

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                                8:0      0   10G  0 disk
├─sda1                             8:1      0    1G  0 part
├─sda2                             8:2      0    2G  0 part
├─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     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                                8:32     0   10G  0 disk
sdd                                8:48     0   10G  0 disk
sr0                                11:0     1 1024M  0 rom
nvme0n1                           259:0     0  100G  0 disk
├─nvme0n1p1                       259:1     0    2G  0 part /boot
├─nvme0n1p2                       259:2     0   50G  0 part /
└─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 **lsblk** 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
  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 (2048-20971519, 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
sda          8:0    0   10G  0 disk
├─sda1       8:1    0    1G  0 part
├─sda2       8:2    0    2G  0 part
├─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   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          8:32   0   10G  0 disk
├─sdc1       8:33   0    4G  0 part
└─sdc2       8:34   0    4G  0 part
sdd          8:48   0   10G  0 disk
sr0         11:0    1 1024M  0 rom
nvme0n1     259:0    0  100G  0 disk
├─nvme0n1p1 259:1    0    2G  0 part /boot
├─nvme0n1p2 259:2    0   50G  0 part /
└─nvme0n1p3 259:3    0    4G  0 part [SWAP]
```

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

```
[root@rhel9-server /]# pvcreate /dev/sdc1
Devices file PVID E0dA4pgeTp8eGnXHfdlV6o6h5SdpAnib not found on device /dev/sdc1.
Devices file PVID m4v1p4rhhc0mecrRCzjAIPG9GJIowVfK not found on device /dev/sdc2.
Physical volume "/dev/sdc1" successfully created.
[root@rhel9-server /]#
```

```
[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 hHofgUZNHe2BMWOYgcFjHcx2ljRehDXD 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           NO
PE Size               0
Total PE              0
Free PE               0
Allocated PE          0
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         1
Metadata Sequence No   1
VG Access               read/write
VG Status               resizable
MAX LV                 0
Cur LV                 0
Open LV                 0
Max PV                 0
Cur PV                 1
Act PV                 1
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                 Lkn0Lz-eKrv-IwN6-h2v1-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
VG Name                 abhay_vol
PV Size                 4.00 GiB / not usable 4.00 MiB
Allocatable             yes
PE Size                 4.00 MiB
Total PE                1023
Free PE                 1023
Allocated PE            0
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 /]# lvs /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
LV UUID                 wKPdrX-6jZC-s4vI-keMA-uf0u-WII0-aCf7Tj
LV Write Access         read/write
LV Creation host, time  rhel9-server.cricbuzz.com, 2022-11-11 09:14:42 +0530
LV Status                available
# open                  1
LV Size                 2.00 GiB
Current LE              512
Segments                2
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          1
Metadata Sequence No    2
VG Access                read/write
VG Status                 resizable
MAX LV                   0
Cur LV                  1
Open LV                  0
Max PV                   0
Cur PV                  1
Act PV                   1
VG Size                  <4.00 GiB
PE Size                  4.00 MiB
Total PE                 1023
Alloc PE / Size          256 / 1.00 GiB
Free PE / Size           767 / <3.00 GiB
VG UUID                  Lkn0Lz-eKrv-1wN6-h2v1-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 /]# lvsdisplay /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                 1
LV Size                5.00 GiB
Current LE             1280
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 /]# vgsdisplay
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
VG Access               read/write
VG Status               resizable
MAX LV                 0
Cur LV                 2
Open LV                0
Max PV                 0
Cur PV                 1
Act PV                 1
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                Lkn0Lz-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
         =                       sectsz=512    attr=2, projid32bit=1
         =                       crc=1        finobt=1, sparse=1, rmapbt=0
         =                       reflink=1     bigtime=1 inobtcount=1
data      =                       bsize=4096   blocks=262144, 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@rhel9-server /]#
```

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

7. Verify created logical volume using **lsblk** command-

