

Desafío 5

Creación de Volúmenes Lógicos y RAIDs en Linux

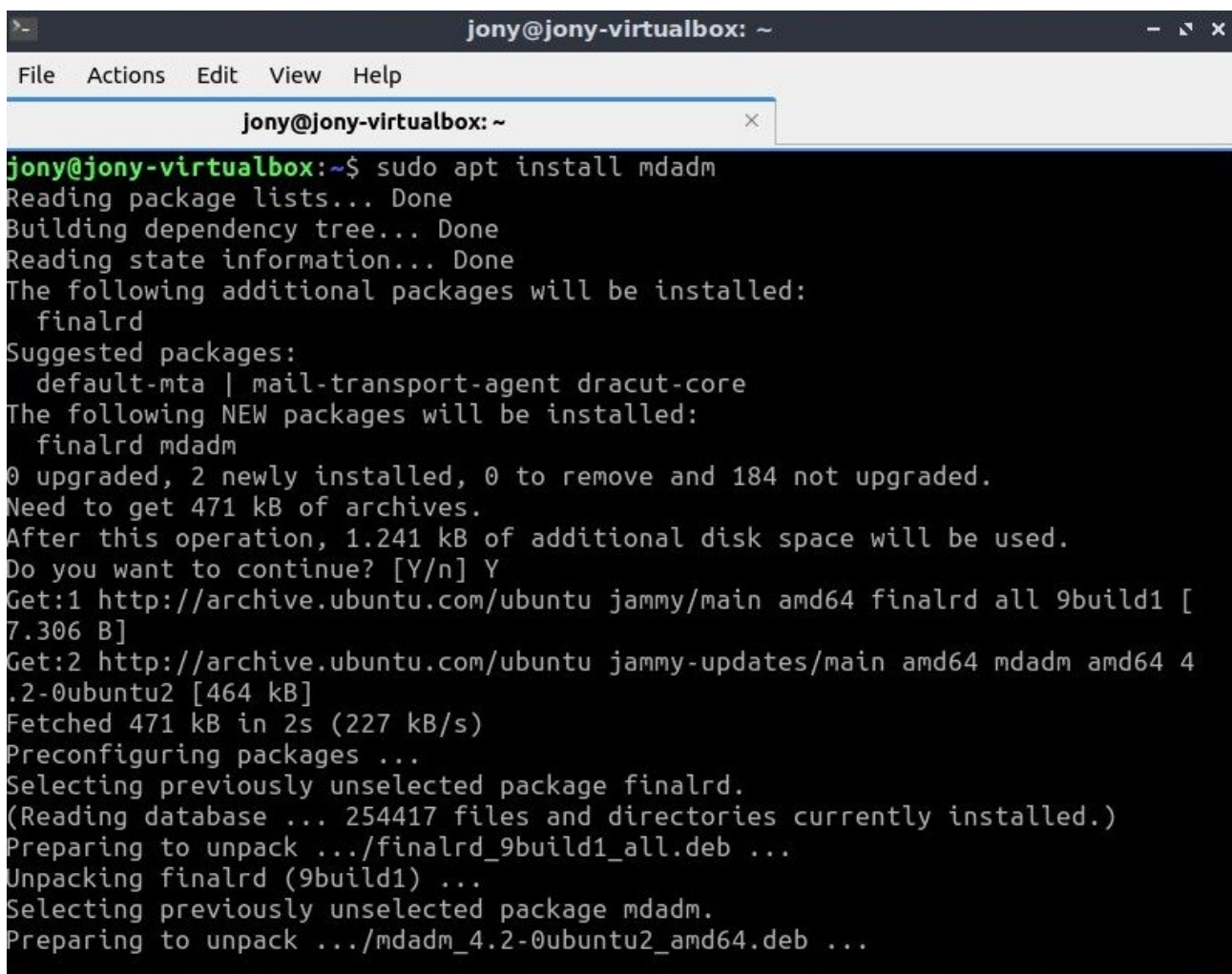
Objetivo:

Configurar volúmenes lógicos (LVM) y RAIDs en un sistema Ubuntu. La práctica cubrirá la creación de un RAID 1 para redundancia y la configuración de un volumen lógico para la gestión flexible del almacenamiento.

