🌀 7.1: Elasticity Task

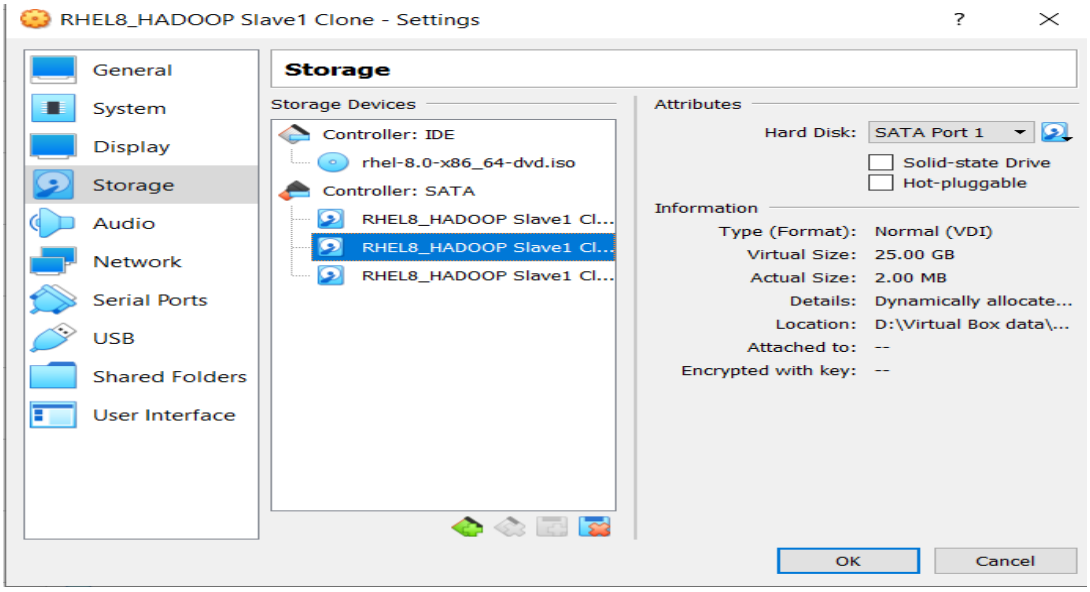
🏵Integrating LVM with Hadoop and providing Elasticity to DataNode Storage

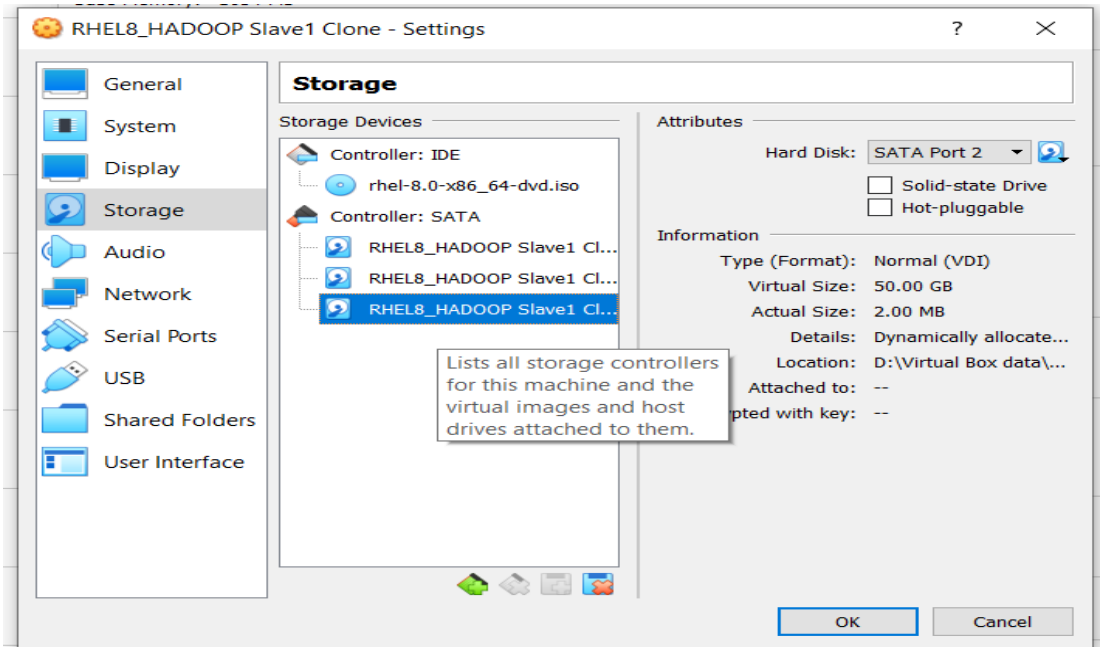
🏵Increase or Decrease the Size of Static Partition in Linux.

🏵Automating LVM Partition using Python-Script.

