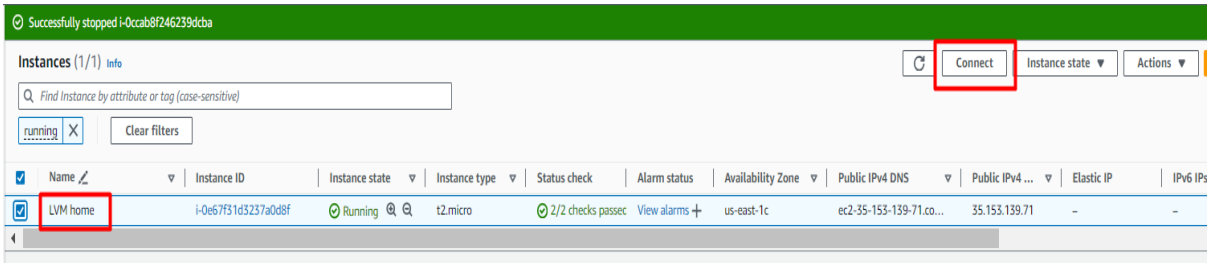
LVM (LOGICAL VOLUME MANGER) SETUP

STEP 1 : Create a EC2 Instance

- With AMI as Linux 2 kernal
- Attach Key Pair
- Attach a Security Grp to it with a port 22 (SSH)

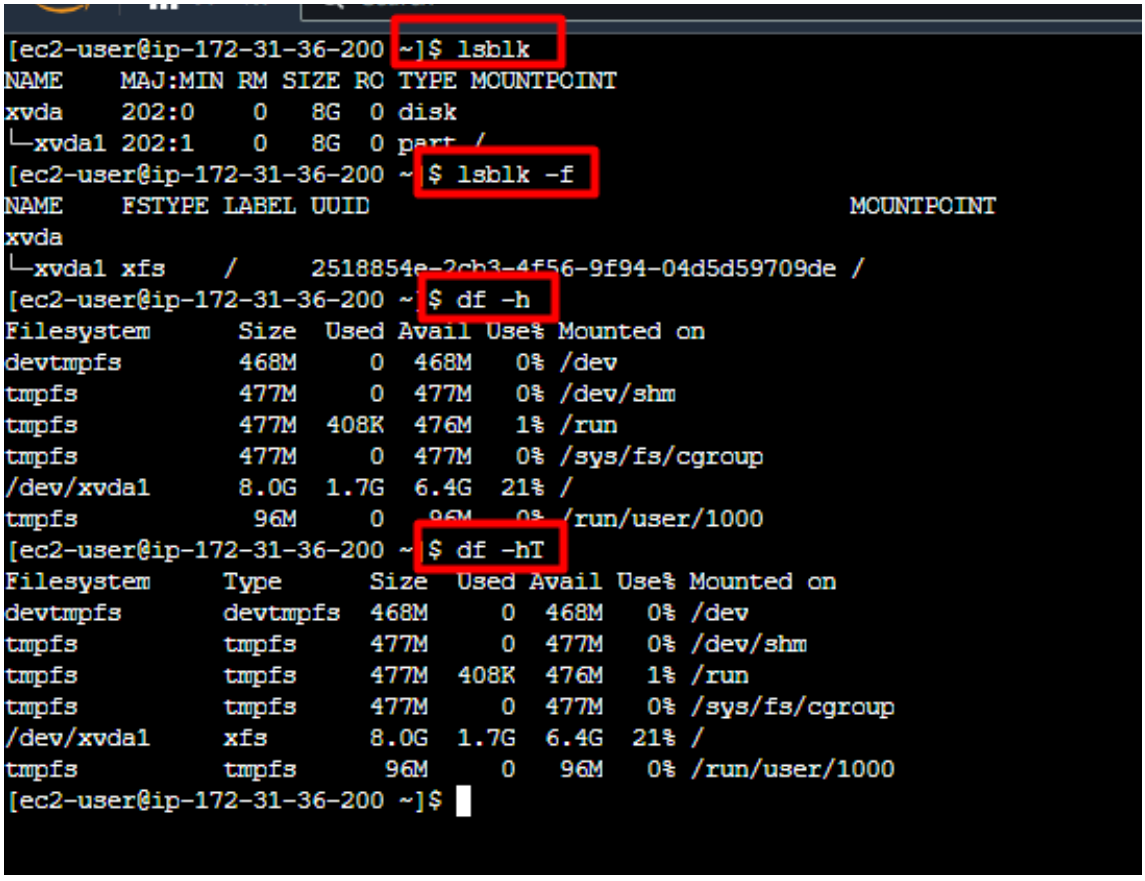


STEP 2 : Connect to server

Command use :

