

24 sept 2024

- **LVM(Logical Volume Management)**

Logical Volume Management (LVM) is a system in Linux that provides a flexible and efficient way of managing disk storage. It allows you to create, resize, and manage disk partitions more easily compared to traditional partitioning methods.

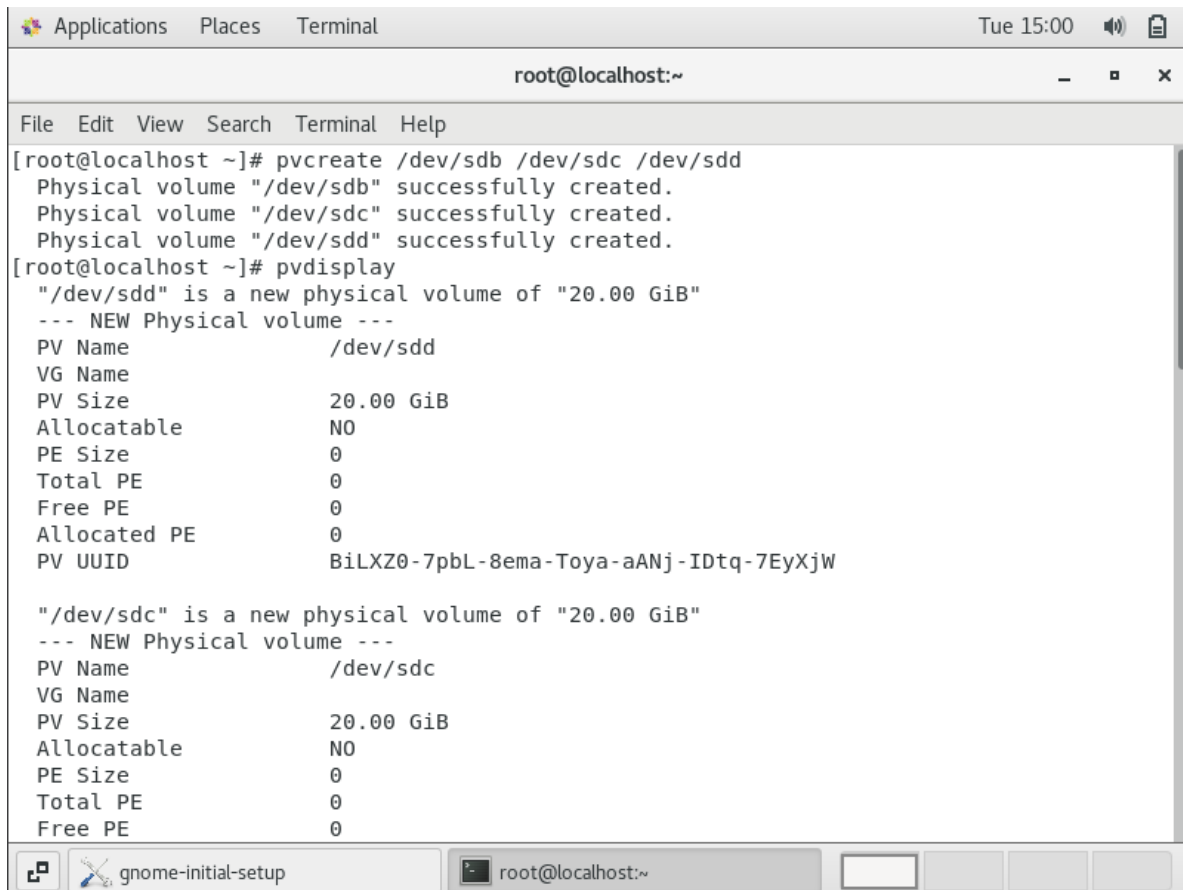
How to configure LVM:-

1) Create Physical Volume for each drive :-

- [root@localhost ~]# pvcreate /dev/sdb /dev/sdc /dev/sdd

2) To display Physical Volume:-

- [root@localhost ~]# pvdisplay



```
[root@localhost ~]# pvcreate /dev/sdb /dev/sdc /dev/sdd
Physical volume "/dev/sdb" successfully created.
Physical volume "/dev/sdc" successfully created.
