

# LFCS - Storage 25%

1. Manage Partitions and Swap Space
2. Create Filesystems and Mount Them at Boot
- 3.
- 4.
- 5.
- 6.

# 1. List, Create, Delete, and Modify Physical Storage Partitions

```
ubuntu@ip-172-31-35-100:~$ lsblk = list block devices
NAME   MAJ:MIN RM  SIZE RO TYPE MOUNTPOINTS
loop0    7:0    0 27.2M  1 loop /snap/amazon-ssm-agent/11320
loop1    7:1    0 26.3M  1 loop /snap/amazon-ssm-agent/9881
loop2    7:2    0 63.8M  1 loop /snap/core20/2571
loop3    7:3    0 63.8M  1 loop /snap/core20/2582
loop4    7:4    0 73.9M  1 loop /snap/core22/1748
loop5    7:5    0 73.9M  1 loop /snap/core22/1963
loop6    7:6    0 89.4M  1 loop /snap/lxd/31333
loop7    7:7    0 44.4M  1 loop /snap/snappyd/23545
loop8    7:8    0 50.9M  1 loop /snap/snappyd/724585
xvda = disk 202:0 0 30G 0 disk
  xvda1 202:1 0 29.9G 0 part /
  xvda14 202:14 0 4M 0 part
  xvda15 202:15 0 106M 0 part /boot/efi
partition
```

	disk	partition
0	sda	sda1
		sda2
0	sdb	sdb1
		sdb2
		sdb3
		:
		sdz

```
ubuntu@ip-172-31-35-100:~$ sudo fdisk --list /dev/xvda → everything is file!
```

Disk /dev/xvda: 30 GiB, 32212254720 bytes, 62914560 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: gpt

Disk identifier: BC76E449-DC25-4EC2-9BE9-1A99FE26A39E

Device	Start	End	Sectors	Size	Type	
/dev/xvda1	227328	62914526	62687199	29.9G	Linux filesystem	2048 sector = 1Mb
/dev/xvda14	2048	10239	8192	4M	BIOS boot	
/dev/xvda15	10240	227327	217088	106M	EFI System	

Partition table entries are not in disk order.

```
ubuntu@ip-172-31-35-100:~$ sudo cfdisk /dev/xvde
```

Syncing disks.

```
ubuntu@ip-172-31-35-100:~$ lsblk
```

NAME	MAJ:MIN	RM	SIZE	RO	TYPE	MOUNTPOINTS
loop0	7:0	0	27.2M	1	loop	/snap/amazon-ssm-agent/11320
loop1	7:1	0	26.3M	1	loop	/snap/amazon-ssm-agent/9881
loop2	7:2	0	63.8M	1	loop	/snap/core20/2571
loop3	7:3	0	63.8M	1	loop	/snap/core20/2582
loop4	7:4	0	73.9M	1	loop	/snap/core22/1748
loop5	7:5	0	73.9M	1	loop	/snap/core22/1963
loop6	7:6	0	89.4M	1	loop	/snap/lxd/31333
loop7	7:7	0	44.4M	1	loop	/snap/snapd/23545
loop8	7:8	0	50.9M	1	loop	/snap/snapd/24505
xvda	202:0	0	30G	0	disk	
xvda1	202:1	0	29.9G	0	part	/
xvda14	202:14	0	4M	0	part	
xvda15	202:15	0	106M	0	part	/boot/efi
xvde	202:64	0	10G	0	disk	
xvde1	202:65	0	4G	0	part	
xvde2	202:66	0	4G	0	part	
xvde3	202:67	0	2G	0	part	

(final)

①

Select label type  
gpt  
dos  
sg1  
sun

(최상위)

= GUID Partition Table  
= MBR (Master boot Record)

Disk: /dev/xvde  
Size: 10 GiB, 10737418240 bytes, 20971520 sectors  
Label: gpt, identifier: 3C1CE242-85FD-8D8B-A6B2-CDF91D973F9E

Device	Start	End	Sectors	Size	Type
/dev/xvde1	2048	8396655	8386608	4G	Linux filesystem
xvde2	16779264	20971486	4192223	2G	Linux filesystem
/dev/xvde3	8396656	16779263	8386608	4G	Linux filesystem

