

CS344 Operating Systems Lab

Assignment 4

README

GROUP 20

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PART A: Installing vdbench and testing

The vdbench zip file provided is to be unzipped and a sample file is tested to check the working of vdbench

```
$unzip vdbench.zip
$cd vdbench
$./vdbench -tf
```

PART B: Installing ZFS and ext4 filesystems

ZFS

The following command is used to install the ZFS filesystem

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

The command to check installation correctly is

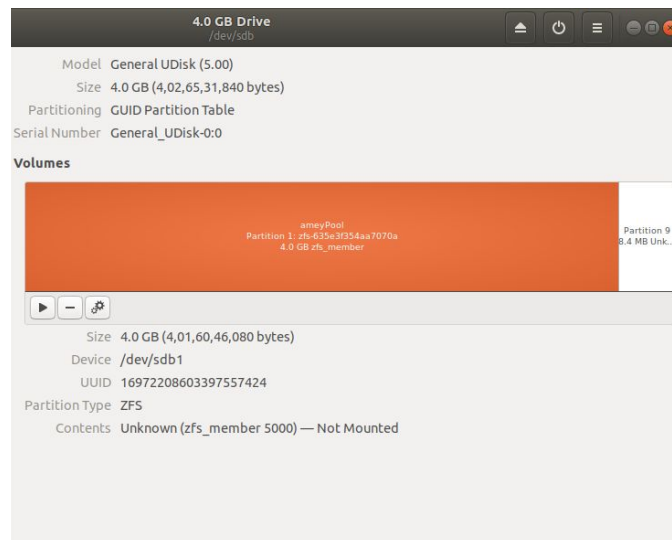
```
$whereis zfs
```

To create a pool at the location /dev/sdb

```
$sudo zpool create [NEW POOL] /dev/sdb
```

Commands to see the status and lists of pools

```
$sudo zpool list
$sudo zpool status
```



```
ilt@varhade: ~
File Edit View Search Terminal Help
(base) amey@varhade:~$ sudo zpool status
no pools available
(base) amey@varhade:~$ sudo zpool create niharikaPool /dev/sdb
(base) amey@varhade:~$ sudo zpool status
pool: niharikaPool
state: ONLINE
scan: none requested
config:

    NAME      STATE    READ WRITE CKSUM
    niharikaPool  ONLINE      0     0     0
    sdb         ONLINE      0     0     0

errors: No known data errors
(base) amey@varhade:~$ sudo zpool list
NAME      SIZE  ALLOC  FREE  EXPANDSZ   FRAG    CAP  DEDUP  HEALTH  ALTROOT
niharikaPool  3.72G  106K  3.72G      -       0%    0%   1.00x  ONLINE  -
(base) amey@varhade:~$ sudo zfs set dedup=on niharikaPool
(base) amey@varhade:~$ sudo zpool list
NAME      SIZE  ALLOC  FREE  EXPANDSZ   FRAG    CAP  DEDUP  HEALTH  ALTROOT
niharikaPool  3.72G  129K  3.72G      -       0%    0%   1.00x  ONLINE  -
(base) amey@varhade:~$ zfs list
NAME      USED  AVAIL  REFER  MOUNTPOINT
niharikaPool  85.5K  3.59G   24K    /niharikaPool
(base) amey@varhade:~$
```

Removing a pool requires the below command.

```
$sudo zpool destroy [POOL NAME]
```

The Anchor of the pool is found by the following command

```
$zfs list
```

ext4

The external USB Drive can be formatted to ext4 file system by using the Disk GUI utility or by using the command line as follows.

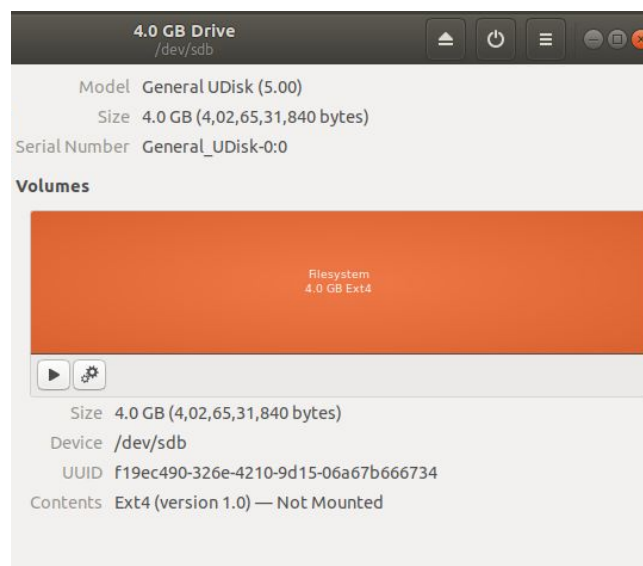
```
$sudo mkfs.ext4 /dev/sdb
```

```
(base) titamey:~$ sudo mkfs.ext4 /dev/sdb
mke2fs 1.44.1 (24-Mar-2018)
Found a gpt partition table in /dev/sdb
Proceed anyway? (y,N) y
Creating filesystem with 983040 4k blocks and 245760 inodes
Filesystem UUID: f19ec490-326e-4210-9d15-06a67b666734
Superblock backups stored on blocks:
    32768, 98304, 163840, 229376, 294912, 819200, 884736

Allocating group tables: done
Writing inode tables: done
Creating journal (16384 blocks): done
Writing superblocks and filesystem accounting information: done
```

