

```
root@ubuntu: ~  
joe@yavin: ~/s17/it... x joe@yavin: ~/s17/it... x joe@yavin: /nfs/su... x root@ubuntu: ~ x  
root@ubuntu:~# echo "here are the block devices that LVM can see and use"  
here are the block devices that LVM can see and use  
root@ubuntu:~# lvmdiskscan  
/dev/ram0 [ 64.00 MiB]  
/dev/loop0 [ 1.36 GiB]  
/dev/ram1 [ 64.00 MiB]  
/dev/ram2 [ 64.00 MiB]  
/dev/ram3 [ 64.00 MiB]  
/dev/ram4 [ 64.00 MiB]  
/dev/ram5 [ 64.00 MiB]  
/dev/ram6 [ 64.00 MiB]  
/dev/ram7 [ 64.00 MiB]  
/dev/ram8 [ 64.00 MiB]  
/dev/ram9 [ 64.00 MiB]  
/dev/ram10 [ 64.00 MiB]  
/dev/ram11 [ 64.00 MiB]  
/dev/ram12 [ 64.00 MiB]  
/dev/ram13 [ 64.00 MiB]  
/dev/ram14 [ 64.00 MiB]  
/dev/ram15 [ 64.00 MiB]  
/dev/sdb [ 465.76 GiB]  
/dev/sdc [ 465.76 GiB]  
/dev/sdd [ 465.76 GiB]  
/dev/sde1 [ 2.38 GiB]  
/dev/sde3 [ 122.00 MiB]  
/dev/sde4 [ 1.43 GiB]  
/dev/sde5 [ 3.56 GiB]  
/dev/sdf [ 465.76 GiB] LVM physical volume  
3 disks  
21 partitions  
1 LVM physical volume whole disk  
0 LVM physical volumes  
root@ubuntu:~#
```

```
root@ubuntu:~# echo "Mark storage devices as LVM physical volumes"
Mark storage devices as LVM physical volumes
root@ubuntu:~# pvcreate /dev/sdb /dev/sdc
WARNING: ext4 signature detected on /dev/sdb at offset 1080. Wipe it? [y/n]: y
Wiping ext4 signature on /dev/sdb.
WARNING: dos signature detected on /dev/sdb at offset 510. Wipe it? [y/n]: y
Wiping dos signature on /dev/sdb.
Physical volume "/dev/sdb" successfully created
Physical volume "/dev/sdc" successfully created
root@ubuntu:~#
```

```
root@ubuntu:~# pvs
PV          VG      Fmt  Attr  PSize   PFree
/dev/sdb                lvm2  ---   465.76g 465.76g
/dev/sdc                lvm2  ---   465.76g 465.76g
root@ubuntu:~# echo "Show new physical volumes"
Show new physical volumes
root@ubuntu:~#
```

