

Tema 08: Tutorial de restauración y copias de seguridad

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6 de mayo de 2024

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1 Recetas relacionadas con backup del sistema

Vamos a ver algunas herramientas clásicas para backup y restauración. Hay muchas más que pueden reemplazar o complementar estas (**rsync**, **unison**...) o implementar soluciones integrales (**backula**...). Además existen distribuciones de GNU/Linux específicas para la recuperación de datos y sistemas.

[Definición de backup en Reddit](#)

[Día Internacional del Backup](#)

[No te olvides de poner el Where en el Delete From](#)

Monitorización discos

Nota: en mi sobremesa el disco se denomina `/dev/sda` mientras que en portátil es `/dev/nvme0`.

smartmontools

En Debian/Ubuntu:

```
sudo apt install smartmontools
sudo apt install gsmartcontrol # interfaz gráfica
```

En Windows: Descarga el instalador en <https://www.smartmontools.org/wiki/Download>

Activar la monitorización S.M.A.R.T.

```
sudo smartctl -s on
```

```
sudo smartctl -i /dev/nvme0
sudo smartctl -a /dev/nvme0
```

Ejemplo de salida:

```
$ sudo smartctl -i /dev/sda
smartctl 7.3 2022-02-28 r5338 [x86_64-linux-5.15.0-105-generic] (local build)
Copyright (C) 2002-22, Bruce Allen, Christian Franke, www.smartmontools.org

=== START OF INFORMATION SECTION ===
Model Family:      Samsung based SSDs
Device Model:      Samsung SSD 850 EVO 250GB
Serial Number:     S2R6NX0H557195R
LU WWN Device Id: 5 002538 d40e92f96
Firmware Version:  EMT02B6Q
User Capacity:     250.059.350.016 bytes [250 GB]
Sector Size:       512 bytes logical/physical
Rotation Rate:     Solid State Device
Form Factor:       2.5 inches
TRIM Command:      Available
Device is:         In smartctl database 7.3/5319
ATA Version is:    ACS-2, ATA8-ACS T13/1699-D revision 4c
SATA Version is:   SATA 3.1, 6.0 Gb/s (current: 6.0 Gb/s)
Local Time is:     Mon May 6 11:27:30 2024 CEST
SMART support is:  Available - device has SMART capability.
SMART support is:  Enabled
```

Test:

```
sudo smartctl -t short /dev/nvme0
sudo smartctl -t long /dev/nvme0
```

Ejemplo de salida:

```
sudo smartctl -t short /dev/sda
smartctl 7.3 2022-02-28 r5338 [x86_64-linux-5.15.0-105-generic] (local build)
Copyright (C) 2002-22, Bruce Allen, Christian Franke, www.smartmontools.org

=== START OF OFFLINE IMMEDIATE AND SELF-TEST SECTION ===
Sending command: "Execute SMART Short self-test routine immediately in off-line mode".
Drive command "Execute SMART Short self-test routine immediately in off-line mode" successful.
Testing has begun.
Please wait 2 minutes for test to complete.
Test will complete after Mon May  6 11:30:59 2024 CEST
Use smartctl -X to abort test.
```

Después de que terminen (pueden ser horas para el largo):

```
sudo smartctl -l selftest -a /dev/nvme0|grep test
SMART overall-health self-assessment test result: PASSED
```

Ejemplo de salida:

```
$ sudo smartctl -l selftest -a /dev/sda|grep test
SMART overall-health self-assessment test result: PASSED
Self-test execution status:      ( 244) Self-test routine in progress...
                               40% of test remaining.
                               Self-test supported.
                               No Conveyance Self-test supported.
                               Selective Self-test supported.

Short self-test routine
Extended self-test routine
SMART Self-test log structure revision number 1
SMART Selective self-test log data structure revision number 1
   1          0          0  Not_testing
   2          0          0  Not_testing
   3          0          0  Not_testing
   4          0          0  Not_testing
   5          0          0  Not_testing
Selective self-test flags (0x0):
```

```

If Selective self-test is pending on power-up, resume after 0 minute delay.
...
$ sudo smartctl -l selftest -a /dev/sda|grep test
SMART overall-health self-assessment test result: PASSED
Self-test execution status:      (  0) The previous self-test routine completed
                                without error or no self-test has ever
                                Self-test supported.
                                No Conveyance Self-test supported.
                                Selective Self-test supported.

Short self-test routine
Extended self-test routine
SMART Self-test log structure revision number 1
SMART Selective self-test log data structure revision number 1
   1          0          0  Not_testing
   2          0          0  Not_testing
   3          0          0  Not_testing
   4          0          0  Not_testing
   5          0          0  Not_testing
Selective self-test flags (0x0):
If Selective self-test is pending on power-up, resume after 0 minute delay.