1. Instalar mdadm

```
sudo apt update
```

```
sudo apt install mdadm
```



```
jony@jony-virtualbox: ~  
File Actions Edit View Help  
jony@jony-virtualbox: ~  
jony@jony-virtualbox:~$ sudo apt install mdadm  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
The following additional packages will be installed:  
  finalrd  
Suggested packages:  
  default-mta | mail-transport-agent dracut-core  
The following NEW packages will be installed:  
  finalrd mdadm  
0 upgraded, 2 newly installed, 0 to remove and 184 not upgraded.  
Need to get 471 kB of archives.  
After this operation, 1.241 kB of additional disk space will be used.  
Do you want to continue? [Y/n] Y  
Get:1 http://archive.ubuntu.com/ubuntu jammy/main amd64 finalrd all 9build1 [7.306 B]  
Get:2 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 mdadm amd64 4.2-0ubuntu2 [464 kB]  
Fetched 471 kB in 2s (227 kB/s)  
Preconfiguring packages ...  
Selecting previously unselected package finalrd.  
(Reading database ... 254417 files and directories currently installed.)  
Preparing to unpack .../finalrd_9build1_all.deb ...  
Unpacking finalrd (9build1) ...  
Selecting previously unselected package mdadm.  
Preparing to unpack .../mdadm_4.2-0ubuntu2_amd64.deb ...
```

2. Crear el RAID 1

Se usa `mdadm` para crear un RAID 1 con los dos discos:

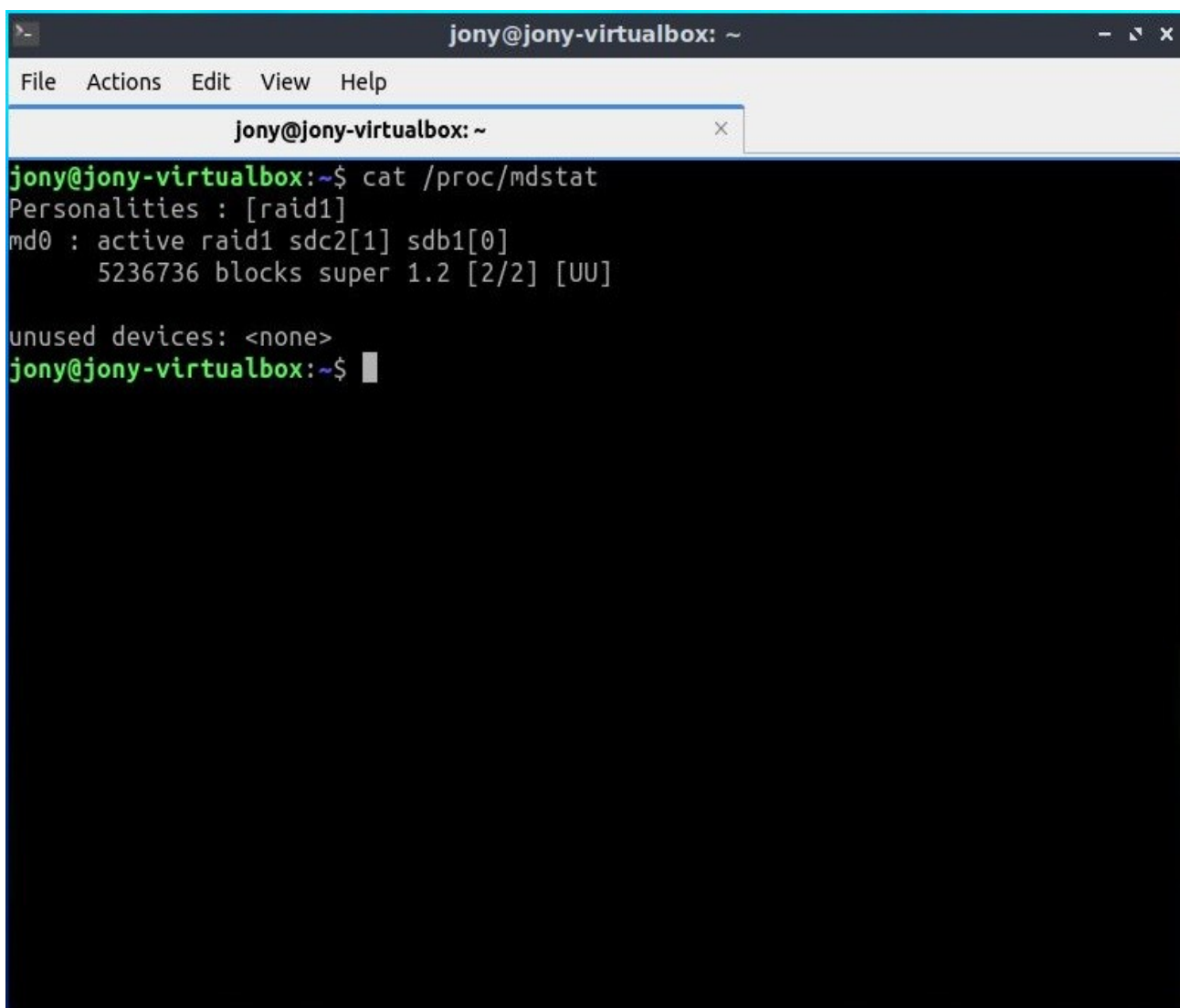
```
sudo mdadm --create --verbose /dev/md0 --level=1 --raid-devices=2 /dev/sdb1  
/dev/sdc1
```

