

Name - Yash Lakhtariya

Enrollment number - 21162101012

Branch - CBA      Batch - 61

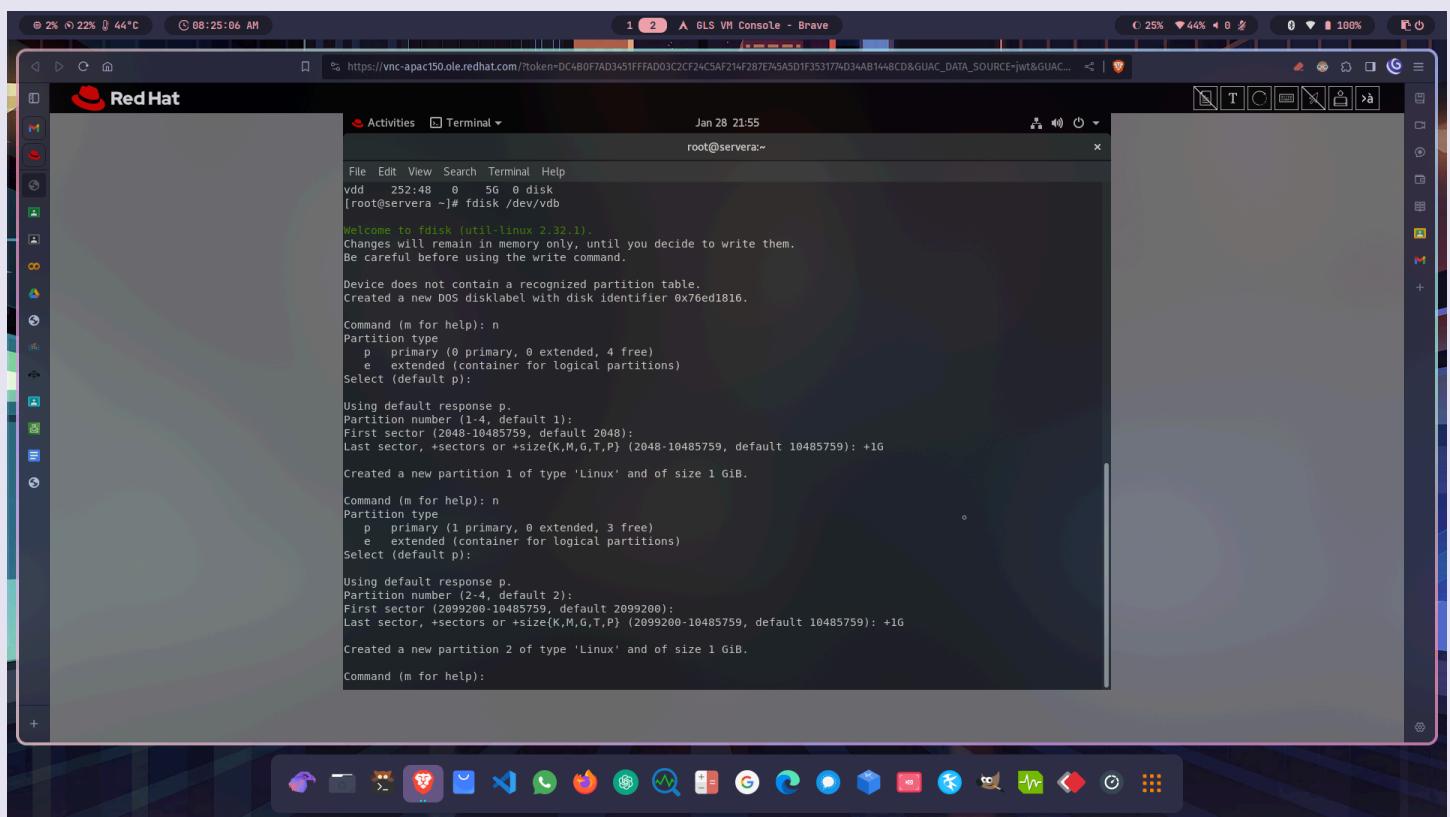
ITIM Practical 6

**Aim :** To understand the advanced concepts of LVM like changing its size, dynamic size allocation, etc.

### Exercises :

#### 1. Demonstrate how to increase the size of the volume group when the memory is exhausted in the volume group.

- First, create the physical volumes, volume group and logical volume using the commands for the same



The screenshot shows a Red Hat Linux desktop environment with a terminal window open. The terminal window title is "GLS VM Console - BRAVE". The terminal session is as follows:

```
vdd 252:48 0 56 0 disk
[root@servera ~]# fdisk /dev/vdb

Welcome to fdisk (util-linux 2.32.1).
Changes will remain in memory only, until you decide to write them.
Be careful before using the write command.

Device does not contain a recognized partition table.
Created a new DOS disklabel with disk identifier 0x76ed1816.

Command (m for help): n
Partition type
   p   primary (0 primary, 0 extended, 4 free)
   e   extended (container for logical partitions)
Select (default p):

Using default response p.
Partition number (1-4, default 1):
First sector (2048-10485759, default 2048):
Last sector, +sectors or +size{K,M,G,T,P} (2048-10485759, default 10485759): +1G

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

Command (m for help): n
Partition type
   p   primary (1 primary, 0 extended, 3 free)
   e   extended (container for logical partitions)
Select (default p):

Using default response p.
Partition number (2-4, default 2):
First sector (2099200-10485759, default 2099200):
Last sector, +sectors or +size{K,M,G,T,P} (2099200-10485759, default 10485759): +1G

Created a new partition 2 of type 'Linux' and of size 1 GiB.

Command (m for help):
```

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The screenshot shows a Red Hat Linux desktop environment with a terminal window open. The terminal window title is "Red Hat" and the tab is "Terminal". The command being run is fdisk, creating partitions on a disk. The terminal output is as follows:

```
File Edit View Search Terminal Help
e extended (container for logical partitions)
Select (default p):
Using default response p.
Partition number (2-4, default 2):
First sector (2099200-10485759, default 2099200):
Last sector, +sectors or +size{K,M,G,T,P} (2099200-10485759, default 10485759): +1G
Created a new partition 2 of type 'Linux' and of size 1 GiB.

Command (m for help): n
Partition type
p primary (2 primary, 0 extended, 2 free)
e extended (container for logical partitions)
Select (default p):
Using default response p.
Partition number (3,4, default 3):
First sector (4196352-10485759, default 4196352):
Last sector, +sectors or +size{K,M,G,T,P} (4196352-10485759, default 10485759): +1G
Created a new partition 3 of type 'Linux' and of size 1 GiB.

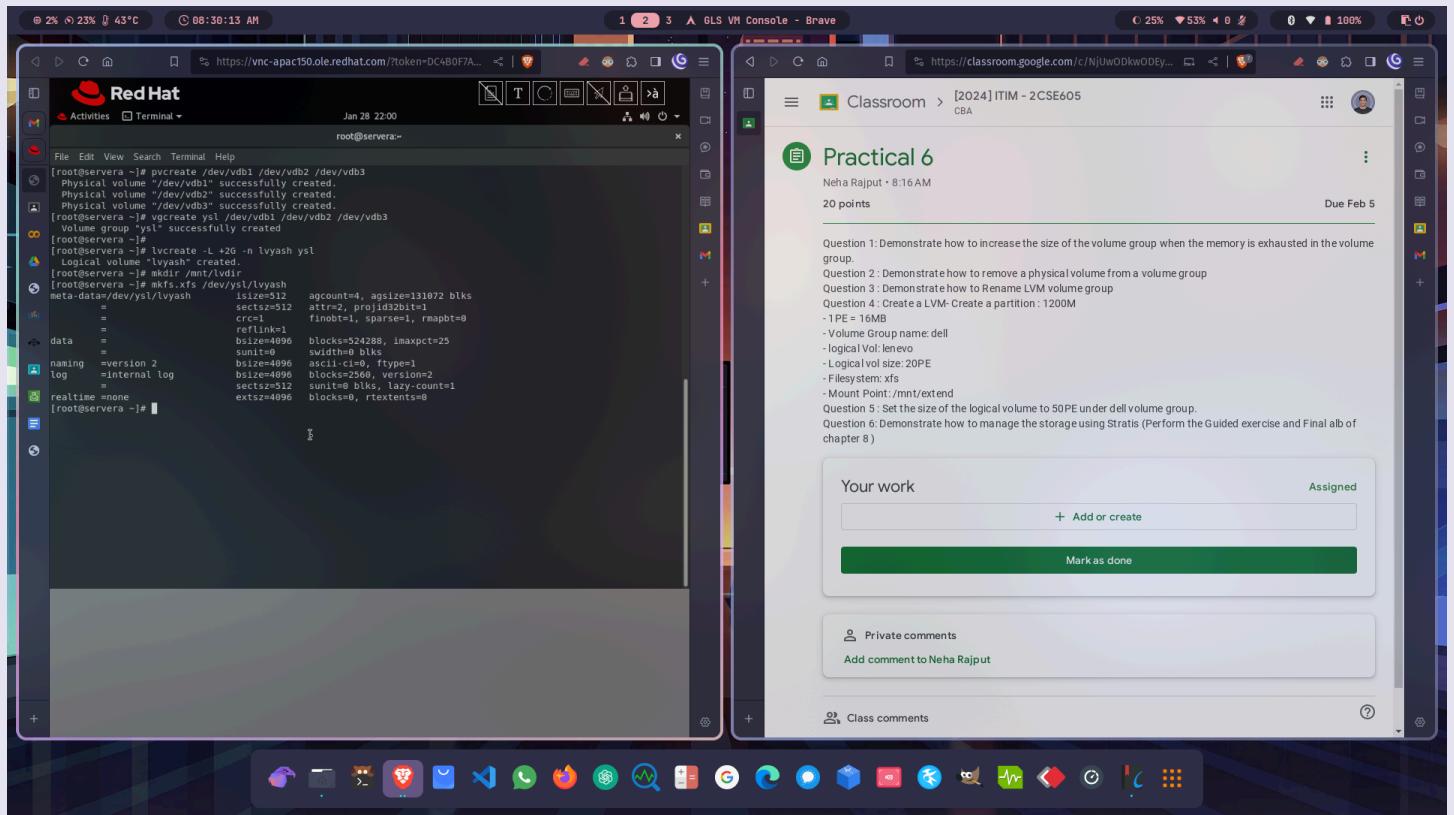
Command (m for help): p
Disk /dev/vdb: 5 GiB, 5368709120 bytes, 10485760 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: dos
Disk identifier: 0x76ed1816

Device      Boot   Start     End Sectors Size Id Type
/dev/vdb1          2048 2099199 2097152  1G 83 Linux
/dev/vdb2      2099200 4196351 2097152  1G 83 Linux
/dev/vdb3      4196352 6293503 2097152  1G 83 Linux

Command (m for help):
```

The terminal window is part of a desktop environment with a dock at the bottom containing various application icons.

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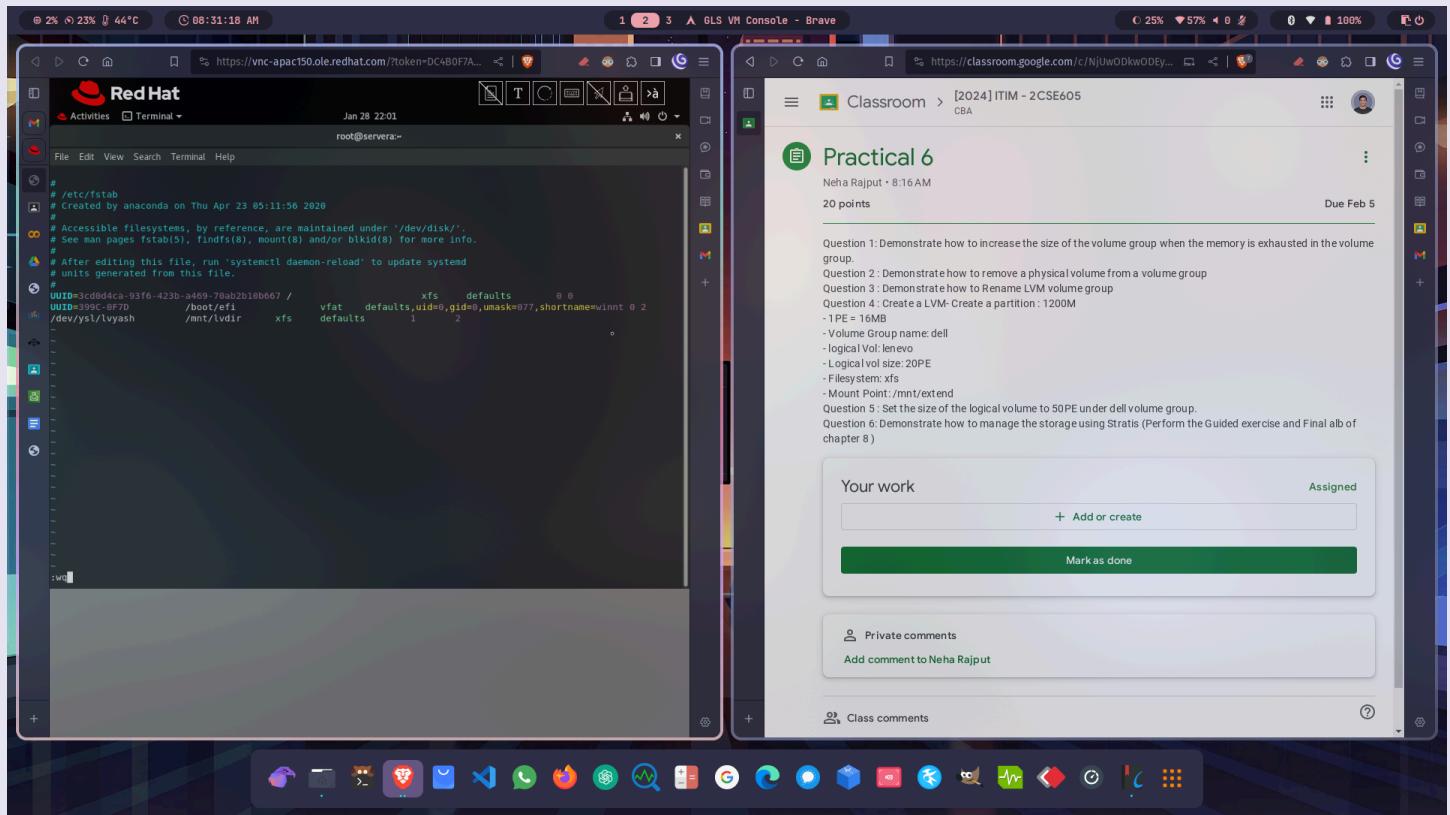


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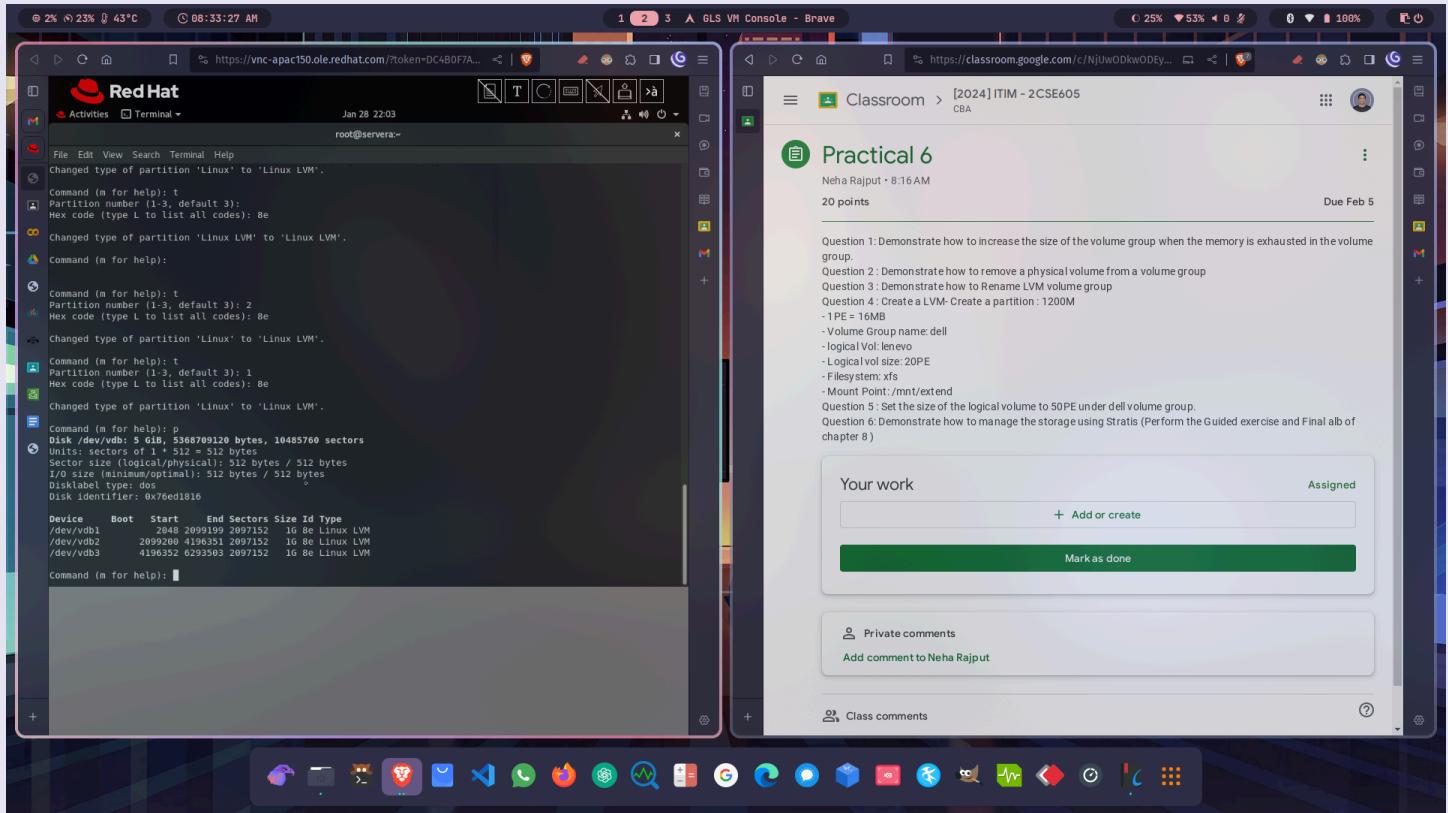
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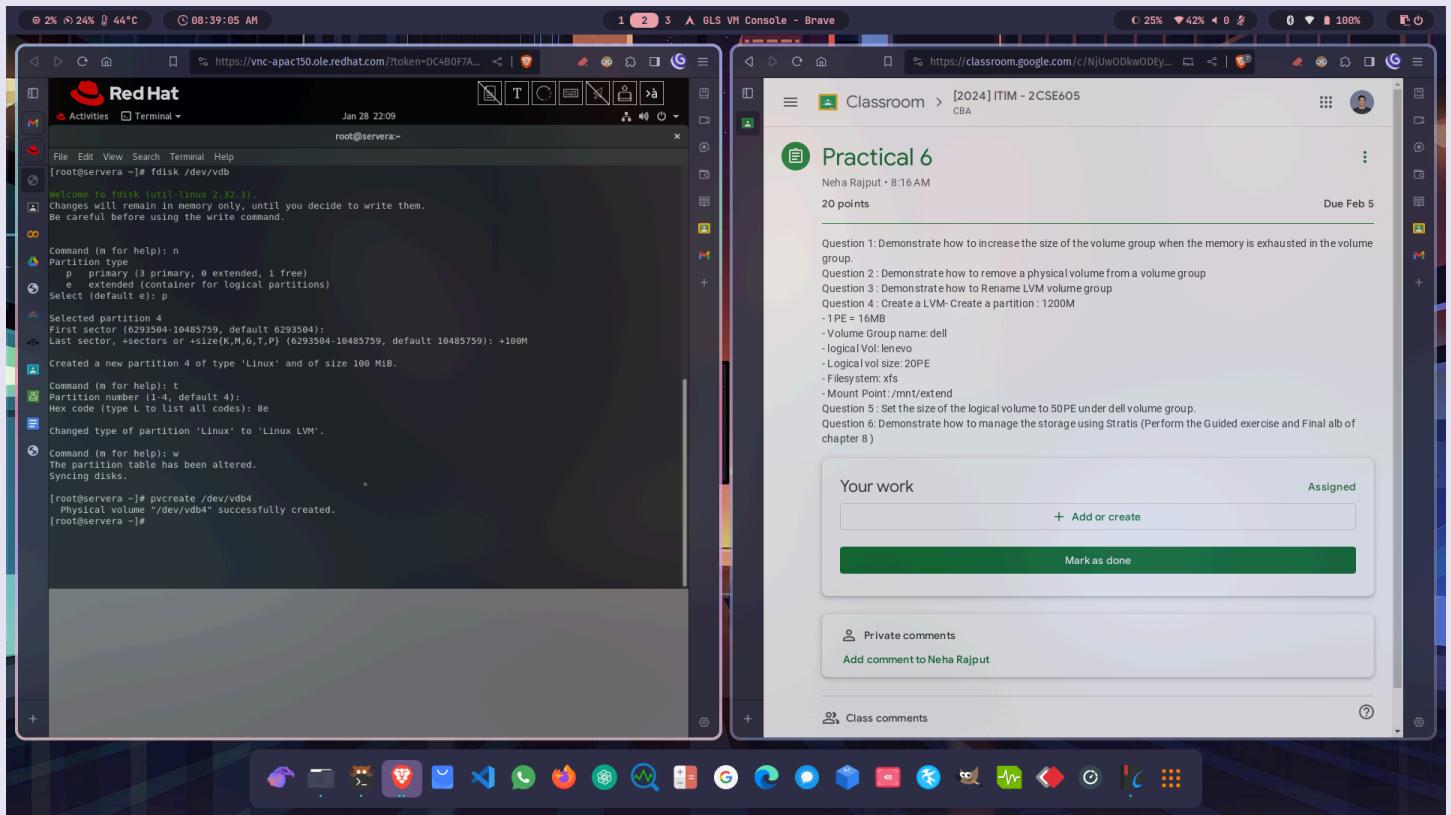


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b) Now, create a PV and extend VG using that

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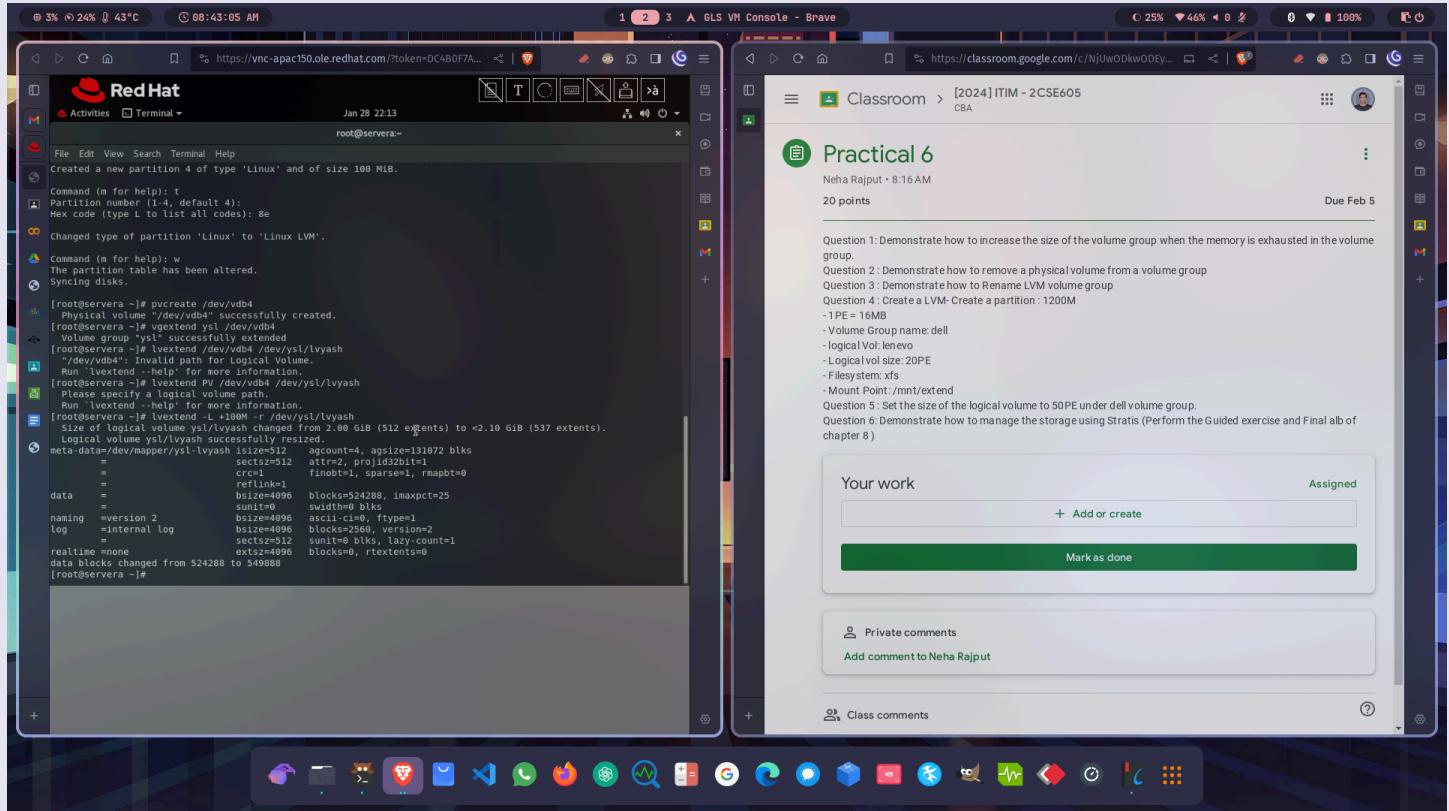


