

Estació de treball HP xw4400 per l'Avance III 400sb - Actualització al maig de 2017

Actualització de l'estació de treball [HP xw4400 de l'espectròmetre Bruker Avance III 400sb](#).

Instal·lació de Debian GNU/Linux

La distribució de GNU/Linux que s'instal·la és la **Debian version 8.8.0**, released on May 6th, 2017, codenamed jessie, AMD64 architecture,

- [Debian "jessie" Release Information](#)
 - [AMD64 Port](#)
 - [Installing Debian 8.8](#)
- [Debian 8 -- Release Notes](#)

Configuració inicial

- Language: English
- Country: Spain
- Locale: en_US.UTF-8
- Keymap: Spanish
- Host name: cie-55-31 (configuració manual)
- Domain name: uab.es (configuració manual)
- User name:
 - sermnadmin (SeRMN-UAB Staff)
 - sermnuab (SeRMN-UAB Users) ⓘ es crearà més un cop completada la instal·lació
- Time zone: Madrid

Partició del disc

Faig servir l'opció "Whole disk using LVM" que crea les següents particions al disc:

 esquema de particions: boot + LVM

```
LVM VG cie-55-31-vg, LV home as ext4
LVM VG cie-55-31-vg, LV root as ext4
LVM VG cie-55-31-vg, LV swap_1 as swap
LVM VG cie-55-31-vg, LV tmp as ext4
LVM VG cie-55-31-vg, LV var as ext4
partition #1 of SCSI3 (0,0,0) (sda) as ext2
```

amb la configuració del LVM:



```
Physical volume: /dev/sda3
Volume groups:  cie-55-31-vg
Logical volumes: home, root, swap_1, tmp, var
```




Un cop finalitzada la instal·lació, caldrà

- ajustar la mida dels volums lògics; i
- crear un volum lògic addicional */opt*

Instal·lació i configuració inicial

Instal·lació bàsica de programes

Les *col·leccions* de programes a instal·lar seleccionades són:

- Standard System
- Desktop Environment
 - Gnome
- SSH Server
- Web Server
- ...  comprovar `tasksel`

La resta de programes que poguessin ser necessaris, s'instal·laran més endavant.

GRUB Boot Loader

GRUB Boot Loader s'instal·la al MBR.

Reiniciar per primer cop

Un cop s'han instal·lat tots els paquets, reinicio l'ordinador i entro a la sessió de GNU/Debian Jessie.

Simplificació de l'escriptori



Explicar la configuració final de l'escriptori, Gnome classic? per més informació consultar:

- <http://www.linuxquestions.org/questions/debian-26/how-can-i-enable-gnome-classic-in-jessie-4175543759/>
- <https://unix.stackexchange.com/questions/199932/different-look-and-feel-for-gnome-classic-in-debian-7-and-debian-8>



• ...

Simplifico l'escriptori:

- Elimino el panel inferior. Abans de fer-ho, moc els applets *Window List* i *Workspace Switcher* al panel superior.
- Elimino els applets *Notification Area* i *Window Selector* al panel superior, el primer perquè no vull que els usuaris enredin les connexions a la xarxa, i el segon perquè és redundant amb el *Window List*.
- Al *Workspace Switcher* redueixo el nombre d'escriptoris a 2. Els usuaris de MS-Windows no coneixen el concepte d'escriptoris i tenen tendència a perdre's.
- Canvio la configuració del *Workpsace Switcher*
 - Show windows from all workspaces
 - Group windows when space is limited
 - Restore to native workspace (les finestres minimitzades s'obren a l'escriptori on es van tancar)
- Afegeixo els applets *Lock Screen Button* per bloquejar la pantalla, i *Log Out Button* per sortir de la sessió o per canviar a un altre usuari.

Edito el menú per amagar les aplicacions que no vull que vegin els usuaris (jocs i altres entreteniments). Més endavant miraré d'esbrinar cóm es poden desinstal·lar algunes d'aquestes aplicacions innecessàries. Entre altres:

- L'usuari "normal" no hauria de veure el menú *System | Administration*
- L'usuari "normal" no hauria de veure moltes de les opcions disponibles al menú *System | Preferences*
- ...

Paquets i programes de Debian

Afegeixo els següents paquets o programes (aquest no és un llistat exhaustiu, només inclou els dimonis i servidors de xarxa, i altres programes importants):

-  rsync
-  byobu (arrossega screen i tmux)

Addició d'altres magatzems (repositories) de programes

Afegeixo altres magatzems (repositories) de programes:

-  deb <http://backports.debian.org/debian-backports/> jessie-backports main
-  deb <http://www.deb-multimedia.org/> jessie main contrib non-free

i la signatura (debian-multimedia-keyring) del magatzem *deb-multimedia*, i instal·lo:

-  Adobe Acrobat Reader


















També afegeixo el magatzem del navegador Chrome de Google:

-  deb <http://dl.google.com/linux/chrome/deb/> stable main


A la pàgina <https://sites.google.com/site/mydebiansourceslist/> es poden consultar altres magatzems disponibles.

Altres paquets i programes de Debian






Afegeixo els següents paquets o programes (aquest no és un llistat exhaustiu, només inclou els dimonis i servidors de xarxa, i altres programes importants):

-  mc (midnight commander)
-  ftp-ssl en comptes de ftp
-  denyhosts
-  nfs-kernel-server
-  tftp-hpa
-  tftpd-hpa
-  bootparamd
-  isc-dhcp-server
-  xinetd (en comptes del programa per defecte: openbsd-inetd)
-  lshw i lshw-gtk
-  gsmartcontrol (instal·la smartmontools)
-  firefox-esr (extended support release)
-  chrome
-  apt-xapian-index (instal·la python-xapian)
-  firmware-linux (instal·la diversos paquets de firmware)
-  meld
-  cu (command used to call up another system and act as a dial in terminal. Part of UUCP but individually packaged)



Elimino els paquets o programes:

-  telnet
- ...


Elimino els següents metapackages per poder eliminar altres paquets o programes que depenen d'ells sense haver de desinstal·lar altres paquets que sí que m'interessen,

-  gnome
-  task-gnome-desktop
-  gnome-desktop-environment
-  gnome-office
-  gnome-documents

Llavors desinstal·lo:

-  gnome-games, gnome-games-data, gnome-games-extra-data
-  simple-scan
- ...

Substitueixo:

-  la versió lliure de Java (java-6-openjdk i paquets que en dependen) per la versió oficial (sun-java6-jdk i paquets que en depenen).

