

RAID 0:

Configuring a RAID 0 (striped) array using `mdadm`:

- Prerequisites:

- At least **2 unused disks or partitions**, e.g. `/dev/sdb` and `/dev/sdc`.
- **Back up any important data**—this process will erase the selected devices.

Step 1: Add New disks and verify the disks

Command: `lsblk`

```
root@suresh:~# lsblk /dev/sdb /dev/sdc
NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINTS
sdb      8:16   0    3G  0 disk
sdc      8:32   0    3G  0 disk
root@suresh ~]#
root@suresh ~]# 
```

Step 2: Create the RAID 0 Array using Mdadm

Command:

`mdadm --create /dev/md0 --level=0 --raid-devices=2 /dev/sdb /dev/sdc`

```
root@suresh:~# mdadm --create /dev/md0 --level=0 --raid-devices=2 /dev/sdb /dev/sdc
mdadm: Defaulting to version 1.2 metadata
mdadm: array /dev/md0 started.
root@suresh ~]# 
```

- **--level=0**: stripe across disks for speed
- **--raid-devices=2**: number of disks
- **/dev/md0**: name of new virtual RAID device

Step 3: Verify the RAID Is Created

Commands:

mdadm --detail /dev/md0

cat /proc/mdstat

```
[root@suresh:~]# mdadm --detail /dev/md0
/dev/md0:
      Version : 1.2
      Creation Time : Fri Jul 11 15:56:06 2025
      Raid Level : raid0
      Array Size : 6285312  (5.99 GiB 6.44 GB)
      Raid Devices : 2
      Total Devices : 2
      Persistence : Superblock is persistent

      Update Time : Fri Jul 11 15:56:06 2025
                  State : clean
      Active Devices : 2
      Working Devices : 2
      Failed Devices : 0
      Spare Devices : 0

      Layout : original
      Chunk Size : 512K

Consistency Policy : none

              Name : suresh:0  (local to host suresh)
              UUID : 0211le1c:c99a1b8e:5f2d45a9:51dbbc3d
              Events : 0

      Number  Major  Minor  RaidDevice State
          0       8       16        0     active sync   /dev/sdb
          1       8       32        1     active sync   /dev/sdc
[root@suresh ~]#
```

```
[root@suresh ~]# cat /proc/mdstat
Personalities : [raid0]
md0 : active raid0 sdc[1] sdb[0]
      6285312 blocks super 1.2 512k chunks

unused devices: <none>
[root@suresh ~]#
```

- **mdadm --detail** shows configuration, component status, and health.
- **cat /proc/mdstat** shows live sync/build progress

Step 4: Assign File System & Mount

Command:

mkfs.xfs /dev/md0

```
[root@suresh ~]# mkfs.xfs /dev/md0
log stripe unit (524288 bytes) is too large (maximum is 256KiB)
log stripe unit adjusted to 32KiB
meta-data=/dev/md0              isize=512    agcount=8, agsize=196480 blks
                                sectsz=512   attr=2, projid32bit=1
                                crc=1       finobt=1, sparse=1, rmapbt=0
                                reflink=1  bigtime=1 inobtcount=1 nrext64=0
data     =             bsize=4096   blocks=1571328, imaxpct=25
          =             sunit=128    swidth=256 blks
naming   =version 2            bsize=4096   ascii-ci=0, ftype=1
log      =internal log         bsize=4096   blocks=16384, version=2
          =             sectsz=512   sunit=8 blks, lazy-count=1
realtime =none                extsz=4096   blocks=0, rtextents=0
[root@suresh ~]#
[root@suresh ~]# blkid /dev/md0
/dev/md0: UUID="ecd9bf2c-eb8a-4578-913e-5e910d90df7c" TYPE="xfs"
[root@suresh ~]#
```

Commands:

mkdir /md0

```
mount /dev/md0 /md0
```

```
df -h /md0
```

```
[root@suresh ~]# mkdir /md0
[root@suresh ~]# mount /dev/md0 /md0
[root@suresh ~]# df -h /md0
Filesystem      Size  Used Avail Use% Mounted on
/dev/md0        6.0G  75M  5.9G   2% /md0
[root@suresh ~]#
```