3. Verificar el RAID

Comprobar el estado del RAID:

```
cat /proc/mdstat
```

```
sudo mdadm --detail /dev/md0
```

A screenshot of a terminal window titled 'jony@jony-virtualbox: ~'. The window has a menu bar with 'File', 'Actions', 'Edit', 'View', and 'Help'. Below the menu bar is a tab labeled 'jony@jony-virtualbox: ~'. The terminal content shows the command 'cat /proc/mdstat' being executed. The output is: 'Personalities : [raid1]', 'md0 : active raid1 sdc2[1] sdb1[0]', '5236736 blocks super 1.2 [2/2] [UU]', and 'unused devices: <none>'. The prompt 'jony@jony-virtualbox:~\$' is visible at the bottom.

```
jony@jony-virtualbox: ~  
File Actions Edit View Help  
jony@jony-virtualbox: ~  
jony@jony-virtualbox:~$ cat /proc/mdstat  
Personalities : [raid1]  
md0 : active raid1 sdc2[1] sdb1[0]  
      5236736 blocks super 1.2 [2/2] [UU]  
  
unused devices: <none>  
jony@jony-virtualbox:~$
```

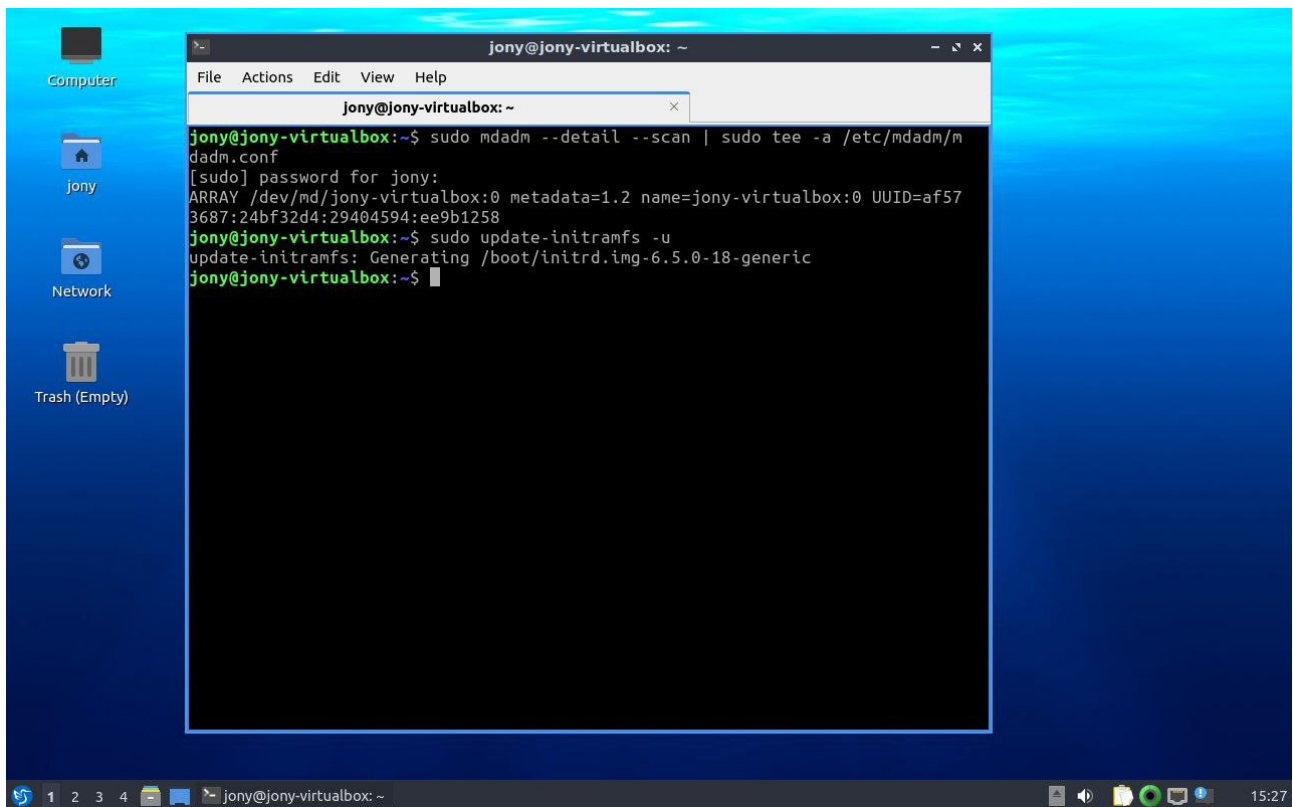
```
jony@jony-virtualbox: ~  
File Actions Edit View Help  
jony@jony-virtualbox: ~  
jony@jony-virtualbox:~$ sudo mdadm --detail /dev/md0  
[sudo] password for jony:  
/dev/md0:  
    Version : 1.2  
    Creation Time : Thu Jul 25 16:00:32 2024  
    Raid Level : raid1  
    Array Size : 5236736 (4.99 GiB 5.36 GB)  
    Used Dev Size : 5236736 (4.99 GiB 5.36 GB)  
    Raid Devices : 2  
    Total Devices : 2  
    Persistence : Superblock is persistent  
  
    Update Time : Thu Jul 25 16:00:59 2024  
    State : clean  
    Active Devices : 2  
    Working Devices : 2  
    Failed Devices : 0  
    Spare Devices : 0  
  
Consistency Policy : resync  
  
    Name : jony-virtualbox:0 (local to host jony-virtualbox)  
    UUID : af573687:24bf32d4:29404594:ee9b1258  
    Events : 17  
  
    Number Major Minor RaidDevice State  
      0      8     17        0    active sync  /dev/sdb1  
      1      8     34        1    active sync  /dev/sdc2  
jony@jony-virtualbox:~$
```

