README Assignment-4 CS344
M-23

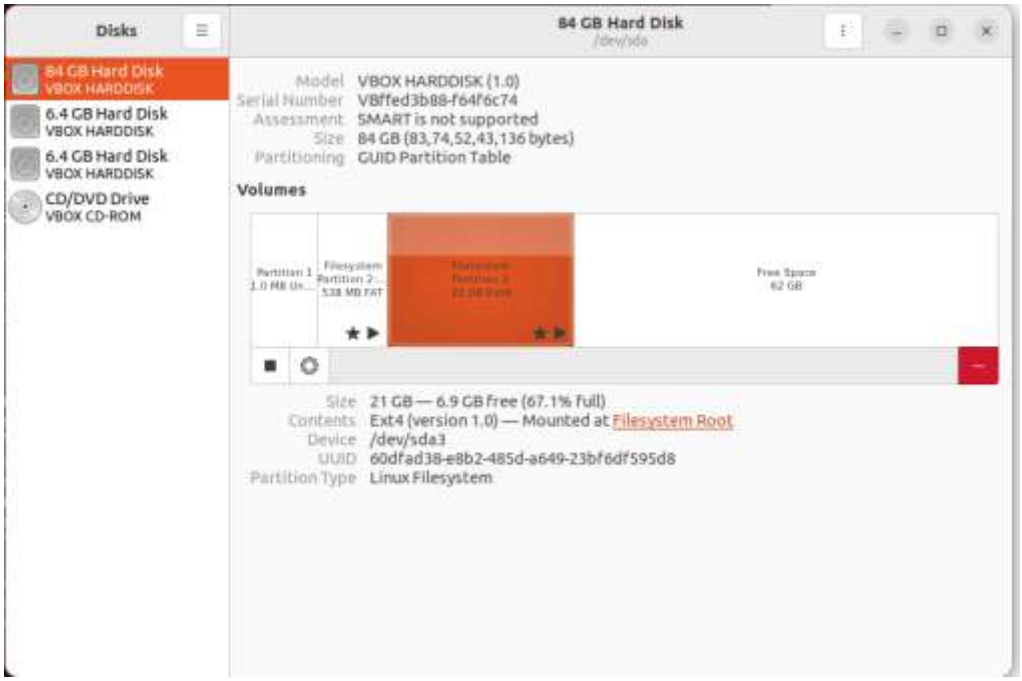
1- Harshul Gupta (200123023)

2- Arti Sahu (200123011)

3- Sunny Narzary(200123062)

Installation:

1. **ZFS:**
    a. First install the ZFS filesystem with:
    `sudo apt install zfsutils-linux -y`
    ```
    harshul@harshul:~/Desktop$ sudo apt install zfsutils-linux -y
    ```
    b. Choose a disk among installed disks (NOTE: THIS DISK MUST BE OF AT LEAST 5 GB IN SIZE). Also, don't use the disks being used by the system (sda in my case).
    You can list the disks using: `sudo fdisk -l`
    ```
    harshul@harshul:~/Desktop$ sudo fdisk -l
    [sudo] password for harshul:
    ```
    c. Once you have picked the disk (**Let's say the chosen disk is /dev/sdb**), create a ZFS pool named "M23_pool" using the following command:
    ```
    harshul@harshul:~/Desktop$ sudo zpool create M23_pool /dev/sdb
    ```
    d. Switch deduplication on for the newly created ZFS pool:
    ```
    harshul@harshul:~/Desktop$ sudo zfs set dedup=on M23_pool
    ```
    e. Now, you will be able to find the directory /M23_pool in the root directory. **This is going to be the anchor for running the workloads.**
2. **ext4**
    a. ext4 is preinstalled and the default file system on Ubuntu. The following instructions tell you how to format a disk and set up the ext4 filesystem on it.
    b. Open the Application "Disks":

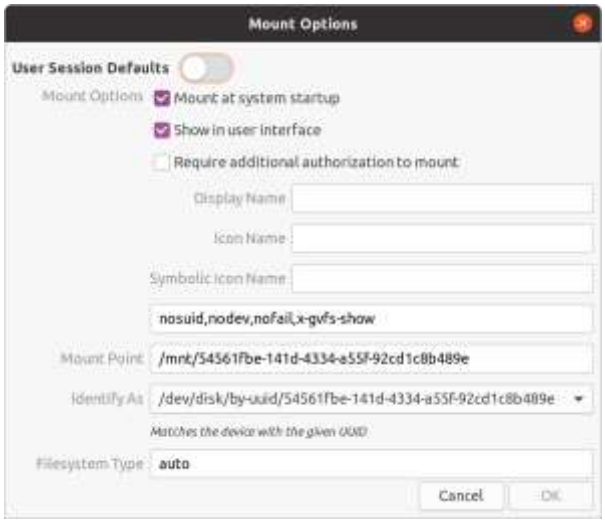


c. Choose the disk you want (SHOULD HAVE AT LEAST 5 GB DISK SPACE) and click the “Gear” icon. Then choose “Format Partition”:

d. Then, choose a name for the new disk and choose the Ext4 option . Check the “Erase” switch. Then click next:

e. Then Select “Format”:

f. Once the disk is formatted, make sure that the disk is mounted. If not, then open “mount options” for the disk (Gear Icon->Edit Mount Options) and then uncheck “User Session Defaults” and check “Mount on system startup”. Then Reboot:



Finding the anchors:

1. In order to run the workloads on ZFS/ext4 partitions, you need to find the anchors corresponding to the partitions. This is how you do it:
    a. Let's say you have a ZFS pool for which you want to find theanchor. This is how you do it:

```
harshul@harshul:~/Desktop$ mount | column -t | grep M23_pool
M23_pool                                                on  /M23_pool
                        type  zfs             (rw,xattr,noacl)
```

    b. The highlighted part is the anchor.
    c. In my case, the ext4 drive was mounted with the name "/dev/sdc":

```
harshul@harshul:~/Desktop$ mount | column -t | grep sdc
/dev/sdc                                                on  /media/harshul/M23_e
xt                      type  ext4            (rw,nosuid,nodev,relatime,errors
=remount-ro,uhelper=udisks2)
```

    d. Here, "/media/harshul/M23_ext " is the anchor.
2. Finding the anchor is extremely important because without it, our workloads will not work.

Running workloads on the two File Systems:

1. Add both the workload files (**workload1** and **workload2**) to your **vdbench** directory.
2. Navigate (cd) to your vdbench directory in the terminal.
3. Run commands:
    a. In order to run workload1 on your ZFS partition, run the workload using the following command :

```
harshul@harshul:~/Desktop/M23-4/vdbench$ sudo ./vdbench -f workload1 anchor=/M23
_pool
```

    b. Likewise, in order to run workload1 on your ext4 partition, s**ubstitute in your ext4 anchor** instead of "/media/harshul/M23_ext " in the following command:

```
harshul@harshul:~/Desktop/M23-4/vdbench$ sudo ./vdbench -f workload1 anchor=/med
ia/harshul/M23_ext
```

    c. Likewise, in order to run **workload2,** substitute **workload2** instead of **workload1** in the above commands.

Viewing stats:

1. You can view the summary for the last workload run in the summary.html file in the Output folder in the vdbench directory.
2. In order to monitor the space taken by the file systems before and after running workload:
    a. For **ZFS:**
        i. Run the following command: `zpool list`

ii. Run this before and after running the workload in order to calculate space taken by the files after the workload.

b. For **ext4:**

i. Navigate to the folder containing the ext4 anchor in the GUI File manager for Ubuntu.

ii. Then right click and view the properties of the anchor folder. Here you can see the space taken: