

Branden Solomon

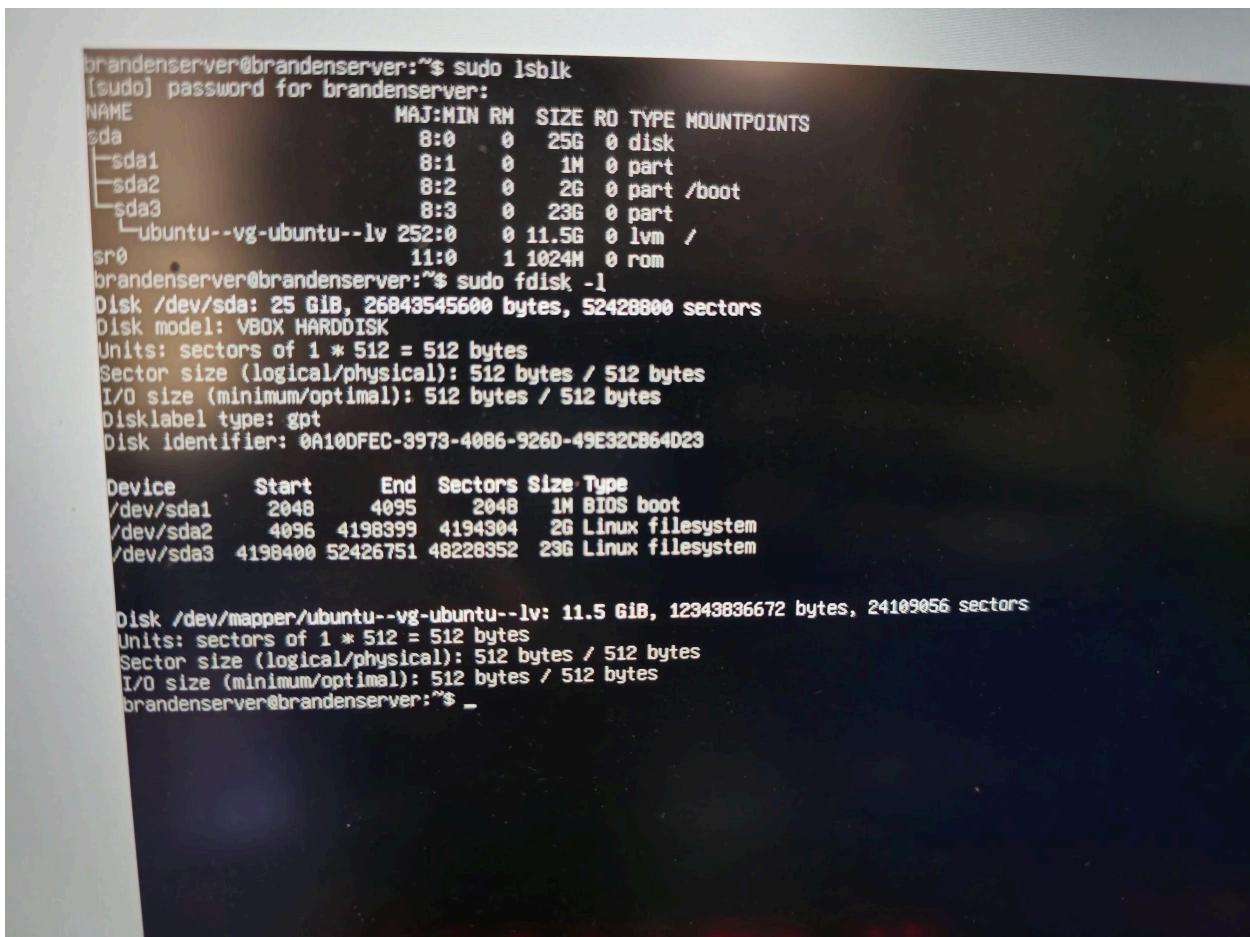
3/12/25

Professor Anthony

CTEC 435

## Storage Lab

### Part 1



```
brandenserver@brandenserver:~$ sudo lsblk
[sudo] password for brandenserver:


| NAME                    | MAJ:MIN | RM | SIZE  | RD | TYPE | MOUNTPOINTS |
|-------------------------|---------|----|-------|----|------|-------------|
| sda                     | 8:0     | 0  | 25G   | 0  | disk |             |
| └─sda1                  | 8:1     | 0  | 1M    | 0  | part |             |
| └─sda2                  | 8:2     | 0  | 2G    | 0  | part | /boot       |
| └─sda3                  | 8:3     | 0  | 23G   | 0  | part |             |
| └─ubuntu--vg-ubuntu--lv | 252:0   | 0  | 11.5G | 0  | lvm  | /           |
