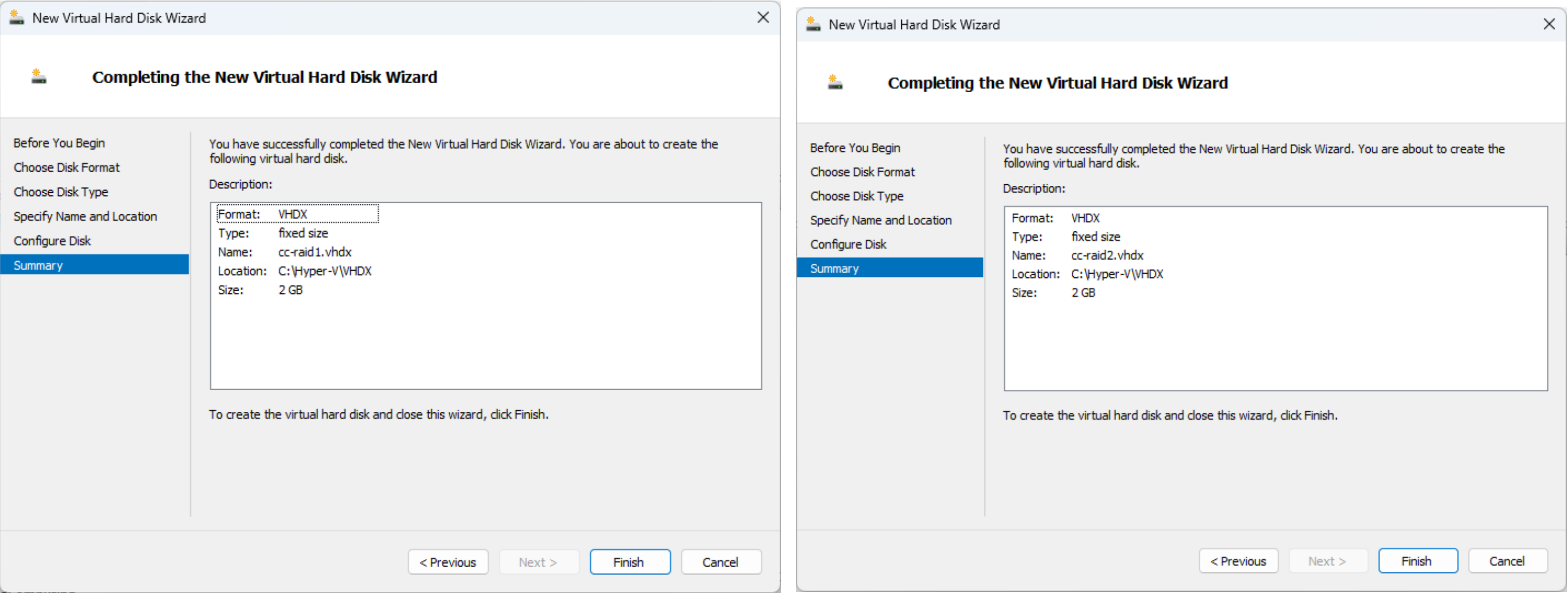


3Mict

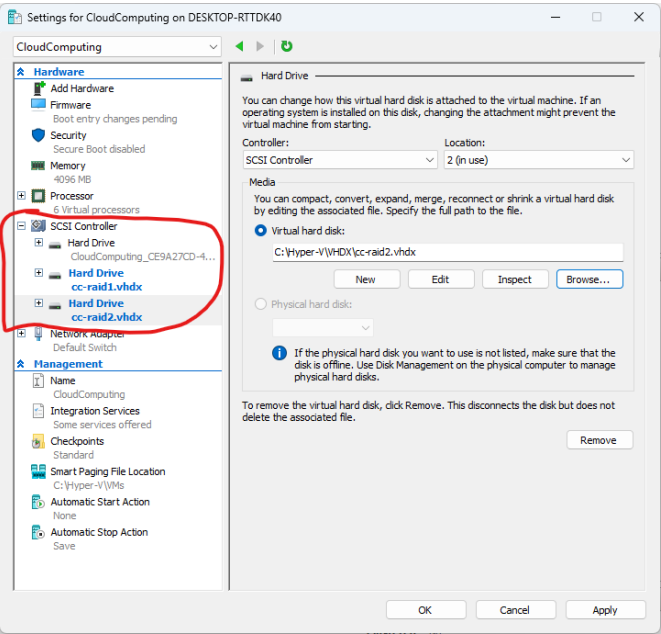
RAID.....	2
LVM.....	5

# RAID

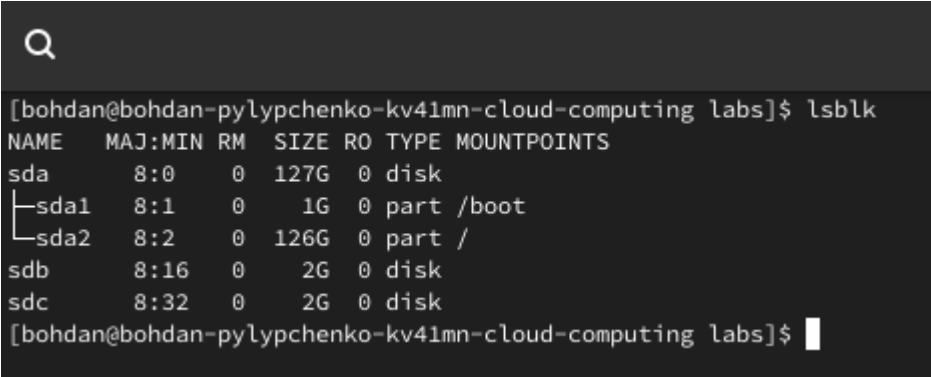
Створимо 2 .VHDX диски, які будуть використані для організації raid:



Додамо створені диски до віртуальної машини:



Вивід команди lsblk після додавання нових дисків:



Створення RAID за допомогою mdadm:

```
[bohdan@bohdan-pylypchenko-kv41mn-cloud-computing labs]$ mdadm --version
mdadm - v4.3 - 2024-02-15
[bohdan@bohdan-pylypchenko-kv41mn-cloud-computing labs]$ mdadm --create --verbose /dev/md0 --level=1 --raid-devices=2 /dev/sdb /dev/sdc
mdadm: must be super-user to perform this action
[bohdan@bohdan-pylypchenko-kv41mn-cloud-computing labs]$ su root
Password:
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]# mdadm --version
mdadm - v4.3 - 2024-02-15
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]# mdadm --create --verbose /dev/md0 --level=1 --raid-devices=2 /dev/sdb /dev/sdc
mdadm: Note: this array has metadata at the start and
may not be suitable as a boot device.  If you plan to
store '/boot' on this device please ensure that
your boot-loader understands md/v1.x metadata, or use
--metadata=0.90
mdadm: size set to 2094080K
Continue creating array?
Continue creating array? (y/n) y
mdadm: Defaulting to version 1.2 metadata
mdadm: array /dev/md0 started.
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]# █
```

Переглянемо статус створеного raid масиву:

```
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]# cat /proc/mdstat
Personalities : [raid1]
md0 : active raid1 sdc[1] sdb[0]
      2094080 blocks super 1.2 [2/2] [UU]

unused devices: <none>
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]# mdadm --detail /dev/md0
/dev/md0:
   Version : 1.2
  Creation Time : Sun Dec 22 19:15:42 2024
    Raid Level : raid1
    Array Size : 2094080 (2045.00 MiB 2144.34 MB)
 Used Dev Size : 2094080 (2045.00 MiB 2144.34 MB)
  Raid Devices : 2
 Total Devices : 2
 Persistence : Superblock is persistent

               Update Time : Sun Dec 22 19:15:53 2024
                 State : clean
 Active Devices : 2
Working Devices : 2
 Failed Devices : 0
  Spare Devices : 0

Consistency Policy : resync

           Name : 0
          UUID : 0ffd934a:9713302a:7ed28792:fd67380c
         Events : 17

   Number   Major   Minor   RaidDevice State
     0         8        16           0    active sync   /dev/sdb