Configuració de la xarxa

La connexió a la placa base s'identifica com a *eth1* i és una

```
Ethernet interface
/0/100/1c.5/0

product: NetXtreme BCM5755 Gigabit Ethernet PCI Express [14E4:167B]
vendor: Broadcom Corporation [14E4]
bus info: pci@0000:3f:00.0
logical name: eth1
version: 02
serial: 00:19:bb:57:96:9b
size: 100Mbit/s
capacity: 1Gbit/s
width: 64 bits
clock: 33MHz
capabilities:
    ...
    1Gbit/s,
    1Gbit/s (full duplex),
    Auto-negotiation
configuration:
    autonegotiation: on
    broadcast: yes
    driver: tg3
    driverversion: 3.137
    duplex: full
    firmware: 5755-v3.17
    latency: 0
    link: yes
    multicast: yes
    port: twisted pair
    speed: 100Mbit/s
resources:
    irq: 48
    memory: e0400000-e040ffff
```

i la targeta de xarxa addicional s'identifica com a *eth0* és una

```
Ethernet interface
/0/100/1c.4/0

product: NetXtreme BCM5751 Gigabit Ethernet PCI Express [14E4:1677]
```

```
vendor: Broadcom Corporation [14E4]
bus info: pci@0000:28:00.0
logical name: eth0
version: 21
serial: 00:10:18:27:55:de
size: 100Mbit/s
capacity: 1Gbit/s
width: 64 bits
clock: 33MHz
capabilities:
    ...
    1Gbit/s,
    1Gbit/s (full duplex),
    Auto-negotiation
configuration:
    autonegotiation: on
    broadcast: yes
    driver: tg3
    driverversion: 3.137
    duplex: full
    firmware: 5751-v3.58
    ip: 158.109.55.31
    latency: 0
    link: yes
    multicast: yes
    port: twisted pair
    speed: 100Mbit/s
resources:
    irq: 47
    memory: e0500000-e050ffff
    memory: e0510000-e051ffff
```

Comprovo que les targetes estiguin definides al fitxer `/etc/udev/rules.d/70-persistent-net.rules` per tal verificar que l'assignació de les targetes al sistema operatiu sigui estàtica i no hi hagi cap possibilitat de que canviï si es reinicia l'ordinador, de forma que la targeta a la placa base sigui sempre `eth1` i correspongui a la connexió a la consola (IPSO), i que la targeta addicional sigui sempre `eth0` i es faci servir per la connexió a la xarxa local (LAN).

```
root@cie-55-31:/etc/udev/rules.d# more 70-persistent-net.rules
# This file was automatically generated by the /lib/udev/write_net_rules
# program, run by the persistent-net-generator.rules rules file.
#
# You can modify it, as long as you keep each rule on a single
# line, and change only the value of the NAME= key.

# PCI device 0x14e4:0x1677 (tg3)
SUBSYSTEM=="net", ACTION=="add", DRIVERS=="?*",
ATTR{address}=="00:10:18:27:55:de", ATTR{dev_id}=="0x0",
ATTR{type}=="1", KERNEL=="eth*", NAME="eth0"
```

```
# PCI device 0x14e4:0x167b (tg3)
SUBSYSTEM=="net", ACTION=="add", DRIVERS=="?*",
ATTR{address}=="00:19:bb:57:96:9b", ATTR{dev_id}=="0x0",
ATTR{type}=="1", KERNEL=="eth*", NAME="eth1"
```

Alhora, la targeta de la xarxa UAB (eth0) és configura de forma estàtica per evitar que la caiguda de la xarxa afecti el funcionament de l'espectròmetre, i els paràmetres de configuració són,

- Hostname: cie-55-31
- Domain: uab.es
- IP address: 158.109.55.31
- Broadcast: 158.109.63.255
- Netmask: 255.255.240.0
- DNS:
 - domain uab.es
 - search uab.es
 - nameserver 158.109.0.9
 - nameserver 158.109.254.130
 - nameserver 158.109.0.1

El dispositiu *eth1* també caldrà configurar-ho de forma estàtica amb els paràmetres de connexió emprats actualment per la connexió de l'estació de treball a la consola.

Paquets i programes de Debian



Cal decidir si es manté la configuració a través del programa *network-manager* o si es desinstal·la i es fa la configuració manual.

Com que la configuració de la xarxa és estàtica, per evitar problemes elimino,

- network-manager i network-manager-gnome, i
- isc-dhcp i isc-dhpc-common,

i instal·lo

- net-tools, i
- ifupdown-extra, que alhora arrossega els paquets
 - ethtools, i
 - iputils-arping
- wireshark

Bibliografia

- [Network Configuration](#) a la wiki de Debian.
- [NetworkManager](#) a la wiki de Debian.
- [Chapter 5. Network setup](#), a *Debian Reference*, by Osamu Aoki.
- [Disable NetworkManager](#)

- ...

Fitxers de configuració provissionals

Aquesta és la configuració de xarxa provissional emprada per la instal·lació i configuració del sistema operatiu i del programa TopSpin.

/etc/hosts

```
127.0.0.1    localhost
127.0.1.1    cie-55-31.uab.es    cie-55-31
```

/etc/resolv.conf

```
domain uab.es
search uab.es
nameserver 158.109.0.9
nameserver 158.109.254.130
nameserver 158.109.0.1
```

/etc/network/interfaces

```
# This file describes the network interfaces available on your system
# and how to activate them. For more information, see interfaces(5).

# The loopback network interface
auto lo
iface lo inet loopback

# Ethernet interfaces are assigned to physical devices in a
# persistent way according to rules in file:
#
# /etc/udev/rules.d/70-persistent-net.rules
#
# Hence, each of eth0 and eth1 will **always** correspond to
# the same device. The configuration below assumes that,
#
# eth0 -> lan (internet)
# eth1 -> nmr (spectrometer ccu or ipso)
#
auto eth0 eth1

# LAN / INTERNET - Assigned to the primary network interface,
# which usually will be the motherboard integrated NIC.
#
iface eth0 inet static
    address 158.109.55.31
    netmask 255.255.240.0
```



```
broadcast 158.109.63.255
gateway 158.109.0.3

# NMR CONSOLE LAN - Assigned to the secondary network interface,
# which usually will be the added NIC.
#
iface eth1 inet static
    address 149.236.99.1
    netmask 255.255.255.0
    network 149.236.99.0
    broadcast 10.10.255.255
```