| sr0                     | 11:0    | 1  | 1024M | 0  | rom  |             |


brandenserver@brandenserver:~$ sudo fdisk -l
Disk /dev/sda: 25 GiB, 26843545600 bytes, 52428800 sectors
Disk model: VBOX HARDDISK
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: gpt
Disk identifier: 0A10DFEC-3973-4086-926D-49E32C864D23

Device      Start      End  Sectors Size Type
/dev/sda1    2048    4095    2048   1M BIOS boot
/dev/sda2    4096  4198399  4194304    2G Linux filesystem
/dev/sda3  4198400  52426751 48228352   23G Linux filesystem

Disk /dev/mapper/ubuntu--vg-ubuntu--lv: 11.5 GiB, 12343836672 bytes, 24109056 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
brandenserver@brandenserver:~$ _
```

1.

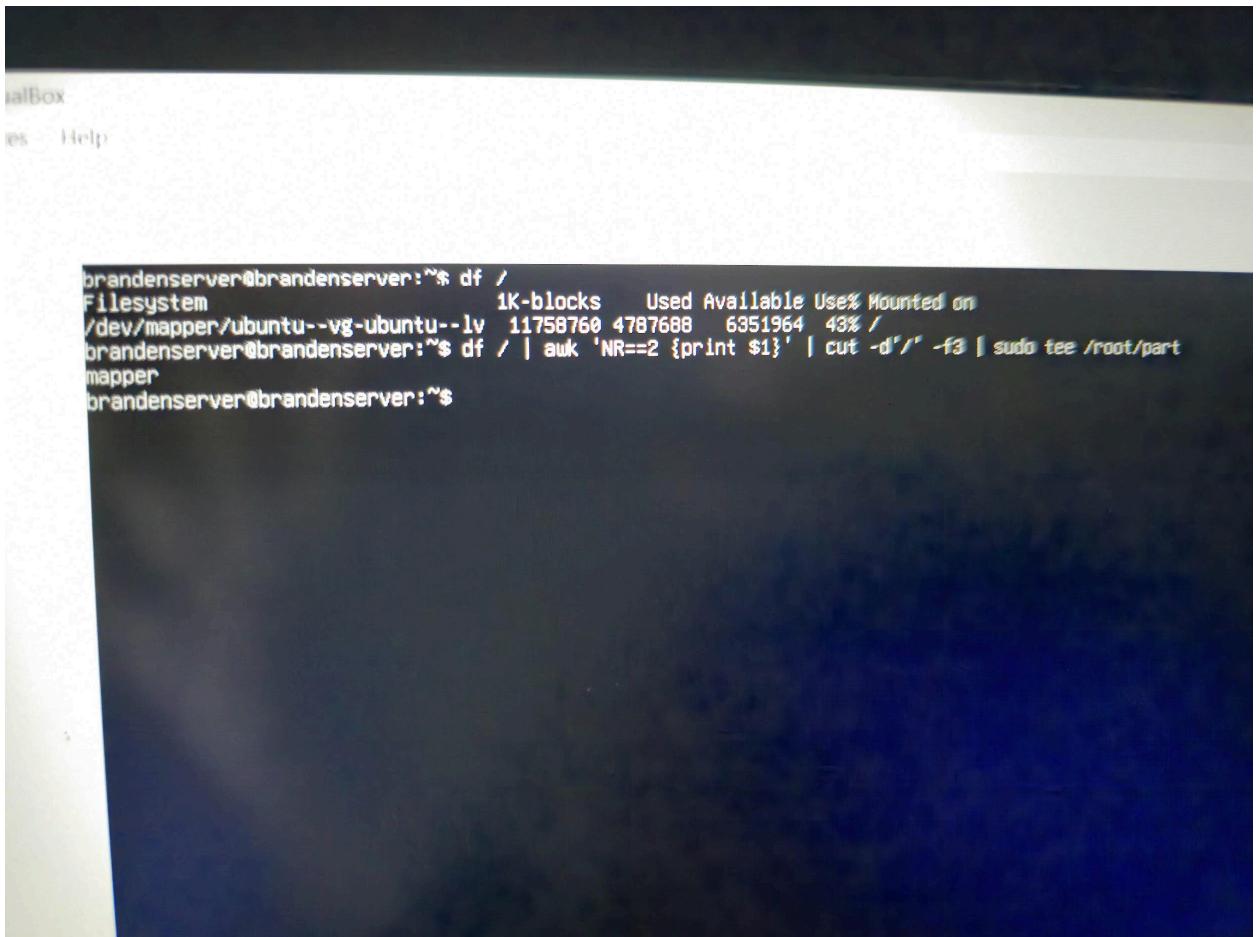
2. Answer:

**Format a Partition as Swap Space:**

bash

Edit

sudo mkswap /dev/sdX



The image shows a terminal window with a dark background and light-colored text. At the top, there is a header bar with some icons and text that is mostly illegible due to the low resolution. Below the header, the terminal prompt is visible: "brandenserver@brandenserver:~\$". The user then runs the command "df /" which outputs the following table:

Filesystem	1K-blocks	Used	Available	Use%	Mounted on
/dev/mapper/ubuntu--vg-ubuntu--lv	11758760	4787688	6351964	43%	/

After this, the user runs another command: "df / | awk 'NR==2 {print \$1}' | cut -d'/' -f3 | sudo tee /root/part". The output of this command is "mapper". Finally, the user types a closing brace: "brandenserver@brandenserver:~\$".

3.

alBox

Help

```
brandenserver@brandenserver:~$ cat /proc/swaps
Filename           Type      Size    Used   Priority
/swap.img          file     2097148       0      -2
brandenserver@brandenserver:~$ swapon --show | awk 'NR==2 {print $1}' | sudo tee /root/swap
/swap.img
brandenserver@brandenserver:~$ _
```

4.

1 EFI System	C12A7328-F81F-11D2-B4B4-00A0C93EC93B
2 MBR partition scheme	024DEE41-33E7-11D3-9D69-0008C781F39F
3 Intel Fast Flash	D3BFE2DE-3DAF-11DF-B440-E3A556D89593
4 BIOS boot	21666148-6449-6E6F-744E-656564454649
5 Sony boot partition	F4019732-065E-4E12-8273-346C5641494F
6 Lenovo boot partition	BFBFAF7-A34F-448A-9A5B-6213E873C622
7 PowerPC PreP boot	9E1A2D98-C612-4316-AA26-8849521E5A8B
8 ONIE boot	7412F7D5-A156-4B13-81D0-867174929325
9 ONIE config	D4E6E2CD-4469-46F3-B5C8-1BFF57MF149
10 Microsoft reserved	E3C9E316-0B5C-4DBB-817D-F92DF00215AE
11 Microsoft basic data	E8D00A02-B9E5-4433-87C0-6B96B72699C7
12 Microsoft LDM metadata	5806CBAA-7EBF-42E0-85D2-E1E96434CFB3
13 Microsoft LDM data	AF9B60A0-1431-4F52-BC68-3317174A694D
14 Windows recovery environment	DE94BBA4-0601-4D40-A16A-BFD50179D6AC
15 IBM General Parallel File System	37AFC59-EF7D-4E36-91C3-2D7AE0558174
16 Microsoft Storage Spaces	E75CAF8F-F680-4CEE-AFA3-B001E56EF2D