[Delete] [Resize] [Quit] [Type] [Help] [Sort] [Write] [Dump]

[New] 2.8G

정해

Disk: /dev/xvde  
Size: 10 GiB, 10737418240 bytes, 20971520 sectors  
Label: gpt, identifier: 3C1CE242-85FD-8D8B-A6B2-CDF91D973F9E

Device	Start	End	Sectors	Size	Type
/dev/xvde1	2048	8396655	8386608	4G	Linux filesystem
xvde2	8396656	16779263	8386608	4G	Linux filesystem
/dev/xvde3	16779264	20971486	4192223	2G	Linux filesystem

[Delete] [Resize] [Quit] [Type] [Help] [Write] [Dump]

change

Select partition type  
Linux swap  
Linux filesystem  
Linux server data  
Linux root (ext4)  
Linux root (ext4-64)  
Linux root (AIO)  
Linux root (AIO-64)  
Linux root (ZFS-64)  
Linux reserved  
Linux home  
Linux RAID  
Linux LVM  
Linux variable data  
Linux temporary data  
Linux /usr (x86)  
Linux /usr (x86-64)

# Configure and Manage Swap Space

```

ubuntu@ip-172-31-35-100:~$ swapon --show
ubuntu@ip-172-31-35-100:~$ lsblk
NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINTS
loop0 7:0 0 27.2M 1 loop /snap/amazon-ssm-agent/11320
loop1 7:1 0 26.3M 1 loop /snap/amazon-ssm-agent/9881
loop2 7:2 0 63.8M 1 loop /snap/core20/2582
loop3 7:3 0 63.8M 1 loop /snap/core20/2571
loop4 7:4 0 73.9M 1 loop /snap/core22/1748
loop5 7:5 0 73.9M 1 loop /snap/core22/1963
loop6 7:6 0 89.4M 1 loop /snap/lxd/31333
loop7 7:7 0 44.4M 1 loop /snap/snappyd/23545
loop8 7:8 0 50.9M 1 loop /snap/snappyd/24505
xvda 202:0 0 30G 0 disk
└─xvda1 202:1 0 29.9G 0 part /
xvda14 202:14 0 4M 0 part
xvda15 202:15 0 100M 0 part /boot/efi
xvde 202:64 0 16G 0 disk
└─xvde1 202:65 0 4G 0 part
xvde2 202:66 0 4G 0 part
xvde3 202:67 0 2G 0 part
ubuntu@ip-172-31-35-100:~$ sudo mkswap /dev/xvde3
Setting up swapspace version 1, size = 2 GiB (2146410496 bytes)
no label, UUID=ec8a20c2-4e57-4487-8c5e-815a653edc75
ubuntu@ip-172-31-35-100:~$ swapon --show
ubuntu@ip-172-31-35-100:~$ sudo swapon --verbose /dev/xvde3
swapon: /dev/xvde3: found signature [pagesize=4096, signature=swap]
swapon: /dev/xvde3: pagesize=4096, swapsize=2146414592, devsize=2146418176
swapon: /dev/xvde3
ubuntu@ip-172-31-35-100:~$ swapon --show
@ disk을 swap으로
NAME      TYPE      SIZE USED PRIO
/dev/xvde3 partition 2G   0B   -2
ubuntu@ip-172-31-35-100:~$ free
total        used        free       shared  buff/cache   available
Mem:      980352      216452     119044         900      644856      596108
Swap:    2896184          0     2896184

```

- disk swap
1. swapon --show
  2. mkswap (target)
  3. swapon (target)
  4. swapoff "