/etc/udev/rules.d/70-persistent-net.rules

```
# This file was automatically generated by the /lib/udev/write_net_rules
# program, run by the persistent-net-generator.rules rules file.
#
# You can modify it, as long as you keep each rule on a single
# line, and change only the value of the NAME= key.

# PCI device 0x14e4:0x167b (tg3)
SUBSYSTEM=="net", ACTION=="add", DRIVERS=="?*",
ATTR{address}=="00:10:18:27:55:de",
ATTR{dev_id}=="0x0", ATTR{type}=="1", KERNEL=="eth*", NAME="eth0"

# PCI device 0x14e4:0x1677 (tg3)
SUBSYSTEM=="net", ACTION=="add", DRIVERS=="?*",
ATTR{address}=="00:19:bb:57:96:9b",
ATTR{dev_id}=="0x0", ATTR{type}=="1", KERNEL=="eth*", NAME="eth1"
```


Configuració de serveis

Avahi

Aturo i desactivo el servei amb les comandes

- `systemctl stop avahi-daemon` i `systemctl disable avahi-daemon`; i
- `systemctl stop avahi-daemon.socket` i `systemctl disable avahi-daemon.socket`

Trivial FTP daemon

 Enllaços sobre la configuració del *tftpd*

- <http://chschneider.eu/linux/server/tftpd-hpa.shtml>
- <http://diablo.craem.net/wordpress/?p=171>
- ...


Bootparam

 Cal configurar-lo per servir el sistema operatiu de la consola.

NFS

 Cal configurar-lo per servir el sistema operatiu de la consola.

NTP

 Instal·lo el paquet *ntp* però no afegeixo cap servidor de temps i deixo la configuració per defecte que fa servir el pool de servidors de temps de Debian.

Nous magatzems

He afegit nous magatzems (repositories) per tal de poder instal·lar programes addicionals o versions més noves d'alguns programes.

En primer lloc, em descarrego i afegeixo la clau del magatzem *Debian Mozilla*

```
# wget -O- -q http://mozilla.debian.net/archive.asc | gpg --import
# gpg --check-sigs --fingerprint --keyring /usr/share/keyrings/debian-
archive-keyring.gpg
# gpg --export -a 06C4AE2A | apt-key add -
```

i la clau del magatzem *Debian Multimedia*,

```
# aptitude install deb-multimedia-keyring
```

Després actualitzo el registres dels programes *apt-get* i *aptitude*

```
# apt-get update
# aptitude update
```

Hardware especial

Drivers per la targeta gràfica

Instal·lo els drivers més actuals disponibles a *debian-backports*.

Per més informació consultar:

- http://wiki.debian.org/NvidiaGraphicsDrivers#non-free_drivers
- <http://www.nvidia.com/object/unix.html>
- <http://www.nvidia.com/object/linux-display-amd64-290.10-driver.html>
- <http://packages.debian.org/search?keywords=nvidia-glx>
- ...

Per veure si es poden connectar dos monitors consultar:

- http://en.gentoo-wiki.com/wiki/X.Org/Dual_Monitors/Nvidia
- http://www.nvidia.com/object/feature_twinview.html
- <http://ubuntuforums.org/showthread.php?t=1817622>
- <http://www.ublug.org/ubuntu/twinview/twinview-howto-breezy.html>
- <http://us.download.nvidia.com/solaris/96.43.21/README/appendix-g.html>
- http://defindit.com/readme_files/x_windows_dual_monitor.html
- <http://forums.nvidia.com/>
- ...

Drivers per la 2a targeta de xarxa

Aparentment no cal instal·lar cap driver especial ja que la targeta és suportada per GNU/Linux, però per si de cas, aquests són alguns enllaços relacionats amb aquest model de targeta:

- [linux driver dge-528t](#) a Google
- [Technical Support - DGE-528T - Copper Gigabit PCI Card for PC](#)
- [DGE-528T - Copper Gigabit PCI Card for PC](#)
- [Components supported by the r8169 module](#)

Drivers per la targeta amb ports sèrie

La targeta és reconeguda i configurada pel sistema, no cal instal·lar cap controlador addicional,

```
[ 0.688353] Serial: 8250/16550 driver, 4 ports, IRQ sharing enabled
[ 0.688545]   alloc irq_desc for 16 on node -1
[ 0.688546]   alloc kstat_irqs on node -1
[ 0.688550] serial 0000:1c:00.0: PCI INT A -> GSI 16 (level, low) -> IRQ
16
[ 0.688562] 2 ports detected on Oxford PCI Express device
[ 0.688613] ttyS0: detected caps 00000700 should be 00000100
[ 0.688617] 0000:1c:00.0: ttyS0 at MMIO 0xec401000 (irq = 16) is a
16C950/954
[ 0.688670] ttyS1: detected caps 00000700 should be 00000100
[ 0.688674] 0000:1c:00.0: ttyS1 at MMIO 0xec401200 (irq = 16) is a
16C950/954
```

Configuració de la BIOS



Quan tot estigui funcionant caldrà verificar la configuració de la BIOS, per exemple, per



protegir l'accés amb una contrasenya.

Securing Debian GNU/Linux

- [Debian SELinux support](#). The Debian packaged Linux kernels have had SELinux support compiled in (but disabled by default) since version 2.6.9.
 - [SELinux Setup](#)
- [Security-Enhanced Linux](#)
- [SELinux Project Wiki](#)
- [SELINUX \(Security-Enhanced Linux\)](#)
- [Securing and Hardening Red Hat Linux Production Systems](#). A Practical Guide to Basic Linux Security in Production Enterprise Environments. Written by Werner Puschitz.

Altres millores a Debian

Devil's pie

- [Devil's Pie](#) is a window-matching utility, inspired by Sawfish's "Matched Windows" option and the lack of the functionality in Metacity. Metacity lacking window matching is not a bad thing — Metacity is a lean window manager, and window matching does not have to be a window manager task. Devil's Pie can be configured to detect windows as they are created, and match the window to a set of rules. If the window matches the rules, it can perform a series of actions on that window. For example, I can make all windows created by X-Chat appear on all workspaces, and the main Gkrellm1 window does not appear in the pager or task list.
- [Devilspie](#) is a non-gui utility that lets you make applications start in specified workplaces, in specified sizes and placements, minimized or maximized and much more based on simple config files.
- [GDevilspie](#) is a user friendly interface to the devilspie window matching daemon, to create rules easily.
 - [How do I tell a start up program to start minimized?](#)

Teamviewer

- [TeamViewer](#) the All-In-One Solution for Remote Access and Support over the Internet. TeamViewer connects to any PC or server around the world within a few seconds. You can remote control your partner's PC as if you were sitting right in front of it.

