

# Assignment-2 Creating RAID 10 Array

## 1. Install mdadm

```
sudo apt-get update  
sudo apt-get install mdadm
```

## 2. Create the RAID 10 Array

```
sudo mdadm --create --verbose /dev/md0 --level=10 --raid-devices=4  
/dev/sdb /dev/sdc /dev/sdd /dev/sde
```

## 3. Verify the RAID Array

```
sudo mdadm --detail /dev/md0
```

To confirm the RAID device, use:

```
lsblk
```

## 4. Format the RAID Array

```
sudo mkfs.ext4 /dev/md0
```

## 5. Mount the RAID Array

```
sudo mkdir /mnt/raid10  
sudo mount /dev/md0 /mnt/raid10
```

Verify the mount:

```
df -h
```

## **6. Test the RAID Array**

```
sudo touch /mnt/raid10/testfile.txt  
sudo ls /mnt/raid10
```

## **Disk Failure and Replacement Scenario**

### **7. Simulate Disk Failure**

```
sudo mdadm /dev/md0 --remove /dev/sdb
```

Check the RAID status:

```
sudo mdadm --detail /dev/md0
```

### **8. Replace the Failed Disk**

```
sudo mdadm /dev/md0 --add /dev/sdb  
watch cat /proc/mdstat
```

## **Final Verification**

```
sudo mdadm --detail /dev/md0  
cat /mnt/raid10/testfile.txt
```

## \*\*\*\*\*SCREENSHOTS\*\*\*\*\*

1.

```
dhpcs@localhost:~
tuned-2.24.0-2.el9.noarch
Installed:
kernel-5.14.0-539.el9.x86_64          kernel-core-5.14.0-539.el9.x86_64
kernel-modules-5.14.0-539.el9.x86_64  kernel-modules-core-5.14.0-539.el9.x86_64

Complete!
[dhpcs@localhost ~]$
[dhpcs@localhost ~]$ lsblk
NAME                                MAJ:MIN RM  SIZE RO TYPE MOUNTPOINTS
sda                                 8:0    0   15G  0 disk
├─sda1                             8:1    0    1G  0 part /boot
└─sda2                             8:2    0   14G  0 part
   ├─cs_vbox-root                 253:0    0  12.5G  0 lvm /
   └─cs_vbox-swap                 253:1    0    1.5G  0 lvm [SWAP]
sdb                                 8:16    0   10G  0 disk
sdc                                 8:32    0   10G  0 disk
sdd                                 8:48    0   10G  0 disk
sde                                 8:64    0   10G  0 disk
sr0                                11:0    1 1024M  0 rom
[dhpcs@localhost ~]$
```

2.

```
dhpcsa@localhost:~  
[dhpcsa@localhost ~]$ sudo mdadm --detail /dev/md0  
[sudo] password for dhpcsa:  
/dev/md0:  
    Version : 1.2  
    Creation Time : Fri Dec 13 12:20:09 2024  
    Raid Level : raid10  
    Array Size : 20953088 (19.98 GiB 21.46 GB)  
    Used Dev Size : 10476544 (9.99 GiB 10.73 GB)  
    Raid Devices : 4  
    Total Devices : 4  
    Persistence : Superblock is persistent  
  
    Update Time : Fri Dec 13 12:21:55 2024  
    State : clean  
    Active Devices : 4  
    Working Devices : 4  
    Failed Devices : 0  
    Spare Devices : 0  
  
    Layout : near=2  
    Chunk Size : 512K  
  
Consistency Policy : resync  
  
    Name : localhost.localdomain:0 (local to host localhost.localdomain)  
    UUID : 3ed7319b:1e9ec6fa:0abc14e1:ef4abcfe  
    Events : 17  
  
    Number Major Minor RaidDevice State  
      0       8      16         0    active sync set-A  /dev/sdb  
      1       8      32         1    active sync set-B  /dev/sdc  
      2       8      48         2    active sync set-A  /dev/sdd  
      3       8      64         3    active sync set-B  /dev/sde  
[dhpcsa@localhost ~]$
```