root@ubuntu: ~

joe@yavin: ~/s17/it... x

joe@yavin: ~/s17/it... x

joe@yavin: /nfs/su... x

root@ubuntu: ~ x



```
root@ubuntu:~# vgcreate myvolumegroup /dev/sdb /dev/sdc
```

```
Volume group "myvolumegroup" successfully created
```

```
root@ubuntu:~# echo "Created a new volume group that included both the physical volumes"
```

```
Created a new volume group that included both the physical volumes
```

```
root@ubuntu:~#
```

```
root@ubuntu:~# vgs
VG          #PV #LV #SN Attr   VSize   VFree
myvolumegroup  2   0   0 wz--n- 931.52g 931.52g
root@ubuntu:~# pvs
PV          VG          Fmt  Attr PSize   PFree
/dev/sdb    myvolumegroup lvm2 a--  465.76g 465.76g
/dev/sdc    myvolumegroup lvm2 a--  465.76g 465.76g
root@ubuntu:~# echo "Note the aggregate size for the VG"
Note the aggregate size for the VG
root@ubuntu:~#
```

```
root@ubuntu: ~  
joe@yavin: ~/s17/it... x joe@yavin: ~/s17/it... x joe@yavin: /nfs/su... x root@ubuntu: ~ x  
root@ubuntu:~# vgextend myvolumegroup /dev/sdd  
Physical volume "/dev/sdd" successfully created  
Volume group "myvolumegroup" successfully extended  
root@ubuntu:~# vgs  
VG                #PV #LV #SN Attr   VSize VFree  
myvolumegroup    3   0   0 wz--n- 1.36t 1.36t  
root@ubuntu:~# pvs  
PV                VG                Fmt  Attr PSize  PFree  
/dev/sdb          myvolumegroup    lvm2 a--  465.76g 465.76g  
/dev/sdc          myvolumegroup    lvm2 a--  465.76g 465.76g  
/dev/sdd          myvolumegroup    lvm2 a--  465.76g 465.76g  
root@ubuntu:~# echo "How to add a new disk to VG, note aggregate size"  
How to add a new disk to VG, note aggregate size  
root@ubuntu:~# █
```

```
root@ubuntu: ~
joe@yavin: ~/s17/it... x
joe@yavin: ~/s17/it... x
joe@yavin: /nfs/su... x
root@ubuntu: ~ x +

root@ubuntu:~# lvcreate -L 100M -n test1 myvolumegroup
Logical volume "test1" created.
root@ubuntu:~# lvcreate -L 100M -n test2 myvolumegroup
Logical volume "test2" created.
root@ubuntu:~# lvcreate -L 100M -n test3 myvolumegroup
Logical volume "test3" created.
root@ubuntu:~# lvcreate -L 100M -n test4 myvolumegroup
Logical volume "test4" created.
root@ubuntu:~# lvs
LV      VG          Attr      LSize   Pool Origin Data%  Meta%  Move Log Cpy%Sync Con
vert
test1   myvolumegroup -wi-a----- 100.00m
test2   myvolumegroup -wi-a----- 100.00m
test3   myvolumegroup -wi-a----- 100.00m
test4   myvolumegroup -wi-a----- 100.00m

root@ubuntu:~# pvs
PV          VG          Fmt  Attr  PSize   PFree
/dev/sdb    myvolumegroup lvm2  a--   465.76g 465.37g