17 HP-UX data	75894C1E-3AE8-11D3-B7C1-7B03A0000000
18 HP-UX service	E2A1F728-32E3-11D6-A6B2-7B03A0000000
19 Linux swap	0657F6D0-44AB-43C4-84E5-0930C84B4F4F
20 Linux filesystem	0FC63D9F-B483-4772-8E79-3D69D8477D04
21 Linux server data	38BF8425-20E8-4F3B-907F-1A25A76F98E8
22 Linux root (x86)	44479549-F297-41B2-9A77-D131D5F04508
23 Linux root (x86-64)	4F68BC3E-EBC0-40B1-96E7-FBCAF984B789
24 Linux root (Alpha)	6523FB8E-3E81-4E2A-A05A-1B8695AE656F
25 Linux root (ARM)	D27F46ED-2919-4C8B-BD25-9531F3C16534
26 Linux root (ARM)	69DAD710-2CE4-4E3C-B16C-21A1D49A8ED3
27 Linux root (ARM-64)	B921B045-1DF0-41C3-AF44-4C6F28003F8E
28 Linux root (IA-64)	993D8D3D-F80E-4225-855A-90AF8ED7EA97
29 Linux root (Loongarch-64)	77055B00-7920-4F94-B39A-98C91B762B86
30 Linux root (MIPS-32 LE)	37C58C8A-D913-4156-A25F-4BB1B64E07F0
31 Linux root (MIPS-64 LE)	700BD443-7A34-4507-B179-EEB93D7A7C88
32 Linux root (HPPA/PARISC)	1AACD98B-5444-413B-BD9E-E5C223982946
33 Linux root (PPC)	1DE3F1EF-F498-47B5-8DCC-4A860A854078
34 Linux root (PPC64)	912ADE1D-A839-4913-8964-A10EE08FB02
35 Linux root (PPC64LE)	C31045E6-3F39-412E-80FB-4809C4980599
36 Linux root (RISC-V-32)	6805A7FE-BE7D-435C-B714-3D0B162144E1
37 Linux root (RISC-V-64)	72EC70A8-CF74-40E5-BD49-4BDAA8EBF224
38 Linux root (S390)	68A77CEA-624C-4A20-91E8-6E9FA67D3F9
39 Linux root (S390X)	5EAD0949-FE09-4A1E-A1D7-520D000531306
40 Linux root (TILE-64)	C501CD70-3962-40C9-90E1-803A8C39EE2C
41 Linux reserved	60A63339-0087-68C9-C486-083ACB2390908
42 Linux home	993AC7E1-2EB4-4F19-BB44-0E14E24E9F15
43 Linux RAID	A19D68A7-05FC-403B-A086-743F0F54911E
44 Linux LVM	E5D60379-F507-44C5-A23C-23BF2A3D9288
45 Linux variable data	4D21B816-B534-45C3-A9FB-5C1E8091FD20
46 Linux temporary data	7EC6F557-3BC5-4ACA-B293-16EFFD639D1
47 Linux /usr (x86)	75250076-8CC6-458E-BD56-BD47C81A812
48 Linux /usr (x86-64)	8484680C-9521-4B04-9C11-B0720656F69E
49 Linux /usr (Alpha)	E18CF08C-33EC-4C0D-B246-C6C6FB3D0A024

```
Devices Help

brandenserver@brandenserver:~$ sudo fdisk -l /dev/sda
[sudo] password for brandenserver:
Disk /dev/sda: 25 GiB, 26843545600 bytes, 52428800 sectors
Disk model: VBOX HARDDISK
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: gpt
Disk identifier: 0A10DFEC-3973-4086-926D-49E32CB64D23

Device      Start    End  Sectors  Size Type
/dev/sda1     2048   4095    2048   1M BIOS boot
/dev/sda2    4096 41983999  4194304     2G Linux filesystem
/dev/sda3  4198400 52426751 48228352    23G Linux filesystem
/dev/sda4    2047    2047       1  512B Linux filesystem

Partition table entries are not in disk order.
brandenserver@brandenserver:~$
```

```
brandenserver@brandenserver:~$ sudo fdisk /dev/sda # Or /dev/vdb if you're practicing safely
Welcome to fdisk (util-linux 2.39.3).
Changes will remain in memory only, until you decide to write them.
Be careful before using the write command.

This disk is currently in use - repartitioning is probably a bad idea.
It's recommended to umount all file systems, and swapoff all swap
partitions on this disk.

Command (m for help): p
Disk /dev/sda: 25 GiB, 26843545600 bytes, 52428800 sectors
Disk model: VBOX HARDDISK
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: gpt
Disk identifier: 0A18DFEC-3973-4086-926D-49E32CB64D23

Device      Start    End  Sectors  Size Type
/dev/sda1     2048   4095    2048   1M BIOS boot
/dev/sda2    4096  4198399  4194304   2G Linux filesystem
/dev/sda3  4198400  52426751 48228352 23G Linux filesystem
/dev/sda4    2047     2047        1  512B Linux filesystem

Partition table entries are not in disk order.

Command (m for help): d
Partition number (1-4, default 4): 1
Partition 1 has been deleted.

Command (m for help): w
The partition table has been altered.
Syncing disks.

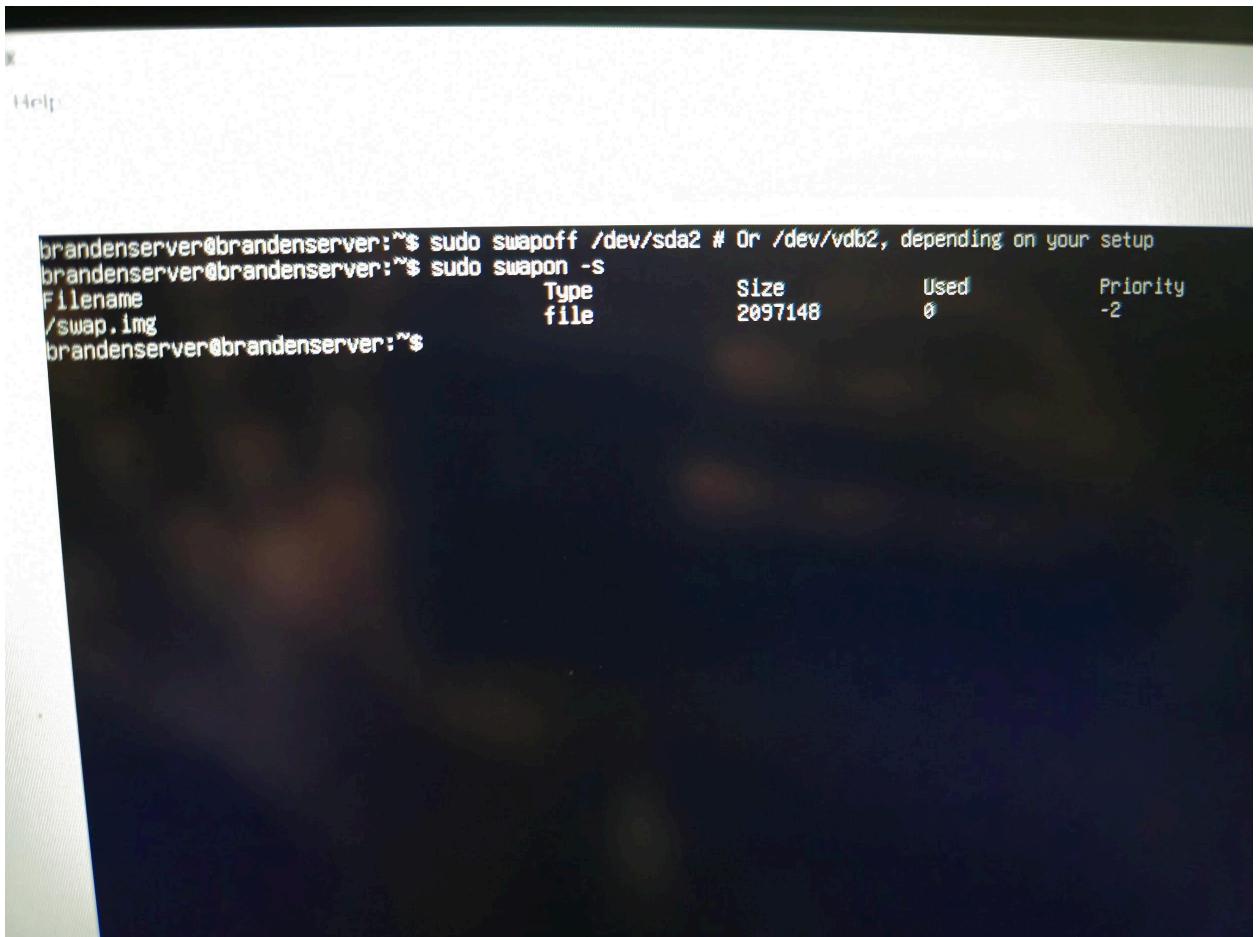
brandenserver@brandenserver:~$ sudo lsblk /dev/sda
NAME          MAJ:MIN RM  SIZE RO TYPE MOUNTPOINTS
sda            8:0    0   25G  0 disk
|__sda2         8:2    0    2G  0 part /boot
|__sda3         8:3    0    23G 0 part
|   __ubuntu--vg-ubuntu--lv 252:0  0 11.5G 0 lvm /
|__sda4         8:4    0    512B 0 part
brandenserver@brandenserver:~$
```