## file swap

1. sudo dd if=/dev/zero of=/swapfile bs=1M count=128
2. sudo mkswap /swapfile

disk duplicator

```

ubuntu@ip-172-31-35-100:~$ swapon --show
NAME      TYPE      SIZE USED PRIO
/dev/xvde3 partition 2G   0B   -2
ubuntu@ip-172-31-35-100:~$ sudo dd if=/dev/zero of=/swapfile bs=1M count=128 status=progress
128+0 records in
128+0 records out
134217728 bytes (134 MB, 128 MiB) copied, 0.113223 s, 1.2 GB/s
ubuntu@ip-172-31-35-100:~$ sudo mkswap /swapfile
mkswap: /swapfile: insecure permissions 0644, fix with: chmod 0600 /swapfile
Setting up swapspace version 1, size = 128 MiB (134213632 bytes)
no label, UUID=120b5b2b-d9ca-4307-beef-aeb397e9d190
ubuntu@ip-172-31-35-100:~$ sudo swapon /swapfile
swapon: /swapfile: insecure permissions 0644, 0600 suggested.
ubuntu@ip-172-31-35-100:~$ chmod 600 /swapfile
chmod: changing permissions of '/swapfile': Operation not permitted
ubuntu@ip-172-31-35-100:~$ sudo chmod 600 /swapfile
sudo: chmod: command not found
ubuntu@ip-172-31-35-100:~$ sudo chmoe 600 /swapfile
ubuntu@ip-172-31-35-100:~$ swapon --show
NAME      TYPE      SIZE USED PRIO
/dev/xvde3 partition 2G   0B   -2
/swapfile file    128M   0B   -3

```

우선 0 생성된 device  
1MB block x 128  
진영을 허용

input file output-file  
file를 swap space로  
Length=128M  
block size

# Create and Configure File Systems

```
ubuntu@ip-172-31-35-100:~$ lsblk | tail -n 4
```

```
xvde 202:64 0 10G 0 disk  
└─xvde1 202:65 0 4G 0 part  
└─xvde2 202:66 0 4G 0 part  
└─xvde3 202:67 0 2G 0 part
```

```
ubuntu@ip-172-31-35-100:~$ sudo mkfs.xfs -i size=512 -L "FirstFS" /dev/xvde1
```

```
mkfs.xfs: /dev/xvde1 appears to contain an existing filesystem (xfs).
```

```
mkfs.xfs: Use the -f option to force overwrite.
```

```
ubuntu@ip-172-31-35-100:~$ sudo mkfs.xfs -f -i size=512 -L "FirstFS" /dev/xvde1  
meta-data=/dev/xvde1          isize=512    agcount=4, agsize=262144 blks  
                      =         sectsz=512   attr=2, projid32bit=1  
                      =         crc=1     finobt=1, sparse=1, rmapbt=0  
                      =         reflink=1 bigtime=0 inobtcount=0  
data           bsize=4096   blocks=1048576, 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
```

```
ubuntu@ip-172-31-35-100:~$ sudo xfs_admin -l /dev/xvde1
```

```
label = "FirstFS"
```

```
ubuntu@ip-172-31-35-100:~$ man mkfs.ext4 | head -n 5
```

```
MKE2FS(8)          System Manager's Manual
```

MKE2FS(8)

이름은 디스크의 가상 디바이스입니다.

```
mke2fs - create an ext2/ext3/ext4 file system
```

-N 2098

```
ubuntu@ip-172-31-35-100:~$ sudo mkfs.ext4 -f -i size=512 -L "SecondFS" /dev/xvde2
```

```
mkfs.ext4: invalid option -- 'f'
```

```
Usage: mkfs.ext4 [-c|-l filename] [-b block-size] [-C cluster-size]  
                  [-i bytes-per-inode] [-I inode-size] [-J journal-options]  
                  [-G flex-group-size] [-N number-of-inodes] [-d root-directory]  
                  [-m reserved-blocks-percentage] [-o creator-os]  
                  [-g blocks-per-group] [-L volume-label] [-M last-mounted-directory]  
                  [-O feature[,...]] [-r fs-revision] [-E extended-option[,...]]  
                  [-t fs-type] [-T usage-type] [-U UUID] [-e errors_behavior] [-z undo_file]  
                  [-jnqvdFSV] device [blocks-count]
```

```
ubuntu@ip-172-31-35-100:~$ sudo cfdisk /dev/xvde
```

Disk: /dev/xvde				
Device	Start	End	Sectors	Size Type
>> /dev/xvde1	2048	8390655	8388608	4G Linux filesystem
/dev/xvde2	8390656	16779263	8388608	4G Linux filesystem
/dev/xvde3	16779264	20971486	4192223	2G Linux swap

```
Partition UUID: 8B203529-6594-544F-9CD7-FB3B56F374DE  
Partition type: Linux filesystem (0FC63DAF-8483-4772-8E79-3D69D8477DE4)  
Filesystem UUID: 9aa0abb5-e28-490e-98a5-44d5365b9695  
Filesystem LABEL: FirstFS  
Filesystem: xfs
```