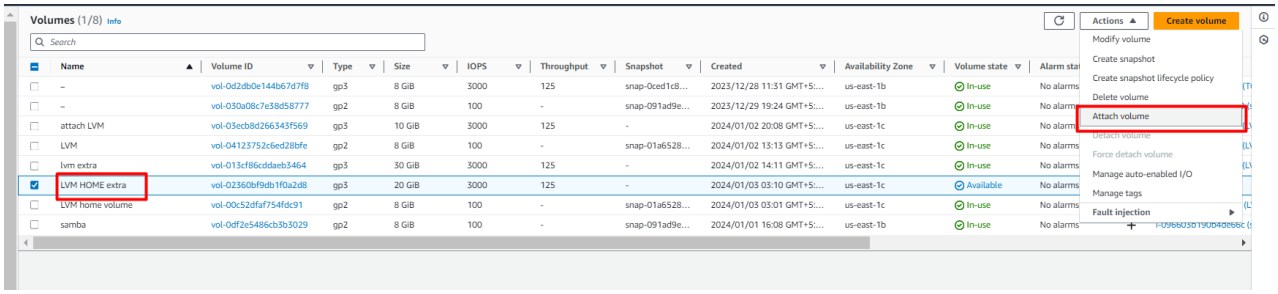
#lsblk

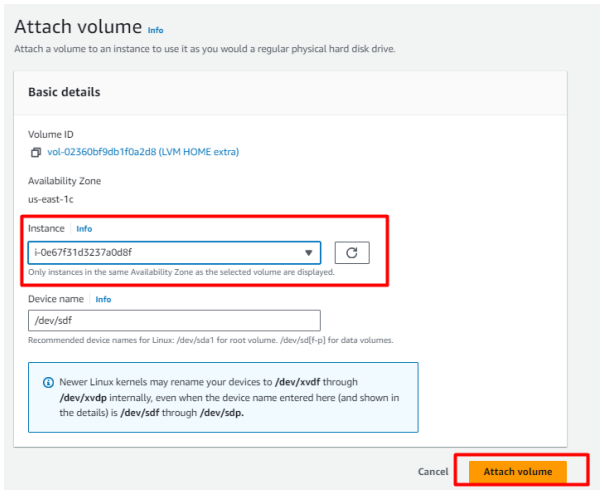
#df -hT



STEP 3 : Attach a extra volume to it so we can perform LVM

- Go to Volume
- Create a new volume with a 20G size
- Then attach the new volume to existing EC2 (we have created)





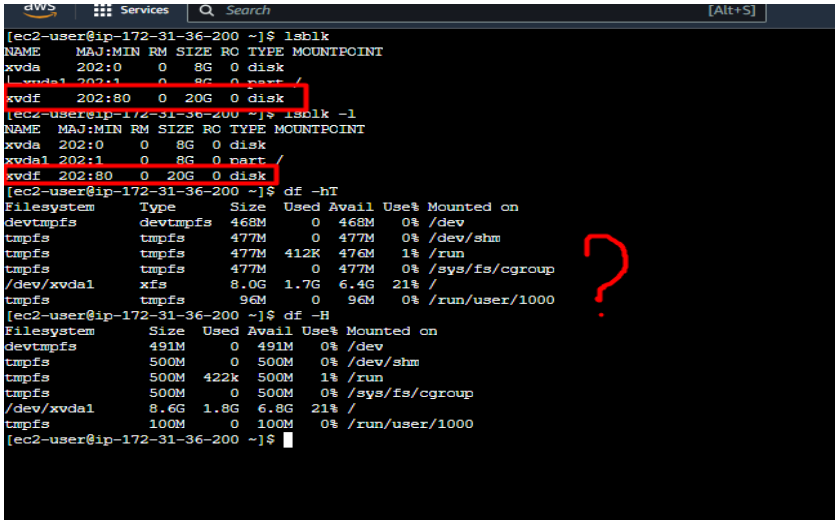
- Connect to server

Command use:

#lsvlk

#df -hT

❖ Hence this will act as the external volume to our root volume



STEP 4 : Now we will Perform LVM

- LVM = Logical Volume Manager
- LVM allows you to allocate disk space and strip, re-mirror, and resize logical volumes. Using LVM, you can allocate an EBS volume or a set of EBS volumes to one or more physical volumes
- Connect to the server

❖ Command used:
#lsblk
#df -h

❖ Now we will partition the volume (extra Volume)
#sudo su
#fdisk -l //this will show if they got any partition or not
#fdisk /dev/xdvf //this command will create a partition in the volume

To create a new a partition we will enter : n

How many partition you want (default) : 1

First sector (34-20971486, default = 2048) or {+-}size{KMGTP}:

Last sector (2048-20971486, default = 20971486) or {+-}size{KMGTP}:

❖ **Then Change the partition to Linux to Linux LVM**

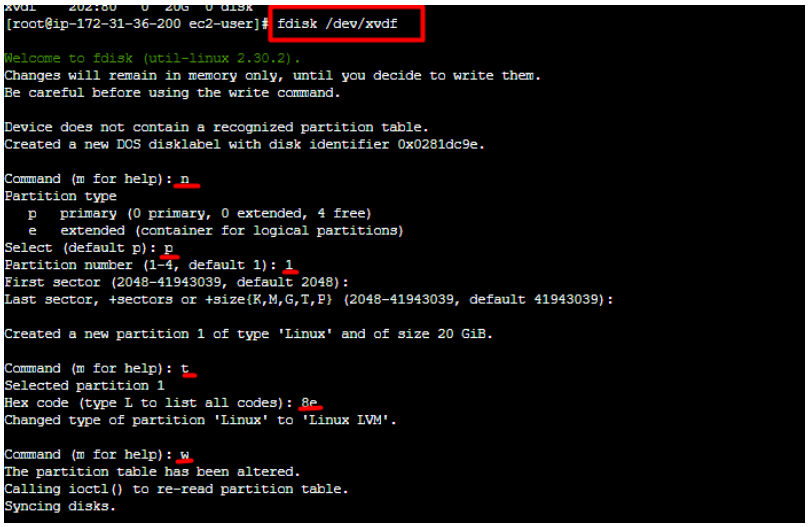
Command (? for help): t

Hex code or GUID (L to show codes, Enter = 8300): 8e

❖ **Now save and exit the file by**

Command (? for help): w

❖ This will help to write save and exit the file



❖ Use this commad to display the partition

#lsblk

#lsblk -f

```
[root@ip-172-31-36-200 ec2-user]# lsblk
NAME    MAJ:MIN RM SIZE RO TYPE MOUNTPOINT
xvda    202:0    0   8G  0 disk
└─xvda1 202:1    0   8G  0 part /
xvdf    202:80   0  20G  0 disk
└─xvdf1 202:81   0  20G  0 part
[root@ip-172-31-36-200 ec2-user]# fdisk -l
Disk /dev/xvda: 8 GiB, 8589934592 bytes, 16777216 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: gpt
Disk identifier: 2C404946-4426-42F6-AB1E-01C3E5BFF473

Device       Start      End  Sectors Size Type
/dev/xvda1    4096 16777182 16773087   8G Linux filesystem
/dev/xvda128  2048     4095     2048   1M BIOS boot

Partition table entries are not in disk order.


Disk /dev/xvdf: 20 GiB, 21474836480 bytes, 41943040 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: dos
Disk identifier: 0x0281dc9e

Device     Boot Start      End  Sectors Size Id Type
/dev/xvdf1       2048 41943039 41940992  20G 8e Linux LVM
[root@ip-172-31-36-200 ec2-user]#
```

STEP 5 : Now we will create a Physical Volume for Our Volume

Command Used :

#sudo pvcreate /dev/xvdf1 //This will create a physical volume for your Extra volume

