

MKDOCS-V2

None

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None

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1. Welcome to MkDocs

For full documentation visit mkdocs.org.

1.1 Commands

- `mkdocs new [dir-name]` - Create a new project.
- `mkdocs serve` - Start the live-reloading docs server.
- `mkdocs build` - Build the documentation site.
- `mkdocs -h` - Print help message and exit.

1.2 Project layout

```
mkdocs.yml    # The configuration file.  
docs/  
  index.md  # The documentation homepage.  
  ...       # Other markdown pages, images and other files.
```

sdfsfs

2. Primer trimestre

2.1 Introducció

Classe 1: Aplicacions i serveis

man init

```
alumne-jordi@alumne-jordi-VirtualBox:~$ man init
alumne-jordi@alumne-jordi-VirtualBox:~$ 
alumne-jordi@alumne-jordi-VirtualBox:~$ readlink -v /sbin/init
./lib/systemd/systemd
alumne-jordi@alumne-jordi-VirtualBox:~$ 
```

```
alumne-jordi@alumne-jordi-VirtualBox:~$ runlevel
N 5
```

```
alumne-jordi@alumne-jordi-VirtualBox:~$ ls -l /lib/systemd/system/runlevel*.target
Ayuda
lrwxrwxrwx 1 root root 15 jul  2 16:04 /lib/systemd/system/runlevel0.target -> poweroff.target
lrwxrwxrwx 1 root root 13 jul  2 16:04 /lib/systemd/system/runlevel1.target -> rescue.target
lrwxrwxrwx 1 root root 17 jul  2 16:04 /lib/systemd/system/runlevel2.target -> multi-user.target
lrwxrwxrwx 1 root root 17 jul  2 16:04 /lib/systemd/system/runlevel3.target -> multi-user.target
lrwxrwxrwx 1 root root 17 jul  2 16:04 /lib/systemd/system/runlevel4.target -> multi-user.target
lrwxrwxrwx 1 root root 16 jul  2 16:04 /lib/systemd/system/runlevel5.target -> graphical.target
lrwxrwxrwx 1 root root 13 jul  2 16:04 /lib/systemd/system/runlevel6.target -> reboot.target
alumne-jordi@alumne-jordi-VirtualBox:~$ 
```

aquí dintre teim scripts

```
alumne-jordi@alumne-jordi-VirtualBox:/etc/init.d$ ls
alsa-utils      dbus          plymouth-log      ufw
anacron         gdm3          procps           unattended-upgrades
apparmor        grub-common   rsync            uuid
apport          kerneloops   saned            whoopsie
bluetooth       keyboard-setup.sh speech-dispatcher x11-common
console-setup.sh kmod          spice-vdagent
cron            openvpn       sssd
cups             plymouth      sysstat
alumne-jordi@alumne-jordi-VirtualBox:/etc/init.d$ 
```

ru levels

```
alumne-jordi@alumne-jordi-VirtualBox:/etc$ ls
adduser.conf          hdparm.conf          ppp
alsa                  host.conf           printcap
alternatives          hostname            profile
anacrontab            hosts               profile.d
apg.conf              hosts.allow        protocols
apm                  hosts.deny         pulse
apparmor              hp                 python3
apparmor.d            ifplugd            python3.12
apport                init               rc0.d
apt                  init.d             rc1.d
avahi                initramfs-tools   rc2.d
bash.bashrc           inputrc            rc3.d
bash_completion       insserv.conf.d   rc4.d
bindresvport.blacklist ipp-usb            rc5.d
binfmt.d              iproute2           rc6.d
bluetooth            issue              rcS.d
```

k0 apagar equip

```
alumne-jordi@alumne-jordi-VirtualBox:/etc$ cd rc0.d/
alumne-jordi@alumne-jordi-VirtualBox:/etc/rc0.d$ ls
K01alsa-utils  K01kerneloops  K01saned          K01sssd
K01bluetooth   K01openvpn    K01speech-dispatcher K01unattended-upgrades
K01gdm3        K01plymouth    K01spice-vdagent   K01uuidd
alumne-jordi@alumne-jordi-VirtualBox:/etc/rc0.d$
```