Solution:

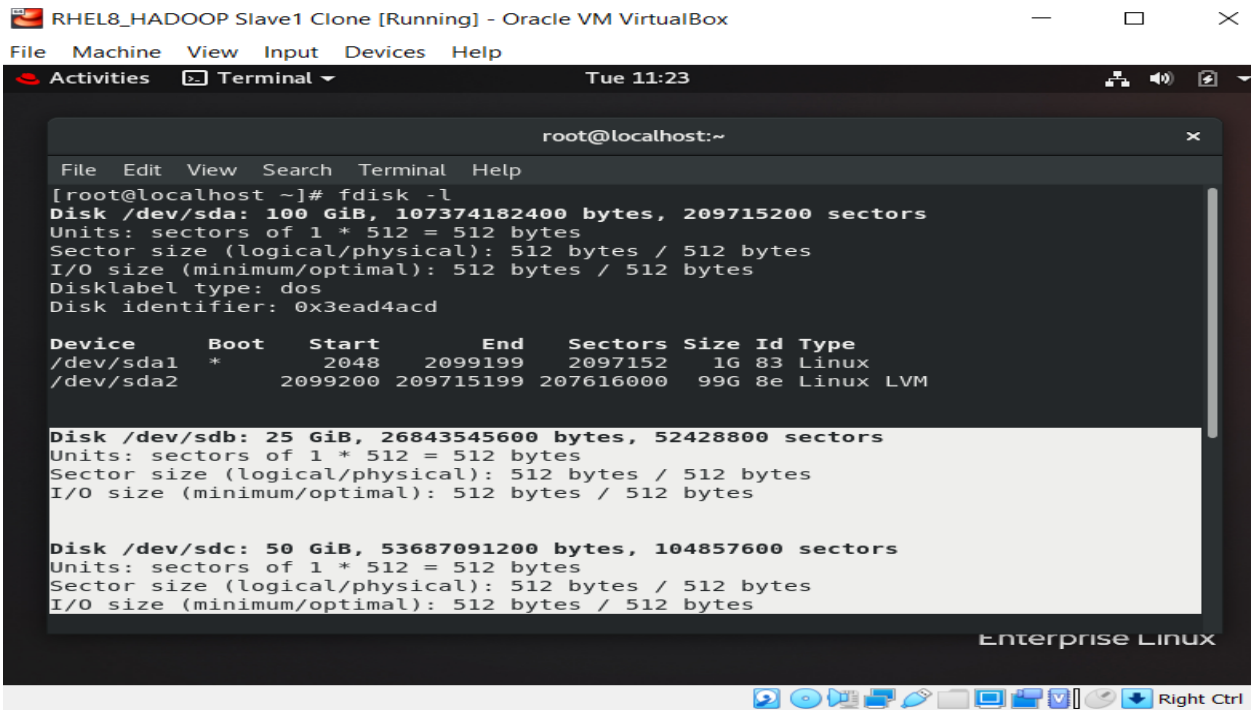
I have created 2 hard disks. Of 25Gib and 50Gib