Command : **vgextend ysl /dev/vdb4**

Explanation : extend volume group named **ysl** by adding the physical volume specified, here **/dev/vdb4**

c) Extend the logical volume now, using the command **lvextend**

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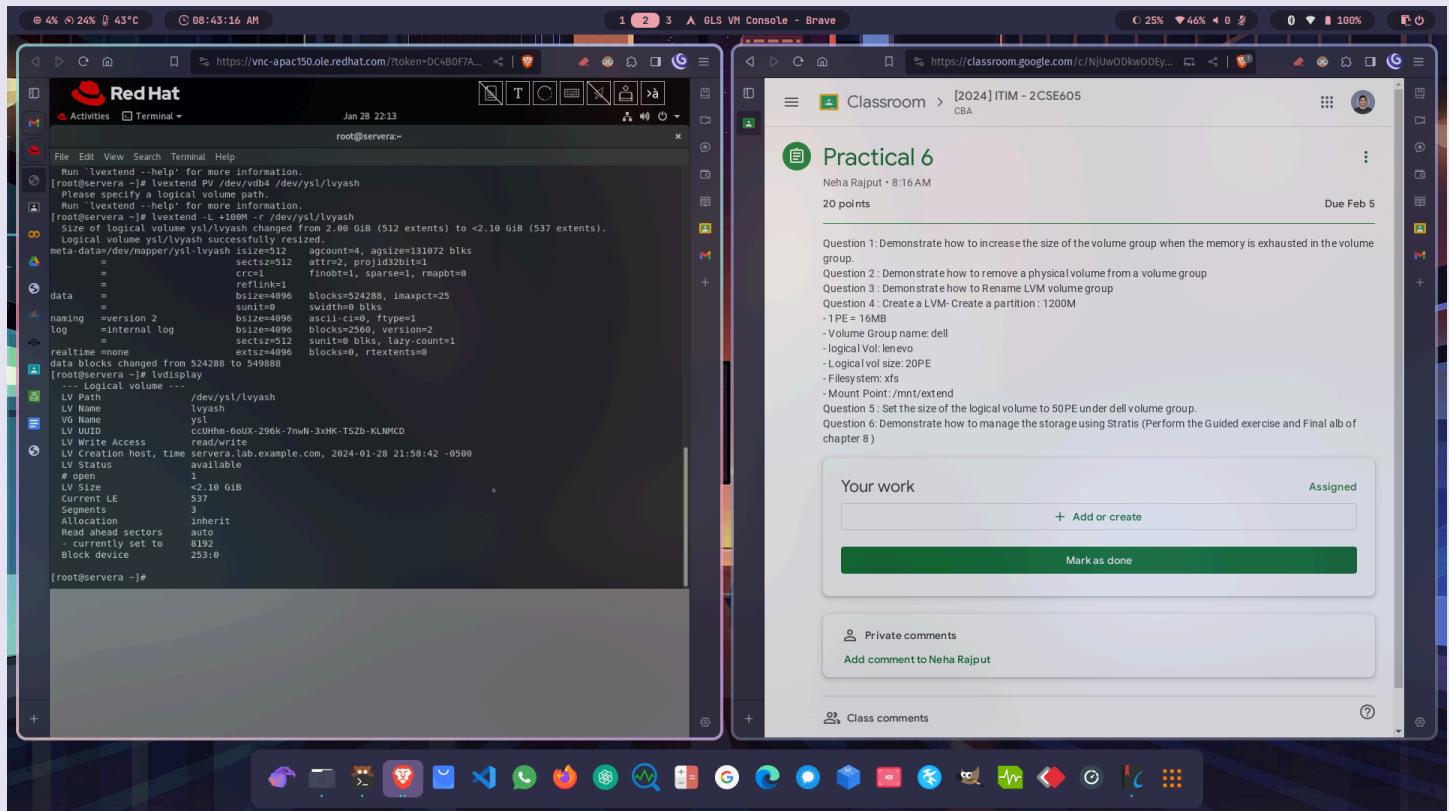


Command : **lvextend -L +100M -r /dev/ysl/lvyash**

Explanation : extend the logical volume of the name and path specified (lvyash here) by 100 Megabytes size specified by **-L**, and resize the filesystem accordingly, as per option **-r** here.

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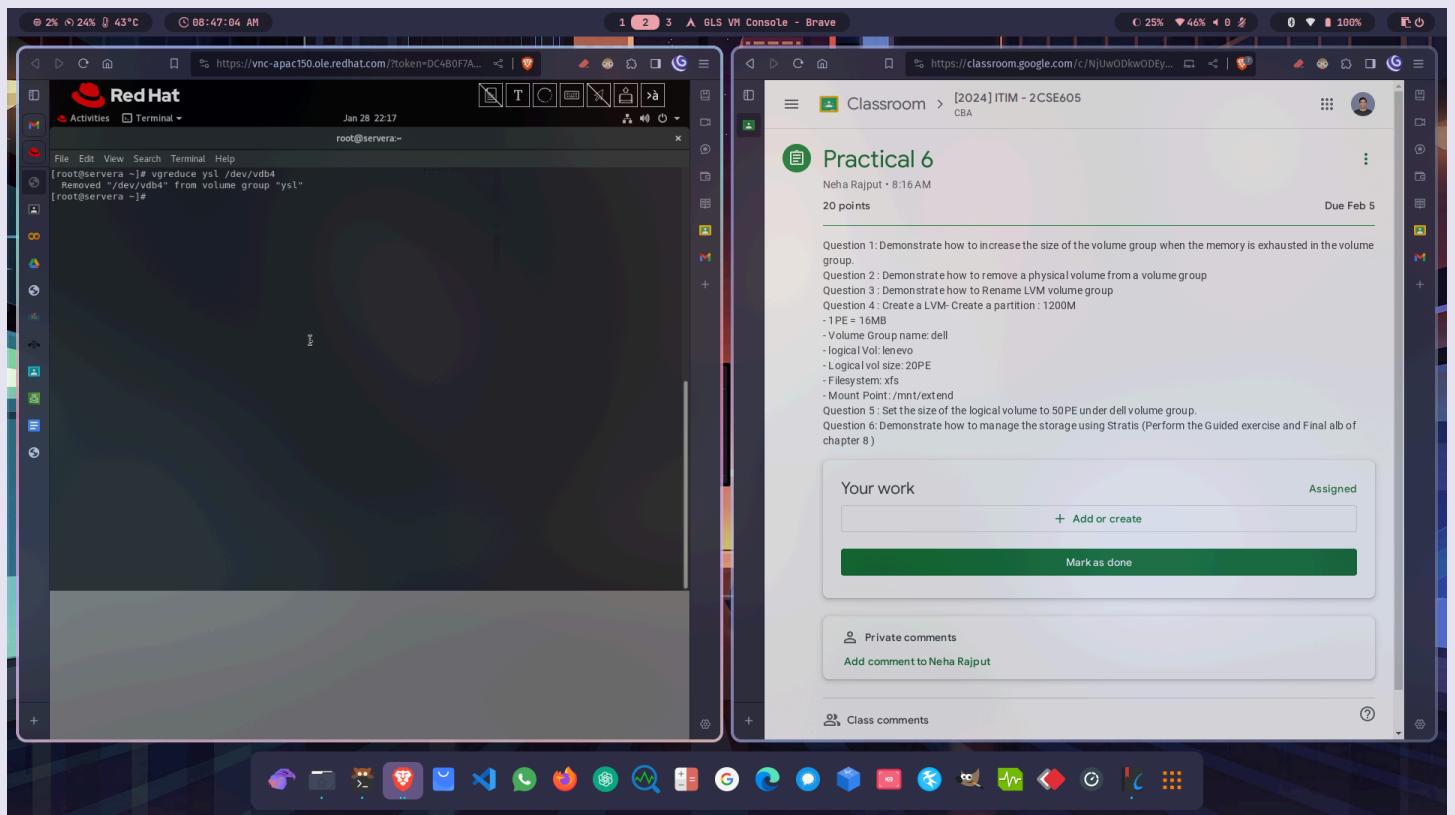
d) Check if the changes are successful using command lvdisplay



Command : **lvdisplay**

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## 2. Demonstrate how to remove a physical volume from a volume group

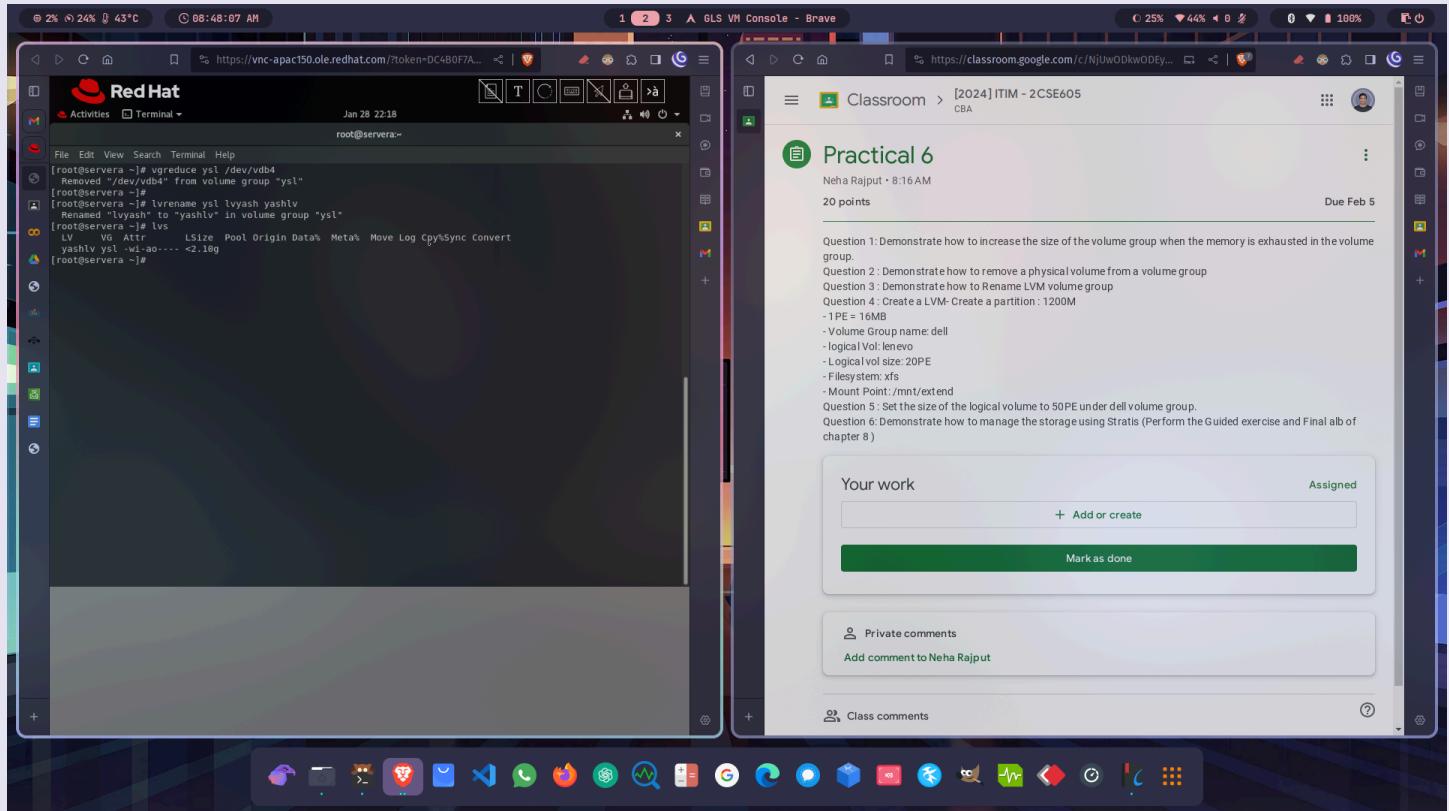


Command : **vgreduce ysl /dev/vdb4**

Explanation : reduce the volume group specified (ysl here) by removing the physical volume specified (/dev/vdb4 here)

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### 3. Demonstrate how to Rename LVM



Command : **lvrename ysl lvyash yashlv**

Explanation : rename the logical volume of the volume group **ysl** from **lvyash** to **yashlv**

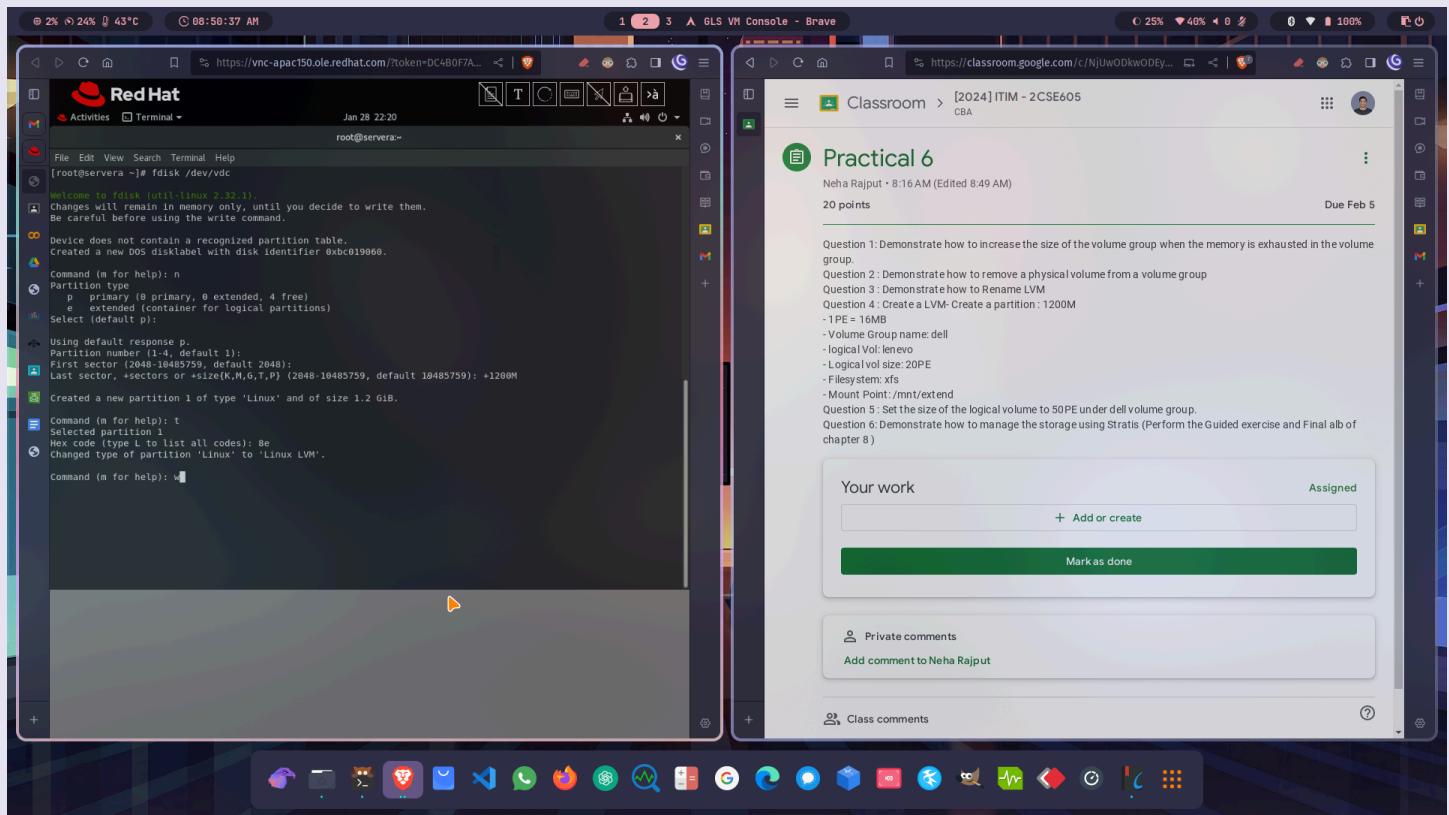
Command : **lvs** (to get short details of logical volumes)

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#### 4. Create a LVM- Create a partition : 1200M

- 1PE = 16MB
- Volume Group name: dell
- logical Vol: lenovo
- Logical vol size: 20PE
- Filesystem: xfs
- Mount Point: /mnt/extend

a) Create physical volume of size 1200 Megabytes and change the type to LVM

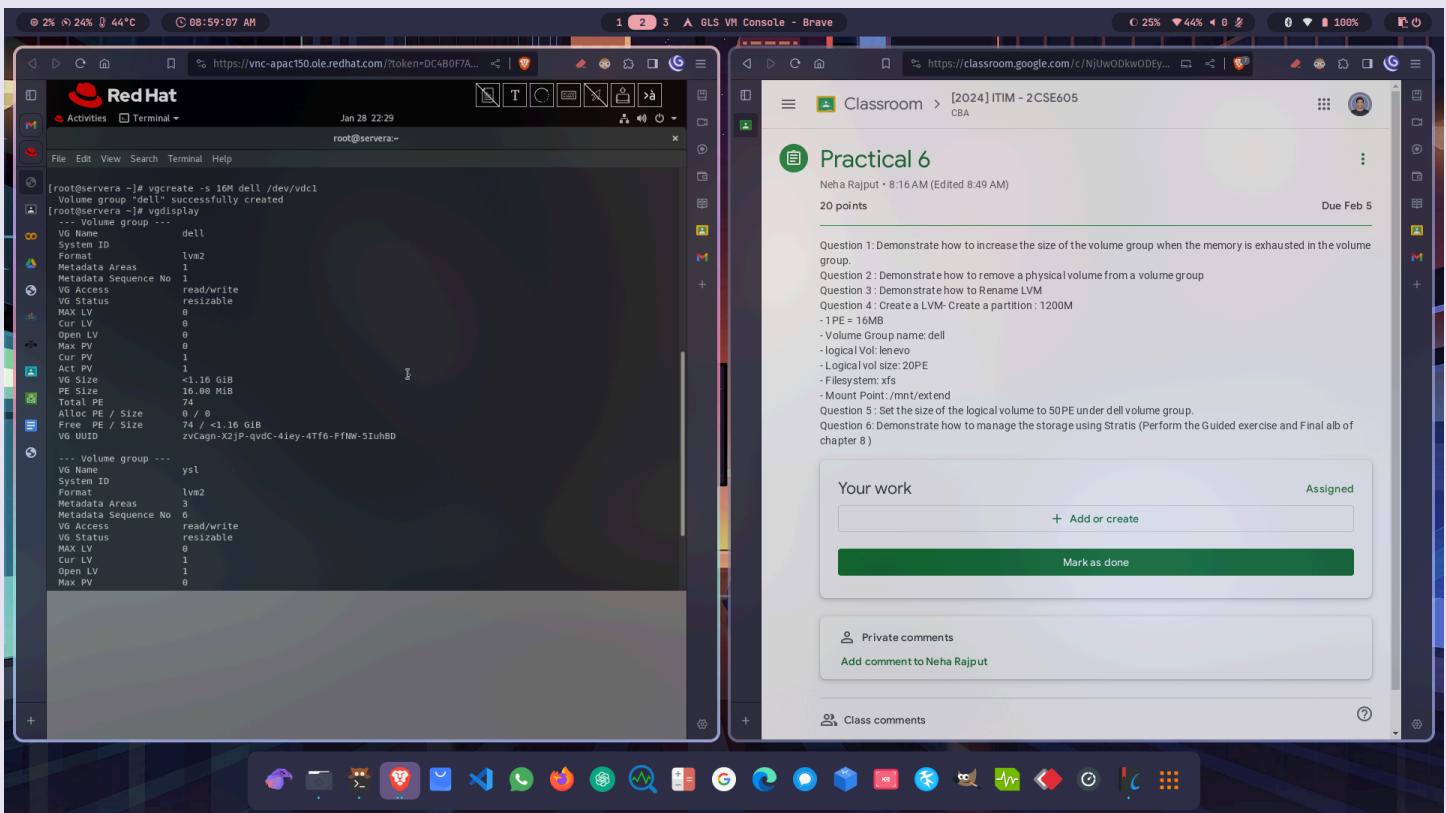


Command : **fdisk /dev/vdc**

Subcommands of fdisk : n, p, t, w

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## b) Create physical volume and volume group



Command : **pvcreate /dev/vdc1**

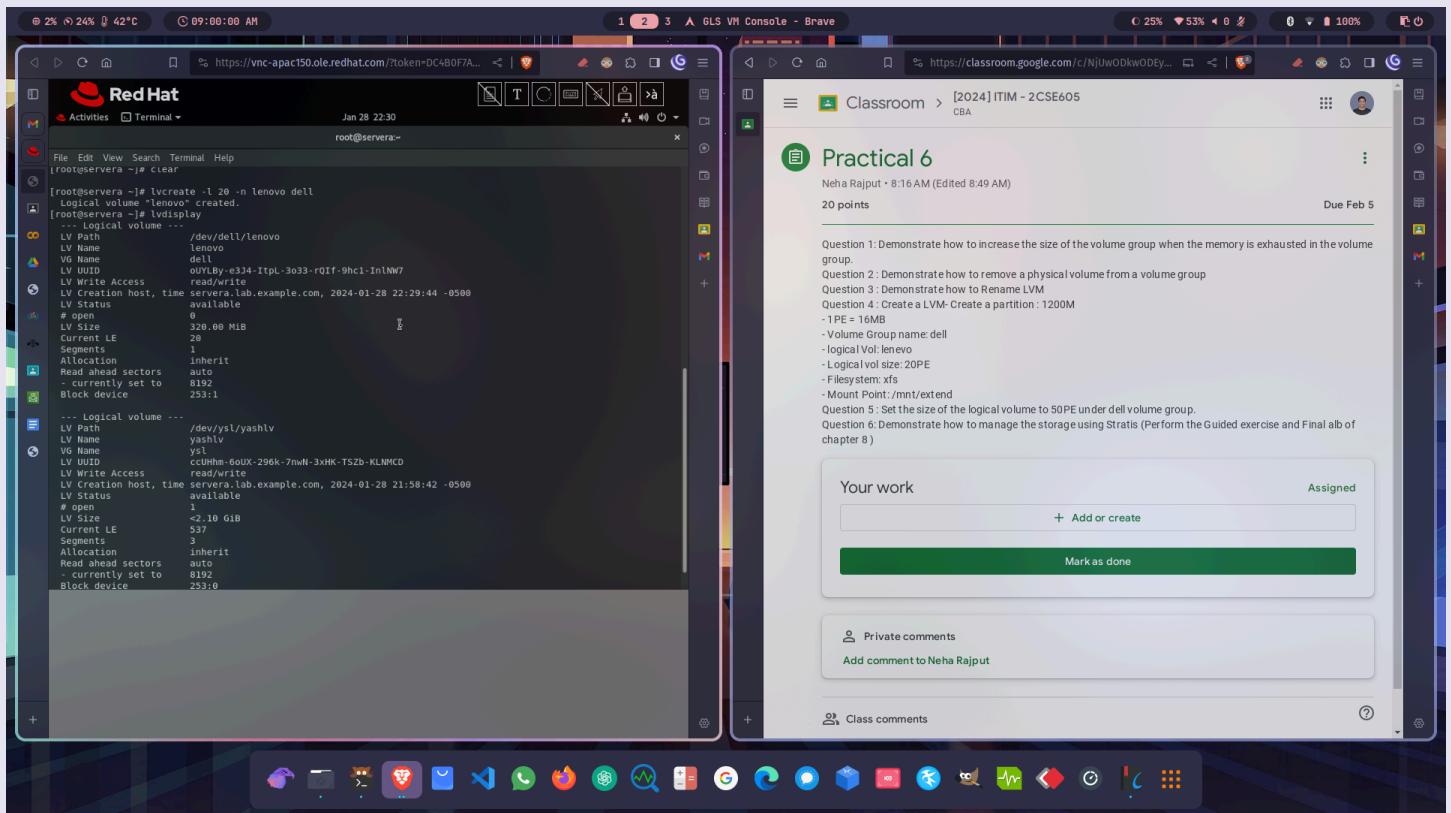
Command : **vgcreate -s 16M dell /dev/vdc1**

Explanation : create volume group of name **dell** with physical extent size specified by **-s** (16M here) using the physical volume vdc1

Command : **vgdisplay** (to get details of VGs in the system)

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c) Now, create logical volume using counts of PEs, instead of size as generally created.