#sudo pvdisplay //this will used to display the output off the physical volume

```
[root@ip-172-31-36-200 ec2-user]# sudo pvcreate /dev/xvdf1
  Physical volume "/dev/xvdf1" successfully created.
[root@ip-172-31-36-200 ec2-user]# pvdisplay
  "/dev/sdf1" is a new physical volume of "<20.00 GiB"
  --- NEW Physical volume ---
  PV Name               /dev/sdf1
  VG Name
  PV Size               <20.00 GiB
  Allocatable           NO
  PE Size               0
  Total PE              0
  Free PE               0
  Allocated PE          0
  PV UUID               DcBFXX-8PFB-bxYl-ycbo-tHdn-TnzI-cXHbf1
```

STEP 6 : Create volume groups and add the physical volumes into the volume group

Commad Used :

#sudo vgcreate rajapp /dev/xvdf1 //In place of rajapp you can name your Volume grp name

#sudo vgs/vgdisplay //this will display the Volume grp

```
[root@ip-172-31-36-200 ec2-user]# sudo vgcreate rajapp /dev/xvdf1
  Volume group "rajapp" successfully created
[root@ip-172-31-36-200 ec2-user]# vgs
  VG     #PV #LV #SN Attr   VSize   VFree
  rajapp   1   0   0 wz--n- <20.00g <20.00g
[root@ip-172-31-36-200 ec2-user]#
```

STEP 7 : Create a logical volume (LV) and a mount directory

Command used :

#sudo lvcreate -n rajLVM -L 10G rajapp // -n : represent name of the Logical volume

// -L : represent the length/size of the Volume

#sudo lvs // this will display the Logical Volume

```
[root@ip-172-31-36-200 ec2-user]# lvdisplay
  --- Logical volume ---
  LV Path                /dev/rajapp/rajLVM
  LV Name                rajLVM
  VG Name                rajapp
  LV UUID                2GYaki-Ectb-JjLr-Ir65-LTj9-dnHc-nw6GCG
  LV Write Access        read/write
  LV Creation host, time ip-172-31-36-200.ec2.internal, 2024-01-02 22:03:40 +0000
  LV Status              available
  # open                 0
  LV Size                10.00 GiB
  Current LE             2560
  Segments               1
  Allocation             inherit
  Read ahead sectors     auto
  - currently set to     256
  Block device           253:0

[root@ip-172-31-36-200 ec2-user]#
```

STEP 8 : a mount directory

- Now we will create a directory to mount

#mkdir /mnt1

- We will Create and mount a file system

#sudo mkfs -t xfs /dev/rajapp/rajLVM

#sudo mount /dev/rajapp/rajLVM /mnt1

#mount -av

- This command will used to display the output that the Volume and file system has been mount properly or not

#lsblk

#lsblk -f

#df -hT

```
[root@ip-172-31-36-200 ec2-user]# mkdir /mnt1
[root@ip-172-31-36-200 ec2-user]# sudo mkfs -t xfs /dev/rajapp/rajLVM
meta-data=/dev/rajapp/rajLVM     isize=512    agcount=4, agsize=655360 blks
         =                       sectsz=512   attr=2, projid32bit=1
         =                       crc=1        finobt=1, sparse=1, rmapbt=0
         =                       reflink=1    bigtime=0 inobtcount=0
data     =                       bsize=4096   blocks=2621440, imaxpct=25
         =                       sunit=0      swidth=0 blks
naming   =version 2              bsize=4096   ascii-ci=0, ftype=1
log      =internal log           bsize=4096   blocks=2560, version=2
         =                       sectsz=512   sunit=0 blks, lazy-count=1
realtime =none                   extsz=4096   blocks=0, rtextents=0
[root@ip-172-31-36-200 ec2-user]# mount /dev/rajapp/rajLVM /mnt1
[root@ip-172-31-36-200 ec2-user]# lsblk
NAME              MAJ:MIN RM SIZE RO TYPE MOUNTPOINT
xvda              202:0    0   8G  0 disk
└─xvda1           202:1    0   8G  0 part /
xvdf              202:80   0  20G  0 disk
└─xvdf1           202:81   0  20G  0 part
  └─rajapp-rajLVM 253:0    0  10G  0 lvm  /mnt1
[root@ip-172-31-36-200 ec2-user]#
```

```
[root@ip-172-31-36-200 ec2-user]# df -hT
Filesystem                Type      Size  Used Avail Use% Mounted on
devtmpfs                  devtmpfs  468M     0  468M   0% /dev
tmpfs                     tmpfs     477M     0  477M   0% /dev/shm
tmpfs                     tmpfs     477M  476K  476M   1% /run
tmpfs                     tmpfs     477M     0  477M   0% /sys/fs/cgroup
/dev/xvda1                xfs       8.0G  1.7G  6.4G  21% /
tmpfs                     tmpfs      96M     0   96M   0% /run/user/1000
tmpfs                     tmpfs      96M     0   96M   0% /run/user/0
/dev/mapper/rajapp-rajLVM xfs        10G  104M  9.9G   2% /mnt1
```