/dev/sdc    myvolumegroup lvm2  a--   465.76g 465.76g
/dev/sdd    myvolumegroup lvm2  a--   465.76g 465.76g
root@ubuntu:~# vgs
VG          #PV #LV #SN Attr   VSize VFree
myvolumegroup 3   4   0 wz--n- 1.36t 1.36t
root@ubuntu:~# echo "How to create some LV's"
How to create some LV's
root@ubuntu:~# █
```



```
root@ubuntu:~# lvcreate -l 20%FREE -n test5 myvolumegroup  
Logical volume "test5" created.
```

```
root@ubuntu:~# echo "Create a LV with 20% free space"  
Create a LV with 20% free space
```

```
root@ubuntu:~#
```



```
root@ubuntu:~# lvcreate -L 1G -n test6 --type raid5 myvolumegroup  
Logical volume "test6" created.
```

```
root@ubuntu:~# echo "created a LV of 1G in a raid5 configuration (must have 3 disks in p  
v)"  
created a LV of 1G in a raid5 configuration (must have 3 disks in pv)
```

```
root@ubuntu:~#
```

```
root@ubuntu: ~
joe@yavin: ~/s17/it... x
joe@yavin: ~/s17/it... x
joe@yavin: /nfs/su... x
root@ubuntu: ~ x +

root@ubuntu:~# lvs
LV          VG          Attr          LSize    Pool Origin Data%  Meta%  Move Log Cpy%Sync Con
vert
test1 myvolumegroup -wi-a----- 100.00m
test2 myvolumegroup -wi-a----- 100.00m
test3 myvolumegroup -wi-a----- 100.00m
test4 myvolumegroup -wi-a----- 100.00m
test5 myvolumegroup -wi-a----- 279.38g
test6 myvolumegroup rwi-a-r---   1.00g                                100.00

root@ubuntu:~# lvremove /dev/myvolumegroup/test3
Do you really want to remove and DISCARD active logical volume test3? [y/n]: y
Logical volume "test3" successfully removed

root@ubuntu:~# lvs
LV          VG          Attr          LSize    Pool Origin Data%  Meta%  Move Log Cpy%Sync Con
vert
test1 myvolumegroup -wi-a----- 100.00m
test2 myvolumegroup -wi-a----- 100.00m
test4 myvolumegroup -wi-a----- 100.00m
test5 myvolumegroup -wi-a----- 279.38g
test6 myvolumegroup rwi-a-r---   1.00g                                100.00

root@ubuntu:~# echo "remove LV"
remove LV
root@ubuntu:~#
```

```
root@ubuntu:~# ls /dev/myvolumegroup/  
test1 test2 test4 test5 test6  
root@ubuntu:~# pwd  
/home/joe  
root@ubuntu:~# mkdir testmounts  
root@ubuntu:~# cd testmounts/  
root@ubuntu:~/testmounts# mkdir d{1..6}  
root@ubuntu:~/testmounts# ls  
d1 d2 d3 d4 d5 d6  
root@ubuntu:~/testmounts# mount /dev/myvolumegroup/test1 d1/  
mount: /dev/mapper/myvolumegroup-test1 is write-protected, mounting read-only  
mount: wrong fs type, bad option, bad superblock on /dev/mapper/myvolumegroup-test1,  
missing codepage or helper program, or other error
```