Command : **lvcreate -l 20 -n lenovo dell**

Explanation : create logical volume of name specified by **-n** (lenovo here) of size equal to counts of physical extents specified by **-l** here in the volume group specified (dell here)

Command : **lvdisplay** (to get details of LVs in the system)

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d) Assign filesystem to LV and mount it at some directory

The terminal window on the left displays the following command history:

```
root@servera ~# mkfs.xfs /dev/dell/lenovo
meta-data=/dev/dell/lenovo isize=512 agcount=4, agsize=20480 blks
          =         sectsz=512 attr=2, projid3bit=1
          =         csum=1 reflink=1 finobt=1, sparsei, rmapbt=0
data     =         bsize=4996 blocks=81920, imaxpct=25
          =         sunit=0 swidth=0 blks
naming   =         version=2 bsize=4996 ascii-ci=0, ftype=1
log      =         internal log bsize=4996 blocks=384, version=2
          =         sectsz=512 sunit=0 blks, lazy-count=1
realtime =         none extsz=4996 blocks=0, rtxcients=0
[root@servera ~]# mkdir /mnt/extend
[root@servera ~]# mount /dev/dell/lenovo /mnt/extend
[root@servera ~]#
```

The Google Classroom assignment 'Practical 6' on the right contains the following instructions:

Question 1: Demonstrate how to increase the size of the volume group when the memory is exhausted in the volume group.  
Question 2 : Demonstrate how to remove a physical volume from a volume group  
Question 3 : Demonstrate how to Rename LVM  
Question 4 : Create a LVM- Create a partition : 1200M  
- 1PE = 16MB  
- Volume Group name: dell  
- logical Vol: lenovo  
- Logical vol size: 20PE  
- Filesystem: xfs  
- Mount Point: /mnt/extend  
Question 5 : Set the size of the logical volume to 50PE under dell volume group.  
Question 6: Demonstrate how to manage the storage using Stratis (Perform the Guided exercise and Final lab of chapter 8)

Your work

Assigned

+ Add or create

Mark as done

Private comments

Add comment to Neha Rajput

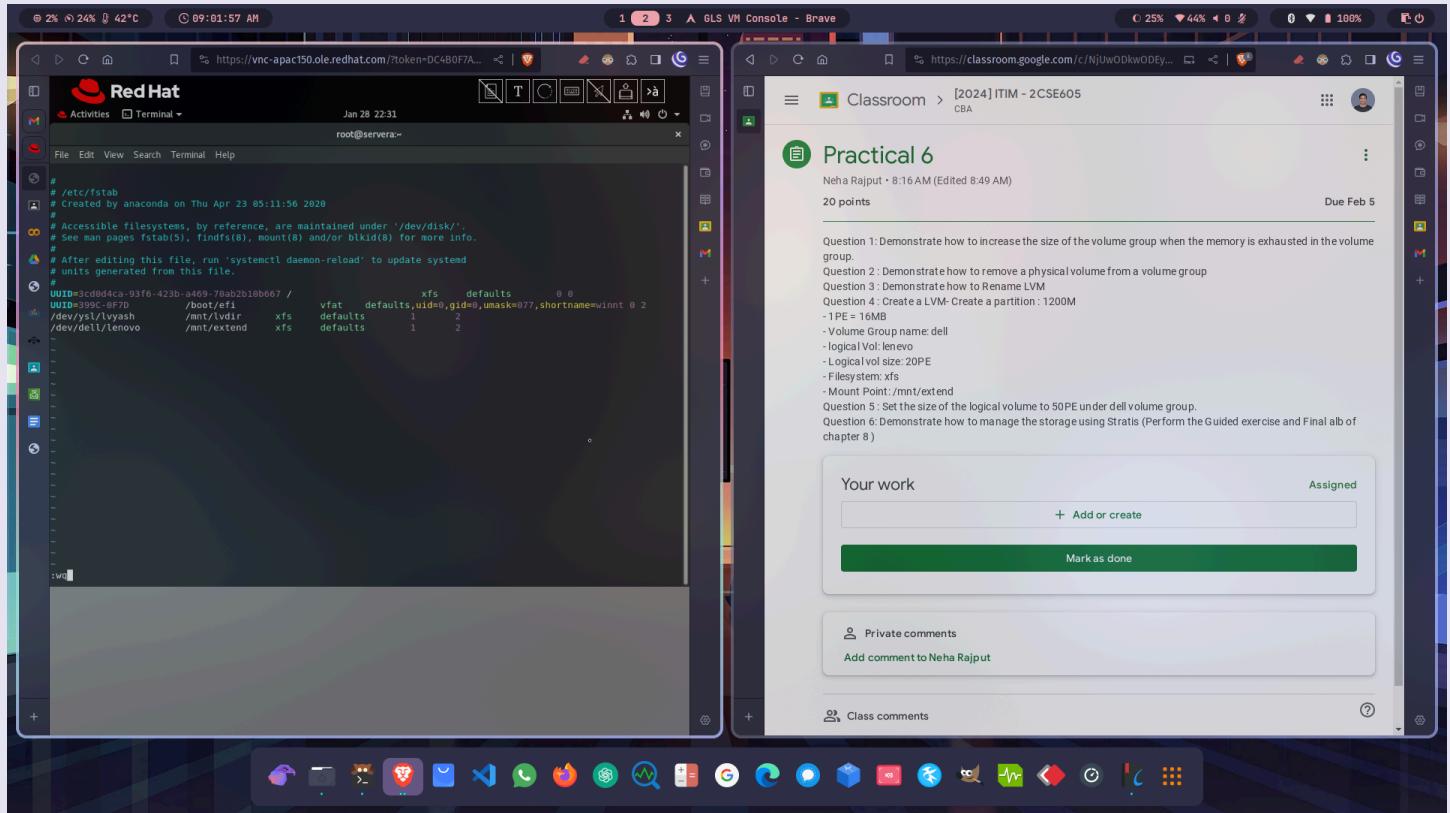
Class comments

Commands :

- **mkfs.xfs /dev/dell/lenovo**
- **mkdir /mnt/extend**
- **mount /dev/dell/lenovo /mnt/extend**

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e) Add an entry in fstab for turning its usage on after reboot



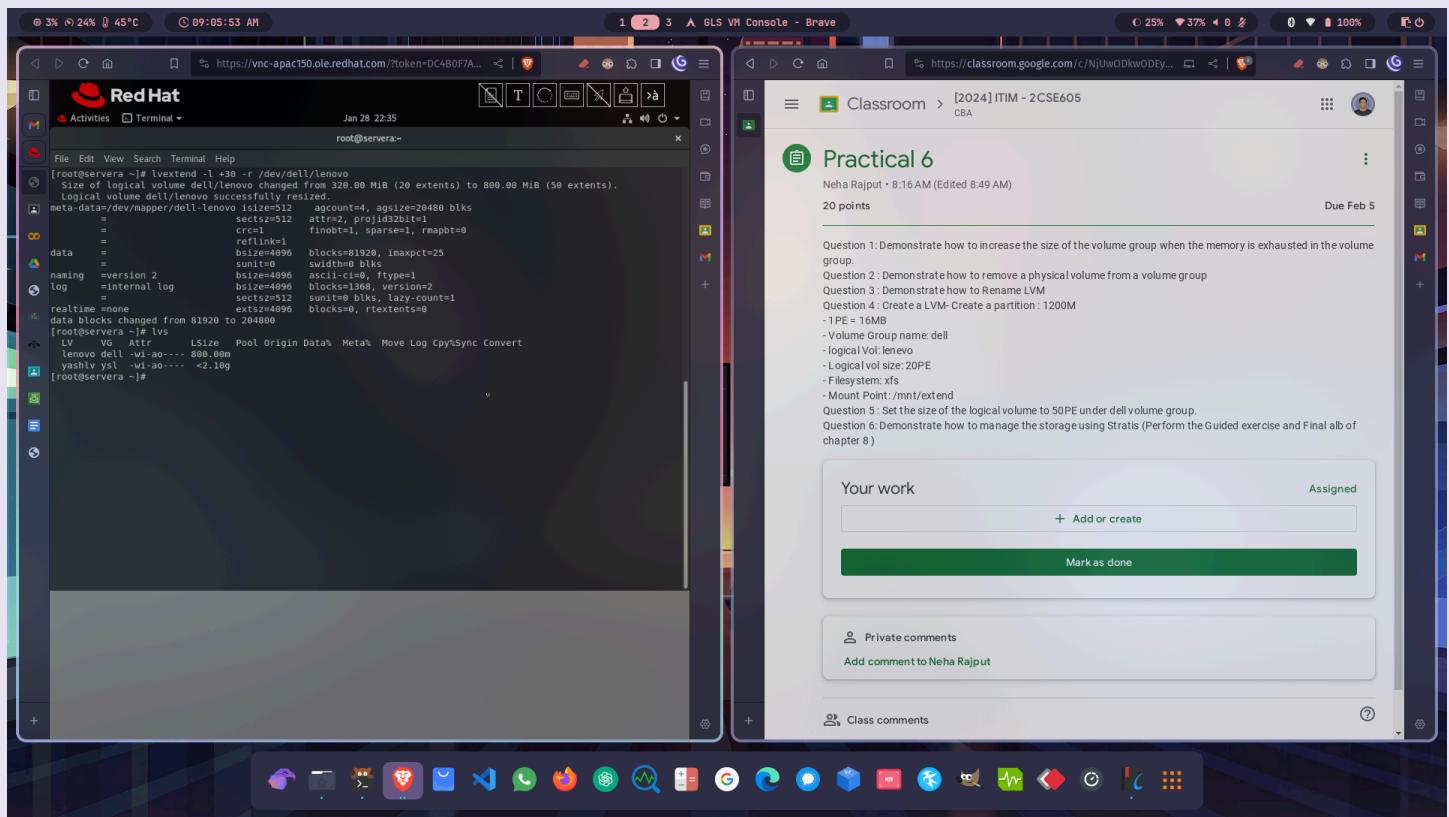
Command : **vim /etc/fstab**

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## 5. Set the size of the logical volume to 50PE under dell volume group.

Size to increase = Desirable size - Current size (for PEs)

Here, size to increase = 50 PEs - 20 PEs = 30 PEs



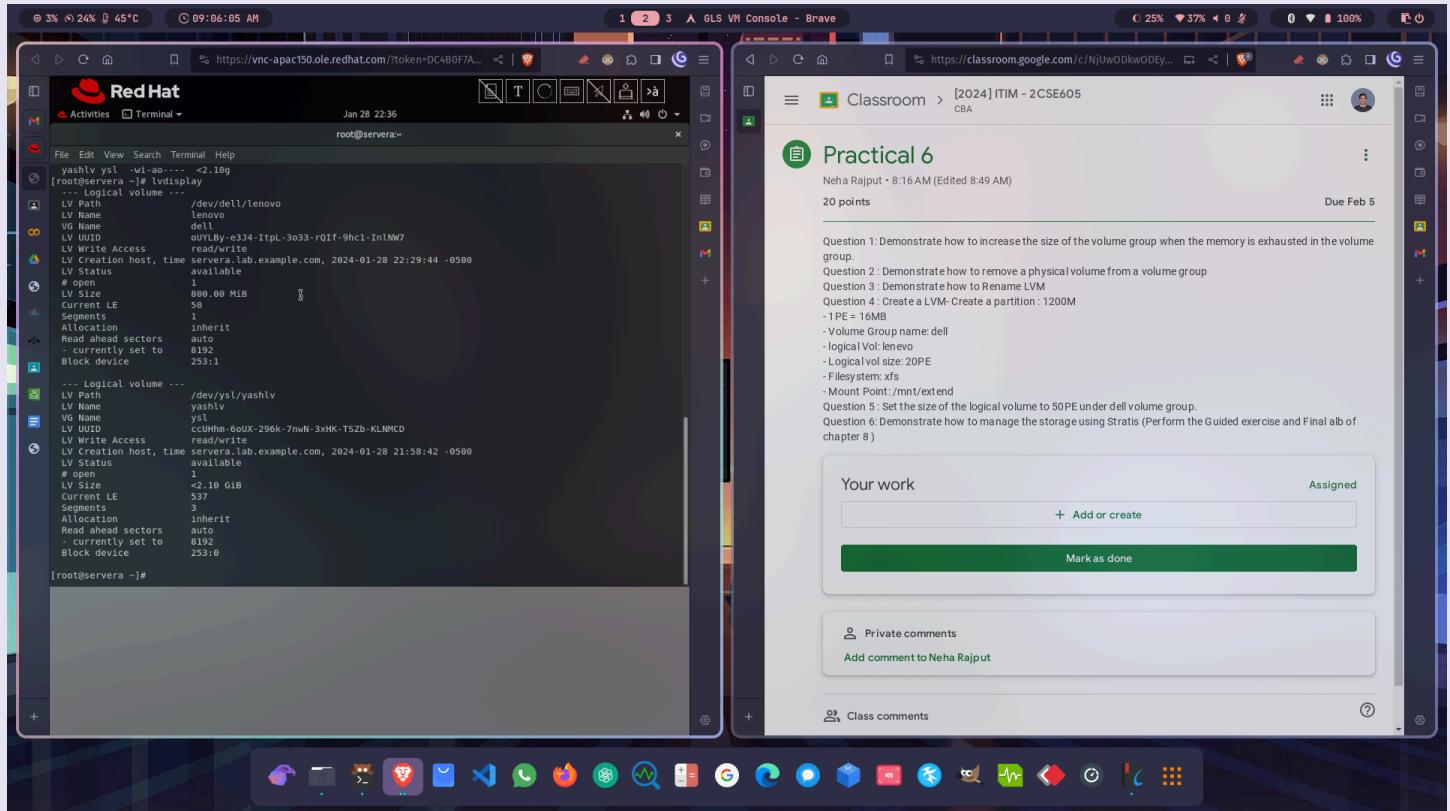
Command : **lvextend -l +30 -r /dev/dell/lenovo**

Explanation : extend the size of logical volume of which path is specified (lenovo here) by counts of PEs specified by **-l** (30 here) and resize the filesystem, as per option **-r** as required.

Command : **lvs** (to get short details of LVs in the system)

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Now, check if the changes are successful



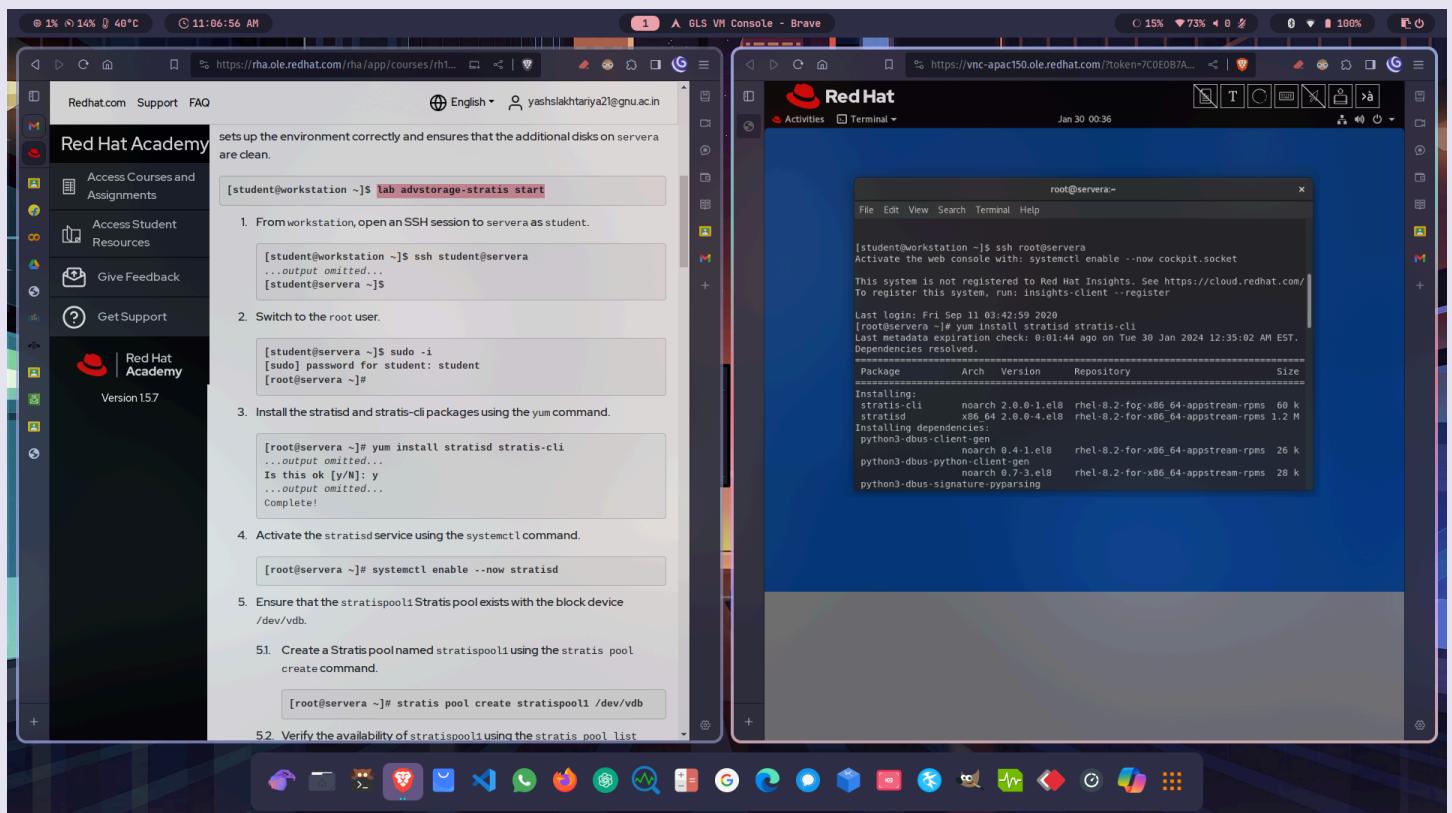
Command : **lvdisplay**

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## 6. Demonstrate how to manage the storage using Stratis (Perform the Guided exercise and Final lab of chapter 8 )

### → Guided Exercise-1 : Managing Layered Storage with Stratis

- Login with root user in servera from workstation via ssh and install stratisd and stratis-cli packages using yum package manager

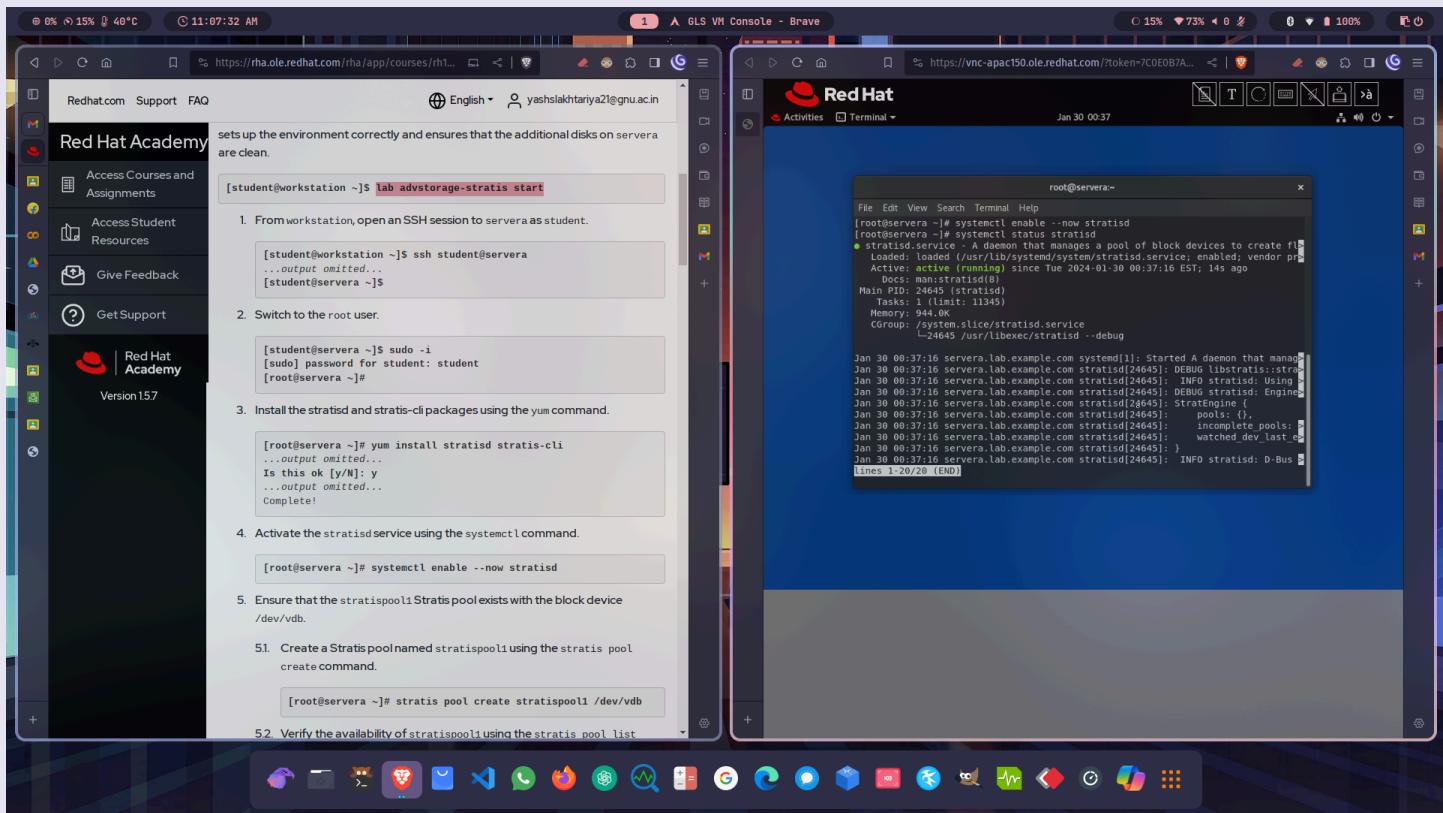


### Commands :

- **ssh root@servera**
- **yum install stratisd stratis-cli**

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- b. Enable the stratis daemon service using systemctl command and check if it is running successfully.

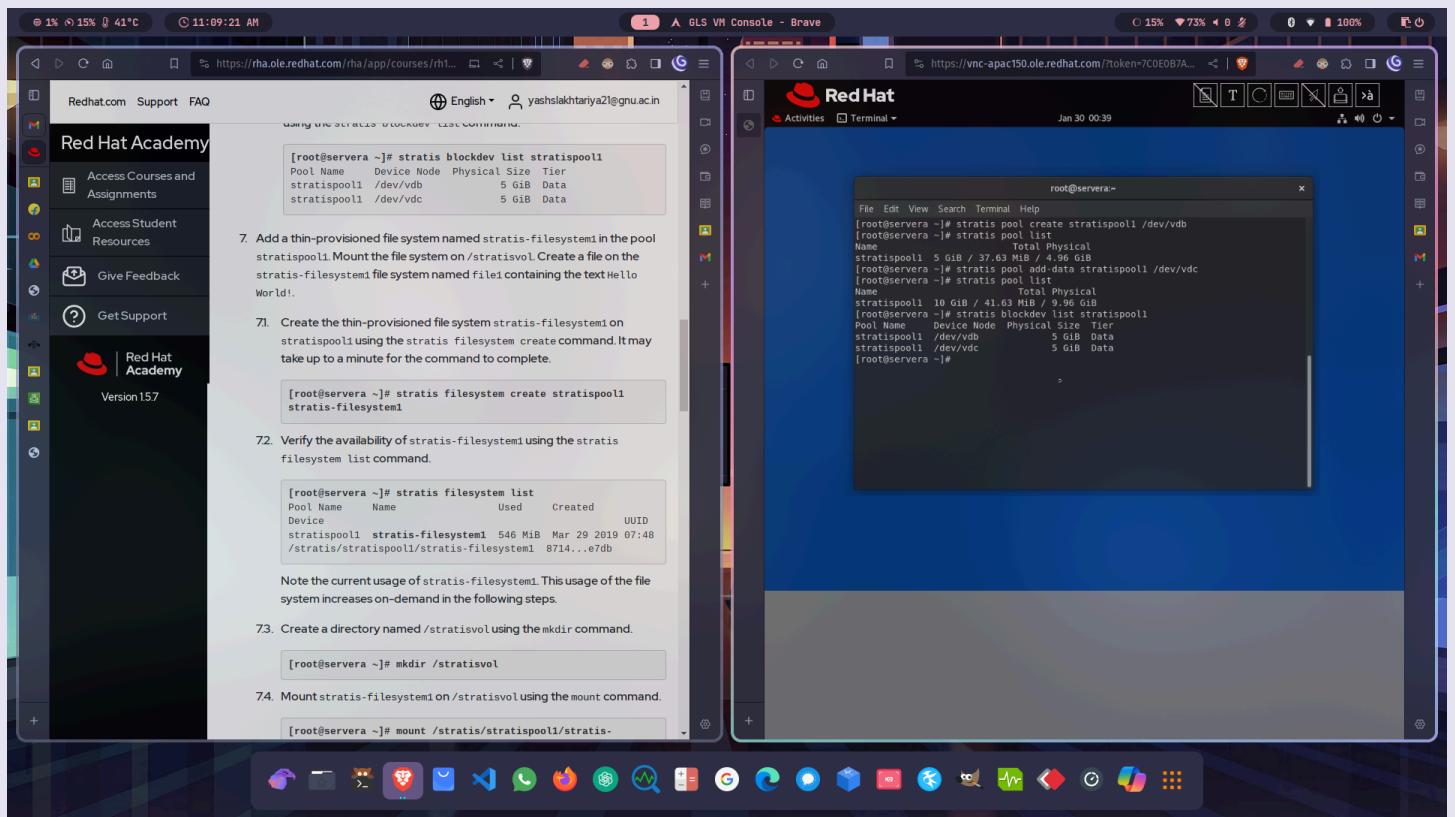


### Commands :

- **systemctl enable --now stratisd**
- **systemctl status stratisd**

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- c. Create stratispool1 named stratis pool with vdb block device included initially, check its details and add vdc block device also afterwards. Now, details can be verified using pool list option and block devices' details using blockdev list option.