Check the hard disks using

fdisk -l



Step 2: Create the Physical Volume for both the hard disks using

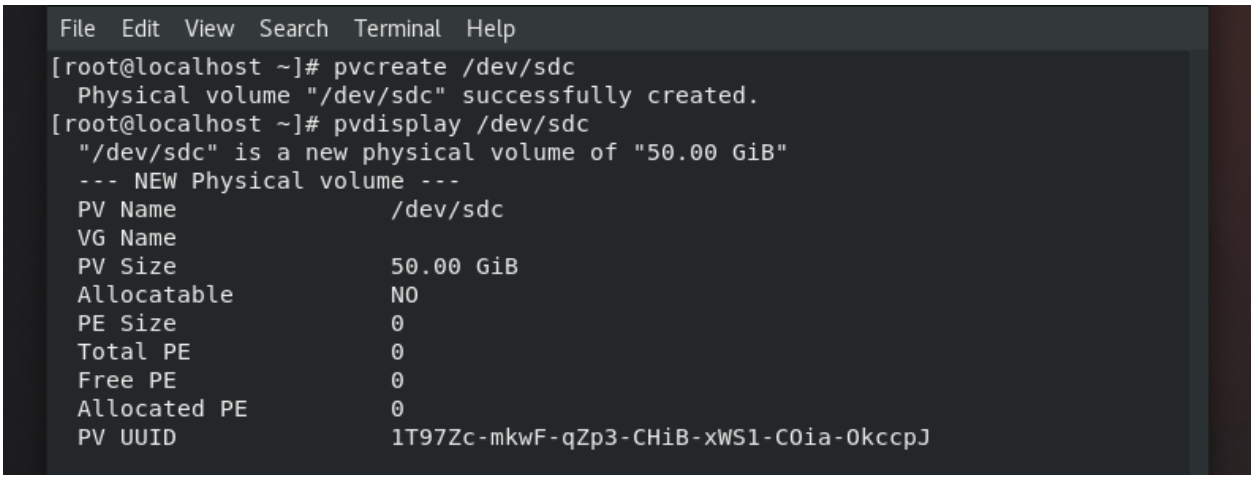
pvcreate /dev/sdc

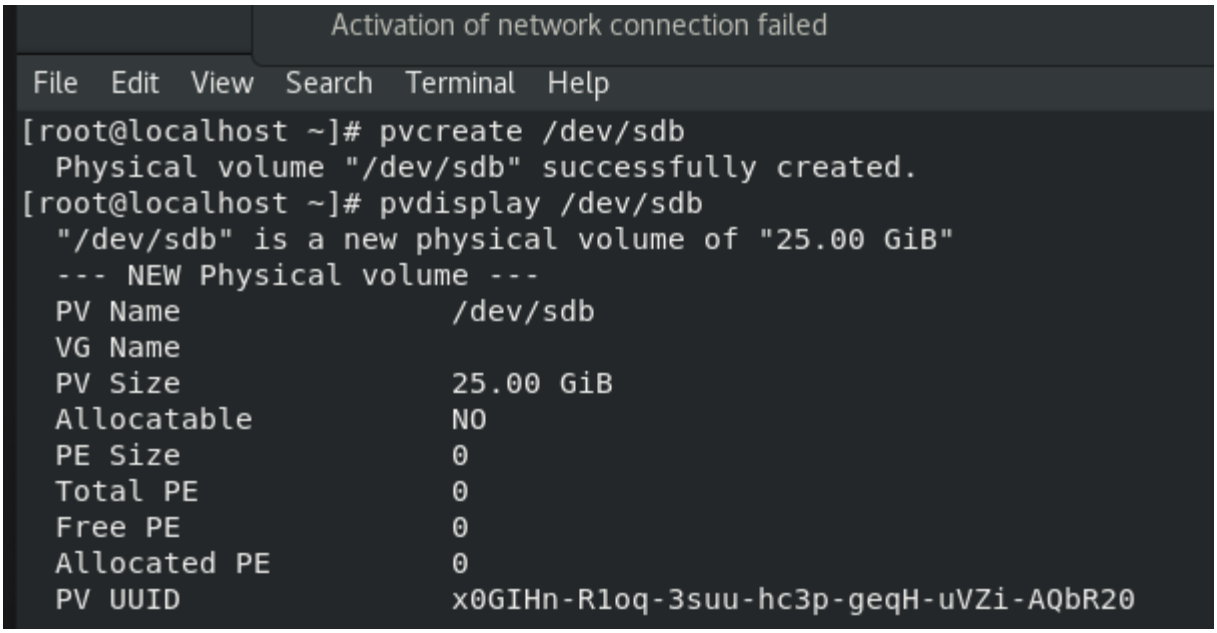
pvcreate /dev/sdb

To check the physical volume is created or not using

pvdisplay /dev/sdb

pvdisplay /dev/sdc

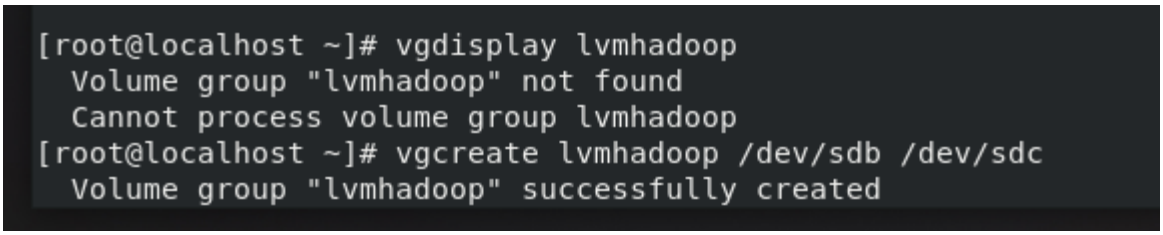


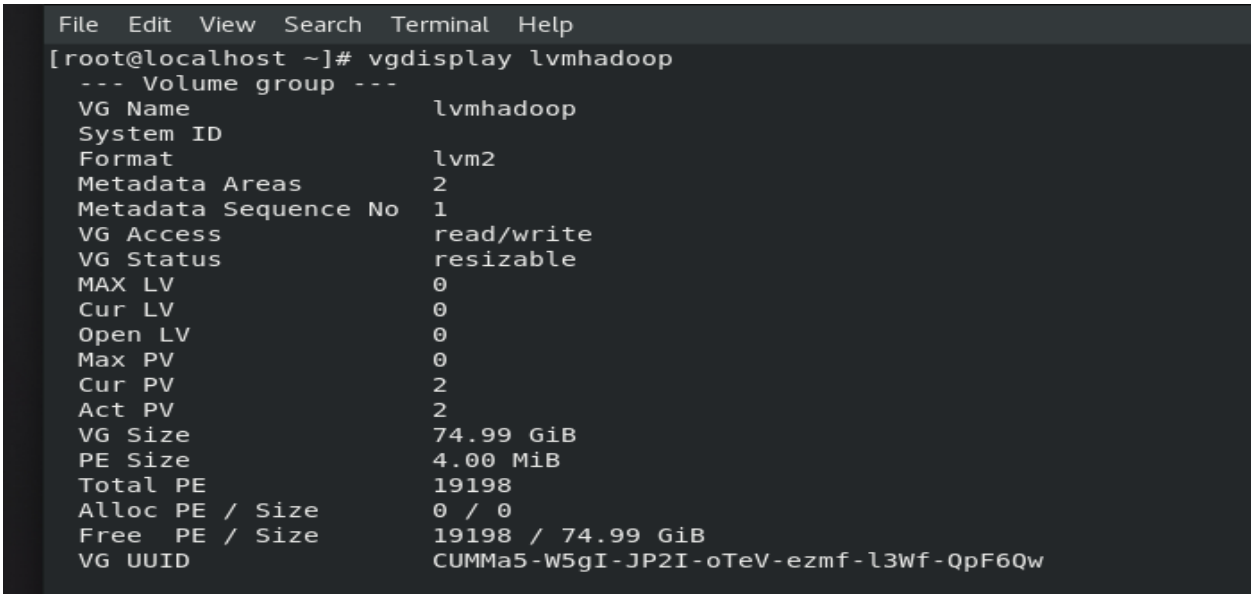


Step3: Create the volumegroup (vg) using

vgcreate <vg_name> <HD1_name> <HD2_name>

vgcreate lvmhadoop /dev/sdb /dev/sdc

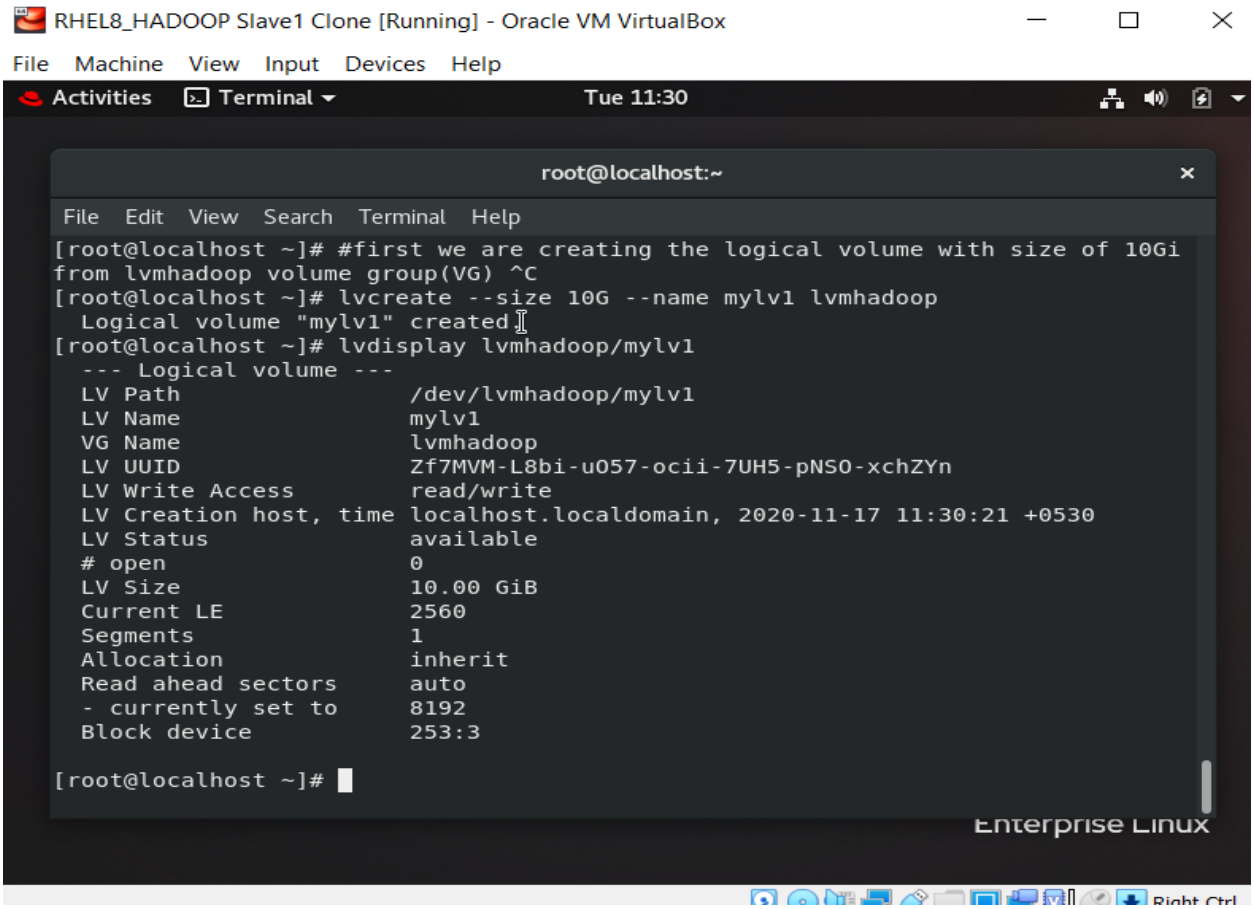




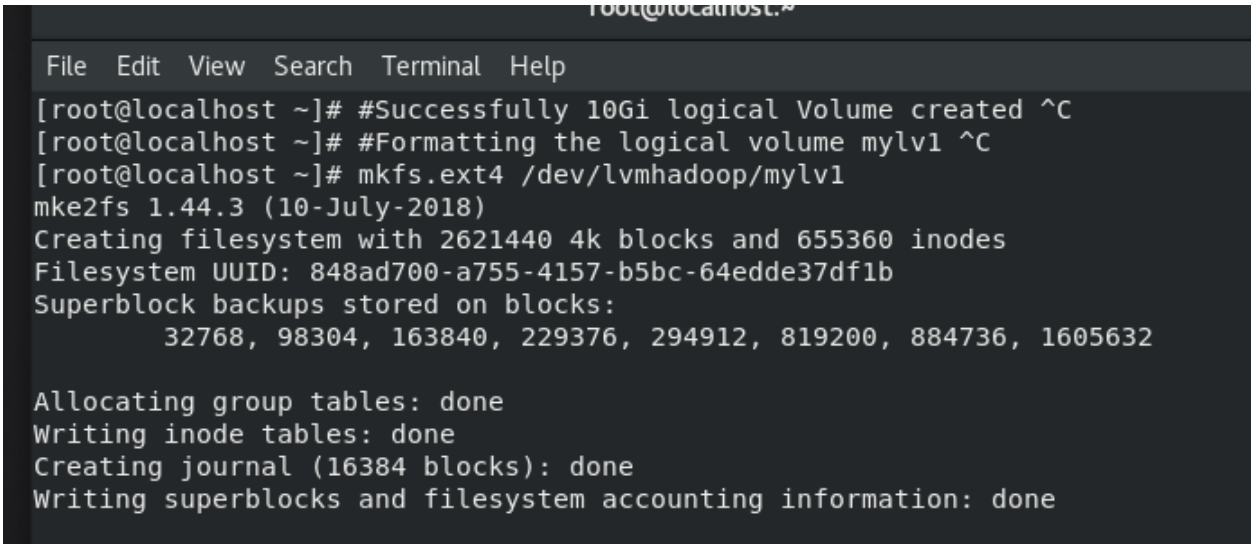
Step4: Create the logical volume with size of 10Gi from lvmhadoop volumegroup(vg) using

lvcreate --size 10G --name <LV_name> <VG_name>

lvcreate --size 10G --name mylv1 lvmhadoop



➔ Format the logical volume using mkfs.ext4 /dev/lvmhadoop/mylv1



➔ Make the new directory and mount the logical volume to that directory

```
[root@localhost ~]# mkdir /lvmDN1