```

La monitorización se puede automatizar a través del servicio `smartd`.

Soporte NVMe

En algunos discos `smartctl` puede no funcionar, en este caso podemos probar con las herramientas específicas para tipos de SSD:

```

sudo apt install nvme-cli
sudo nvme smart-log /dev/nvme0

```

Backup y recuperación

Comando tar

Creación de ficheros de backup:

```
tar cvf backup.tar /home
```

Opciones:

- c: Crea el archivo
- v: Muestra información del proceso
- f: Nombre del fichero
- z: Añade compresión con `gzip`

Si olvidas indicar el fichero destino obtendrás un error *cobarde*.

```

pas@debian:~$ tar cf /home
tar: Rechazo cobarde a crear un archivo vacío
Pruebe 'tar --help' o 'tar --usage' para más información.
pas@debian:~$ jp2a chiquito.jpeg --height=30
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%WxK00X%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%N0ko'..lw%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%Kdxdc; ;0%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%Xkdll0o':Kw%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%W0xokc....,oK%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%Wk;.....k%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%K,... ..... 'N%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%d... .....0%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%MNKN:.. .....k%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%WKd;... ..l%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%WK;.. ...0%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%X000x... ;w%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%c .....0%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%d . .. c%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%0. .... ,lw%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%X,. .... ow%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%X' . .K%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%0.. ;. ..X%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%N.. lM0. .N%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%w,. cMmx. .w%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%;. oMml ,%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%:.. lMMmk :%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%:.. cMMmk l%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%w; cMMmk d%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%Kdc;lKXwMmw l .0%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%wd; .:dw%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%wK00XwWw%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

```

Podemos añadir información de la fecha y hora:

```
sudo mkdir -p /mnt/backup/  
sudo tar zcf /mnt/backup/$(date '+%Y-%m-%d-%H-%M-%S').tar.gz /home
```

Extraer todo el contenido:

```
tar xvzf backup.tar.gz
```

Extraer un fichero concreto (observa que hay que indicar la ruta con la que `tar` lo almacenó):

```
tar xvzf backup.tar.gz /backup/directory/file.txt
```

Listar el contenido:

```
tar ztvf backup.tar.gz
```

Se puede hacer muchas más cosas como buscar archivos, excluir carpetas/archivos, partir la copia en trozos, comprobar integridad, etc. más en:

- [Taming the tar command: Tips for managing backups in Linux](#) de RedHat.
- [TAR](#) en Ubuntu.

Copias incrementales con tar

Se puede elegir hacer copia de los ficheros cread/modificados en los últimos días, por ejemplo:

```
tar -N 2 -cvf backup.tar /home  
tar --newer-mtime="2023-05-06" -cvf backup.tar /home
```

Es posible usar `tar` para hacer copias incrementales utilizando las opciones: `* --listed-incremental=file`, o `-g file`, que permite especificar un archivo de *snapshot* incremental. `* --incremental` o `-G`, que permite analizar un backup incremental.

```
# Copia de nivel 0  
sudo tar -czf /mnt/backup/bkp0.tgz -g /mnt/backup/snapshot.snar /home/  
# Copia de nivel 1  
sudo tar -czf /mnt/backup/bkp1.tgz -g /mnt/backup/snapshot.snar /home/  
# Creamos un fichero y copia de nivel 2  
pas@debian:~$ fallocate --length 1M fichero  
pas@debian:~$ sudo tar -czf /mnt/backup/bkp2.tgz -g /mnt/backup/snapshot.snar /home/
```

```
tar: Eliminando la `/' inicial de los nombres
# La copia de nivel 2 es pequeña porque hemos creado un fichero vacío que se comprime fácilmente
pas@debian:~$ ls -lth /mnt/backup/
total 14M
-rw-r--r-- 1 root root  69K may  6 12:51 bkp2.tgz
-rw-r--r-- 1 root root 270K may  6 12:51 snapshot.snar
-rw-r--r-- 1 root root  67K may  6 12:49 bkp1.tgz
-rw-r--r-- 1 root root 14M may  6 12:49 bkp0.tgz
```

Ejercicio: ¿Cómo las restaurarías?