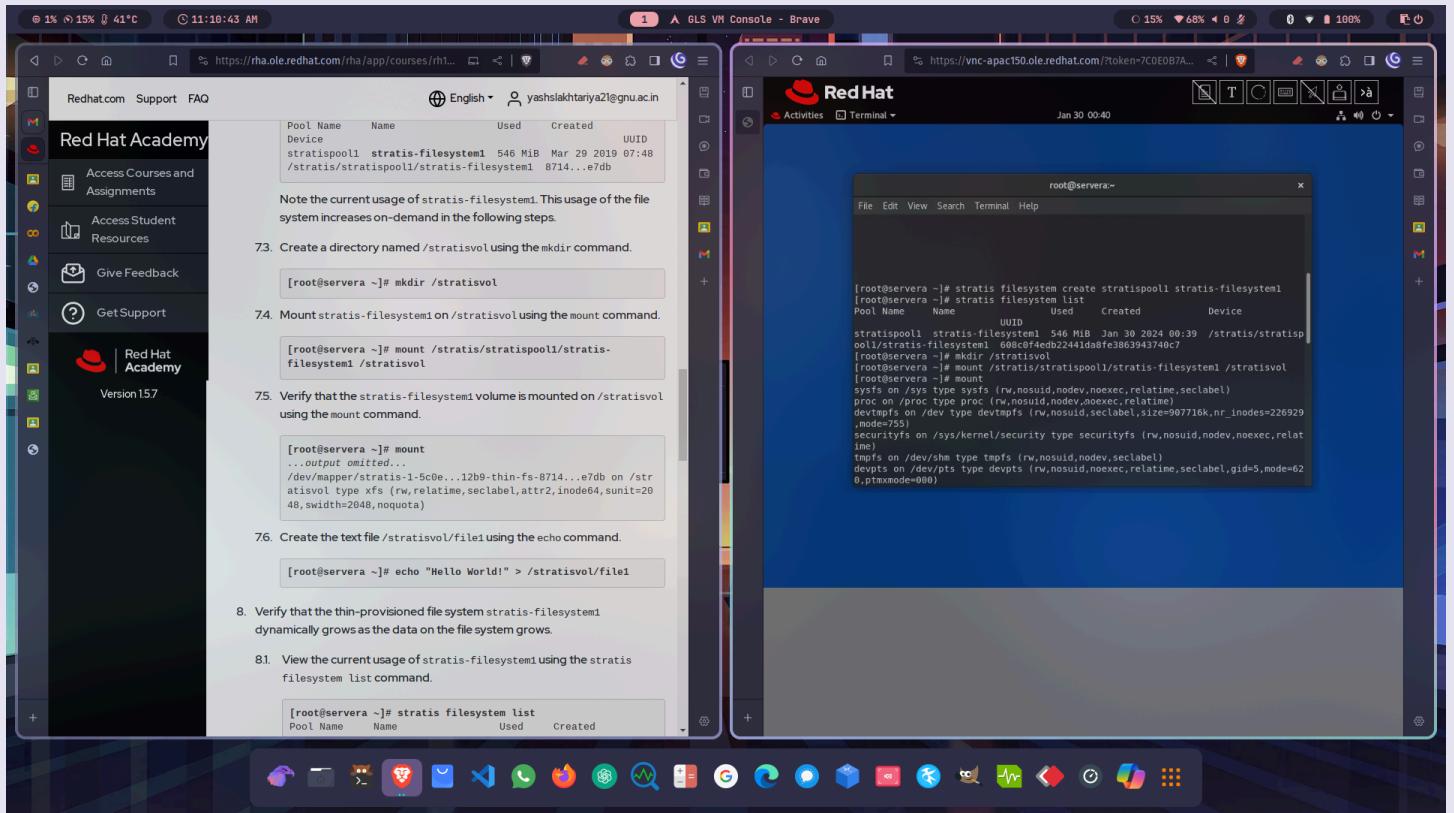


### Commands :

- **stratis pool create stratispool1 /dev/vdb**
- **stratis pool list**
- **stratis pool add-data stratispool1 /dev/vdc**
- **stratis pool list**
- **stratis blockdev list stratispool1**

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- d. Now, assign the filesystem to stratispool1 of name stratis-filesystem1 and check its details, and then after creating a directory to mount(/stratisvol here), mount it there.

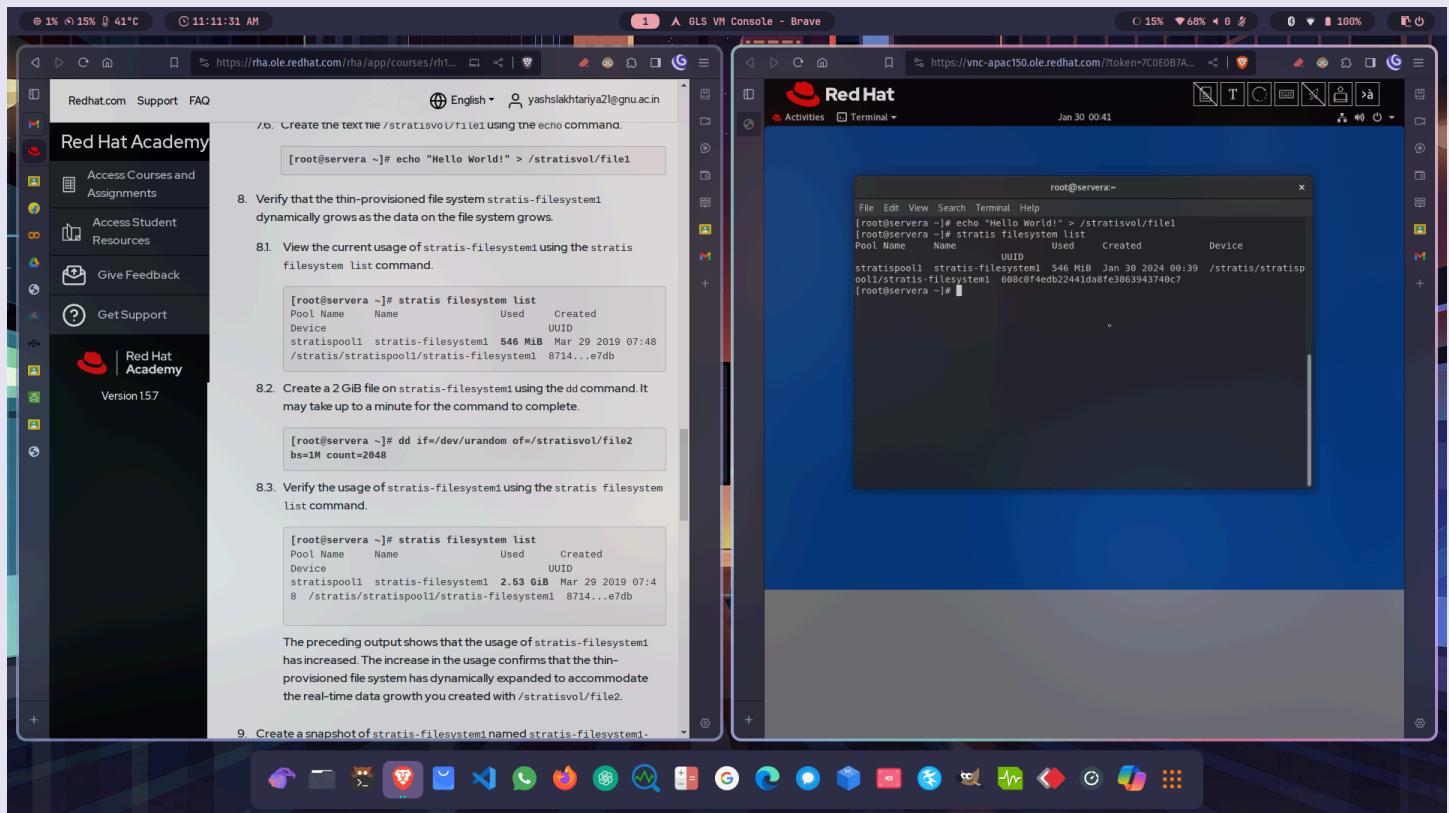


### Commands :

- **stratis filesystem create stratispool1 stratis-filesystem1**
- **stratis filesystem list**
- **mkdir /stratisvol**
- **mount /stratis/stratispool1/stratis-filesystem1 /stratisvol**
- **mount**

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- e. Append Hello World text to a new file- file1 inside the /stratisvol directory and check the details of filesystem.

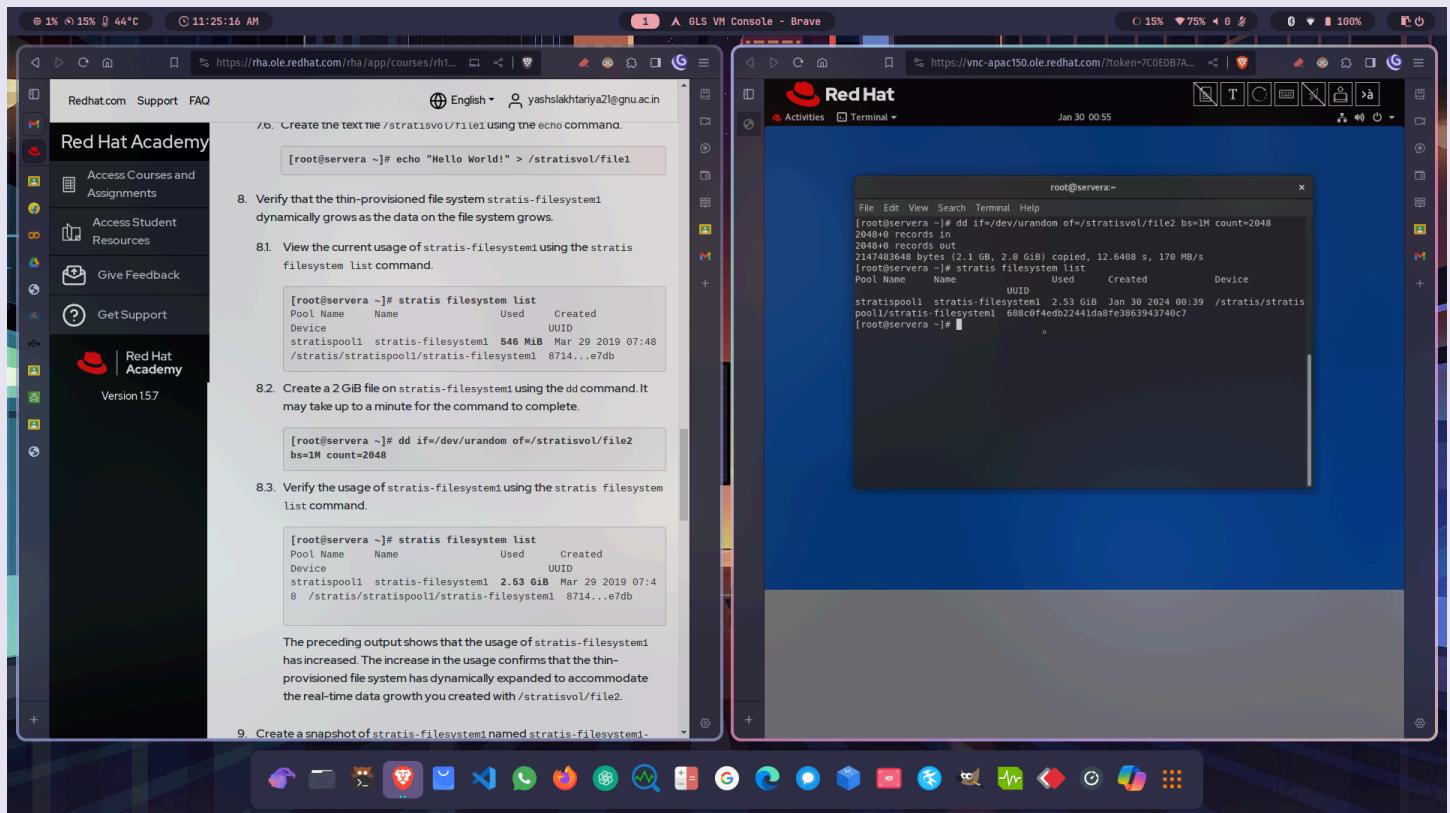


Commands :

- **echo "Hello World!" > /stratisvol/file1**
- **stratis filesystem list**

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- f. Now, create a 2Gigabytes file of name file2 using dd command in that stratis filesystem directory.

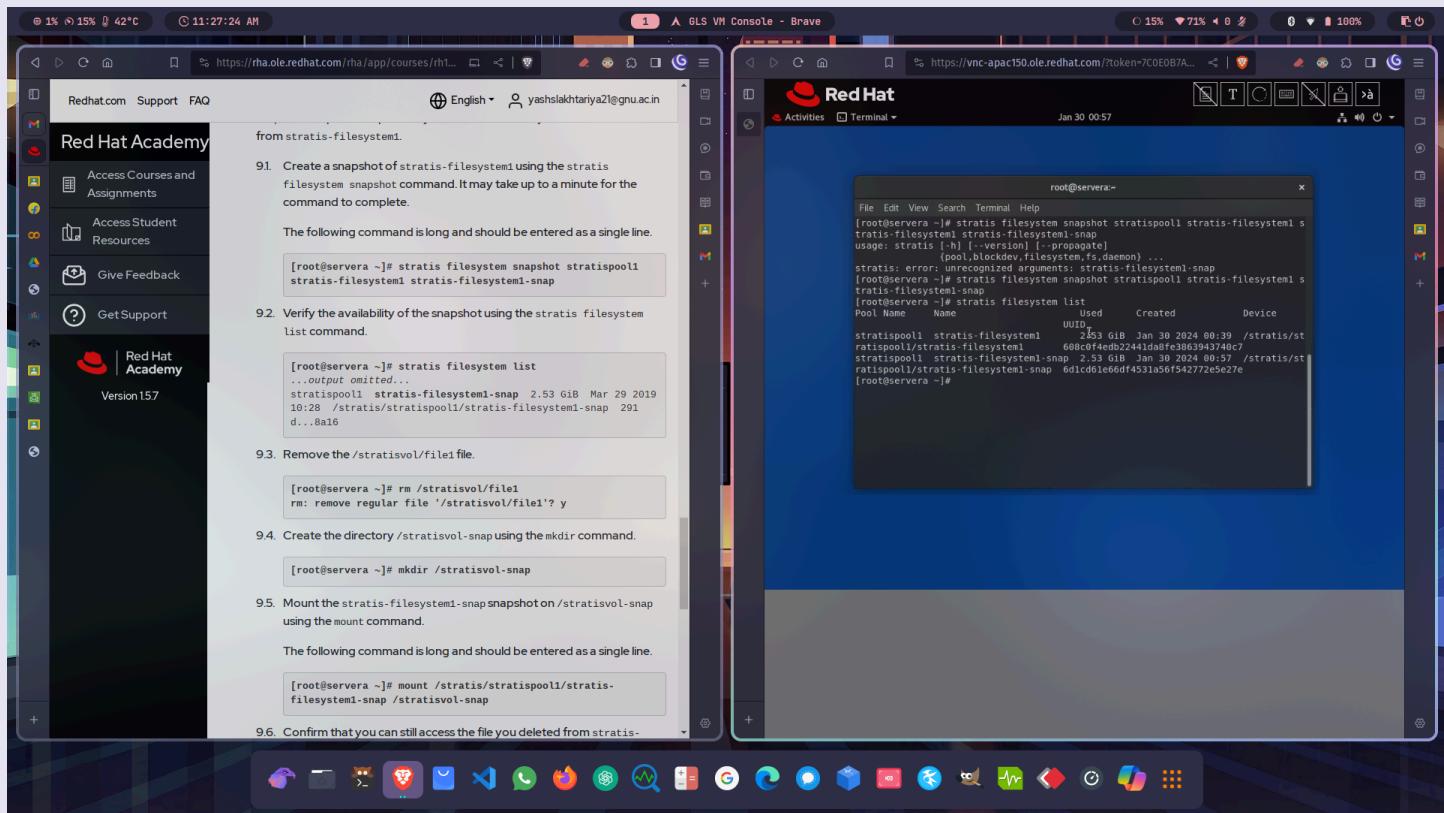


Commands :

- **dd if=/dev/urandom of=/stratisvol/file2 bs=1M count=2048**
- **stratis filesystem list**

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- g. Take a snapshot of the current stratis filesystem, which will create another filesystem as a backup of the current one.

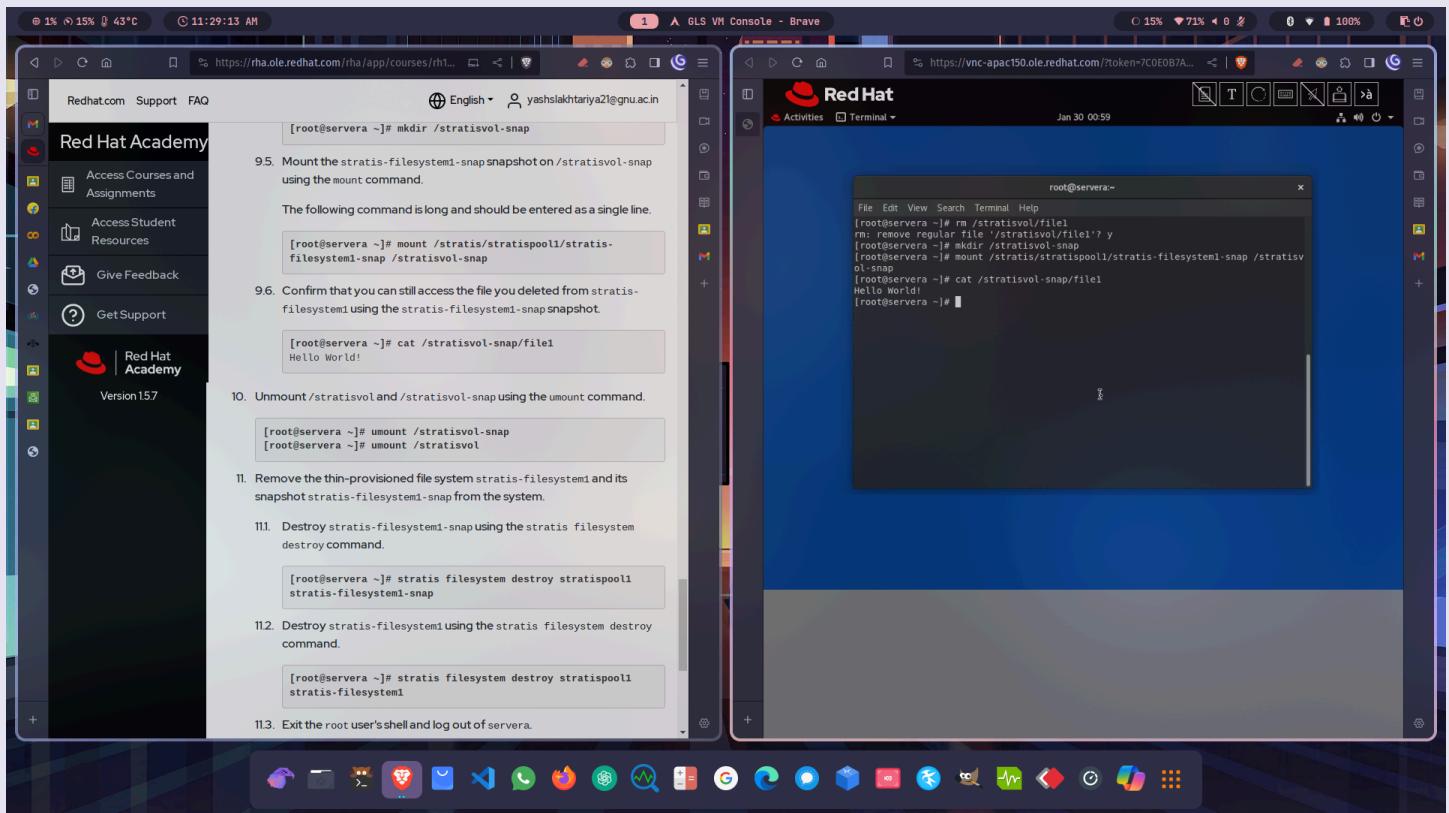


### Commands :

- **stratis filesystem snapshot stratispool1 stratis-filesystem1 stratis-filesystem1-snap**
- **stratis filesystem lis**

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h. Now, remove file1 in /stratisvol and mount the snapshot to a different location and check if the file1 is there in it with required content.

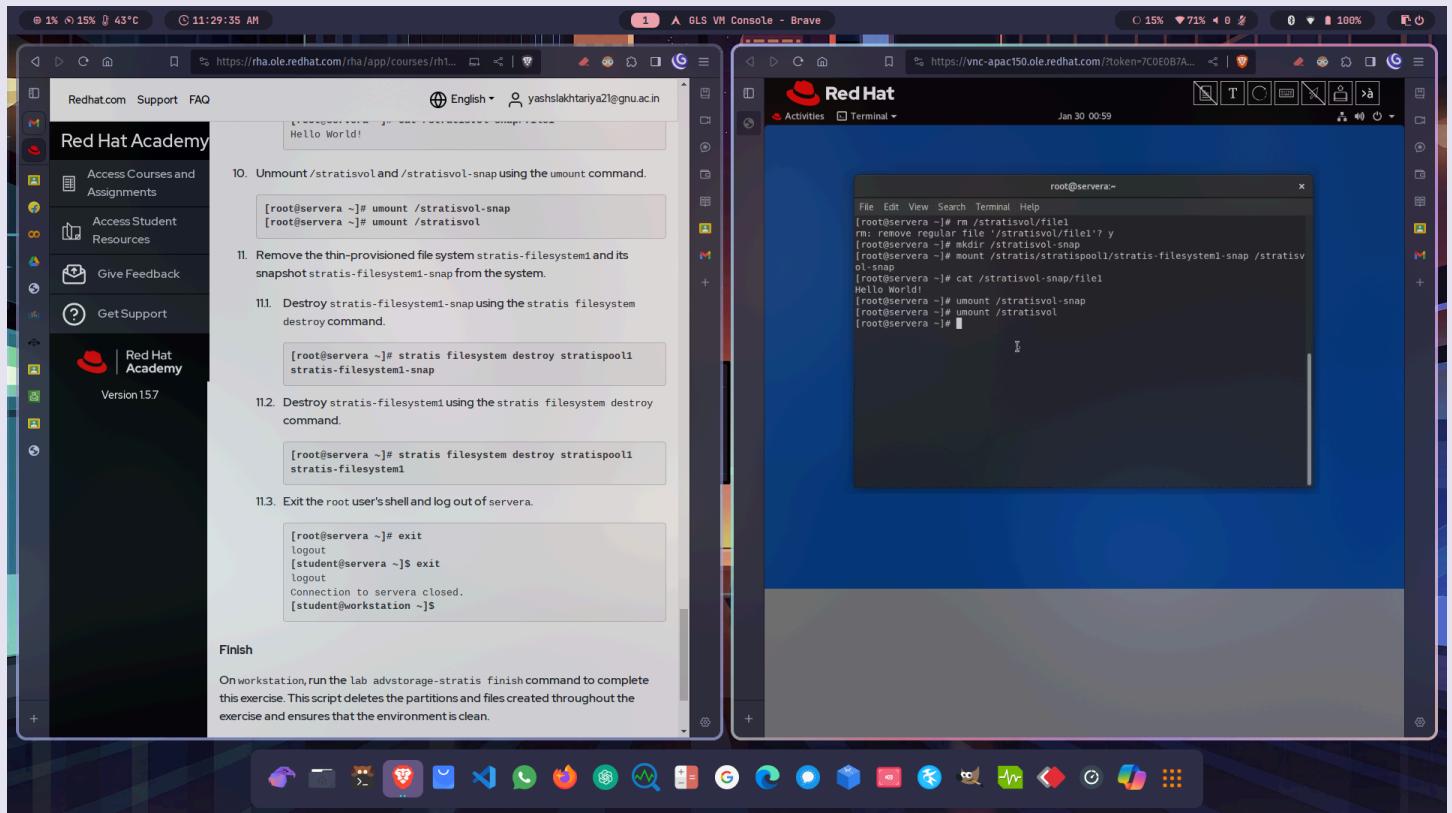


Commands :

- **rm /stratisvol/file1**
- **mkdir /stratisvol-snap**
- **mount /stratis/stratispool1/stratis-filesystem1-snap /stratisvol-snap**
- **cat /stratisvol-snap/file1**

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i. After finishing, unmount the both stratis filesystems

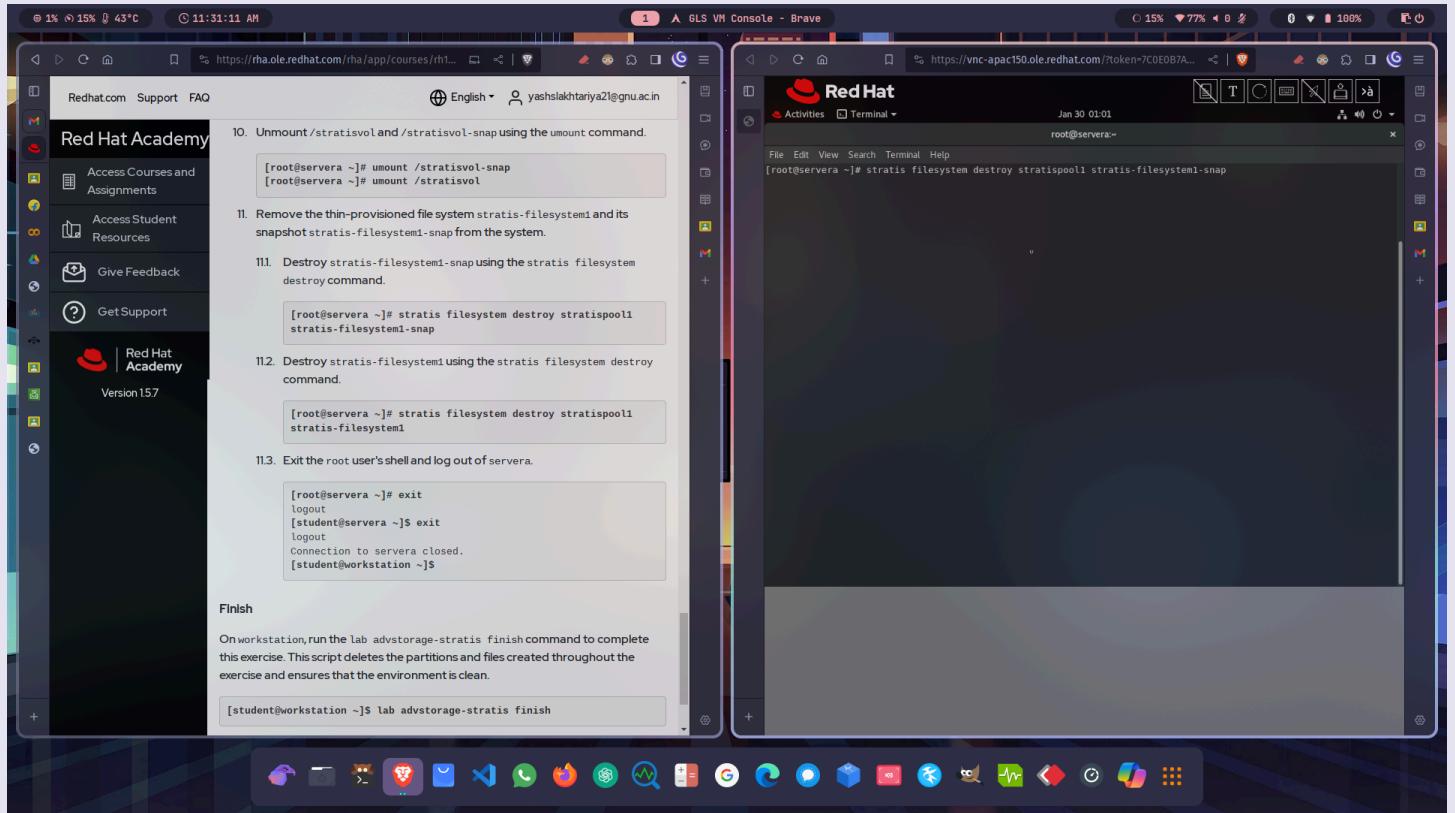


Commands :