Physical volume "/dev/sdd" successfully created.
[root@localhost ~]# pvdisplay
"/dev/sdd" is a new physical volume of "20.00 GiB"
--- NEW Physical volume ---
PV Name                /dev/sdd
VG Name
PV Size                 20.00 GiB
Allocatable            NO
PE Size                0
Total PE               0
Free PE                0
Allocated PE           0
PV UUID                BiLXZ0-7pbL-8ema-Toya-aANj-IDtq-7EyXjW

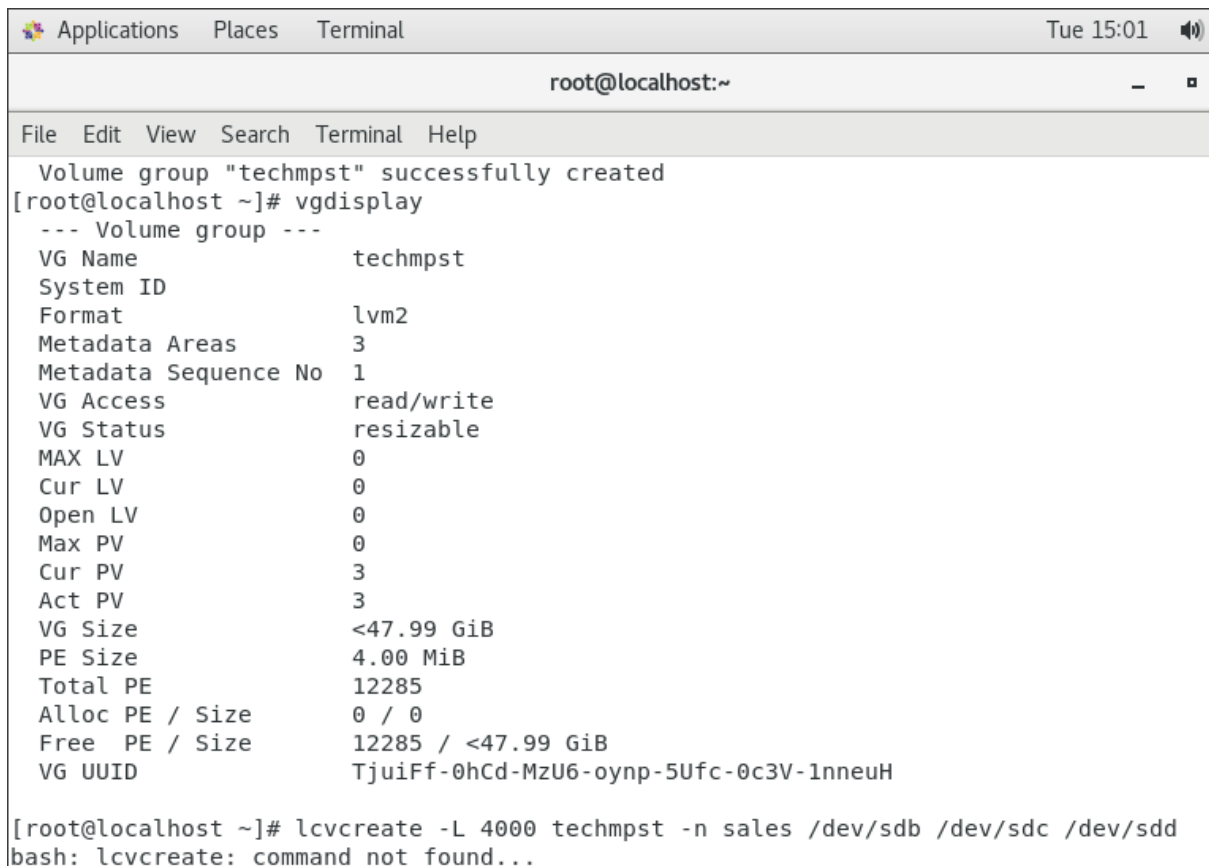
"/dev/sdc" is a new physical volume of "20.00 GiB"
--- NEW Physical volume ---
PV Name                /dev/sdc
VG Name
PV Size                 20.00 GiB
Allocatable            NO
PE Size                0
Total PE               0
Free PE                0
```

