**SYS: Create and remove physical volumes, assign physical volumes to volume groups, and create and delete logical volumes.**

**Prerequisites**

Before dealing with physical volumes, volume groups and logical volumes, you need to know how to create partitions on disk.

**LVM Presentation**

**LVM** stands for **L**ogical **V**olume **M**anager. It’s the system component that is able to deal with partitions in a modern way.

Traditionally, Unix disks were divided into slices called partitions. It was possible to decide the size of each partition but, once done, you couln’t change it without destroying all data on it.

With **LVM**, you can allocate disk space in a flexible manner.

**LVM** relies on three main concepts:

* **physical volume** or **pv**: a pv is a whole disk or a partition of a disk,
* **volume group** or **vg**: a vg contains one or more pv; a pv can only belong to one vg,
* **logical volume** or **lv**: a lv represents a portion of a vg; a lv can only belong to one vg; it’s on a lv that you can create a file system.

**LVM** brings flexibility compared to the previous system only based on partitions:

* you can easily increase the size of a logical volume if you’ve got some space available in the associated volume group,
* if you don’t have any available space anymore, you can add a new disk as a physical volume, add it to the volume group and increase the size of your logical volume: the logical volume will span two or more disks without any additional operations, creating or extending logical volumes don’t require any downtime.

**Configuration Report**

Before starting any operation, you need to know the current configuration. Type:

# lsblk -a

NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINT

vda 252:0 0 6G 0 disk

├─vda1 252:1 0 390M 0 part /boot

└─vda2 252:2 0 5.5G 0 part

├─rhel-swap 253:0 0 552M 0 lvm [SWAP]

└─rhel-root 253:1 0 3G 0 lvm /

With the **lsblk** command, you get quickly the following information:

* it is a virtual machine (**vda**, **sda** would indicate a physical server),
* there is only one disk **/dev/vda** of **6GB**,
* the disk is divided into two partitions (**vda1** and **vda2**) respectively with a size of **390MB** and **5.5GB**,
* the **vda1** partition is mounted under **/boot**,
* the **vda2** partition consists in two logical volumes (**lvm**) **swap** and **root** in a volume group called **rhel**,
* the **swap** logical volume is used by the system as a swapping area (**[SWAP]**) of **552MB**,
* the **root** logical volume is mounted under **/** with a size of **3GB**,
* there is around **2GB** of free available space (**5.5GB**–**552MB**–**3GB**=**2GB**) in the **vda2** partition,
* none of the partitions are in **R**ead-**O**nly mode (**RO**=**0**) or **R**e**M**ovable (**RM**=**0**).

Note1: **lsblk** should be the first command to type when dealing with partitions.  
Note2: By default, the **lsblk** command doesn’t display empty devices. The **-a** option corrects this problem.

**Physical Volume Management**

To create a physical volume (here **/dev/vda**), type:

# pvcreate /dev/vda

To remove a physical volume not belonging to any volume group (here **/dev/vda**), type:

# pvremove /dev/vda

To get the list of the physical volumes, type:

# pvs

**Volume Group Management**

To create a volume group (here called **vg** using a physical volume **/dev/vda**) with a physical extent size of **8MB**, type:

# vgcreate -s 8m vg /dev/vda

To add a physical volume (here **/dev/vdb**) to an existing volume group (here **vg**), type:

# vgextend vg /dev/vdb

To remove a physical volume (here **/dev/vdb**) from an existing volume group (here **vg**), type:

# vgreduce vg /dev/vdb

To remove an existing volume group (here called **vg**), type:

# vgremove vg

To get the list of the volume groups, type:

# vgs

**Logical Volume Management**

To create a logical volume (here called **lv\_vol** with a size of **1GB** in the **vg** volume group), type:

# lvcreate --size 1G --name lv\_vol vg

To remove a logical volume (here called **lv\_vol** in the **vg** volume group), type:

# lvremove /dev/vg/lv\_vol

To get the list of the logical volumes, type:

# lvs