CS 444/544 Lab 6

Setup Software RAID
Advantage of RAID

- Expand Drive capacity (RAID 0)
- Faster access (RAID 0)
- Data integrity (RAID 1, RAID 5, RAID 6)
Different Types of RAID

- **Software-RAID**: Where the RAID is created by software (included in most Linux dist.).

- **Hardware-RAID**: A special controller used to build RAID. Hardware RAID is generally faster, and does not place load on the CPU, and hardware RAID can be used with any OS.

- **FakeRAID**: Since RAID hardware is very expensive, many motherboard manufacturers use multi-channel controllers with special BIOS features to perform RAID.
Setup Software RAID in Linux

- mdadm (multiple device admin)
- Supported RAID format
  - RAID 0 – Block level striping.
  - RAID 1 – Mirror.
  - RAID 4 – Like RAID 0, but with an extra device for the parity.
  - RAID 5 – Like RAID 4, but with the parity distributed across all devices.
  - RAID 6 – Like RAID 5, but with two parity segments per stripe.
  - RAID 10 – Take a number of RAID 1 mirrorsets and stripe across them RAID 0 style
Non-RAID features in mdadm

- **Linear**
  - concatenates a number of devices into a single large MD device. (difference to RAID 0?)
- **Multipath**
  - provides multiple paths with failover to a single device.
- ** Faulty**
  - a single device which emulates a number of disk-fault scenarios for testing and development.
- **Container**
  - a group of devices managed as a single device, in which one can build RAID systems.
Before we start...

- Power on your sandbox Virtual machine
- Run the following command to see how many disks you have now
  ```bash
  sudo lshw -class disk
  ```
- Power off the vm, go to Setting/Storage, add two new hard disks
- Power on the vm and run `lshw` again
  - What do you see?
Install mdadm

• Run the following command in sandbox
  sudo apt-get install mdadm

  – Press Enter for all the prompts
Setup a MD device

- Let's assume the new hard drives are /dev/sdb and /dev/sdc
Partition the hard drive

- Use fdisk to partition the hard drive
- Start fdisk using the following command
  
  `sudo fdisk /dev/sdb`

- Then use the following command to add a new partition
  
  `n` (Create Partition)
  
  `p` (Primary Partition)

  Choose partition parameters (partition number, start offset, stop offset, we use default values here)

  `w` (Write changes and quit)

- Do the same thing for sdc

- `sudo fdisk -l` to check your partitions
Create a MD device

- `mdadm --create /dev/md0 --level=raid0 --raid-devices=2 /dev/sdb1 /dev/sdc1`
- `mdadm --detail /dev/md0`
  - Pay attention to the array size
Add/Remove device

• sudo mdadm --remove /dev/md0 /dev/sdx1
• sudo mdadm --add /dev/md0 /dev/sdx1

• Task: Add another new hard drive(sdd), partition it and add it to the array
Use your MD devices

- To use a device, we need to “mount” it to a place in file system
- First format the device
  ```bash
  sudo mkfs.ext4 /dev/md0
  ```
- Create a folder
  ```bash
  mkdir ~/md0folder
  ```
- Mount the hard drive to the folder
  ```bash
  mount /dev/md0 ~/md0folder
  ```
- Run `df -h` to check all the mounted devices