[root@localhost ~]# mount /dev/lvmhadoop/mylv1 /lvmDN1
[root@localhost ~]# df -h
Filesystem                   Size  Used Avail Use% Mounted on
devtmpfs                     706M     0  706M   0% /dev
tmpfs                        721M     0  721M   0% /dev/shm
tmpfs                        721M  9.6M  712M   2% /run
tmpfs                        721M     0  721M   0% /sys/fs/cgroup
/dev/mapper/rhel-root         50G  6.4G   44G  13% /
/dev/mapper/rhel-home         47G  380M   47G   1% /home
/dev/sda1                   1014M  170M  845M  17% /boot
tmpfs                        145M   40K  145M   1% /run/user/42
tmpfs                        145M  5.7M  139M   4% /run/user/0
/dev/sr0                     6.7G  6.7G     0 100% /run/media/root/RHEL-8-0-0-Ba
seOS-x86_64
/dev/mapper/lvmhadoop-mylv1  9.8G   37M  9.3G   1% /lvmDN1
[root@localhost ~]#
```

```
File  Edit  View  Search  Terminal  Help
[root@localhost ~]# cd /lvmDN1
[root@localhost lvmDN1]# ls
lost+found
[root@localhost lvmDN1]#
```

Step5: Start the services of Hadoop namenode

```
[root@localhost ~]# jps
2780 Jps
[root@localhost ~]# hadoop-daemon.sh start namenode
starting namenode, logging to /var/log/hadoop/root/hadoop-root-namenode-localhos
t.localdomain.out
[root@localhost ~]# jps
2839 NameNode
2890 Jps
[root@localhost ~]#
```

```
[root@localhost hadoop]# cat hdfs-site.xml
<?xml version="1.0"?>
<?xml-stylesheet type="text/xsl" href="configuration.xsl"?>

<!-- Put site-specific property overrides in this file. -->

<configuration>

<property>
<name>dfs.data.dir</name>
<value>/lvmDN1</value>
</property>

</configuration>
[root@localhost hadoop]#
```

```
[root@localhost hadoop]# cat core-site.xml
<?xml version="1.0"?>
<?xml-stylesheet type="text/xsl" href="configuration.xsl"?>

<!-- Put site-specific property overrides in this file. -->

<configuration>

<property>
<name>fs.default.name</name>
<value>hdfs://192.168.99.124:9001</value>
</property>

</configuration>
[root@localhost hadoop]#
```