Step 5: Persist the mount in /etc/fstab

Commands:

```
vi /etc/fstab
```

```
cat /etc/fstab | grep -i /md0
```

```
mount | grep /md0
```

```
[root@suresh ~]# vi /etc/fstab
[root@suresh ~]# cat /etc/fstab | grep -i /md0
UUID=ecd9bf2c-eb8a-4578-913e-5e910d90df7c      /md0      xfs      defaults      0 0
[root@suresh ~]# mount | grep /md0
/dev/md0 on /md0 type xfs (rw,relatime,seclabel,attr2,inode64,logbufs=8,logbsize=32k,sunit=1024,swidth=2048,noquota)
[root@suresh ~]#
```

```
[root@suresh ~]# lsblk /dev/sdb /dev/sdc
NAME  MAJ:MIN RM SIZE RO TYPE  MOUNTPOINTS
sdb    8:16    0  3G  0 disk
└─md0  9:0     0  6G  0 raid0 /md0
sdc    8:32    0  3G  0 disk
└─md0  9:0     0  6G  0 raid0 /md0
[root@suresh ~]#
```

RAID 1:

Configuring a RAID 1 (mirrored) array using **mdadm**:

- **Prerequisites:**

- At least **2 unused disks or partitions** of identical size (e.g., `/dev/sdd`, `/dev/sde`).
- **Back up important data**—this process erases the selected devices.

Step 1: Add New disks and verify the disks

Command: **lsblk**

```
root@suresh:~# lsblk /dev/sdb /dev/sde
NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINTS
sdb    8:16   0   3G  0 disk
sde    8:64   0   3G  0 disk
[root@suresh ~]#
```

Step 2: Create the RAID 1 Array using Mdadm

Command:

```
mdadm --create /dev/md1 --level=1 --raid-devices=2 /dev/sdd /dev/sde
```

```
[root@suresh ~]# mdadm --create /dev/md1 --level=1 --raid-devices=2 /dev/sdd /dev/sde
mdadm: Note: this array has metadata at the start and
      may not be suitable as a boot device. If you plan to
      store '/boot' on this device please ensure that
      your boot-loader understands md/v1.x metadata, or use
      --metadata=0.90
Continue creating array [y/N]? y
mdadm: Defaulting to version 1.2 metadata
mdadm: array /dev/md1 started.
[root@suresh ~]#
```

NOTE:

By default, **mdadm** uses metadata version 1.2, which writes RAID information (called a *superblock*) at the beginning of the array—before any user data.

If you plan to put `/boot` (or anything boot-critical) on this RAID, use metadata version 0.90, which places metadata at the end of the array—keeping the start clean for your bootloader.

Command:

```
mdadm --create /dev/md1 --level=1 --raid-devices=2 --metadata=0.90 /dev/sdd
/dev/sde
```

- **--level=1** = sets mirroring (RAID 1).
- **--raid-devices=2** = uses 2 disks.
- **/dev/md1** = name of the RAID device.

Step 3: Verify the RAID Is Created

Commands:

```
mdadm --detail /dev/md1
```

```
cat /proc/mdstat
```

```
root@suresh:~# mdadm --detail /dev/md1
/dev/md1:
      Version : 1.2
      Creation Time : Fri Jul 11 17:17:15 2025
      Raid Level : raid1
      Array Size : 3142656 (3.00 GiB 3.22 GB)
      Used Dev Size : 3142656 (3.00 GiB 3.22 GB)
      Raid Devices : 2
      Total Devices : 2
      Persistence : Superblock is persistent

      Update Time : Fri Jul 11 17:17:31 2025
      State : clean
      Active Devices : 2
      Working Devices : 2
      Failed Devices : 0
      Spare Devices : 0

Consistency Policy : resync

      Name : suresh:1 (local to host suresh)
      UUID : 7fe5845c:3c8266d9:6148579e:371e2182
      Events : 17

      Number  Major  Minor  RaidDevice State
          0      8      48        0  active sync  /dev/sdd
          1      8      64        1  active sync  /dev/sde
[root@suresh ~]#
```

```
root@suresh:~#
[root@suresh ~]# cat /proc/mdstat
Personalities : [raid0] [raid1]
md1 : active raid1 sde[1] sdd[0]
      3142656 blocks super 1.2 [2/2] [UU]

unused devices: <none>
[root@suresh ~]#
```

