Configure RAID 0-1-5 on debian

Partitioning with fdisk

You don't need to partition disks before using them in an array, but partitioning does provide a couple of advantages.

- Partitioning is necessary if you want the kernel to automatically start arrays, because the md driver uses the partition type to identify member disks.

> If you have a lot of disks, then you might not want to go through the trouble of partitioning each disk since this process can take a lot of time if you have more than a few drives. In that case, you can simply use a whole, unpartitioned disk as an array member (`/dev/sda` , for example). This means that you won't be able to autostart arrays, however, so you'll have to include commands to start `md` devices in your system initialization scripts.

Next we will start creating partitions on our disks `/dev/sdb` and `/dev/sdc` using fdisk

```
Partition 1 of type Linux and of size 4 GiB is set

Command (m for help): n
Tipo de partición
   p   primaria (0 primaria(s), 0 extendida(s), 4 libre(s))
   e   extendida (contenedor para particiones lógicas)
Seleccionar (valor predeterminado p): p
Se está utilizando la respuesta predeterminada p.
Número de partición (1-4, valor predeterminado 1): 1
Primer sector (2048-1048575, valor predeterminado 2048):
Último sector, +/-sectores o +/-tamaño{K,M,G,T,P} (2048-1048575, valor predeterminado
1048575):

Crea una nueva partición 1 de tipo 'Linux' y de tamaño 511 MiB.

Command (m for help): t
Selected partition 1
Hex code (type L to list all codes): fd
Changed type of partition 'Linux' to 'Linux raid autodetect'

Command (m for help): p

Disk /dev/sdc: 4294 MB, 4294967296 bytes, 8388608 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk label type: dos
Disk identifier: 0xe215a659

   Device Boot      Start         End      Blocks   Id  System
/dev/sdc1            2048     8388607     4193280   fd  Linux raid autodetect

Command (m for help): w
The partition table has been altered!

Calling ioctl() to re-read partition table.
Syncing disks.
```

Update the partition table in the kernel.

```
[root@node1 ~]# partprobe
```

Now list the available partitions on your node and verify the changes. So now we have two new partitions `/dev/sdb1` and `/dev/sdc1` for setting up linear mode software raid.

```
[root@node1 ~]# lsblk
NAME            MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
sda               8:0    0   30G  0 disk
├─sda1            8:1    0  512M  0 part /boot
└─sda2            8:2    0 27.5G  0 part
  ├─centos-root 253:0    0 25.5G  0 lvm  /
  └─centos-swap 253:1    0    2G  0 lvm  [SWAP]
sdb               8:16   0    4G  0 disk
└─sdb1            8:17   0    4G  0 part
sdc               8:32   0    4G  0 disk
└─sdc1            8:33   0    4G  0 part
sr0              11:0    1 1024M  0 rom
```

Create Linear Software RAID 0

```
[root@node1 ~]# mdadm -Cv -llinear -n2 /dev/md0 /dev/sd{b,c}1
mdadm: Defaulting to version 1.2 metadata
mdadm: array /dev/md0 started.
```

OR you can also use the long version of this command to create linear raid

```
# mdadm --create --verbose --level=linear --raid-devices=2 /dev/md0 /dev/sdb1
/dev/sdc1
```

Here,

```
-C, --create
Create a new array.

-v, --verbose
Be more verbose.

-l, --raid-level
Select the RAID level: linear, 0, 1, 4, or 5.

-n, --raid-disks
Set the number of member disks in the array.
```

`mdadm` automatically activate newly created linear raid arrays. Information about the array and its member disks is now available via the `/proc/mdstat` pseudo file.

```
[root@node1 ~]# cat /proc/mdstat
Personalities : [linear]
md0 : active linear sdc1[1] sdb1[0]
      8380416 blocks super 1.2 0k rounding

unused devices: <none>
```

Create RAID 5

Now since we have all the partitions with us, we will create software RAID 5 array on those partitions

```
[root@node1 ~]# lsblk
NAME            MAJ:MIN RM  SIZE RO TYPE  MOUNTPOINT
sda               8:0    0   30G  0 disk
├─sda1            8:1    0  512M  0 part  /boot
└─sda2            8:2    0 27.5G  0 part
  ├─centos-root 253:0    0 25.5G  0 lvm   /
  └─centos-swap 253:1    0    2G  0 lvm   [SWAP]
sdb               8:16   0    2G  0 disk
└─sdb1            8:17   0    2G  0 part
sdc               8:32   0    2G  0 disk
└─sdc1            8:33   0    2G  0 part
sdd               8:48   0    2G  0 disk
└─sdd1            8:49   0    2G  0 part
sr0              11:0    1 1024M  0 rom
```

