```
root@test-lvm:~# echo "lets look at what we have"
lets look at what we have
root@test-lvm:~# pvs
  PV         VG        Fmt  Attr PSize  PFree
  /dev/sda3  ubuntu-vg lvm2 a--  <9.00g <5.00g
root@test-lvm:~# vgs
  VG        #PV #LV #SN Attr   VSize  VFree
  ubuntu-vg   1   1   0 wz--n- <9.00g <5.00g
root@test-lvm:~# lvs
  LV        VG        Attr       LSize Pool Origin Data%  Meta%  Move Log Cpy%Sync Convert
  ubuntu-lv ubuntu-vg -wi-ao---- 4.00g
root@test-lvm:~#
```

```
root@test-lvm:~# df -h | grep mapper
/dev/mapper/ubuntu--vg-ubuntu--lv  3.9G  2.0G  1.8G  54% /
root@test-lvm:~# echo "this is our lvm volume"
this is our lvm volume
root@test-lvm:~#
```

```
root@test-lvm:~# echo "lets add our other disks as physical volumes"
lets add our other disks as physical volumes
root@test-lvm:~# pvcreate /dev/sdb
  Physical volume "/dev/sdb" successfully created.
root@test-lvm:~# pvcreate /dev/sdc
  Physical volume "/dev/sdc" successfully created.
root@test-lvm:~# pvcreate /dev/sdd
  Physical volume "/dev/sdd" successfully created.
root@test-lvm:~#
```

```
root@test-lvm:~# pvs
  PV         VG        Fmt  Attr PSize  PFree
  /dev/sda3  ubuntu-vg lvm2 a--  <9.00g <5.00g
  /dev/sdb             lvm2 ---  10.00g 10.00g
  /dev/sdc             lvm2 ---  10.00g 10.00g
  /dev/sdd             lvm2 ---  10.00g 10.00g
root@test-lvm:~# echo "Now let's add those disks to our volume group"
Now let's add those disks to our volume group
root@test-lvm:~# vgextend ubuntu-vg /dev/sdb
  Volume group "ubuntu-vg" successfully extended
root@test-lvm:~# vgextend ubuntu-vg /dev/sdc
  Volume group "ubuntu-vg" successfully extended
root@test-lvm:~# vgextend ubuntu-vg /dev/sdd
  Volume group "ubuntu-vg" successfully extended
root@test-lvm:~# pvs
  PV         VG        Fmt  Attr PSize   PFree
  /dev/sda3  ubuntu-vg lvm2 a--   <9.00g  <5.00g
  /dev/sdb   ubuntu-vg lvm2 a--  <10.00g <10.00g
  /dev/sdc   ubuntu-vg lvm2 a--  <10.00g <10.00g
  /dev/sdd   ubuntu-vg lvm2 a--  <10.00g <10.00g
root@test-lvm:~# vgs
  VG        #PV #LV #SN Attr   VSize  VFree
  ubuntu-vg   4   1   0 wz--n- 38.98g 34.98g
root@test-lvm:~# _
```

```
root@test-lvm:~# vgs
  VG        #PV #LV #SN Attr   VSize  VFree
  ubuntu-vg   4   1   0 wz--n- 38.98g 34.98g
root@test-lvm:~# echo "As each of those disks was roughly 10 gigs, we now have ~40 gigs of space"
As each of those disks was roughly 10 gigs, we now have ~40 gigs of space
root@test-lvm:~#
```

```
root@test-lvm:~# df -h | grep mapper
/dev/mapper/ubuntu--vg-ubuntu--lv  3.9G  2.0G  1.8G  54% /
root@test-lvm:~# echo "lets see if we can resize that partition... while it is mounted and we are us
ing it."
lets see if we can resize that partition... while it is mounted and we are using it.
root@test-lvm:~# lvresize -r --size 10G /dev/mapper/ubuntu--vg-ubuntu--lv
  Size of logical volume ubuntu-vg/ubuntu-lv changed from 4.00 GiB (1024 extents) to 10.00 GiB (2560
 extents).
