

LVM Quick Reference

How to create a Volume Group (VG):

Note The following example is using the disk c1t6d0, the volume group vg01 and the logical volume lvhome

1) Prepare the disk

```
pvcreate /dev/rdisk/c1t6d0
```

Note if the disk was previously used in another VG use the following command instead

```
pvcreate -f /dev/rdisk/c1t6d0
```

2) Create the Volume Group (VG):

```
a) mknod /dev/vg01/group c 64 0x010000
```

Note: the group number (last parameter) is in hexadecimal and should be different for each volume group. For vg02, that number would be 0x020000. The default limit is 10 volume groups as set by the kernel parameter **maxvgs**.

```
b) vgcreate /dev/vg01 /dev/dsk/c1d0s2
```

Note: When a volume group is created the maximum physical extents per volume (max_pe parameter) will be set to the max_pe of the largest physical volume (PV) or 1016, which ever is greater, if no max_pe is specified. The effect of not setting the max_pe parameter would be that any PV added to the volume group in the future regardless of there size will be limited to the volume group creation value of max_pe. Therefore, consider increasing the max_pe to accommodate PV's that may likely be larger than the largest PV used to create the Volume Group. The formula to use to determine the value is:

```
physical_extent_size * max_pe = size_of_the_disk.
```

The default value for physical_extent_size is 4M and the maximum value for max_pe is 65535 (example for 18 gig disk use a value 4608 for max_pe: 4M* 4608 = 18 GB). There is also a default value of a maximum of 16 disks per volume group. The following is an example of the creation of a volume group modifying these two parameters (max_pe=4608, maximum number of disk = 24):

```
vgcreate -e 4608 -p 24 /dev/vg01 /dev/dsk/c1d0s2
```

How to create a Logical Volume (LV) and mount the filesystem:

1) Create the Logical Volume (LV)

```
lvcreate -L 120 -n lvhome /dev/vg01
```

Note: this will create a logical volume of 120 meg.

2) Create the filesystem

```
newfs -F vxfs /dev/vg01/rlvhome
```

Note: to create an **hfs** filesystem change **vxfs** to **hfs** in the previous command.

- 3) Mount the Logical Volume:
 - a) **mkdir /home**
 - b) **mount /dev/vg01/lvhome /home**

How to add a disk to a Volume Group:

Note The following examples is using the disk c1t6d0 and the volume group vg01

- 1) Prepare the disk

pvcreate /dev/rdisk/c1t6d0

Note if the disk was previously used in another VG use the following command instead:

pvcreate -f /dev/rdisk/c1t6d0

Note: Use caution when using **pvcreate -f** as this will overwrite the existing volume group information on the disk.

- 2) Add the disk to the Volume Group
vgextend /dev/vg01 /dev/dsk/c1t6d0

How to increase the size of a logical volume without OnlineJFS

Note: the following example is using the volume group vg01 and the logical volume lvhome

Note: Increasing the root filesystem (/) is not feasible

- 1) **lvextend -L 240 /dev/vg01/lvhome**; The new total size will be 240M.
- 2) **umount /home**

Note: If the filesystem is in use, it is impossible to unmount it. Therefore stop all the processes (applications) that use the filesystem then unmount it. Processes that use **/usr** and **/var** cannot be all stopped, the only solution is to reboot in single user mode.

- 3) **extendfs -F vxfs /dev/vg01/rlvhome**
- 4) **mount /dev/vg01/lvhome /home**

How to remove a Logical Volume:

Note: the following example is using the volume group vg01 and the logical volume lvhome

- 1) Backup all user data
- 2) Umount the filesystem
umount /home
- 3) remove the Logical volume
lvremove /dev/vg01/lvhome

How to reduce the size of a logical volume without OnlineJFS:

Note: the following example is using the volume group vg01 and the logical volume lvhome

- 1) Backup all user data
- 2) Umount the filesystem

umount /home

- 3) Reduce the size

lvreduce -L 60 /dev/vg01/lvhome

Note: the new total size will be 60M.

- 4) Re-create the filesystem

newfs -F vxfs /dev/vg01/lvhome

Note: to create an **hfs** filesystem change **vxfs** by **hfs** in the previous command.

- 5) Mount the Logical Volume:

mount /dev/vg01/lvhome /home

- 6) Restore the user data

How to remove a disk from a volume group:

Note: the following example is using the disk c1t6d0 and the volume group vg01

- 1) Make sure that the disk is not in use:

pvdisk /dev/dsk/c1t6d0

Look at line starting with **Allocated PE** the number at the end of the line should be 0. If it is not the disk is still in use.

