Logical Volume Manager (LVM)

1. First check available disks for this lab using lsblk command-

```
[root@rhel9-server /]# lsblk
NAME
             MAJ:MIN RM
                           SIZE RO TYPE MOUNTPOINTS
sda
                                  0 disk
                8:0
                            10G
                        Θ
 -sda1
                8:1
                        0
                              1G
                                  0 part
  -sda2
                             2G
                8:2
                        0
                                  0 part
  -sda3
                8:3
                        Θ
                              1G
                                  0 part
                                  0 part
  -sda4
                        0
                              1K
                8:4
  -sda5
                8:5
                        Θ
                              1G
                                  0 part
  -sda6
                        0
                              1G
                                  0 part
                8:6
  -sda7
                             2G
                        0
                                  0 part
                8:7
 -sda8
                8:8
                        0
                              1G
                                  0 part
sdb
                                  0 disk
                8:16
                        0
                            10G
 -sdb1
                8:17
                        0
                              1G
                                  0 part
  -sdb2
                              1G
                8:18
                        0
                                    part
                                  Θ
  -sdb3
                8:19
                        0
                              1G
                                  0 part
  -sdb4
                              1G
                8:20
                        0
                                  0 part
  -sdb5
                8:21
                              1G
                        0
                                  0 part
 -sdb6
                8:22
                        Θ
                              1G
                                    part
  -sdb7
                        0
                              1G
                                  0 part
                8:23
sdc
                                  0 disk
                        0
                             10G
                8:32
sdd
                                  0 disk
                        0
                            10G
                8:48
sr0
               11:0
                          1024M
                        1
                                  0 rom
                                  0 disk
             259:0
                        Θ
                           100G
nvme0n1
 -nvme0n1p1 259:1
                                  0 part /boot
                        0
                             2G
                                  0 part
  -nvme0n1p2 259:2
                            50G
                        0
 -nvme0n1p3 259:3
                        0
                             4G
                                  0 part [SWAP]
[root@rhel9-server /]#
[root@rhel9-server /]#
```

2. Doing this lab using MBR partitioning. Same can be done for GPT as well. Here we need to create two 4GB partitions in disk sdc as sdc1 & sdc2. Keep it primary & change its partition type to LVM using 8e (Hex code or alias) & then list it using |sb|k command-

```
[root@rhel9-server /]# fdisk /dev/sdc
Welcome to fdisk (util-linux 2.37.4).
Changes will remain in memory only, until you decide to write them.
Be careful before using the write command.
Command (m for help): n
Partition type
       primary (0 primary, 0 extended, 4 free)
       extended (container for logical partitions)
Select (default p): p
Partition number (1-4, default 1): 1
First sector (2048-20971519, default 2048):
Last sector, +/-sectors or +/-size{K,M,G,T,P} (2048-20971519, default 20971519): +4G
Created a new partition 1 of type 'Linux' and of size 4 GiB.
Command (m for help): t
Selected partition 1
Hex code or alias (type L to list all): 8e
Changed type of partition 'Linux' to 'Linux LVM'.
```

```
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 (8390656-20971519, default 8390656):
Last sector, +/-sectors or +/-size{K,M,G,T,P} (8390656-20971519, default 20971519): +4G

Created a new partition 2 of type 'Linux' and of size 4 GiB.

Command (m for help): t
Partition number (1,2, default 2): 2
Hex code or alias (type L to list all): 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@rhel9-server /]#
[root@rhel9-server /]# partprobe /dev/sdc
[root@rhel9-server /]#
```

```
[root@rhel9-server /]# lsblk
NAME
             MAJ:MIN RM
                          SIZE RO TYPE MOUNTPOINTS
                            10G
sda
               8:0
                       Θ
                                 0 disk
 -sda1
               8:1
                       Θ
                             1G
                                 0 part
 -sda2
               8:2
                       Θ
                             2G
                                 0 part
  -sda3
               8:3
                       Θ
                             1G
                                 0 part
  -sda4
               8:4
                       Θ
                             1K
                                 0 part
  -sda5
               8:5
                       Θ
                             1G
                                 Θ
                                   part
  -sda6
               8:6
                       Θ
                             1G
                                 Θ
                                   part
  -sda7
               8:7
                       Θ
                             2G
                                 0 part
  -sda8
               8:8
                       Θ
                             1G
                                 0 part
sdb
               8:16
                       0
                            10G
                                 0 disk
 -sdb1
               8:17
                       0
                             1G
                                 0 part
  -sdb2
               8:18
                       Θ
                             1G
                                 0 part
                             1G
  -sdb3
               8:19
                       Θ
                                 0 part
  -sdb4
               8:20
                       0
                             1G
                                 Θ
                                   part
 -sdb5
               8:21
                       Θ
                             1G
                                 0 part
  -sdb6
               8:22
                       Θ
                             1G
                                 0 part
 -sdb7
               8:23
                       Θ
                             1G
                                 0 part
sdc
               8:32
                       Θ
                            10G
                                 0 disk
 -sdc1
               8:33
                       0
                             4G
                                 0 part
  -sdc2
               8:34
                       Θ
                             4G
                                 0 part
sdd
               8:48
                       Θ
                            10G
                                 0 disk
              11:0
                       1 1024M
                                 0 rom
sr0
nvme0n1
             259:0
                       Θ
                           100G
                                 0 disk
 -nvme0n1p1 259:1
                       Θ
                             2G
                                 0 part /boot
  -nvme0n1p2 259:2
                       Θ
                            50G
                                 0 part
 -nvme0n1p3 259:3
                       0
                             4G
                                 0 part
                                         [SWAP]
```

3. Create first physical volume using partition sdc1 & verify it-

```
[root@rhel9-server /]# pvdisplay
Devices file PVID E0dA4pgeTp8eGnXHfdlV6o6h5SdpAnib last seen on /dev/sdc1 not found.
Devices file PVID m4v1p4rhhc0mecrRCzjAIPG9GJIowVfK last seen on /dev/sdc2 not found.
Devices file PVID hHofgUZNHe2BMW0YgcfjHcx2ljRehDXD last seen on /dev/sdd1 not found.
    "/dev/sdc1" is a new physical volume of "4.00 GiB"
          NEW Physical volume -
   PV Name
                                         /dev/sdc1
   VG Name
   PV Size
                                         4.00 GiB
   Allocatable
   PE Size
                                         Θ
   Total PE
                                         Θ
   Free PE
                                         Θ
   Allocated PE
                                         Θ
   PV UUID
                                         2KicJN-v74I-Japr-qU0o-jQwt-j1Sw-turL6E
```

Note: Ignore the "not found" message. This was due to previous lab. It won't show in yours.

Note: It is showing Allocatable as No, cause this physical volume is not a part of any volume group yet.

4. Create new volume group & verify it-

```
[root@rhel9-server /]# vgcreate abhay_vol /dev/sdc1
Volume group "abhay_vol" successfully created
```

```
[root@rhel9-server /]# vgdisplay
 Devices file PVID E0dA4pgeTp8eGnXHfdlV6o6h5SdpAnib last seen on /dev/sdc1 not found.
 Devices file PVID m4v1p4rhhc0mecrRCzjAIPG9GJIowVfK last seen on /dev/sdc2 not found.
 Devices file PVID hHofgUZNHe2BMW0YgcfjHcx2ljRehDXD last seen on /dev/sdd1 not found.
  --- Volume group ---
 VG Name
                        abhay vol
 System ID
  Format
                        lvm2
 Metadata Areas
 Metadata Sequence No 1
                        read/write
 VG Access
 VG Status
                        resizable
 MAX LV
 Cur LV
                        Θ
                        Θ
 Open LV
 Max PV
                        Θ
 Cur PV
  Act PV
 VG Size
                        <4.00 GiB
 PE Size
                        4.00 MiB
  Total PE
                        1023
 Alloc PE / Size
                        0 / 0
  Free PE / Size
                        1023 / <4.00 GiB
  VG UUID
                        LknOLz-eKrv-IwN6-h2vl-mbzR-qYxi-wXTsMr
```

5. Now physical volume created earlier will show allocatable "yes" this time as it is added in newly created volume group-

```
[root@rhel9-server /]# pvdisplay
 Devices file PVID E0dA4pgeTp8eGnXHfdlV6o6h5SdpAnib last seen on /dev/sdc1 not found.
 Devices file PVID m4v1p4rhhc0mecrRCzjAIPG9GJIowVfK last seen on /dev/sdc2 not found.
 Devices file PVID hHofgUZNHe2BMW0YgcfjHcx2ljRehDXD last seen on /dev/sdd1 not found.
  --- Physical volume -
 PV Name
                         /dev/sdc1
                        abhay_vol
4.00 GiB / not usable 4.00 MiB
 VG Name
 PV Size
 Allocatable
                         4.00 MiB
 PE Size
 Total PE
                         1023
 Free PE
                         1023
 Allocated PE
                        Θ
 PV UUID
                         2KicJN-v74I-Japr-qU0o-jQwt-j1Sw-turL6E
```

6. We will create two logical volumes "atlantis" & "waikiki" each of 1GB in size-

```
[root@rhel9-server /]# lvcreate -n atlantis -L +1G abhay_vol
WARNING: ext4 signature detected on /dev/abhay_vol/atlantis at offset 1080. Wipe it? [y/n]: y
Wiping ext4 signature on /dev/abhay_vol/atlantis.
Logical volume "atlantis" created.
```

Note: Ignore this warning. It won't show in your case.

It is showing detail of atlantis logical volume in below snap.

```
[root@rhel9-server /]# lvdisplay /dev/abhay_vol/atlantis
  Devices file PVID E0dA4pgeTp8eGnXHfdlV6o6h5SdpAnib last seen on /dev/sdc1 not found.
  Devices file PVID m4v1p4rhhc0mecrRCzjAIPG9GJIowVfK last seen on /dev/sdc2 not found.
 Devices file PVID hHofgUZNHe2BMW0YgcfjHcx2ljRehDXD last seen on /dev/sdd1 not found.
  --- Logical volume ---
 LV Path
                         /dev/abhay_vol/atlantis
 LV Name
                         atlantis
 VG Name
                         abhay_vol
                         wKPdrX-6jZC-s4vI-keMA-uf0u-WII0-aCf7Tj
 LV UUID
 LV Write Access
                        read/write
 LV Creation host, time rhel9-server.cricbuzz.com, 2022-11-11 09:14:42 +0530
                        available
 LV Status
 # open
 LV Size
                         2.00 GiB
 Current LE
                         512
  Segments
 Allocation
                         inherit
 Read ahead sectors
                         auto
  - currently set to
                         256
 Block device
                         253:0
```

Now, vgdisplay will show available space after creating first volume. It is nearly 3GB left to allocate.

```
[root@rhel9-server /]# vgdisplay
Devices file PVID E0dA4pgeTp8eGnXHfdlV6o6h5SdpAnib last seen on /dev/sdc1 not found.
Devices file PVID m4v1p4rhhc0mecrRCzjAIPG9GJIowVfK last seen on /dev/sdc2 not found.
Devices file PVID hHofgUZNHe2BMW0YgcfjHcx2ljRehDXD last seen on /dev/sdd1 not found.
    --- Volume group ---
   VG Name
                                      abhay vol
   System ID
   Format
                                      lvm2
   Metadata Areas
   Metadata Sequence No 2
   VG Access
                                      read/write
   VG Status
                                      resizable
   MAX LV
   Cur LV
   Open LV
                                     Θ
   Max PV
                                     Θ
   Cur PV
   Act PV
                                    <4.00 GiB
   VG Size
   PE Size
                                     4.00 MiB
   Total PE
                                      1023
   Alloc PE / Size
Free PE / Size
                                      256 / 1.00 GiB
767 / <3.00 GiB
   VG UUID
                                      LknOLz-eKrv-IWN6-h2vl-mbzR-qYxi-wXTsMr
```

Waikiki LV creation-

```
[root@rhel9-server /]# lvcreate -n waikiki -L +1G abhay_vol
Logical volume "waikiki" created.
[root@rhel9-server /]#
```

```
[root@rhel9-server /]# lvdisplay /dev/abhay_vol/waikiki
Devices file PVID E0dA4pgeTp8eGnXHfdlV6o6h5SdpAnib last seen on /dev/sdc1 not found.
Devices file PVID m4v1p4rhhc0mecrRCzjAIPG9GJIowVfK last seen on /dev/sdc2 not found.
  Devices file PVID hHofgUZNHe2BMW0YgcfjHcx2ljRehDXD last seen on /dev/sdd1 not found.
  --- Logical volume --
  LV Path
                                /dev/abhay vol/waikiki
  LV Name
                                waikiki
  VG Name
                                abhay vol
  LV UUID
                                au8zZ7-usfm-bqGx-4lnN-qA0E-gSl0-yyZ4vI
  LV Write Access
                                read/write
  LV Creation host, time rhel9-server.cricbuzz.com, 2022-11-11 09:15:36 +0530
  LV Status
                                available
  # open
  LV Size
                                5.00 GiB
                                1280
  Current LE
  Segments
                                3
  Allocation
                                inherit
  Read ahead sectors
                                auto
  - currently set to
                                256
  Block device
                                253:1
```

It is showing detail of waikiki logical volume in above snap.

```
root@rhel9-server /]# vqdisplay
Devices file PVID E0dA4pgeTp8eGnXHfdlV6o6h5SdpAnib last seen on /dev/sdc1 not found.
Devices file PVID m4v1p4rhhc0mecrRCzjAIPG9GJIowVfK last seen on /dev/sdc2 not found.
 Devices file PVID hHofgUZNHe2BMW0YgcfjHcx2ljRehDXD last seen on /dev/sdd1 not found.
 --- Volume group ---
 VG Name
                       abhay vol
 System ID
 Format
                       lvm2
 Metadata Areas
                       1
 Metadata Sequence No 3
                       read/write
 VG Access
                       resizable
 VG Status
 MAX LV
                       0
 Cur LV
                       2
                       0
 Open LV
                       0
 Max PV
 Cur PV
 Act PV
 VG Size
                       <4.00 GiB
PE Size
                       4.00 MiB
 Total PE
                       1023
 Alloc PE / Size
                       512 / 2.00 GiB
 Free PE / Size
                       511 //<2.00 GiB_
 VG UUID
                       LknOLz-eKrv-IwN6-h2vl-mbzR-qYxi-wXTsMr
```

We have nearly 2GB space left after creating both logical volumes.

6. Next, we will format atlantis volume with ext4 & waikiki with xfs file system-

```
[root@rhel9-server /]# mkfs.ext4 /dev/abhay vol/atlantis
mke2fs 1.46.5 (30-Dec-2021)
Creating filesystem with 262144 4k blocks and 65536 inodes
Filesystem UUID: 2b0484ef-c49b-4350-bf5a-285e1c854f9a
Superblock backups stored on blocks:
        32768, 98304, 163840, 229376
Allocating group tables: done
Writing inode tables: done
Creating journal (8192 blocks): done
Writing superblocks and filesystem accounting information: done
[root@rhel9-server /]# mkfs.xfs /dev/abhay_vol/waikiki
meta-data=/dev/abhay_vol/waikiki isize=512
                                                 agcount=4, agsize=65536 blks
                                                 attr=2, projid32bit=1
                                   sectsz=512
                                                finobt=1, sparse=1, rmapbt=0
bigtime=1 inobtcount=1
                                   crc=1
                                   reflink=1
          =
data
                                   bsize=4096
                                                blocks=262144, imaxpct=25
                                   sunit=0
                                                 swidth=0 blks
naming
          =version 2
                                   bsize=4096
                                                 ascii-ci=0, ftype=1
                                                blocks=2560, version=2
          =internal log
                                   bsize=4096
log
                                                 sunit=0 blks, lazy-count=1
                                   sectsz=512
realtime =none
                                   extsz=4096
                                                 blocks=0, rtextents=0
```

Note: ext4 logical volume can be expand & reduce, but xfs can only expand.

7. Verify created logical volume using Isblk command-

[root@rhel9-server /]#

```
[root@rhel9-server /]# lsblk -f
                                     FSVER
                                              LABEL UUID
                                                                                               FSAVAIL FSUSE% MOUNTPOINTS
sda
  -sda1
                        xfs
                                                     b1d8efeb-9a48-45d3-b762-275cd0660acd
                                                     49c4d6de-3156-4900-9967-a46f267db90c
                        xfs
  -sda2
                                                     033e82b8-c3e2-408a-95be-0a533494b506
  -sda3
                        xfs
  -sda4
  -sda5
                        xfs
                                                     2d0cd70d-f32c-45d4-be26-51ec9dcdf273
  -sda6
                        xfs
                                                     a3218450-cd05-437c-9398-8cef5171754d
                                                     b30a85b1-840c-430e-b8bb-69daf9b378e6
  -sda7
                        xfs
  -sda8
                        xfs
                                                     009478f9-959d-4db4-b681-c3da8e30d851
sdb
  -sdb1
                        xfs
                                                     580350e9-2a6e-420d-b569-83256a032c93
  -sdb2
                        xfs
                                                     28949252-a971-42c6-a6ea-f2fd40e8efc3
                        xfs
                                                     28aaa96a-0026-4a35-a688-43eeb84f75c4
  -sdb3
                                                     5c78820c-94a4-4af1-a31d-2378214dde0b
  -sdb4
                        xfs
  -sdb5
                                                     8ff2a55d-722b-4b43-9ee9-4889d2e1924f
                        xfs
                                                     14ea51d7-64e3-435e-893b-4097bba6874b
  -sdb6
                        xfs
  -sdb7
                        xfs
                                                     80b2fe9a-0f93-4b12-a333-c2070cb70b67
sdc
  -sdc1
                        LVM2_member LVM2 001
                                                     2KicJN-v74I-Japr-qU0o-jQwt-j1Sw-turL6E
  —abhay_vol-atlantis ext4
—abhay_vol-waikiki xfs
                                                     2b0484ef-c49b-4350-bf5a-285e1c854f9a
                                                     98a887cf-c703-4900-95f5-ed011bf993e1
  -sdc2
sdd
sr0
nvme0n1
                                                                                                  1.8G
                                                                                                          11% /boot
 -nvme0n1p1
                                                     1b97b83e-8c41-4cd9-a9e6-894073b7299f
                                                                                                          21% /
[SWAP]
  -nvme0n1p2
                        xfs
                                                     4bec8248-9eb3-48da-902d-b0b7c7e10d16
                                                                                                 39.7G
nvme0n1p3
                                                     89f90bba-41f6-4381-941e-8b8d7dc8b66e
                        swap
[root@rhel9-server /]#
```

8. Now mount these two logical volumes & add some data in it as shown-

```
[root@rhel9-server /]#
[root@rhel9-server /]# mount /dev/abhay_vol/atlantis /disks/atlantis data drive/
[root@rhel9-server /]# mount /dev/abhay_vol/waikiki /disks/waikiki_data_drive/
[root@rhel9-server /]# df -h
                                Used Avail Use% Mounted on
Filesystem
                           Size
devtmpfs
                           856M
                                   0 856M
                                            0% /dev
                                            0% /dev/shm
                           875M
                                   0 875M
tmpfs
tmpfs
                                9.5M 341M
                           350M
                                            3% /run
/dev/nvme0n1p2
                            50G
                                      40G
                                           21% /
                                 11G
                                           11% /boot
                                      1.8G
/dev/nvme0n1p1
                           2.0G
                                222M
                                            0% /run/user/0
tmpfs
                           175M
                                   Θ
                                      175M
tmpfs
                           175M
                                     175M
                                            0% /run/user/1000
                                   Θ
                                            1% /disks/atlantis data drive
/dev/mapper/abhay vol-atlantis 974M
                                      907M
                                 24K
                                            4% /disks/waikiki data drive
/dev/mapper/abhay_vol-waikiki 1014M
                                 40M 975M
[root@rhel9-server atlantis data drive]# cal >cal.txt
[root@rhel9-server atlantis data drive]# touch atl{1..5}.txt
[root@rhel9-server atlantis data drive]# mkdir IT Account Admin
[root@rhel9-server atlantis data drive]# ls -ll
total 16
drwxr-xr-x. 2 root root 4096 Nov 11 09:19 Account
drwxr-xr-x. 2 root root 4096 Nov 11 09:19 Admin
drwxr-xr-x. 2 root root 4096 Nov 11 09:19 IT
                            0 Nov 11 09:19 atl1.txt
-rw-r--r--. 1 root root
                            0 Nov 11 09:19 atl2.txt
-rw-r--r--. 1 root root
-rw-r--r--. 1 root root
                            0 Nov 11 09:19 atl3.txt
-rw-r--r--. 1 root root
                            0 Nov 11 09:19 atl4.txt
-rw-r--r--. 1 root root
                            0 Nov 11 09:19 atl5.txt
[root@rhel9-server atlantis data drive]# cd ..
[root@rhel9-server disks]# cd waikiki data drive/
[root@rhel9-server waikiki data drive]# ls
[root@rhel9-server waikiki data drive]# cp /etc/passwd .
[root@rhel9-server waikiki_data_drive]# touch wk{1..5}.txt
[root@rhel9-server waikiki data drive]# mkdir SAM QA
[root@rhel9-server waikiki data drive]# ls -ll
total 4
drwxr-xr-x. 2 root root
                            6 Nov 11 09:20 OA
drwxr-xr-x. 2 root root
                            6 Nov 11 09:20 SAM
-rw-r--r--. 1 root root 2912 Nov 11 09:19 passwd
-rw-r--r--. 1 root root
                            0 Nov 11 09:20 wk1.txt
                            0 Nov 11 09:20 wk2.txt
-rw-r--r--. 1 root root
                            0 Nov 11 09:20 wk3.txt
-rw-r--r--. 1 root root
-rw-r--r--. 1 root root
                            0 Nov 11 09:20 wk4.txt
                            0 Nov 11 09:20 wk5.txt
-rw-r--r--. 1 root root
```

Steps to Extend Logical Volume Size in LVM

1. If we try to extend atlantis logical volume by 2GB, it fails due to insufficient space in volume group-

```
[root@rhel9-server /]# lvextend -L +2G /dev/abhay_vol/atlantis
  Insufficient free space: 512 extents needed, but only 511 available
[root@rhel9-server /]#
```

2. We will add additional partition sdc2 in logical volume abhay_vol to increase its size in order to allocate space to logical volumes-

```
[root@rhel9-server /]# pvcreate /dev/sdc2
Physical volume "/dev/sdc2" successfully created.
[root@rhel9-server /]#
```

This physical volume is still unallocated to volume group as shown below-

```
[root@rhel9-server /]# pvdisplay
  Devices file PVID E0dA4pgeTp8eGnXHfdlV6o6h5SdpAnib last seen on /dev/sdc1 not found.
  Devices file PVID m4v1p4rhhc0mecrRCzjAIPG9GJIowVfK last seen on /dev/sdc2 not found.
  Devices file PVID hHofgUZNHe2BMW0YgcfjHcx2ljRehDXD last seen on /dev/sdd1 not found.
  --- Physical volume --
  PV Name
                        /dev/sdc1
  VG Name
                        abhay vol
                        4.00 GiB / not usable 4.00 MiB
  PV Size
  Allocatable
                        ves
                        4.00 MiB
  PE Size
  Total PE
                        1023
  Free PE
                        511
  Allocated PE
                        512
  PV UUID
                        2KicJN-v74I-Japr-qU0o-jQwt-j1Sw-turL6E
  "/dev/sdc2" is a new physical volume of "4.00 GiB"
  --- NEW Physical volume ---
  PV Name
                        /dev/sdc2
  VG Name
  PV Size
                        4.00 GiB
  Allocatable
  PE Size
                        Θ
  Total PE
                        Θ
  Free PE
                        0
  Allocated PE
  PV UUID
                        v9Ac25-YrAj-Cq0D-BIxJ-4FNM-0e8f-z3bjPr
```

3. To allocate this use command as shown-

```
[root@rhel9-server /]# vgextend abhay_vol /dev/sdc2
Volume group "abhay_vol" successfully extended
[root@rhel9-server /]#
```

Verify it. This will show sdc2 is allocated to volume group-

```
[root@rhel9-server /]# pvdisplay
Devices file PVID E0dA4pgeTp8eGnXHfdlV6o6h5SdpAnib last seen on /dev/sdc1 not found.
Devices file PVID m4v1p4rhhc0mecrRCzjAIPG9GJIowVfK last seen on /dev/sdc2 not found.
Devices file PVID hHofgUZNHe2BMW0YgcfjHcx2ljRehDXD last seen on /dev/sdd1 not found.
  --- Physical volume --
  PV Name
                                  /dev/sdc1
  VG Name
                                 abhay_vol
  PV Size
                                 4.00 GiB / not usable 4.00 MiB
  Allocatable
                                 ves
                                  4.00 MiB
  PE Size
  Total PE
                                 1023
                                 511
  Free PE
  Allocated PE
                                 512
  PV UUID
                                 2KicJN-v74I-Japr-qU0o-jQwt-j1Sw-turL6E
  --- Physical volume -
  PV Name
                                  /dev/sdc2
  VG Name
                                 abhay_vol
                                 4.00 GiB / not usable 4.00 MiB
  PV Size
  Allocatable
                                  ves
  PE Size
                                  4.00 MiB
  Total PE
                                 1023
                                 1023
  Free PE
  Allocated PE
  PV UUID
                                 v9Ac25-YrAj-Cq0D-BIxJ-4FNM-0e8f-z3bjPr
```

4. Now extend atlantis logical volume size by 2GB-

```
[root@rhel9-server /]# lvextend -L +2G /dev/abhay_vol/atlantis
   Size of logical volume abhay_vol/atlantis changed from 1.00 GiB (256 extents) to 3.00 GiB (768 extents).
   Logical volume abhay_vol/atlantis successfully resized.
[root@rhel9-server /]#
```

However, it will still show same old volume size-

```
[root@rhel9-server /]# df -h
                                       Used Avail Use% Mounted on
Filesystem
                                 Size
devtmpfs
                                 856M
                                          0
                                            856M
                                                    0% /dev
tmpfs
                                             875M
                                                    0% /dev/shm
                                 875M
                                          0
                                 350M
                                             341M
tmpfs
                                       9.5M
                                                    3% /run
/dev/nvme0n1p2
                                  50G
                                        11G
                                              40G
                                                   21% /
                                 2.0G
/dev/nvme0n1p1
                                       222M
                                             1.8G
                                                    11% /boot
tmpfs
                                 175M
                                             175M
                                          0
                                                    0% /run/user/0
                                 175M
                                             175M
tmpfs
                                          0
                                                    0% /run/user/1000
/dev/mapper/abhay vol-atlantis | 974M
                                        24K
                                             907M
                                                     1% /disks/atlantis data drive
                                                    4% /disks/waikiki data drive
/dev/mapper/abhay_vol-waikiki
                                        40M 975M
                                1014m
```

5. To update it, use below command for ext4 file system-

```
[root@rhel9-server /]# resize2fs /dev/abhay_vol/atlantis
resize2fs 1.46.5 (30-Dec-2021)
Filesystem at /dev/abhay_vol/atlantis is mounted on /disks/atlantis_data_drive; on-line resizing required
old_desc_blocks = 1, new_desc_blocks = 1
The filesystem on /dev/abhay_vol/atlantis is now 786432 (4k) blocks long.
```

Now it will be updated as shown in snap-

```
[root@rhel9-server /]# df -h
                                     Used Avail Use% Mounted on
Filesystem
                               Size
                                           856M
devtmpfs
                               856M
                                        0
                                                  0% /dev
tmpfs
                               875M
                                        0
                                           875M
                                                  0% /dev/shm
tmpfs
                               350M
                                     9.5M
                                           341M
                                                  3% /run
/dev/nvme0n1p2
                                50G
                                     11G
                                            40G 21% /
/dev/nvme0n1p1
                               2.0G
                                     222M 1.8G 11% /boot
tmpfs
                               175M
                                        0 175M
                                                0% /run/user/0
tmpfs
                               175M
                                           175M
                                                  0% /run/user/1000
                                        0
/dev/mapper/abhay vol-atlantis 3.0G 3.0M 2.8G
                                                  1% /disks/atlantis data drive
/dev/mapper/abhay_vol-waikiki 1014M
                                     40M 975M
                                                  4% /disks/waikiki_data_drive
[root@rhel9-server /]#
[root@rhel9-server /]#
```

6. In next snap, it shows part of sdc2 partition is used in atlantis logical volume-

```
[root@rhel9-server /]# lsblk
NAME
                       MAJ:MIN RM
                                   SIZE RO TYPE MOUNTPOINTS
sda
                         8:0
                                0
                                     10G 0 disk
 -sda1
                         8:1
                                0
                                      1G 0 part
                                      2G 0 part
 -sda2
                         8:2
                                Θ
 -sda3
                         8:3
                                0
                                      1G 0 part
 -sda4
                         8:4
                                0
                                      1K 0 part
  -sda5
                         8:5
                                0
                                      1G 0 part
 -sda6
                         8:6
                                0
                                      1G 0 part
 -sda7
                         8:7
                                0
                                      2G 0 part
 -sda8
                         8:8
                                0
                                      1G 0 part
sdb
                         8:16
                                0
                                     10G 0 disk
 -sdb1
                         8:17
                                Θ
                                      1G 0 part
  -sdb2
                         8:18
                                Θ
                                      1G 0 part
 -sdb3
                         8:19
                                0
                                      1G 0 part
 -sdb4
                         8:20
                                0
                                      1G 0 part
 -sdb5
                         8:21
                                0
                                      1G 0 part
 -sdb6
                         8:22
                                0
                                      1G 0 part
                                     1G 0 part
 -sdb7
                         8:23
                                Θ
sdc
                         8:32
                                0
                                     10G 0 disk
 -sdc1
                         8:33
                                0
                                     4G 0 part
  ⊢abhay vol-atlantis 253:0
                                0
                                     3G 0 lvm /disks/atlantis data drive
  └abhay vol-waikiki 253:1
                                0
                                      1G
                                         0 lvm /disks/waikiki_data_drive
                         8:34
                                0
                                      4G 0 part
  └─abhay_vol-atlantis 253:0
                                      3G 0 lvm /disks/atlantis data drive
                                0
sdd
                                     10G 0 disk
                         8:48
                                0
sr0
                                 1 1024M 0 rom
                        11:0
                                0
                                    100G 0 disk
nvme0n1
                       259:0
 -nvme0n1p1
                       259:1
                                0
                                      2G 0 part /boot
                                0
                                     50G 0 part /
 -nvme0n1p2
                       259:2
                                0
 -nvme0n1p3
                       259:3
                                     4G 0 part [SWAP]
```

7. Verify remaining space in volume group-

```
[root@rhel9-server /]# vgdisplay
  Devices file PVID E0dA4pgeTp8eGnXHfdlV6o6h5SdpAnib last seen on /dev/sdc1 not found.
  Devices file PVID m4v1p4rhhcOmecrRCzjAIPG9GJIowVfK last seen on /dev/sdc2 not found.
  Devices file PVID hHofgUZNHe2BMW0YgcfjHcx2ljRehDXD last seen on /dev/sdd1 not found.
  --- Volume group ---
  VG Name
                        abhay vol
  System ID
                        lvm2
  Format
  Metadata Areas
                        2
 Metadata Sequence No 5
  VG Access
                        read/write
  VG Status
                        resizable
 MAX LV
                        Θ
  Cur LV
                        2
  Open LV
                        2
  Max PV
                        0
  Cur PV
                        2
  Act PV
                        2
  VG Size
                        7.99 GiB
  PE Size
                        4.00 MiB
  Total PE
                        2046
  Alloc PE / Size
                        1024 / 4.00 GiB
  Free PE / Size
                        1022 / 3.99 GiB
  VG UUID
                        LknOLz-eKrv-IwN6-h2vl-mbzR-qYxi-wXTsMr
```

8. Similarly, extend volume size for waikiki logical volume by 2 GB & verify it-

```
[root@rhel9-server /]# lvextend -r -L +2G /dev/abhay_vol/waikiki
Size of logical volume abhay_vol/waikiki changed from 1.00 GiB (256 extents) to 3.00 GiB (768 extents).
Logical volume abhay_vol/waikiki successfully resized.
```

```
[root@rhel9-server /]# df -h
                               Size Used Avail Use% Mounted on
Filesystem
devtmpfs
                               856M
                                       0 856M
                                                 0% /dev
tmpfs
                                       0 875M
                                                0% /dev/shm
                               875M
tmpfs
                               350M
                                    9.5M 341M
                                                 3% /run
/dev/nvme0n1p2
                               50G
                                     11G
                                           40G 21% /
/dev/nvme0n1p1
                               2.0G 222M 1.8G
                                                11% /boot
tmpfs
                               175M
                                       0 175M
                                               0% /run/user/0
tmpfs
                               175M
                                       0 175M
                                               0% /run/user/1000
/dev/mapper/abhay vol-atlantis 3.0G 3.0M 2.8G 1% /disks/atlantis data drive
/dev/mapper/abhay vol-waikiki 3.0G 55M 3.0G 2% /disks/waikiki data drive
[root@rhel9-server /]#
```

Here increased size is showing as we have used "-r" here. Check remaining volume group size & run |sb|k-

```
[root@rhel9-server /]# vgdisplay
  Devices file PVID E0dA4pgeTp8eGnXHfdlV6o6h5SdpAnib last seen on /dev/sdc1 not found.
  Devices file PVID m4v1p4rhhcOmecrRCzjAIPG9GJIowVfK last seen on /dev/sdc2 not found.
  Devices file PVID hHofqUZNHe2BMW0YqcfjHcx2ljRehDXD last seen on /dev/sdd1 not found.
  --- Volume group ---
                        abhay vol
  VG Name
  System ID
  Format
                        lvm2
  Metadata Areas
  Metadata Sequence No 6
  VG Access
                        read/write
                        resizable
  VG Status
  MAX LV
                        0
                        2
  Cur LV
                        2
  Open LV
  Max PV
                        0
                        2
  Cur PV
  Act PV
  VG Size
                        7.99 GiB
  PE Size
                        4.00 MiB
  Total PE
                        2046
  Alloc PE / Size
                        1536 / 6.00 GiB
  Free PE / Size
                        510 / 1.99 GiB
  VG UUID
                        LknOLz-eKrv-IwN6-h2vl-mbzR-qYxi-wXTsMr
```

```
[root@rhel9-server /]#
                             lsblk
NAME
                              MAJ:MTN RM
                                             SIZE RO TYPE MOUNTPOINTS
                                                    0 disk
                                               10G
şda
                                8:0
                                         Θ
  -sda1
                                8:1
                                         Θ
                                                1G
                                                    Θ
                                                       part
                                8:2
  -sda2
                                         Θ
                                                2G
                                                    0 part
                                                1G
  -sda3
                                8:3
                                         Θ
                                                    Θ
                                                       part
  -sda4
                                8:4
                                         Θ
                                                1K
                                                    0 part
  -sda5
                                8:5
                                         Θ
                                                1G
                                                     0 part
  -sda6
                                8:6
                                         Θ
                                                1G
                                                     0 part
  -sda7
                                8:7
                                                2G
                                                     0 part
                                8:8
                                                1G
                                                    0 part
0 disk
   sda8
                                         Θ
sdb
                                8:16
                                         Θ
                                               10G
                                8:17
  -sdb1
                                         Θ
                                                    0 part
                                                1G
                                8:18
  sdb2
                                         Θ
                                                1G
                                                    0 part
  -sdb3
                                8:19
                                         Θ
                                                1G
                                                       part
                                         Θ
  -sdb4
                                8:20
                                                1G
                                                    0 part
  -sdb5
                                8:21
                                                1G
                                         Θ
                                                    Θ
                                                       part
  -sdb6
                                8:22
                                         Θ
                                                1G
                                                    0 part
                                8:23
                                                1G
  -sdb7
                                         Θ
                                                    Θ
                                                       part
                                         Θ
                                8:32
                                               10G
                                                    0 disk
                                                       part
  -șdc1
                                8:33
                                         Θ
                                               4G
                                                     Θ
    —abhay_vol-atlantis
—abhay_vol-waikiki
                                                       lvm /disks/atlantis_data_drive
lvm /disks/waikiki_data_drive
                              253:0
                                         Θ
                                                3G
                                                     Θ
                              253:1
                                         Θ
                                                3G
                                                     Θ
                                                     0 part
0 lvm
                                8:34
                                         Θ
                                                4G
    -abhay_vol-atlantis
-abhay_vol-waikiki
                                                              /disks/atlantis_data_drive
/disks/waikiki_data_drive
                              253:0
                                         Θ
                                                3G
                              253:1
                                         Θ
                                                     0 lvm
sdd
                                8:48
                                               10G
                                                       disk
                                         Θ
                               11:0
                                            1024M
sr0
                                                     Θ rom
nvme0n1
                              259:0
                                         Θ
                                                     0 disk
                                             100G
  -nvme0n1p1
                              259:1
                                         Θ
                                               2G
                                                     0 part
                                                              /boot
  -nvme0n1p2
                              259:2
                                         Θ
                                              50G
                                                     0 part
_nvme0n1p3
[root@rhel9-server /]#
                                                     0 part [SWAP]
                              259:3
                                               4G
```

9. Now create new partition sdd1 from newly added disk & verify using |sblk command-

```
[root@rhel9-server /]# fdisk /dev/sdd
Changes will remain in memory only, until you decide to write them.
Be careful before using the write command.
Command (m for help): n
Partition type
       primary (0 primary, 0 extended, 4 free)
       extended (container for logical partitions)
Select (default p): p
Partition number (1-4, default 1): 1
First sector (2048-20971519, default 2048):
Last sector, +/-sectors or +/-size{K,M,G,T,P} (2048-20971519, default 20971519): +9G
Created a new partition 1 of type 'Linux' and of size 9 GiB.
Partition #1 contains a LVM2 member signature.
Do you want to remove the signature? [Y]es/[N]o: Y
The signature will be removed by a write command.
Command (m for help):
Command (m for help): t
Selected partition 1
Hex code or alias (type L to list all): 8e
Changed type of partition 'Linux' to 'Linux LVM'.
Command (m for help):
Command (m for help): w
The partition table has been altered.
Calling ioctl() to re-read partition table.
Syncing disks.
[root@rhel9-server /]# partprobe
[root@rhel9-server /]#
```

```
[root@rhel9-server /]# lsblk
NAME
                        MAJ:MIN RM
                                   SIZE RO TYPE MOUNTPOINTS
sda
                                     10G 0 disk
                          8:0
                                 0
 -sda1
                          8:1
                                 0
                                      1G
                                         0 part
                                          0 part
  -sda2
                          8:2
                                 0
                                      2G
 -sda3
                          8:3
                                 0
                                         0 part
                                      1G
  -sda4
                                    512B 0 part
                          8:4
                                 0
 -sda5
                          8:5
                                 0
                                      1G
                                         0 part
  -sda6
                                      1G 0 part
                          8:6
                                 0
  -sda7
                          8:7
                                 0
                                      2G 0 part
  -sda8
                          8:8
                                 0
                                      1G 0 part
sdb
                          8:16
                                 0
                                     10G 0 disk
 -sdb1
                          8:17
                                 0
                                      1G 0 part
  -sdb2
                          8:18
                                 0
                                      1G 0 part
  -sdb3
                          8:19
                                 0
                                      1G 0 part
  -sdb4
                          8:20
                                 0
                                      1G 0 part
  -sdb5
                          8:21
                                 0
                                      1G 0 part
  -sdb6
                          8:22
                                 0
                                      1G 0 part
  -sdb7
                          8:23
                                 0
                                      1G 0 part
sdc
                                     10G 0 disk
                          8:32
                                 0
                                      4G 0 part
  -sdc1
                          8:33
                                 0
    -abhay vol-atlantis 253:0
                                                 /disks/atlantis data drive
                                 0
                                      3G 0 lvm
    -abhay vol-waikiki 253:1
                                                 /disks/waikiki data drive
                                 0
                                      3G 0 lvm
 -sdc2
                          8:34
                                 0
                                      4G 0 part
                                      3G 0 lvm /disks/atlantis data drive
    -abhay vol-atlantis 253:0
                                 0
    -abhay vol-waikiki 253:1
                                      3G 0 lvm /disks/waikiki data drive
                                 0
sdd
                                     10G 0 disk
                          8:48
                                 0
∟sdd1
                          8:49
                                 0
                                      9G 0 part
sr0
                                 1 1024M 0 rom
                         11:0
                                    100G 0 disk
nvme0n1
                        259:0
                                 0
 -nvme0n1p1
                        259:1
                                 0
                                      2G 0 part /boot
 -nvme0n1p2
                        259:2
                                 0
                                     50G 0 part /
  -nvme0n1p3
                        259:3
                                 0
                                      4G
                                          0 part [SWAP]
```

10. Create new physical volume using this /dev/sdd1 partition-

```
[root@rhel9-server /]# pvcreate /dev/sdd1
  Devices file PVID hHofgUZNHe2BMW0YgcfjHcx2ljRehDXD not found on device /dev/sdd1.
  Physical volume "/dev/sdd1" successfully created.
[root@rhel9-server /]#
```

Verify it using pvdisplay. Here it is unallocated as not a part of any volume group-

```
[root@rhel9-server /]# pvdisplay
 Devices file PVID E0dA4pgeTp8eGnXHfdlV6o6h5SdpAnib last seen on /dev/sdc1 not found.
 Devices file PVID m4v1p4rhhc0mecrRCzjAIPG9GJIowVfK last seen on /dev/sdc2 not found.
 Devices file PVID hHofgUZNHe2BMW0YgcfjHcx2ljRehDXD last seen on /dev/sdd1 not found.
  --- Physical volume ---
 PV Name
                        /dev/sdc1
 VG Name
                        abhay vol
                        4.00 GiB / not usable 4.00 MiB
 PV Size
                        yes (but full)
 Allocatable
 PE Size
                        4.00 MiB
  Total PE
                        1023
  Free PE
                        Θ
 Allocated PE
                       1023
 PV UUID
                        2KicJN-v74I-Japr-qU0o-jQwt-j1Sw-turL6E
  --- Physical volume -
                        /dev/sdc2
 PV Name
  VG Name
                        abhay_vol
 PV Size
                        4.00 GiB / not usable 4.00 MiB
  Allocatable
                        ves
                        4.00 MiB
 PE Size
 Total PE
                        1023
  Free PE
                        510
  Allocated PE
                        513
 PV UUID
                       v9Ac25-YrAj-Cq0D-BIxJ-4FNM-0e8f-z3bjPr
  "/dev/sdd1" is a new physical volume of "9.00 GiB"
  --- NEW Physical volume ---
 PV Name
                        /dev/sdd1
  VG Name
 PV Size
                        9.00 GiB
 Allocatable
 PE Size
                        0
 Total PE
                        Θ
  Free PE
                        Θ
  Allocated PE
                        DucT49-tjl7-NrGE-QFmi-cgbz-AyII-fuES3c
  PV UUID
```

11. Extend volume group using this new physical volume-

```
[root@rhel9-server /]# vgextend abhay_vol /dev/sdd1
   Volume group "abhay_vol" successfully extended
[root@rhel9-server /]#
```

Verify new volume group size as shown-

```
[root@rhel9-server /]# vgdisplay
  Devices file PVID E0dA4pgeTp8eGnXHfdlV6o6h5SdpAnib last seen on /dev/sdc1 not found.
  Devices file PVID m4v1p4rhhc0mecrRCzjAIPG9GJIowVfK last seen on /dev/sdc2 not found.
  Devices file PVID hHofgUZNHe2BMW0YgcfjHcx2ljRehDXD last seen on /dev/sdd1 not found.
  --- Volume group --
                        abhay vol
  VG Name
  System ID
  Format
                        lvm2
  Metadata Areas
                        3
  Metadata Sequence No
                        read/write
  VG Access
  VG Status
                        resizable
  MAX LV
  Cur LV
                        2
  Open LV
                        2
                        0
  Max PV
  Cur PV
                        3
  Act PV
                        3
  VG Size
                        <16.99 GiB
  PE Size
                        4.00 MiB
  Total PE
                        4349
  Alloc PE / Size
                        1536 / 6.00 GiB
  Free PE / Size
                        2813 / <10.99 GiB
  VG UUID
                        LknOLz-eKrv-IwN6-h2vl-mbzR-qYxi-wXTsMr
```

12. Again, extend atlantis logical volume by 2GB-

```
[root@rhel9-server /]# lvextend -r -L +2G /dev/abhay_vol/atlantis
   Size of logical volume abhay_vol/atlantis changed from 3.00 GiB (768 extents) to 5.00 GiB (1280 extents).
   Logical volume abhay_vol/atlantis successfully resized.
resize2fs 1.46.5 (30-Dec-2021)
Filesystem at /dev/mapper/abhay_vol-atlantis is mounted on /disks/atlantis_data_drive; on-line resizing required
old_desc_blocks = 1, new_desc_blocks = 1
The filesystem on /dev/mapper/abhay_vol-atlantis is now 1310720 (4k) blocks long.
```

Verify new volume size of atlantis logical volume using df -h command-

```
[root@rhel9-server /]# df -h
                               Size Used Avail Use% Mounted on
Filesystem
devtmpfs
                               856M
                                          856M
                                                  0% /dev
tmpfs
                                                  0% /dev/shm
                               875M
                                        0 875M
tmpfs
                               350M
                                     9.5M 341M
                                                  3% /run
/dev/nvme0n1p2
                                50G
                                     11G
                                           40G
                                                 21% /
                                                 11% /boot
/dev/nvme0n1p1
                                     222M 1.8G
                               2.0G
tmpfs
                               175M
                                        0 175M
                                                  0% /run/user/0
tmpfs
                               175M
                                        0 175M
                                                  0% /run/user/1000
/dev/mapper/abhay vol-atlantis 4.9G 4.0M 4.7G
                                                  1% /disks/atlantis data drive
/dev/mapper/abhay vol-waikiki
                               3.0G 55M 3.0G
                                                  2% /disks/waikiki data drive
```

Verify remaining volume space in volume group-

```
[root@rhel9-server /]# vgdisplay
  Devices file PVID E0dA4pgeTp8eGnXHfdlV6o6h5SdpAnib last seen on /dev/sdc1 not found.
  Devices file PVID m4v1p4rhhcOmecrRCzjAIPG9GJIowVfK last seen on /dev/sdc2 not found. Devices file PVID hHofgUZNHe2BMWOYgcfjHcx2ljRehDXD last seen on /dev/sdd1 not found.
  --- Volume group ---
  VG Name
                            abhay vol
  System ID
  Format
                            lvm2
  Metadata Areas
                            3
  Metadata Sequence No
                           8
  VG Access
                            read/write
  VG Status
                            resizable
  MAX LV
  Cur LV
                            2
  Open LV
                            2
  Max PV
                            Θ
  Cur PV
                            3
  Act PV
                            3
  VG Size
                            <16.99 GiB
  PE Size
                            4.00 MiB
  Total PE
                            4349
  Alloc PE / Size
                            2048 / 8.00 GiB
  Free PE / Size
                            2301 / <8.99 GiB
  VG UUID
                            LknOLz-eKrv-IwN6-h2vl-mbzR-qYxi-wXTsMr
```

13. Similarly, extend volume size of waikiki volume by 2GB & verify-

```
[root@rhel9-server /]# lvextend -r -L +2G /dev/abhay_vol/waikiki
Size of logical volume abhay_vol/waikiki changed from 3.00 GiB (768 extents) to 5.00 GiB (1280 extents).
Logical volume abhay_vol/waikiki successfully resized.
meta-data=/dev/mapper/abhay_vol-waikiki isize=512
                                                               agcount=12, agsize=65536 blks
                                        sectsz=512 attr=2, projid32bit=1
                                        crc=1
                                                        finobt=1, sparse=1, rmapbt=0
                                                       bigtime=1 inobtcount=1
                                        reflink=1
                                        bsize=4096
data
                                                       blocks=786432, imaxpct=25
                                                        swidth=0 blks
                                        sunit=0
naming
           =version 2
                                        bsize=4096
                                                        ascii-ci=0, ftype=1
           =internal log
                                        bsize=4096
                                                       blocks=2560, version=2
log
                                        sectsz=512
                                                        sunit=0 blks, lazy-count=1
realtime =none
                                        extsz=4096
                                                       blocks=0, rtextents=0
data blocks changed from 786432 to 1310720
[root@rhel9-server /]#
```

```
[root@rhel9-server /]# df -h
                                       Used Avail Use% Mounted on
Filesystem
                                 Size
devtmpfs
                                 856M
                                             856M
                                                     0% /dev
                                          Θ
                                                     0% /dev/shm
tmpfs
                                 875M
                                          Θ
                                             875M
tmpfs
                                 350M
                                       9.5M
                                             341M
                                                     3% /run
                                  50G
                                        11G
                                              40G
                                                    21% /
/dev/nvme0n1p2
                                                    11% /boot
/dev/nvme0n1p1
                                 2.0G
                                       222M
                                             1.8G
                                 175M
tmpfs
                                          Θ
                                             175M
                                                     0% /run/user/0
tmpfs
                                 175M
                                          0
                                             175M
                                                     0% /run/user/1000
/dev/mapper/abhay_vol-atlantis
                                 4.9G
                                       4.0M 4.7G
                                                     1% /disks/atlantis_data_drive
/dev/mapper/abhay vol-waikiki
                                 5.0G
                                        69M
                                             5.0G
                                                     2% /disks/waikiki data drive
[root@rhel9-server /]#
```

```
[root@rhel9-server /]# vgdisplay
  Devices file PVID E0dA4pgeTp8eGnXHfdlV6o6h5SdpAnib last seen on /dev/sdc1 not found.
  Devices file PVID m4v1p4rhhc0mecrRCzjAIPG9GJIowVfK last seen on /dev/sdc2 not found.
 Devices file PVID hHofgUZNHe2BMW0YgcfjHcx2ljRehDXD last seen on /dev/sdd1 not found.
      Volume group -
                         abhay_vol
 VG Name
 System ID
  Format
                         lvm2
 Metadata Areas
                        3
  Metadata Sequence No
                        9
  VG Access
                         read/write
  VG Status
                         resizable
 MAX LV
                        Θ
  Cur LV
                        2
                         2
  Open LV
 Max PV
                        Θ
  Cur PV
                        3
  Act PV
                        3
  VG Size
                        <16.99 GiB
 PE Size
                        4.00 MiB
  Total PE
                        4349
  Alloc PE / Size
                        2560 / 10.00 GiB
  Free PE / Size
                        1789 / <6.99 GiB
  VG UUID
                        LknOLz-eKrv-IwN6-h2vl-mbzR-qYxi-wXTsMr
```

```
[root@rhel9-server /]# lsblk
NAME
                             MAJ:MIN RM
                                           SIZE RO TYPE MOUNTPOINTS
sda
                               8:0
                                        0
                                             10G
                                                  0 disk
                                        Θ
                                                   0 part
  -sda1
                               8:1
                                              1G
  -sda2
                               8:2
                                        Θ
                                              2G
                                                     part
                               8:3
  -sda3
                                        Θ
                                                   Θ
                                                     part
                                              1G
  -sda4
                               8:4
                                        Θ
                                            512B
                                                   0 part
  -sda5
                               8:5
                                        Θ
                                              1G
                                                   0 part
  -sda6
                               8:6
                                        Θ
                                              1G
                                                   Θ
                                                     part
 -sda7
                               8:7
                                        Θ
                                              2G
                                                   0 part
                               8:8
                                        Θ
                                              1G
                                                   0 part
  -sda8
sdb
                               8:16
                                        Θ
                                             10G
                                                   0 disk
 -sdb1
                                        Θ
                               8:17
                                              1G
                                                   0 part
  -sdb2
                               8:18
                                        Θ
                                              1G
                                                   0 part
  -sdb3
                               8:19
                                        Θ
                                              1G
                                                   0 part
  -sdb4
                               8:20
                                        Θ
                                              1G
                                                   0 part
  -sdb5
                               8:21
                                        Θ
                                              1G
                                                   0 part
  -sdb6
                                        Θ
                                              1G
                                                   0 part
                               8:22
                                                   0 part
0 disk
  -sdb7
                               8:23
                                        Θ
                                              1G
                               8:32
                                        Θ
sdc
                                             10G
                                                   0 part
  -sdc1
                               8:33
                                        0
                                              4G
    -abhay_vol-atlantis 253:0
-abhay_vol-waikiki 253:1
                                                            /disks/atlantis_data_drive
/disks/waikiki_data_drive
                                        Θ
                                              5G
                                                   0 lvm
0 lvm
                                                   Θ
                                        Θ
                                              5G
                               8:34
                                        Θ
                                              4G
                                                   0 part
    -abhay_vol-atlantis 253:0
                                        0
                                                   0 lvm
                                                            /disks/atlantis_data_drive
                                              5G
     -abhay_vol-waikiki
                                        0
                                                   Θ
                                                     lvm
                                                            /disks/waikiki_data_drive
                             253:1
                                              5G
sdd
                                                   0 disk
                               8:48
                                        Θ
                                             10G
                               8:49
                                        Θ
                                              9G
                                                   Θ
                                                     part
    -abhay_vol-atlantis 253:0
-abhay_vol-waikiki 253:1
                                                     lvm
lvm
                                                            /disks/atlantis_data_drive
/disks/waikiki_data_drive
                                        Θ
                                              5G
                                                   Θ
                                        Θ
                                              5G
                                                   Θ
sr0
                              11:0
                                           1024M
                                                   0 rom
                             259:0
                                        Θ
                                                   0 disk
nvme0n1
                                            100G
                                        Θ
  -nvme0n1p1
                             259:1
                                              2G
                                                   0 part /boot
  -nvme0n1p2
                             259:2
                                        Θ
                                             50G
                                                   Θ
                                                      part
  nvme0n1p3
                             259:3
                                        Θ
                                              4G
                                                   0 part
                                                            [SWAP]
```

14. List data in atlantis volume after increasing volume size-

```
[root@rhel9-server /]# ls disks/atlantis_data_drive/
Account Admin IT atl1.txt atl2.txt atl3.txt atl4.txt atl5.txt cal.txt
```

Steps to Reduce the Logical Volume size in LVM-

Note: We can't reduce volume size from xfs file system LV. So, we will do for ext4 (atlantis volume).

- 1. Take the data backup as it may cause data loss.
- 2. unmount this atlantis LV & verify using df -h.

```
[root@rhel9-server /]#
[root@rhel9-server /]# umount /disks/atlantis_data_drive
[root@rhel9-server /]#
```

```
[root@rhel9-server /]# df -h
                                       Used Avail Use% Mounted on
Filesystem
                                 Size
devtmpfs
                                                     0% /dev
                                 856M
                                          Θ
                                             856M
tmpfs
                                                    0% /dev/shm
                                 875M
                                          Θ
                                             875M
tmpfs
                                 350M
                                       9.5M
                                             341M
                                                    3% /run
/dev/nvme0n1p2
                                 50G
                                        11G
                                              40G
                                                    21% /
                                                    11% /boot
/dev/nvme0n1p1
                                 2.0G
                                       222M
                                             1.8G
tmpfs
                                 175M
                                          Θ
                                             175M
                                                    0% /run/user/0
                                                    0% /run/user/1000
tmpfs
                                 175M
                                          0
                                             175M
/dev/mapper/abhay_vol-waikiki 5.0G
                                        69M
                                            5.0G
                                                     2% /disks/waikiki data drive
[root@rhel9-server /]#
```

3. Check for file system errors-

```
[root@rhel9-server /]# fsck -f /dev/abhay_vol/atlantis
fsck from util-linux 2.37.4
e2fsck 1.46.5 (30-Dec-2021)
Pass 1: Checking inodes, blocks, and sizes
Pass 2: Checking directory structure
Pass 3: Checking directory connectivity
Pass 4: Checking reference counts
Pass 5: Checking group summary information
/dev/mapper/abhay_vol-atlantis: 20/131072 files (0.0% non-contiguous), 17197/524288 blocks
[root@rhel9-server /]#
```

4. Run resize2fs (For ext4) to fix the final volume size for atlantis LV to 2GB

5. Finally, resize it to 2GB as shown below-

```
[root@rhel9-server /]# lvreduce -L 2G /dev/abhay_vol/atlantis
    WARNING: Reducing active logical volume to 2.00 GiB.
    THIS MAY DESTROY YOUR DATA (filesystem etc.)
Do you really want to reduce abhay_vol/atlantis? [y/n]: y
    Size of logical volume abhay_vol/atlantis changed from 5.00 GiB (1280 extents) to 2.00 GiB (512 extents).
    Logical volume abhay_vol/atlantis successfully resized.
[root@rhel9-server /]#
```

6. Again repeat step 4 for verification. It should show "Nothing to do!"-

```
[root@rhel9-server /]#
[root@rhel9-server /]# resize2fs -p /dev/abhay_vol/atlantis 2G
resize2fs 1.46.5 (30-Dec-2021)
The filesystem is already 524288 (4k) blocks long. Nothing to do!
```

7. Repeat step 3 for file system error check-

```
[root@rhel9-server /]# fsck -f /dev/abhay_vol/atlantis
fsck from util-linux 2.37.4
e2fsck 1.46.5 (30-Dec-2021)
Pass 1: Checking inodes, blocks, and sizes
Pass 2: Checking directory structure
Pass 3: Checking directory connectivity
Pass 4: Checking reference counts
Pass 5: Checking group summary information
/dev/mapper/abhay_vol-atlantis: 20/131072 files (0.0% non-contiguous), 17197/524288 blocks
[root@rhel9-server /]#
```

8. Again mount atlantis LV & verify it-

```
[root@rhel9-server /]#
[root@rhel9-server /]# mount /dev/abhay_vol/atlantis /disks/atlantis_data_drive/
[root@rhel9-server /]#
```

```
[root@rhel9-server /]# df -h
                              Size Used Avail Use% Mounted on
Filesystem
devtmpfs
                                                0% /dev
                              856M
                                       0 856M
tmpfs
                              875M
                                       0 875M
                                                0% /dev/shm
tmpfs
                              350M 9.5M 341M
                                                3% /run
/dev/nvme0n1p2
                               50G
                                    11G 40G 21% /
                              2.0G 222M 1.8G 11% /boot
/dev/nvme0n1p1
tmpfs
                              175M
                                       0 175M
                                                0% /run/user/0
tmpfs
                                                0% /run/user/1000
                              175M
                                       0 175M
                                                2% /disks/waikiki data drive
/dev/mapper/abhay vol-waikiki
                              5.0G
                                    69M 5.0G
/dev/mapper/abhay vol-atlantis 2.0G 3.1M (1.9G)
                                                1% /disks/atlantis data drive
```

9. Check data of atlantis LV after reducing volume size-

```
[root@rhel9-server /]#
[root@rhel9-server /]# ls disks/atlantis_data_drive/
Account Admin IT atl1.txt atl2.txt atl3.txt atl4.txt atl5.txt cal.txt
[root@rhel9-server /]#
```

10. Check increased volume size of volume group-

```
[root@rhel9-server /]# vgdisplay
Devices file PVID E0dA4pgeTp8eGnXHfdlV6o6h5SdpAnib last seen on /dev/sdc1 not found.
Devices file PVID m4v1p4rhhc0mecrRCzjAIPG9GJIowVfK last seen on /dev/sdc2 not found.
Devices file PVID hHofgUZNHe2BMW0YgcfjHcx2ljRehDXD last seen on /dev/sdd1 not found.
     --- Volume group -
    VG Name
                                              abhay_vol
    System ID
    Format
                                              lvm2
   Metadata Areas
Metadata Sequence No
                                              read/write
resizable
    VG Access
    VG Status
    MAX LV
                                              Θ
    Cur LV
    Open LV
                                              2
0
    Max PV
    Cur PV
    Act PV
   VG Size
PE Size
                                              <16.99 GiB
4.00 MiB
                                              4349
    Total PE
   Alloc PE / Size
Free PE / Size
VG UUID
                                              1792 / 7.00 GiB
2557 / <9.99 GiB
LknOLz-eKrv-IwN6-h2vl-mbzR-qYxi-wXTsMr
```

That's it!!!!