Configuració de GNOME

Consultar els següents enllaços sobre cómo millorar o personalitzar el comportament de Gnome

- [GNOME](#) at ArchLinux

- [GNOME Tips](#)
- [Configuring GDM 2.28](#)

Gnome Shell Extensions

Segueixo les instruccions a stackexchange.com per poder instal·lar les següents extensions pel Gnome:

- [No Topleft Hot Corner](#)
- ...

Instal·lació del TopSpin

- [Instal·lació del TopSpin 3.5 Pl 6](#)

Transferència de dades

Disc dur amb problemes

Provo a transferir les dades des de l'antic disc dur que ha donat problemes. Per començar, comprovo si es pot accedir a la taula de particions del disc vell,

```
sermnadmin@cie-55-31:~$ sudo sfdisk -l /dev/sdb
```

```
Disk /dev/sdb: 19457 cylinders, 255 heads, 63 sectors/track
sfdisk: Warning: extended partition does not start at a cylinder boundary.
DOS and Linux will interpret the contents differently.
Units: cylinders of 8225280 bytes, blocks of 1024 bytes, counting from 0
```

Device	Boot	Start	End	#cyls	#blocks	Id	System
/dev/sdb1	*	0+	2431-	2432-	19530752	83	Linux
/dev/sdb2		2431+	19457-	17026-	136757249	5	Extended
/dev/sdb3		0	-	0	0	0	Empty
/dev/sdb4		0	-	0	0	0	Empty
/dev/sdb5		2431+	3039-	608-	4881408	83	Linux
/dev/sdb6		3039+	4498-	1459-	11717632	82	Linux swap / Solaris
/dev/sdb7		4498+	6929-	2432-	19529728	83	Linux
/dev/sdb8		6929+	19457-	12528-	100625408	83	Linux

Llavors faig una còpia de seguretat de la taula de particions,

```
root@cie-55-31:/home/sermnadmin/Documents/old-hdd-recovery/partition-backup#
dd if=/dev/sdb of=backup-old-hdd.mbr count=1 bs=512
1+0 records in
1+0 records out
512 bytes (512 B) copied, 0.00115307 s, 444 kB/s
```

```
root@cie-55-31:/home/sermnadmin/Documents/old-hdd-recovery/partition-backup#
sfdisk -d /dev/sdb > backup-old-hdd.sf
sfdisk: Warning: extended partition does not start at a cylinder boundary.
DOS and Linux will interpret the contents differently.
root@cie-55-31:/home/sermnadmin/Documents/old-hdd-recovery/part
```

Finalment, provo a copiar amb [ddrescue](#) les particions `/dev/sdb5` (VAR), `/dev/sdb7` (OPT) i `/dev/sdb8` (HOME),

```
root@cie-55-31:/home/sermnadmin/Documents/old-hdd-recovery/sdb5-old-hdd-var#
ddrescue -d -r3 /dev/sdb5 sdb5.image sdb5.mapfile
GNU ddrescue 1.19
Press Ctrl-C to interrupt
rescued: 1179 kB, errsize: 0 B, current rate: 10922 B/s
 ipos: 1179 kB, errors: 0, average rate: 15521 B/s
 opos: 1179 kB, run time: 1.26 m, successful read: 0 s ago
Copying non-tried blocks... Pass 1 (forwards)
```



Per algun motiu, aquest procediment és molt lent. Després de provar diverses recomanacions trobades a Internet sense obtenir una millora substancial a la velocitat amb què es copien les dades, decideixo deixar-ho per més endavant i provar amb el disc anterior a aquest.

Serviria de res canvia la placa de control? <http://www.hdd-parts.com/13082508.html>

Un cop recuperades les dades del disc dur més antic, torno a provar a recuperar les del disc que amb problemes.

L'ordinador reconeix el disc i troba les particions esmentades més amunt

```
[167302.836024] usb 5-8: new high-speed USB device number 12 using ehci-pci
[167302.984889] usb 5-8: New USB device found, idVendor=152d, idProduct=2329
[167302.984895] usb 5-8: New USB device strings: Mfr=1, Product=2,
SerialNumber=5
[167302.984898] usb 5-8: Product: USB to ATA/ATAPI Bridge
[167302.984902] usb 5-8: Manufacturer: JMicron
[167302.984905] usb 5-8: SerialNumber: 56819FFFFFFF
[167302.985556] usb-storage 5-8:1.0: USB Mass Storage device detected
[167302.985724] usb-storage 5-8:1.0: Quirks match for vid 152d pid 2329:
8020
[167302.985758] scsi11 : usb-storage 5-8:1.0
[167307.111166] scsi 11:0:0:0: Direct-Access ST316081 2AS
PQ: 0 ANSI: 2 CCS
[167307.111581] sd 11:0:0:0: Attached scsi generic sg2 type 0
[167308.435394] sd 11:0:0:0: [sdb] 312581808 512-byte logical blocks: (160
GB/149 GiB)
[167308.436640] sd 11:0:0:0: [sdb] Write Protect is off
```

```
[167308.436646] sd 11:0:0:0: [sdb] Mode Sense: 34 00 00 00
[167308.437632] sd 11:0:0:0: [sdb] Write cache: disabled, read cache:
enabled, doesn't support DPO or FUA
[167325.207247] sdb: sdb1 sdb2 < sdb5 sdb6 sdb7 sdb8 >
[167325.211102] sd 11:0:0:0: [sdb] Attached SCSI disk
[167527.620198] sd 11:0:0:0: [sdb] Unhandled sense code
[167527.620204] sd 11:0:0:0: [sdb]
```