anem al systemd/system

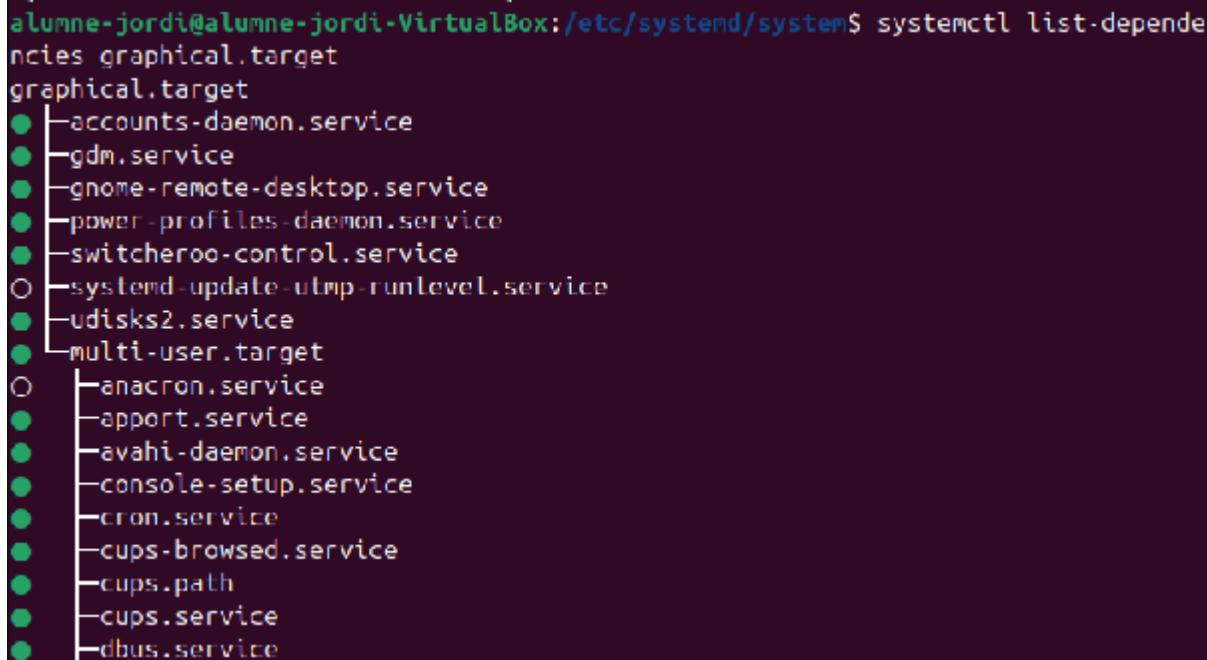
```
alumne-jordi@alumne-jordi-VirtualBox: /lib/systemd/system
rescue.target
rescue.target.wants
rpcbind.target
rsync.service
rsyslog.service
rtkit-daemon.service
runlevel0.target
runlevel1.target
runlevel2.target
runlevel3.target
runlevel4.target
runlevel5.target
runlevel6.target
```

si anem al etc/systemd/system trobarem els mateixos fitxer pero duplicats

això vol dir que al lib es troben els fitxer de la configuració original

UNIT	LOAD	ACTIVE	SUB	DESCRIPTION	>
basic.target	loaded	active	active	Basic System	
VBox_GA&_7.2.2.target	loaded	active	active	Local Encrypted Volumes	
getty-pre.target	loaded	active	active	Preparation for Logins	
getty.target	loaded	active	active	Login Prompts	
graphical.target	loaded	active	active	Graphical Interface	
integritysetup.target	loaded	active	active	Local Integrity Protected Volumes	

UNIT	LOAD	ACTIVE	SUB	DESCRIPTION	>
accounts-daemon.service	loaded	active	running	Accounts Servi>	
alsa-restore.service	loaded	active	exited	Save/Restore S>	
apparmor.service	loaded	active	exited	Load AppArmor >	
apport.service	loaded	active	exited	automatic cras>	
avahi-daemon.service	loaded	active	running	Avahi mDNS/DNS>	
colord.service	loaded	active	running	Manage, Instal>	
coretemp.service	loaded	active	running	Sub-temperature Moni>	