In some cases useful info is found in syslog - try
dmesg | tail or so.

```
root@ubuntu:~/testmounts# echo "note we cannot mount these until we create a filesystem"  
note we cannot mount these until we create a filesystem  
root@ubuntu:~/testmounts#
```

```
root@ubuntu: ~/testmounts
joe@yavin: ~/s17/it... x joe@yavin: ~/s17/it... x joe@yavin: /nfs/su... x root@ubuntu: ~/te... x
root@ubuntu:~/testmounts# ls /dev/myvolumegroup/
test1 test2 test4 test5 test6
root@ubuntu:~/testmounts# mkfs.ext4 /dev/myvolumegroup/test1
mke2fs 1.42.13 (17-May-2015)
Creating filesystem with 102400 1k blocks and 25688 inodes
Filesystem UUID: 9381cb37-79ed-434d-adc1-cc5a7ace0e51
Superblock backups stored on blocks:
    8193, 24577, 40961, 57345, 73729

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

root@ubuntu:~/testmounts# mkfs.ext4 /dev/myvolumegroup/test6
mke2fs 1.42.13 (17-May-2015)
Creating filesystem with 262144 4k blocks and 65536 inodes
Filesystem UUID: e5b17e2d-ae97-4776-96c2-3ae8bcf6b657
Superblock backups stored on blocks:
    32768, 98304, 163840, 229376

Allocating group tables: done
Writing inode tables: done
Creating journal (8192 blocks): done
Writing superblocks and filesystem accounting information: done

root@ubuntu:~/testmounts#
```

```
root@ubuntu:~/testmounts# ls
d1 d2 d3 d4 d5 d6
root@ubuntu:~/testmounts# mount /dev/myvolumegroup/test1 d1/
root@ubuntu:~/testmounts# mount /dev/myvolumegroup/test6 d6/
root@ubuntu:~/testmounts# mount | grep test
/dev/mapper/myvolumegroup-test1 on /home/joe/testmounts/d1 type ext4 (rw,relatime,data=ordered)
/dev/mapper/myvolumegroup-test6 on /home/joe/testmounts/d6 type ext4 (rw,relatime,stripe=32,data=ordered)
root@ubuntu:~/testmounts# echo "note that they are mounted now"
note that they are mounted now
root@ubuntu:~/testmounts#
```

```
root@ubuntu:~/testmounts/d1# for i in {1..100}; do echo "here is file$i" >> file$i.txt; done
```

```
root@ubuntu:~/testmounts/d1# ls
file100.txt  file23.txt  file37.txt  file50.txt  file64.txt  file78.txt  file91.txt
file10.txt   file24.txt  file38.txt  file51.txt  file65.txt  file79.txt  file92.txt
file11.txt   file25.txt  file39.txt  file52.txt  file66.txt  file7.txt   file93.txt
file12.txt   file26.txt  file3.txt   file53.txt  file67.txt  file80.txt  file94.txt
file13.txt   file27.txt  file40.txt  file54.txt  file68.txt  file81.txt  file95.txt
file14.txt   file28.txt  file41.txt  file55.txt  file69.txt  file82.txt  file96.txt
file15.txt   file29.txt  file42.txt  file56.txt  file6.txt   file83.txt  file97.txt
file16.txt   file2.txt   file43.txt  file57.txt  file70.txt  file84.txt  file98.txt
file17.txt   file30.txt  file44.txt  file58.txt  file71.txt  file85.txt  file99.txt
file18.txt   file31.txt  file45.txt  file59.txt  file72.txt  file86.txt  file9.txt
file19.txt   file32.txt  file46.txt  file5.txt   file73.txt  file87.txt  lost+found
file1.txt    file33.txt  file47.txt  file60.txt  file74.txt  file88.txt
file20.txt   file34.txt  file48.txt  file61.txt  file75.txt  file89.txt
file21.txt   file35.txt  file49.txt  file62.txt  file76.txt  file8.txt
file22.txt   file36.txt  file4.txt   file63.txt  file77.txt  file90.txt
```

```
root@ubuntu:~/testmounts/d1# echo "Create some files"
Create some files
```

```
root@ubuntu:~/testmounts/d1#
```