però l'intent de fer servir la comanda partprobe dóna un munt d'errors com:

```
[167527.620207] Result: hostbyte=DID_OK driverbyte=DRIVER_SENSE
[167527.620210] sd 11:0:0:0: [sdb]
[167527.620213] Sense Key : Medium Error [current]
[167527.620217] sd 11:0:0:0: [sdb]
[167527.620220] Add. Sense: Unrecovered read error
[167527.620223] sd 11:0:0:0: [sdb] CDB:
[167527.620225] Read(10): 28 00 00 00 08 00 00 00 08 00
[167527.620235] end_request: critical medium error, dev sdb, sector 2048
[167527.620240] Buffer I/O error on device sdb, logical block 256
[167535.691059] sd 11:0:0:0: [sdb] Unhandled sense code
[167535.691066] sd 11:0:0:0: [sdb]
[167535.691069] Result: hostbyte=DID_OK driverbyte=DRIVER_SENSE
[167535.691072] sd 11:0:0:0: [sdb]
[167535.691074] Sense Key : Medium Error [current]
[167535.691079] sd 11:0:0:0: [sdb]
[167535.691082] Add. Sense: Unrecovered read error
[167535.691085] sd 11:0:0:0: [sdb] CDB:
[167535.691088] Read(10): 28 00 00 00 08 00 00 00 08 00
[167535.691098] end_request: critical medium error, dev sdb, sector 2048
[167535.691103] Buffer I/O error on device sdb, logical block 256
[167576.211102] sd 11:0:0:0: [sdb] Unhandled sense code
[167576.211109] sd 11:0:0:0: [sdb]
[167576.211111] Result: hostbyte=DID_OK driverbyte=DRIVER_SENSE
[167576.211114] sd 11:0:0:0: [sdb]
[167576.211117] Sense Key : Medium Error [current]
[167576.211121] sd 11:0:0:0: [sdb]
[167576.211124] Add. Sense: Unrecovered read error
[167576.211128] sd 11:0:0:0: [sdb] CDB:
[167576.211130] Read(10): 28 00 06 a2 c0 00 00 00 08 00
[167576.211140] end_request: critical medium error, dev sdb, sector
111329280
[167576.211146] Buffer I/O error on device sdb8, logical block 0
```

0

```
[168724.524020] usb 5-7: new high-speed USB device number 14 using ehci-pci
[168724.664870] usb 5-7: New USB device found, idVendor=152d, idProduct=2329
[168724.664876] usb 5-7: New USB device strings: Mfr=1, Product=2,
SerialNumber=5
[168724.664879] usb 5-7: Product: USB to ATA/ATAPI Bridge
[168724.664883] usb 5-7: Manufacturer: JMicron
```

```
[168724.664886] usb 5-7: SerialNumber: 801130168383
[168724.665536] usb-storage 5-7:1.0: USB Mass Storage device detected
[168724.665701] usb-storage 5-7:1.0: Quirks match for vid 152d pid 2329:
8020
[168724.665736] scsi13 : usb-storage 5-7:1.0
[168729.117271] scsi 13:0:0:0: Direct-Access
PQ: 0 ANSI: 2 CCS
[168729.117663] sd 13:0:0:0: Attached scsi generic sg2 type 0
[168759.413200] sd 13:0:0:0: [sdb] READ CAPACITY failed
[168759.413206] sd 13:0:0:0: [sdb]
[168759.413209] Result: hostbyte=DID_OK driverbyte=DRIVER_SENSE
[168759.413212] sd 13:0:0:0: [sdb]
[168759.413215] Sense Key : Unit Attention [current]
[168759.413220] sd 13:0:0:0: [sdb]
[168759.413224] Add. Sense: Not ready to ready change, medium may have
changed
[168764.942936] sd 13:0:0:0: [sdb] Test WP failed, assume Write Enabled
[168773.198053] sd 13:0:0:0: [sdb] Asking for cache data failed
[168773.198060] sd 13:0:0:0: [sdb] Assuming drive cache: write through
[168830.604440] sd 13:0:0:0: [sdb] READ CAPACITY failed
[168830.604445] sd 13:0:0:0: [sdb]
[168830.604447] Result: hostbyte=DID_OK driverbyte=DRIVER_SENSE
[168830.604449] sd 13:0:0:0: [sdb]
[168830.604451] Sense Key : Unit Attention [current]
[168830.604454] sd 13:0:0:0: [sdb]
[168830.604457] Add. Sense: Not ready to ready change, medium may have
changed
```

i el resultat d'executar la comanda `smartctl -a /dev/sdb` és,

```
root@cie-55-31:/home/sermnadmin/Documents/old-old-hdd-recovery# smartctl -a
/dev/sdb
smartctl 6.4 2014-10-07 r4002 [x86_64-linux-3.16.0-4-amd64] (local build)
Copyright (C) 2002-14, Bruce Allen, Christian Franke, www.smartmontools.org

=== START OF INFORMATION SECTION ===
Model Family:      Seagate Barracuda 7200.9
Device Model:      ST3160812AS
Serial Number:     5LS68H19
Firmware Version:  3.AHL
User Capacity:     160,041,885,696 bytes [160 GB]
Sector Size:       512 bytes logical/physical
Device is:         In smartctl database [for details use: -P show]
ATA Version is:    ATA/ATAPI-7 (minor revision not indicated)
Local Time is:     Fri May 19 16:26:32 2017 CEST
SMART support is:  Available - device has SMART capability.
SMART support is:  Enabled

=== START OF READ SMART DATA SECTION ===
```


SMART overall-health self-assessment test result: PASSED

General SMART Values:

Offline data collection status: (0x82) Offline data collection activity was completed without error.

Auto Offline Data Collection: Enabled.

Self-test execution status: (0) The previous self-test routine completed

without error or no self-test has ever been run.

Total time to complete Offline data collection: (433) seconds.

Offline data collection capabilities: (0x5b) SMART execute Offline immediate. Auto Offline data collection on/off support. Suspend Offline collection upon new command. Offline surface scan supported. Self-test supported. No Conveyance Self-test supported. Selective Self-test supported.

SMART capabilities: (0x0003) Saves SMART data before entering power-saving mode. Supports SMART auto save timer.

Error logging capability: (0x01) Error logging supported. General Purpose Logging supported.

Short self-test routine recommended polling time: (2) minutes.

Extended self-test routine recommended polling time: (54) minutes.

SCT capabilities: (0x0009) SCT Status supported. SCT Error Recovery Control supported.