4. Configurar el RAID para que se Inicie Automáticamente

Guardar la configuración del RAID:

```
sudo mdadm --detail --scan | sudo tee -a /etc/mdadm/mdadm.conf
```

```
sudo update-initramfs -u
```



Configuración de Volúmenes Lógicos con LVM

1. Crear Volúmenes Físicos (PV)

```
sudo pvcreate /dev/md127
```

```
jony@jony-virtualbox: ~  
Disk /dev/sdc: 5 GiB, 5368709120 bytes, 10485760 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: dos  
Disk identifier: 0xce336971  
  
Device      Boot Start      End  Sectors  Size Id Type  
/dev/sdc2    2048 10485759 10483712   5G 83 Linux  
  
Disk /dev/md127: 4,99 GiB, 5362417664 bytes, 10473472 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  
jony@jony-virtualbox:~$ cat /proc/mdstat  
Personalities : [raid1] [linear] [multipath] [raid0] [raid6] [raid5] [raid4]  
[raid10]  
md127 : active (auto-read-only) raid1 sdb1[0] sdc2[1]  
5236736 blocks super 1.2 [2/2] [UU]  
  
unused devices: <none>  
jony@jony-virtualbox:~$ sudo pvcreate /dev/md127  
Physical volume "/dev/md127" successfully created.  
jony@jony-virtualbox:~$
```

2. Crear un Grupo de Volúmenes (VG)

Crea un grupo de volúmenes llamado vg_data:

```
sudo vgcreate vg_data /dev/md0
```

```
jony@jony-virtualbox: ~  
File Actions Edit View Help  
jony@jony-virtualbox: ~  
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: dos  
Disk identifier: 0xce336971  
  
Device      Boot Start      End  Sectors  Size Id Type  
/dev/sdc2    2048 10485759 10483712    5G 83 Linux  
  
Disk /dev/md127: 4,99 GiB, 5362417664 bytes, 10473472 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  
jony@jony-virtualbox:~$ cat /proc/mdstat  
Personalities : [raid1] [linear] [multipath] [raid0] [raid6] [raid5] [raid4]  
[raid10]  
md127 : active (auto-read-only) raid1 sdb1[0] sdc2[1]  
5236736 blocks super 1.2 [2/2] [UU]  
  
unused devices: <none>  
jony@jony-virtualbox:~$ sudo pvcreate /dev/md127  
Physical volume "/dev/md127" successfully created.  
jony@jony-virtualbox:~$ sudo vgcreate vg_data /dev/md127  
Volume group "vg_data" successfully created  
jony@jony-virtualbox:~$ █
```

