# Solution M6 (@VasAtanasov)

### Solution Details

**CHECK:** <https://courses.zahariev.pro/check.php?20250411112732priSefX5ns>

1. Create archive of **/etc** with **xz** utility and **measure** the **time** needed. Name the archive **etc.tar.xz**

vasil@debian:~$ time sudo tar -cvJf etc.tar.xz /etc && ls -ahl etc.tar.xz

...

real 0m0.724s

user 0m0.021s

sys 0m0.021s

-rw-r--r-- 1 root root 409K Apr 11 13:13 etc.tar.xz

1. Create archive of **/etc** with **bzip** utility and **measure** the **time** needed. Name the archive **etc.tar.bzip**

vasil@debian:~$ time sudo tar -cvjf etc.tar.bzip /etc && ls -ahl etc.tar.bzip

...

real 0m0.525s

user 0m0.015s

sys 0m0.015s

-rw-r--r-- 1 root root 475K Apr 11 13:22 etc.tar.bzip

1. Create archive of **/etc** with **gzip** utility and **measure** the **time** needed. Name the archive **etc.tar.gzip**

vasil@debian:~$ time sudo tar -cvzf etc.tar.gzip /etc && ls -ahl etc.tar.gzip

...

real 0m0.167s

user 0m0.005s

sys 0m0.032s

-rw-r--r-- 1 root root 479K Apr 11 13:23 etc.tar.gzip

1. Compare the **size** of the **three** archive files created earlier. **List** their **names** and **sizes** (using the **ls** command) ordered from smallest to the largest and store them in a file **compression-test.txt**

vasil@debian:~$ ls -ahl etc\* | sort -n > compression-test.txt

1. Partition the disk using **GPT**:
   1. **First** partition of type **Linux** and **700MB** in size;
   2. **Second** partition if type **Linux Swap** and **200MB** in size;
   3. **Third** partition of type **Linux** and **300MB** in size;
   4. **Fourth** partition of type **LVM** and **100MB** in size;
   5. **Fifth** and **sixth** partitions of type **LVM** and **300MB** in size;

vasil@debian:~$ lsblk

NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINTS

sda 8:0 0 32G 0 disk

├─sda1 8:1 0 31G 0 part /

├─sda2 8:2 0 1K 0 part

└─sda5 8:5 0 975M 0 part [SWAP]

sdb 8:16 0 2G 0 disk

sr0 11:0 1 1024M 0 rom

# Install gdisk tool

vasil@debian:~$ sudo apt update && sudo apt install gdisk -y

vasil@debian:~$ sudo gdisk /dev/sdb

...

Command (? for help): p

Disk /dev/sdb: 4194304 sectors, 2.0 GiB

Model: VBOX HARDDISK

Sector size (logical/physical): 512/512 bytes

Disk identifier (GUID): 0FE54EEA-A0B4-4A45-A04A-D95789258526

Partition table holds up to 128 entries

Main partition table begins at sector 2 and ends at sector 33

First usable sector is 34, last usable sector is 4194270

Partitions will be aligned on 2048-sector boundaries

Total free space is 4194237 sectors (2.0 GiB)

Number Start (sector) End (sector) Size Code Name

Command (? for help):

In gdisk, created partitions as follows:

* n → Partition 1 → 700M → default type (8300, Linux filesystem)
* n → Partition 2 → 200M → type 8200 (Linux swap)
* n → Partition 3 → 300M → type 8300 (Linux filesystem)
* n → Partition 4 → 100M → type 8e00 (Linux LVM)
* n → Partition 5 → 300M → type 8e00 (Linux LVM)
* n → Partition 6 → 300M → type 8e00 (Linux LVM)

Then write changes with w.

