Assignment 4 – Disk Partitioning, File System Creation, Management and Mounting

Launch virtual machine in the cloud, attach 20 GB EBS volume

Important Note:- Do not try partition, filesystem creation on your local desktop or laptop instead use virtual machine to do practice. These operations are destructive, chances of system crash. Work carefully.

First we need to create a volume on the EBS(Elastic Block Store) on AWS and give it a size of 20GiB

We also need to ensure that the volume is hosted on the same zone as the instance (in this case ap-south-1b).

Then we need to attach the volume to the instance by clicking on “Actions” . We need to set up a partition name which is always in this format /dev/sd[a-z] where sda is the root partition and sdb-e are always in use by system administrators sd[f-p] are what is available. We can also choose /dev/xvdf as our name

New Linux kernels may change the name from /dev/sdf to /dev/xvdf

After attaching the volume we can just connect to our instance and view the partitions in the instance by the command lsblk

```
ubuntu@ip-172-31-12-62:~$ lsblk
NAME     MAJ:MIN RM  SIZE RO TYPE MOUNTPOINTS
loop0      7:0    0 26.3M  1 loop /snap/amazon-ssm-agent/9881
loop1      7:1    0 73.9M  1 loop /snap/core22/1748
loop2      7:2    0 73.9M  1 loop /snap/core22/1802
loop3      7:3    0 44.4M  1 loop /snap/snapd/23545
loop4      7:4    0 44.4M  1 loop /snap/snapd/23771
xvda     202:0    0    8G  0 disk
├─xvda1  202:1    0    7G  0 part /
├─xvda14 202:14   0    4M  0 part
├─xvda15 202:15   0  106M  0 part /boot/efi
└─xvda16 259:0    0  913M  0 part /boot
xvdf     202:80   0   20G  0 disk
```

Create partition on newly attached disk as per below instructions -

a) Create 2 primary partitions of 3 GB each
fdisk command is used to modify the partitons

```
ubuntu@ip-172-31-12-62:~$ sudo fdisk /dev/xvdf

Welcome to fdisk (util-linux 2.39.3).
Changes will remain in memory only, until you decide to write them.
Be careful before using the write command.

Device does not contain a recognized partition table.
Created a new DOS (MBR) disklabel with disk identifier 0xbc3a0b47.

Command (m for help): n
Partition type
   p   primary (0 primary, 0 extended, 4 free)
   e   extended (container for logical partitions)
Select (default p): p
Partition number (1-4, default 1): 1
First sector (2048-41943039, default 2048):
Last sector, +/-sectors or +/-size{K,M,G,T,P} (2048-41943039, default 41943039): +3G

Created a new partition 1 of type 'Linux' and of size 3 GiB.
```

```
Command (m for help): n
Partition type
   p   primary (1 primary, 0 extended, 3 free)
   e   extended (container for logical partitions)
Select (default p): p
Partition number (2-4, default 2): 2
First sector (6293504-41943039, default 6293504):
Last sector, +/-sectors or +/-size{K,M,G,T,P} (6293504-41943039, default 41943039): +3G

Created a new partition 2 of type 'Linux' and of size 3 GiB.
```

b) Create 2 logical partitions of 6 GB each

```
Command (m for help): n
Partition type
   p   primary (2 primary, 0 extended, 2 free)
   e   extended (container for logical partitions)
Select (default p): e
Partition number (3,4, default 3): 3
First sector (12584960-41943039, default 12584960):
Last sector, +/-sectors or +/-size{K,M,G,T,P} (12584960-41943039, default 41943039):

Created a new partition 3 of type 'Extended' and of size 14 GiB.

Command (m for help): w
The partition table has been altered.
Calling ioctl() to re-read partition table.
Syncing disks.
```