3. Crear Volúmenes Lógicos (LV)

Crea un volumen lógico llamado `lv_data` dentro del grupo de volúmenes `vg_data`:

```
sudo lvcreate -n lv_data -l 100%FREE vg_data
```



```
jony@jony-virtualbox: ~  
File Actions Edit View Help  
jony@jony-virtualbox: ~  
Device Boot Start End Sectors Size Id Type  
/dev/sdc2 2048 10485759 10483712 5G 83 Linux  
  
Disk /dev/md127: 4,99 GiB, 5362417664 bytes, 10473472 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  
jony@jony-virtualbox:~$ cat /proc/mdstat  
Personalities : [raid1] [linear] [multipath] [raid0] [raid6] [raid5] [raid4]  
[raid10]  
md127 : active (auto-read-only) raid1 sdb1[0] sdc2[1]  
5236736 blocks super 1.2 [2/2] [UU]  
  
unused devices: <none>  
jony@jony-virtualbox:~$ sudo pvcreate /dev/md127  
Physical volume "/dev/md127" successfully created.  
jony@jony-virtualbox:~$ sudo vgcreate vg_data /dev/md127  
Volume group "vg_data" successfully created  
jony@jony-virtualbox:~$ sudo lvcreate -n lv_data -l 100%FREE vg_data  
[sudo] password for jony:  
Volume group name expected (no slash)  
Run 'lvcreate --help' for more information.  
jony@jony-virtualbox:~$ sudo lvcreate -n lv_data -l 100%FREE vg_data  
Logical volume "lv_data" created.  
jony@jony-virtualbox:~$ █
```

4. Formatear y Montar el Volumen Lógico

Formatea el volumen lógico con el sistema de archivos ext4:

```
sudo mkfs.ext4 /dev/vg_data/lv_data
```

```
jony@jony-virtualbox:~$ sudo mkfs.ext4 /dev/vg_data/lv_data  
mke2fs 1.46.5 (30-Dec-2021)  
Creating filesystem with 1308672 4k blocks and 327680 inodes  
Filesystem UUID: 6d87d2b2-a397-4856-9159-cc6cebce75ca  
Superblock backups stored on blocks:  
32768, 98304, 163840, 229376, 294912, 819200, 884736  
  
Allocating group tables: done  
Writing inode tables: done  
Creating journal (16384 blocks): done  
Writing superblocks and filesystem accounting information: done  
  
jony@jony-virtualbox:~$ █
```

Crea un punto de montaje y monta el volumen lógico:

```
sudo mkdir /mnt/data
```

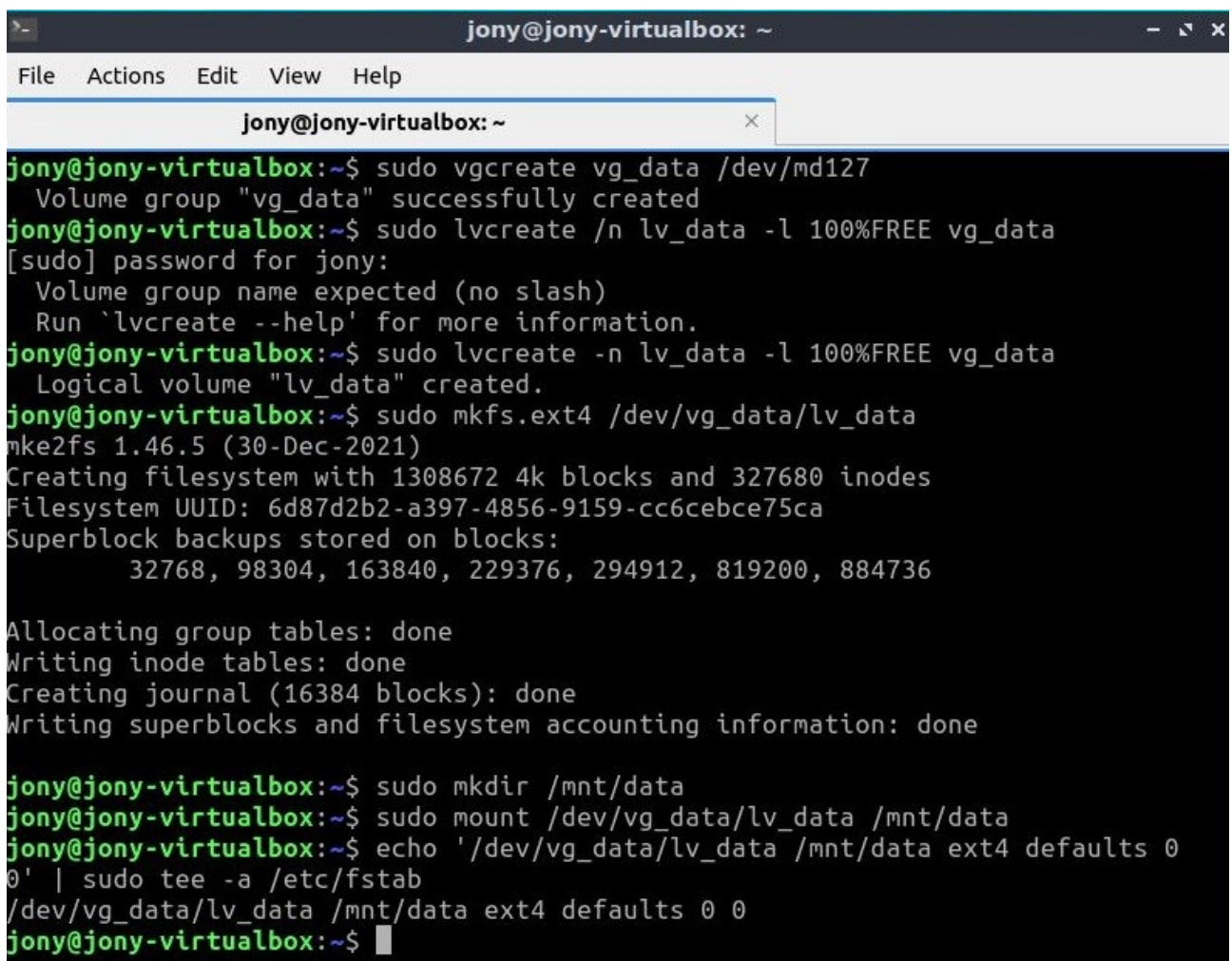
```
sudo mount /dev/vg_data/lv_data /mnt/data
```

```
jony@jony-virtualbox:~$ sudo mkdir /mnt/data
jony@jony-virtualbox:~$ sudo mount /dev/vg_data/lv_data /mnt/data
jony@jony-virtualbox:~$ █
```