- **umount /stratisvol-snap**
- **umount /stratisvol**

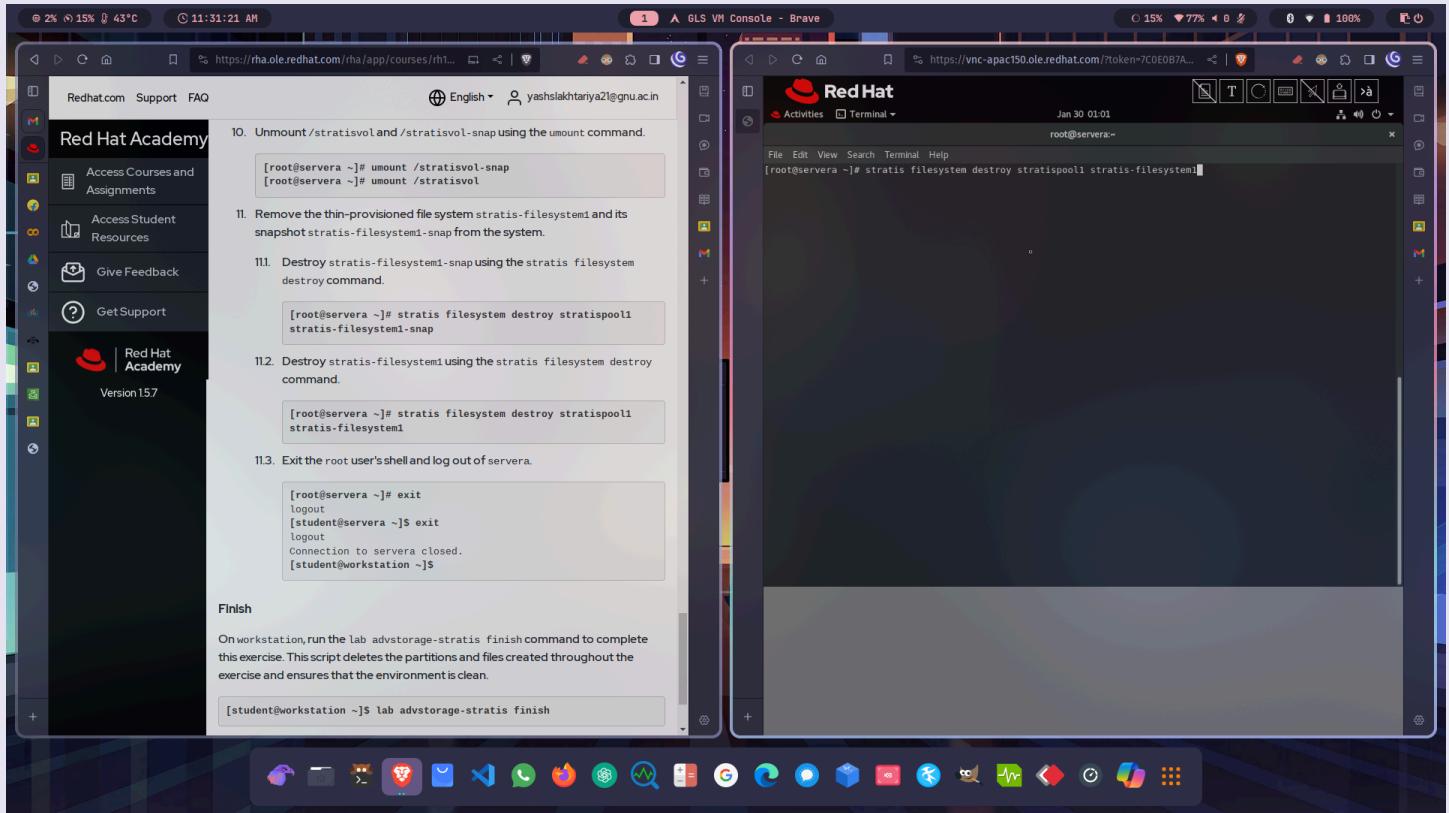
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j. Now, delete both the stratis filesystems



Command : **stratis filesystem destroy stratispool1 stratis-filesystem1-snap**

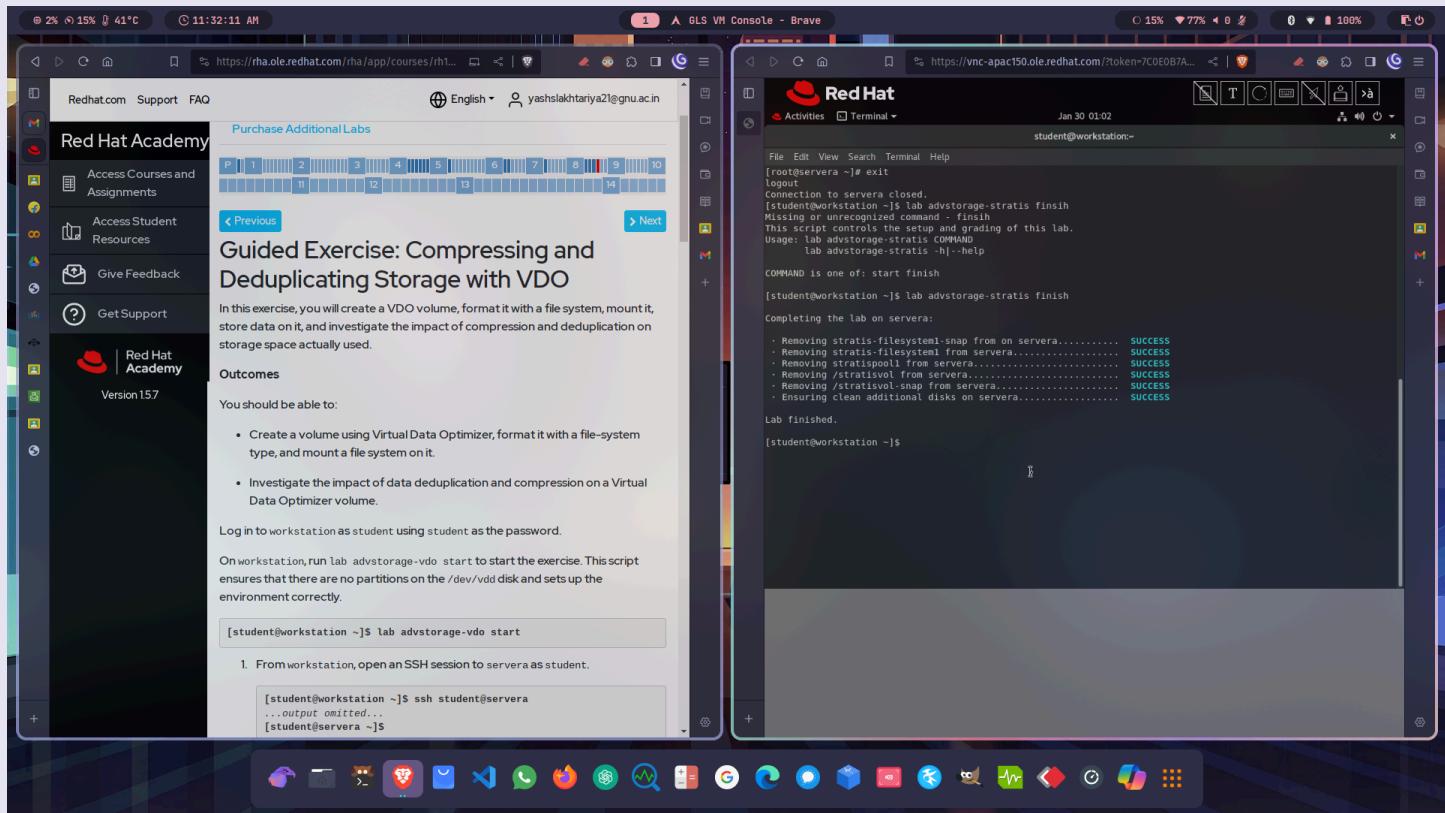
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Command : **stratis filesystem destroy stratispool1 stratis-filesystem1**

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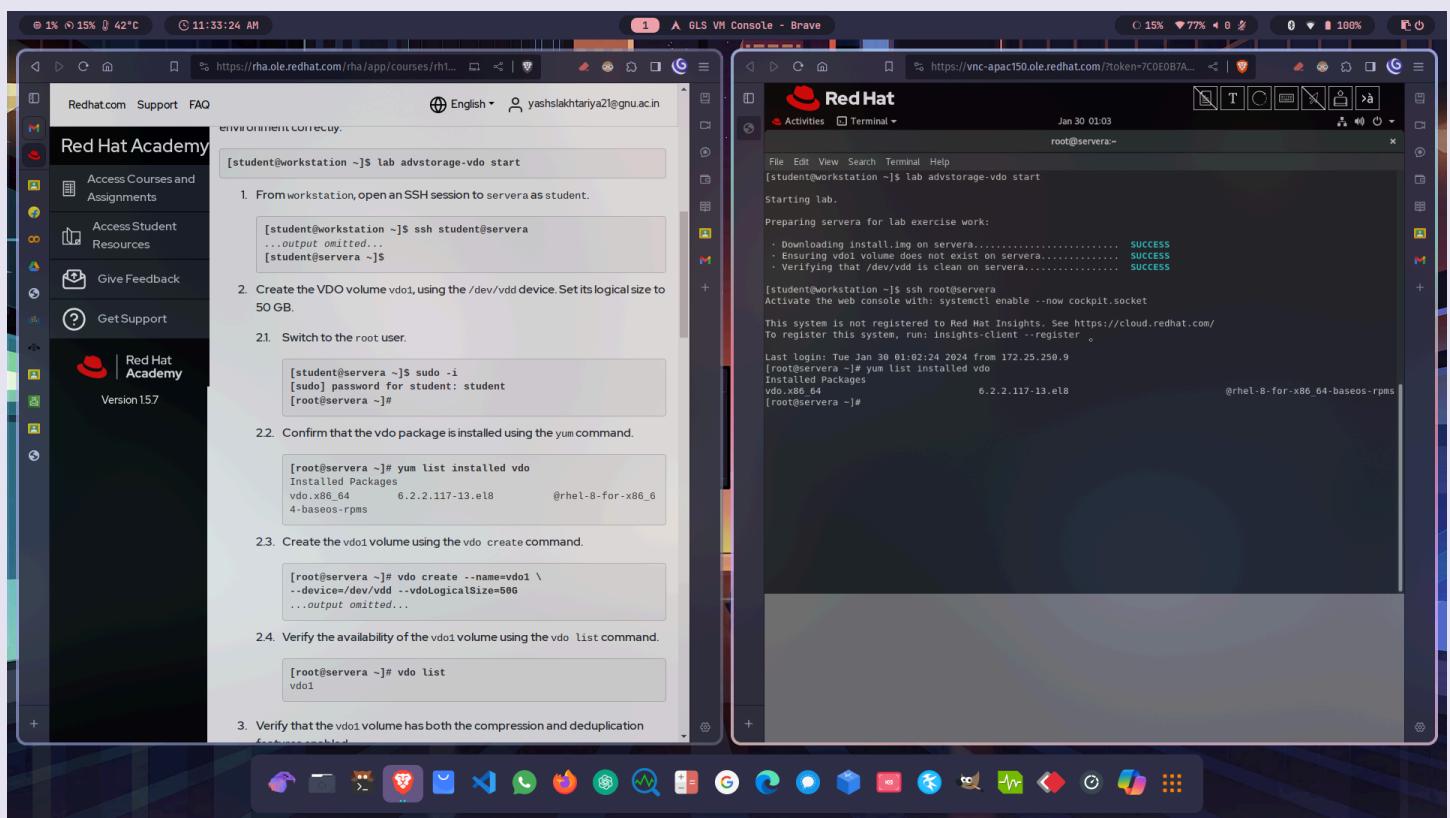
## k. Exit and finish the lab



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## → Guided Exercise-2 : Compressing and Deduplicating Storage with VDO

- Start the lab and login to servera from workstation via ssh. Check the existence of the installed package *vdo* using *yum*.

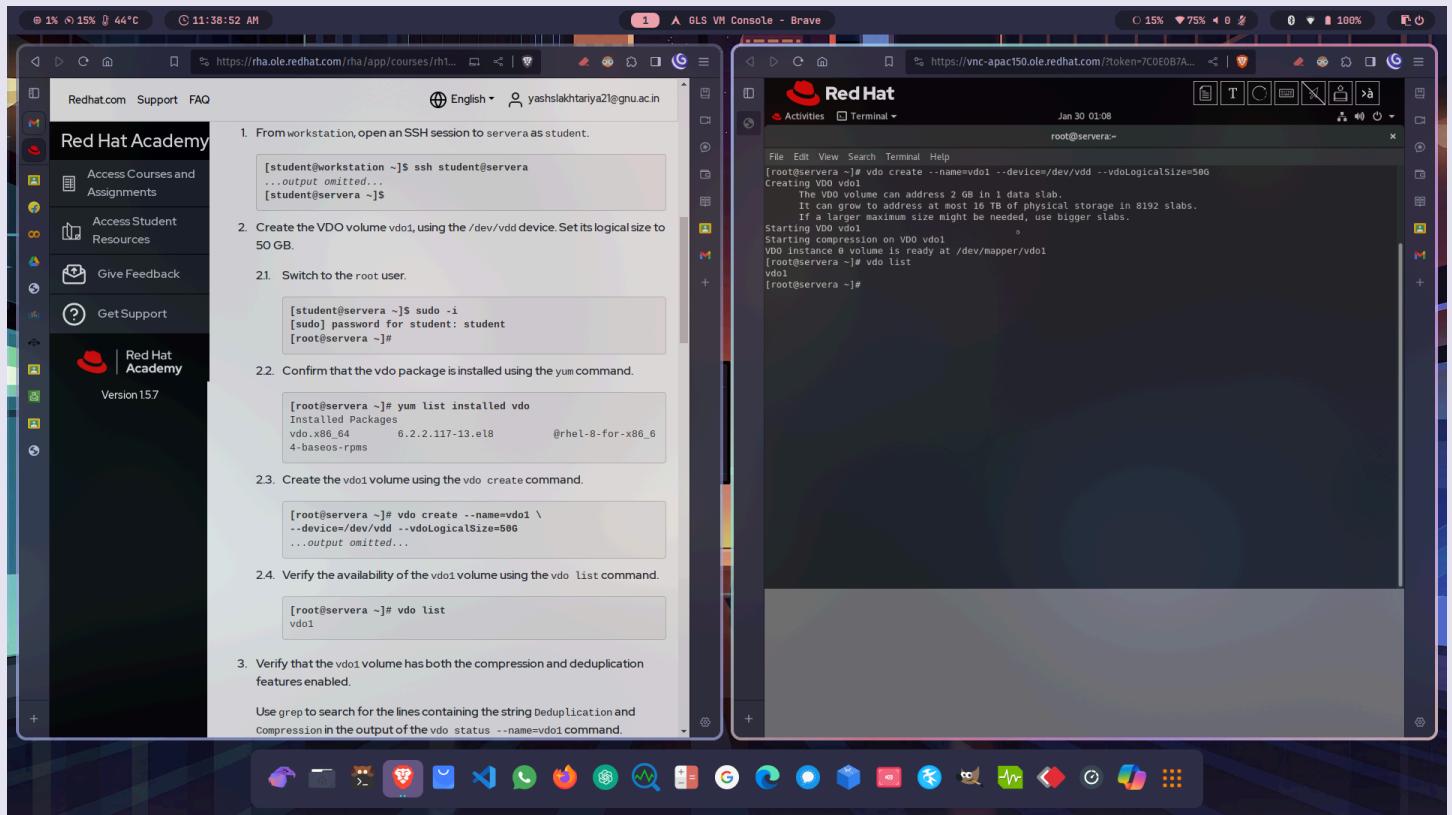


### Commands :

- **ssh root@servera**
- **yum list installed vdo**

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b. Create a vdo1 named VDO with 50G logical size and check the same.

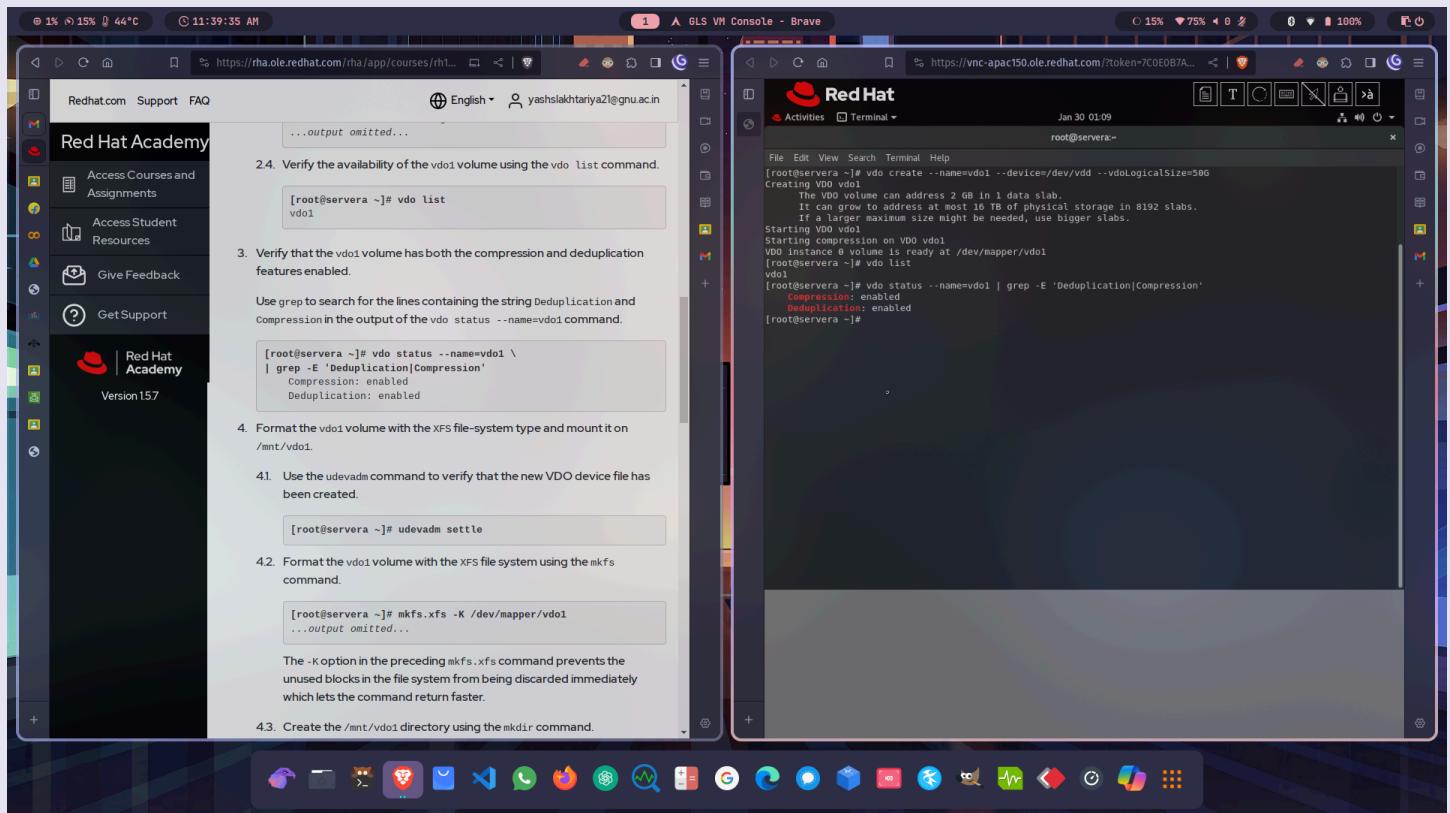


Commands :

- **vdo create --name=vdo1 --device=/dev/vdd --vdoLogicalSize=50G**
- **vdo list**

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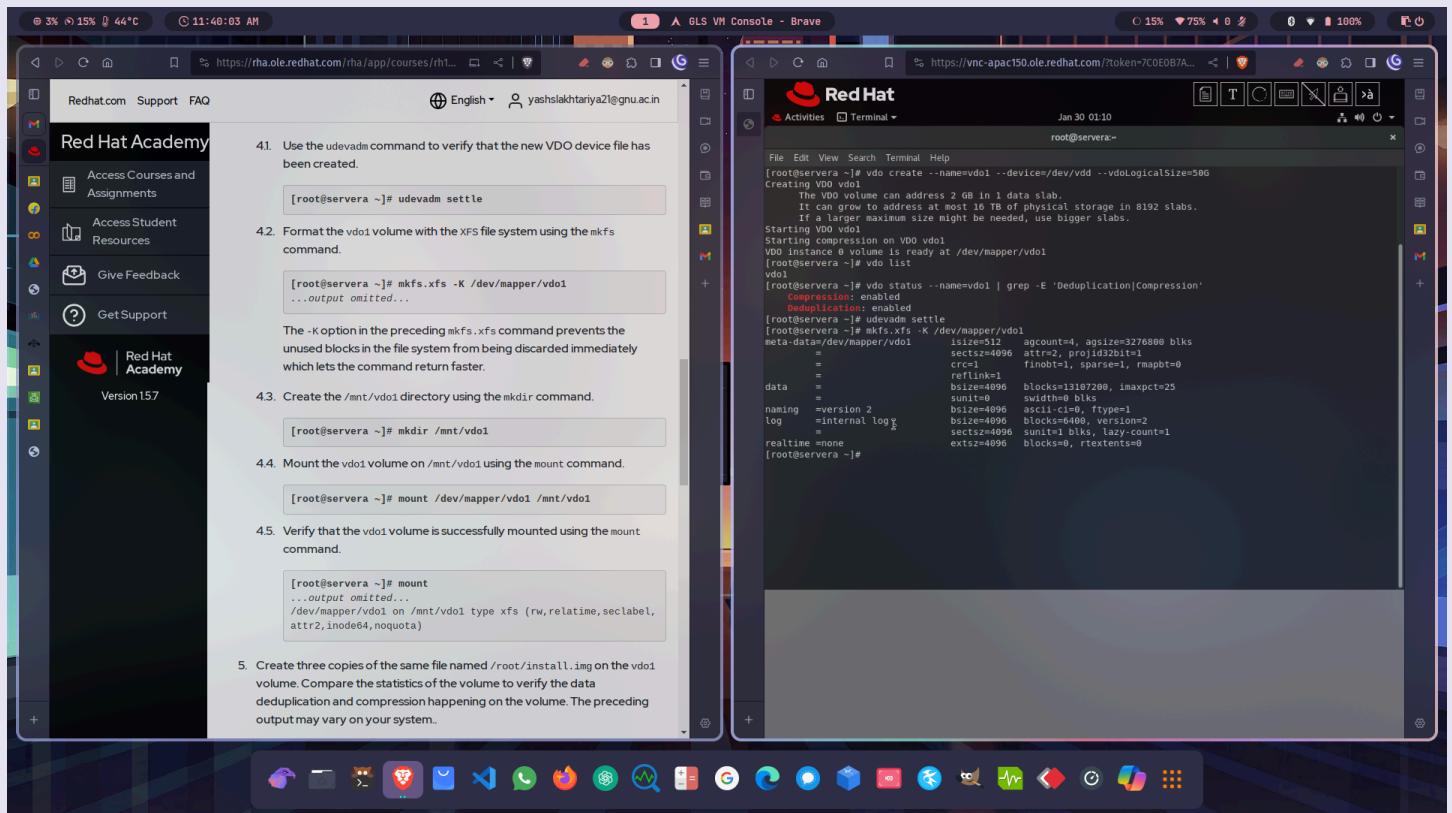
c. Check if deduplication and compression features of the VDO are enabled using vdo status command's stdout piped to stdin of grep command.



Command : **vdo status --name=vdo1 | grep -E 'Deduplication|Compression'**

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d. Ensure the creation of file via udevadm settle and assign the xfs filesystem to the newly created VDO using mkfs.