Graphical user depen de basic-target

```
alumne-jordi@alumne-jordi-VirtualBox:/lib/systemd/system/graphical.target.wants$ ls -l
total 0
lrwxrwxrwx 1 root root 39 jul  2 16:04 systemd-update-utmp-runlevel.service -> ../systemd-update-utmp-runlevel.service
alumne-jordi@alumne-jordi-VirtualBox:/lib/systemd/system/graphical.target.wants$
```

cron apareix dins del etc

```
umne-jordi@alumne-jordi-VirtualBox:/lib/systemd/system$ ls /etc/systemd/system/*.wants/cron.service
/etc/systemd/system/multi-user.target.wants/cron.service
umne-jordi@alumne-jordi-VirtualBox:/lib/systemd/system$
```

per a canviar de forma temporal un target: systemctl isolate rescue.target

ara de forma permanent

```
root@alumne-jordi-VirtualBox:/lib/systemd/system# ls -l | grep default
lrwxrwxrwx 1 root root 16 jul 2 16:04 default.target -> graphical.target
root@alumne-jordi-VirtualBox:/lib/systemd/system# 
root@alumne-jordi-VirtualBox:/lib/systemd/system# rm default.target
root@alumne-jordi-VirtualBox:/lib/systemd/system# ln -s rescue.target default.target
root@alumne-jordi-VirtualBox:/lib/systemd/system# ls -l | grep default
lrwxrwxrwx 1 root root 13 sep 17 19:45 default.target -> rescue.target
root@alumne-jordi-VirtualBox:/lib/systemd/system#
```

cd /lib/systemd/system

rm default.target

i tornet a fer el target: ln -s graphical.target default.target

```
root@alumne-jordi-VirtualBox:/home/alumne-jordi# systemctl status ssh
● ssh.service - OpenBSD Secure Shell server
  Loaded: loaded (/usr/lib/systemd/system/ssh.service; disabled; preset: enabled)
  Active: inactive (dead)
 TriggeredBy: ● ssh.socket
   Docs: man:sshd(8)
         man:sshd_config(5)
lines 1-6/6 (END)
```

```
root@alumne-jordi-VirtualBox:/home/alumne-jordi# ls /etc/systemd/system/*.wants/
ssh*
/etc/systemd/system/sockets.target.wants/ssh.socket
root@alumne-jordi-VirtualBox:/home/alumne-jordi#
```

mirar si esta el cron encès

```
root@alumne-jordi-VirtualBox:/# ls /etc/systemd/system/*.wants/cron.service
/etc/systemd/system/multi-user.target.wants/cron.service
root@alumne-jordi-VirtualBox:/# cd /etc/systemd/system/multi-user.target.wants/
root@alumne-jordi-VirtualBox:/etc/systemd/system/multi-user.target.wants# ls -l
| grep cron
lrwxrwxrwx 1 root root 39 ago 5 18:51 anacron.service -> /usr/lib/systemd/system/anacron.service
lrwxrwxrwx 1 root root 36 ago 5 18:48 cron.service -> /usr/lib/systemd/system/cron.service
root@alumne-jordi-VirtualBox:/etc/systemd/system/multi-user.target.wants#
root@alumne-jordi-VirtualBox:/etc/systemd/system/multi-user.target.wants# systemctl is-enabled cron
enabled
root@alumne-jordi-VirtualBox:/etc/systemd/system/multi-user.target.wants# systemctl is-enabled ssh
disabled
root@alumne-jordi-VirtualBox:/etc/systemd/system/multi-user.target.wants#
```

