

Note:

This zip file contains:

- 1) README file which specifies all the required steps for installations of file partitions.
- 2) Report.pdf which contains a detailed description of the assignment with relevant screenshots.
- 3) Output folder which contains all the outputs of the vdbench directory. You can view the summary for the workload run in the summary.html file of the corresponding workload output file.

Creating a ZFS partition:

- 1) We need to add an extra hard disk to our VM. In the VM settings, under the storage section, add an hard disk in the Controller: SATA section.
- 2) Start the VM, and then open the terminal.
- 3) To install ZFS, run the following command:

```
sudo apt install zfsutils-linux
```

- 4) To check if ZFS has been successfully installed, run the following command:

```
whereis zfs
```

- 5) To create the storage pool, first check the available disks using the following command:

```
sudo fdisk -l
```

We will use /dev/sdb to create our ZFS pool

```
Disk /dev/sdb: 6 GiB, 6442450944 bytes, 12582912 sectors
Disk model: VBOX HARDDISK
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
```

- 6) Create a ZFS pool named "zfs_pool" using the following command:

```
sudo zpool create zfs_pool /dev/sdb
```

- 7) Switch deduplication on for the newly created zfs pool:

```
sudo zfs set dedup=on zfs_pool
```

- 8) 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

Creating an ext4 partition:

- 1) We need to add an extra hard disk to our VM. Refer step 1 of creating a zfs partition.

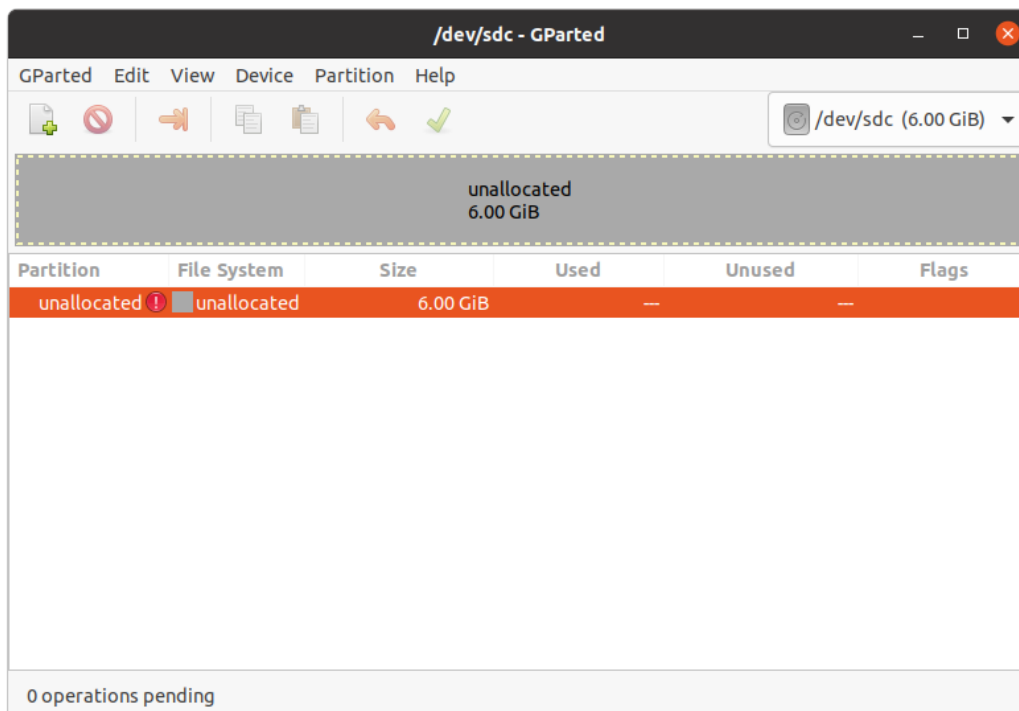
- 2) First we need to run the virtual machine and install **gparted** tool:

```
sudo apt-get install gparted
```