3)To Create vg name:-

- [root@localhost ~]# vgcreate techmpst /dev/sdb /dev/sdc /dev/sdd

4) To display:-

- [root@localhost ~]# vgdisplay



```
Applications Places Terminal Tue 15:01
root@localhost:~
File Edit View Search Terminal Help
Volume group "techmpst" successfully created
[root@localhost ~]# vgdisplay
--- Volume group ---
VG Name                techmpst
System ID
Format                 lvm2
Metadata Areas         3
Metadata Sequence No   1
VG Access               read/write
VG Status               resizable
MAX LV                 0
Cur LV                 0
Open LV                 0
Max PV                  0
Cur PV                 3
Act PV                  3
VG Size                 <47.99 GiB
PE Size                 4.00 MiB
Total PE                12285
Alloc PE / Size         0 / 0
Free PE / Size          12285 / <47.99 GiB
VG UUID                 TjuiFf-0hCd-MzU6-oynp-5Ufc-0c3V-1nneuH

[root@localhost ~]# lvcvcreate -L 4000 techmpst -n sales /dev/sdb /dev/sdc /dev/sdd
bash: lvcvcreate: command not found...
```

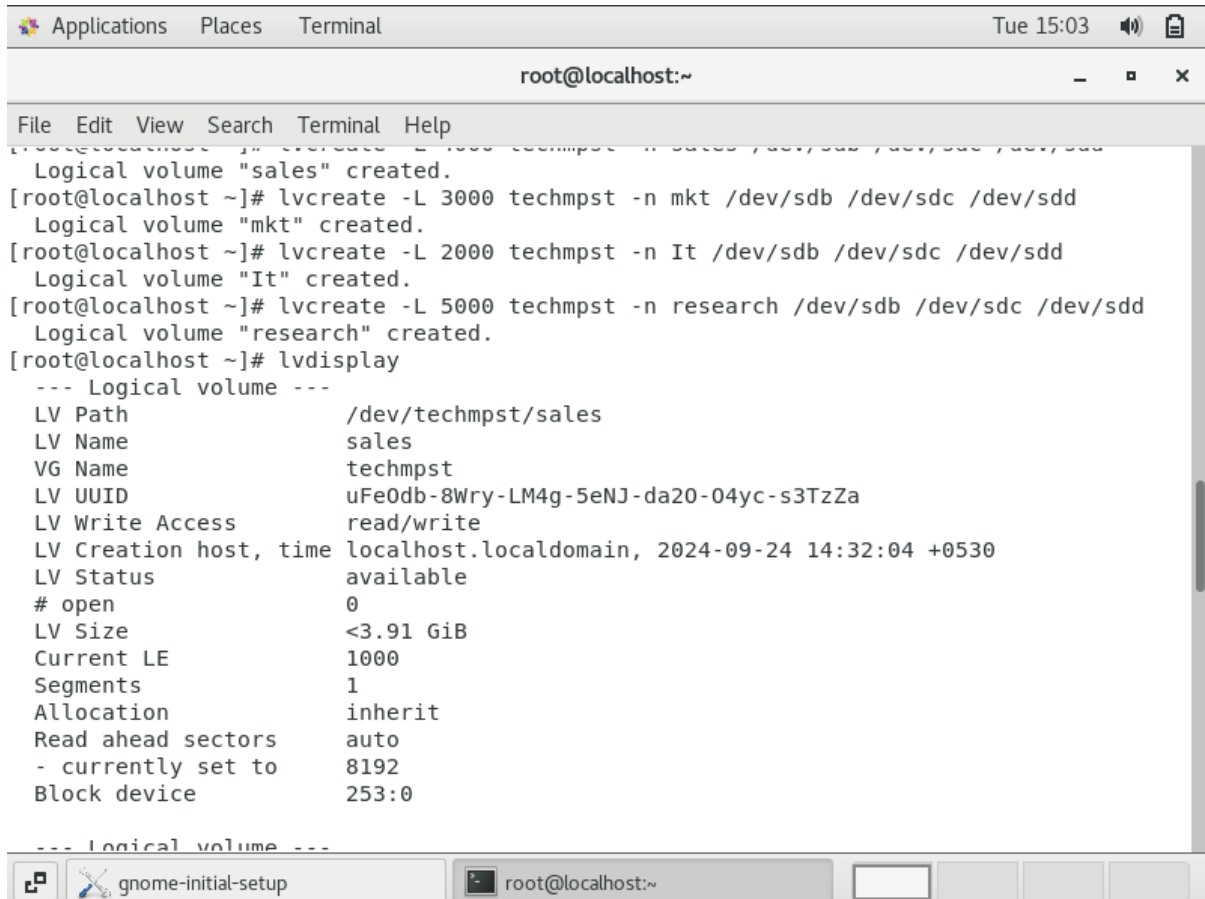
5)To Create Logical Volume:-