The file type in the external device is set to be ext4 as shown below

```
/dev/loop25: TYPE="squashfs"
/dev/loop27: TYPE="squashfs"
/dev/loop28: TYPE="squashfs"
/dev/sdb1: LABEL="Anjali" UUID="ee9262cc-22b9-4129-84da-6758d7a1c945" TYPE="ext4"
```



To find the anchor of the ext4 filesystem use the following command
`$lsblk`

```
(base) iit@amey:~$ lsblk
NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINT
loop0 7:0 0 162.9M 1 loop /snap/gnome-3-28-1804/145
loop1 7:1 0 67.6M 1 loop /snap/sublime-text/85
loop2 7:2 0 9.1M 1 loop /snap/canonical-livepatch/94
loop3 7:3 0 276K 1 loop /snap/gnome-characters/570
loop4 7:4 0 62.1M 1 loop /snap/gtk-common-themes/1506
loop5 7:5 0 11.9M 1 loop /snap/remote/5
loop6 7:6 0 55.3M 1 loop /snap/core18/1885
loop7 7:7 0 161.4M 1 loop /snap/gnome-3-28-1804/128
loop8 7:8 0 97.8M 1 loop /snap/core/10185
loop10 7:10 0 255.6M 1 loop /snap/gnome-3-34-1804/36
loop11 7:11 0 956K 1 loop /snap/gnome-logs/93
loop12 7:12 0 956K 1 loop /snap/gnome-logs/100
loop13 7:13 0 2.2M 1 loop /snap/gnome-system-monitor/148
loop14 7:14 0 55.4M 1 loop /snap/core18/1932
loop15 7:15 0 2.4M 1 loop /snap/gnome-calculator/748
loop16 7:16 0 142.3M 1 loop /snap/code/49
loop17 7:17 0 9.8M 1 loop /snap/remote/1
loop18 7:18 0 276K 1 loop /snap/gnome-characters/550
loop19 7:19 0 140.7M 1 loop /snap/gnome-3-26-1604/98
loop20 7:20 0 146M 1 loop /snap/code/50
loop21 7:21 0 97.7M 1 loop /snap/core/10126
loop22 7:22 0 217.9M 1 loop /snap/gnome-3-34-1804/60
loop23 7:23 0 2.5M 1 loop /snap/gnome-calculator/826
loop24 7:24 0 67.6M 1 loop /snap/sublime-text/77
loop25 7:25 0 9.1M 1 loop /snap/canonical-livepatch/95
loop26 7:26 0 140.7M 1 loop /snap/gnome-3-26-1604/100
loop27 7:27 0 2.2M 1 loop /snap/gnome-system-monitor/145
loop28 7:28 0 64.4M 1 loop /snap/gtk-common-themes/1513
sda 8:0 0 931.5G 0 disk
├─sda1 8:1 0 750M 0 part /boot/efi
├─sda2 8:2 0 5G 0 part
├─sda3 8:3 0 910G 0 part /
└─sda4 8:4 0 15.8G 0 part [SWAP]
sdb 8:16 1 3.8G 0 disk /media/iit/f19ec490-326e-4210-9d15-06a67b666734
(base) iit@amey:~$
```

PART C: Compilation and Execution for Experimentation

Experiment 1

For, deduplication to be kept on, execute the following command after creating the pools

```
$sudo zfs set dedup=on /[POOL NAME]
```

When the deduplication is kept off, the following command needs to be executed,

```
$sudo zfs set dedup=off /[POOL NAME]
```

Now, change the directory to the vdbench directory

Then execute the following command to run a particular file

```
$sudo ./vdbench -f [WORKLOAD] anchor=/[ANCHOR]
```

Here, the [ANCHOR] is the one found above

Experiment 2

For the execution of the ext4 related workload, the following command is needed

```
$sudo ./vdbench -f [WORKLOAD] anchor=/[ANCHOR]
```

Here, the [ANCHOR] is the one found above