Command (? for help): n

Partition number (1-128, default 1): 1

First sector (34-4194270, default = 2048) or {+-}size{KMGTP}: 2048

Last sector (2048-4194270, default = 4192255) or {+-}size{KMGTP}: +700M

Current type is 8300 (Linux filesystem)

Hex code or GUID (L to show codes, Enter = 8300): 8300

Changed type of partition to 'Linux filesystem'

Command (? for help): n

Partition number (2-128, default 2): 2

First sector (34-4194270, default = 1435648) or {+-}size{KMGTP}: 1435648

Last sector (1435648-4194270, default = 4192255) or {+-}size{KMGTP}: +200M

Current type is 8300 (Linux filesystem)

Hex code or GUID (L to show codes, Enter = 8300): 8200

Changed type of partition to 'Linux swap'

Command (? for help): n

Partition number (3-128, default 3): 3

First sector (34-4194270, default = 1845248) or {+-}size{KMGTP}: 1845248

Last sector (1845248-4194270, default = 4192255) or {+-}size{KMGTP}: +300M

Current type is 8300 (Linux filesystem)

Hex code or GUID (L to show codes, Enter = 8300): 8300

Changed type of partition to 'Linux filesystem'

Command (? for help): n

Partition number (4-128, default 4):

First sector (34-4194270, default = 2459648) or {+-}size{KMGTP}:

Last sector (2459648-4194270, default = 4192255) or {+-}size{KMGTP}: +100M

Current type is 8300 (Linux filesystem)

Hex code or GUID (L to show codes, Enter = 8300): 8e00

Changed type of partition to 'Linux LVM'

Command (? for help): n

Partition number (5-128, default 5):

First sector (34-4194270, default = 2664448) or {+-}size{KMGTP}:

Last sector (2664448-4194270, default = 4192255) or {+-}size{KMGTP}: +300m

Current type is 8300 (Linux filesystem)

Hex code or GUID (L to show codes, Enter = 8300): 8e00

Changed type of partition to 'Linux LVM'

Command (? for help): n

Partition number (6-128, default 6):

First sector (34-4194270, default = 3278848) or {+-}size{KMGTP}:

Last sector (3278848-4194270, default = 4192255) or {+-}size{KMGTP}: +300M

Current type is 8300 (Linux filesystem)

Hex code or GUID (L to show codes, Enter = 8300): 8e00

Changed type of partition to 'Linux LVM'

Command (? for help): p

Disk /dev/sdb: 4194304 sectors, 2.0 GiB

Model: VBOX HARDDISK

Sector size (logical/physical): 512/512 bytes

Disk identifier (GUID): 0FE54EEA-A0B4-4A45-A04A-D95789258526

Partition table holds up to 128 entries

Main partition table begins at sector 2 and ends at sector 33

First usable sector is 34, last usable sector is 4194270

Partitions will be aligned on 2048-sector boundaries

Total free space is 303037 sectors (148.0 MiB)

Number Start (sector) End (sector) Size Code Name

1 2048 1435647 700.0 MiB 8300 Linux filesystem

2 1435648 1845247 200.0 MiB 8200 Linux swap

3 1845248 2459647 300.0 MiB 8300 Linux filesystem

4 2459648 2664447 100.0 MiB 8E00 Linux LVM

5 2664448 3278847 300.0 MiB 8E00 Linux LVM

6 3278848 3893247 300.0 MiB 8E00 Linux LVM

Command (? for help): w

Final checks complete. About to write GPT data. THIS WILL OVERWRITE EXISTING

PARTITIONS!!

Do you want to proceed? (Y/N): Y

OK; writing new GUID partition table (GPT) to /dev/sdb.