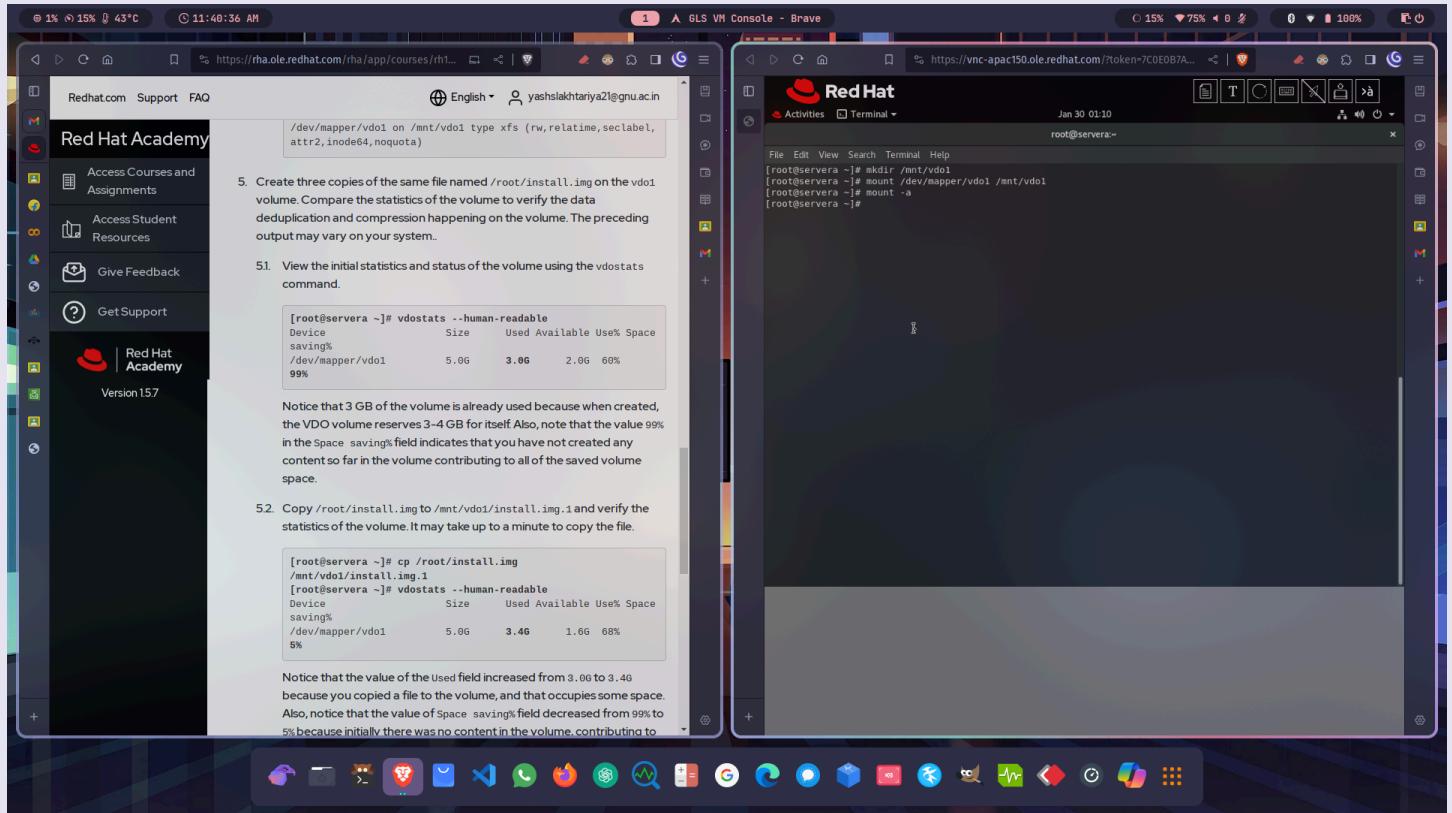


Commands :

- **udevadm settle**
- **mkfs.xfs -K /dev/mapper/vdo1**

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e. Create a directory and mount the vdo volume to it.

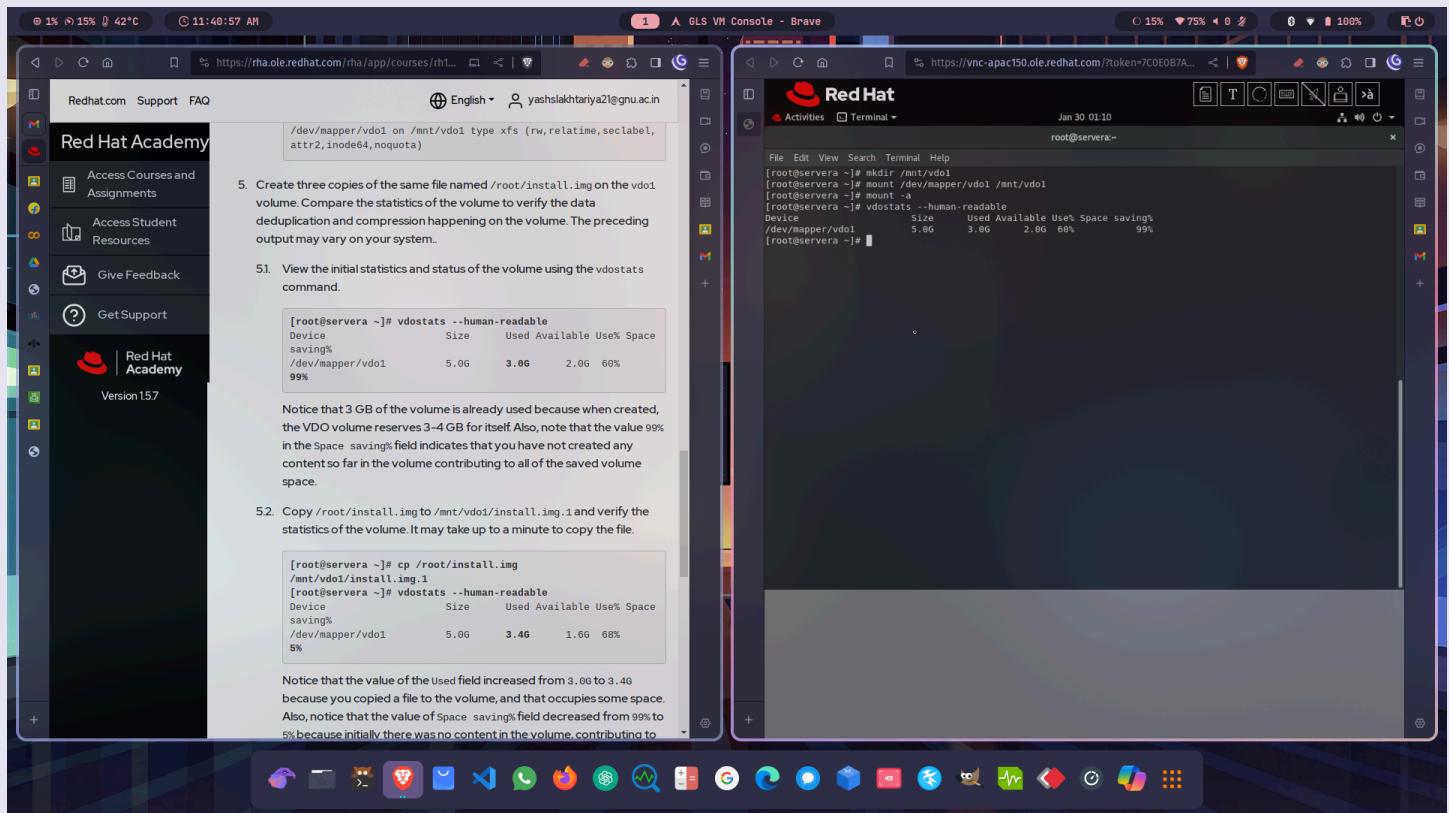


Commands :

- **mkdir /mnt/vdo1**
- **mount /dev/mapper/vdo1 /mnt/vdo1**
- **mount -a**

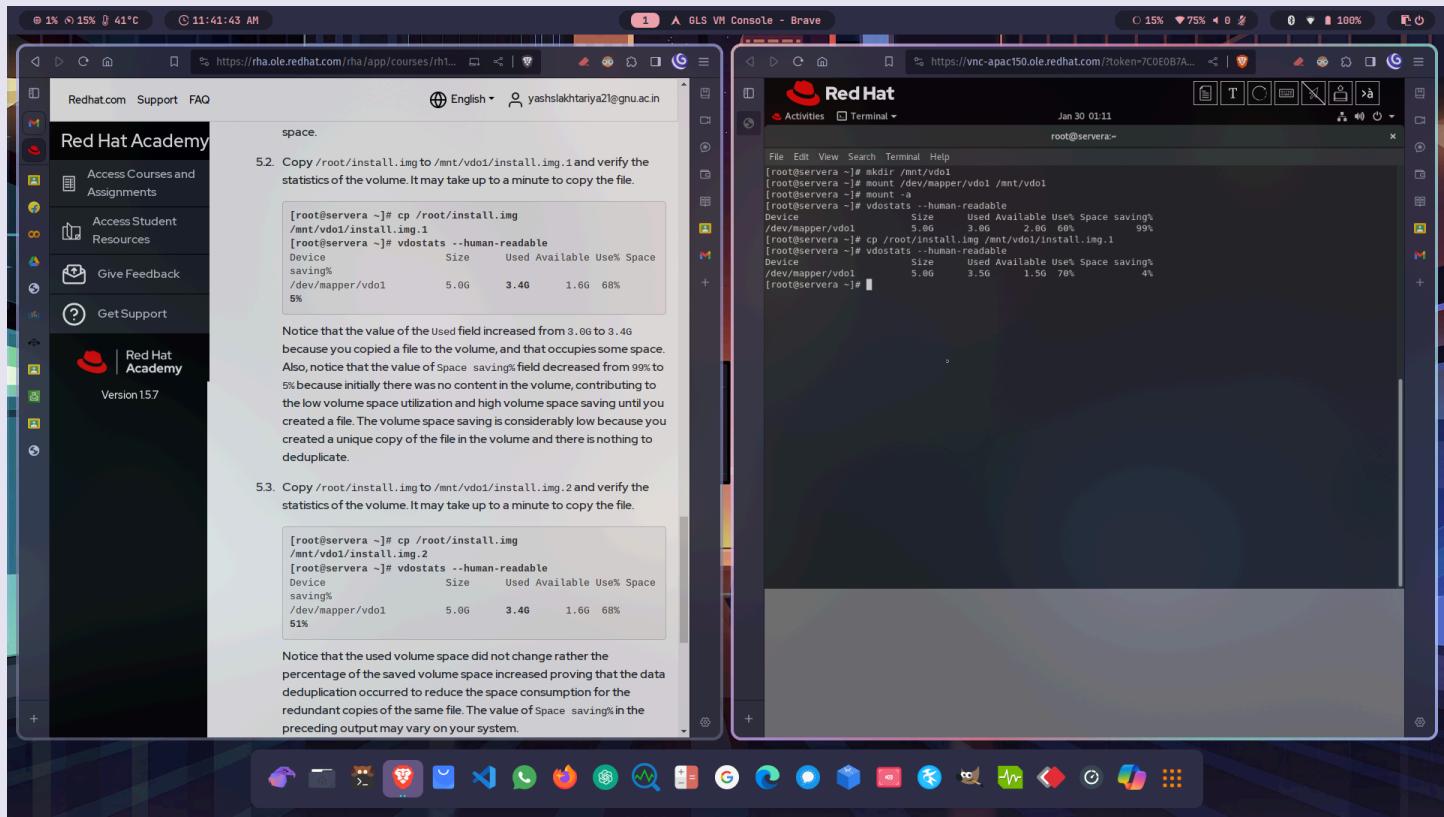
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- f. Check the human readable details of the cdo and create 2 copies of /root/install.img file there. And check the increase in volume size.



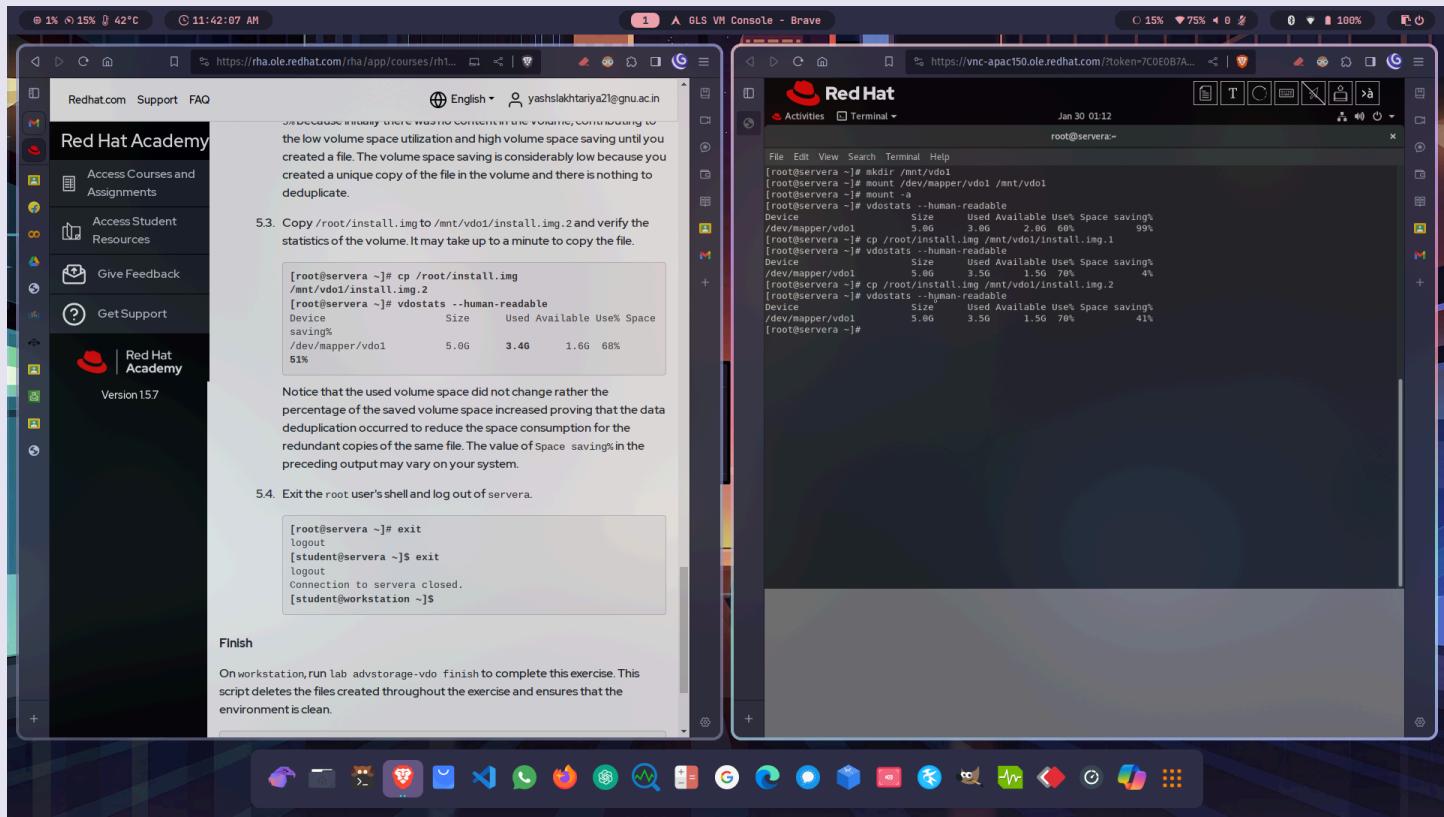
Command : **vdfstats --human-readable**

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Command : **cp /root/install.img /mnt/vdo1/install.img.1**

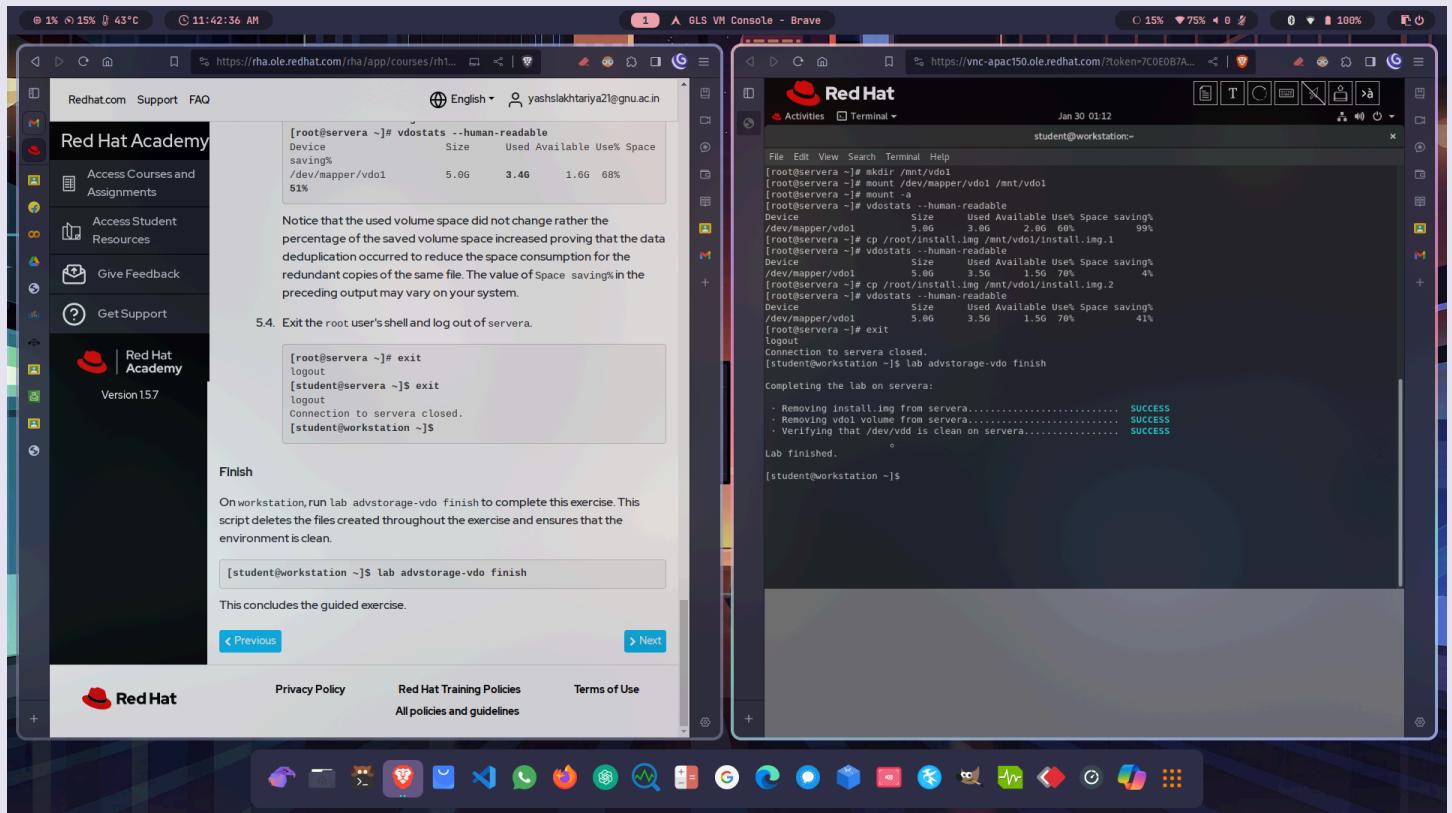
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Command : **cp /root/install.img /mnt/vdo1/install.img.2**

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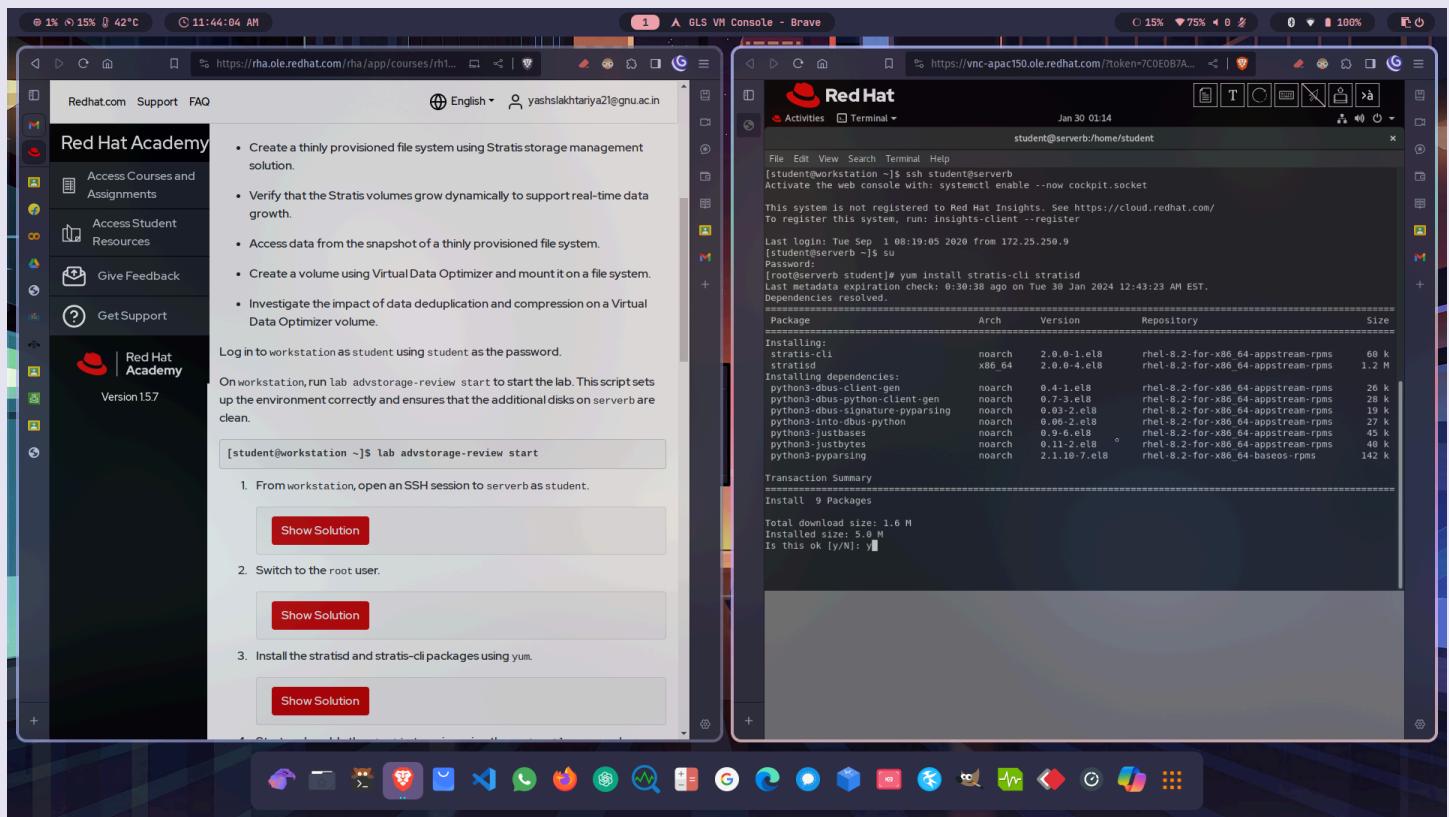
g. Now, exit and end the lab



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## → Lab : Implementing Advanced Storage Features (using stratis)

- Login to serverb as student user from workstation via ssh and switch to root user. Install the stratisd and stratis-cli packages using yum package manager.

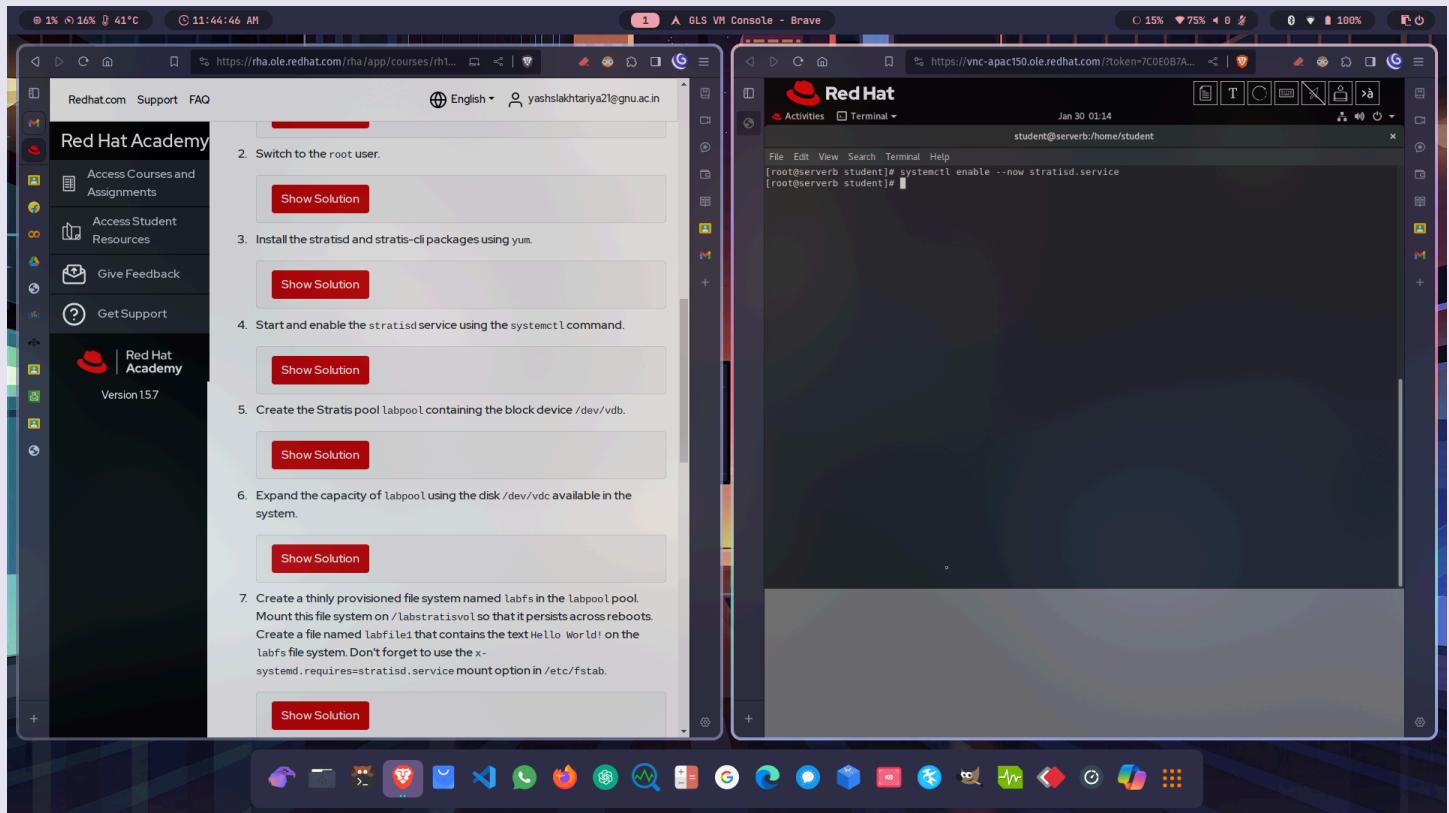


### Commands :

- **ssh student@serverb**
- **sudo -i**
- **yum install stratisd stratis-cli**

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b. Enable the stratis daemon service using systemctl.