root@ubuntu: ~/testmounts/d1

joe@yavin: ~/s17/it... x

joe@yavin: ~/s17/it... x

joe@yavin: /nfs/su... x

root@ubuntu: ~/te... x



```
root@ubuntu:~/testmounts/d1# lvcreate -s -L 200M -n snap_of_test1 myvolumegroup/test1
Reducing COW size 200.00 MiB down to maximum usable size 104.00 MiB.
Logical volume "snap_of_test1" created.
```

```
root@ubuntu:~/testmounts/d1# echo "Created a snapshot of that LV"
Created a snapshot of that LV
```

```
root@ubuntu:~/testmounts/d1#
```

```
root@ubuntu: ~/testmounts/d1
joe@yavin: ~/s17/it... x
joe@yavin: ~/s17/it... x
joe@yavin: /nfs/su... x
root@ubuntu: ~/te... x
root@ubuntu:~/testmounts/d1# ls
file100.txt  file23.txt  file37.txt  file50.txt  file64.txt  file78.txt  file91.txt
file10.txt   file24.txt  file38.txt  file51.txt  file65.txt  file79.txt  file92.txt
file11.txt   file25.txt  file39.txt  file52.txt  file66.txt  file7.txt   file93.txt
file12.txt   file26.txt  file3.txt   file53.txt  file67.txt  file80.txt  file94.txt
file13.txt   file27.txt  file40.txt  file54.txt  file68.txt  file81.txt  file95.txt
file14.txt   file28.txt  file41.txt  file55.txt  file69.txt  file82.txt  file96.txt
file15.txt   file29.txt  file42.txt  file56.txt  file6.txt   file83.txt  file97.txt
file16.txt   file2.txt   file43.txt  file57.txt  file70.txt  file84.txt  file98.txt
file17.txt   file30.txt  file44.txt  file58.txt  file71.txt  file85.txt  file99.txt
file18.txt   file31.txt  file45.txt  file59.txt  file72.txt  file86.txt  file9.txt
file19.txt   file32.txt  file46.txt  file5.txt   file73.txt  file87.txt  lost+found
file1.txt    file33.txt  file47.txt  file60.txt  file74.txt  file88.txt
file20.txt   file34.txt  file48.txt  file61.txt  file75.txt  file89.txt
file21.txt   file35.txt  file49.txt  file62.txt  file76.txt  file8.txt
file22.txt   file36.txt  file4.txt   file63.txt  file77.txt  file90.txt
root@ubuntu:~/testmounts/d1# rm file{50..99}.txt
root@ubuntu:~/testmounts/d1# ls
file100.txt  file17.txt  file24.txt  file31.txt  file39.txt  file46.txt  file8.txt
file10.txt   file18.txt  file25.txt  file32.txt  file3.txt   file47.txt  file9.txt
file11.txt   file19.txt  file26.txt  file33.txt  file40.txt  file48.txt  lost+found
file12.txt   file1.txt   file27.txt  file34.txt  file41.txt  file49.txt
file13.txt   file20.txt  file28.txt  file35.txt  file42.txt  file4.txt
file14.txt   file21.txt  file29.txt  file36.txt  file43.txt  file5.txt
file15.txt   file22.txt  file2.txt   file37.txt  file44.txt  file6.txt
file16.txt   file23.txt  file30.txt  file38.txt  file45.txt  file7.txt
root@ubuntu:~/testmounts/d1#
```



```
root@ubuntu: ~/testmounts/d1
joe@yavin: ~/s17/it... x
joe@yavin: ~/s17/it... x
joe@yavin: /nfs/su... x
root@ubuntu: ~/te... x
root@ubuntu:~/testmounts/d1# ls
file10.txt  file18.txt  file25.txt  file32.txt  file3.txt  file47.txt  file9.txt
file11.txt  file19.txt  file26.txt  file33.txt  file40.txt  file48.txt  lost+found
file12.txt  file1.txt   file27.txt  file34.txt  file41.txt  file49.txt
file13.txt  file20.txt  file28.txt  file35.txt  file42.txt  file4.txt
file14.txt  file21.txt  file29.txt  file36.txt  file43.txt  file5.txt
file15.txt  file22.txt  file2.txt   file37.txt  file44.txt  file6.txt
file16.txt  file23.txt  file30.txt  file38.txt  file45.txt  file7.txt
file17.txt  file24.txt  file31.txt  file39.txt  file46.txt  file8.txt
root@ubuntu:~/testmounts/d1# echo "Uh oh, we lost some files..."
Uh oh, we lost some files...
root@ubuntu:~/testmounts/d1# echo "Lets restore from the snapshot"
Lets restore from the snapshot
root@ubuntu:~/testmounts/d1#
```

```
root@ubuntu:~/testmounts# lvs myvolumegroup/test1
--- Logical volume ---
LV Path                /dev/myvolumegroup/test1
LV Name                 test1
VG Name                 myvolumegroup
LV UUID                 T0bHzq-tRLb-o88J-B5oq-dmJt-TGNQ-t0wIa0
LV Write Access         read/write
LV Creation host, time ubuntu, 2017-02-10 16:20:42 +0000
LV snapshot status     source of
                       snap of test1 [active]
LV Status                available
# open                   1
LV Size                 100.00 MiB
Current LE               25
Segments                 1
Allocation               inherit
Read ahead sectors      auto
- currently set to      256
Block device             252:0

root@ubuntu:~/testmounts#
```