5. Configurar el Montaje Automático

Añade el volumen lógico a `/etc/fstab` para que se monte automáticamente al iniciar el sistema:

```
echo '/dev/vg_data/lv_data /mnt/data ext4 defaults 0 0' | sudo tee -a /etc/fstab
```



```
jony@jony-virtualbox: ~
File Actions Edit View Help
jony@jony-virtualbox: ~
jony@jony-virtualbox:~$ sudo vgcreate vg_data /dev/md127
Volume group "vg_data" successfully created
jony@jony-virtualbox:~$ sudo lvcreate /n lv_data -l 100%FREE vg_data
[sudo] password for jony:
Volume group name expected (no slash)
Run `lvcreate --help' for more information.
jony@jony-virtualbox:~$ sudo lvcreate -n lv_data -l 100%FREE vg_data
Logical volume "lv_data" created.
jony@jony-virtualbox:~$ sudo mkfs.ext4 /dev/vg_data/lv_data
mke2fs 1.46.5 (30-Dec-2021)
Creating filesystem with 1308672 4k blocks and 327680 inodes
Filesystem UUID: 6d87d2b2-a397-4856-9159-cc6cebce75ca
Superblock backups stored on blocks:
    32768, 98304, 163840, 229376, 294912, 819200, 884736

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

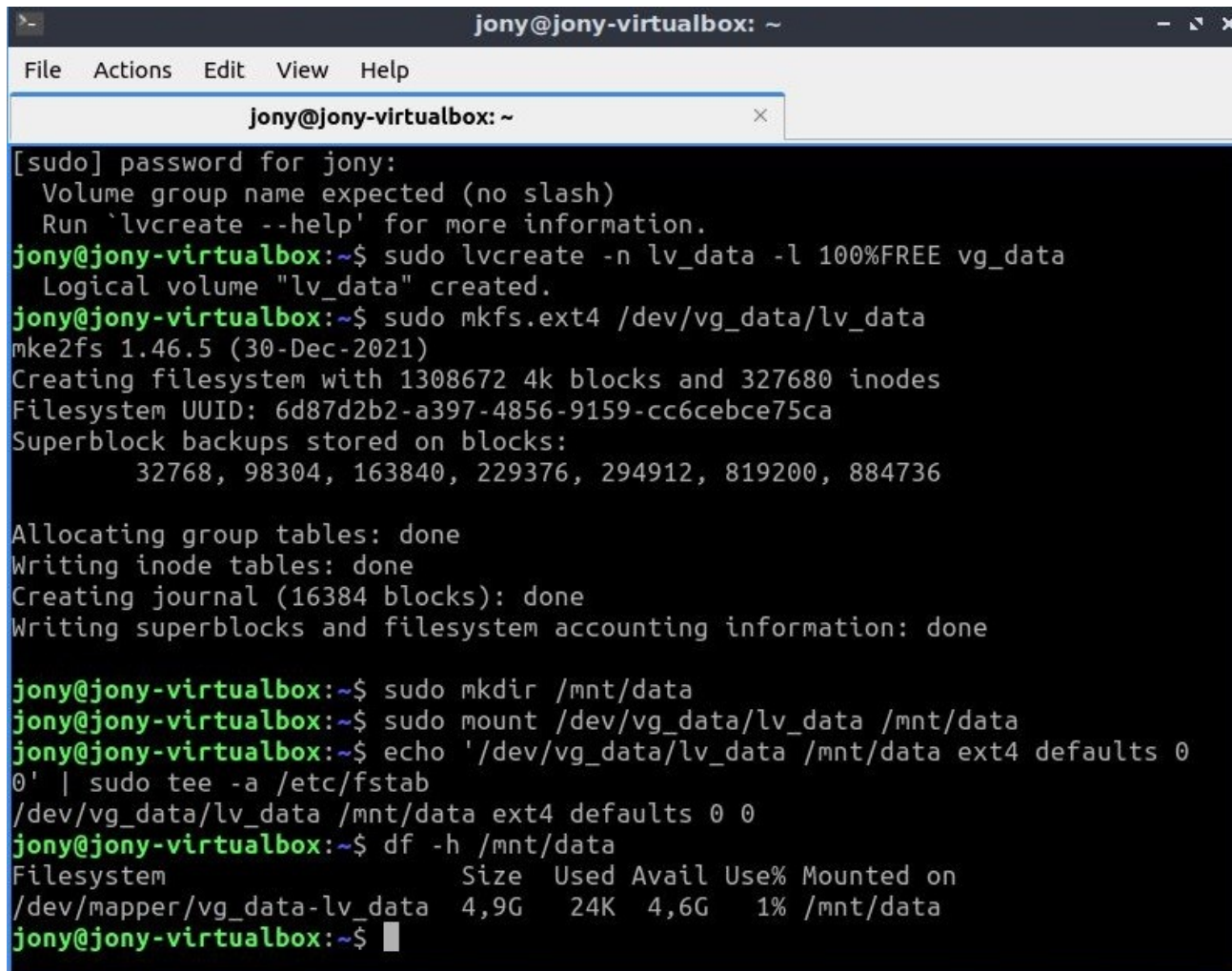
jony@jony-virtualbox:~$ sudo mkdir /mnt/data
jony@jony-virtualbox:~$ sudo mount /dev/vg_data/lv_data /mnt/data
jony@jony-virtualbox:~$ echo '/dev/vg_data/lv_data /mnt/data ext4 defaults 0
0' | sudo tee -a /etc/fstab
/dev/vg_data/lv_data /mnt/data ext4 defaults 0 0
jony@jony-virtualbox:~$ █
```