Disk: /dev/xvde				
Device	Start	End	Sectors	Size Type
/dev/xvde1	2048	8390655	8388608	4G Linux filesystem
/dev/xvde2	8390656	16779263	8388608	4G Linux filesystem
/dev/xvde3	16779264	20971486	4192223	2G Linux swap

```
Partition UUID: BC9FCE99-1E6B-4F41-98AC-355CE885310E  
Partition type: Linux filesystem (0FC63DAF-8483-4772-8E79-3D69D8477DE4)  
Filesystem UUID: 30793ddf-ef59-4905-8d3a-c8397feb7ee1  
Filesystem LABEL: SecondFS  
Filesystem: ext4
```

# Configure Systems to Mount Filesystems at or During Boot

filesystem을 실제 directory로 mount할 수 있다

(수동)

```
ubuntu@ip-172-31-35-100:~$ lsblk | tail -n 4
xvde 202:64 0 10G 0 disk
└─xvde1 202:65 0 4G 0 part
└─xvde2 202:66 0 4G 0 part
└─xvde3 202:67 0 2G 0 part
공간은 있음  
설정은 만듬 X
```

```
ubuntu@ip-172-31-35-100:~$ sudo mount /dev/xvde1 /mnt
ubuntu@ip-172-31-35-100:~$ ls /mnt/
ubuntu@ip-172-31-35-100:~$ touch /mnt/testfile
touch: cannot touch '/mnt/testfile': Permission denied
ubuntu@ip-172-31-35-100:~$ sudo touch /mnt/testfile
ubuntu@ip-172-31-35-100:~$ ls /mnt/testfile
/mnt/testfile
ubuntu@ip-172-31-35-100:~$ lsblk | tail -n 4
xvde 202:64 0 10G 0 disk
└─xvde1 202:65 0 4G 0 part /mnt
└─xvde2 202:66 0 4G 0 part
└─xvde3 202:67 0 2G 0 part
ubuntu@ip-172-31-35-100:~$ sudo umount /dev/xvde1
ubuntu@ip-172-31-35-100:~$ ls /mnt
ubuntu@ip-172-31-35-100:~$ lsblk | tail -n 4
xvde 202:64 0 10G 0 disk
└─xvde1 202:65 0 4G 0 part
└─xvde2 202:66 0 4G 0 part
└─xvde3 202:67 0 2G 0 part
```

(자동)

