**LVM**(**Logical Volume Management)**

**What is LVM?**

* **LVM**(**logical volume management)**is a tool which includes allocating disks, striping, mirroring and resizing logical volumes.
* LVM is used to Combine the Multiple Physical Hard Disk and Create Logical valume Greater than the Size of Actual hard Disk . We can Also Extend or Reduce the Size of Logical Valume by Online
* LVM is a method of allocating hard drive space into logical volumes that can be easily resized instead of partitions.

**Why should I use/need LVM? OR The main benefit of LVM?**

* Suppose you have three hard disk of 1TB and you need the volume 2T then you can use lvm and create the logical volume of 2TB space

**What is a physical volume in Linux?**

* A physical valume (PV) is another name for a regular physical Disk partition that is used by LVM

**What is a volume group?**

* VG are the combined physical volume into a single pool of storage. Think it is as a group of PV.

**What is a logical volume in Linux?**

* Volume Group must be Subdivided into logical Volume. LV are the actual partitions on system created from VG.

**What are the steps to create LVM?**

* Create physical volumes by “pvcreate” command  
  #pvcreate /dev/sda2
* Add physical volume to volume group by “vgcreate” command  
  #vgcreate VLG0 /dev/sda2
* Create logical volume from volume group by “lvcreate” command.  
  #lvcreate -L 1G -n LVM1 VLG0
* Now create file system on /dev/sda2 partition by “mke2fs” command.  
  #mke2fs -j /dev/VLG0/LVM1

The following commands implement the core LVM functionality

e2fsck - check a Linux ext2/ext3/ext4 file system.

fsck- check and repair a Linux file system

resize2fs -ext2/ext3/ext4 file system resizer

pvchange — Change attributes of a Physical Volume.

pvck — Check Physical Volume metadata.

pvcreate — Initialize a disk or partition for use by LVM.

pvdisplay — Display attributes of a Physical Volume.

pvmove — Move Physical Extents.

pvremove — Remove a Physical Volume.

pvresize — Resize a disk or partition in use by LVM2.

pvs — Report information about Physical Volumes.

pvscan — Scan all disks for Physical Volumes.

vgcfgbackup — Backup Volume Group descriptor area.

vgcfgrestore — Restore Volume Group descriptor area.

vgchange — Change attributes of a Volume Group.

vgck — Check Volume Group metadata.

vgconvert — Convert Volume Group metadata format.

vgcreate — Create a Volume Group.

vgdisplay — Display attributes of Volume Groups.

vgexport — Make volume Groups unknown to the system.

vgextend — Add Physical Volumes to a Volume Group.

vgimport — Make exported Volume Groups known to the system.

vgimportclone — Import and rename duplicated Volume Group (e.g. a hardware snapshot).

vgmerge — Merge two Volume Groups.

vgmknodes — Recreate Volume Group directory and Logical Volume special files

vgreduce — Reduce a Volume Group by removing one or morE Physical Volumes.

vgremove — Remove a Volume Group.

vgrename — Rename a Volume Group.

vgs — Report information about Volume Groups.

vgscan — Scan all disks for Volume Groups and rebuild caches.

vgsplit — Split a Volume Group into two, moving any logical volumes from one Volume Group to

another by moving entire Physical Volumes.

lvchange — Change attributes of a Logical Volume.

lvconvert — Convert a Logical Volume from linear to mirror or snapshot.

lvcreate — Create a Logical Volume in an existing Volume Group.

lvdisplay — Display attributes of a Logical Volume.

lvextend — Extend the size of a Logical Volume.

lvmchange — Change attributes of the Logical Volume Manager.

lvmdiskscan — Scan for all devices visible to LVM2.

lvmdump — Create lvm2 information dumps for diagnostic purposes.

lvreduce — Reduce the size of a Logical Volume.

lvremove — Remove a Logical Volume.

lvrename — Rename a Logical Volume.

lvresize — Resize a Logical Volume.

lvs — Report information about Logical Volumes.

lvscan — Scan (all disks) for Logical Volumes.

**Creating, Remove, Extend & Reduce the Valume (PV,VG,LV)**

**Vgname = vg1 , vg2**

**Lvname = lv1, lv2**

**Pv Create :-**

# pvcreate /dev/sdb1 /dev/sdb2 .......... # for HD partition

# pvcreate /dev/sdb .......... # for HD

# pvs

# pvdisplay

**VG Create :-**

# Vgcreate vg1 /dev/sdb1 /dev/sdb2 .......... # for HD partition

# vgcreate vg2 /dev/sdb .......... # for HD

# vgs

# vgdisplay

**LV Create :-**

# lvcreate -L +1T -n lv1 /dev/vg1

# lvcreate -L +1T -n lv2 /dev/vg1

# lvs

# lvdisplay

**Make a File System :-**

# mkfs.ext4 /dev/vg1/lv1

# mkfs.ext4 /dev/vg1/lv2

**Mount File System :-**

# mkdir /mnt/fs1

# vim /etc/fstab

/dev/vg1/lv1 /mnt/fs1 ext4 default 0 0

:wq!