STEP 9 : If we want to permanently mount store the value in /etc/fstab :

#cat /etc/mtab //this command will show the path and xfs details that we want to store in /etc/fstab

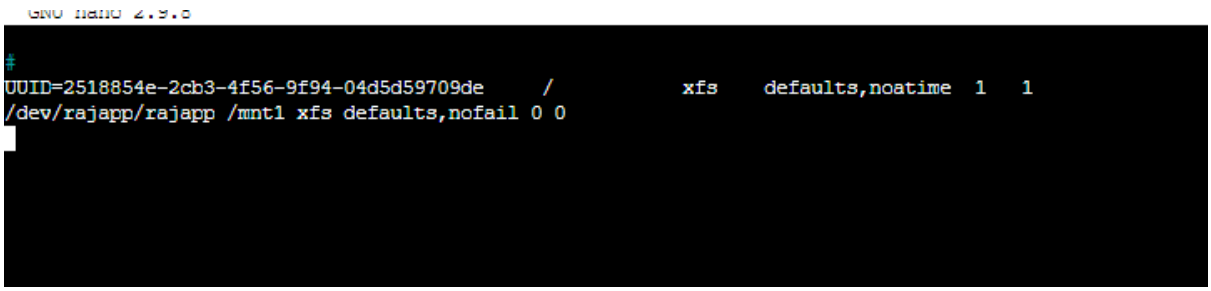
#nano etc/fstab

- Add the below command to store permanantly

“

/dev/rajapp/rajLVM /mnt1 xfs defaults,nofail 0 0

”

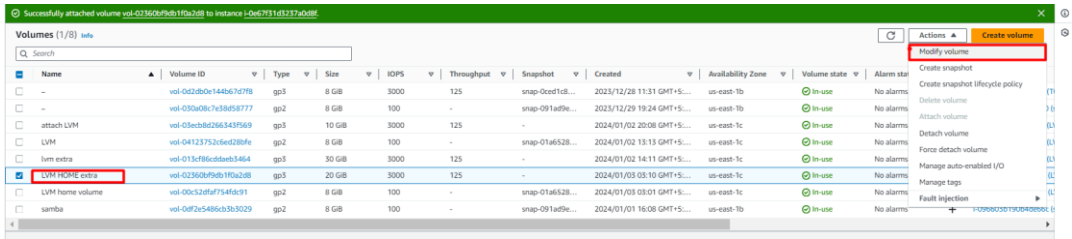


STEP 10 : Extend the logical volume

- There are two options for extending logical volumes:
  - Option 1: Increase the size of the existing EBS volume.
  - Option 2: Add additional EBS volumes to your volume group.

Option 1: Increase the size of the existing EBS volume.

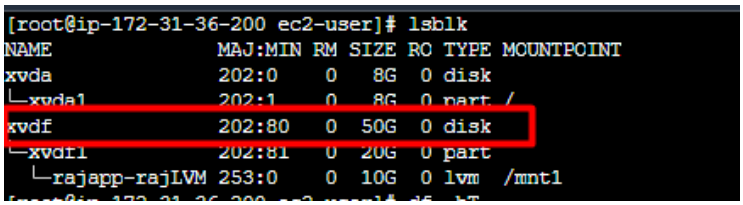
STEP 11 : Modify the Voulme

- Go to volume
- Select the extra volume we had attach
- And select Modify
- Increase the Volume Size By 50 G
- Save and exit
- 
- 