```
[root@rhel9-server /]# lsblk -f
```

NAME	FSTYPE	FSVER	LABEL	UUID	FSAVAIL	FSUSE%	MOUNTPOINTS
sda							
├─sda1	xfs			b1d8efeb-9a48-45d3-b762-275cd0660acd			
├─sda2	xfs			49c4d6de-3156-4900-9967-a46f267db90c			
├─sda3	xfs			033e82b8-c3e2-408a-95be-0a533494b506			
├─sda4							
├─sda5	xfs			2d0cd70d-f32c-45d4-be26-51ec9dcdf273			
├─sda6	xfs			a3218450-cd05-437c-9398-8cef5171754d			
├─sda7	xfs			b30a85b1-840c-430e-b8bb-69daf9b378e6			
└─sda8	xfs			009478f9-959d-4db4-b681-c3da8e30d851			
sdb							
├─sdb1	xfs			580350e9-2a6e-420d-b569-83256a032c93			
├─sdb2	xfs			28949252-a971-42c6-a6ea-f2fd40e8efc3			
├─sdb3	xfs			28aaa96a-0026-4a35-a688-43eeb84f75c4			
├─sdb4	xfs			5c78820c-94a4-4af1-a31d-2378214dde0b			
├─sdb5	xfs			8ff2a55d-722b-4b43-9ee9-4889d2e1924f			
├─sdb6	xfs			14ea51d7-64e3-435e-893b-4097bba6874b			
└─sdb7	xfs			80b2fe9a-0f93-4b12-a333-c2070cb70b67			
sdc							
├─sdc1	LVM2_member	LVM2 001		2KicJN-v74I-Japr-qU0o-jQwt-j1Sw-turL6E			
├─└─abhay_vol-atlantis	ext4	1.0		2b0484ef-c49b-4350-bf5a-285e1c854f9a			
└─└─abhay_vol-waikiki	xfs			98a887cf-c703-4900-95f5-ed011bf993e1			
└─sdc2							
sdd							
sr0							
nvme0n1							
├─nvme0n1p1	xfs			1b97b83e-8c41-4cd9-a9e6-894073b7299f	1.8G	11%	/boot
├─nvme0n1p2	xfs			4bec8248-9eb3-48da-902d-b0b7c7e10d16	39.7G	21%	/
└─nvme0n1p3	swap	1		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
```

Filesystem	Size	Used	Avail	Use%	Mounted on
devtmpfs	856M	0	856M	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	0	175M	0%	/run/user/1000
/dev/mapper/abhay_vol-atlantis	974M	24K	907M	1%	/disks/atlantis_data_drive
/dev/mapper/abhay_vol-waikiki	1014M	40M	975M	4%	/disks/waikiki_data_drive

```
[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  
-rw-r--r--. 1 root root 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 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  
-rw-r--r--. 1 root root 168 Nov 11 09:19 cal.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 QA  
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  
-rw-r--r--. 1 root root 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 0 Nov 11 09:20 wk4.txt  
-rw-r--r--. 1 root root 0 Nov 11 09:20 wk5.txt
```


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
PV Size                4.00 GiB / not usable 4.00 MiB
Allocatable            yes
PE Size                4.00 MiB
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            NO
PE Size                0
Total PE               0
Free PE                0
Allocated PE           0
PV UUID                v9Ac25-YrAj-Cq0D-BIkJ-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           yes
PE Size               4.00 MiB
Total PE              1023
Free PE               511
Allocated PE          512
PV UUID               2KicJN-v74I-Japr-qU0o-jQwt-j1Sw-turL6E