→ 해당 dir

```
ubuntu@ip-172-31-35-100:~$ sudo mkdir /backups/
ubuntu@ip-172-31-35-100:~$ sudo cat /etc/fstab
LABEL=cloudimg-rootfs / ext4 discard,errors=remount-ro 0 1
LABEL=UEFI /boot/efi vfat umask=0077 0 1
/dev/xvde1 /mybackups xfs defaults 0 2
ubuntu@ip-172-31-35-100:~$ lsblk | tail -n 4
xvde 202:64 0 10G 0 disk
└─xvde1 202:65 0 4G 0 part /mybackups
└─xvde2 202:66 0 4G 0 part
└─xvde3 202:67 0 2G 0 part
ubuntu@ip-172-31-35-100:~$ ls /mybackups/
testfile
ubuntu@ip-172-31-35-100:~$ sudo systemctl reboot
reboot 후  
확인
```

```
ubuntu@ip-172-31-35-100:~$ free
total used free shared buff/cache available
Mem: 980356 220120 513156 608 247080 600704
Swap: 0 0 0
ubuntu@ip-172-31-35-100:~$ sudo vim /etc/fstab
ubuntu@ip-172-31-35-100:~$ free
total used free shared buff/cache available
Mem: 980356 213544 512904 608 253908 607180
Swap: 0 0 0
ubuntu@ip-172-31-35-100:~$ lsblk | tail -n 4
xvde 202:64 0 10G 0 disk
└─xvde1 202:65 0 4G 0 part /mybackups
└─xvde2 202:66 0 4G 0 part
└─xvde3 202:67 0 2G 0 part [SWAP] 0
0B
ubuntu@ip-172-31-35-100:~$ swapon --show
ubuntu@ip-172-31-35-100:~$ cat /etc/fstab
LABEL=cloudimg-rootfs / ext4 discard,errors=remount-ro 0 1
LABEL=UEFI /boot/efi vfat umask=0077 0 1
/dev/xvde1 /mybackups xfs defaults 0 2
/dev/xvde3 none swap defaults 0 0
ubuntu@ip-172-31-35-100:~$ sudo systemctl reboot
ubuntu@ip-172-31-35-100:~$ free
total used free shared buff/cache available
Mem: 980356 218652 526512 624 235192 602896
Swap: 2096104 0 2096104
ubuntu@ip-172-31-35-100:~$ swapon --show
NAME TYPE SIZE USED PRIO
/dev/xvde3 partition 2G 0B -2
```

```
ubuntu@ip-172-31-35-100:~$ sudo blkid /dev/xvde1  
/dev/xvde1: LABEL="FirstFS" UUID="9aa0abb5-8e28-490e-98a5-44d5365b9695" BLOCK_SIZE="512" TYP  
E="xfs" PARTUUID="8b203529-6594-544f-9cd7-fb3b56f374de"  
ubuntu@ip-172-31-35-100:~$ ls -l /dev/disk/by-uuid/  
total 0  
lrwxrwxrwx. 1 root root 11 Jun 6 09:11 30793d0f-ef59-4965-8d3a-c8397feb7ee1 -> ../../xvde2  
lrwxrwxrwx. 1 root root 12 Jun 6 09:11 79F0-AB3E -> ../../xvda15  
lrwxrwxrwx. 1 root root 11 Jun 6 09:11 85538820-9e86-47ea-9d4a-f18019b855c3 -> ../../xvda1  
lrwxrwxrwx. 1 root root 11 Jun 6 09:11 9aa0abb5-8e28-490e-98a5-44d5365b9695 -> ../../xvde1  
lrwxrwxrwx. 1 root root 11 Jun 6 09:11 ec8a20c2-4e57-4487-8c5e-815a653e0c75 -> ../../xvde3
```