Step6: Start the services of Hadoop NameNode

```
[root@localhost hadoop]# jps
4422 Jps
[root@localhost hadoop]# hadoop-daemon.sh start datanode
starting datanode, logging to /var/log/hadoop/root/hadoop-root-datanode-localhos
t.localdomain.out
[root@localhost hadoop]# jps
4531 Jps
4473 DataNode
[root@localhost hadoop]#
```

```
root@localhost:/etc/hadoop
File  Edit  View  Search  Terminal  Help
[root@localhost hadoop]# hadoop dfsadmin -report
Safe mode is ON
Configured Capacity: 10501771264 (9.78 GB)
Present Capacity: 9910370304 (9.23 GB)
DFS Remaining: 9910325248 (9.23 GB)
DFS Used: 45056 (44 KB)
DFS Used%: 0%
Under replicated blocks: 0
Blocks with corrupt replicas: 0
Missing blocks: 0

-------------------------------------------------
Datanodes available: 1 (1 total, 0 dead)

Name: 192.168.99.127:50010
Decommission Status : Normal
Configured Capacity: 10501771264 (9.78 GB)
DFS Used: 45056 (44 KB)
Non DFS Used: 591400960 (564 MB)
DFS Remaining: 9910325248(9.23 GB)
DFS Used%: 0%
DFS Remaining%: 94.37%
Last contact: Tue Nov 17 11:43:09 IST 2020
```

Step7: Now I want to increase the lv from 10Gi to 30Gi

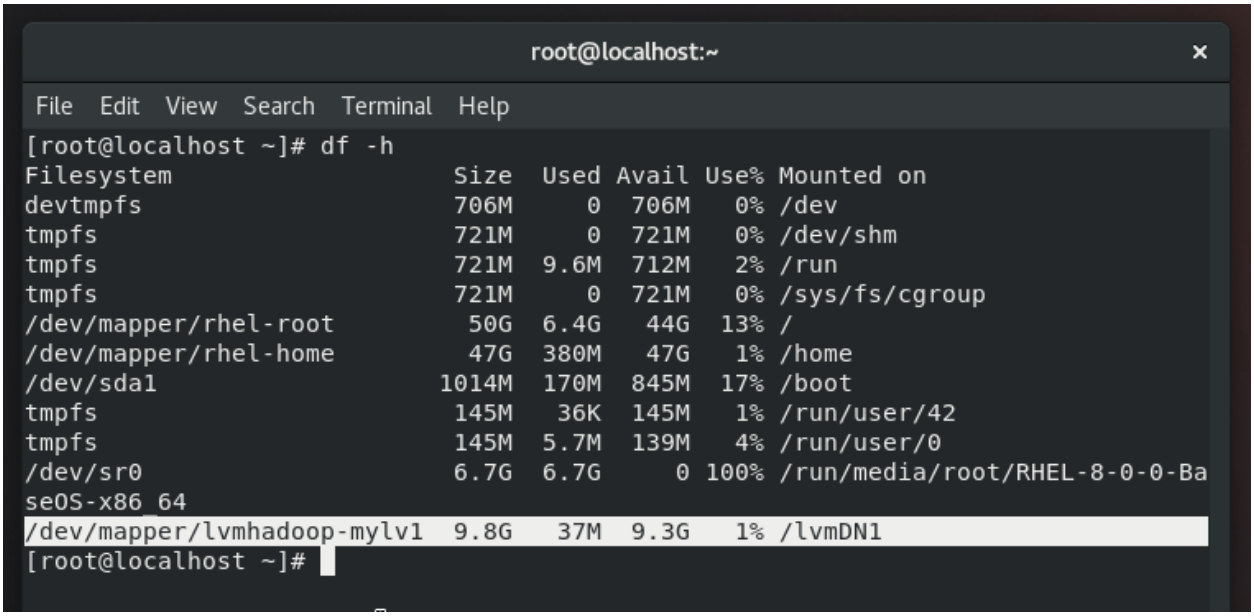
```
[root@localhost ~]# #Now i want to increase the lv to 30Gi ^C
[root@localhost ~]# lvextend --size +20G /dev/lvmhadoop/mylv1
  Size of logical volume lvmhadoop/mylv1 changed from 10.00 GiB (2560 extents) t
o 30.00 GiB (7680 extents).
  Logical volume lvmhadoop/mylv1 successfully resized.
[root@localhost ~]# lvdisplay /dev/lvmhadoop/mylv1
  --- Logical volume ---
  LV Path                /dev/lvmhadoop/mylv1
  LV Name                mylv1
  VG Name                lvmhadoop
  LV UUID                Zf7MVM-L8bi-uO57-ocii-7UH5-pNSO-xchZYn
  LV Write Access        read/write
  LV Creation host, time localhost.localdomain, 2020-11-17 11:30:21 +0530
  LV Status              available
  # open                 1
  LV Size                30.00 GiB
  Current LE             7680
  Segments               2
  Allocation             inherit
  Read ahead sectors     auto
  - currently set to     8192
  Block device           253:3

[root@localhost ~]#
```

```
[root@localhost ~]# hadoop dfsadmin -report
Safe mode is ON
Configured Capacity: 10501771264 (9.78 GB)
Present Capacity: 9910370304 (9.23 GB)
DFS Remaining: 9910325248 (9.23 GB)
DFS Used: 45056 (44 KB)
DFS Used%: 0%
Under replicated blocks: 0
Blocks with corrupt replicas: 0
Missing blocks: 0

-------------------------------------------------
Datanodes available: 1 (1 total, 0 dead)

Name: 192.168.99.127:50010
Decommission Status : Normal
Configured Capacity: 10501771264 (9.78 GB)
DFS Used: 45056 (44 KB)
Non DFS Used: 591400960 (564 MB)
DFS Remaining: 9910325248(9.23 GB)
DFS Used%: 0%
DFS Remaining%: 94.37%
Last contact: Tue Nov 17 11:47:15 IST 2020
```