--- Physical volume ---
PV Name               /dev/sdc2
VG Name               abhay_vol
PV Size               4.00 GiB / not usable 4.00 MiB
Allocatable           yes
PE Size               4.00 MiB
Total PE              1023
Free PE               1023
Allocated PE          0
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
Filesystem              Size  Used Avail Use% Mounted on
devtmpfs                856M   0  856M   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   0  175M   0% /run/user/1000
/dev/mapper/abhay_vol-atlantis 974M  24K  907M   1% /disks/atlantis_data_drive
/dev/mapper/abhay_vol-waikiki 1014M  40M  975M   4% /disks/waikiki_data_drive
```

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
Filesystem                Size      Used Avail Use% Mounted on
devtmpfs                   856M         0  856M   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         0  175M   0% /run/user/1000
/dev/mapper/abhay_vol-atlant 3.0G     3.0M   2.8G   1% /disks/atlantia_data_drive
/dev/mapper/abhay_vol-waikiki 1014M     40M   975M   4% /disks/waikiki_data_drive
[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
├─sda2                8:2    0    2G  0 part
├─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    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                  8:32    0   10G  0 disk
├─sdc1                8:33    0    4G  0 part
├─abhay_vol-atlantia 253:0    0    3G  0 lvm /disks/atlantia_data_drive
├─abhay_vol-waikiki  253:1    0    1G  0 lvm /disks/waikiki_data_drive
└─sdc2                8:34    0    4G  0 part
   └─abhay_vol-atlantia 253:0    0    3G  0 lvm /disks/atlantia_data_drive
sdd                  8:48    0   10G  0 disk
sr0                  11:0    1 1024M  0 rom
nvme0n1              259:0    0  100G  0 disk
├─nvme0n1p1           259:1    0    2G  0 part /boot
├─nvme0n1p2           259:2    0   50G  0 part /
└─nvme0n1p3           259:3    0    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 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         2
Metadata Sequence No   5
VG Access               read/write
VG Status               resizable
MAX LV                 0
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                 Lkn0Lz-eKrv-IwN6-h2v1-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
Filesystem              Size  Used Avail Use% Mounted on
devtmpfs                856M   0    856M   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   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 `lsblk`-

```
[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         2
Metadata Sequence No   6
VG Access               read/write
VG Status               resizable
MAX LV                 0
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         1536 / 6.00 GiB
Free PE / Size           510 / 1.99 GiB
VG UUID                 Lkn0Lz-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
├─sda1                             8:1    0    1G  0 part
├─sda2                             8:2    0    2G  0 part
├─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   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                                 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    3G  0 lvm  /disks/waikiki_data_drive
├─sdc2                             8:34   0    4G  0 part
│   ├─abhay_vol-atlantis          253:0   0    3G  0 lvm  /disks/atlantis_data_drive
│   └─abhay_vol-waikiki           253:1   0    3G  0 lvm  /disks/waikiki_data_drive
sdd                                 8:48   0   10G  0 disk
sr0                                 11:0   1  1024M  0 rom
nvme0n1                            259:0   0   100G  0 disk
├─nvme0n1p1                        259:1   0    2G  0 part  /boot
├─nvme0n1p2                        259:2   0   50G  0 part  /
└─nvme0n1p3                        259:3   0    4G  0 part  [SWAP]
[root@rhel9-server ~]#
```

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

```
[root@rhel9-server ~]# fdisk /dev/sdd

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
   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 (2048-20971519, 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	8:0	0	10G	0	disk	
├─sda1	8:1	0	1G	0	part	
├─sda2	8:2	0	2G	0	part	
├─sda3	8:3	0	1G	0	part	
├─sda4	8:4	0	512B	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	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	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	3G	0	lvm	/disks/waikiki_data_drive
└─sdc2	8:34	0	4G	0	part	
│ └─abhay_vol-atlantis	253:0	0	3G	0	lvm	/disks/atlantis_data_drive
│ └─abhay_vol-waikiki	253:1	0	3G	0	lvm	/disks/waikiki_data_drive
sdd	8:48	0	10G	0	disk	
└─sdd1	8:49	0	9G	0	part	
sr0	11:0	1	1024M	0	rom	
nvme0n1	259:0	0	100G	0	disk	
├─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 hHofgUZNHe2BMWOYgcfjHcx2ljRehDXD 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            yes (but full)
PE Size                4.00 MiB
Total PE               1023
Free PE                0
Allocated PE           1023
PV UUID                2KicJN-v74I-Japr-qU0o-jQwt-j1Sw-turL6E