Verificación y Simulación de Recuperación Ante Fallos

1. Verificar el Volumen Lógico y RAID

Verifica que el volumen lógico está montado correctamente:

```
df -h /mnt/data
```



The screenshot shows a terminal window titled 'jony@jony-virtualbox: ~'. The user runs several commands to create and mount a logical volume. First, they run 'sudo lvcreate -n lv_data -l 100%FREE vg_data', which creates the logical volume. Then, they run 'sudo mkfs.ext4 /dev/vg_data/lv_data', which creates an ext4 filesystem on the logical volume. Next, they run 'sudo mkdir /mnt/data' to create the mount point. Then, they run 'sudo mount /dev/vg_data/lv_data /mnt/data' to mount the logical volume. Finally, they run 'df -h /mnt/data' to check the disk usage, which shows that the filesystem is mounted correctly with a size of 4.9G and 24K used space.

```
jony@jony-virtualbox: ~  
[sudo] password for jony:  
Volume group name expected (no slash)  
Run `lvcreate --help` for more information.  
jony@jony-virtualbox:~$ sudo lvcreate -n lv_data -l 100%FREE vg_data  
Logical volume "lv_data" created.  
jony@jony-virtualbox:~$ sudo mkfs.ext4 /dev/vg_data/lv_data  
mke2fs 1.46.5 (30-Dec-2021)  
Creating filesystem with 1308672 4k blocks and 327680 inodes  
Filesystem UUID: 6d87d2b2-a397-4856-9159-cc6cebce75ca  
Superblock backups stored on blocks:  
        32768, 98304, 163840, 229376, 294912, 819200, 884736  
  
Allocating group tables: done  
Writing inode tables: done  
Creating journal (16384 blocks): done  
Writing superblocks and filesystem accounting information: done  
  
jony@jony-virtualbox:~$ sudo mkdir /mnt/data  
jony@jony-virtualbox:~$ sudo mount /dev/vg_data/lv_data /mnt/data  
jony@jony-virtualbox:~$ echo '/dev/vg_data/lv_data /mnt/data ext4 defaults 0  
0' | sudo tee -a /etc/fstab  
/dev/vg_data/lv_data /mnt/data ext4 defaults 0 0  
jony@jony-virtualbox:~$ df -h /mnt/data  
Filesystem                Size      Used Avail Use% Mounted on  
/dev/mapper/vg_data-lv_data 4,9G       24K    4,6G   1% /mnt/data  
jony@jony-virtualbox:~$
```