- [root@localhost ~]# lvcreate -L 3000 -n mkt /dev/sdb /dev/sdc /dev/sdd
- [root@localhost ~]# lvcreate -L 4000 -n sales /dev/sdb /dev/sdc /dev/sdd
- [root@localhost ~]# lvcreate -L 2000 -n It /dev/sdb /dev/sdc /dev/sdd

- [root@localhost ~]# lvcreate -L 5000 -n research /dev/sdb /dev/sdc /dev/sdd

6) To display:-

- [root@localhost ~]# lvdisplay



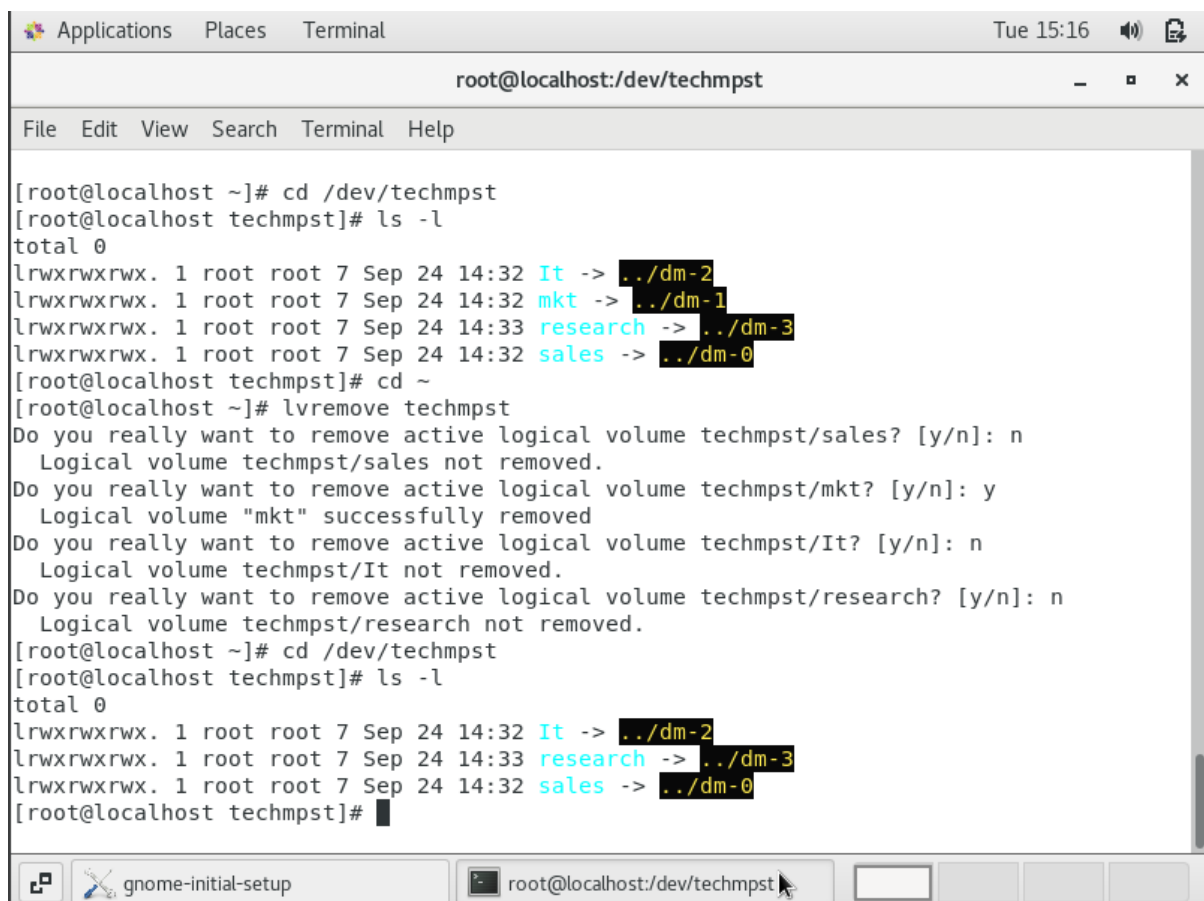
```
root@localhost:~# lvcreate -L 5000 -n research /dev/sdb /dev/sdc /dev/sdd
Logical volume "research" created.
root@localhost:~# lvdisplay
--- Logical volume ---
LV Path                /dev/techmpst/sales
LV Name                 sales
VG Name                 techmpst
LV UUID                 uFe0db-8Wry-LM4g-5eNJ-da20-04yc-s3TzZa
LV Write Access         read/write
LV Creation host, time  localhost.localdomain, 2024-09-24 14:32:04 +0530
LV Status                available
# open                  0
LV Size                 <3.91 GiB
Current LE              1000
Segments                1
Allocation               inherit
Read ahead sectors      auto
- currently set to      8192
Block device            253:0
```