) → 실제 /dev/xvde1 를  
UUID를 많이 쓸.  
아기는 변동이

# File System and Mount Options

```
ubuntu@ip-172-31-35-100:~$ findmnt -t ext4, xfs
ubuntu@ip-172-31-35-100:~$ findmnt -t xfs
TARGET SOURCE FSTYPE OPTIONS
/mybackups /dev/xvde1 xfs rw,relatime,seclabel,attr2,inode64,logbufs=8,logbsize=32k,noquota
ubuntu@ip-172-31-35-100:~$ findmnt -t xfs, ext4
ubuntu@ip-172-31-35-100:~$ findmnt -t xfs,ext4
TARGET SOURCE FSTYPE OPTIONS
/ /dev/xvda1 ext4 rw,relatime,seclabel,discard,errors=remount-ro
└─/mybackups /dev/xvde1 xfs rw,relatime,seclabel,attr2,inode64,logbufs=8,logbsize=32k,noquota
ubuntu@ip-172-31-35-100:~$ sudo touch /mybackups/testfile2
ubuntu@ip-172-31-35-100:~$ sudo mount -o ro /dev/xvde2 /mnt
ubuntu@ip-172-31-35-100:~$ findmnt -t xfs,ext4
TARGET SOURCE FSTYPE OPTIONS
/ /dev/xvda1 ext4 rw,relatime,seclabel,discard,errors=remount-ro
└─/mybackups /dev/xvde1 xfs rw,relatime,seclabel,attr2,inode64,logbufs=8,logbsize=32k,noquota
└─/mnt /dev/xvde2 ext4 ro,relatime,seclabel
ubuntu@ip-172-31-35-100:~$ sudo touch /mnt/testfile
touch: cannot touch '/mnt/testfile': Read-only file system
ubuntu@ip-172-31-35-100:~$ sudo umount /mnt
ubuntu@ip-172-31-35-100:~$ sudo mount -o ro,noexec,nosuid /dev/xvde2 /mnt
ubuntu@ip-172-31-35-100:~$ sudo findmnt -t ext4,xfs
TARGET SOURCE FSTYPE OPTIONS
/ /dev/xvda1 ext4 rw,relatime,seclabel,discard,errors=remount-ro
└─/mybackups /dev/xvde1 xfs rw,relatime,seclabel,attr2,inode64,logbufs=8,logbsize=32k,noquota
└─/mnt /dev/xvde2 ext4 ro,nosuid,noexec,relatime,seclabel
ubuntu@ip-172-31-35-100:~$ sudo mount -o rw,noexec,nosuid /dev/xvde2 /mnt
mount: /mnt: /dev/xvde2 already mounted on /mnt.
ubuntu@ip-172-31-35-100:~$ sudo mount -o remount,rw,noexec,nosuid /dev/xvde2 /mnt
ubuntu@ip-172-31-35-100:~$ sudo findmnt -t ext4,xfs
TARGET SOURCE FSTYPE OPTIONS
/ /dev/xvda1 ext4 rw,relatime,seclabel,discard,errors=remount-ro
└─/mybackups /dev/xvde1 xfs rw,relatime,seclabel,attr2,inode64,logbufs=8,logbsize=32k,noquota
└─/mnt /dev/xvde2 ext4 rw,nosuid,noexec,relatime,seclabel
ubuntu@ip-172-31-35-100:~$ sudo umount /dev/xvde2
ubuntu@ip-172-31-35-100:~$ sudo umount /dev/xvde1
ubuntu@ip-172-31-35-100:~$ sudo findmnt -t ext4,xfs
TARGET SOURCE FSTYPE OPTIONS
/ /dev/xvda1 ext4 rw,relatime,seclabel,discard,errors=remount-ro
ubuntu@ip-172-31-35-100:~$ sudo mount -o allocsize=32K /dev/xvde1 /mybackups
ubuntu@ip-172-31-35-100:~$ sudo findmnt -t ext4,xfs
TARGET SOURCE FSTYPE OPTIONS
/ /dev/xvda1 ext4 rw,relatime,seclabel,discard,errors=remount-ro
└─/mybackups /dev/xvde1 xfs rw,relatime,seclabel,attr2,inode64,allocsize=32k,logbufs=8,logbsize=32k,noquota
ubuntu@ip-172-31-35-100:~$ sudo vim /etc/fstab
ubuntu@ip-172-31-35-100:~$ sudo findmnt -t ext4,xfs
TARGET SOURCE FSTYPE OPTIONS
/ /dev/xvda1 ext4 rw,relatime,seclabel,discard,errors=remount-ro
└─/mybackups /dev/xvde1 xfs rw,relatime,seclabel,attr2,inode64,allocsize=32k,logbufs=8,logbsize=32k,noquota
ubuntu@ip-172-31-35-100:~$ sudo cat /etc/fstab
LABEL=cloudimg-rootfs / ext4 discard,errors=remount-ro 0 1
LABEL=UEFI /boot/efi vfat umask=0077 0 1
/dev/xvde1 /mybackups xfs defaults 0 2
/dev/xvde3 none swap defaults 0 0
/dev/xvde2 /mnt xfs ro,noexec 0 0
2번정도가 2개
```

type  
findmnt -t ext4, xfs  
[no whitespace]

Subs mount -o [ro] [/dev/] ~ [/mnt]  
options filesystem FSN 한글

mount -o [remount, ~]  
source target ( ) ( )

# Use Remote Filesystems : NFS

Sudo apt install nfs-kernel-server

Sudo vim /etc/exports

## 1. 서버 설정

/srv/homes

Server가 NFS로  
지원하는 directory path

hostname1 (rw) sync, no-subtree-check  
x.example.com  
= example.com

hostname2 ( )  
x.example.com  
server.example.com  
10.0.0.9  
10.0.6.0/24  
\*  
x.example.com  
= example.com

read/write ≠ ro (read only)

+ no-root-squash (client root = server root)

기본적으로는 client root = nobody로 세팅

squash

/etc 127.0.0.1 (ro)