Step 4: Assign File System & Mount

Command:

mkfs.xfs /dev/md1

```
root@suresh:~]# mkfs.xfs /dev/md1
meta-data=/dev/md1              isize=512    agcount=4, agsize=196416 blks
                                =          sectsz=512  attr=2, projid32bit=1
                                =          crc=1    finobt=1, sparse=1, rmapbt=0
data      =          bsize=4096   reflink=1  bigtime=1 inobtcount=1 nrext64=0
          =          sunit=0    blocks=785664, imaxpct=25
naming    =version 2            bsize=4096   swidth=0 blks
log       =internal log        bsize=4096   ascii-ci=0, ftype=1
          =          sectsz=512  blocks=16384, version=2
realtime  =none                extsz=4096  sunit=0 blks, lazy-count=1
                                =          blocks=0, rtextents=0
[root@suresh ~]#
[root@suresh ~]# blkid /dev/md1
/dev/md1: UUID="487b9682-1f2f-42b7-a8c7-c570f81018af" TYPE="xfs"
[root@suresh ~]#
```

Commands:

mkdir /md1

mount /dev/md1 /md1

df -h /md1

```
root@suresh:~]#
[root@suresh ~]# mkdir /md1
[root@suresh ~]# mount /dev/md1 /md1
[root@suresh ~]# df -h /md1
Filesystem      Size  Used Avail Use% Mounted on
/dev/md1        3.0G  54M  2.9G  2% /md1
[root@suresh ~]#
```

Step 5: Persist the mount in /etc/fstab

Commands:

```
vi /etc/fstab
```

```
cat /etc/fstab | grep -i /md1
```

```
mount | grep /md1
```

```
[root@suresh:~]# vi /etc/fstab
[root@suresh ~]# cat /etc/fstab | grep -i /md1
UUID=487b9682-1f2f-42b7-a8c7-c570f81018af      /md1      xfs      defaults      0 0
[root@suresh ~]#
[root@suresh ~]# mount | grep /md1
/dev/md1 on /md1 type xfs (rw,relatime,seclabel,attr2,inode64,logbufs=8,logbsize=32k,noquota)
[root@suresh ~]#
```

```
[root@suresh:~]# lsblk /dev/sdd /dev/sde
NAME  MAJ:MIN RM  SIZE RO TYPE  MOUNTPOINTS
sdd    8:48    0   3G  0 disk
└─md1  9:1     0   3G  0 raid1 /md1
sde    8:64    0   3G  0 disk
└─md1  9:1     0   3G  0 raid1 /md1
[root@suresh ~]#
```

RAID 5:

Configuring a RAID 5 (striped with parity) array using mdadm:

- Prerequisites

- Minimum 3 same-size unused disks/partitions, e.g. `/dev/sdb`, `/dev/sdc`, `/dev/sdd`.

Step 1: Add New disks and verify the disks

Command: `lsblk | grep -E 'sdb|sdc|sdd'`

```
root@localhost:~# lsblk | grep -E 'sdb|sdc|sdd'
sdb              8:16    0      3G  0 disk
sdc              8:32    0      3G  0 disk
sdd              8:48    0      3G  0 disk
root@localhost:~# 
```

Step 2: Create the RAID 5 Array using Mdadm

Command:

```
mdadm --create /dev/md5 --level=5 --raid-devices=3 /dev/sdb /dev/sdc
/dev/sdd
```

```
root@localhost:~# mdadm --create /dev/md5 --level=5 --raid-devices=3 /dev/sdb /dev/sdc /dev/sdd
mdadm: Defaulting to version 1.2 metadata
mdadm: array /dev/md5 started.
root@localhost:~# 
```

- `--level=5` : RAID 5 (striping + parity)

- **--raid-devices=3 : using 3 disks**
(mdadm spins up the array and starts parity sync)

Step 3: Verify the RAID Is Created

Commands:

mdadm --detail /dev/md5

cat /proc/mdstat

```
root@localhost:~# mdadm --detail /dev/md5
/dev/md5:
      Version : 1.2
      Creation Time : Fri Jul 11 19:11:27 2025
      Raid Level : raid5
      Array Size : 6285312 (5.99 GiB 6.44 GB)
      Used Dev Size : 3142656 (3.00 GiB 3.22 GB)
      Raid Devices : 3
      Total Devices : 3
      Persistence : Superblock is persistent

      Update Time : Fri Jul 11 19:11:42 2025
      State : clean
      Active Devices : 3
      Working Devices : 3
      Failed Devices : 0
      Spare Devices : 0

      Layout : left-symmetric
      Chunk Size : 512K

Consistency Policy : resync

              Name : localhost.localdomain:5 (local to host localhost.localdomain)
              UUID : ed97c684:b3ae174b:e86ea7e2:2b0264f0
              Events : 18

      Number  Major  Minor  RaidDevice State
          0      8       16        0    active sync   /dev/sdb
          1      8       32        1    active sync   /dev/sdc
          3      8       48        2    active sync   /dev/sdd
```

```
root@localhost:~# cat /proc/mdstat
Personalities : [raid6] [raid5] [raid4]
md5 : active raid5 sdd[3] sdc[1] sdb[0]
      6285312 blocks super 1.2 level 5, 512k chunk, algorithm 2 [3/3] [UUU]

unused devices: <none>
[root@localhost ~]# █
```