# mount /dev/vg1/lv1 /mnt/fs1

# df–h

**To Remove lv :-**

# showmount

# umount /mnt/fs1 ......... # if mount

# lvs

# lvremove /dev/vg1/lv1

**To Remove vg :-**

# vgs

# vgremove vg1

# vgs

**To Remove pv :-**

# pvs

# pvremove /dev/sdb1 .......... # for HD partition

# pvremove /dev/sdb .......... # for HD

# pvs

**To Extend lv :-**

1. Check available space in vg

# vgs

1. Check available pv

# pvs

# lvextend -L +1000G /dev/vg1/lv2

# resize2fs /dev/vg1/lv2 1000G

# lvs

**To Extend vg :-**

1. Check which pv is free

# pvs

If pv is not Free then Create new pv

# pvcreate /dev/sdh

# vgextend vg2 /dev/sdh

# vgs

**To Reduce lv :-**

1. Check and umount lv if Mount

# umount /mnt/fs1

1. File System Check

# e2fsck -f /dev/vg1/lv1

1. Resize File System

# resize2fs /dev/vg1/lv1 500G

1. Reduce lv

# lvreduce -L -500G /dev/vg1/lv1

# e2fsck -f /dev/vg1/lv1

1. Mount the File System

# mount /dev/vg1/lv1 /mnt/fs1

**To Reduce vg :-**

1. Frist Check which PV is free and also if associate with which lv

# pvs

# lvs

1. Reduce vg

# vgreduce vg2 /dev/sdh

**Interview Question of LVM**

**Q1) It is possible to increase logical volume on fly?**

Ans: - yes we can. It is the feature of LVM to increase logical volume without umount it.

**Q2) How do scan new LUN from SAN or DISK for LVM physical volume?**

Ans: - use “pvscan“ to scan existing physical volume from SAN or LUN

**Q3) How to reduce LV ? Is it possible to reduce on fly?**

Ans:-NO, we can not reduce LV on fly. Here is the step reduce LV

* Umount the filesystem
* Reduce the file system using resize2fs command
* Reduce LV using lvreduce command
* Mount the file system

**Q4) What are the step to increase LV on fly?**

**Ans:-**

* Extend the LV using lvextend command
* Increase the file system size using file (resize2fs) command
* Verify the status using lvs command

**Q5) Why is LVM is required ?**  
**Ans:-** LVM stands for Logical Volume Manager , to resize filesystem’s size online we required LVM partition in Linux. Size of LVM partition can be extended and reduced using the lvextend&lvreduce commands respectively.

**Q6)How to decommission/remove LVM completely from the host?**  
Ans:-  
     1.Un-mount all the logical filesystems  
     2.Remove the logical volumes using "lvremove" command.  
     3.Destroy the volume group using "vgremove" command.  
     4.Use "pvremove" command remove the physical volumes from the system.

**Q7)Assume Volume group "vg02" is already exists. How do you extend the volume group with 50GB? Provide all the steps with commands.**

**Ans:-**

1.Get the 50GB lun from storage team.(/dev/sdd)  
   2.Create physcical volume ( # pvcreate /dev/sdd )  
   3.Extend the volume group (# vgextend vg02 /dev/sdd)

**Q8)What are LVM1 and LVM2?**  
Ans:-

LVM1 and LVM2 are the versions of LVM.   
LVM2 uses device mapper driver contained in 2.6 kernel version.  
LVM 1 was included in the 2.4 series kernels.

**Q9)What is the maximum size of a single LV?**  
Ans:-

For 2.4 based kernels, the maximum LV size is 2TB.   
For 32-bit CPUs on 2.6 kernels, the maximum LV size is 16TB.  
For 64-bit CPUs on 2.6 kernels, the maximum LV size is 8EB.

**Q10) How to take a LVM configuration backup ?**Ans:-

Use “vgcfgbackupvg\_name” to take the latest configuration backup of volume group.The default volume group backup location is “/etc/lvm/backup” .  
Refer:<http://www.unixarena.com/2013/08/linux-lvm-volume-group-operations.html>

**Q11) How to check free space on volume group?**

Ans:-

Vgdisplay –v vgname