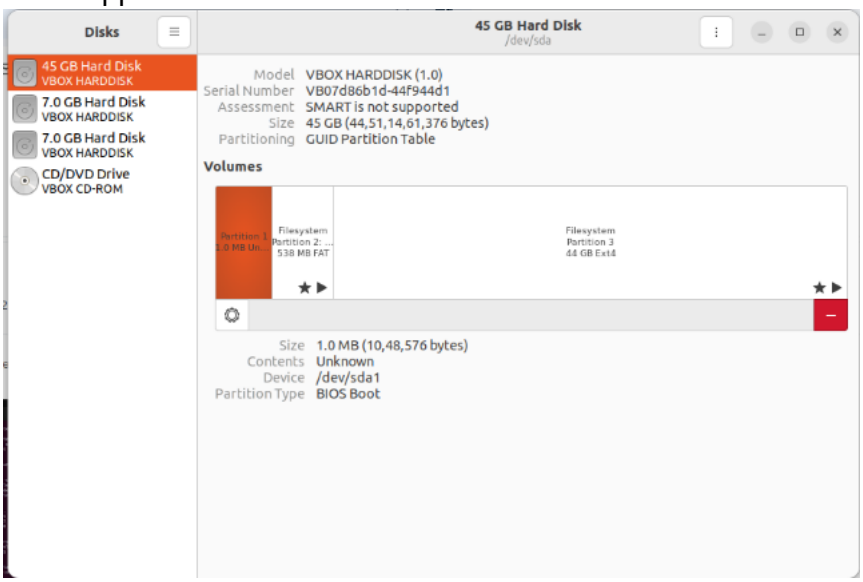
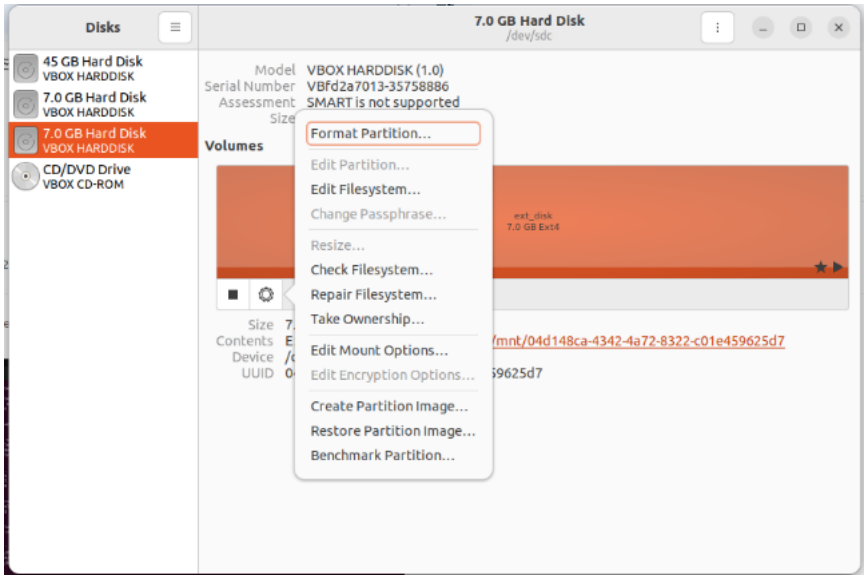
Installation:

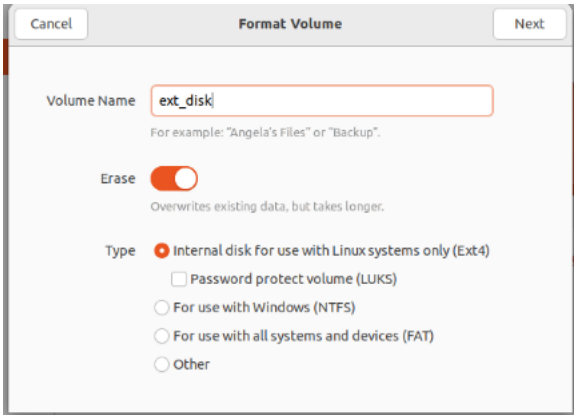
1. **ZFS:**
    a. First install the ZFS filesystem with:
    `sudo apt install zfsutils-linux -y`
    b. Choose a disk among installed disks (**NOTE: THIS DISK MUST BE OF AT LEAST 5 GB IN SIZE**) . Also, don't use the disks being used by the system (sda in my case).
    You can list the disks using: `sudo fdisk -l`
    c. Once you have picked the disk (**Let's say the chosen disk is /dev/sdb**) , create a ZFS pool named "zfs_pool" using the following command: `sudo zpool create zfs_pool /dev/sdb`
    d. **Switch deduplication on for the newly created zfs pool:** `sudo zfs set dedup=on zfs_pool`
    e. Now, you will be able to find the directory /zfs_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":



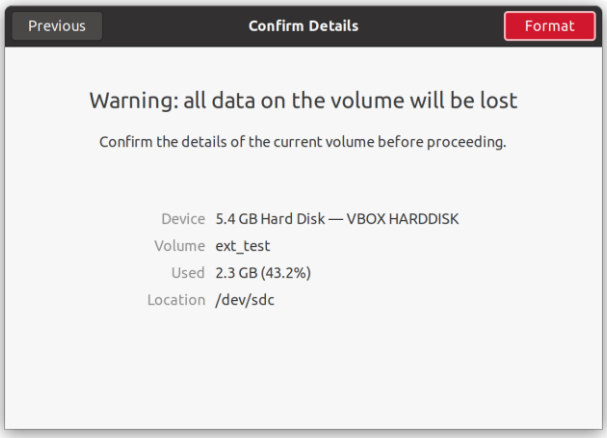
    c. Choose the disk you want (**SHOULD HAVE AT LEAST 5 GB DISK SPACE**) and click the "Gear" icon. Then choose "**Format Partition** ":