--- Physical volume ---
PV Name                /dev/sdc2
VG Name                abhay_vol
PV Size                4.00 GiB / not usable 4.00 MiB
Allocatable            yes
PE Size                4.00 MiB
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            NO
PE Size                0
Total PE               0
Free PE                0
Allocated PE           0
PV UUID                DucT49-tjl7-NrGE-QFmi-cgbz-AyII-fuES3c
```

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 hHofgUZNH2BMW0YgcfjHcx2ljRehDXD last seen on /dev/sdd1 not found.
--- Volume group ---
VG Name                abhay_vol
System ID
Format                 lvm2
Metadata Areas         3
Metadata Sequence No   7
VG Access               read/write
VG Status               resizable
MAX LV                 0
Cur LV                 2
Open LV                 2
Max PV                 0
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                 Lkn0Lz-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
Filesystem                                Size  Used Avail Use% Mounted on
devtmpfs                                  856M   0  856M   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   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 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         3
Metadata Sequence No   8
VG Access               read/write
VG Status               resizable
MAX LV                 0
Cur LV                 2
Open LV                 2
Max PV                  0
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                 Lkn0Lz-eKrv-IwN6-h2v1-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
        =                               reflink=1     bigtime=1 inobtcount=1
data      =                               bsize=4096   blocks=786432, 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
data blocks changed from 786432 to 1310720
[root@rhel9-server ~]#
```

```
[root@rhel9-server ~]# df -h
Filesystem      Size  Used Avail Use% Mounted on
devtmpfs        856M   0  856M   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   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 ---
VG Name                abhay_vol
System ID
Format                 lvm2
Metadata Areas         3
Metadata Sequence No   9
VG Access               read/write
VG Status               resizable
MAX LV                 0
Cur LV                 2
Open LV                 2
Max PV                  0
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                 Lkn0Lz-eKrv-IwN6-h2v1-mbzR-qYxi-wXTsMr
```

```
[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
├─sda2                            8:2    0    2G  0 part
├─sda3                            8:3    0    1G  0 part
├─sda4                            8:4    0   512B  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   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                                8:32   0   10G  0 disk
├─sdc1                            8:33   0    4G  0 part
│   ├─abhay_vol-atlantis 253:0   0    5G  0 lvm /disks/atlantis_data_drive
│   └─abhay_vol-waikiki  253:1   0    5G  0 lvm /disks/waikiki_data_drive
├─sdc2                            8:34   0    4G  0 part
│   ├─abhay_vol-atlantis 253:0   0    5G  0 lvm /disks/atlantis_data_drive
│   └─abhay_vol-waikiki  253:1   0    5G  0 lvm /disks/waikiki_data_drive
└─sdd                            8:48   0   10G  0 disk
    ├─sdd1                        8:49   0    9G  0 part
    │   ├─abhay_vol-atlantis 253:0   0    5G  0 lvm /disks/atlantis_data_drive
    │   └─abhay_vol-waikiki  253:1   0    5G  0 lvm /disks/waikiki_data_drive
sr0                                11:0    1 1024M  0 rom
nvme0n1                           259:0   0  100G  0 disk
├─nvme0n1p1                       259:1   0    2G  0 part /boot
├─nvme0n1p2                       259:2   0   50G  0 part /
└─nvme0n1p3                       259:3   0    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  
Filesystem      Size  Used Avail Use% Mounted on  
devtmpfs        856M    0  856M   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    0  175M   0% /run/user/1000  
/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

```
[root@rhel9-server /]# resize2fs -p /dev/abhay_vol/atlantis 2G  
resize2fs 1.46.5 (30-Dec-2021)  
Resizing the filesystem on /dev/abhay_vol/atlantis to 524288 (4k) blocks.  
Begin pass 3 (max = 40)  
Scanning inode table      XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  
The filesystem on /dev/abhay_vol/atlantis is now 524288 (4k) blocks long.
```

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
```

Filesystem	Size	Used	Avail	Use%	Mounted on
devtmpfs	856M	0	856M	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	0	175M	0%	/run/user/1000
/dev/mapper/abhay_vol-waikiki	5.0G	69M	5.0G	2%	/disks/waikiki_data_drive
/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 /]# vgsdisplay
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   3
Metadata Sequence No 10
VG Access        read/write
VG Status        resizable
MAX LV           0
Cur LV          2
Open LV          2
Max PV           0
Cur PV          3
Act PV           3
VG Size          <16.99 GiB
PE Size          4.00 MiB
Total PE         4349
Alloc PE / Size  1792 / 7.00 GiB
Free PE / Size   2557 / <9.99 GiB
VG UUID          Lkn0Lz-eKrv-IwN6-h2v1-mbzR-qYxi-wXTsMr
```

That's it!!!!