SMART Attributes Data Structure revision number: 10

Vendor Specific SMART Attributes with Thresholds:

ID#	ATTRIBUTE_NAME	FLAG	VALUE	WORST	THRESH	TYPE	UPDATED
1	Raw_Read_Error_Rate	0x000f	100	253	006	Pre-fail	Always
-	0						
3	Spin_Up_Time	0x0002	094	094	000	Old_age	Always
-	0						
4	Start_Stop_Count	0x0033	100	100	020	Pre-fail	Always
-	71						
5	Reallocated_Sector_Ct	0x0033	100	100	036	Pre-fail	Always
-	37						
7	Seek_Error_Rate	0x000f	085	060	030	Pre-fail	Always
-	356768337						
9	Power_On_Hours	0x0032	021	021	000	Old_age	Always
-	69653						
10	Spin_Retry_Count	0x0013	100	100	097	Pre-fail	Always
-	0						

12	Power_Cycle_Count	0x0033	100	100	020	Pre-fail	Always
-	82						
187	Reported_Uncorrect	0x0032	068	068	000	Old_age	Always
-	32						
189	High_Fly_Writes	0x003a	100	100	000	Old_age	Always
-	0						
190	Airflow_Temperature_Cel	0x0022	063	063	045	Old_age	Always
-	37 (Min/Max 37/37)						
194	Temperature_Celsius	0x0022	037	040	000	Old_age	Always
-	37 (0 16 0 0 0)						
195	Hardware_ECC_Recovered	0x001a	102	048	000	Old_age	Always
-	124688544						
197	Current_Pending_Sector	0x0012	001	001	000	Old_age	Always
-	4403						
198	Offline_Uncorrectable	0x0010	001	001	000	Old_age	Offline
-	4403						
199	UDMA_CRC_Error_Count	0x003e	200	200	000	Old_age	Always
-	0						
200	Multi_Zone_Error_Rate	0x0000	100	253	000	Old_age	Offline
-	0						
202	Data_Address_Mark_Errs	0x0032	100	253	000	Old_age	Always
-	0						

SMART Error Log Version: 1

ATA Error Count: 167 (device log contains only the most recent five errors)

CR = Command Register [HEX]

FR = Features Register [HEX]

SC = Sector Count Register [HEX]

SN = Sector Number Register [HEX]

CL = Cylinder Low Register [HEX]

CH = Cylinder High Register [HEX]

DH = Device/Head Register [HEX]

DC = Device Command Register [HEX]

ER = Error register [HEX]

ST = Status register [HEX]

Powered_Up_Time is measured from power on, and printed as DDd+hh:mm:SS.sss where DD=days, hh=hours, mm=minutes, SS=sec, and sss=millisec. It "wraps" after 49.710 days.

Error 167 occurred at disk power-on lifetime: 4117 hours (171 days + 13 hours)

When the command that caused the error occurred, the device was active or idle.

After command completion occurred, registers were:

ER ST SC SN CL CH DH

-- -- -- -- -- -- --

40 51 00 00 08 00 e0 Error: UNC at LBA = 0x00000800 = 2048

Commands leading to the command that caused the error were:

CR	FR	SC	SN	CL	CH	DH	DC	Powered_Up_Time	Command/Feature_Name
25	00	08	00	08	00	e0	00	00:06:38.518	READ DMA EXT
25	00	08	18	b8	4e	e0	00	00:06:38.516	READ DMA EXT
25	00	08	00	c0	4e	e0	00	00:06:38.502	READ DMA EXT
25	00	08	18	18	e9	e0	00	00:06:34.538	READ DMA EXT
25	00	08	f8	0e	e9	e0	00	00:06:30.491	READ DMA EXT

Error 166 occurred at disk power-on lifetime: 4117 hours (171 days + 13 hours)

When the command that caused the error occurred, the device was active or idle.

After command completion occurred, registers were:

ER ST SC SN CL CH DH

-- -- -- -- -- -- --

40 51 00 00 08 00 e0 Error: UNC at LBA = 0x00000800 = 2048

Commands leading to the command that caused the error were:

CR FR SC SN CL CH DH DC Powered_Up_Time Command/Feature_Name

-- -- -- -- -- -- -- -----

25	00	08	00	08	00	e0	00	00:06:38.518	READ DMA EXT
ef	03	45	00	00	00	a0	00	00:06:38.516	SET FEATURES [Set transfer mode]
00	00	08	00	00	00	00	04	00:06:38.502	NOP [Abort queued commands]
25	00	08	00	08	00	e0	00	00:06:34.538	READ DMA EXT
25	00	08	f8	b6	a2	e0	00	00:06:30.491	READ DMA EXT

Error 165 occurred at disk power-on lifetime: 4117 hours (171 days + 13 hours)

When the command that caused the error occurred, the device was active or idle.

After command completion occurred, registers were:

ER ST SC SN CL CH DH

-- -- -- -- -- -- --

40 51 00 00 08 00 e0 Error: UNC at LBA = 0x00000800 = 2048

Commands leading to the command that caused the error were:

CR FR SC SN CL CH DH DC Powered_Up_Time Command/Feature_Name

-- -- -- -- -- -- -- -----

25	00	08	00	08	00	e0	00	00:05:58.830	READ DMA EXT
25	00	08	f8	b6	a2	e0	00	00:05:54.874	READ DMA EXT
25	00	10	f8	b7	a2	e0	00	00:05:50.836	READ DMA EXT
25	00	08	f8	ae	4e	e0	00	00:06:34.538	READ DMA EXT
25	00	08	f8	af	4e	e0	00	00:06:30.491	READ DMA EXT

Error 164 occurred at disk power-on lifetime: 4117 hours (171 days + 13 hours)

When the command that caused the error occurred, the device was active or idle.

After command completion occurred, registers were:

ER ST SC SN CL CH DH

-- -- -- -- -- -- --

40 51 00 00 08 00 e0 Error: UNC at LBA = 0x00000800 = 2048

Commands leading to the command that caused the error were:

CR FR SC SN CL CH DH DC Powered_Up_Time Command/Feature_Name

-- -- -- -- -- -- -- -----

25 00 08 00 08 00 e0 00 00:05:58.830 READ DMA EXT

25 00 08 00 b0 4e e0 00 00:05:54.874 READ DMA EXT

ef 03 45 00 00 00 a0 00 00:05:50.836 SET FEATURES [Set transfer mode]

00 00 08 00 00 00 00 04 00:05:46.773 NOP [Abort queued commands]

25 00 08 00 08 00 e0 00 00:05:46.726 READ DMA EXT

Error 163 occurred at disk power-on lifetime: 4117 hours (171 days + 13 hours)

When the command that caused the error occurred, the device was active or idle.

After command completion occurred, registers were:

ER ST SC SN CL CH DH

-- -- -- -- -- -- --

40 51 00 00 08 00 e0 Error: UNC at LBA = 0x00000800 = 2048

Commands leading to the command that caused the error were:

CR FR SC SN CL CH DH DC Powered_Up_Time Command/Feature_Name

-- -- -- -- -- -- -- -----

25 00 08 00 08 00 e0 00 00:05:13.529 READ DMA EXT

25 00 08 08 b8 4e e0 00 00:05:54.874 READ DMA EXT

25 00 08 00 b8 4e e0 00 00:05:50.836 READ DMA EXT

ef 03 45 00 00 00 a0 00 00:05:46.773 SET FEATURES [Set transfer mode]

00 00 08 00 00 00 00 04 00:05:46.726 NOP [Abort queued commands]

SMART Self-test log structure revision number 1

Num	Test_Description	Status	Remaining	LifeTime(hours)
LBA_of_first_error				
# 1	Short offline	Completed without error	00%	0
-				

SMART Selective self-test log data structure revision number 1

SPAN	MIN_LBA	MAX_LBA	CURRENT_TEST_STATUS
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):

After scanning selected spans, do NOT read-scan remainder of disk.