root@ubuntu:~/testmounts# lvsdisplay myvolumegroup/snap_of_test1

```
--- Logical volume ---
LV Path                /dev/myvolumegroup/snap_of_test1
LV Name                snap_of_test1
VG Name                myvolumegroup
LV UUID                jq4bNz-q61F-28HA-zfT3-7yfw-F9ws-yZoQSi
LV Write Access        read/write
LV Creation host, time ubuntu, 2017-02-10 16:32:19 +0000
LV snapshot status     active destination for test1
LV Status               available
# open                  0
LV Size                100.00 MiB
Current LE              25
COW-table size         104.00 MiB
COW-table LE           26
Allocated to snapshot  0.05%
Snapshot chunk size    4.00 KiB
Segments               1
Allocation              inherit
Read ahead sectors     auto
- currently set to    256
Block device           252:13
```

root@ubuntu:~/testmounts# █


```
root@ubuntu:~/testmounts# echo "Make sure it is unmounted before restoring from snapshot"
```

```
Make sure it is unmounted before restoring from snapshot
```

```
root@ubuntu:~/testmounts# umount d1
```

```
root@ubuntu:~/testmounts#
```

```
root@ubuntu:~/testmounts# lvconvert --merge /dev/myvolumegroup/snap_of_test1
Merging of volume snap_of_test1 started.
test1: Merged: 100.0%
root@ubuntu:~/testmounts#
```

```
root@ubuntu: ~/testmounts
joe@yavin: ~/s17/it... x
joe@yavin: ~/s17/it... x
joe@yavin: /nfs/su... x
root@ubuntu: ~/te... x +

root@ubuntu:~/testmounts# lvs
LV      VG          Attr          LSize   Pool Origin Data%  Meta%  Move Log Cpy%Sync Con
vert
test1   myvolumegroup -wi-a----- 100.00m
test2   myvolumegroup -wi-a----- 100.00m
test4   myvolumegroup -wi-a----- 100.00m
test5   myvolumegroup -wi-a----- 279.38g
test6   myvolumegroup rwi-aor---   1.00g                                100.00

root@ubuntu:~/testmounts# echo "Note that snapshot no longer exists"
Note that snapshot no longer exists
root@ubuntu:~/testmounts#
```

```
root@ubuntu: ~/testmounts
joe@yavin: ~/s17/it... x
joe@yavin: ~/s17/it... x
joe@yavin: /nfs/su... x
root@ubuntu: ~/te... x
root@ubuntu:~/testmounts# mount /dev/myvolumegroup/test1 d1/
root@ubuntu:~/testmounts# ls d1/
file10.txt  file24.txt  file38.txt  file51.txt  file65.txt  file79.txt  file92.txt
file11.txt  file25.txt  file39.txt  file52.txt  file66.txt  file7.txt   file93.txt
file12.txt  file26.txt  file3.txt   file53.txt  file67.txt  file80.txt  file94.txt
file13.txt  file27.txt  file40.txt  file54.txt  file68.txt  file81.txt  file95.txt
file14.txt  file28.txt  file41.txt  file55.txt  file69.txt  file82.txt  file96.txt
file15.txt  file29.txt  file42.txt  file56.txt  file6.txt   file83.txt  file97.txt
file16.txt  file2.txt   file43.txt  file57.txt  file70.txt  file84.txt  file98.txt
file17.txt  file30.txt  file44.txt  file58.txt  file71.txt  file85.txt  file99.txt
file18.txt  file31.txt  file45.txt  file59.txt  file72.txt  file86.txt  file9.txt
file19.txt  file32.txt  file46.txt  file5.txt   file73.txt  file87.txt  lost+found
file1.txt   file33.txt  file47.txt  file60.txt  file74.txt  file88.txt
file20.txt  file34.txt  file48.txt  file61.txt  file75.txt  file89.txt
file21.txt  file35.txt  file49.txt  file62.txt  file76.txt  file8.txt
file22.txt  file36.txt  file4.txt   file63.txt  file77.txt  file90.txt
file23.txt  file37.txt  file50.txt  file64.txt  file78.txt  file91.txt
root@ubuntu:~/testmounts# echo "Yay all my files are back from when I took the snapshot"
Yay all my files are back from when I took the snapshot
root@ubuntu:~/testmounts#
```



```
root@ubuntu: ~/testmounts
joe@yavin: ~/s17/it... x joe@yavin: ~/s17/it... x joe@yavin: /nfs/su... x root@ubuntu: ~/te... x
root@ubuntu:~/testmounts# lvs
LV      VG          Attr          LSize   Pool Origin Data%  Meta%  Move Log Cpy%Sync Con
vert
test1  myvolumegroup -wi-ao---- 100.00m
test2  myvolumegroup -wi-a----- 100.00m
test4  myvolumegroup -wi-a----- 100.00m
test5  myvolumegroup -wi-a----- 279.38g
test6  myvolumegroup rwi-aor--- 1.00g                                100.00

root@ubuntu:~/testmounts# lvextend -L+1g myvolumegroup/test6
Using stripesize of last segment 64.00 KiB
Size of logical volume myvolumegroup/test6 changed from 1.00 GiB (256 extents) to 2.00 GiB (512 extents).
Logical volume test6 successfully resized.

root@ubuntu:~/testmounts# lvs
LV      VG          Attr          LSize   Pool Origin Data%  Meta%  Move Log Cpy%Sync Con
vert
test1  myvolumegroup -wi-ao---- 100.00m
test2  myvolumegroup -wi-a----- 100.00m
test4  myvolumegroup -wi-a----- 100.00m
test5  myvolumegroup -wi-a----- 279.38g
test6  myvolumegroup rwi-aor--- 2.00g                                100.00

root@ubuntu:~/testmounts# echo "resize volume"
resize volume
root@ubuntu:~/testmounts#
```