev/sde /dev/sdf  
Labels on physical volume "/dev/sdc" successfully wiped.  
Labels on physical volume "/dev/sde" successfully wiped.  
Labels on physical volume "/dev/sdf" successfully wiped.
```