If Selective self-test is pending on power-up, resume after 0 minute delay.

En relació a l'error "Error: UNC at LBA = ..." consultar les recomanacions a:

- <https://serverfault.com/questions/381012/is-unc-s-m-a-r-t-error-serious-need-to-take-action>

Per altra banda, aquesta es la traça de l'execució de la comanda `sfdisk -l /dev/sdb`

```
root@cie-55-31:/home/sermnadmin/Documents/old-hdd-recovery/partition-backup#
strace sfdisk -l /dev/sdb
execve("/sbin/sfdisk", ["sfdisk", "-l", "/dev/sdb"], [/* 20 vars */]) = 0
brk(0) = 0xed4000
access("/etc/ld.so.nohwcap", F_OK) = -1 ENOENT (No such file or
directory)
mmap(NULL, 8192, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7f7386212000
access("/etc/ld.so.preload", R_OK) = -1 ENOENT (No such file or
directory)
open("/etc/ld.so.cache", O_RDONLY|O_CLOEXEC) = 3
fstat(3, {st_mode=S_IFREG|0644, st_size=98535, ...}) = 0
mmap(NULL, 98535, PROT_READ, MAP_PRIVATE, 3, 0) = 0x7f73861f9000
close(3) = 0
access("/etc/ld.so.nohwcap", F_OK) = -1 ENOENT (No such file or
directory)
open("/lib/x86_64-linux-gnu/libc.so.6", O_RDONLY|O_CLOEXEC) = 3
read(3, "\177ELF\2\1\1\3\0\0\0\0\0\0\0\0\0\0\3\0>\0\1\0\0\0P\34\2\0\0\0\0"...,
832) = 832
fstat(3, {st_mode=S_IFREG|0755, st_size=1738176, ...}) = 0
mmap(NULL, 3844640, PROT_READ|PROT_EXEC, MAP_PRIVATE|MAP_DENYWRITE, 3, 0) =
0x7f7385c49000
mprotect(0x7f7385dea000, 2097152, PROT_NONE) = 0
mmap(0x7f7385fea000, 24576, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_DENYWRITE, 3, 0x1a1000) = 0x7f7385fea000
mmap(0x7f7385ff0000, 14880, PROT_READ|PROT_WRITE,
MAP_PRIVATE|MAP_FIXED|MAP_ANONYMOUS, -1, 0) = 0x7f7385ff0000
close(3) = 0
mmap(NULL, 4096, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7f73861f8000
mmap(NULL, 4096, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7f73861f7000
mmap(NULL, 4096, PROT_READ|PROT_WRITE, MAP_PRIVATE|MAP_ANONYMOUS, -1, 0) =
0x7f73861f6000
arch_prctl(ARCH_SET_FS, 0x7f73861f7700) = 0
mprotect(0x7f7385fea000, 16384, PROT_READ) = 0
mprotect(0x611000, 4096, PROT_READ) = 0
mprotect(0x7f7386214000, 4096, PROT_READ) = 0
munmap(0x7f73861f9000, 98535) = 0
brk(0) = 0xed4000
brk(0xef5000) = 0xef5000
open("/usr/lib/locale/locale-archive", O_RDONLY|O_CLOEXEC) = 3
fstat(3, {st_mode=S_IFREG|0644, st_size=1607712, ...}) = 0
```



```

"\17\377\0\0\330\315\0\0\t\233\0\0\303c\0\0`&\0\0\30\347\377\377\244\253\377
\377\217s\377\377"... , 512) = 512
lseek(3, 56999542784, SEEK_SET) = 56999542784
read(3,
"9\246\f\0'0\5\0\232\n\1\0\356\223\6\0\236\307\n\0\360\226\1\0z?\363\377\222
\303\355\377"... , 512) = 512
write(1, "Units: cylinders of 8225280 byte"... , 74Units: cylinders of
8225280 bytes, blocks of 1024 bytes, counting from 0

) = 74
write(1, " Device Boot Start End #"... , 61 Device Boot Start
End #cyls #blocks Id System
) = 61
write(1, "/dev/sdb1 * 0+ 2431- "... , 60/dev/sdb1 * 0+
2431- 2432- 19530752 83 Linux
) = 60
write(1, "/dev/sdb2 2431+ 19457- 1"... , 63/dev/sdb2 2431+
19457- 17026- 136757249 5 Extended
) = 63
write(1, "/dev/sdb3 0 - "... , 60/dev/sdb3 0
- 0 0 0 Empty
) = 60
write(1, "/dev/sdb4 0 - "... , 60/dev/sdb4 0
- 0 0 0 Empty
) = 60
write(1, "/dev/sdb5 2431+ 3039- "... , 60/dev/sdb5 2431+
3039- 608- 4881408 83 Linux
) = 60
write(1, "/dev/sdb6 3039+ 4498- "... , 75/dev/sdb6 3039+
4498- 1459- 11717632 82 Linux swap / Solaris
) = 75
write(1, "/dev/sdb7 4498+ 6929- "... , 60/dev/sdb7 4498+
6929- 2432- 19529728 83 Linux
) = 60
write(1, "/dev/sdb8 6929+ 19457- 1"... , 60/dev/sdb8 6929+
19457- 12528- 100625408 83 Linux
) = 60
close(3) = 0
close(1) = 0
munmap(0x7f7386211000, 4096) = 0
close(2) = 0
exit_group(0) = ?
+++ exited with 0 +++

```

Disc dur anterior

Com que vaig guardar el disc anterior al disc que ha fallat ara, provo a muntar-ho i a recuperar els fitxers de configuració del TopSpin i els fitxers de dades que conté.