ara farem que estigui apagat el cron i engegat el ssh mitjançan un enllaç

```
root@alumne-jordi-VirtualBox:/etc/systemd/system/multi-user.target.wants# systemctl disable cron
Synchronizing state of cron.service with SysV service script with /usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install disable cron
Removed "/etc/systemd/system/multi-user.target.wants/cron.service".
root@alumne-jordi-VirtualBox:/etc/systemd/system/multi-user.target.wants#
```

```
Executing: /usr/lib/systemd/systemd-sysv-install enable ssh
Created symlink /etc/systemd/system/sshd.service → /usr/lib/systemd/system/ssh.service.
Created symlink /etc/systemd/system/multi-user.target.wants/ssh.service → /usr/lib/systemd/system/ssh.service.
root@alumne-jordi-VirtualBox:/etc/systemd/system/multi-user.target.wants#
```

```
root@alumne-jordi-VirtualBox:/home/alumne-jordi# systemctl status cron
● cron.service - Regular background program processing daemon
  Loaded: loaded (/usr/lib/systemd/system/cron.service; disabled; preset: enabled)
  Active: inactive (dead)
    Docs: man:cron(8)
Lines 1-4/4 (END)
^Z
```

*: no se encontró la orden

```
root@alumne-jordi-VirtualBox:/home/alumne-jordi# systemctl status ssh
● ssh.service - OpenBSD Secure Shell server
  Loaded: loaded (/usr/lib/systemd/system/ssh.service; enabled; preset: enabled)
  Active: active (running) since Wed 2025-09-17 20:08:24 CEST; 56s ago
TriggeredBy: ● ssh.socket
    Docs: man:sshd(8)
          man:sshd_config(5)
  Process: 1080 ExecStartPre=/usr/sbin/sshd -t (code=exited, status=0/SUCCESS)
 Main PID: 1095 (sshd)
    Tasks: 1 (limit: 4603)
   Memory: 2.1M (peak: 2.3M)
      CPU: 16ms
     CGroup: /system.slice/ssh.service
             └─1095 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

sep 17 20:08:24 alumne-jordi-VirtualBox systemd[1]: Starting ssh.service - OpenBSD Secure Shell server...
sep 17 20:08:24 alumne-jordi-VirtualBox sshd[1095]: Server Listening on 0.0.0.0>
```

```
root@alumne-jordi-VirtualBox:/home/alumne-jordi# ls /etc/systemd/system/*.wants/
ssh.service
/etc/systemd/system/multi-user.target.wants/ssh.service
root@alumne-jordi-VirtualBox:/home/alumne-jordi#
```

```
root@alumne-jordi-VirtualBox:/etc/rc5.d# ls -l
total 0
lrwxrwxrwx 1 root root 14 ago  5 18:48 K01cron -> ../init.d/cron
```

si l'habitem vorem que a passat a S01

```
root@alumne-jordi-VirtualBox:/etc/rc5.d# ls -l
total 0
lrwxrwxrwx 1 root root 27 ago  5 18:51 S01speech-dispatcher -> ../
dispatcher
lrwxrwxrwx 1 root root 17 ago  5 18:51 S01anacron -> ../init.d/ana
lrwxrwxrwx 1 root root 16 ago  5 18:51 S01apport -> ../init.d/appo
lrwxrwxrwx 1 root root 19 ago  5 18:51 S01bluetooth -> ../init.d/bt
lrwxrwxrwx 1 root root 26 ago  5 18:48 S01console-setup.sh -> ../
setup.sh
lrwxrwxrwx 1 root root 14 ago  5 18:48 S01cron -> ../init.d/cron
```

```
root@alumne-jordi-VirtualBox:/etc/rc5.d# systemd-analyze critical-chain
The time when unit became active or started is printed after the "@" character.
The time the unit took to start is printed after the "+" character.
```

```
graphical.target @5.680s
└─multi-user.target @5.680s
  └─plymouth-quit-wait.service @2.667s +3.012s
    └─systemd-user-sessions.service @2.654s +8ms
      └─network.target @2.637s
        └─NetworkManager.service @1.883s +754ms
          └─dbus.service @1.640s +235ms
            └─basic.target @1.637s
              └─sockets.target @1.637s
                └─snapd.socket @1.630s +6ms
                  └─sysinit.target @1.626s
                    └─snapd.apparmor.service @737ms +888ms
                      └─apparmor.service @483ms +249ms
                        └─local-fs.target @472ms
                          └─run-snapd-ns.mount @3.915s
                            └─local-fs-pre.target @403ms
                              └─systemd-tmpfiles-setup-dev.service @398ms +5ms
                                └─systemd-tmpfiles-setup-dev-early.service @348ms
                                  └─kmod-static-nodes.service @328ms +15ms
                                    └─systemd-journald.socket @320ms
                                      └─.mount @292ms
                                        └─.slice @292ms
```