➔ After extending the lv to 30Gi, we must format it too. In this case, if we use mkfs.ext4, the data will be lost. So, we must use resize2fs.

```
[root@localhost ~]# #Here we have extended to 30Gi, but we have to format it too
, if we format with mkfs.ext4 the date which is present will be lost. So, we hav
e to use resize2fs ^C
[root@localhost ~]# resize2fs /dev/lvmhadoop/mylv1
resize2fs 1.44.3 (10-July-2018)
Filesystem at /dev/lvmhadoop/mylv1 is mounted on /lvmDN1; on-line resizing requi
red
old_desc_blocks = 2, new_desc_blocks = 4
The filesystem on /dev/lvmhadoop/mylv1 is now 7864320 (4k) blocks long.

[root@localhost ~]# df -h
Filesystem                   Size  Used Avail Use% Mounted on
devtmpfs                     706M     0  706M   0% /dev
tmpfs                        721M     0  721M   0% /dev/shm
tmpfs                        721M  9.6M  712M   2% /run
tmpfs                        721M     0  721M   0% /sys/fs/cgroup
/dev/mapper/rhel-root         50G  6.4G   44G  13% /
/dev/mapper/rhel-home         47G  380M   47G   1% /home
/dev/sda1                   1014M  170M  845M  17% /boot
tmpfs                        145M   40K  145M   1% /run/user/42
tmpfs                        145M  5.7M  139M   4% /run/user/0
/dev/sr0                     6.7G  6.7G     0 100% /run/media/root/RHEL-8-0-0-Ba
seOS-x86_64
/dev/mapper/lvmhadoop-mylv1   30G   44M   29G   1% /lvmDN1
[root@localhost ~]#
```

```
[root@localhost ~]# hadoop dfsadmin -report
Safe mode is ON
Configured Capacity: 31639638016 (29.47 GB)
Present Capacity: 30159491072 (28.09 GB)
DFS Remaining: 30159446016 (28.09 GB)
DFS Used: 45056 (44 KB)
DFS Used%: 0%
Under replicated blocks: 0
Blocks with corrupt replicas: 0
Missing blocks: 0

-------------------------------------------------
Datanodes available: 1 (1 total, 0 dead)

Name: 192.168.99.127:50010
Decommission Status : Normal
Configured Capacity: 31639638016 (29.47 GB)
DFS Used: 45056 (44 KB)
Non DFS Used: 1480146944 (1.38 GB)
DFS Remaining: 30159446016(28.09 GB)
DFS Used%: 0%
DFS Remaining%: 95.32%
Last contact: Tue Nov 17 11:51:12 IST 2020
```