Step 4: Assign File System & Mount

Command:

mkfs.xfs /dev/md5

```
root@localhost ~]# mkfs.xfs /dev/md5
log stripe unit (524288 bytes) is too large (maximum is 256KiB)
log stripe unit adjusted to 32KiB
meta-data=/dev/md5          isize=512    agcount=8, agsize=196480 blks
                           =          sectsz=512  attr=2, projid32bit=1
                           =          crc=1     finobt=1, sparse=1, rmapbt=0
                           =          reflink=1 bigtime=1 inobtcount=1 nrext64=0
data        =          bsize=4096   blocks=1571328, imaxpct=25
                           =          sunit=128   swidth=256 blks
naming      =version 2    bsize=4096   ascii-ci=0, ftype=1
log         =internal log  bsize=4096   blocks=16384, version=2
                           =          sectsz=512  sunit=8 blks, lazy-count=1
realtime    =none         extsz=4096   blocks=0, rtextents=0
[root@localhost ~]#
[root@localhost ~]# blkid /dev/md5
/dev/md5: UUID="9cde95f5-5d51-45eb-805d-5e57beb34972" TYPE="xfs"
[root@localhost ~]# 
```

Commands:

mkdir /md5

mount /dev/md5 /md5

df -h /md5

```
root@localhost ~]# mkdir /md5
[root@localhost ~]# mount /dev/md5 /md5
[root@localhost ~]# df -h /md5
Filesystem      Size  Used Avail Use% Mounted on
/dev/md5       6.0G   75M  5.9G   2% /md5
[root@localhost ~]# 
```

Step 5: Persist the mount in /etc/fstab

Commands:

vi /etc/fstab

cat /etc/fstab | grep -i /md5

mount | grep /md5

```
root@localhost:~ [root@localhost ~]# vi /etc/fstab
root@localhost:~ [root@localhost ~]# cat /etc/fstab | grep -i /md5
/dev/md5      /md5      xfs      defaults      0 0
root@localhost:~ [root@localhost ~]#
```

```
root@localhost:~ [root@localhost ~]# lsblk /dev/sd{b,c,d}
NAME  MAJ:MIN RM SIZE RO TYPE  MOUNTPOINTS
sdb    8:16   0  3G  0 disk
└─md5  9:5    0  6G  0 raid5 /md5
sdc    8:32   0  3G  0 disk
└─md5  9:5    0  6G  0 raid5 /md5
sdd    8:48   0  3G  0 disk
└─md5  9:5    0  6G  0 raid5 /md5
root@localhost:~ [root@localhost ~]#
```

RAID 10:

Configuring a RAID 10 (Striped Mirrors) array using `mdadm`:

- Prerequisites

- Minimum 4 same-size unused disks/partitions, e.g. `/dev/sdb`,
`/dev/sdc`, `/dev/sdd`, `/dev/sde`

Step 1: Add New disks and verify the disks

Command: `lsblk | grep -E 'sdb|sdc|sdd|sde'`

```
root@localhost:/ [root@localhost /]# lsblk | grep -E 'sdb|sdc|sdd|sde'  
sdb          8:16    0      3G  0 disk  
sdc          8:32    0      3G  0 disk  
sdd          8:48    0      3G  0 disk  
sde          8:64    0      3G  0 disk  
[root@localhost /]#
```

Step 2: Create the RAID 10 Array using Mdadm

Command:

```
mdadm --create /dev/md10 --level=10 --raid-devices=4 /dev/sdb /dev/sdc  
/dev/sdd /dev/sde
```

```
root@localhost ~]# mdadm --create /dev/md10 --level=10 --raid-devices=4 /dev/sdb /dev/sdc /dev/sdd /dev/sde  
mdadm: Defaulting to version 1.2 metadata  
mdadm: array /dev/md10 started.  
[root@localhost ~]#
```

- **--level=10**: sets up RAID 10 (striped mirrors).
- **--raid-devices=4**: specifies four disks.