     1         8        32           1    active sync   /dev/sdc
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]# █
```

Змоделюємо відмову одного із дисків у RAID:

```
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]# mdadm /dev/md0 --fail /dev/sdc
mdadm: set /dev/sdc faulty in /dev/md0
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]# cat /proc/mdstat
Personalities : [raid1]
md0 : active raid1 sdc[1](F) sdb[0]
      2094080 blocks super 1.2 [2/1] [U_]

unused devices: <none>
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]# █
```

Статус sdc – F (fail).

Видалимо «пошкоджений» диск із raid масиву:

```
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]# mdadm /dev/dm0 --remove /dev/sdc
mdadm: Value "/dev/dm0" cannot be set as devname. Reason: Not POSIX compatible.
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]# mdadm /dev/md0 --remove /dev/sdc
mdadm: hot removed /dev/sdc from /dev/md0
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]# cat /proc/mdstat
Personalities : [raid1]
md0 : active raid1 sdb[0]
      2094080 blocks super 1.2 [2/1] [U_]

unused devices: <none>
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]# █
```

Диск sdc видалено, залишився лише «здоровий» sdb.

Додамо диск sdc до масиву, попередньо видаливши всі дані з диску (команда dd заповнить всю пам'ять диску значеннями з /dev/zero – тобто нульовими значеннями):

```
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]# dd if=/dev/zero of=/dev/sdc bs=1M
dd: error writing '/dev/sdc': No space left on device
2049+0 records in
2048+0 records out
2147483648 bytes (2.1 GB, 2.0 GiB) copied, 1.97821 s, 1.1 GB/s
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]# mdadm /dev/md0 --add /dev/sdc
mdadm: added /dev/sdc
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]# cat /proc/mdstat
Personalities : [raid1]
md0 : active raid1 sdc[2] sdb[0]
      2094080 blocks super 1.2 [2/1] [U_]
      [=====>.....]  recovery = 66.9% (1401728/2094080) finish=0.0min speed=233621K/sec

unused devices: <none>
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]# cat /proc/mdstat
Personalities : [raid1]
md0 : active raid1 sdc[2] sdb[0]
      2094080 blocks super 1.2 [2/2] [UU]

unused devices: <none>
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]#
```

Бачимо 2 диски у raid масиві, обидва є «здоровими».

