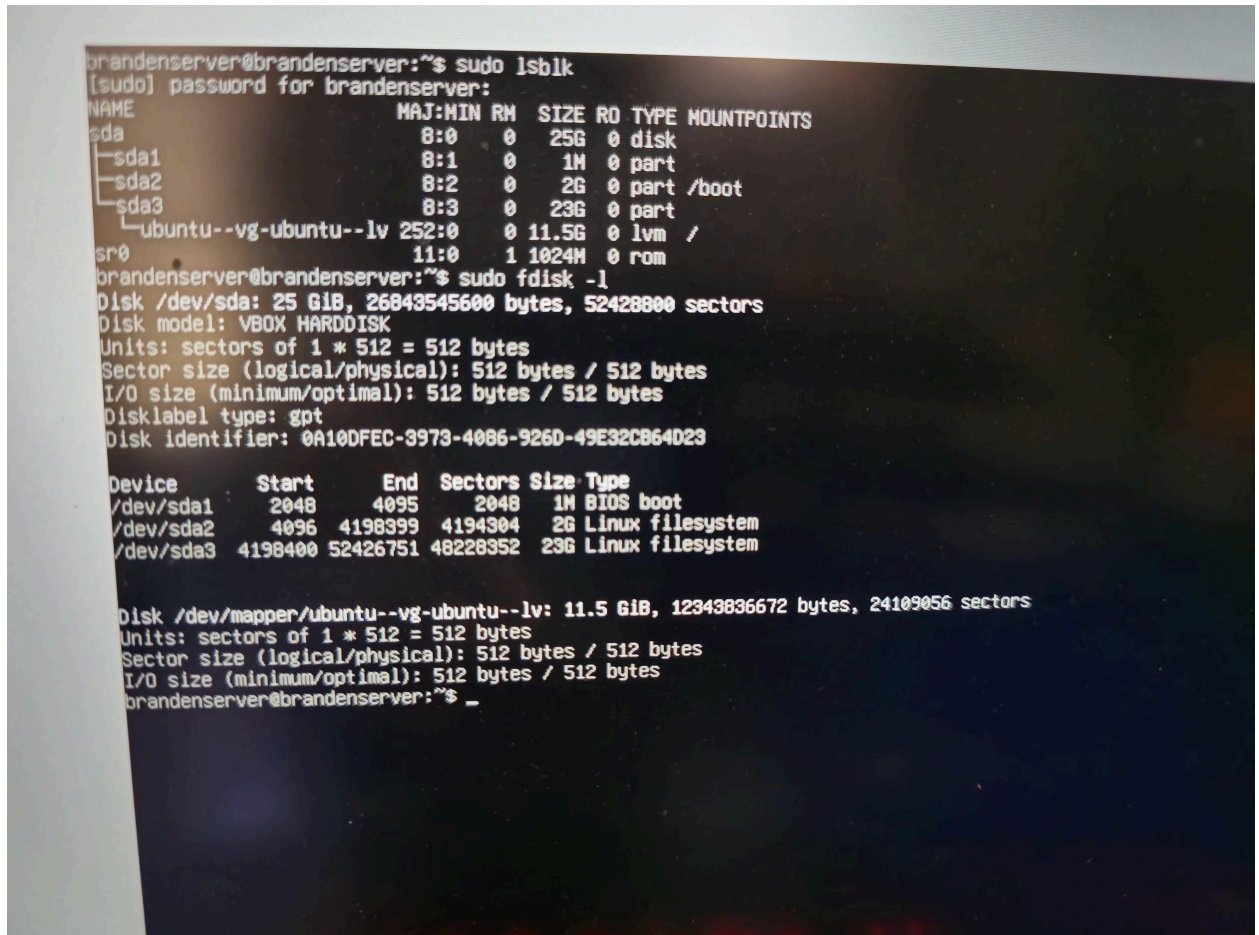


Branden Solomon
3/12/25
Professor Anthony
CTEC 435

Storage Lab

Part 1



```
brandenserver@brandenserver:~$ sudo lsblk
[sudo] password for brandenserver:
NAME                                MAJ:MIN RM  SIZE RO 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-49E32CB64D23

Device            Start      End  Sectors  Size Type
/dev/sda1         2048      4095     2048    1M BIOS boot
/dev/sda2         4096  4198399   419404    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

CopyEdit

sudo mkswap /dev/sdX

ialBox

es Help

```
brandenserver@brandenserver:~$ df /
Filesystem            1K-blocks    Used Available Use% Mounted on
/dev/mapper/ubuntu--vg-ubuntu--lv 11758760 4787688   6951964   43% /
brandenserver@brandenserver:~$ df / | awk 'NR==2 {print $1}' | cut -d"/" -f3 | sudo tee /root/part
mapper
brandenserver@brandenserver:~$
```

3.