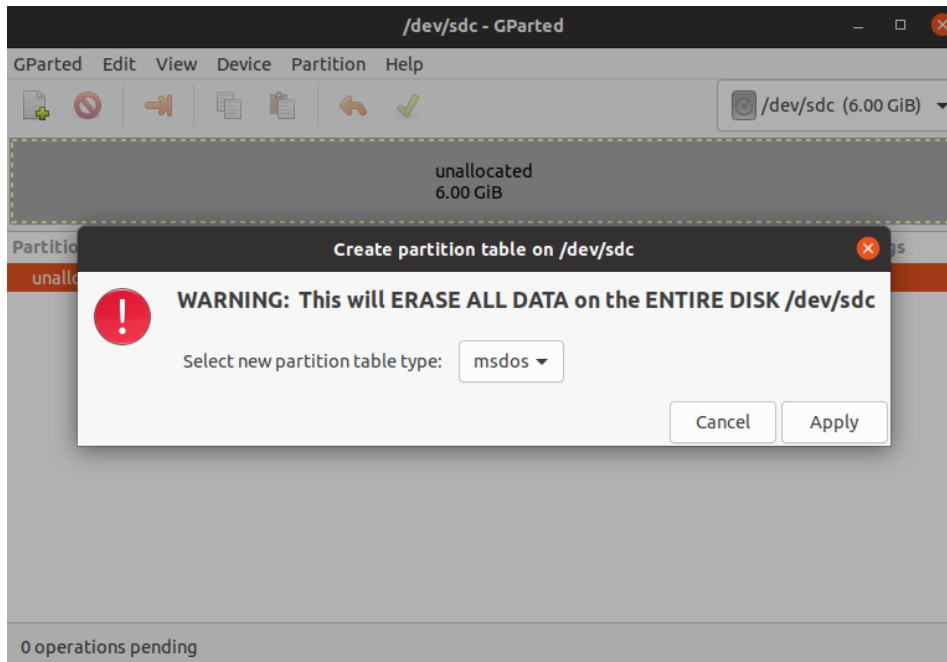
- 3) Next execute gparted with the following command:

```
sudo gparted
```

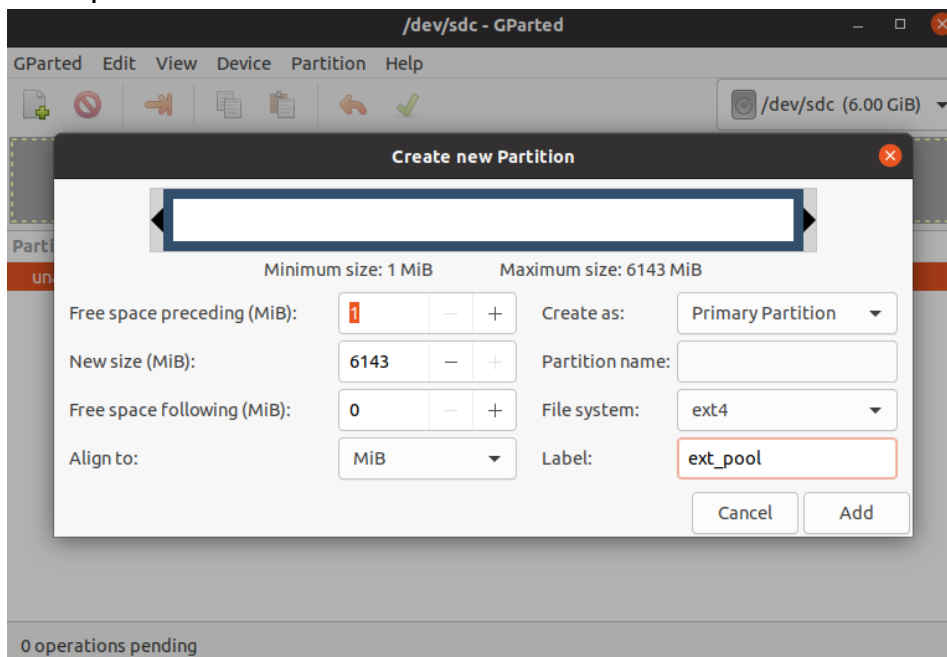
- 4) In the gparted's main window in the upper right corner select the newly added disk (`/dev/sdc`):