Sudo exportfs -T 새롭고정

-V verbose (자세한 출력)

설정으로 ro 보다 더 많은 권한이 들어감

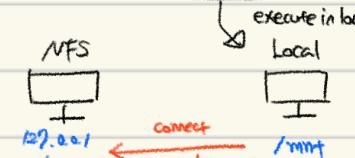
/etc x.example.com (rw)

\*(ro)

## 2. Client 설정

Sudo mount 127.0.0.1:/etc /mnt  
nfs  
local

if /etc/fstab  
127.0.0.1:/etc /mnt nfs defaults 0 0  
Source Target



# Use Network Block Devices, NBD

Server

```
sudo apt install nbd-server
```

```
sudo vim /etc/nbd-server/config
```

NBD daemon은 nbd라는 사용자를 실행된다.  
즉, root로 실행되야 실제 파일 가능  
rw

```
# user = nbd
```

```
# group = nbd
```

```
allowlist = true
```

↳ Client가 sever에게 open block

exports 가 제공되는 경우 가능

[partition 2] → export id

export name = /dev/xvde2

↳ local device path

```
sudo systemctl restart nbd-server.service
```

Client

```
sudo apt install nbd-client
```

명령 ① sudo modprobe nbd

명령 ② sudo vim /etc/modules-load.d/modules.conf

↳ nbd 추가

```
sudo nbd-client <서버-ip> -N partition2
```

연결

```
sudo mount /dev/nbd0 /mnt
```

마운트

```
sudo nbd-client -d /dev/nbd0
```

연결 해제

```
sudo nbd-client -l <서버 ip>
```

allowlist=true 인 경우에만 가능

# LVM = Logical Volume Manager

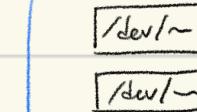
PV = Physical Volume

LU = Logical Volume

VG = Volume Group

PE = Physical Extent

lvdiskscan



1. PVcreate

lv filesystem  
설정

sudo pvcreate /dev/xvde1

pvremove

sudo vgcreate my-volume /dev/xvde1

sudo vgs

2. Vgcreate

vg:my-volume

/dev/sda

/dev/sdb

sudo pvs

vgextend

/dev/sdc

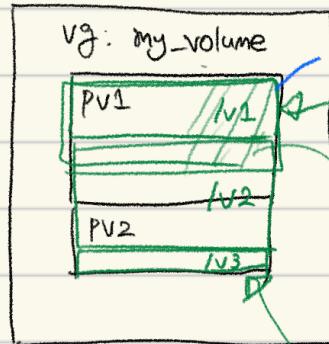
out  
vgreduce

sudo vgextend my-volume /dev/xvde2

3. Lvcreate

sudo lvcreate --size 2G --name partition1 my-volume

lvm



partition1

sudo lvs

sudo lvresize

sudo lvdisplay

path: /dev/my-volume/partition1

vg

lu

mount

sudo mount /dev/my-volume/partition1 /mnt

--extents 100% VP my-volume/partition1

확장

--size 2G myvolume/partition1

축소 (만약 기본보다 작을경우, data loss 가능)

But! 이런 단순히 확장 안 늘릴 뿐, fs는 고정

즉 fs도 자동확장

sudo lvresize --resizefs

--size 3G my\_volume/partition1

# Disk Monitoring

iostat (I/O)

sudo apt install sysstat

↳ pidstat (Process ID)

ubuntu@ip-172-31-37-61:~\$ iostat							
	Linux 6.8.0-1029-aws (ip-172-31-37-61) 06/15/25 _x86_64_ (1 CPU)						
avg-cpu:	%user	%nice	%system	%iowait	%steal	%idle	
	0.03	0.00	0.01	0.01	8.61	91.33	
Device	tps	kB_read/s	kB_wrtn/s	kB_dscd/s	kB_read	kB_wrtn	kB_dscd
dm-0	0.00	0.03	0.00	0.00	8352	4	0
dm-1	0.00	0.01	0.00	0.00	3132	4	0
loop0	0.00	0.02	0.00	0.00	6100	0	0
loop1	0.00	0.01	0.00	0.00	3015	0	0
loop2	0.00	0.10	0.00	0.00	23743	0	0
loop3	0.00	0.00	0.00	0.00	10	0	0
xvda	0.47	3.63	8.58	0.00	891821	2109982	0
xvde	0.01	0.18	0.01	0.00	45337	2509	0

tps = transfers per second

(읽기, 쓰기 요청수)

소요되는 미리 정한

제작된 디스크의 고속도 1. 짧은 IO

2. 긴 IO

디스크가 process가 disk 부하를 만들고 있으면...?

dd if=/dev/zero of=deletefile bs=1 count=100000 ...