3.

```
dhpcs@localhost:~  
UUID : 3ed7319b:1e9ec6fa:0abc14e1:ef4abcf  
Events : 17  
  
Number Major Minor RaidDevice State  
0 8 16 0 active sync set-A /dev/sdb  
1 8 32 1 active sync set-B /dev/sdc  
2 8 48 2 active sync set-A /dev/sdd  
3 8 64 3 active sync set-B /dev/sde  
[dhpcs@localhost ~]$  
[dhpcs@localhost ~]$ lsblk  
NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINTS  
sda 8:0 0 15G 0 disk  
├─sda1 8:1 0 1G 0 part /boot  
├─sda2 8:2 0 14G 0 part  
│ └─cs_vbox-root 253:0 0 12.5G 0 lvm /  
│ └─cs_vbox-swap 253:1 0 1.5G 0 lvm [SWAP]  
sdb 8:16 0 10G 0 disk  
└─md0 9:0 0 20G 0 raid10  
sdc 8:32 0 10G 0 disk  
└─md0 9:0 0 20G 0 raid10  
sdd 8:48 0 10G 0 disk  
└─md0 9:0 0 20G 0 raid10  
sde 8:64 0 10G 0 disk  
└─md0 9:0 0 20G 0 raid10  
sr0 11:0 1 1024M 0 rom  
[dhpcs@localhost ~]$
```

4.

```

[dhpcsa@localhost ~]$ sudo mkfs.ext4 /dev/md0
mke2fs 1.46.5 (30-Dec-2021)
Creating filesystem with 5238272 4k blocks and 1310720 inodes
Filesystem UUID: e2140755-9418-49cf-9988-d68006e43dd8
Superblock backups stored on blocks:
    32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208,
    4096000

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

[dhpcsa@localhost ~]$ █

```

5.

```

dhpcsa@localhost:~
[dhpcsa@localhost ~]$ sudo mkdir /mnt/raid10
[dhpcsa@localhost ~]$
[dhpcsa@localhost ~]$
[dhpcsa@localhost ~]$ sudo mount /dev/md0 /mnt/raid10
[dhpcsa@localhost ~]$ df -h
Filesystem      Size  Used Avail Use% Mounted on
devtmpfs        4.0M   0  4.0M   0% /dev
tmpfs           3.8G   0  3.8G   0% /dev/shm
tmpfs           1.6G  11M  1.5G   1% /run
/dev/mapper/cs_vbox-root 13G  6.1G  6.4G  49% /
/dev/sda1       960M  425M  536M  45% /boot
tmpfs           769M  924K  768M   1% /run/user/1000
/dev/md0        20G   24K   19G   1% /mnt/raid10
[dhpcsa@localhost ~]$ sudo touch /mnt/raid10/suraj.txt
[dhpcsa@localhost ~]$
[dhpcsa@localhost ~]$
[dhpcsa@localhost ~]$
[dhpcsa@localhost ~]$ sudo ls /mnt/raid10
lost+found  suraj.txt
[dhpcsa@localhost ~]$

```

6.

```
dhpcs@localhost:~  
[dhpcs@localhost ~]$  
[dhpcs@localhost ~]$  
[dhpcs@localhost ~]$ sudo mdadm /dev/md0 --remove /dev/sdb  
mdadm: hot remove failed for /dev/sdb: Device or resource busy  
[dhpcs@localhost ~]$  
[dhpcs@localhost ~]$ lsblk  
NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINTS  
sda 8:0 0 15G 0 disk  
├─sda1 8:1 0 1G 0 part /boot  
├─sda2 8:2 0 14G 0 part  
│   └─cs_vbox-root 253:0 0 12.5G 0 lvm /  
│       └─cs_vbox-swap 253:1 0 1.5G 0 lvm [SWAP]  
sdb 8:16 0 10G 0 disk  
└─md0 9:0 0 20G 0 raid10 /mnt/raid10  
sdc 8:32 0 10G 0 disk  
└─md0 9:0 0 20G 0 raid10 /mnt/raid10  
sdd 8:48 0 10G 0 disk  
└─md0 9:0 0 20G 0 raid10 /mnt/raid10  
sde 8:64 0 10G 0 disk  
└─md0 9:0 0 20G 0 raid10 /mnt/raid10  
sr0 11:0 1 1024M 0 rom  
[dhpcs@localhost ~]$ sudo mdadm --detail /dev/md0  
/dev/md0:  
Version : 1.2  
Creation Time : Fri Dec 13 12:20:09 2024  
Raid Level : raid10  
State : clean  
Array Size : 20953088 (19.98 GiB 21.46 GB)  
Used Dev Size : 10476544 (9.99 GiB 10.73 GB)  
Raid Devices : 4  
Total Devices : 4  
Persistence : Superblock is persistent  
  
Update Time : Fri Dec 13 12:27:01 2024  
State : clean  
Active Devices : 4  
Working Devices : 4  
Failed Devices : 0  
Spare Devices : 0  
  
Layout : near=2  
Chunk Size : 512K  
  
Consistency Policy : resync  
  
Name : localhost.localdomain:0 (local to host localhost.localdomain)  
UUID : 3ed7319b:1e9ec6fa:0abc14e1:ef4abcfe  
Events : 17  
  
Number Major Minor RaidDevice State  
0 8 16 0 active sync set-A /dev/sdb  
1 8 32 1 active sync set-B /dev/sdc  
2 8 48 2 active sync set-A /dev/sdd  
3 8 64 3 active sync set-B /dev/sde  
[dhpcs@localhost ~]$
```