The operation has completed successfully.

vasil@debian:~$

vasil@debian:~$ lsblk /dev/sdb

NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINTS

sdb 8:16 0 2G 0 disk

├─sdb1 8:17 0 700M 0 part

├─sdb2 8:18 0 200M 0 part

├─sdb3 8:19 0 300M 0 part

├─sdb4 8:20 0 100M 0 part

├─sdb5 8:21 0 300M 0 part

└─sdb6 8:22 0 300M 0 part

1. **Create** folder **/addon** and subfolders to mount the new filesystems

vasil@debian:~$ sudo mkdir -p /addon/{xfs,ext4,lvm}

1. Create **xfs** filesystem on the **first** partition, mount it at **/addon/xfs**, and include it in the **/etc/fstab**

vasil@debian:~$ sudo apt-get install xfsprogs

vasil@debian:~$ sudo mkfs.xfs -L VOLUME-XFS /dev/sdb1

meta-data =/dev/sdb1 isize=512 agcount=4, agsize=44800 blks

= sectsz=512 attr=2, projid32bit=1

= crc=1 finobt=1, sparse=1, rmapbt=0

= reflink=1 bigtime=1 inobtcount=1 nrext64=0

data = bsize=4096 blocks=179200, imaxpct=25

= sunit=0 swidth=0 blks

naming =version 2 bsize=4096 ascii-ci=0, ftype=1

log =internal log bsize=4096 blocks=16384, version=2

= sectsz=512 sunit=0 blks, lazy-count=1

realtime =none extsz=4096 blocks=0, rtextents=0

vasil@debian:~$ sudo blkid /dev/sdb1

/dev/sdb1: LABEL="VOLUME-XFS" UUID="f8fb7ec6-232f-498e-a5ce-0075bc6bbd23" BLOCK\_SIZE="512" TYPE="xfs" PARTLABEL="Linux filesystem" PARTUUID="0be62500-24bd-4ff8-b8f1-e70f8fcca6cc"

vasil@debian:~$ echo 'UUID=f8fb7ec6-232f-498e-a5ce-0075bc6bbd23 /addon/xfs xfs defaults 0 0' | sudo tee -a /etc/fstab

vasil@debian:~$ sudo mount -a

1. Initialize the **swap** partition, **turn it on**, and include it in the **/etc/fstab** file

vasil@debian:~$ sudo mkswap /dev/sdb2

Setting up swapspace version 1, size = 200 MiB (209711104 bytes)

no label, UUID=cba019bd-1000-4e84-a082-e9618eeb65cf

vasil@debian:~$ sudo swapon /dev/sdb2

vasil@debian:~$ sudo blkid /dev/sdb2

/dev/sdb2: UUID="cba019bd-1000-4e84-a082-e9618eeb65cf" TYPE="swap" PARTLABEL="Linux swap" PARTUUID="4b25e614-4399-43e5-8a5e-f98e1b862d35"

vasil@debian:~$ echo 'UUID=cba019bd-1000-4e84-a082-e9618eeb65cf none swap sw 0 0' | sudo tee -a /etc/fstab

UUID=cba019bd-1000-4e84-a082-e9618eeb65cf none swap sw 0 0

vasil@debian:~$ sudo mount -a

1. Create **ext4** filesystem on the **third** partition, mount it at **/addon/ext4**, and include it in the **/etc/fstab**

vasil@debian:~$ sudo mkfs.ext4 /dev/sdb3

mke2fs 1.47.0 (5-Feb-2023)

Creating filesystem with 307200 1k blocks and 76912 inodes

Filesystem UUID: eb9c2d70-2a5c-438b-8d1a-f0026d5f98a9

Superblock backups stored on blocks:

8193, 24577, 40961, 57345, 73729, 204801, 221185

Allocating group tables: done

Writing inode tables: done

Creating journal (8192 blocks): done

Writing superblocks and filesystem accounting information: done

vasil@debian:~$ sudo blkid /dev/sdb3

/dev/sdb3: UUID="eb9c2d70-2a5c-438b-8d1a-f0026d5f98a9" BLOCK\_SIZE="1024" TYPE="ext4" PARTLABEL="Linux filesystem" PARTUUID="4e8c3c93-42fc-4135-9be3-9c8f9e582bb9"

vasil@debian:~$ echo 'UUID=eb9c2d70-2a5c-438b-8d1a-f0026d5f98a9 /addon/ext4 ext4 defaults 0 0' | sudo tee -a /etc/fstab

UUID=cba019bd-1000-4e84-a082-e9618eeb65cf none swap sw 0 0

vasil@debian:~$ sudo mount -a

1. Create **PVs** on the **fourth**, **fifth**, and **sixth** partitions

# Installation of LVM tool for Debian

vasil@debian:~$ sudo apt install lvm2

vasil@debian:~$ sudo pvcreate /dev/sdb{4,5,6}

Physical volume "/dev/sdb4" successfully created.