Execute the below command to create software raid 5 array using `/dev/sdb1`, `/dev/sdc1` and `/dev/sdd1`

```
[root@node1 ~]# mdadm -Cv -l5 -c64 -n3 -pls /dev/md0 /dev/sd{b,c,d}1
mdadm: /dev/sdb1 appears to contain an ext2fs file system
       size=2096128K  mtime=Wed Jun 12 11:21:25 2019
mdadm: size set to 2094080K
Continue creating array? y
mdadm: Defaulting to version 1.2 metadata
mdadm: array /dev/md0 started.
```

`mdadm` defaults to the **left-symmetric** algorithm, so you can safely omit the `-p` option from the command line.

> The left-symmetric algorithm will yield the best disk performance for a RAID-5, although this value can be changed to one of the other algorithms (right-symmetric, left-asymmetric, or right-asymmetric).

Here,

```
-C, --create
       Create a new array.

-v, --verbose
       Be  more  verbose about what is happening.

-l, --level=
       Set RAID level.  When used with --create, options are: linear, raid0,  0,
stripe,  raid1,  1,  mirror,
       raid4,  4,  raid5,  5, raid6, 6, raid10, 10, multipath, mp, faulty, container.
Obviously some of these
       are synonymous.

-c, --chunk=
       Specify chunk size of kilobytes.

-n, --raid-devices=
       Specify  the number of active devices in the array.

-p, --layout=
       This option configures the fine details of data layout for RAID5, RAID6, and
RAID10 arrays, and controls the failure  modes
       for faulty.

       The  layout of the RAID5 parity block can be one of left-asymmetric, left-
symmetric, right-asymmetric, right-symmetric, la,
       ra, ls, rs.  The default is left-symmetric.
```

Create filesystem

Next, create a file-system on the new software raid array. We will create ext4 filesystem on our linear raid array

```
[root@node1 ~]# mkfs.ext4 /dev/md0
mke2fs 1.42.9 (28-Dec-2013)
Filesystem label=
OS type: Linux
Block size=4096 (log=2)
Fragment size=4096 (log=2)
Stride=0 blocks, Stripe width=0 blocks
524288 inodes, 2095104 blocks
104755 blocks (5.00%) reserved for the super user
First data block=0
Maximum filesystem blocks=2145386496
64 block groups
32768 blocks per group, 32768 fragments per group
8192 inodes per group
Superblock backups stored on blocks:
        32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632

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

Create mount point

Create a mount point for accessing the software raid array

```
[root@node1 ~]# mkdir /linear_raid
```

Next mount the raid array on the created directory

```
[root@node1 ~]# mount /dev/md0 /linear_raid/
```

Check the mount status which also gives more details about mount point, available space etc details.

```
[root@node1 ~]# df -h /linear_raid/
Filesystem      Size  Used Avail Use% Mounted on
/dev/md0        7.8G   36M  7.3G   1% /linear_raid
```

Next add an entry for the array to `/etc/fstab` file so it will be mounted automatically when the system restarts.

```
[root@node1 ~]# tail -n 1 /etc/fstab
/dev/md0     /linear_raid     ext4    defaults     0 0
```

> Be warned that some distributions (Red Hat, for one) halt system initialization if an `/etc/fstab` entry could not be properly checked and mounted. So if the kernel doesn't automatically start your array, an entry in `/etc/fstab` might be preventing the system from booting successfully. It's a good idea to place commands that will manually start arrays in your initialization scripts before filesystems are checked and mounted, even if you're already successfully using autodetection. This will provide additional stability and, at worst, display some innocuous warnings on the console.

Verify the software raid changes

Post reboot verify the raid status

```
[root@node1 ~]# cat /proc/mdstat
Personalities : [linear]
md0 : active linear sdc1[1] sdb1[0]
      8380416 blocks super 1.2 0k rounding

unused devices: <none>
```