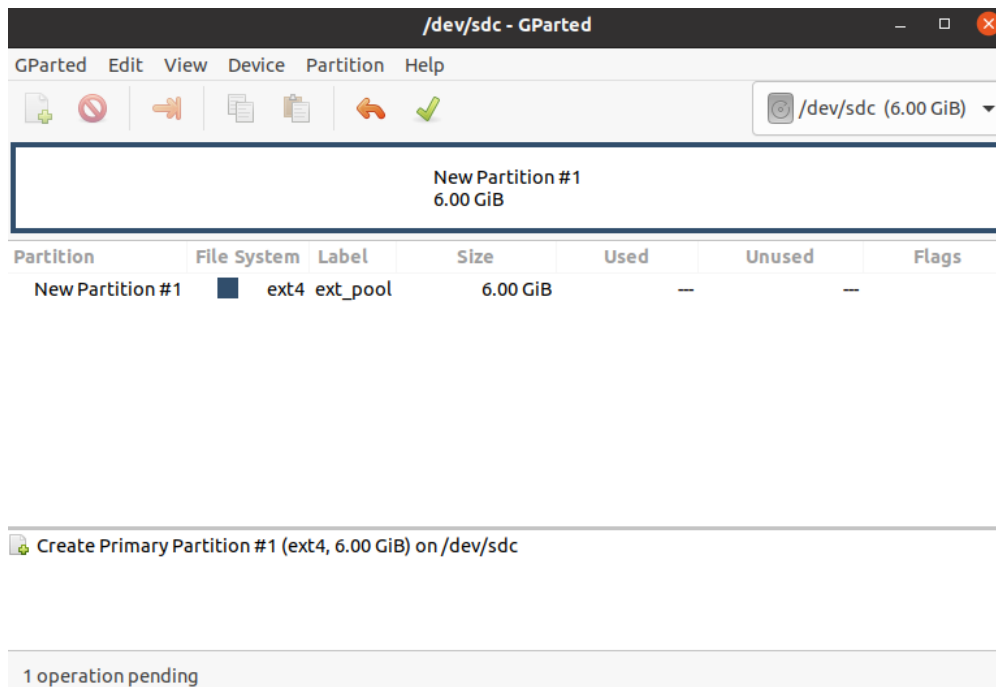
- 5) Now from the main menu select an option: Device -> Create Partition Table..., accept selected by default partition table type (msdos) and press Apply button:



- 6) Next click with right mouse button a grey unallocated area of the disk drive space and from the menu select New item. In the dialog box that will appear accept default settings to create one partition which spreads all the disk space and click Add button:



- 7) In the end you have to apply the changes to the disk. To accomplish this, click the green tick icon in the toolbar:



- 8) After changes was applied gparted application can be closed. Now we have to mount new disk in some directory. To do this, create in home directory a directory `ext_pool`:

```
cd && mkdir ext_pool
```

- 9) This should be mounted to it:

```
sudo mount -t ext4 /dev/sdc1 ~/ext pool
```

- 10) Change directory privileges to allow all users for a full access to the directory:

```
sudo chmod 777 ~/ext pool
```

- 11) At this point we should make the disk to be automatically mounted at the system startup. For this, issue following commands:

```
pramodh_billal@Billa:/$ sudo bash -i
root@Billa:/# echo -e "/dev/sdc1\t/home/pramodh_billal/ext_pool\text4\terrors=remount-ro\t0\t1" >> /etc/fstab
root@Billa:/# exit
exit
```

Mounting Verification:

Mounting is very essential for file systems. So we can run the command shown in the following image for confirming our mounting process for both the file systems

```
pramodh_billaga@billa:~$ mount | column -t | grep zfs_pool
zfs_pool      on      /zfs_pool      type  zfs          (rw,xattr,noacl)
pramodh_billaga@billa:~$ mount | column -t | grep ext_pool
/dev/sdc1     on      /home/pramodh_billaga/ext_pool type  ext4         (rw,relatime,errors=remount-ro)
pramodh_billaga@billa:~$
```

Running the workloads:

There are 4 files which we need to run using vdbench. After creating ZFS and ext4 partitions, place zfs_dedup, ext4_dedup, zfs_large and ext4_large in the vdbench folder.

Run the following commands one by one:

```
sudo ./vdbench -f zfs_dedup
```

```
sudo ./vdbench -f ext4_dedup
```

```
sudo ./vdbench -f zfs_large
```

```
sudo ./vdbench -f ext4_large
```