7.

```
[dhpcs@localhost ~]$ lsblk  
NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINTS  
sda 8:0 0 15G 0 disk  
├─sda1 8:1 0 1G 0 part /boot  
├─sda2 8:2 0 14G 0 part  
│   └─cs_vbox-root 253:0 0 12.5G 0 lvm /  
│       └─cs_vbox-swap 253:1 0 1.5G 0 lvm [SWAP]  
sdb 8:16 0 10G 0 disk  
└─md127 9:127 0 0B 0 md  
sdc 8:32 0 10G 0 disk  
└─md127 9:127 0 0B 0 md  
sdd 8:48 0 10G 0 disk  
└─md127 9:127 0 0B 0 md  
sr0 11:0 1 1024M 0 rom  
[dhpcs@localhost ~]$
```

8.

```

sda                8:0      0    15G    0 disk
├─sda1             8:1      0     1G    0 part /boot
├─sda2             8:2      0    14G    0 part
│   └─cs_vbox-root 253:0    0  12.5G    0 lvm  /
│       └─cs_vbox-swap 253:1 0    1.5G    0 lvm  [SWAP]
sdb                8:16     0    10G    0 disk
├─md127            9:127    0     0B    0 md
├─sdc              8:32     0    10G    0 disk
│   └─md127        9:127    0     0B    0 md
├─sdd              8:48     0    10G    0 disk
│   └─md127        9:127    0     0B    0 md
└─sr0              11:0     1  1024M    0 rom

[dhpcsa@localhost ~]$ sudo mdadm --detail /dev/md0
[sudo] password for dhpcsa:
mdadm: cannot open /dev/md0: No such file or directory
[dhpcsa@localhost ~]$ sudo mdadm --detail /dev/md127
/dev/md127:
    Version : 1.2
    Raid Level : raid10
    Total Devices : 3
    Persistence : Superblock is persistent

    State : inactive
    Active Devices : 0
    Working Devices : 3
    Failed Devices : 0
    Spare Devices : 3

    Name : localhost.localdomain:0 (local to host localhost.localdomain)
    UUID : 3ed7319b:1e9ec6fa:0abc14e1:ef4abcfe
    Events : 17

    Number   Major   Minor   RaidDevice
    ---
    -         8       32      -         /dev/sdc
    -         8       48      -         /dev/sdd
    -         8       16      -         /dev/sdb
[dhpcsa@localhost ~]$

```

9.

```

Every 2.0s: cat /proc/mdstat
2024
Personalities :
md127 : inactive sdb[1](S) sdc[3](S) sdd[2](S)
        31429632 blocks super 1.2

unused devices: <none>

```

10.



```

[dhpcsa@localhost ~]$ sudo mdadm --detail /dev/md0
[sudo] password for dhpcsa:
mdadm: cannot open /dev/md0: No such file or directory
[dhpcsa@localhost ~]$ sudo mdadm --detail /dev/md127
/dev/md127:
    Version : 1.2
    Raid Level : raid10
    Total Devices : 3
    Persistence : Superblock is persistent

    State : inactive
    Active Devices : 0
    Working Devices : 3
    Failed Devices : 0
    Spare Devices : 3

    Name : localhost.localdomain:0 (local to host localhost.localdomain)
    UUID : 3ed7319b:1e9ec6fa:0abc14e1:ef4abcf6
    Events : 17

    Number   Major   Minor   RaidDevice
    ---
    -         8       32      -         /dev/sdc
    -         8       48      -         /dev/sdd
    -         8       16      -         /dev/sdb
[dhpcsa@localhost ~]$ █