1. iostat 1 (1초마다 I/O stat 측정)

ubuntu@ip-172-31-37-61:~\$ iostat							
	Linux 6.8.0-1029-aws (ip-172-31-37-61) 06/15/25 _x86_64_ (1 CPU)						
avg-cpu:	%user	%nice	%system	%iowait	%steal	%idle	
	0.00	0.00	1.03	98.97	0.00	0.00	
Device	tps	kB_read/s	kB_wrtn/s	kB_dscd/s	kB_read	kB_wrtn	kB_dscd
dm-0	0.00	0.00	0.00	0.00	0	0	0
dm-1	0.00	0.00	0.00	0.00	0	0	0
loop0	0.00	0.00	0.00	0.00	0	0	0
loop1	0.00	0.00	0.00	0.00	0	0	0
loop2	0.00	0.00	0.00	0.00	0	0	0
loop3	0.00	0.00	0.00	0.00	0	0	0
xvda	841.00	0.00	4484.00	0.00	0	4484	0
xvde	0.00	0.00	0.00	0.00	0	0	0

ubuntu@ip-172-31-37-61:~\$ pidstat -d 1						
	Linux 6.8.0-1029-aws (ip-172-31-37-61) 06/15/25 _x86_64_ (1 CPU)					
10:55:23	UID	PID	kB_rd/s	kB_wr/s	kB_ccwr/s	iodelay
10:55:24	1000	13529	0.00	1128.71	0.00	0 dd

ps 13529  
kill 13529

-h = human-readable

iostat -p xvda (특정 partition)

# Advanced Permissions

sudo apt install acl

setfacl -m  
-R

file/dir attribute

chattr +a i  
(SOTer)

기본설정

getfacl file3 으로 확인가능

sudo setfacl --modify user:jeremy rw file3  
-m jeremy 권한 대상  
mask: r files  
↳ 최대한락제한  
--modify group:sudo :rw file3

--remove group:sudo file3  
no acl

--remove-all file3

(-R)  
-m user:jeremy:rw /some/dir  
/some/dir/a/b/c  
recursively set all

append only vs immutable

```
ubuntu@ip-172-31-37-61:~$ echo "This is new content" > newfile
ubuntu@ip-172-31-37-61:~$ sudo chattr +a newfile
ubuntu@ip-172-31-37-61:~$ cat newfile
This is new content
ubuntu@ip-172-31-37-61:~$ echo "Replace new content" > newfile
-bash: newfile: Operation not permitted
ubuntu@ip-172-31-37-61:~$ cat newfile
This is new content
ubuntu@ip-172-31-37-61:~$ echo "Append new content" >> newfile
ubuntu@ip-172-31-37-61:~$ cat newfile
This is new content
```

replace x

append o

Append new content

```
ubuntu@ip-172-31-37-61:~$ sudo chattr -a newfile
ubuntu@ip-172-31-37-61:~$ sudo chattr +i newfile
ubuntu@ip-172-31-37-61:~$ sudo rm newfile
rm: cannot remove 'newfile': Operation not permitted
ubuntu@ip-172-31-37-61:~$ lsattr newfile
-i----- newfile
ubuntu@ip-172-31-37-61:~$ lsattr
-----e---- ./file3
-----e---- ./deleteme
-----o----- ./newfile
ubuntu@ip-172-31-37-61:~$ sudo chattr +i newfile
ubuntu@ip-172-31-37-61:~$ lsattr newfile
-----e---- newfile
ubuntu@ip-172-31-37-61:~$ sudo rm newfile
ubuntu@ip-172-31-37-61:~$
```

delete

add immutable

even root user  
cannot be delete it

then ..

b