After the creation of Extended Partitions we need to give the sudo fdisk /dev/xvdf command again to create the logical partitions as asked

```
Command (m for help): n
All space for primary partitions is in use.
Adding logical partition 5
First sector (12587008-41943039, default 12587008):
Last sector, +/-sectors or +/-size{K,M,G,T,P} (12587008-41943039, default 41943039): +6G

Created a new partition 5 of type 'Linux' and of size 6 GiB.
```

```
Command (m for help): n
All space for primary partitions is in use.
Adding logical partition 6
First sector (25171968-41943039, default 25171968):
Last sector, +/-sectors or +/-size{K,M,G,T,P} (25171968-41943039, default 41943039): +6G

Created a new partition 6 of type 'Linux' and of size 6 GiB.

Command (m for help):
All unwritten changes will be lost, do you really want to quit? (y/n)n

Command (m for help): w
The partition table has been altered.
Calling ioctl() to re-read partition table.
Syncing disks.

ubuntu@ip-172-31-12-62:~$
```

c) Format all 4 partitions and create ext4 filesystem on that

Use mkfs command to create ext4 filesystem

It can only be done separately for each partition

```
ubuntu@ip-172-31-12-62:~$ sudo mkfs.ext4 /dev/xvdf1
mke2fs 1.47.0 (5-Feb-2023)
Creating filesystem with 786432 4k blocks and 196608 inodes
Filesystem UUID: 5d20a97a-c2e7-4216-a902-c915f30a656a
Superblock backups stored on blocks:
        32768, 98304, 163840, 229376, 294912

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

ubuntu@ip-172-31-12-62:~$ sudo mkfs.ext4 /dev/xvdf2
mke2fs 1.47.0 (5-Feb-2023)
Creating filesystem with 786432 4k blocks and 196608 inodes
Filesystem UUID: 62b9d0a0-0bf4-4cca-94e0-1edf78419514
Superblock backups stored on blocks:
        32768, 98304, 163840, 229376, 294912

Allocating group tables: done
```

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

ubuntu@ip-172-31-12-62:~$ sudo mkfs.ext4 /dev/xvdf5
mke2fs 1.47.0 (5-Feb-2023)
Creating filesystem with 1572864 4k blocks and 393216 inodes
Filesystem UUID: ac056979-30c9-4e94-8a6e-c398ba529c01
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

ubuntu@ip-172-31-12-62:~$ sudo mkfs.ext4 /dev/xvdf6
mke2fs 1.47.0 (5-Feb-2023)
Creating filesystem with 1572864 4k blocks and 393216 inodes
Filesystem UUID: 45426232-c8c5-4637-9fbf-abf27b2c682d
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

ubuntu@ip-172-31-12-62:~$
```

d) Create 4 folders inside root (/) folder name it as Data1, Data2, Data3, Data4

Create 4 directories inside root folder

```
ubuntu@ip-172-31-12-62:~$ sudo mkdir /Data1 /Data2 /Data3 /Data 4
```

e) Mount all formated partitions on the respective folders

Mount the partition onto the directory.

This can only be done on superuser privileges

```
ubuntu@ip-172-31-12-62:~$ sudo mount /dev/xvdf1 /Data1
ubuntu@ip-172-31-12-62:~$ sudo mount /dev/xvdf2 /Data2
ubuntu@ip-172-31-12-62:~$ sudo mount /dev/xvdf5 /Data3
ubuntu@ip-172-31-12-62:~$ sudo mount /dev/xvdf6 /Data4
mount: /Data4: mount point does not exist.
       dmesg(1) may have more information after failed mount system call.
ubuntu@ip-172-31-12-62:~$ sudo mount /dev/xvdf6 /Data
```

f) Create empty file inside each folders of size 2 GB, 2GB, 4 GB and 4 GB respectively using command -

dd - "convert and copy a file"

if= inputfile

of=outputfile
bs=Blocksize
count= No. of Blocks
The dd command is a powerful utility for low-level data manipulation and duplication, allowing copying, converting, and transforming data between files, devices, and partitions, often used for tasks like creating disk images or wiping data.
We have copied zeroes in the /dev/zero file to create and empty file