Physical volume "/dev/sdb5" successfully created.

Physical volume "/dev/sdb6" successfully created.

1. Create new **VG** named **vg\_addon** and include all **three PVs** created earlier

vasil@debian:~$ sudo vgcreate vg\_addon /dev/sdb4 /dev/sdb5 /dev/sdb6

Volume group "vg\_addon" successfully created

vasil@debian:~$ sudo vgs

VG #PV #LV #SN Attr VSize VFree

vg\_addon 3 0 0 wz--n- 688.00m 688.00m

vasil@debian:~$ sudo vgscan

Found volume group "vg\_addon" using metadata type lv

1. Create new **LV** named **lv\_addon** with size **400MB**

vasil@debian:~$ sudo lvcreate -L 400M -n lv\_addon vg\_addon

vasil@debian:~$ sudo lvs

LV VG Attr LSize Pool Origin Data% Meta% Move Log Cpy%Sync Convert

lv\_addon vg\_addon -wi-a----- 400.00m

vasil@debian:~$ sudo lvscan

ACTIVE '/dev/vg\_addon/lv\_addon' [400.00 MiB] inherit

1. Create **ext4** filesystem on the new **LV**, mount it at **/addon/lvm**, and include it in the **/etc/fstab**

vasil@debian:~$ sudo mkfs.ext4 /dev/vg\_addon/lv\_addon

mke2fs 1.47.0 (5-Feb-2023)

Creating filesystem with 409600 1k blocks and 102400 inodes

Filesystem UUID: 0e0dfd4b-1f2a-468f-8c51-d1df23bd5017

Superblock backups stored on blocks:

8193, 24577, 40961, 57345, 73729, 204801, 221185, 401409

Allocating group tables: done

Writing inode tables: done

Creating journal (8192 blocks): done

Writing superblocks and filesystem accounting information: done

vasil@debian:~$ echo '/dev/vg\_addon/lv\_addon /addon/lvm ext4 defaults 0 0' | sudo tee -a /etc/fstab

/dev/vg\_addon/lv\_addon /addon/lvm ext4 defaults 0 0

vasil@debian:~$ sudo mount -a

1. Extend the **LV** to include all the space available on the **VG**

vasil@debian:~$ sudo lvextend -l +100%FREE /dev/vg\_addon/lv\_addon

Size of logical volume vg\_addon/lv\_addon changed from 400.00 MiB (100 extents) to 688.00 MiB (172 extents).

Logical volume vg\_addon/lv\_addon successfully resized.