Command : **systemctl enable --now stratisd**

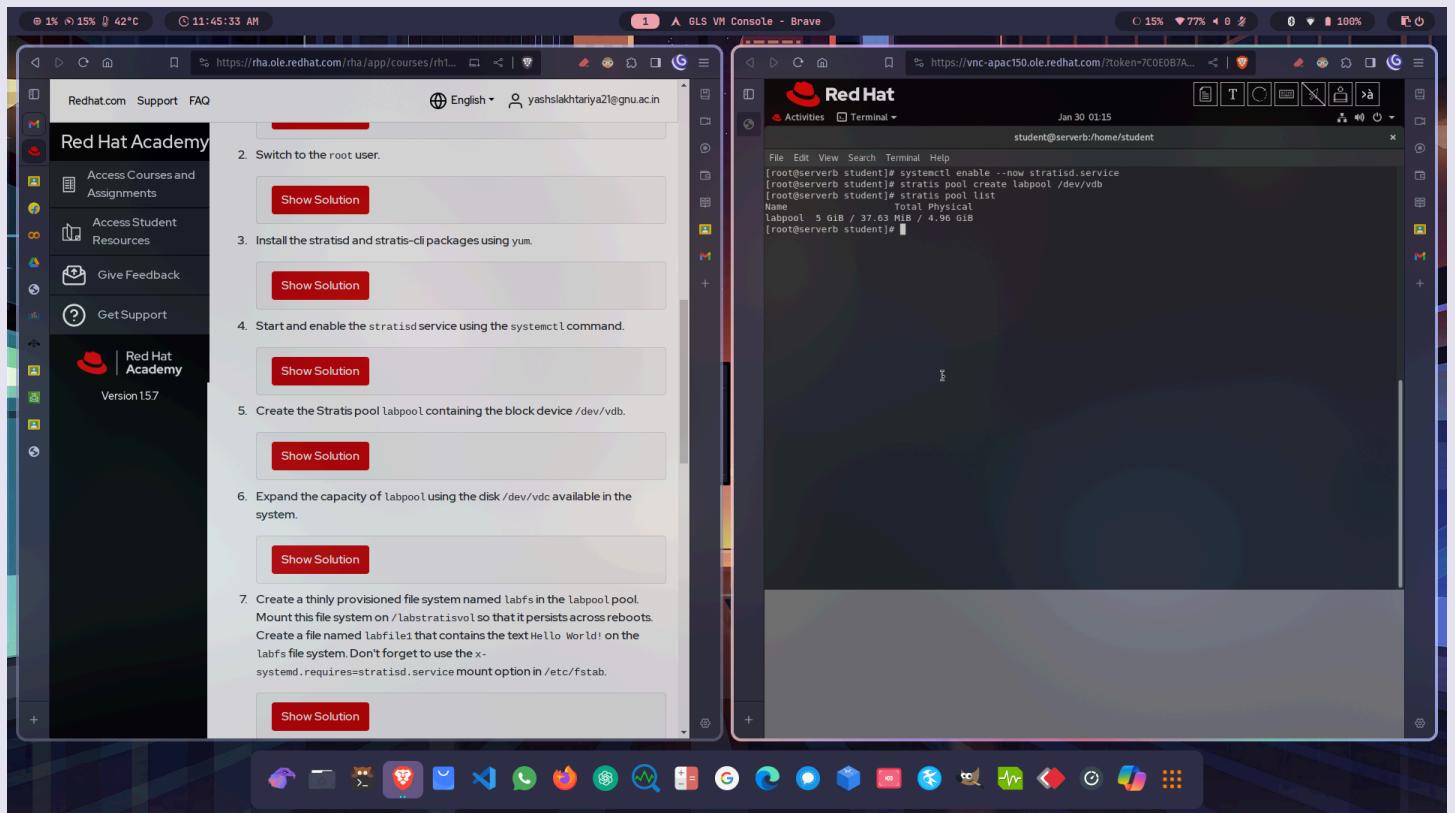
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- c. Create a labpool named stratis pool using the block device /dev/vdb and check the status.



Commands :

- **stratis pool create labpool /dev/vdb**
- **stratis pool list**

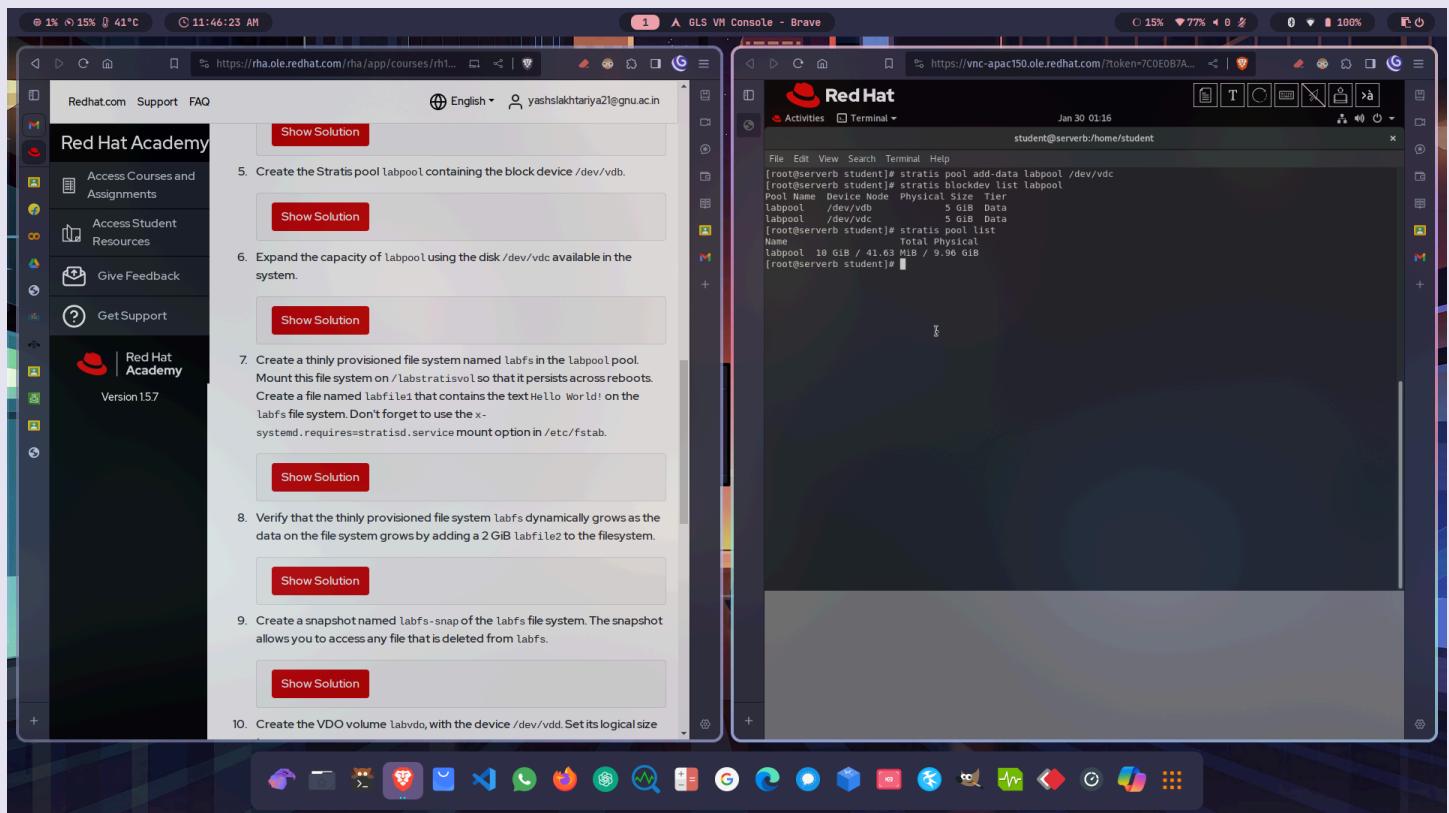
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d. Now, add vdc block device to the pool and check the status.

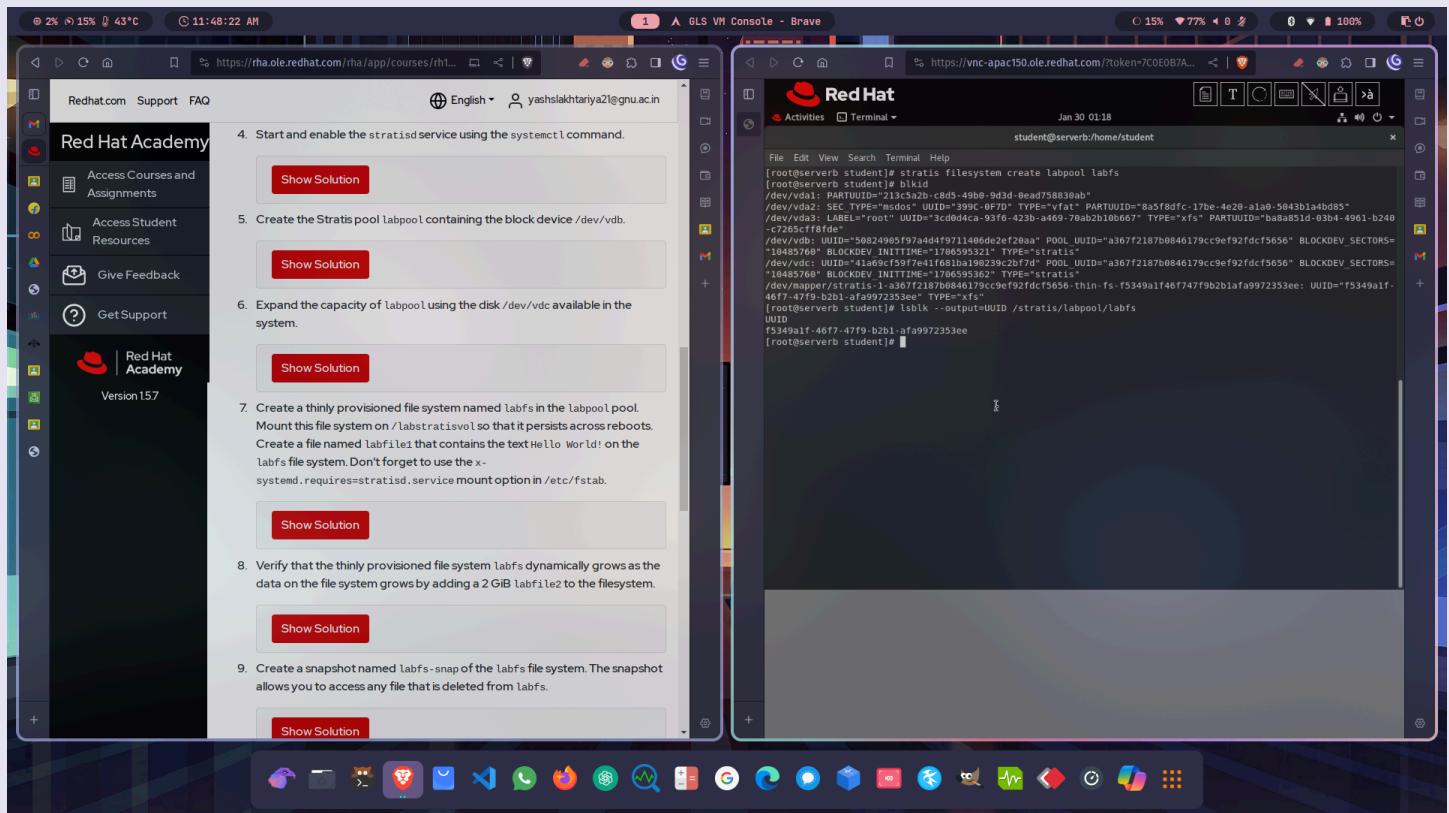


Commands :

- **stratis pool add-data labpool /dev/vdc**
- **stratis pool list**
- **stratis blockdev list labpool**

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- e. Assign and create labfs named filesystem to labpool and get its UUID using blkid or lsblk command.

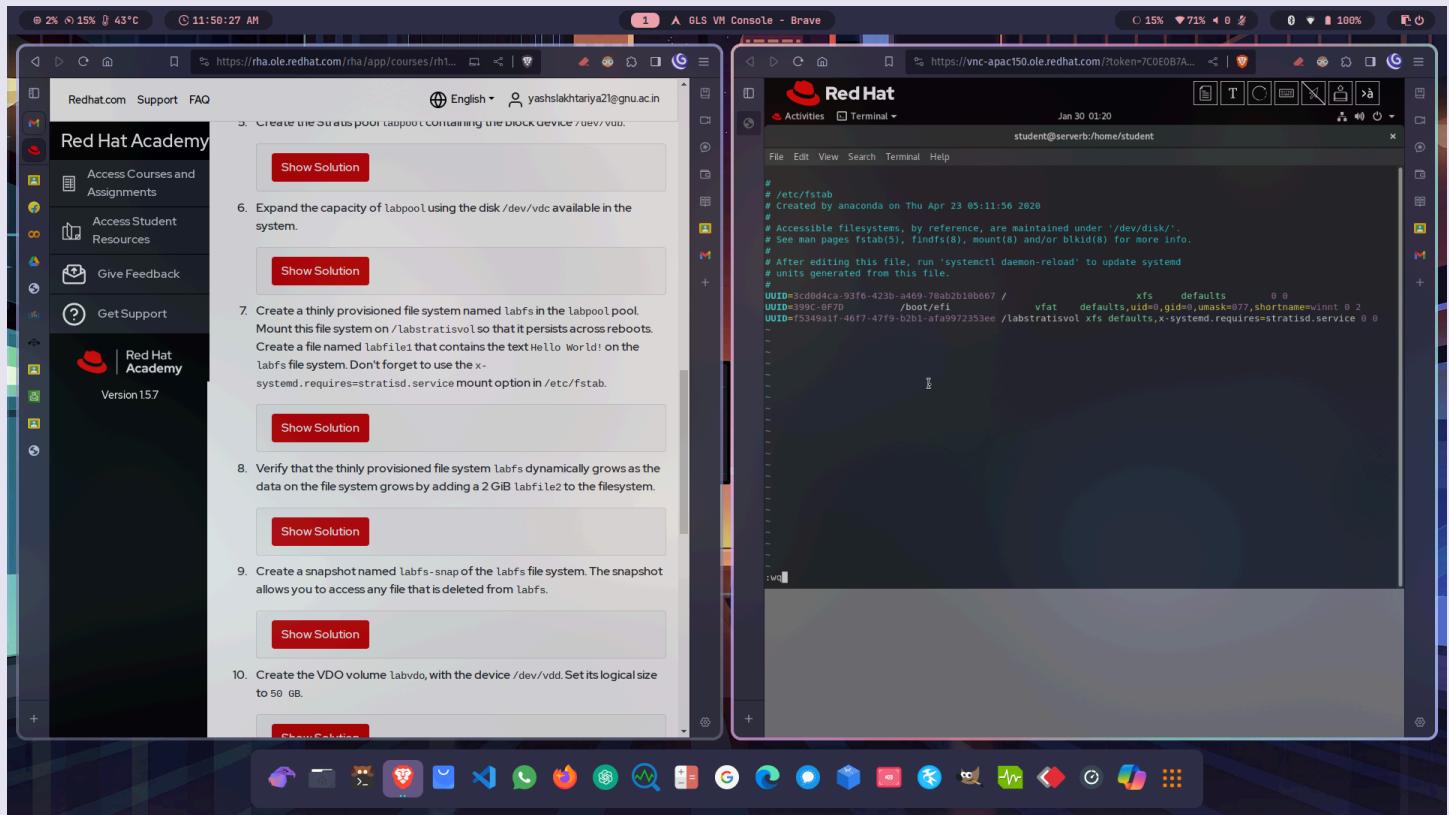


### Commands :

- **stratis filesystem create labpool labfs**
- **lsblk --output=UUID /stratis/labpool/labfs**
- **blkid** (alternative to lsblk long command)

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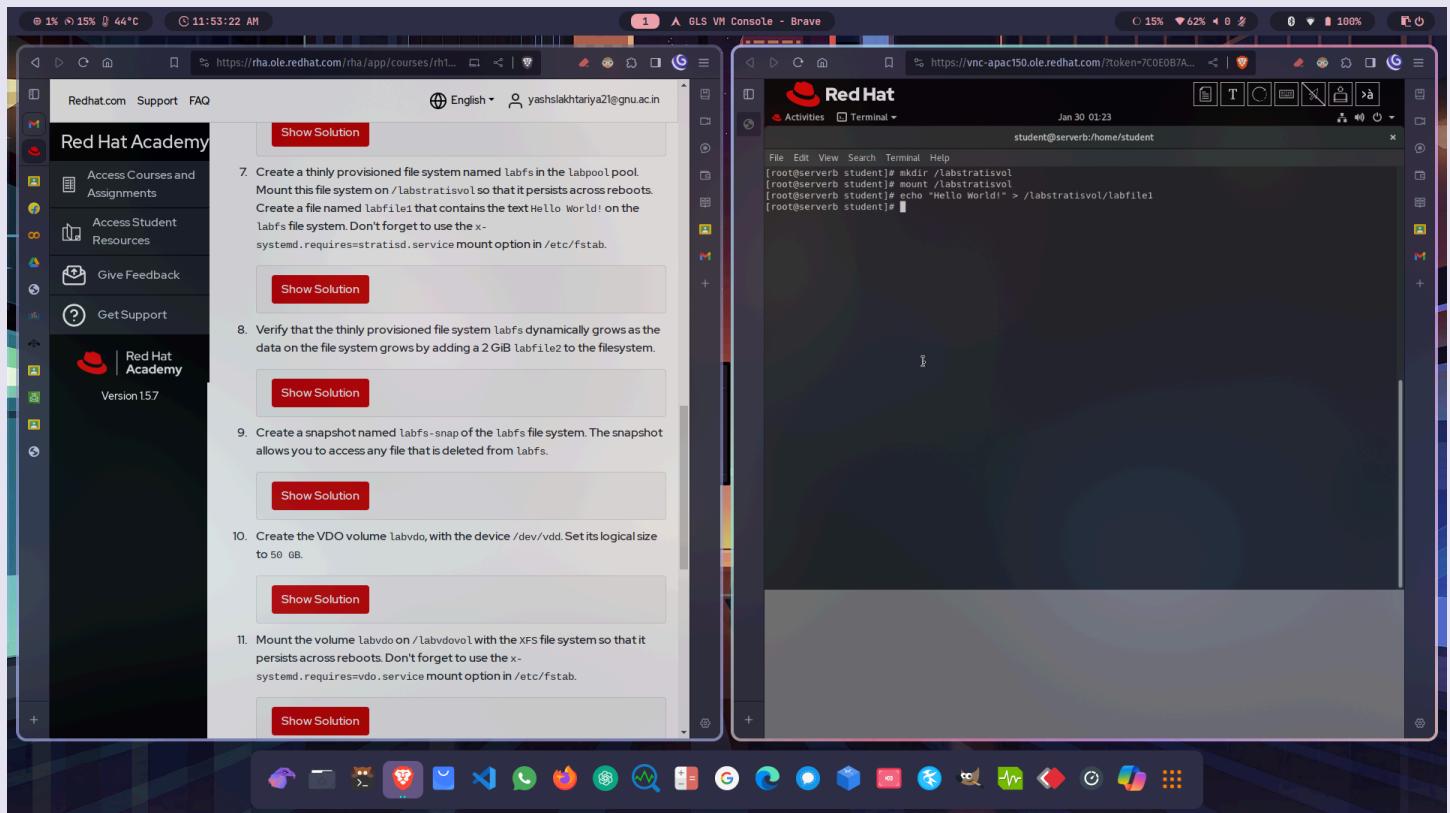
f. Create its entry in fstab using text editor like vim.



Command : **vim /etc/fstab**

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g. Now, create a directory and mount the stratis filesystem there, monut it and create a Hello World text containing file in it.

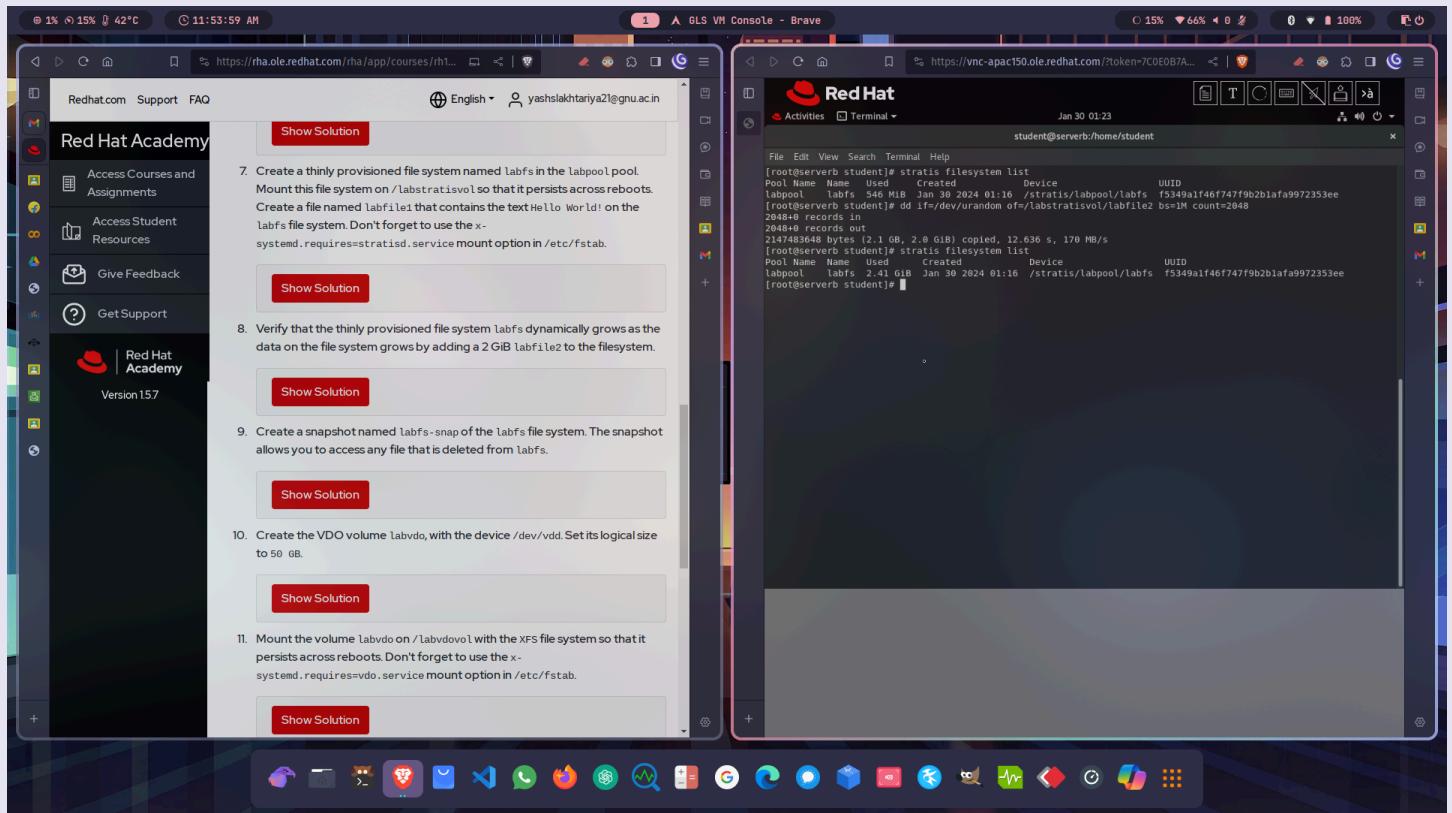


Commands :

- **mkdir /labstratisvol**
- **mount /labstratisvol**
- **echo "Hello World!" > /labstratisvol/labfile1**

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h. Check the status before and after creating a 2GB file in stratis filesystem.

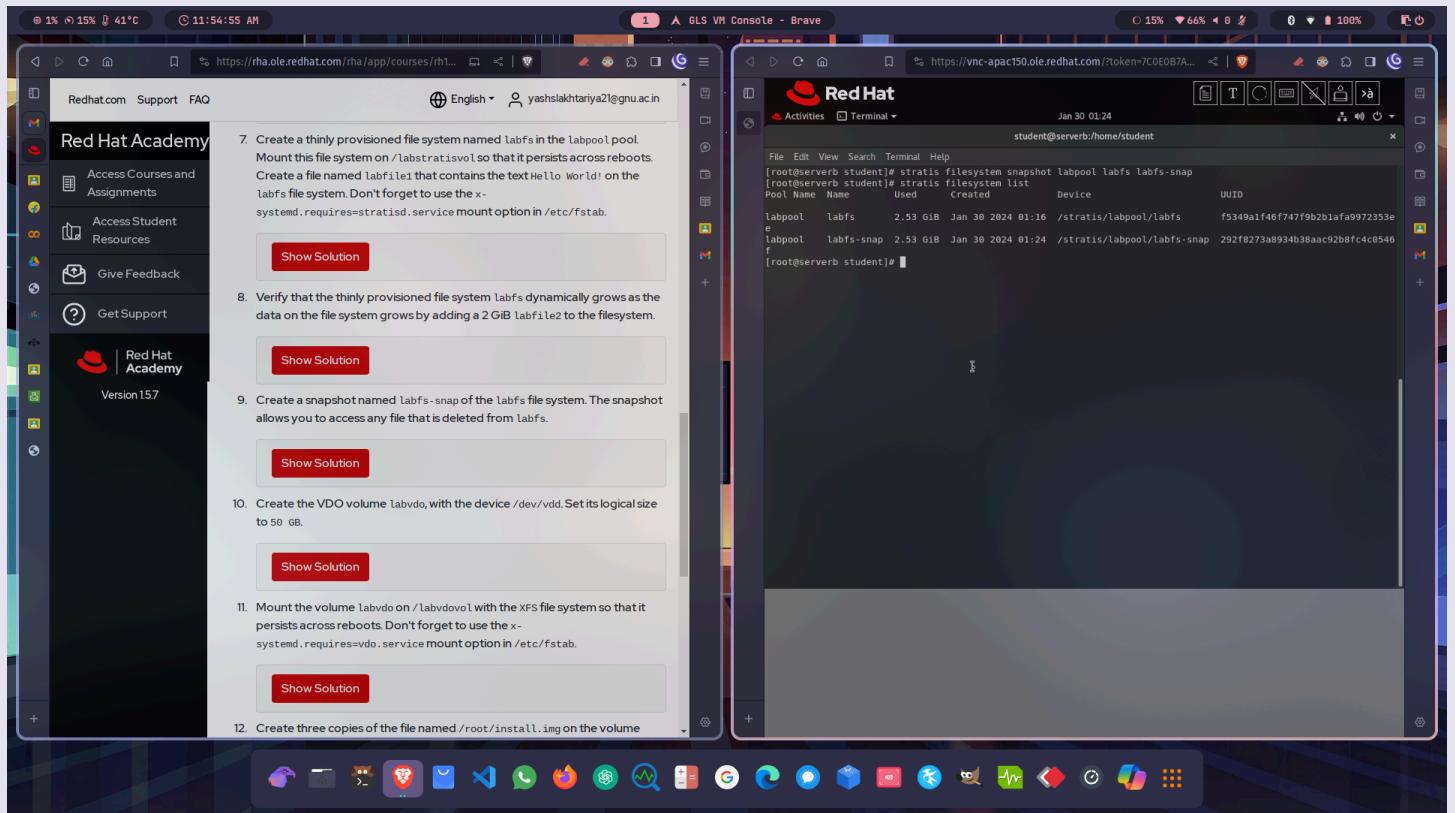


Commands :

- **stratis filesystem list**
- **dd if=/dev/urandom of=/labstratisvol/labfile2 bs=1M count=2048**
- **stratis filesystem list**

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i. Create a snapshot of the current stratis filesystem and check the status.