  Logical volume ubuntu-vg/ubuntu-lv successfully resized.
resize2fs 1.44.1 (24-Mar-2018)
Filesystem at /dev/mapper/ubuntu--vg-ubuntu--lv is mounted on /; on-line resizing required
old_desc_blocks = 1, new_desc_blocks = 2
The filesystem on /dev/mapper/ubuntu--vg-ubuntu--lv is now 2621440 (4k) blocks long.

root@test-lvm:~# df -h | grep mapper
/dev/mapper/ubuntu--vg-ubuntu--lv  9.8G  2.0G  7.4G  21% /
root@test-lvm:~# echo "yay!!"
echo "yaydf -h | grep mapper"
yaydf -h | grep mapper
root@test-lvm:~# echo "whoops. It worked"
whoops. It worked
root@test-lvm:~# _
```

```
root@test-lvm:~# echo "can I shrink it back down to 8 gigs?"
can I shrink it back down to 8 gigs?
root@test-lvm:~# lvresize -r --size 8G /dev/mapper/ubuntu--vg-ubuntu--lv
Do you want to unmount "/" ? [Y|n] n
fsadm: Cannot proceed with mounted filesystem "/".
  /sbin/fsadm failed: 1
  Filesystem resize failed.
root@test-lvm:~# _
```

```
root@test-lvm:~# echo "what about if I unmount it?"
what about if I unmount it?
root@test-lvm:~# lvresize -r --size 8G /dev/mapper/ubuntu--vg-ubuntu--lv
Do you want to unmount "/" ? [Y|n] y
umount: /: target is busy.
fsadm: Cannot proceed with mounted filesystem "/".
  /sbin/fsadm failed: 1
  Filesystem resize failed.
root@test-lvm:~# cd /
root@test-lvm:/# lvresize -r --size 8G /dev/mapper/ubuntu--vg-ubuntu--lv
Do you want to unmount "/" ? [Y|n] y
umount: /: target is busy.
fsadm: Cannot proceed with mounted filesystem "/".
  /sbin/fsadm failed: 1
  Filesystem resize failed.
root@test-lvm:/# echo "So we can't shrink while it is mounted"
So we can't shrink while it is mounted
root@test-lvm:/#
```

```
root@test-lvm:/# lvresize -r --size 14G /dev/mapper/ubuntu--vg-ubuntu--lv
  Size of logical volume ubuntu-vg/ubuntu-lv changed from 10.00 GiB (2560 extents) to 14.00 GiB (358
4 extents).
  Logical volume ubuntu-vg/ubuntu-lv successfully resized.
resize2fs 1.44.1 (24-Mar-2018)
Filesystem at /dev/mapper/ubuntu--vg-ubuntu--lv is mounted on /; on-line resizing required
old_desc_blocks = 2, new_desc_blocks = 2
The filesystem on /dev/mapper/ubuntu--vg-ubuntu--lv is now 3670016 (4k) blocks long.

root@test-lvm:/# df -h
Filesystem                         Size  Used Avail Use% Mounted on
udev                               1.9G     0  1.9G   0% /dev
tmpfs                              395M  952K  394M   1% /run
/dev/mapper/ubuntu--vg-ubuntu--lv   14G  2.0G   12G  15% /
tmpfs                              2.0G     0  2.0G   0% /dev/shm
tmpfs                              5.0M     0  5.0M   0% /run/lock
tmpfs                              2.0G     0  2.0G   0% /sys/fs/cgroup
/dev/sda2                          976M  139M  771M  16% /boot
/dev/loop0                          87M   87M     0 100% /snap/core/4917
tmpfs                              395M     0  395M   0% /run/user/1000
root@test-lvm:/# df -h | grep mapper
/dev/mapper/ubuntu--vg-ubuntu--lv   14G  2.0G   12G  15% /
root@test-lvm:/# echo "I can grow it without unmounting though"
I can grow it without unmounting though
root@test-lvm:/# echo "And I kept my ext filesystem"
And I kept my ext filesystem
root@test-lvm:/#
```