STEP 12 : Install the package Growpart

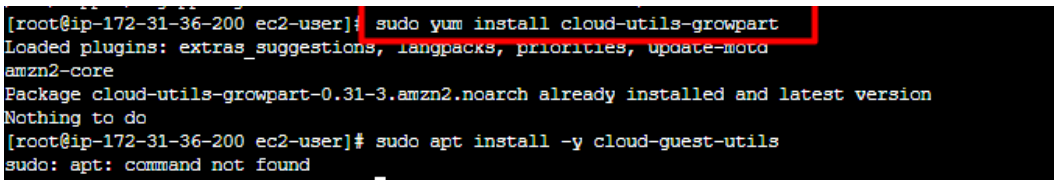
#lsblk

#df -h



❖ This command will use to install the growpart as we need to increase the volume size

sudo yum install cloud-utils-growpart



STEP 13 : Run the growpart command to extend the partition, and then run the pvresize command to resize the PV :

sudo growpart /dev/xvdf //this command will tell the filesystem to increase the volume size

sudo pvresize /dev/xvdf //we will create a Physical volume for the volume

#sudo pvs //this will display the Physical Volume

sudo vgs

```
[root@ip-172-31-36-200 ec2-user]# sudo growpart /dev/xvdf 1
CHANGED: partition=1 start=2048 old: size=41940992 end=41943040 new: size=104855519 end=104857567
[root@ip-172-31-36-200 ec2-user]# sudo pvresize /dev/xvdf1
  Physical volume "/dev/sdf1" changed
  1 physical volume(s) resized or updated / 0 physical volume(s) not resized
[root@ip-172-31-36-200 ec2-user]# sudo pvs
  PV         VG     Fmt  Attr PSize   PFree
  /dev/sdf1  rajapp lvm2 a--  <50.00g <40.00g
[root@ip-172-31-36-200 ec2-user]# sudo vgs
  VG     #PV #LV #SN Attr   VSize   VFree
  rajapp   1   1   0 wz--n- <50.00g <40.00g
[root@ip-172-31-36-200 ec2-user]#
```

❖ Run the **lvextend** command to extend the logical volume:

sudo lvextend -L 10G /dev/rajapp/rajLVM

sudo lvs

```
[root@ip-172-31-36-200 ec2-user # sudo lvextend -L 20G /dev/rajapp/rajLVM
  Size of logical volume rajapp/rajLVM changed from 10.00 GiB (2560 extents) to 20.00 GiB (5120 extents).
  Logical volume rajapp/rajLVM successfully resized.
[root@ip-172-31-36-200 ec2-user # lvs
  LV     VG     Attr       LSize  Pool Origin Data%  Meta%  Move Log Cpy%Sync Convert
  rajLVM rajapp -wi-ao---- 20.00g
```

❖ Extend the file system:

sudo yum install x rogs

sudo xfs_growfs /dev/rajapp/rajLVM

❖ This command will show the volume has increase

#df -hT

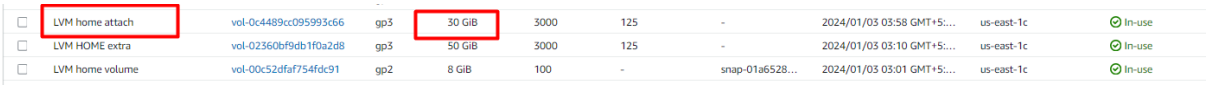
#lsblk

```
[root@ip-172-31-36-200 ec2-user]# lsblk
NAME              MAJ:MIN RM SIZE RO TYPE MOUNTPOINT
xvda              202:0    0   8G  0 disk
└─xvda1           202:1    0   8G  0 part /
xvdf              202:80   0  50G  0 disk
└─xvdf1           202:81   0  50G  0 part
  └─rajapp-rajLVM 253:0    0  20G  0 lvm  /mnt1
```

Option 2: Add additional EBS volumes to your volume group.

STEP 14 : Add additional EBS volumes to your volume group.