```

11.

```

      -      8      32      -      /dev/sdc
      -      8      48      -      /dev/sdd
      -      8      16      -      /dev/sdb
[dhpcsa@localhost ~]$
[dhpcsa@localhost ~]$ lsblk
NAME                                MAJ:MIN RM  SIZE RO TYPE MOUNTPOINTS
sda                                8:0      0   15G  0 disk
├─sda1                            8:1      0    1G  0 part /boot
├─sda2                            8:2      0   14G  0 part
│   └─cs_vbox-root                253:0    0  12.5G  0 lvm  /
│       └─cs_vbox-swap            253:1    0   1.5G  0 lvm  [SWAP]
sdb                                8:16     0   10G  0 disk
├─md127                          9:127    0     0B  0 md
sdc                                8:32     0   10G  0 disk
├─md127                          9:127    0     0B  0 md
sdd                                8:48     0   10G  0 disk
├─md127                          9:127    0     0B  0 md
sr0                               11:0     1 1024M  0 rom
[dhpcsa@localhost ~]$ █

```

12

```

[dhpcsa@localhost ~]$ lsblk
NAME                                MAJ:MIN RM  SIZE RO TYPE MOUNTPOINTS
sda                                8:0      0   15G  0 disk
├─sda1                            8:1      0    1G  0 part /boot
├─sda2                            8:2      0   14G  0 part
│   └─cs_vbox-root                253:0    0  12.5G  0 lvm  /
│       └─cs_vbox-swap            253:1    0   1.5G  0 lvm  [SWAP]
sdb                                8:16     0   10G  0 disk
├─md127                          9:127    0   20G  0 raid10
sdc                                8:32     0   10G  0 disk
├─md127                          9:127    0   20G  0 raid10
sdd                                8:48     0   10G  0 disk
├─md127                          9:127    0   20G  0 raid10
sde                                8:64     0   10G  0 disk
├─md127                          9:127    0   20G  0 raid10
sr0                               11:0     1 1024M  0 rom
[dhpcsa@localhost ~]$ █

```

13.

```

[dhpcsa@localhost ~]$
[dhpcsa@localhost ~]$
[dhpcsa@localhost ~]$ watch cat /proc/mdstat
[dhpcsa@localhost ~]$ cat /mnt/raid10/suraj.txt
[dhpcsa@localhost ~]$ ls /mnt/raid10/
suraj.txt
[dhpcsa@localhost ~]$
[dhpcsa@localhost ~]$

```

14.

```

└─md127          9:127 0   20G 0 raid10
sde              8:64 0   10G 0 disk
└─md127          9:127 0   20G 0 raid10
sr0             11:0  1 1024M 0 rom
[dhpcsa@localhost ~]$
[dhpcsa@localhost ~]$ sudo mdadm --detail /dev/md127
[sudo] password for dhpcsa:
/dev/md127:
    Version : 1.2
    Creation Time : Fri Dec 13 12:20:09 2024
    Raid Level : raid10
    Array Size : 20953088 (19.98 GiB 21.46 GB)
    Used Dev Size : 10476544 (9.99 GiB 10.73 GB)
    Raid Devices : 4
    Total Devices : 4
    Persistence : Superblock is persistent

    Update Time : Fri Dec 13 12:30:53 2024
    State : clean
    Active Devices : 4
    Working Devices : 4
    Failed Devices : 0
    Spare Devices : 0


    Layout : near=2
    Chunk Size : 512K

Consistency Policy : resync


    Name : localhost.localdomain:0 (local to host localhost.localdomain)
    UUID : 3ed7319b:1e9ec6fa:0abc14e1:ef4abcfe
    Events : 17


   Number   Major   Minor   RaidDevice State
    0         8       16         0     active sync set-A   /dev/sdb
    1         8       32         1     active sync set-B   /dev/sdc
    2         8       48         2     active sync set-A   /dev/sdd
    3         8       64         3     active sync set-B   /dev/sde
[dhpcsa@localhost ~]$
[dhpcsa@localhost ~]$
[dhpcsa@localhost ~]$

```