```
ubuntu@ip-172-31-12-62:~$ sudo dd if=/dev/zero of=/Data1/file1 bs=1G count=2
dd: memory exhausted by input buffer of size 1073741824 bytes (1.0 GiB)
ubuntu@ip-172-31-12-62:~$ sudo dd if=/dev/zero of=/Data2/file2 bs=1G count=2
dd: memory exhausted by input buffer of size 1073741824 bytes (1.0 GiB)
ubuntu@ip-172-31-12-62:~$ sudo dd if=/dev/zero of=/Data3/file3 bs=1G count=4
dd: memory exhausted by input buffer of size 1073741824 bytes (1.0 GiB)
ubuntu@ip-172-31-12-62:~$ sudo dd if=/dev/zero of=/Data/file4 bs=1G count=4
dd: memory exhausted by input buffer of size 1073741824 bytes (1.0 GiB)
ubuntu@ip-172-31-12-62:~$
```

g) Go inside /Data1 and run command - while(true); do sleep 5s; done , do ctrl-z

```
ubuntu@ip-172-31-12-62:/Data1$ while true; do sleep 5s; done
^Z
[1]+  Stopped                 sleep 5s
```

h) Check disk utilization of each mount point
Use df -h to display free space

```
ubuntu@ip-172-31-12-62:/Data1$ df -h /Data1 /Data2 /Data3 /Data
Filesystem      Size  Used Avail Use% Mounted on
/dev/xvdf1      2.9G   24K  2.8G   1% /Data1
/dev/xvdf2      2.9G   24K  2.8G   1% /Data2
/dev/xvdf5      5.9G   24K  5.6G   1% /Data3
/dev/xvdf6      5.9G   24K  5.6G   1% /Data
ubuntu@ip-172-31-12-62:/Data1$
```

i) Unmount all partitions /Data1, /Data2, /Data3 and /Data4
The partitions were already unmounted
You have to make sure that the infinite loop run on Data1 stops before unmounting otherwise it will not unmount

```
ubuntu@ip-172-31-12-62:~$ sudo umount /Data1 /Data2 /Data3 /Data
umount: /Data2: not mounted.
umount: /Data3: not mounted.
umount: /Data: not mounted.
ubuntu@ip-172-31-12-62:~$
```

Note:- All partitions should be automatically mounted post reboot.

```
ubuntu@ip-172-31-12-62:~$ sudo nano /etc/fstab
```

```
LABEL=cloudimg-rootfs   /        ext4   discard,commit=30,errors=remount-ro     0 1
LABEL=BOOT      /boot   ext4    defaults        0 2
LABEL=UEFI      /boot/efi       vfat    umask=0077      0 1
UUID=62b9d0a0-0bf4-4cca-94e0-1edf78419514 /Data1 ext4 defaults 0 0
UUID=ac056979-30c9-4e94-8a6e-c398ba529c01 /Data2 ext4 defaults 0 0
UUID=5d20a97a-c2e7-4216-a902-c915f30a656a /Data3 ext4 defaults 0 0
UUID=45426232-c8c5-4637-9fbf-abf27b2c682d /Data  ext4 defaults 0 0
```

Check for error by issuing the sudo mount-a command

```
ubuntu@ip-172-31-12-62:~$ sudo systemctl daemon-reexec
ubuntu@ip-172-31-12-62:~$ sudo systemctl daemon-reload
ubuntu@ip-172-31-12-62:~$ sudo mount -a
ubuntu@ip-172-31-12-62:~$ df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/root       6.8G  2.5G  4.3G  37% /
tmpfs           479M     0  479M   0% /dev/shm
tmpfs           192M  932K  191M   1% /run
tmpfs           5.0M     0  5.0M   0% /run/lock
/dev/xvda16     881M  137M  683M  17% /boot
/dev/xvda15     105M  6.1M   99M   6% /boot/efi
tmpfs            96M   12K   96M   1% /run/user/1000
/dev/xvdf1      2.9G   24K  2.8G   1% /Data3
/dev/xvdf6      5.9G   24K  5.6G   1% /Data
/dev/xvdf2      2.9G   24K  2.8G   1% /Data1
/dev/xvdf5      5.9G   24K  5.6G   1% /Data2
ubuntu@ip-172-31-12-62:~$ sudo nano /etc/fstab
```