# LVM

Спочатку видалимо створений raid масив. Для цього виконаємо послідовність команд:

```
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]# mdadm /dev/md0 --fail /dev/sdc
mdadm: set /dev/sdc faulty in /dev/md0
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]# mdadm /dev/md0 --fail /dev/sdb
mdadm: Cannot remove /dev/sdb from /dev/md0, array will be failed.
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]# mdadm /dev/md0 --remove /dev/sdc
mdadm: hot removed /dev/sdc from /dev/md0
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]# cat /proc/mdstat
Personalities : [raid1]
md0 : active raid1 sdb[0]
      2094080 blocks super 1.2 [2/1] [U_]

unused devices: <none>
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]# mdadm --stop /dev/md0
mdadm: stopped /dev/md0
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]# mdadm --remove /dev/md0
mdadm: error opening /dev/md0: No such file or directory
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]# cat /proc/mdstat
Personalities : [raid1]
unused devices: <none>
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]# dd if=/dev/zero of=/dev/sdc bs=1M
dd: error writing '/dev/sdc': No space left on device
2049+0 records in
2048+0 records out
2147483648 bytes (2.1 GB, 2.0 GiB) copied, 2.2286 s, 964 MB/s
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]# dd if=/dev/zero of=/dev/sdb bs=1M
dd: error writing '/dev/sdb': No space left on device
2049+0 records in
2048+0 records out
2147483648 bytes (2.1 GB, 2.0 GiB) copied, 2.20471 s, 974 MB/s
[root@bohdan-pylypchenko-kv41mn-cloud-computing labs]#
```

і перезавантажимо систему.

Всі подальші кроки будемо виконувати для дисків sdb та sdc:

```
[bohdan@bohdan-pylypchenko-kv41mn-cloud-computing ~]$ lsblk
NAME        MAJ:MIN RM  SIZE RO TYPE MOUNTPOINTS
sda           8:0    0  127G  0 disk
├─sda1        8:1    0    1G  0 part /boot
└─sda2        8:2    0  126G  0 part /
sdb           8:16   0    2G  0 disk
sdc           8:32   0    2G  0 disk
[bohdan@bohdan-pylypchenko-kv41mn-cloud-computing ~]$
```

Створимо розмітку дисків sdb та sdc, partition type – Linux LVM:

CloudComputing on DESKTOP-RTTDC40

Dec 22 7:56 PM

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🔍 bohdan@bohdan-pylypchenko-kv41mn-cloud-computing:/home/bohdan

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[bohdan@bohdan-pylypchenko-kv41mn-cloud-computing ~]\$ su root  
Password:  
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# fdisk /dev/sdb

Welcome to fdisk (util-linux 2.40.2).  
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 (MBR) disklabel with disk identifier 0x94c7dd30.

Command (m for help): n  
Partition type  
  p primary (0 primary, 0 extended, 4 free)  
  e extended (container for logical partitions)  
Select (default p): p  
Partition number (1-4, default 1):  
First sector (2048-4194303, default 2048):  
Last sector, +/-sectors or +/-size{K,M,G,T,P} (2048-4194303, default 4194303):

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

Command (m for help): p  
**Disk /dev/sdb: 2 GiB, 2147483648 bytes, 4194304 sectors**  
Disk model: Virtual Disk  
Units: sectors of 1 \* 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 4096 bytes  
I/O size (minimum/optimal): 4096 bytes / 4096 bytes  
Disklabel type: dos  
Disk identifier: 0x94c7dd30

Device	Boot	Start	End	Sectors	Size	Id	Type
/dev/sdb1		2048	4194303	4192256	2G	83	Linux

Command (m for help): t  
Selected partition 1  
Hex code or alias (type L to list all): 8e  
Changed type of partition 'Linux' to 'Linux LVM'.

Command (m for help): p  
**Disk /dev/sdb: 2 GiB, 2147483648 bytes, 4194304 sectors**  
Disk model: Virtual Disk  
Units: sectors of 1 \* 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 4096 bytes  
I/O size (minimum/optimal): 4096 bytes / 4096 bytes  
Disklabel type: dos  
Disk identifier: 0x94c7dd30

Device	Boot	Start	End	Sectors	Size	Id	Type
/dev/sdb1		2048	4194303	4192256	2G	8e	Linux LVM

Command (m for help): w  
The partition table has been altered.  
Calling ioctl() to re-read partition table.  
Syncing disks.