7)To display all departments:-

- [root@localhost ~]# cd /dev/techmpst
- [root@localhost techmpst]# ls -l

8)To remove one department from Logical Volume:-

- [root@localhost ~]# lvremove techmpst



```
Applications  Places  Terminal  Tue 15:16
root@localhost:/dev/techmpst

File Edit View Search Terminal Help

[root@localhost ~]# cd /dev/techmpst
[root@localhost techmpst]# ls -l
total 0
lrwxrwxrwx. 1 root root 7 Sep 24 14:32 It -> ../dm-2
lrwxrwxrwx. 1 root root 7 Sep 24 14:32 mkt -> ../dm-1
lrwxrwxrwx. 1 root root 7 Sep 24 14:33 research -> ../dm-3
lrwxrwxrwx. 1 root root 7 Sep 24 14:32 sales -> ../dm-0
[root@localhost techmpst]# cd ~
[root@localhost ~]# lvremove techmpst
Do you really want to remove active logical volume techmpst/sales? [y/n]: n
Logical volume techmpst/sales not removed.
Do you really want to remove active logical volume techmpst/mkt? [y/n]: y
Logical volume "mkt" successfully removed
Do you really want to remove active logical volume techmpst/It? [y/n]: n
Logical volume techmpst/It not removed.
Do you really want to remove active logical volume techmpst/research? [y/n]: n
Logical volume techmpst/research not removed.
[root@localhost ~]# cd /dev/techmpst
[root@localhost techmpst]# ls -l
total 0
lrwxrwxrwx. 1 root root 7 Sep 24 14:32 It -> ../dm-2
lrwxrwxrwx. 1 root root 7 Sep 24 14:33 research -> ../dm-3
lrwxrwxrwx. 1 root root 7 Sep 24 14:32 sales -> ../dm-0
[root@localhost techmpst]#
```

RAID(Redundancy Array of Independent Disk)

RAID is a technology that combines multiple hard drives into a single logical unit to provide data redundancy, improve performance, or both.

Types of RAID:

1)RAID 0 (Striping):

- No redundancy.
- Increased performance.
- Data split across drives; failure of one drive causes total data loss.

2) RAID 1 (Mirroring):

- Full data redundancy.
- Data mirrored on multiple drives.
- Read speed improvement, no write performance gain

3) RAID 4 (in 3 points):

- Data is spread across multiple disks with one dedicated parity disk.
- Can recover from one disk failure using parity information.
- Fast reads but slower writes due to the parity disk.

4) RAID 5 (Striping with Parity):

- Redundancy using parity.
- Can tolerate one drive failure.
- Balanced performance (good read, slower write due to parity).

5) RAID 6 (Striping with Double Parity):

- Redundancy with two parity blocks.
- Can withstand two drive failures.
- Slower write speeds than RAID 5, good for redundancy.