Step8: To reduce the lv, we must follow this 5steps

a) make the partition offline. i.e unmount the drive

b) clean/scan the drive using e2fsck

c) format the drive using resize2fs

d) reduce the logical volume

e) make the partition online i.e mount the drive

```
[root@localhost ~]# #Toreduce the mylv1 from 30Gi to 15Gi
[root@localhost ~]# umount /dev/lvmhadoop/mylv1 /lvmDN1
umount: /lvmDN1: not mounted.
[root@localhost ~]# e2fsck -f /dev/mapper/lvmhadoop-mylv1
e2fsck 1.44.3 (10-July-2018)
Pass 1: Checking inodes, blocks, and sizes
Pass 2: Checking directory structure
Pass 3: Checking directory connectivity
Pass 4: Checking reference counts
Pass 5: Checking group summary information
/dev/mapper/lvmhadoop-mylv1: 11/1966080 files (0.0% non-contiguous), 167453/7864
320 blocks
[root@localhost ~]# resize2fs /dev/mapper/lvmhadoop-mylv1 15G
resize2fs 1.44.3 (10-July-2018)
Resizing the filesystem on /dev/mapper/lvmhadoop-mylv1 to 3932160 (4k) blocks.
The filesystem on /dev/mapper/lvmhadoop-mylv1 is now 3932160 (4k) blocks long.

[root@localhost ~]#
```

```
[root@localhost ~]# lvdisplay /dev/mapper/lvmhadoop-mylv1
  --- Logical volume ---
  LV Path                /dev/lvmhadoop/mylv1
  LV Name                mylv1
  VG Name                lvmhadoop
  LV UUID                eojfNh-0DVg-gYIk-cGeV-FtUR-epQH-0OeTSI
  LV Write Access        read/write
  LV Creation host, time localhost.localdomain, 2020-11-17 13:05:01 +0530
  LV Status              available
  # open                 0
  LV Size                30.00 GiB
  Current LE             7680
  Segments               1
  Allocation             inherit
  Read ahead sectors     auto
  - currently set to     8192
  Block device           253:3
```

```
root@localhost:~                    root@localhost:~
[root@localhost ~]# lvreduce --size -15G /dev/mapper/lvmhadoop-mylv1
  WARNING: Reducing active logical volume to 15.00 GiB.
  THIS MAY DESTROY YOUR DATA (filesystem etc.)
Do you really want to reduce lvmhadoop/mylv1? [y/n]: y
  Size of logical volume lvmhadoop/mylv1 changed from 30.00 GiB (7680 extents) t
o 15.00 GiB (3840 extents).
  Logical volume lvmhadoop/mylv1 successfully resized.
[root@localhost ~]#
```

Note: During reducing, the data present in the reducing part will be lost

```
[root@localhost ~]# lvdisplay lvmhadoop/mylv1
  --- Logical volume ---
  LV Path                /dev/lvmhadoop/mylv1
  LV Name                mylv1
  VG Name                lvmhadoop
  LV UUID                eojfNh-0DVg-gYIk-cGeV-FtUR-epQH-0OeTSI
  LV Write Access        read/write
  LV Creation host, time localhost.localdomain, 2020-11-17 13:05:01 +0530
  LV Status              available
  # open                 0
  LV Size                15.00 GiB
  Current LE             3840
  Segments               1
  Allocation             inherit
  Read ahead sectors     auto
  - currently set to     8192
  Block device           253:3
```

```
[root@localhost ~]# mount /dev/lvmhadoop/mylv1 /lvmDN1
[root@localhost ~]# df -h
Filesystem                   Size  Used Avail Use% Mounted on
devtmpfs                     706M     0  706M   0% /dev
tmpfs                        721M     0  721M   0% /dev/shm
tmpfs                        721M  9.6M  712M   2% /run
tmpfs                        721M     0  721M   0% /sys/fs/cgroup
/dev/mapper/rhel-root         50G  6.4G   44G  13% /
/dev/mapper/rhel-home         47G  380M   47G   1% /home
/dev/sda1                   1014M  170M  845M  17% /boot
tmpfs                        145M   40K  145M   1% /run/user/42
/dev/sr0                     6.7G  6.7G     0 100% /run/media/anup/RHEL-8-0-0-Ba
seOS-x86_64
tmpfs                        145M  5.7M  139M   4% /run/user/0
/dev/mapper/lvmhadoop-mylv1   15G   41M   14G   1% /lvmDN1
[root@localhost ~]#
```

```
[root@localhost ~]# hadoop dfsadmin -report
Safe mode is ON
Configured Capacity: 15719145472 (14.64 GB)
Present Capacity: 14855114752 (13.83 GB)
DFS Remaining: 14855069696 (13.83 GB)
DFS Used: 45056 (44 KB)
DFS Used%: 0%
Under replicated blocks: 0
Blocks with corrupt replicas: 0
Missing blocks: 0

-------------------------------------------------
Datanodes available: 1 (1 total, 0 dead)

Name: 192.168.99.127:50010
Decommission Status : Normal
Configured Capacity: 15719145472 (14.64 GB)
DFS Used: 45056 (44 KB)
Non DFS Used: 864030720 (824 MB)
DFS Remaining: 14855069696(13.83 GB)
DFS Used%: 0%
DFS Remaining%: 94.5%
Last contact: Tue Nov 17 13:19:12 IST 2020
```

Lets Start with integration with python.

https://drive.google.com/file/d/18VyArgbSvmuO1dcY7K1FJILmL_rkqDz9/view?usp=sharing

GitHub: https://github.com/Anuddeeph/Task7.1-Automation-of-Hadoop-Datanode-Using-LVM-.git