[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]#

🔍 bohdan@bohdan-pylypchenko-kv41mn-cloud-computing:/home/bohdan

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[bohdan@bohdan-pylypchenko-kv41mn-cloud-computing ~]\$ su root  
Password:  
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# fdisk /dev/sdc

Welcome to fdisk (util-linux 2.40.2).  
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 (MBR) disklabel with disk identifier 0x034cf5ec.

Command (m for help): n  
Partition type  
  p primary (0 primary, 0 extended, 4 free)  
  e extended (container for logical partitions)  
Select (default p): p  
Partition number (1-4, default 1):  
First sector (2048-4194303, default 2048):  
Last sector, +/-sectors or +/-size{K,M,G,T,P} (2048-4194303, default 4194303):

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

Command (m for help): p  
**Disk /dev/sdc: 2 GiB, 2147483648 bytes, 4194304 sectors**  
Disk model: Virtual Disk  
Units: sectors of 1 \* 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 4096 bytes  
I/O size (minimum/optimal): 4096 bytes / 4096 bytes  
Disklabel type: dos  
Disk identifier: 0x034cf5ec

Device	Boot	Start	End	Sectors	Size	Id	Type
/dev/sdc1		2048	4194303	4192256	2G	83	Linux

Command (m for help): t  
Selected partition 1  
Hex code or alias (type L to list all): 8e  
Changed type of partition 'Linux' to 'Linux LVM'.

Command (m for help): p  
**Disk /dev/sdc: 2 GiB, 2147483648 bytes, 4194304 sectors**  
Disk model: Virtual Disk  
Units: sectors of 1 \* 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 4096 bytes  
I/O size (minimum/optimal): 4096 bytes / 4096 bytes  
Disklabel type: dos  
Disk identifier: 0x034cf5ec

Device	Boot	Start	End	Sectors	Size	Id	Type
/dev/sdc1		2048	4194303	4192256	2G	8e	Linux LVM

Command (m for help): w  
The partition table has been altered.  
Calling ioctl() to re-read partition table.  
Syncing disks.

[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]#

Виявилось, що команда pvcreate не передвстановлена у Arch linux:

```
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# lsblk
NAME        MAJ:MIN RM  SIZE RO TYPE MOUNTPOINTS
sda          8:0    0  127G  0 disk
├─sda1       8:1    0    1G  0 part /boot
└─sda2       8:2    0  126G  0 part /
sdb          8:16   0    2G  0 disk
└─sdb1       8:17   0    2G  0 part
sdc          8:32   0    2G  0 disk
└─sdc1       8:33   0    2G  0 part
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# pvcreate /dev/sdb1
bash: pvcreate: command not found
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# pvdisplay --version
bash: pvdisplay: command not found
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# pvcreate --version
bash: pvcreate: command not found
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]#
```

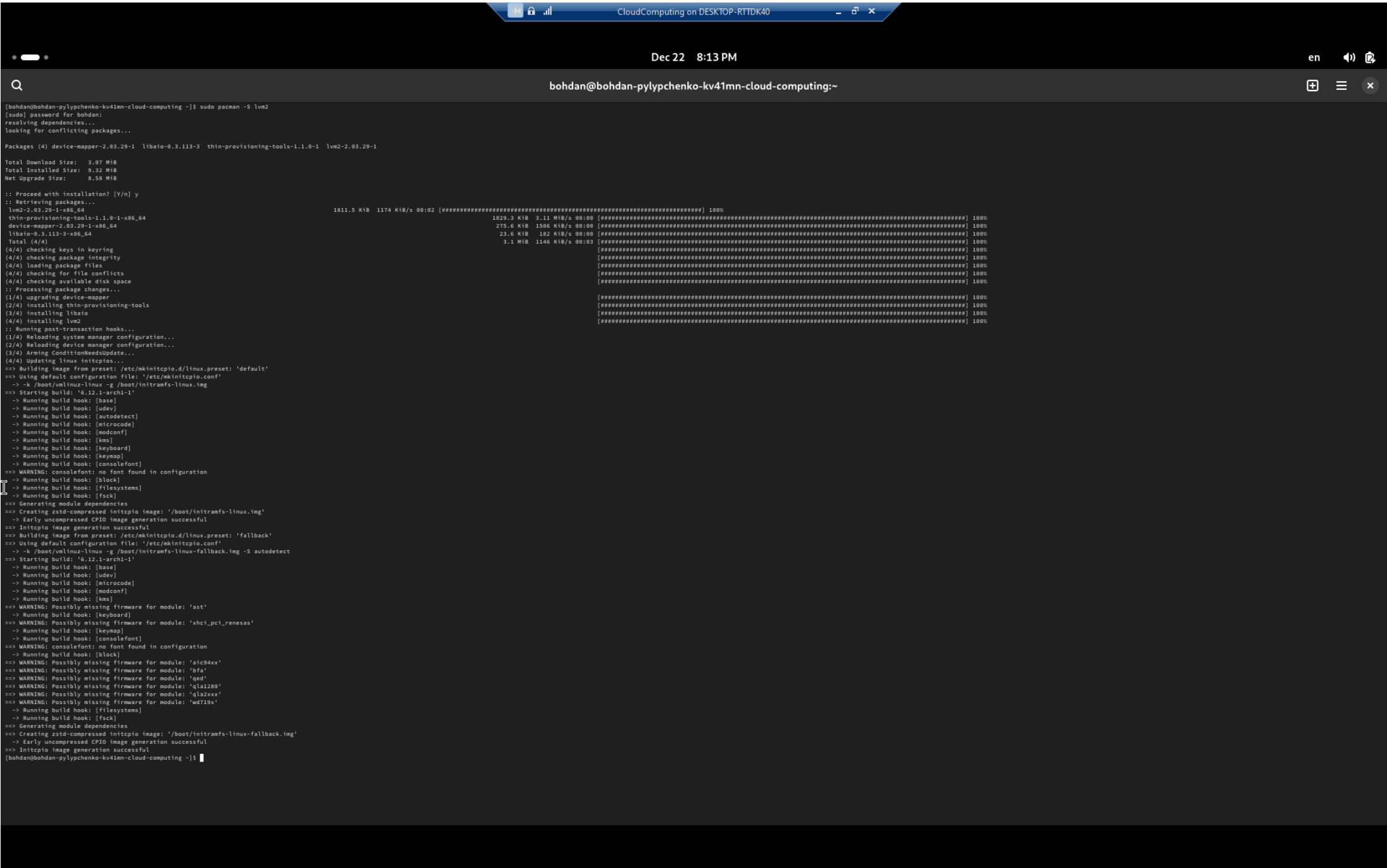
Встановлення пакету lvm2:

Згідно документації, для використання LVM потрібно встановити пакет lvm2:

## 2 Installation

Make sure the **lvm2** package is **installed**.

If you have LVM volumes not activated via the **initramfs**, **enable** `lvm2-monitor.service`, which is provided by the **lvm2** package.



Створення нових фізичних томів:

CloudComputing on DESKTOP-RTTDK40

Dec 22 8:15 PM

en

bohdan@bohdan-pylypchenko-kv41mn-cloud-computing:/home/bohdan

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```
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# lsblk
NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINTS
sda   8:0    0  127G  0 disk
├─sda1 8:1    0    1G  0 part /boot
└─sda2 8:2    0  126G  0 part /
sdb   8:16   0    2G  0 disk
└─sdb1 8:17   0    2G  0 part
sdc   8:32   0    2G  0 disk
└─sdc1 8:33   0    2G  0 part

[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# pvcreate /dev/sdb1
Physical volume "/dev/sdb1" successfully created.
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# pvdisplay
"/dev/sdb1" is a new physical volume of "<2.00 GiB"
--- NEW Physical volume ---
PV Name           /dev/sdb1
VG Name
PV Size           <2.00 GiB
Allocatable       NO
PE Size           0
Total PE          0
Free PE           0
Allocated PE      0
PV UUID           4HYv0s-Ih9i-Mg46-L8Tc-xUDB-TFVu-82c6d6

"/dev/sdb1" is a new physical volume of "<2.00 GiB"
--- NEW Physical volume ---
PV Name           /dev/sdb1
VG Name
PV Size           <2.00 GiB
Allocatable       NO
PE Size           0
Total PE          0
Free PE           0
Allocated PE      0
PV UUID           T2oFSS-fVde-0ULh-RCFS-zS1h-n96g-2rSIqf

[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]#
```

bohdan@bohdan-pylypchenko-kv41mn-cloud-computing:/home/bohdan

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```
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# lsblk
NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINTS
sda   8:0    0  127G  0 disk
├─sda1 8:1    0    1G  0 part /boot
└─sda2 8:2    0  126G  0 part /
sdb   8:16   0    2G  0 disk
└─sdb1 8:17   0    2G  0 part
sdc   8:32   0    2G  0 disk
└─sdc1 8:33   0    2G  0 part

[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# pvcreate /dev/sdc1
Physical volume "/dev/sdc1" successfully created.
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# pvdisplay
"/dev/sdb1" is a new physical volume of "<2.00 GiB"
--- NEW Physical volume ---
PV Name           /dev/sdb1
VG Name
PV Size           <2.00 GiB
Allocatable       NO
PE Size           0
Total PE          0
Free PE           0
Allocated PE      0
PV UUID           4HYv0s-Ih9i-Mg46-L8Tc-xUDB-TFVu-82c6d6

"/dev/sdc1" is a new physical volume of "<2.00 GiB"
--- NEW Physical volume ---
PV Name           /dev/sdc1
VG Name
PV Size           <2.00 GiB
Allocatable       NO
PE Size           0
Total PE          0
Free PE           0
Allocated PE      0
PV UUID           T2oFSS-fVde-0ULh-RCFS-zS1h-n96g-2rSIqf

[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]#
```