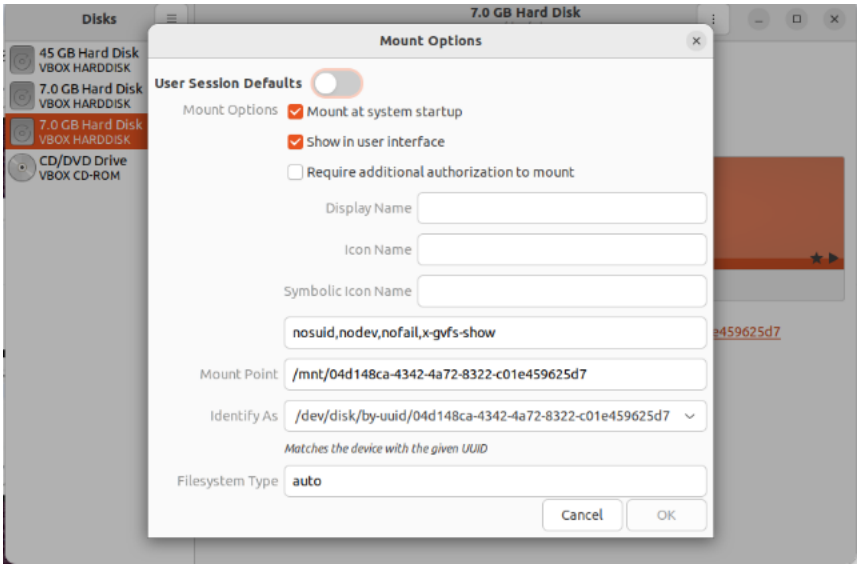
d. Then, choose a name for the new disk and choose the Ext4 option (first option in my computer). Check the “Erase” switch. Then click next:



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:

❾ Let's say you have a ZFS pool (named zfs_pool) for which you want to find the anchor. This is how you do it:

❾ The highlighted part (/zfs_pool) is

the anchor.

❾ In my case, the ext4 drive was mounted with the name "/dev/sdc":

Here, /mnt/04d148ca-4342-4a72-8322-c01e459625d7 is the anchor.

2. **Finding the anchor is extremely important because without it, our workloads won't 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 (**SUBSTITUTE IN YOUR ZFS ANCHOR INSTEAD OF**

zfs_pool):

```
~/vdbench$ sudo ./vdbench -f workload1 anchor=/zfs_pool
```

b. Likewise, in order to run workload1 on your ext4 partition, s**ubstitute in your ext4 anchor** instead /mnt/04d148ca-4342-4a72-8322-c01e459625d7 in the following command:

```
~/vdbench$ sudo ./vdbench -f workload1 anchor=/mnt/54561fbe-141d-4334-a55f-92cd1c8b489e
```

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:**

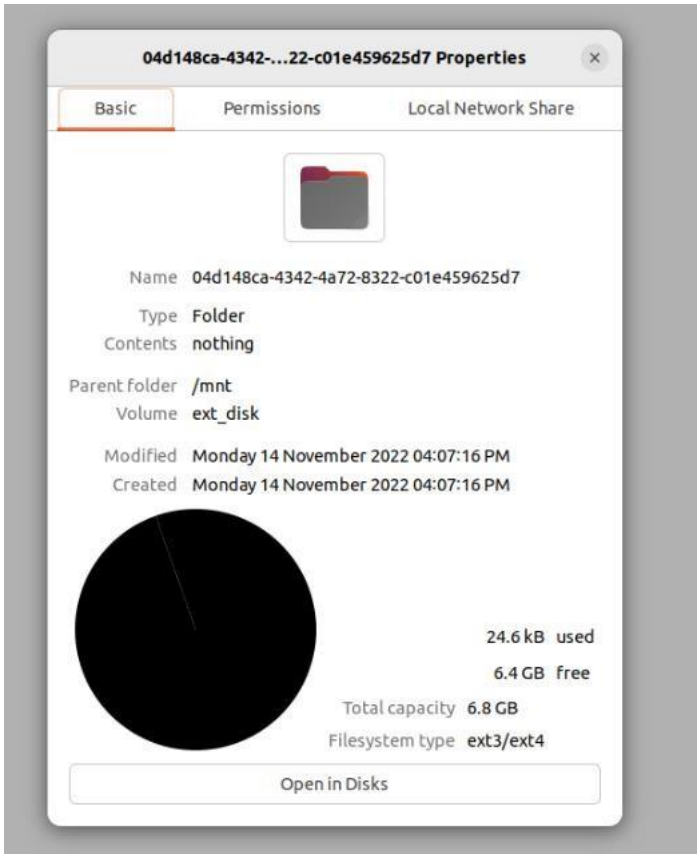
      i. Run the following command: `zpool list` ii.

      Here's a sample output:

      iii. Run this before and after running the workload in order to calculate space taken by the files after the workload. (Calculation done in report) b. For **ext4:**

      i. Navigate to the folder containing the ext4 anchor in the GUI File manager for Ubuntu. In my case, the anchor is /mnt/04d148ca-4342-4a72-8322-c01e459625d7".

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


04d148ca-4342-...22-c01e459625d7 Properties
Basic
Permissions
Local Network Share
Name 04d148ca-4342-4a72-8322-c01e459625d7
Type Folder
Contents nothing
Parent folder /mnt
Volume ext_disk
Modified Monday 14 November 2022 04:07:16 PM
Created Monday 14 November 2022 04:07:16 PM
24.6 kB used
6.4 GB free
Total capacity 6.8 GB
Filesystem type ext3/ext4
Open in Disks