Comprueba el estado del RAID:

```
sudo mdadm --detail /dev/md127
```

```
jony@jony-virtualbox: ~  
File Actions Edit View Help  
jony@jony-virtualbox: ~  
jony@jony-virtualbox:~$ sudo mdadm --detail /dev/md127  
/dev/md127:  
    Version : 1.2  
    Creation Time : Thu Jul 25 16:00:32 2024  
    Raid Level : raid1  
    Array Size : 5236736 (4.99 GiB 5.36 GB)  
    Used Dev Size : 5236736 (4.99 GiB 5.36 GB)  
    Raid Devices : 2  
    Total Devices : 2  
    Persistence : Superblock is persistent  
  
    Update Time : Sat Jul 27 12:25:48 2024  
    State : clean  
    Active Devices : 2  
    Working Devices : 2  
    Failed Devices : 0  
    Spare Devices : 0  
  
Consistency Policy : resync  
  
    Name : jony-virtualbox:0 (local to host jony-virtualbox)  
    UUID : af573687:24bf32d4:29404594:ee9b1258  
    Events : 19  
  
    Number  Major  Minor  RaidDevice State  
      0         8      17         0  active sync  /dev/sdb1
```

2. Simular un Fallo de Disco

Simula un fallo en uno de los discos del RAID:

```
sudo mdadm /dev/md0 --fail /dev/sdb1
```

```
sudo mdadm /dev/md0 --remove /dev/sdb1
```

```
jony@jony-virtualbox: ~  
File Actions Edit View Help  
jony@jony-virtualbox: ~  
Used Dev Size : 5236736 (4.99 GiB 5.36 GB)  
Raid Devices : 2  
Total Devices : 2  
Persistence : Superblock is persistent  
  
Update Time : Sat Jul 27 12:25:48 2024  
State : clean  
Active Devices : 2  
Working Devices : 2  
Failed Devices : 0  
Spare Devices : 0  
  
Consistency Policy : resync  
  
Name : jony-virtualbox:0 (local to host jony-virtualbox)  
UUID : af573687:24bf32d4:29404594:ee9b1258  
Events : 19  
  
Number Major Minor RaidDevice State  
0 8 17 0 active sync /dev/sdb1  
1 8 34 1 active sync /dev/sdc2  
jony@jony-virtualbox:~$ sudo mdadm /dev/md127 --fail /dev/sdb1  
mdadm: set /dev/sdb1 faulty in /dev/md127  
jony@jony-virtualbox:~$ sudo mdadm /dev/md127 --remove /dev/sdb1  
mdadm: hot removed /dev/sdb1 from /dev/md127  
jony@jony-virtualbox:~$
```

3. Reemplazar el Disco Fallido

Supón que reemplazas el disco fallido con uno nuevo (por ejemplo, /dev/sdd).

Crea una nueva partición en el disco nuevo y añadir el nuevo disco al RAID:

```
sudo mdadm /dev/md0 --add /dev/sdd1
```

```
jony@jony-virtualbox: ~  
File Actions Edit View Help  
jony@jony-virtualbox: ~  
jony@jony-virtualbox:~$ sudo mdadm /dev/md127 --add /dev/sdd1  
mdadm: added /dev/sdd1  
jony@jony-virtualbox:~$
```

4. Verificar la Recuperación del RAID

Verifica que el RAID está reconstruyéndose:

```
sudo mdadm --detail /dev/md127
```

```
jony@jony-virtualbox: ~  
File Actions Edit View Help  
jony@jony-virtualbox: ~  
unused devices: <none>  
jony@jony-virtualbox:~$ sudo mdadm --detail /dev/md127  
/dev/md127:  
    Version : 1.2  
    Creation Time : Thu Jul 25 16:00:32 2024  
    Raid Level : raid1  
    Array Size : 5236736 (4.99 GiB 5.36 GB)  
    Used Dev Size : 5236736 (4.99 GiB 5.36 GB)  
    Raid Devices : 2  
    Total Devices : 2  
    Persistence : Superblock is persistent  
  
    Update Time : Sat Jul 27 12:41:31 2024  
    State : clean  
    Active Devices : 2  
    Working Devices : 2  
    Failed Devices : 0  
    Spare Devices : 0  
  
Consistency Policy : resync  
  
    Name : jony-virtualbox:0 (local to host jony-virtualbox)  
    UUID : af573687:24bf32d4:29404594:ee9b1258  
    Events : 43  
  
    Number  Major  Minor  RaidDevice State  
      2      8      49        0  active sync  /dev/sdd1  
      1      8      34        1  active sync  /dev/sdc2  
jony@jony-virtualbox:~$
```