Створимо нову групу томів:

[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# vgcreate newvg /dev/sdb1 /dev/sdc1

Volume group "newvg" successfully created

[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]#

[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# vgdisplay

--- Volume group ---

VG Name

newvg

System ID

Format

lvm2

Metadata Areas

2

Metadata Sequence No

1

VG Access

read/write

VG Status

resizable

MAX LV

0

Cur LV

0

Open LV

0

Max PV

0

Cur PV

2

Act PV

2

VG Size

3.99 GiB

PE Size

4.00 MiB

Total PE

1022

Alloc PE / Size

0 / 0

Free PE / Size

1022 / 3.99 GiB

VG UUID

5Ppiv3-qXh6-QZEu-0qDe-Wyap-jkZM-rxNA90

[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]#



Створимо логічні томи у групі newvg:

```
--- NEW Physical volume ---
PV Name           /dev/sdc1
VG Name
PV Size           <2.00 GiB
Allocatable       NO
PE Size           0
Total PE          0
Free PE           0
Allocated PE       0
PV UUID           T2oFSS-fVde-0ULh-RCFS-zS1h-n96g-2rSIqf

[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# vgcreate newvg /dev/sdb1 /dev/sdc1
Volume group "newvg" successfully created
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# lvcreate -n logvol1 -L 1G newvg
Logical volume "logvol1" created.
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# lvcreate -n mytestvol -L 2G newvg
Logical volume "mytestvol" created.
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]#

[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# lvdisplay newvg
--- Logical volume ---
LV Path            /dev/newvg/logvol1
LV Name            logvol1
VG Name            newvg
LV UUID            0dq8aT-M7g7-f6Wr-56oY-35UC-c9Rq-ifi9Y3
LV Write Access     read/write
LV Creation host, time bohdan-pylypchenko-kv41mn-cloud-computing, 2024-12-22 20:21:27 +0000
LV Status           available
# open              0
LV Size            1.00 GiB
Current LE          256
Segments            1
Allocation          inherit
Read ahead sectors  auto
- currently set to  256
Block device        254:0

--- Logical volume ---
LV Path            /dev/newvg/mytestvol
LV Name            mytestvol
VG Name            newvg
LV UUID            rp00g9-HXCL-8jKd-JLDm-xWqs-d00s-WzGU7f
LV Write Access     read/write
LV Creation host, time bohdan-pylypchenko-kv41mn-cloud-computing, 2024-12-22 20:21:39 +0000
LV Status           available
# open              0
LV Size            2.00 GiB
Current LE          512
Segments            2
Allocation          inherit
Read ahead sectors  auto
- currently set to  256
Block device        254:1

[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]#
```

Створення файлових систем на логічних томах:

CloudComputing on DESKTOP-RTTDK40

Dec 22 8:25 PM en

bohdan@bohdan-pylypchenko-kv41mn-cloud-computing:/home/bohdan

bohdan@bohdan-pylypchenko-kv41mn-cloud-computing:/home/bohdan

```
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# mkfs.ext4 /dev/newvg/logvol1
mke2fs 1.47.1 (20-May-2024)
Discarding device blocks: done
Creating filesystem with 262144 4k blocks and 65536 inodes
Filesystem UUID: c91d18a8-766e-4b34-8b17-35ed7bd1c656
Superblock backups stored on blocks:
    32768, 98304, 163840, 229376

Allocating group tables: done
Writing inode tables: done
Creating journal (8192 blocks): done
Writing superblocks and filesystem accounting information: done

[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]#

[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# mkfs.ext4 /dev/newvg/mytestvol
mke2fs 1.47.1 (20-May-2024)
Discarding device blocks: done
Creating filesystem with 524288 4k blocks and 131072 inodes
Filesystem UUID: 59151955-b77a-4f66-ac98-b4c55ec7e5f7
Superblock backups stored on blocks:
    32768, 98304, 163840, 229376, 294912

Allocating group tables: done
Writing inode tables: done
Creating journal (16384 blocks): done
Writing superblocks and filesystem accounting information: done

[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]#
```