- Go to Volume
- Create a new Volume with a 10G size
- And create



LVM home attach	vol-0c4489cc095993c66	gp3	30 GiB	3000	125	-	2024/01/03 03:58 GMT+5:...	us-east-1c	In-use
LVM HOME extra	vol-02360bf9db1f0a2d8	gp3	50 GiB	3000	125	-	2024/01/03 03:10 GMT+5:...	us-east-1c	In-use
LVM home volume	vol-00c52dfaf754fdc91	gp2	8 GiB	100	-	snap-01a6528...	2024/01/03 03:01 GMT+5:...	us-east-1c	In-use

STEP 15 : Connect to server

```
[root@ip-172-31-36-200 ec2-user]# lsblk
NAME                MAJ:MIN RM SIZE RO TYPE MOUNTPOINT
xvda                202:0    0   8G  0 disk
└─xvda1             202:1    0   8G  0 part /
xvdf                202:80   0  50G  0 disk
└─xvdf1             202:81   0  50G  0 part
  └─rajapp-rajLVM 253:0    0  20G  0 lvm  /mnt1
xvdg                202:96   0  30G  0 disk
```

STEP 16 : Create a New disk partition for the file system

Command used :

#sudo fdisk -l

#sudo fdisk /dev/xvdg

- For partition :
  - **n**
  - **p**
  - **1**
  -
  -
  - **T**
  - **8e**
  - **w**

```
[root@ip-172-31-81-213 ec2-user]# fdisk /dev/xvdg

Welcome to fdisk (util-linux 2.30.2).
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 disklabel with disk identifier 0x57870706.

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 (2048-104857599, default 2048):
Last sector, +sectors or +size{K,M,G,T,P} (2048-104857599, default 104857599):

Created a new partition 1 of type 'Linux' and of size 50 GiB.

Command (m for help): t
Selected partition 1
Hex code (type L to list all codes): 8e
Changed type of partition 'Linux' to 'Linux LVM'.

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

[root@ip-172-31-81-213 ec2-user]#
```

```
[root@ip-172-31-81-213 ec2-user]# lsblk
NAME              MAJ:MIN RM SIZE RO TYPE MOUNTPOINT
xvda              202:0    0   8G  0 disk
└─xvda1           202:1    0   8G  0 part /
xvdf              202:80   0  20G  0 disk
└─xvdf1           202:81   0  20G  0 part
  └─rajapp-rajLVM 253:0    0  10G  0 lvm  /mnt1
xvdg              202:96   0  50G  0 disk
└─xvdg1           202:97   0  50G  0 part
```

STEP 17 : Create a New disk partition for the file system

- **Create physical volumes on the partition of your EBS volume**. Then run the **pvcreate** command

Command used :

```
# sudo pvcreate /dev/xvdg1
```

```
#sudo pvs
```

```
[root@ip-172-31-81-213 ec2-user]# sudo pvcreate /dev/xvdg1
  Physical volume "/dev/xvdg1" successfully created.
[root@ip-172-31-81-213 ec2-user]# pvs
  PV         VG     Fmt  Attr PSize   PFree
  /dev/sdf1  rajapp lvm2 a--  <20.00g <10.00g
  /dev/sdg1         lvm2 ---  <50.00g <50.00g
[root@ip-172-31-81-213 ec2-user]#
```

STEP 17 : Use the vgextend **command to extend the volume group and add the new volume.**

```
# sudo vgextend rajapp /dev/xvdg1
```

- To confirm the extension, run the **vgs** or **vgdisplay** command

```
# sudo vgs
```

```
[root@ip-172-31-81-213 ec2-user]# sudo vgextend rajapp /dev/xvdg1
  Volume group "rajapp" successfully extended
[root@ip-172-31-81-213 ec2-user]# vgs
  VG     #PV #LV #SN Attr   VSize  VFree
  rajapp   2   1   0 wz--n- 69.99g 59.99g
[root@ip-172-31-81-213 ec2-user]#
```

STEP 18 : Run the lvextend command to extend the logical volume:

```
# sudo lvextend -L 10G /dev/rajapp/rajLVM
```

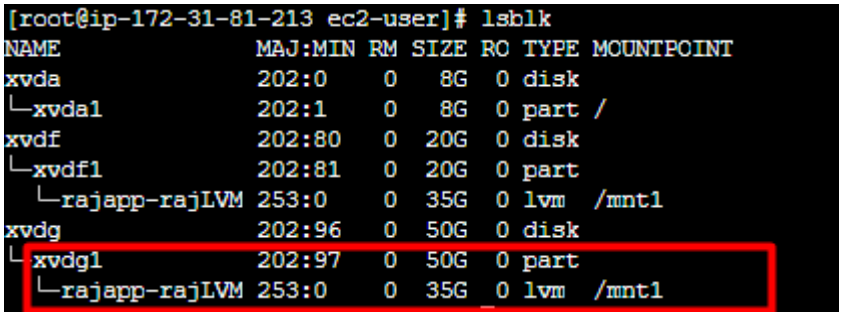
#sudo lvs

```
[root@ip-172-31-81-213 ec2-user]# sudo lvextend -L 25G /dev/rajapp/rajLVM
  Size of logical volume rajapp/rajLVM changed from 10.00 GiB (2560 extents) to 25.00 GiB (6400 extents).
  Logical volume rajapp/rajLVM successfully resized.
[root@ip-172-31-81-213 ec2-user]# lvs
  LV     VG     Attr       LSize  Pool Origin Data%  Meta%  Move Log Cpy%Sync Convert
  rajLVM rajapp -wi-ao---- 25.00g
[root@ip-172-31-81-213 ec2-user]#
```

STEP 19 : follow the steps for XFS

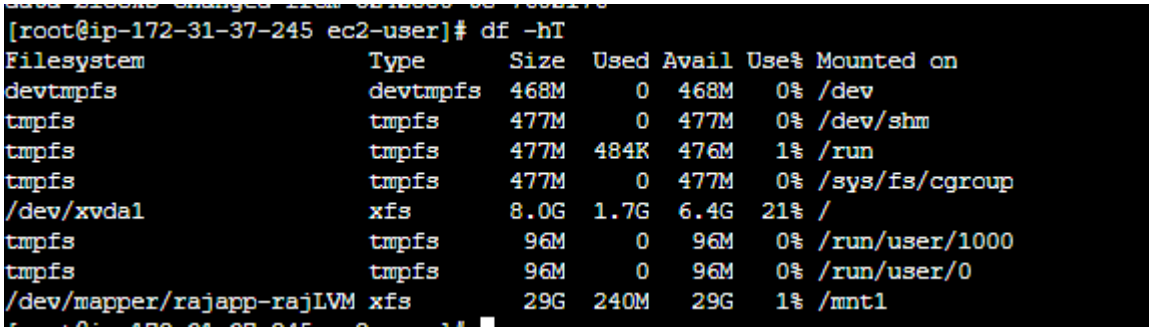
```
#sudo xfs_growfs /dev/examplegroup1/lvexample1
```

STEP 20 : OUTPUT



```
[root@ip-172-31-81-213 ec2-user]# lsblk
NAME                MAJ:MIN RM SIZE RO TYPE MOUNTPOINT
xvda                202:0    0   8G  0 disk
└─xvda1             202:1    0   8G  0 part /
xvdf                202:80   0  20G  0 disk
└─xvdf1             202:81   0  20G  0 part
  └─rajapp-rajLVM 253:0    0  35G  0 lvm  /mnt1
xvdg                202:96   0  50G  0 disk
└─xvdg1             202:97   0  50G  0 part
  └─rajapp-rajLVM 253:0    0  35G  0 lvm  /mnt1
```

It works properly as this below is different layer output but it works properly and do not extend the size by low always choose higher value



```
[root@ip-172-31-37-245 ec2-user]# df -hT
Filesystem                Type      Size  Used Avail Use% Mounted on
devtmpfs                  devtmpfs  468M     0  468M   0% /dev
tmpfs                     tmpfs     477M     0  477M   0% /dev/shm
tmpfs                     tmpfs     477M  484K  476M   1% /run
tmpfs                     tmpfs     477M     0  477M   0% /sys/fs/cgroup
/dev/xvda1                xfs       8.0G  1.7G  6.4G  21% /
tmpfs                     tmpfs      96M     0   96M   0% /run/user/1000
tmpfs                     tmpfs      96M     0   96M   0% /run/user/0
/dev/mapper/rajapp-rajLVM xfs        29G  240M   29G   1% /mnt1
```

REFERENECE :

Doc : https://repost.aws/knowledge-center/create-lv-on-ebs-partition

Youtube : https://youtu.be/FsSf3rmu2Cc?si=hwwDzVE4ICNcq6Re