1. Extend the **LV's filesystem** to include all the available space

vasil@debian:~$ sudo resize2fs /dev/vg\_addon/lv\_addon

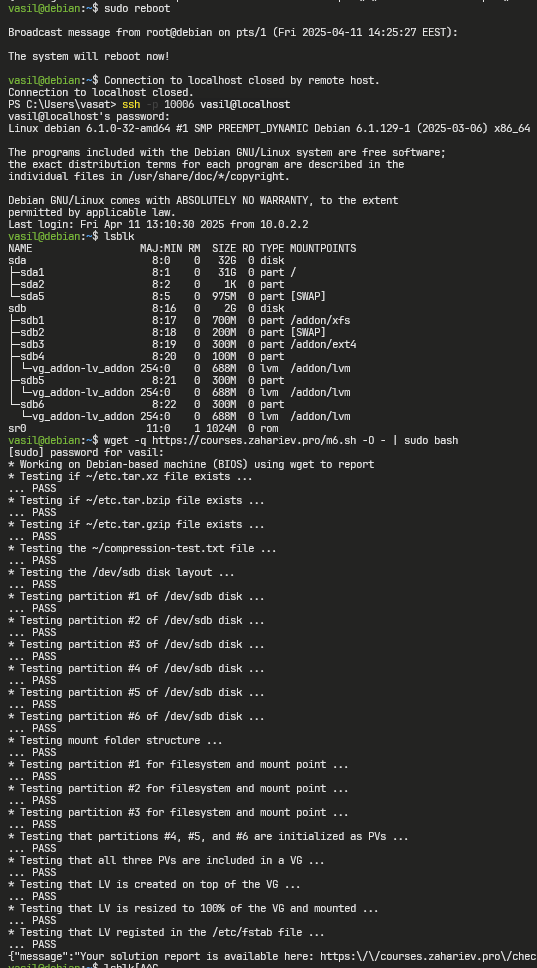
resize2fs 1.47.0 (5-Feb-2023)

Filesystem at /dev/vg\_addon/lv\_addon is mounted on /addon/lvm; on-line resizing required

old\_desc\_blocks = 4, new\_desc\_blocks = 6

The filesystem on /dev/vg\_addon/lv\_addon is now 704512 (1k) blocks long.

1. **Reboot** the system and **check** if everything with the new filesystems is okay (**list them**).



### Result

// https://courses.zahariev.pro/check.php?20250411112732priSefX5ns

{

"homework": {

"date": "2025-04-11 14:23:35",

"vm": 1,

"fware": "BIOS",

"family": "Debian",

"distribution": "Debian GNU/Linux 12 (bookworm)",

"module": 6,

"tests": [

{

"id": 1,

"name": "Testing if ~/etc.tar.xz file exists",

"result": "PASS"

},

{

"id": 2,

"name": "Testing if ~/etc.tar.bzip file exists",

"result": "PASS"

},

{

"id": 3,

"name": "Testing if ~/etc.tar.gzip file exists",

"result": "PASS"

},

{

"id": 4,

"name": "Testing the ~/compression-test.txt file",

"result": "PASS"

},

{

"id": 5,

"name": "Testing the /dev/sdb disk layout",

"result": "PASS"

},

{

"id": 6,

"name": "Testing partition #1 of /dev/sdb disk",

"result": "PASS"

},

{

"id": 7,

"name": "Testing partition #2 of /dev/sdb disk",

"result": "PASS"

},

{

"id": 8,

"name": "Testing partition #3 of /dev/sdb disk",

"result": "PASS"

},

{

"id": 9,

"name": "Testing partition #4 of /dev/sdb disk",

"result": "PASS"

},

{

"id": 10,

"name": "Testing partition #5 of /dev/sdb disk",

"result": "PASS"

},

{

"id": 11,

"name": "Testing partition #6 of /dev/sdb disk",

"result": "PASS"

},

{

"id": 12,

"name": "Testing mount folder structure",

"result": "PASS"

},

{

"id": 13,

"name": "Testing partition #1 for filesystem and mount point",

"result": "PASS"

},

{

"id": 14,

"name": "Testing partition #2 for filesystem and mount point",

"result": "PASS"

},

{

"id": 15,

"name": "Testing partition #3 for filesystem and mount point",

"result": "PASS"

},

{

"id": 16,

"name": "Testing that partitions #4, #5, and #6 are initialized as PVs",

"result": "PASS"

},

{

"id": 17,

"name": "Testing that all three PVs are included in a VG",

"result": "PASS"

},

{

"id": 18,

"name": "Testing that LV is created on top of the VG",

"result": "PASS"

},

{

"id": 19,

"name": "Testing that LV is resized to 100% of the VG and mounted",

"result": "PASS"

},

{

"id": 20,

"name": "Testing that LV registed in the /etc/fstab file",

"result": "PASS"

}

]

}

}