Монтування новостворених файлових систем на логічних томах:

```
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# mkdir /mnt/data1
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# mount /dev/newvg/logvol1 /mnt/data1
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# df -h
Filesystem                Size      Used Avail Use% Mounted on
dev                        2.0G         0   2.0G   0% /dev
run                        2.0G    856K   2.0G   1% /run
efivarfs                  128M     16K   128M   1% /sys/firmware/efi/efivars
/dev/sda2                  126G    6.3G   119G   5% /
tmpfs                      2.0G         0   2.0G   0% /dev/shm
tmpfs                      2.0G     16K   2.0G   1% /tmp
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-journald.service
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-network-generator.service
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-udev-load-credentials.service
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-sysctl.service
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-tmpfiles-setup-dev-early.service
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-tmpfiles-setup-dev.service
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-networkd.service
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-vconsole-setup.service
/dev/sda1                 1022M    145M   878M  15% /boot
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-tmpfiles-setup.service
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-resolved.service
tmpfs                     392M    128K   392M   1% /run/user/1000
/dev/mapper/newvg-logvol1   974M    280K   906M   1% /mnt/data1
/dev/mapper/newvg-mytestvol 2.0G    536K    1.8G   1% /mnt/data2
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]#
```

```
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# mkdir /mnt/data2
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# mount /dev/newvg/mytestvol /mnt/data2
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# df -h
Filesystem                Size      Used Avail Use% Mounted on
dev                        2.0G         0   2.0G   0% /dev
run                        2.0G    856K   2.0G   1% /run
efivarfs                  128M     16K   128M   1% /sys/firmware/efi/efivars
/dev/sda2                  126G    6.3G   119G   5% /
tmpfs                      2.0G         0   2.0G   0% /dev/shm
tmpfs                      2.0G     16K   2.0G   1% /tmp
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-journald.service
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-network-generator.service
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-udev-load-credentials.service
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-sysctl.service
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-tmpfiles-setup-dev-early.service
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-tmpfiles-setup-dev.service
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-networkd.service
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-vconsole-setup.service
/dev/sda1                 1022M    145M   878M  15% /boot
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-tmpfiles-setup.service
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-resolved.service
tmpfs                     392M    128K   392M   1% /run/user/1000
/dev/mapper/newvg-logvol1   974M    280K   906M   1% /mnt/data1
/dev/mapper/newvg-mytestvol 2.0G    536K    1.8G   1% /mnt/data2
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]#
```

Запис тестових даних:

```
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# dd if=/dev/random of=/mnt/data1/test-file-1 bs=1M count=100
100+0 records in
100+0 records out
104857600 bytes (105 MB, 100 MiB) copied, 0.317673 s, 330 MB/s
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# ls /mnt/data1
lost+found test-file-1
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]#
```

```
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# dd if=/dev/random of=/mnt/data2/test-file-2 bs=1M count=100
100+0 records in
100+0 records out
104857600 bytes (105 MB, 100 MiB) copied, 0.31352 s, 334 MB/s
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# ls /mnt/data2
lost+found test-file-2
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]#
```

Збільшення розміру тому logvol1:

```
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# lvresize --resizefs --size +512M /dev/newvg/logvol1
Size of logical volume newvg/logvol1 changed from 1.00 GiB (256 extents) to 1.50 GiB (384 extents).
File system ext4 found on newvg/logvol1 mounted at /mnt/data1.
Extending file system ext4 to 1.50 GiB (1610612736 bytes) on newvg/logvol1...
resize2fs /dev/newvg/logvol1
resize2fs 1.47.1 (20-May-2024)
Filesystem at /dev/newvg/logvol1 is mounted on /mnt/data1; on-line resizing required
old_desc_blocks = 1, new_desc_blocks = 1
The filesystem on /dev/newvg/logvol1 is now 393216 (4k) blocks long.

resize2fs done
Extended file system ext4 on newvg/logvol1.
Logical volume newvg/logvol1 successfully resized.
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# df -h
Filesystem                Size      Used Avail Use% Mounted on
dev                        2.0G         0   2.0G   0% /dev
run                        2.0G    856K   2.0G   1% /run
efivarfs                  128M     16K   128M   1% /sys/firmware/efi/efivars
/dev/sda2                  126G    6.3G   119G   5% /
tmpfs                      2.0G         0   2.0G   0% /dev/shm
tmpfs                      2.0G     16K   2.0G   1% /tmp
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-journald.service
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-network-generator.service
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-udev-load-credentials.service
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-sysctl.service
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-tmpfiles-setup-dev-early.service
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-tmpfiles-setup-dev.service
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-networkd.service
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-vconsole-setup.service
/dev/sda1                 1022M    145M   878M  15% /boot
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-tmpfiles-setup.service
tmpfs                      1.0M         0   1.0M   0% /run/credentials/systemd-resolved.service
tmpfs                     392M    128K   392M   1% /run/user/1000
/dev/mapper/newvg-logvol1   1.5G    101M    1.3G   8% /mnt/data1
/dev/mapper/newvg-mytestvol 2.0G    101M    1.7G   6% /mnt/data2
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]#
```