RAID 10 combines mirroring and striping for both performance and redundancy

Step 3: Verify the RAID Is Created

Commands:

mdadm --detail /dev/md10

cat /proc/mdstat

```
root@localhost:~#
[root@localhost ~]# mdadm --detail /dev/md10
/dev/md10:
      Version : 1.2
      Creation Time : Sat Jul 12 09:52:18 2025
      Raid Level : raid10
      Array Size : 6285312 (5.99 GiB 6.44 GB)
      Used Dev Size : 3142656 (3.00 GiB 3.22 GB)
      Raid Devices : 4
      Total Devices : 4
      Persistence : Superblock is persistent

      Update Time : Sat Jul 12 09:52:49 2025
      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:10  (local to host localhost.localdomain)
              UUID : be1c905a:172cd45a:0b10ecfc:7c0dc4a3
              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
[root@localhost ~]#
```

```
[root@localhost ~]# cat /proc/mdstat
Personalities : [raid6] [raid5] [raid4] [raid10]
md10 : active raid10 sde[3] sdd[2] sdc[1] sdb[0]
      6285312 blocks super 1.2 512K chunks 2 near-copies [4/4] [UUUU]

unused devices: <none>
[root@localhost ~]#
```

Step 4: Assign File System & Mount

Command:

mkfs.xfs /dev/md10

```
[root@localhost ~]# mkfs.xfs /dev/md10 -f
log stripe unit (524288 bytes) is too large (maximum is 256KiB)
log stripe unit adjusted to 32KiB
meta-data=/dev/md10              isize=512    agcount=8, agsize=196480 blks
                                 =          sectsz=512   attr=2, projid32bit=1
                                 =          crc=1     finobt=1, sparse=1, rmapbt=0
                                 =          reflink=1 bigtime=1 inobtcount=1 nrext64=0
data                =             bsize=4096   blocks=1571328, imaxpct=25
                     =             sunit=128    swidth=256 blks
naming              =version 2   bsize=4096   ascii-ci=0, ftype=1
log                 =internal log bsize=4096   blocks=16384, version=2
                     =             sectsz=512   sunit=8 blks, lazy-count=1
realtime            =none        extsz=4096   blocks=0, rtextents=0
[root@localhost ~]#
[root@localhost ~]# blkid /dev/md10
/dev/md10: UUID="a918fd67-31a2-4546-87a0-32dc9af10edd" TYPE="xfs"
[root@localhost ~]#
```

Commands:

mkdir /md10

mount /dev/md10 /md10

df -h /md10

```
[root@localhost ~]# mkdir /md10
[root@localhost ~]# mount /dev/md10 /md10
[root@localhost ~]# df -h /md10
Filesystem      Size  Used Avail Use% Mounted on
/dev/md10       6.0G  75M  5.9G  2% /md10
[root@localhost ~]#
```

Step 5: Persist the mount in /etc/fstab

Commands:

vi /etc/fstab

cat /etc/fstab | grep -i /md10

mount | grep /md10

```
[root@localhost ~]# vi /etc/fstab
[root@localhost ~]# cat /etc/fstab | grep -i /md10
UUID=a918fd67-31a2-4546-87a0-32dc9af10edd      /md10      xfs      defaults      0 0
[root@localhost ~]#
[root@localhost ~]#
```

```
[root@localhost ~]# lsblk /dev/sd{b,c,d,e}
NAME   MAJ:MIN RM SIZE RO TYPE  MOUNTPOINTS
sdb     8:16    0  3G  0 disk
└─md10  9:10    0  6G  0 raid10 /md10
sdc     8:32    0  3G  0 disk
└─md10  9:10    0  6G  0 raid10 /md10
sdd     8:48    0  3G  0 disk
└─md10  9:10    0  6G  0 raid10 /md10
sde     8:64    0  3G  0 disk
└─md10  9:10    0  6G  0 raid10 /md10
[root@localhost ~]#
```

Step 6: Save Configuration

Command:

mdadm --detail --scan --verbose >> /etc/mdadm.conf

cat /etc/mdadm.conf

```
[root@localhost ~]# mdadm --detail --scan --verbose >> /etc/mdadm.conf
[root@localhost ~]# cat /etc/mdadm.conf
ARRAY /dev/md/localhost.localdomain:10 level=raid10 num-devices=4 metadata=1.2 UUID=be1c905a:172cd45a:0b10ecfc:7c0dc4a
3
  devices=/dev/sdb,/dev/sdc,/dev/sdd,/dev/sde
[root@localhost ~]# █
```

Fail / Remove / Add Disk:

mdadm /dev/md10 --fail /dev/sdb

mdadm /dev/md10 --remove /dev/sdb

mdadm /dev/md10 --add /dev/sdb