Comprovo que es pugui llegir la taula de particions del disc

```
root@cie-55-31:/media/sermnadmin/_opt1# sfdisk -l /dev/sdb
```

```
Disk /dev/sdb: 19457 cylinders, 255 heads, 63 sectors/track  
Units: cylinders of 8225280 bytes, blocks of 1024 bytes, counting from 0
```

Device	Boot	Start	End	#cyls	#blocks	Id	System
/dev/sdb1	*	0+	15	16-	128488+	83	Linux
/dev/sdb2		16	2055	2040	16386300	83	Linux
/dev/sdb3		2056	3075	1020	8193150	82	Linux swap / Solaris
/dev/sdb4		3076	19456	16381	131580382+	83	Linux

i resulta que l'ordinador reconeix i munta automàticament les particions *sdb1* (BOOT), *sdb2* (ROOT & HOME), i *sdb4* (OPT), de forma que puc copiar el seu contingut amb la comanda `rsync`. Les còpies es guarden provisionalment a les carpetes:

- /home/sermnuab/Documents/old-old-hdd-recovery/sdb2-old-old-hdd-root_and_home
- /home/sermnuab/Documents/old-old-hdd-recovery/sdb4-old-old-hdd-opt

i inclouen els directoris:

- /etc (71 MB)
- /home (147 MB)
- /usr/local (3.1 MB)
- /opt/topspin/data, conf, exp, nmr_backup, i prog/au (871 MB)
- /opt/topspin21pl5/data, conf, exp, nmr_backup, i prog/au (871 MB)
- /opt/BASH (451 MB)
- /opt/sermn-uab (ca 85 GB) **!** **conté les dades de rmn**

Aquest és el resum del procés de còpia de les dades de rmn,

```
root@cie-55-31:/home/sermnadmin/Documents/old-old-hdd-recovery/sdb4-old-old-hdd-opt# rsync -Haxv --progress --stats /media/sermnadmin/_opt1/sermn-uab .  
:  
:  
Number of files: 1,245,349 (reg: 1,048,377, dir: 196,972)  
Number of created files: 1,245,349 (reg: 1,048,377, dir: 196,972)  
Number of deleted files: 0  
Number of regular files transferred: 1,048,377  
Total file size: 85,823,932,533 bytes  
Total transferred file size: 85,823,932,533 bytes  
Literal data: 85,823,932,533 bytes  
Matched data: 0 bytes  
File list size: 4,915,042  
File list generation time: 0.001 seconds  
File list transfer time: 0.000 seconds  
Total bytes sent: 85,909,483,467  
Total bytes received: 21,165,285  
  
sent 85,909,483,467 bytes  received 21,165,285 bytes  12,098,648.19  
bytes/sec
```



```
total size is 85,823,932,533 speedup is 1.00
```

Bibliografia

- [GNU ddrescue](#) - Data recovery tool
 - [GNU ddrescue Manual](#)
- [Guide to Using DdRescue to Recover Data](#)
- [TestDisk](#) is powerful free data recovery software.
 - [TestDisk Step By Step](#)

Canvis a les particions



Cal estudiar la conveniència de moure la carpeta `/opt` a una partició separada.

Bloqueig dels ports USB

Per evitar que els usuaris facin ús dels ports USB per connectar pendrives o discos externs, o del lector de CD/DVD, edito el fitxer `/etc/group` i els bloquejo l'accés eliminant l'usuari `sermnub` dels grups `cdrom` i `plugdev`.

Impressora en PDF

Instal·lo el paquet `printer-driver-cups-pdf` per crear una impressora virtual en fitxers PDF. Això fa que s'instal·li el gestor d'impressió [CUPS](#) i que a la llista d'impressores surtin les que troba a la xarxa. Per eliminar-les desactivo el servei de descoberta d'impressores:

```
sermnadmin@cie-55-31:~$ sudo systemctl stop cups-browsed.service
[sudo] password for sermnadmin:
sermnadmin@cie-55-31:~$ sudo systemctl disable cups-browsed.service
Synchronizing state for cups-browsed.service with SysVinit using update-rc.d...
Executing /usr/sbin/update-rc.d cups-browsed defaults
Executing /usr/sbin/update-rc.d cups-browsed disable
insserv: warning: current start runlevel(s) (empty) of script `cups-browsed'
overrides LSB defaults (2 3 4 5).
insserv: warning: current stop runlevel(s) (0 1 2 3 4 5 6) of script `cups-
browsed' overrides LSB defaults (0 1 6).
sermnadmin@cie-55-31:~$ sudo systemctl status cups-browsed.service
● cups-browsed.service - Make remote CUPS printers available locally
   Loaded: loaded (/lib/systemd/system/cups-browsed.service; disabled)
   Active: inactive (dead)
```

```
May 31 12:47:30 cie-55-31 systemd[1]: Starting Make remote CUPS printers available locally...
May 31 12:47:30 cie-55-31 systemd[1]: Started Make remote CUPS printers available locally.
May 31 12:56:32 cie-55-31 systemd[1]: Stopping Make remote CUPS printers available locally...
May 31 12:56:32 cie-55-31 systemd[1]: Stopped Make remote CUPS printers available locally.
```

i les impressores de xarxa desapareixen i només queda la impressora virtual local.

La impressió des de la pestanya *plot* del TopSpin dóna un error,

```
Printing has been cancelled:
java.awt.print.PrinterIOException
(Original message = Printing has been cancelled:
java.awt.print.PrinterIOException)

=====
31 May 2017 13:12:06.490 +0200
Topspin Version = 3.5 pl 6 (of August 4 2016), build 1784
JVM Version      = 1.8.0_102 (32 bit) Oracle Corporation
JVM Total memory = 110 MB
JVM Free  memory = 42 MB

java.lang.Exception: Stack trace
    at
    bruker.bio.topspin.bfw.gui.warn.AbstractMessage.getDetailsString(
AbstractMessage.java:827)
    at
    bruker.bio.topspin.bfw.gui.warn.AbstractMessage.setMsgSource(
AbstractMessage.java:790)
    at
    bruker.bio.topspin.bfw.gui.warn.AbstractMessage.<init>(
AbstractMessage.java:774)
    at de.bruker.nmr.mfw.base.BWarning.<init>(BWarning.java:102)
    at de.bruker.nmr.mfw.base.BError.<init>(BError.java:93)
    at de.bruker.nmr.mfw.base.BError.<init>(BError.java:72)
    at
    de.bruker.nmr.pr.plot.media.MediaFactory.doPrint(MediaFactory.
java:583)
    at
    de.bruker.nmr.pr.plot.LayoutEditor$PlotPreviewHelperThread.
run(LayoutEditor.java:1059)
```



Per trobar una solució, consultar

- <https://docs.oracle.com/javase/7/docs/api/java/awt/print/PrinterIOException.html>



- https://www.questarter.com/q/java-printing-with-cups-printers-not-found-3_860495.html

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