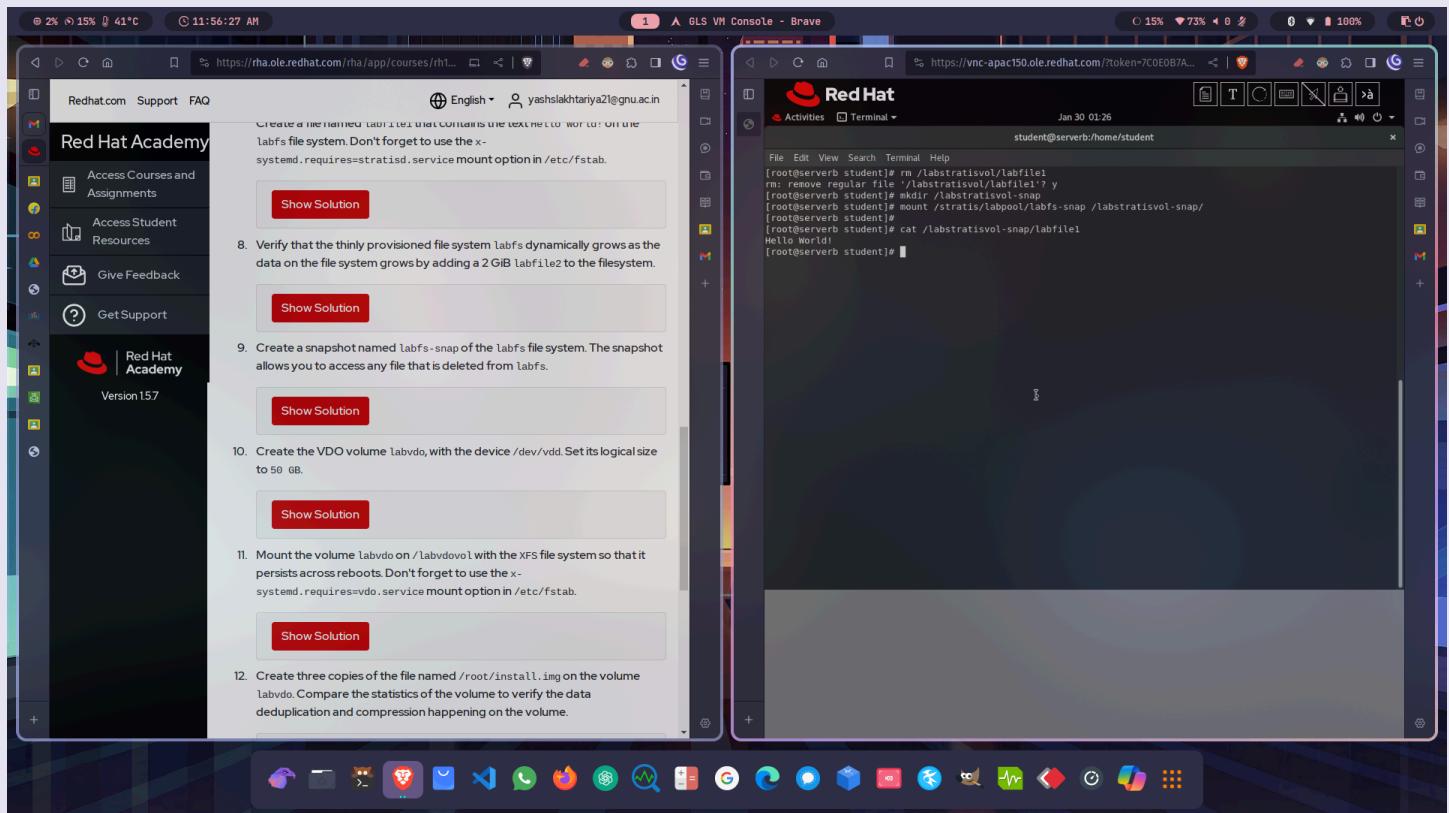


Commands :

- **stratis filesystem snapshot labpool labfs labfs-snap**
- **stratis filesystem list**

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- j. To check, remove the labfile1 and create another directory and mount the snapshot of stratis filesystem to it. After that, check if the backup of labfile1 exists and has similar contents.

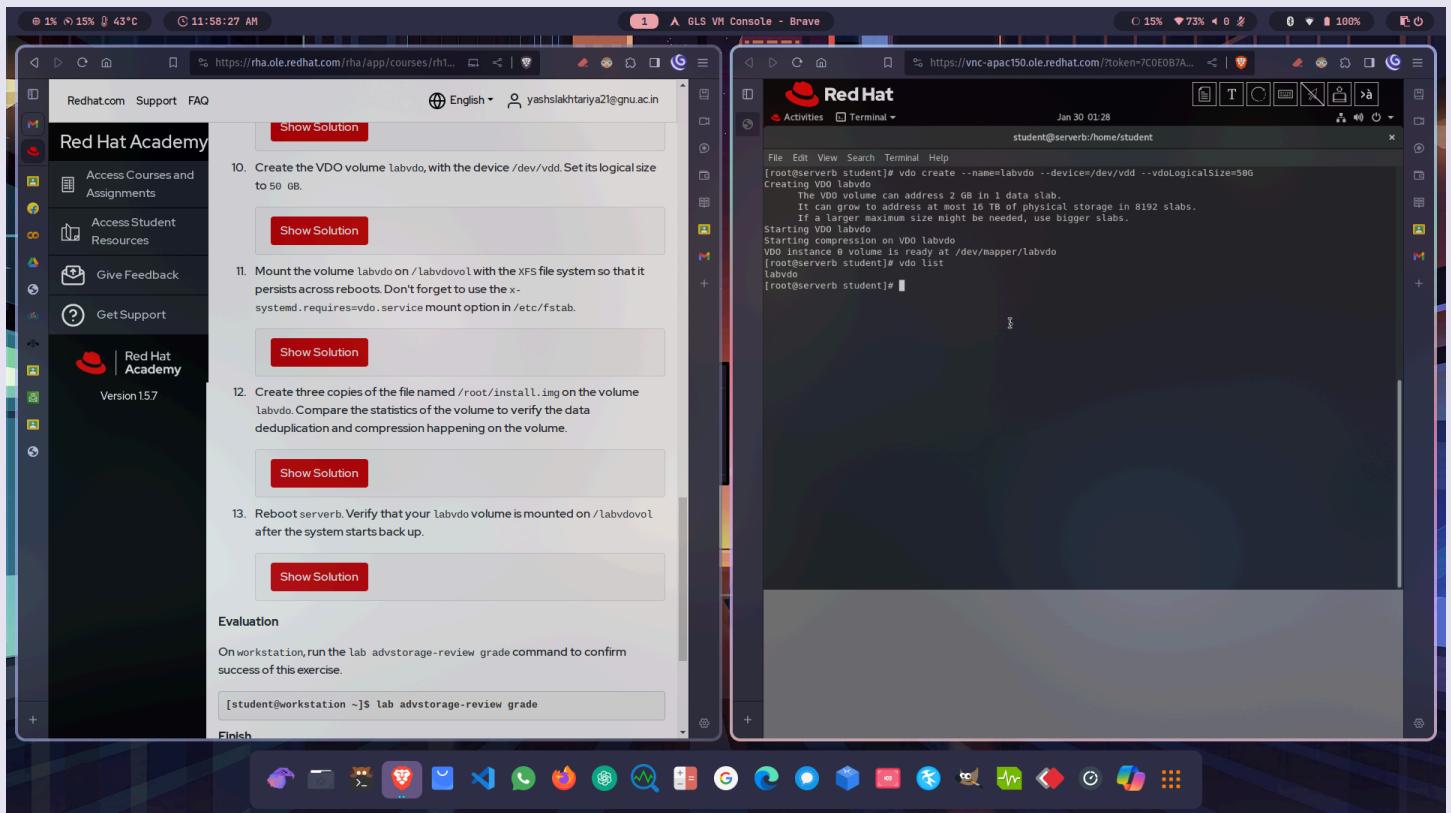


## Commands :

- **rm /labstratisvol/labfile1**
- **mkdir /labstratisvol-snap**
- **mount /stratis/labpool/labfs-snap /labstratisvol-snap**
- **cat /labstratisvol-snap/labfile1**

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k. Create the VDO volume of name labvdo with 50GB logical size and check the status.

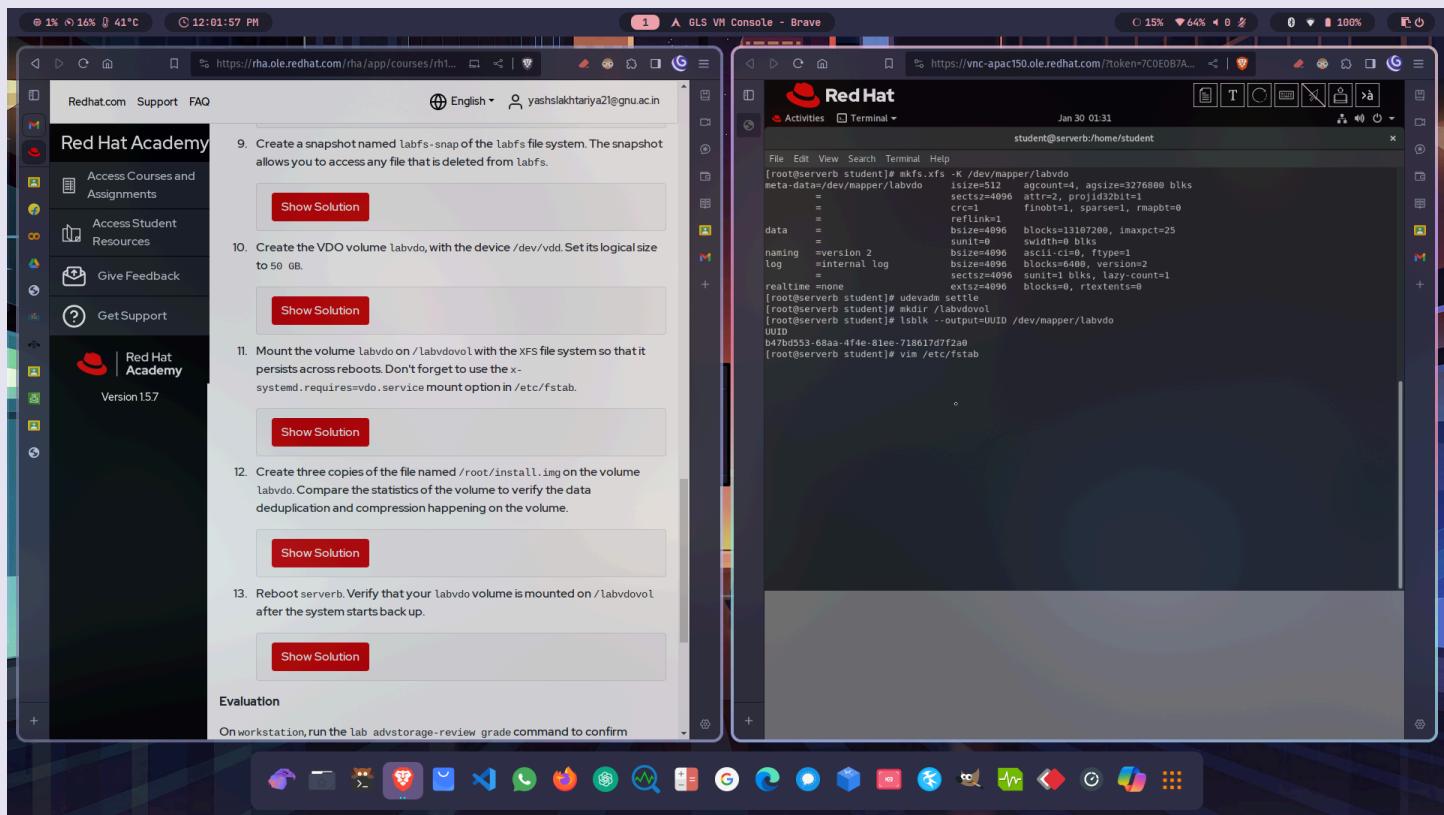


Commands :

- **vdo create --name=labvdo --device=/dev/vdd --vdoLogicalSize=50G**
- **vdo list**

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I. Assign the xfs filesystem to labvdo, check the status and get its UUID.

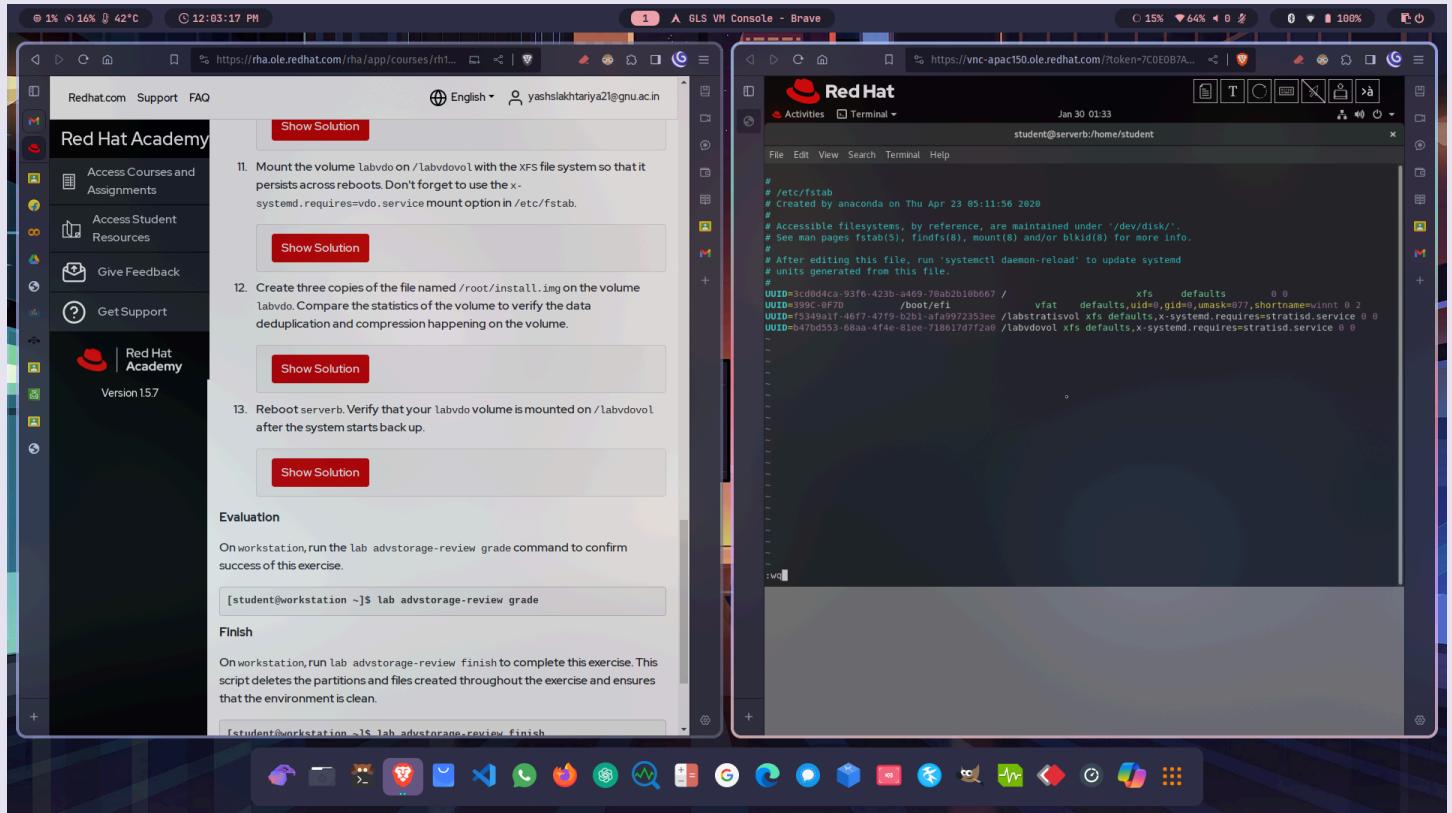


Commands :

- **mkfs.xfs -K /dev/mapper/labvdo**
- **udevadm settle**
- **mkdir /labvdovol**
- **lsblk --output=UUID /dev/mapper/labvdo**

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m. Create an entry of vdo volume in /etc/fstab using vim.



Command : **vim /etc/fstab**

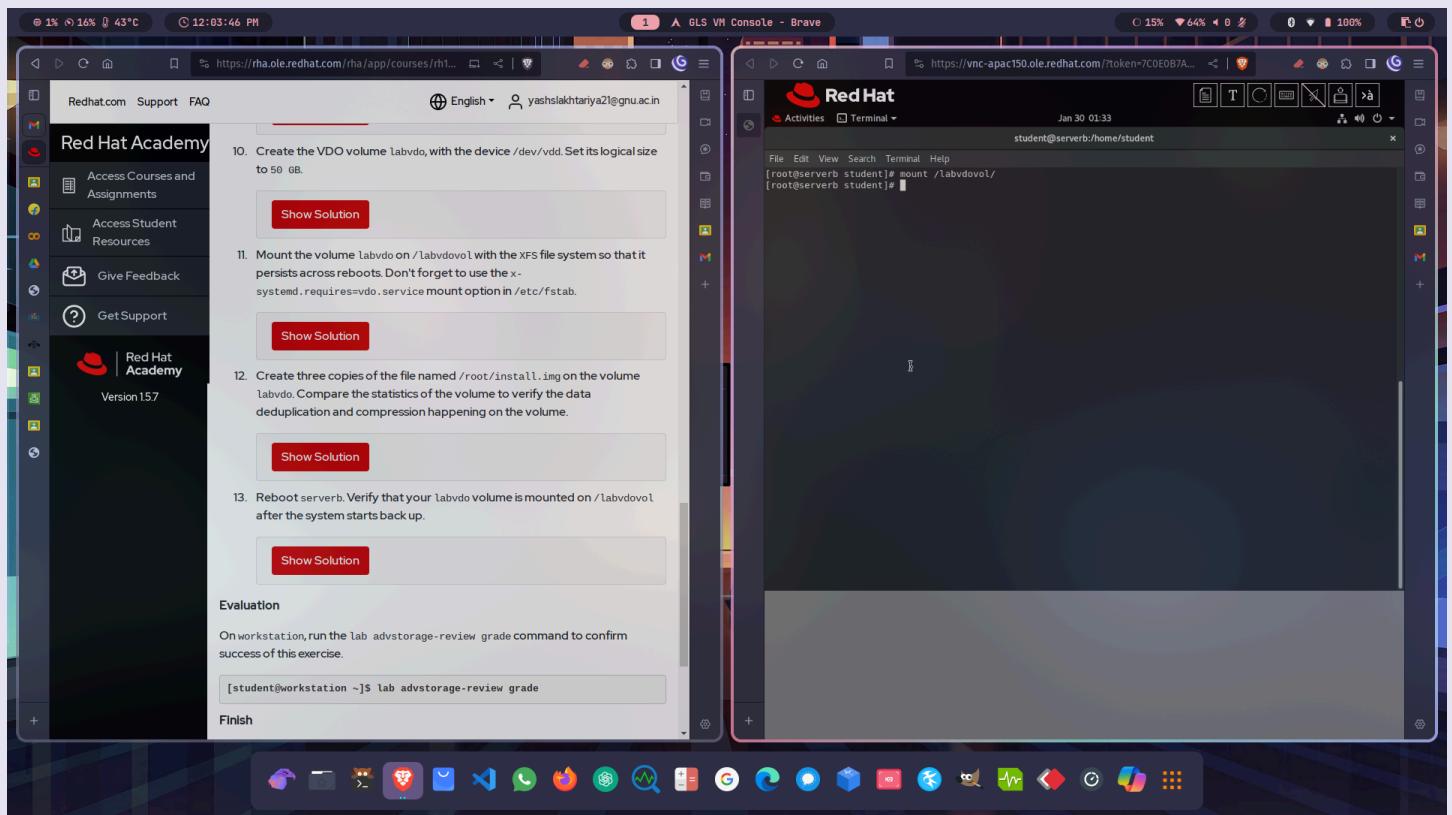
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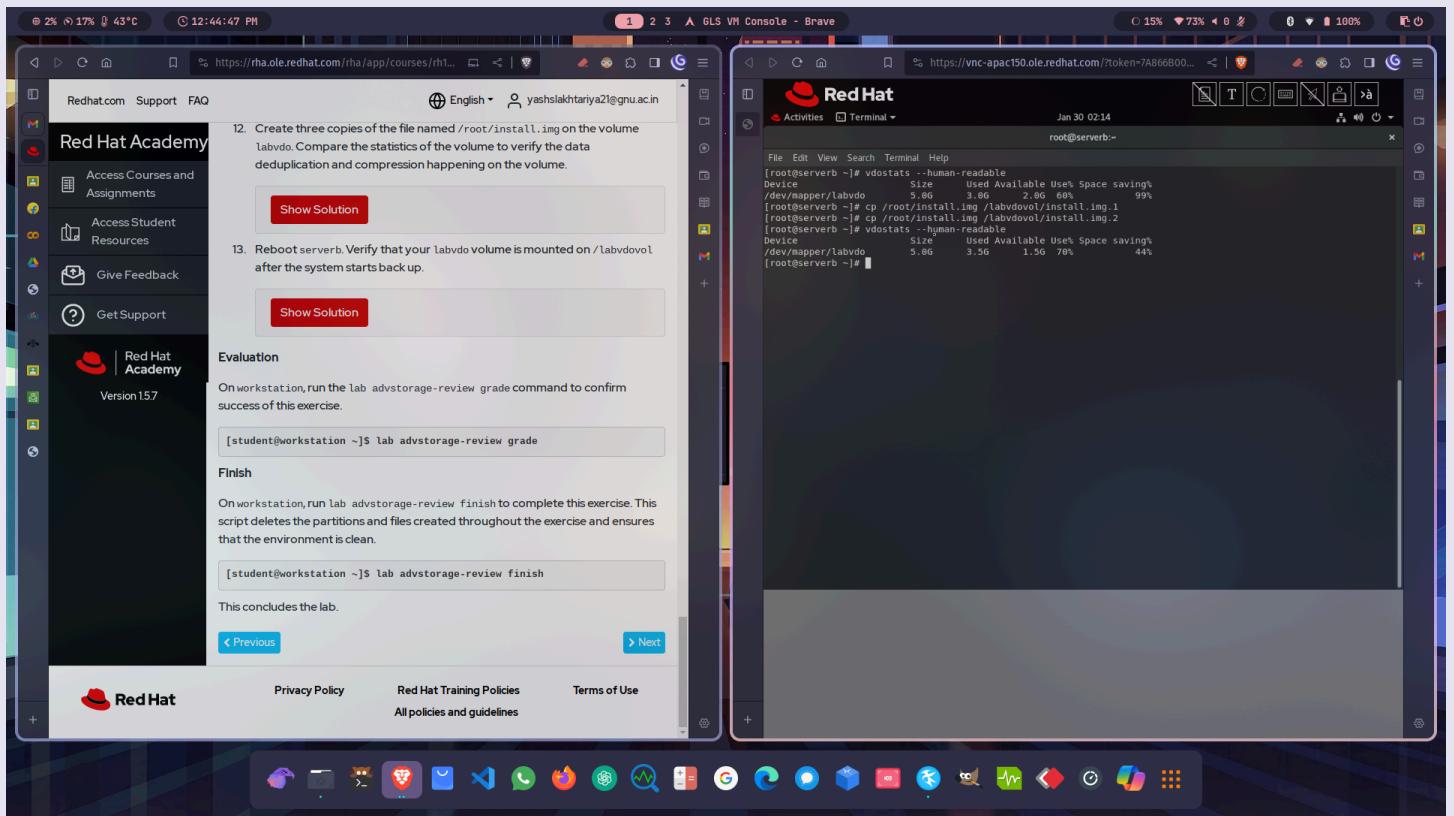
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n. Mount the labvdo volume to the directory previously created.



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- o. Now, create two copies of the /root/install.img file in the vdo volume and check the status before and after the creation.



Commands :

- **vdostats --human-readable**
- **cp /root/install.img /labvdovol/install.img.1**
- **cp /root/install.img /labvdovol/install.img.2**
- **vdostats --human-readable**

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p. Reboot serverb and grade the lab and ensure the successful completion of all the operations performed.

