CSCI 4460/5460 NETWORK OPERATION & DEFENSE

Fall 2022

LAB #2: Basic RAID Setup

DUE: September 19, 11:59pm

GOALS

The purpose of this lab is to exercise the basic storage using RAID on an Ubuntu host.

RESOURCES & ASSUMPTIONS

The plan:

- Create additional 3 VM disks (identical size, no need to be big, 50MB would work)
- Partition disks (identically)
- Create file system, use ext4
  - Note: You can use gparted for partition and creating file systems.
- In order to create RAID, use “mdadm” package.
  - To install mdadm, use “sudo apt install mdadm”

You can use the following tutorial for mdadm package. No worries about Ubuntu version in the tutorial. It works for recent Ubuntu versions as well.

https://www.digitalocean.com/community/tutorials/how-to-create-raid-arrays-with-mdadm-on-ubuntu-16-04

First part of the assignment: Creating RAID 0 Array

1. Show your 3 VM disks. You can use gparted screen or type “fdisk -lu /dev/sd[bcd]” (Assuming that the disks you will use for this assignments are sdb,sdc, and sdd. Change the naming in the command if necessary).
2. Type “lsblk -a” to see all lists information about all available or the specified block devices. You will see that 3 VM disk you created are separate entities.

```
root@ayn-VirtualBox:/home/ayn/Desktop# lsblk -a
NAME   MAJ:MIN RM   SIZE RO TYPE MOUNTPOINTS
loop0    7:0    0     4K  1 loop /snap/bare/5
loop1    7:1    0  61.9M  1 loop /snap/core20/1405
loop2    7:2    0  81.3M  1 loop /snap/gtk-common-themes/1534
loop3    7:3    0 248.8M  1 loop /snap/gnome-3-38-2004/99
loop4    7:4    0 155.6M  1 loop /snap/firefox/1232
loop5    7:5    0  43.6M  1 loop /snap/snapd/15177
loop6    7:6    0  45.9M  1 loop /snap/snap-store/575
loop7    7:7    0   284K  1 loop /snap/snapd-desktop-integration/10
loop8    7:8    0     0B  0 loop
sda      8:0    0    20G  0 disk
├─sda1   8:1    0     1M  0 part
├─sda2   8:2    0   513M  0 part /boot/efi
└─sda3   8:3    0  19.5G  0 part /
sdb      8:16   0    50M  0 disk
└─sdb1   8:17   0    48M  0 part
sdc      8:32   0    50M  0 disk
└─sdc1   8:33   0    48M  0 part
sdd      8:48   0    50M  0 disk
└─sdd1   8:49   0    48M  0 part
sr0     11:0    1  1024M  0 rom
root@ayn-VirtualBox:/home/ayn/Desktop#
```

e.g. sdb1, sdc1,sdd1

3. List existing md devices by using “cat /proc/mdstat”
4. Our aim is to create a RAID 0 Array by using 3 VM disks. You can find the necessary commands and steps in the tutorial above.
    a. HINT: Don’t forget to change disk size to 3.
    b. Also, you can use wildcard for 3 disk when you write mdadm code. E.g. /dev/sd[bcd] to combine sdb, sdc, sdd disks.
5. List existing md devices by using “cat /proc/mdstat” again
6. Show current status by using “mdadm --detail --scan”
7. Type “lsblk -a” to see all lists information about all available or the specified block devices again. Now we see md0 in sdb, sdc, sdd disks (md0 is the name of my raid)

```
root@ayn-VirtualBox:/home/ayn/Desktop# lsblk -a
NAME   MAJ:MIN RM   SIZE RO TYPE  MOUNTPOINTS
loop0    7:0    0     4K  1 loop  /snap/bare/5
loop1    7:1    0  61.9M  1 loop  /snap/core20/1405
loop2    7:2    0  81.3M  1 loop  /snap/gtk-common-themes/1534
loop3    7:3    0 248.8M  1 loop  /snap/gnome-3-38-2004/99
loop4    7:4    0 155.6M  1 loop  /snap/firefox/1232
loop5    7:5    0  43.6M  1 loop  /snap/snapd/15177
loop6    7:6    0  45.9M  1 loop  /snap/snap-store/575
loop7    7:7    0   284K  1 loop  /snap/snapd-desktop-integration/10
loop8    7:8    0    47M  1 loop  /snap/snapd/16292
loop9    7:9    0    62M  1 loop  /snap/core20/1593
loop10   7:10   0   284K  1 loop  /snap/snapd-desktop-integration/14
loop11   7:11   0  91.7M  1 loop  /snap/gtk-common-themes/1535
loop12   7:12   0  45.9M  1 loop  /snap/snap-store/582
loop13   7:13   0 163.3M  1 loop  /snap/firefox/1670
loop14   7:14   0 400.8M  1 loop  /snap/gnome-3-38-2004/112
sda      8:0    0    20G  0 disk
├─sda1   8:1    0     1M  0 part
├─sda2   8:2    0   513M  0 part  /boot/efi
└─sda3   8:3    0  19.5G  0 part  /
sdb      8:16   0    50M  0 disk
└─md0    9:0    0   144M  0 raid0
sdc      8:32   0    50M  0 disk
└─md0    9:0    0   144M  0 raid0
sdd      8:48   0    50M  0 disk
└─md0    9:0    0   144M  0 raid0
sr0     11:0    1  1024M  0 rom
root@ayn-VirtualBox:/home/ayn/Desktop#
```

8. Create and Mount the Filesystem for RAID. You can use gparted. Show what is the size of your RAID (size of md0).

Second part of the assignment: Removal of mdadm RAID Devices and Create RAID 1 Array.

9. Unmount and Remove all Filesystems. You can use “umount /dev/md0”
10. Stop mdadm RAID Device. You can use “mdadm --stop /dev/md0”
11. Remove mdadm RAID Device. Use “mdadm --remove /dev/md0”. In case you see an error regarding the “no such file or directory”, ignore it.
12. cat /proc/mdstat and confirm there are no active RAID devices

Now we will use the similar steps when we created RAID 0 in the first part of the assignment. However, we will create RAID 1 this time.

13. Our aim is to create a RAID 1 Array by using 3 VM disks. You can find the necessary commands and steps in the tutorial above.
    a. HINT: Don’t forget to change disk size to 3.
    b. Don’t forget to change the level=1
    c. Also, you can use wildcard for 3 disk when you write mdadm code. E.g. /dev/sd[bcd] to combine sdb, sdc, sdd disks.
14. List existing md devices by using “cat /proc/mdstat” again
15. Use gparted to show what is the size of your RAID (size of md0)

What to Deliver:

You need to write a report showing all the steps. Your report needs to include screenshots for each steps. For some steps, you may need to provide more than one screenshot.

Submit a single PDF file to Moodle.

Rules:

- You may search freely online reference materials – man pages, stack overflow, etc. However, you may not ask anyone for specific help (related to this lab) online, or offline, other than the instructor.
- This is an individual assignment; all work must by yours.
- Your assignment will not be graded without a report.
- The submission deadline is a hard one. No late submissions.