- 2) Remove the disk

vgreduce /dev/vg01 /dev/dsk/c1t6d0

How to remove a volume group:

Note: the following example is using the volume group vg01 and the logical volume lvhome

- 1) Backup all user data
- 2) Find the name of all logical volume in this volume group

vgdisplay -v /dev/vg01

- 3) unmount all logical volumes

Note: repeat the following command for each logical command

umount /dev/vg01/lvhome

- 4) Remove the volume group:

vgexport /dev/vg01

Note: using **vgexport** to remove a volume group is easier and faster than using the **vgreduce** on each physical volume except the last one, followed by a **vgremove**. The other advantage is that the /dev/vg01 directory is also removed.

How to increase the primary swap:

Note: Because of the contiguous allocation policy, create a bigger logical volume and modify the Boot Data Reserved Area (BDRA) to make it primary.

1) **lvcreate -C y -L 240 /dev/vg00**

The name of this new logical volume will be displayed on the screen, note it, it will be needed later. (let say it is /dev/vg00/lvol8)

Note: This new logical volume has to be in vg00

2) **lvlnboot -v /dev/vg00**

This will display the current root and swap volumes

Note: lvol2 is the default primary swap.

3) **lvlnboot -s /dev/vg00/lvol8 /dev/vg00**

Note: use the logical volume name from step 1

4) **lvlnboot -R /dev/vg00**

Recover any missing links to all of the logical volumes specified in the BDRA and update the BDRA of each bootable physical volume in the volume group

5) Reboot the system

How to create a secondary boot disk:

Note: This will create an identical copy of the current vg00. The new volume group needs to be as big as vg00. This will also be a static version of the primary boot disk which could be used in case of a problem.

Note: The following example is using the disk c1t6d0 and the volume group vg01

1) Initialize the disk and make it bootable

pvcreate -B /dev/rdisk/c1t6d0

Note: the -B parameter tells pvcreate that this will be a bootable disk.

mkboot /dev/dsk/c1t6d0

mkboot -a "hpux" /dev/rdisk/c1t6d0

2) Create the volume group

mkdir /dev/vg01

mkknod /dev/vg01/group c 64 0x010000

vgcreate /dev/vg01 /dev/dsk/c1t6d0

3) Find the size of each logical volume in vg00

vgdisplay -v /dev/vg00 | more

look at **LV Size (Mbytes)** for each logical volume and note it.

Note: this example will use these values:

lvol1 84M
lvol2 256M
lvol3 140M
lvol4 500M
lvol5 64M
lvol6 20M
lvol7 500M
lvol8 500M

Note: The size of the new logical volumes needs to be exactly the same as the size of the logical volumes on the primary root disk.

4) Create the first 3 logical volumes contiguous (needed by the system)

```
lvvol1:  lvcreate -L 84 -C y -r n /dev/vg01
lvvol2:  lvcreate -L 256 -C y -r n /dev/vg01
lvvol3:  lvcreate -L 140 -C y -r n /dev/vg01
```

5) Now create the other logical volumes

```
lvvol4:  lvcreate -L 500 /dev/vg01
lvvol5:  lvcreate -L 64 /dev/vg01
lvvol6:  lvcreate -L 20 /dev/vg01
lvvol7:  lvcreate -L 500 /dev/vg01
lvvol8:  lvcreate -L 500 /dev/vg01
```

6) Copy each logical volume except the swap which is usually lvvol2.

```
dd if=/dev/vg00/rlvol1 of=/dev/vg01/rlvol1 bs=1024k
dd if=/dev/vg00/rlvol3 of=/dev/vg01/rlvol3 bs=1024k
dd if=/dev/vg00/rlvol4 of=/dev/vg01/rlvol4 bs=1024k
dd if=/dev/vg00/rlvol5 of=/dev/vg01/rlvol5 bs=1024k
dd if=/dev/vg00/rlvol6 of=/dev/vg01/rlvol6 bs=1024k
dd if=/dev/vg00/rlvol7 of=/dev/vg01/rlvol7 bs=1024k
dd if=/dev/vg00/rlvol8 of=/dev/vg01/rlvol8 bs=1024k
```

7) Verify the integrity of all the new volume except swap.