6) RAID 10 (1+0, Mirroring and Striping):

- Combines RAID 1 and RAID 0.
- High redundancy and performance.
- Requires a minimum of four drives.
-

Command for Raid:

1)To create a configuration file for mdadm:

- [root@localhost ~]# mdadm -C

2)To create a new RAID array using mdadm:

- [root@localhost ~]# mdadm -C /dev/md0 -n3
/dev/sdb /dev/sdc /dev/sdd

The screenshot shows a terminal window titled "CentOs VM [Running] - Oracle VM VirtualBox". The terminal prompt is "root@localhost:~". The user has entered the command "mdadm -C", which resulted in an error: "mdadm: an md device must be given in this mode". The user then entered "mdadm -C /dev/md0 -n3 /dev/sdb /dev/sdc /dev/sdd -l5", which resulted in another error: "mdadm: largest drive (/dev/sdc) exceeds size (8379392K) by more than 1%". The user then entered "Continue creating array? y", which resulted in "mdadm: Defaulting to version 1.2 metadata" and "mdadm: array /dev/md0 started.". The user then entered "mdadm -D /dev/md0", which resulted in the following output:

```
Version : 1.2
Creation Time : Tue Sep 24 16:14:44 2024
Raid Level : raid5
Array Size : 16758784 (15.98 GiB 17.16 GB)
Used Dev Size : 8379392 (7.99 GiB 8.58 GB)
Raid Devices : 3
Total Devices : 3
Persistence : Superblock is persistent

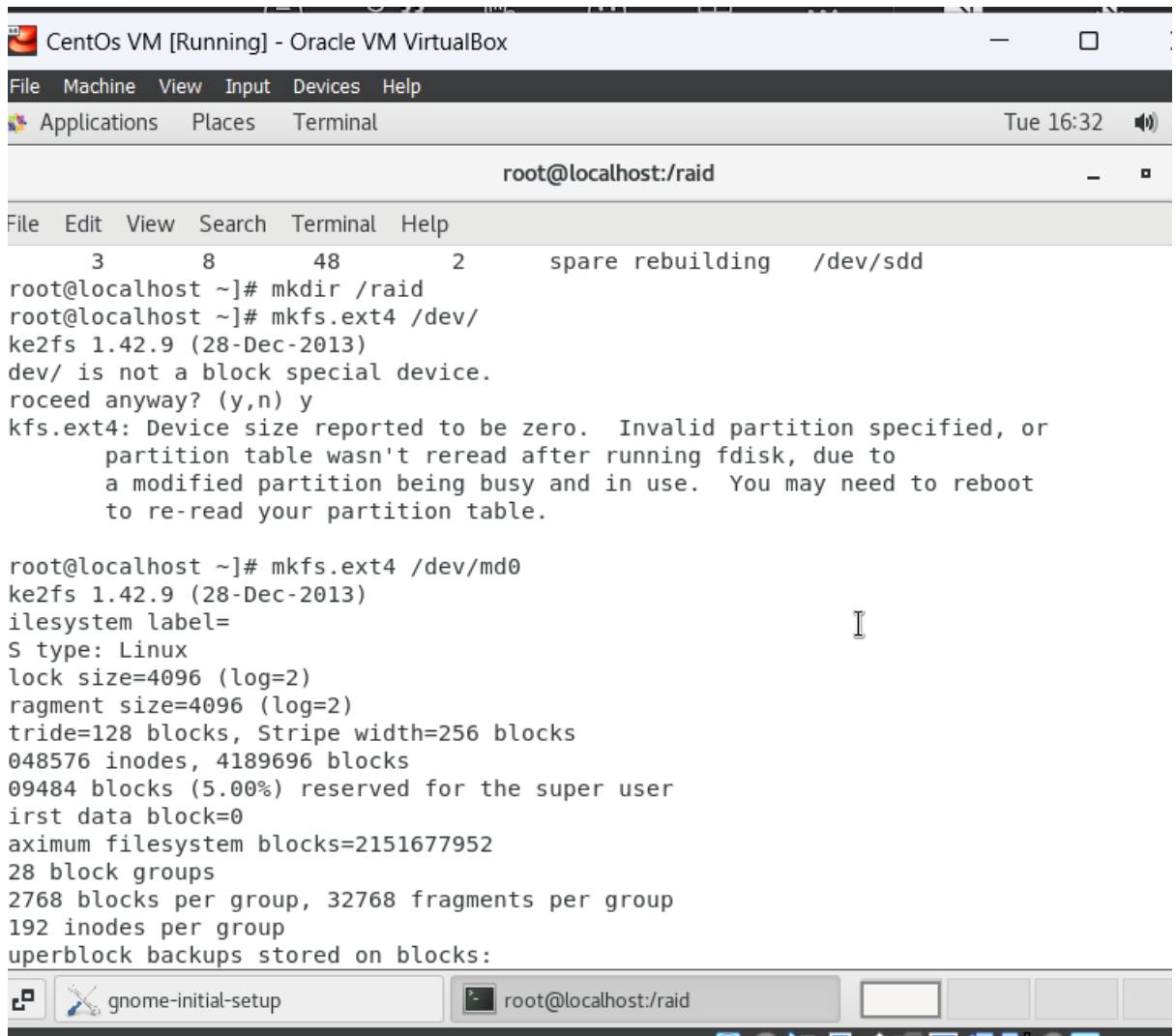
Update Time : Tue Sep 24 16:14:59 2024
State : clean, degraded, recovering
Active Devices : 2
Working Devices : 3
Failed Devices : 0
Spare Devices : 1
```