Зменшення розміру тому logvol1:

```
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# lvresize --resizefs --size -512M /dev/newvg/logvol1
File system ext4 found on newvg/logvol1 mounted at /mnt/data1.
File system size (1.50 GiB) is larger than the requested size (1.00 GiB).
File system reduce is required using resize2fs.
File system unmount is needed for reduce.
File system fsck will be run before reduce.
Continue with ext4 file system reduce steps: unmount, fsck, resize2fs? [y/n]:y
Reducing file system ext4 to 1.00 GiB (1073741824 bytes) on newvg/logvol1...
unmount /mnt/data1
unmount done
e2fsck /dev/newvg/logvol1
/dev/newvg/logvol1: 13/98304 files (7.7% non-contiguous), 40804/393216 blocks
e2fsck done
resize2fs /dev/newvg/logvol1 1048576k
resize2fs 1.47.1 (20-May-2024)
Resizing the filesystem on /dev/newvg/logvol1 to 262144 (4k) blocks.
The filesystem on /dev/newvg/logvol1 is now 262144 (4k) blocks long.

resize2fs done
remount /dev/newvg/logvol1 /mnt/data1
remount done
Reduced file system ext4 on newvg/logvol1.
Size of logical volume newvg/logvol1 changed from 1.50 GiB (384 extents) to 1.00 GiB (256 extents).
Logical volume newvg/logvol1 successfully resized.
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# df -h
Filesystem      Size  Used Avail Use% Mounted on
dev              2.0G   0    2.0G   0% /dev
run              2.0G  856K   2.0G   1% /run
efivarfs         128M   16K   128M   1% /sys/firmware/efi/efivars
/dev/sda2        126G   6.3G   119G   5% /
tmpfs             2.0G   0    2.0G   0% /dev/shm
tmpfs             2.0G   16K    2.0G   1% /tmp
tmpfs             1.0M   0    1.0M   0% /run/credentials/systemd-journald.service
tmpfs             1.0M   0    1.0M   0% /run/credentials/systemd-network-generator.service
tmpfs             1.0M   0    1.0M   0% /run/credentials/systemd-udev-load-credentials.service
tmpfs             1.0M   0    1.0M   0% /run/credentials/systemd-sysctl.service
tmpfs             1.0M   0    1.0M   0% /run/credentials/systemd-tmpfiles-setup-dev-early.service
tmpfs             1.0M   0    1.0M   0% /run/credentials/systemd-tmpfiles-setup-dev.service
tmpfs             1.0M   0    1.0M   0% /run/credentials/systemd-networkd.service
tmpfs             1.0M   0    1.0M   0% /run/credentials/systemd-vconsole-setup.service
/dev/sda1        1022M  145M   878M  15% /boot
tmpfs             1.0M   0    1.0M   0% /run/credentials/systemd-tmpfiles-setup.service
tmpfs             1.0M   0    1.0M   0% /run/credentials/systemd-resolved.service
tmpfs             392M  128K   392M   1% /run/user/1000
/dev/mapper/newvg-mytestvol 2.0G  101M   1.7G   6% /mnt/data2
/dev/mapper/newvg-logvol1   974M  101M   810M  12% /mnt/data1
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]#
```

Видалення логічних томів, групи, фізичних томів:

```
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# umount /mnt/data1
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# umount /mnt/data2
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# df -h
Filesystem      Size  Used Avail Use% Mounted on
dev              2.0G   0    2.0G   0% /dev
run              2.0G  856K   2.0G   1% /run
efivarfs         128M   16K   128M   1% /sys/firmware/efi/efivars
/dev/sda2        126G   6.3G   119G   5% /
tmpfs             2.0G   0    2.0G   0% /dev/shm
tmpfs             2.0G   16K    2.0G   1% /tmp
tmpfs             1.0M   0    1.0M   0% /run/credentials/systemd-journald.service
tmpfs             1.0M   0    1.0M   0% /run/credentials/systemd-network-generator.service
tmpfs             1.0M   0    1.0M   0% /run/credentials/systemd-udev-load-credentials.service
tmpfs             1.0M   0    1.0M   0% /run/credentials/systemd-sysctl.service
tmpfs             1.0M   0    1.0M   0% /run/credentials/systemd-tmpfiles-setup-dev-early.service
tmpfs             1.0M   0    1.0M   0% /run/credentials/systemd-tmpfiles-setup-dev.service
tmpfs             1.0M   0    1.0M   0% /run/credentials/systemd-networkd.service
tmpfs             1.0M   0    1.0M   0% /run/credentials/systemd-vconsole-setup.service
/dev/sda1        1022M  145M   878M  15% /boot
tmpfs             1.0M   0    1.0M   0% /run/credentials/systemd-tmpfiles-setup.service
tmpfs             1.0M   0    1.0M   0% /run/credentials/systemd-resolved.service
tmpfs             392M  128K   392M   1% /run/user/1000
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# lvremove logvol1 mytestvol
Volume group "logvol1" not found
Cannot process volume group logvol1
Volume group "mytestvol" not found
Cannot process volume group mytestvol
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# lvremove newvg
Do you really want to remove active logical volume newvg/logvol1? [y/n]: y
Logical volume "logvol1" successfully removed.
Do you really want to remove active logical volume newvg/mytestvol? [y/n]: y
Logical volume "mytestvol" successfully removed.
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# vgremove newvg
Volume group "newvg" successfully removed
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]# pvremove /dev/sdb1 /dev/sdc1
Labels on physical volume "/dev/sdb1" successfully wiped.
Labels on physical volume "/dev/sdc1" successfully wiped.
[root@bohdan-pylypchenko-kv41mn-cloud-computing bohdan]#
```