Note: The following lines are base on a system with vxfs filesystems except for /stand (lvvol1) which needs to be hfs.

```
fsck -F hfs /dev/vg01/rlvol1
fsck -F vxfs /dev/vg01/rlvol3
fsck -F vxfs /dev/vg01/rlvol4
fsck -F vxfs /dev/vg01/rlvol5
fsck -F vxfs /dev/vg01/rlvol6
fsck -F vxfs /dev/vg01/rlvol7
fsck -F vxfs /dev/vg01/rlvol8
```

8) Now configure the Boot Data Reserved Area (BDRA)

Note: The following commands assume that /stand is lvvol1, swap is lvvol2 and / is lvvol3

```
lvlnboot -b /dev/vg01/lvol1 /dev/vg01
lvlnboot -r /dev/vg01/lvol3 /dev/vg01
lvlnboot -s /dev/vg01/lvol2 /dev/vg01
lvlnboot -d /dev/vg01/lvol2 /dev/vg01
```

9) Modify the fstab file on the new disk.

```
a) If /tmp_mnt doesn't exist create it
mkdir /tmp_mnt
b) Mount the new root filesystem on /tmp_mnt
mount /dev/vg01/lvol3 /tmp_mnt
c) change to etc directory on the new disk.
cd /tmp/etc
```

- d) Modify all occurrence of vg00 in the fstab for vg01


```
sed "s/vg00/vg01/" fstab > fstab.out
mv fstab fstab.BAK
mv fstab.out fstab
```
- e) Unmount the new root filesystem


```
cd /
umount /tmp_mnt
```

LVM Mirroring:

How to mirror a logical volume:

Note: Data mirroring is provided by an additional purchasable software product called MirrorDisk/UX.

Note: the following example is using the volume group vg01 and the logical volume lvhome

To add a mirror to an existing logical volume:

```
lvextend -m 1 /dev/vg01/lvhome
```

This will add 1 mirror (2 copies of the filesystem).

To add 2 mirrors (3 copies of the filesystem) use **-m 2** instead.

To create a new logical volume of 200M with 1 mirror:

```
lvcreate -m 1 -L 200 /dev/vg01
```

How to unmirror a logical volume:

Note: the following example is using the volume group vg01 and the logical volume lvhome

```
lvreduce -m 0 /dev/vg01/lvhome
```

How to create a mirrored boot disk:

Note the following example is using the disk c1t6d0 as the mirrored boot disk and c0t6d0 as the boot disk.

1) Initialize the disk and make it bootable

```
pvcreate -B /dev/rdisk/c1t6d0
```

Note: the -B parameter tell pvcreate that this will be a bootable disk.

2) Add the physical volume to the volume group

```
vgextend /dev/vg01 /dev/dsk/c1t6d0
```

3) Use **mkboot** to place the boot utilities in the boot area and add the **AUTO** file.

```
mkboot /dev/dsk/c1t6d0
```

```
mkboot -a "hpux -lq" /dev/rdisk/c1t6d0
```

4) Use **mkboot** to update the **AUTO** file on the primary boot disk.

```
mkboot -a "hpux -lq" /dev/rdisk/c0t6d0
```

5) Mirror the stand, root and swap logical volumes
lvextend -m 1 /dev/vg00/lvol1
lvextend -m 1 /dev/vg00/lvol2
lvextend -m 1 /dev/vg00/lvol3

Note: LVM will resynchronize the new mirror copies. This step will takes several minutes Repeat the **lvextend** for all other logical volumes on the boot mirror.

6) Modify your alternate boot path to point to the mirror copy of boot disk.
setboot -a 8/8.6.0 # Use the Hardware path for your new boot disk.

How to mirror a logical volume on a specific physical volume:

Note: the following example, is using the disk c1t6d0 for the primary copy, c2t6d0 for the mirror copy, the volume group vg01, the logical volume lvhome and the size will be 200M

```
lvcreate -n lvhome /dev/vg01  
lvextend -L 200 /dev/vg01/lvhome /dev/dsk/c1t6d0  
lvextend -m 1 /dev/vg01/lvhome /dev/dsk/c2t6d0
```

How to create a Physical Volume Group (PVG):

create a file named **/etc/lvmpvg** with the following syntax:

```
VG vg_name  
PVG pvg_name  
pv_path  
...  
PVG pvg_name  
pv_path  
...  
VG vg_name  
PVG pvg_name  
pv_path  
...
```

For example, to use two PVGs in vg01 with c1t6d0 and c2t6d0 in one PVG(PVG0), c3t6d0 and c4t6d0 in the other PVG (PVG1) the contents of the file (**/etc/lvmpvg**) should be:

```
VG /dev/vg01  
PVG PVG0  
/dev/dsk/c1t6d0  
/dev/dsk/c2t6d0  
PVG PVG1  
/dev/dsk/c3t6d0  
/dev/dsk/c4t6d0
```

How to use PVG to mirror logical volumes on specific physical volumes:

Note: in the following text, the volume group will be vg01 and the logical volume will be name lvhome

After creating the **/etc/lvmpvg** file as describe above, each copy of your mirror could be force on different PVG. To achieve this if the logical volume is already created but not mirrored yet, use the following command:

```
lvchange -s g /dev/vg01/lvhome  
lvextend -m 1 /dev/vg01/lvhome
```

If the logical volume is not created yet:

```
lvcreate -s g -m 1 -n lvhome -L 200 /dev/vg01
```