Más detalles en: * [TAR y los backups incrementales en GNU/Linux](#) * Guía oficial [Using tar to Perform Incremental Dumps](#)

dump y restore

```
sudo apt install -y dump
```

Comprobar estado copias:

```
$ /sbin/dump -W
Last dump(s) done (Dump '>' file systems):
/dev/sda1 ( / ) Last dump: never
/dev/sda6 ( /var) Last dump: never
/dev/sda7 ( /tmp) Last dump: never
/dev/md0 ( /home) Last dump: never
```

Realizar copia de nivel 0:

```
$ sudo /sbin/dump -Ou -f /mnt/backup/dump0 /home/
DUMP: Date of this level 0 dump: Mon May  6 12:55:37 2024
DUMP: Dumping /dev/md0 (/home) to /mnt/backup/dump0
DUMP: Label: none
DUMP: Writing 10 Kilobyte records
DUMP: mapping (Pass I) [regular files]
DUMP: mapping (Pass II) [directories]
DUMP: estimated 158815 blocks.
DUMP: Volume 1 started with block 1 at: Mon May  6 12:55:37 2024
DUMP: dumping (Pass III) [directories]
```

```
DUMP: dumping (Pass IV) [regular files]
DUMP: Closing /mnt/backup/dump0
DUMP: Volume 1 completed at: Mon May  6 12:55:38 2024
DUMP: Volume 1 159680 blocks (155.94MB)
DUMP: Volume 1 took 0:00:01
DUMP: Volume 1 transfer rate: 159680 kB/s
DUMP: 159680 blocks (155.94MB) on 1 volume(s)
DUMP: finished in 1 seconds, throughput 159680 kBytes/sec
DUMP: Date of this level 0 dump: Mon May  6 12:55:37 2024
DUMP: Date this dump completed: Mon May  6 12:55:38 2024
DUMP: Average transfer rate: 159680 kB/s
DUMP: DUMP IS DONE
```

Creamos un archivo y una copia de nivel 1:

```
wget https://sindominio.net/quique/Textos/netiquette.pdf
sudo /sbin/dump -1u -f /mnt/backup/dump1 /home/
```

Creamos una copia de nivel 2:

```
sudo /sbin/dump -2u -f /mnt/backup/dump2 /home/
```

Estas son nuestras copias:

```
$ ls -lht /mnt/backup/
total 157M
-rw-r--r-- 1 root root 100K may  6 12:57 dump2
-rw-r--r-- 1 root root 100K may  6 12:57 dump1
-rw-r--r-- 1 pas  pas 156M may  6 12:55 dump0
```

Listar el contenido de las copias con `restore`:

```
sudo restore -t -f /mnt/backup/dump0
sudo restore -t -f /mnt/backup/dump1
sudo restore -t -f /mnt/backup/dump2
```

Navegar por una copia:


```
sudo restore -i -f /mnt/backup/dump1
```

Restaurar por niveles (sobre la carpeta original):

```
# Nivel 0
cd /home
sudo restore -rf /mnt/backup/dump0
# Nivel 1, ahora aparece el fichero netiquette.pdf
sudo restore -rf /mnt/backup/dump1
# Nivel 2
sudo restore -rf /mnt/backup/dump2
```

Automatizar las copias por niveles

Ejercicio.

- Escribir un `crontab` que automatice copias de nivel 0 para los domingos y de nivel 1 para el resto de la semana.
- Ampliar las tareas para que la copia se transfiera a tu cuenta de la universidad automáticamente.

Referencias

- [Ubuntu - Backup Your System](#)
- [Quick Guide to the Linux Dump and Restore Commands](#)