6.

OK  
Help

```
brandenserver@brandenserver:~$ mount | grep /dev/sda2
/dev/sda2 on /boot type ext4 (rw,relatime)
brandenserver@brandenserver:~$ sudo umount /dev/sda2 #Or the mount point that was found in the previous command.
[sudo] password for brandenserver:
brandenserver@brandenserver:~$ sudo mkswap /dev/sda2
mkswap: /dev/sda2: warning: wiping old ext4 signature.
Setting up swapspace version 1, size = 2 GiB (214779552 bytes)
no label, UUID=49b79953-aa2a-41a1-9f9c-cdf682170033
brandenserver@brandenserver:~$ sudo swapon /dev/sda2
brandenserver@brandenserver:~$ sudo swapon -s
              Filename            Type      Size    Used  Priority
/swap.img          file    2097148       0     -2
/dev/sda2          partition 2097148       0     -3
brandenserver@brandenserver:~$
```

7.



```
brandenserver@brandenserver:~$ sudo swapoff /dev/sda2 # Or /dev/vdb2, depending on your setup
brandenserver@brandenserver:~$ sudo swapon -s
Filename           Type      Size    Used   Priority
/swap.img          file     2097148       0      -2
brandenserver@brandenserver:~$
```

8.

9. Answer: sudo parted /dev/vdb resizepart 3 21MB

## Part 2

1. Answer: i. /etc/fstab
2. Answer: ii. B. The lowercase -l option is wrong. It should be -L, with an uppercase L.
3. Answer:  
XFS on /dev/vdb:  
bash  
sudo mkfs.xfs -L DataDisk /dev/vdb
- Ext4 on /dev/vdc with 2048 inodes:  
Bash  
sudo mkfs.ext4 -N 2048 /dev/vdc
4. Answer: sudo mkfs.ext4 -N 2048 /dev/vdc
5. Answer: sudo mount /dev/vdb /mnt
6. Answer: sudo umount /mnt
7. Answer: sudo mkdir /test → echo "/dev/vdc /test ext4 defaults 0 2" | sudo tee -a /etc/fstab
8. Answer: echo "/dev/vdb none swap sw 0 0" | sudo tee -a /etc/fstab
9. Answer: sudo e2label /dev/vdb SwapFS

### Part 3

1. Answer: mount | grep "/dev/vda1" > /root/moptions
2. Answer: sudo umount /mnt
3. Answer: sudo mount -o ro,noexec,nosuid /dev/vdb1 /mnt
4. Answer: sudo mount -o remount,rw /dev/vdb1
5. Answer: echo "/dev/vdb1 /mnt ext4 defaults,ro 0 2" | sudo tee -a /etc/fstab

### Part 4

1. Answer: /etc/exports
2. Answer: echo "/home 10.0.0.0/24(ro)" | sudo tee -a /etc/exports → sudo exportfs -r
3. Answer: sudo mount -t nfs 127.0.0.1:/home /mnt
4. Answer: /etc/fstab
5. Answer: echo "127.0.0.1:/home /mnt nfs defaults 0 0" | sudo tee -a /etc/fstab
6. Answer: Yes
7. Answer: echo "/home 192.0.0.0/24(ro) 127.0.0.10(rw,no\_root\_squash)" | sudo tee -a /etc/exports sudo exportfs -r

### Part 5:

1. Answer: sudo apt install lvm2
2. Answer: sudo pvcreate /dev/vdb /dev/vdc
3. Answer: sudo pvdisk /dev/vdc | grep "PV Size" | awk '{print \$3}' > /root/pvsize
4. Answer: sudo vgreduce volume1 /dev/vdc → sudo pvremove /dev/vdc
5. Answer: sudo vgcreate volume1 /dev/vdb
6. Answer: sudo vgextend volume1 /dev/vdc
7. Answer: sudo vgreduce volume1 /dev/vdc
8. Answer: sudo vgdisplay volume1 | grep "VG Size" | awk '{print \$3}' > /root/volume1
9. Answer: sudo lvcreate -L 0.5G -n smalldata volume1
10. Answer: sudo lvresize -L 752M volume1/smadata
11. Answer: sudo mkfs.xfs /dev/volume1/smadata
12. Answer: sudo lvremove /dev/volume1/smadata

### Part 6:

1. Answer: RAID 1
2. Answer: cat /proc/mdstat
3. Answer: sudo mdadm --create --verbose /dev/md0 --level=1 --raid-devices=2 /dev/vdb /dev/vdc
4. Answer: sudo setfacl -m u:john:rw specialfile
5. Answer: sudo setfacl -x u:john specialfile
6. Answer: sudo setfacl -m g:mail:rx specialfile

7. Answer: sudo setfacl -R -m u:john:rwx collection