RAID on GnuLinux - Mdadm

1 Overview

There are a few options for RAID on Gnu Linux. Among them is BtrFS, ZFS, however today I will focus on the software RAID solution using mdadm. This is historically the oldest software raid, therefore should be better vetted, although its performance may be slightly less of that of the first two mentioned. For simple servers, mdadm might be the most stable choice.

2 Details

I've worked with this in setting up some Core 2 Duo PCs, with 2 to 4 Sata HDDs. Let's begin.

2.1 Creation of RAID:

I'll need to have partitions be the same if adding a replacement or new disk.

I'm going to make a boot partition of 10GB, a swap of 2GB and the 50GB home / data partition

First let's clear partition tables, with sgdisk again. [1]

```
sgdisk --zap-all /dev/sda
sgdisk --zap-all /dev/sdb
sgdisk --zap-all /dev/sdc

*needs gdisk

fdisk /dev/sda
First put the 55GB Root in.


n
-return
-return
-return
```

---

[1]Ref: https://github.com/zfsonlinux/zfs/wiki/Debian-Stretch-Root-on-ZFS

```
+55G

Then swap
n
-return
-return
-return
+8G

t
-return
82
```

This is for swap The setup will be root of 55G, then swap. We will be generous with swap, even though it's probably not necessary to go over 4GB

Do this for all HDD in the raid.

EDIT: you can clone hdds partitions tables. See further down this doc.

2.2   Details of RAID:

```
root@advacoONE:/dev# sudo mdadm -D /dev/md127
/dev/md127:
          Version : 1.2
    Creation Time : Fri Feb  1 01:00:25 2019
       Raid Level : raid1
       Array Size : 57638912 (54.97 GiB 59.02 GB)
    Used Dev Size : 57638912 (54.97 GiB 59.02 GB)
     Raid Devices : 3
    Total Devices : 2
      Persistence : Superblock is persistent

      Update Time : Fri Feb  1 02:40:44 2019
            State : clean, degraded
   Active Devices : 2
  Working Devices : 2
   Failed Devices : 0
    Spare Devices : 0

             Name : devuan:root
             UUID : 83a8dc03:802a4129:26322116:c2cfe1d4
```

```
        Events : 82

    Number   Major   Minor   RaidDevice State
       -        0       0        0       removed
       1        8       17       1       active sync   /dev/sdb1
       2        8       33       2       active sync   /dev/sdc1
root@advacoONE:/dev#--
```

so you can see, one was removed (it auto removes, when unplugged)

2.3   Add Drive to RAID:

sudo mdadm –add /dev/md127 /dev/sda1

NOTE2: If you setup 2 hdds, in a raid, and want to add a third, if you just –add, it will show up as a spare... if you do mdadm –grow /dev/md127 -raid-devices=3 then the third might be active sync (what we want) note that the –grow, seems to allow for parameter changes after you have already created the raid. you can also specify the exact same command, raid-devices=3 in the setup of the raid (see install doc)

NOTE: don't worry about mkfs.ext4 on the raid members, they are their own file system type

NOTE: if you have a new drive and need to copy the hdd partition tables: https://unix.stackexchange.com/questions/12986/how-to-copy-the-partition-layout-of-a-whole-disk-using-standard-tools or aka

```
(FOR MBR ONLY)
Save:
sfdisk -d /dev/sda > part_table

Restore:
sfdisk /dev/NEWHDD < part_table

(FOR GPT:)
# Save MBR disks
sgdisk --backup=/partitions-backup-$(basename $source).sgdisk $source
```

```
sgdisk --backup=/partitions-backup-$(basename $dest).sgdisk $dest

# Copy $source layout to $dest and regenerate GUIDs
sgdisk --replicate=$dest $source
sgdisk -G $dest
```

NOTE: don't worry about mkfs.ext4 on the raid members, they are their own file system type No need for ext4 here.

```
root@advacoONE:/dev# mdadm --add /dev/md127 /dev/sda1
mdadm: added /dev/sda1
root@advacoONE:/dev# sudo mdadm -D /dev/md127
/dev/md127:
          Version : 1.2
    Creation Time : Fri Feb  1 01:00:25 2019
       Raid Level : raid1
       Array Size : 57638912 (54.97 GiB 59.02 GB)
    Used Dev Size : 57638912 (54.97 GiB 59.02 GB)
     Raid Devices : 3
    Total Devices : 3
      Persistence : Superblock is persistent

      Update Time : Fri Feb  1 02:41:43 2019
            State : clean, degraded, recovering
   Active Devices : 2
  Working Devices : 3
   Failed Devices : 0
    Spare Devices : 1

   Rebuild Status : 0% complete

             Name : devuan:root
             UUID : 83a8dc03:802a4129:26322116:c2cfe1d4
           Events : 92

    Number   Major   Minor   RaidDevice State
       3       8        1        0      spare rebuilding   /dev/sda1
       1       8       17        1      active sync   /dev/sdb1
       2       8       33        2      active sync   /dev/sdc1
root@advacoONE:/dev#
```

Looks good.

```
 Rebuild Status : 6% complete

          Name : devuan:root
          UUID : 83a8dc03:802a4129:26322116:c2cfe1d4
        Events : 103


    Number   Major   Minor   RaidDevice State
        3       8       1        0       spare rebuilding   /dev/sda1
        1       8      17        1       active sync   /dev/sdb1
        2       8      33        2       active sync   /dev/sdc1
```

as it progresses, you see the RAID rebuilding.

```
watch -n1 cat /proc/mdstat

Every 1.0s: cat /proc/mdstat
advacoONE: Fri Feb  1 02:43:24 2019

Personalities : [raid1] [linear] [multipath] [raid0] [raid6] [raid5] [raid4] [raid10]
md127 : active raid1 sda1[3] sdb1[1] sdc1[2]
      57638912 blocks super 1.2 [3/2] [_UU]
      [==>.................]  recovery = 11.2% (6471936/57638912) finish=13.2min spe

unused devices: <none>
```

WARNING: Reinstall grub on the drive again as well afterwards.

2.4   Email Notifications on mdadm

Test emails on mdadm.. first configure email however you prefer (i currently
use ssmtp, see this link: wiki.zoneminder.com/SMS_Notifications)
    then edit /etc/mdadm/mdadm.conf to have your email in mailaddr then

```
sudo mdadm --monitor --scan --test --oneshot
```

should send an email
    https://ubuntuforums.org/showthread.php?t=1185134 for more details
on email sending

3 References

The section about degraded disks
https://help.ubuntu.com/lts/serverguide/advanced-installation.html.en

General partition tips.
https://github.com/zfsonlinux/zfs/wiki/Debian-Stretch-Root-on-ZFS

SSMTP email setup:
 wiki.zoneminder.com/SMS_Notifications