3) To display detailed information about the specified RAID array.

- [root@localhost ~]# mdadm -D /dev/md0

4)To format RAID device:

- [root@localhost ~]# Mkfs.ext 4 /dev/md0



```
CentOs VM [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Applications Places Terminal Tue 16:32
root@localhost:/raid
File Edit View Search Terminal Help
3      8      48      2      spare rebuilding /dev/sdd
root@localhost ~]# mkdir /raid
root@localhost ~]# mkfs.ext4 /dev/
ke2fs 1.42.9 (28-Dec-2013)
dev/ is not a block special device.
roceed anyway? (y,n) y
kfs.ext4: Device size reported to be zero.  Invalid partition specified, or
partition table wasn't reread after running fdisk, due to
a modified partition being busy and in use.  You may need to reboot
to re-read your partition table.

root@localhost ~]# mkfs.ext4 /dev/md0
ke2fs 1.42.9 (28-Dec-2013)
ilesystem label=
S type: Linux
lock size=4096 (log=2)
ragment size=4096 (log=2)
tride=128 blocks, Stripe width=256 blocks
048576 inodes, 4189696 blocks
09484 blocks (5.00%) reserved for the super user
irst data block=0
aximum filesystem blocks=2151677952
28 block groups
2768 blocks per group, 32768 fragments per group
192 inodes per group
uperblock backups stored on blocks:

gnome-initial-setup root@localhost:/raid
```

5)To mount:

```
[root@localhost ~]# mount /dev/md0 /raid
```

```
[root@localhost ~]# cd /raid
```

```
[root@localhost ~]# touch t1 t2 t3
```

6)To remove HDD if disk is faulty:

```
[root@localhost ~]# mdadm -f /dev/md0 /dev/sdd
```

```
[root@localhost ~]# mdadm -r /dev/md0 /dev/sdd
```


7)To Add HDD:

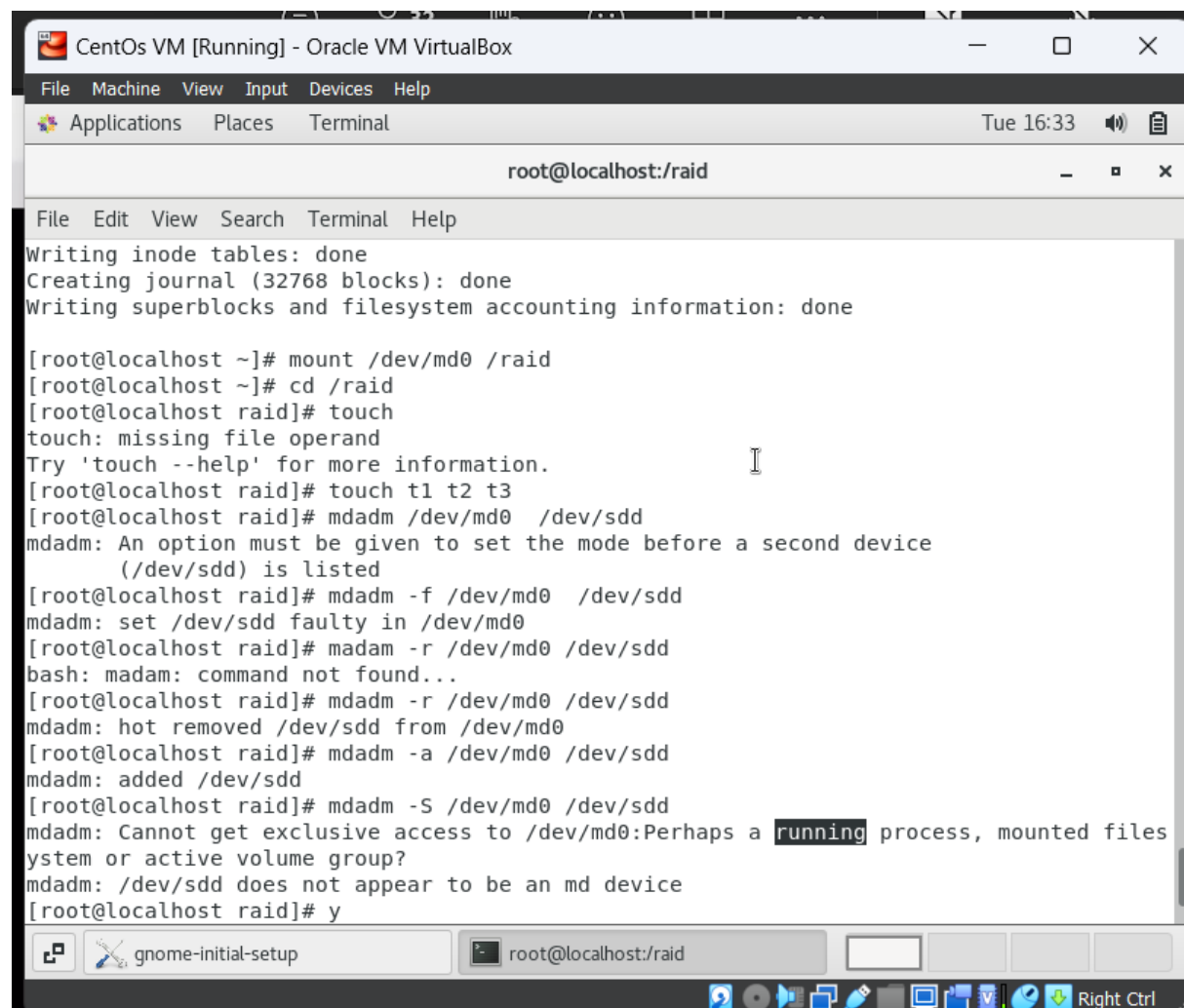
```
[root@localhost ~]# mdadm -a /dev/md0 /dev/sdd
```

8)To stop Raid:

```
[root@localhost ~]# mdadm -s /dev/md0 /dev/sdd
```

9)To activate Raid:

```
[root@localhost ~]# mdadm -A /dev/md0 /dev/sdd
```

A screenshot of a CentOS VM running in Oracle VM VirtualBox. The terminal window shows the following commands and output:

```
Writing inode tables: done
Creating journal (32768 blocks): done
Writing superblocks and filesystem accounting information: done

[root@localhost ~]# mount /dev/md0 /raid
[root@localhost ~]# cd /raid
[root@localhost raid]# touch
touch: missing file operand
Try 'touch --help' for more information.
[root@localhost raid]# touch t1 t2 t3
[root@localhost raid]# mdadm /dev/md0 /dev/sdd
mdadm: An option must be given to set the mode before a second device
(/dev/sdd) is listed
[root@localhost raid]# mdadm -f /dev/md0 /dev/sdd
mdadm: set /dev/sdd faulty in /dev/md0
[root@localhost raid]# mdadm -r /dev/md0 /dev/sdd
bash: mdadm: command not found...
[root@localhost raid]# mdadm -r /dev/md0 /dev/sdd
mdadm: hot removed /dev/sdd from /dev/md0
[root@localhost raid]# mdadm -a /dev/md0 /dev/sdd
mdadm: added /dev/sdd
[root@localhost raid]# mdadm -S /dev/md0 /dev/sdd
mdadm: Cannot get exclusive access to /dev/md0: Perhaps a running process, mounted files
ystem or active volume group?
mdadm: /dev/sdd does not appear to be an md device
[root@localhost raid]# y
```

The terminal window has a menu bar with 'File', 'Edit', 'View', 'Search', 'Terminal', and 'Help'. The title bar says 'CentOs VM [Running] - Oracle VM VirtualBox'. The window title is 'root@localhost:/raid'. The taskbar at the bottom shows 'gnome-initial-setup' and 'root@localhost:/raid' as open applications, along with system icons and a 'Right Ctrl' button.