```
alBox
is 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-BA4B-00A0C93EC93B
2	MBR partition scheme	024DEE41-33E7-11D3-9D69-0008C781F39F
3	Intel Fast Flash	D38FE20E-3DAF-11D1-BA40-E3A556089593
4	BIOS boot	21686148-6449-6E6F-744E-656564454649
5	Sony boot partition	F4019732-066E-4E12-8278-346C5641494F
6	Lenovo boot partition	8FBFAFE7-A34F-448A-9A5B-6213EB736C22
7	PowerPC PReP boot	9E1A2D38-C612-4316-AA26-8B49521E5A8B
8	ONIE boot	7412F7D5-A156-4B13-81DC-867174929325
9	ONIE config	D4E6E2C0-4469-46F8-B5CB-1BFF57AFC149
10	Microsoft reserved	ESC9E316-0B5C-4DB8-8170-F92DF00215AE
11	Microsoft basic data	E8D0A0A2-B9E5-4433-87C0-68B6B72699C7
12	Microsoft LDM metadata	5808C8AA-7E8F-42E0-85D2-E1E90434CFB3
13	Microsoft LDM data	AF9B60A0-1431-4F62-BC68-3311714A69AD
14	Windows recovery environment	DE94BBA4-06D1-4D40-A16A-BFD50179D6AC
15	IBM General Parallel Fs	37AFFC90-EF70-4E96-91C3-2D7AE055B174
16	Microsoft Storage Spaces	E75DCAF8-F680-4CEE-AFA3-B001E56EFC2D
17	HP-UX data	76B94C1E-3AEB-11D3-B7C1-7B03A0000000
18	HP-UX service	E2A1E72B-32E3-11D6-A682-7B03A0000000
19	Linux swap	0657FD6D-A4AB-43C4-84E5-0933C84B4F4F
20	Linux filesystem	0FC53DAF-8483-4772-8E79-3D63D8477DE4
21	Linux server data	3B8F0425-20E0-4F3B-907F-1A25A76F98E8
22	Linux root (x86)	44479540-F297-41B2-9AF7-D131D5F0458A
23	Linux root (x86-64)	4F68BCE3-E8CD-40B1-96E7-FBCAF984B709
24	Linux root (Alpha)	6523F0AE-3EB1-4E2A-A05A-18B695AE656F
25	Linux root (ARC)	D27F46ED-2919-4CB8-B025-9531F3C16534
26	Linux root (ARM)	69DAD710-2CE4-4E3C-B16C-21A1D49ABED3
27	Linux root (ARM-64)	B921B045-1DF0-41C3-AF44-4C6F2B0D3FAE
28	Linux root (IA-64)	993D8D3D-F80E-4225-B55A-9DAF8ED7EA97
29	Linux root (LoongArch-64)	77055800-792C-4F94-B39A-98C91B762BB6
30	Linux root (MIPS-32 LE)	37C58C8A-D913-4156-A25F-48B1B64E07F0
31	Linux root (MIPS-64 LE)	7008DA43-7A34-4507-B179-EEB93D7A7CA3
32	Linux root (MPPA/PA-RISC)	1AACDB3B-5444-413B-BD9E-E5C2239B2346
33	Linux root (PPC)	1DE3F1EF-FA98-47B5-8DCD-4A860A654D78
34	Linux root (PPC64)	912ADE1D-A839-4913-8964-A10EEE08FBD2
35	Linux root (PPC64LE)	C31C45E6-3F39-412E-80FB-4809C4980599
36	Linux root (RISC-V-32)	60D5A7FE-BE7D-435C-B714-3DD8162144E1
37	Linux root (RISC-V-64)	72EC70A6-CF74-40E6-BD49-48DA08E8F224
38	Linux root (S390)	08A7ACEA-624C-4A20-91E8-6E0FA67D23F9
39	Linux root (S390X)	5EEAD9A9-FE09-4A1E-A1D7-520D00531306
40	Linux root (TILE-Gx)	C50CDD70-3B62-4CC3-90E1-803A8C93E8C0
41	Linux reserved	8DA63339-0007-60C0-C436-083AC83309A0
42	Linux home	933AC7E1-2EB4-4F13-B841-0E14E2A0F915
43	Linux RAID	A190880F-05FC-4D3B-A086-749F0A3DF928
44	Linux LVM	E6060379-F507-4402-A28C-230F2A3DF928
45	Linux variable data	4D21B016-BE34-45C2-A9F8-5C16E091FD2D
46	Linux temporary data	7EC6F557-38C5-4ACA-B293-16EFD0F639D1
47	Linux /usr (x86)	75250076-8CC6-458E-BD66-BD47CC81A812
48	Linux /usr (x86-64)	84B4600C-9521-48C6-9C11-B0720656F69E
49	Linux /usr (Alpha)	E18CF09C-33EC-4C9D-B246-C6C6FB3DA024

```
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	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.
brandenserver@brandenserver:~\$

```
brandenserver@brandenserver:~$ sudo fdisk /dev/sda # Or /dev/vdb if you're practicing safely
```

```
Welcome to fdisk (util-linux 2.39.0).
```

```
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 unmount 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: 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
/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.

```
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 (2147479552 bytes)
no label, UUID=49b79963-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 pvdisplay /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/smalldata`
11. Answer: `sudo mkfs.xfs /dev/volume1/smalldata`
12. Answer: `sudo lvremove /dev/volume1/smalldata`

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`