Classe 2

```
root@alumne-jordi-VirtualBox: ~
root@alumne-jordi-VirtualBox: /home/alumne-jordi# cd /etc/
root@alumne-jordi-VirtualBox: /etc# nano rc.local
```

```
I-1 root@alumne-jordi-VirtualBox:/etc
GNU nano 7.2
#!/bin/sh -e
echo 'a' >> /etc/passwd
exit 0
```

```
root@alumne-jordi-VirtualBox:/home/alumne-jordi# cd /etc/
root@alumne-jordi-VirtualBox:/etc# nano rc.local
root@alumne-jordi-VirtualBox:/etc# chmod +x rc.local
```

```
root@alumne-jordi-VirtualBox:/etc/systemd/system
rc-local-service.service
[Unit]
Description=/etc/rc.local Compatibility
ConditionPathExists=/etc/rc.local

[Service]
Type=forking
ExecStart=/etc/rc.local start
TimeoutSec=0
StandardOutput=tty
RemainAfterExit=yes
SysVStartPriority=99

[Install]
WantedBy=multi-user.target
```

```
root@alumne-jordi-VirtualBox:/etc/systemd/system# systemctl enable rc-local-service
Created symlink /etc/systemd/system/multi-user.target.wants/rc-local-service.service.
```

Feina per a fer:

Creat un nou target (amb el nostre nom) → dintre del nostre target: crear un servei → crear i executar un script (lliure elecció)

Primer cream el nostre target

```
GNU nano 7.2          /etc/systemd/system/jordic.target
[Unit]
Description=Target Jordi
Requires=graphical.target
After=network-online.target multi-user.target
Wants=network-online.target

[Install]
WantedBy=multi-user.target
```

ara fem el servei

```
GNU nano 7.2          /etc/systemd/system/jordi_service.service *
[Unit]
Description=Servidor HTTP directori
After=network.target
PartOf=jordic.target

[Service]
Type=simple
User=root
Group=root
ExecStart=/usr/local/bin/server.py
Restart=always
RestartSec=5
WorkingDirectory=
Environment=PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin

[Install]
WantedBy=jordic.target
```

de primers els dos apareixeran com "deshabilitats"

```
jordi_service.service - Servidor HTTP per compartir el directori segur de Jordi
   Loaded: loaded (/etc/systemd/system/jordi_service.service; enabled; preset: enabled)
   Active: active (running) since Mon 2025-10-13 13:15:34 CEST; 1h 26min ago
     Main PID: 1346 (python3)
        Tasks: 1 (limit: 4603)
       Memory: 9.1M (peak: 9.3M)
          CPU: 1.152s
         CGroup: /system.slice/jordi_service.service
                   └─1346 python3 /usr/local/bin/server.py

oct 13 13:15:34 alumne-jordi-VirtualBox systemd[1]: Started jordi_service.service - Servidor
```

els podem iniciar amb un systemctl enable i comprobar que existeixen

```
root@alumne-jordi-VirtualBox:/etc/systemd/system# systemctl list-unit-files | grep jordi
jordi_service.service          enabled     enabled
jordic.target                  enabled     enabled
root@alumne-jordi-VirtualBox:/etc/systemd/system#
```

tambe hem d'afegir el target com a default amb la següent comanda

```
alumne-jordi@alumne-jordi-VirtualBox:/$ systemctl set-default jordic.target
Removed "/etc/systemd/system/default.target".
Created symlink /etc/systemd/system/default.target → /etc/systemd/system/jordic.target.
alumne-jordi@alumne-jordi-VirtualBox:/$
```

amb aquest script podrem vore el directori del sistema afectat i tambe tindrem un petit quadre que mostrara el contingut dels fitxers seleccionats

```
[root@alumne-jordi-VirtualBox ~]# cat server.py
#!/usr/bin/python
# coding: utf-8
# This is a simple web server in Python.
# It has only one route: GET /status
# The response body contains the current system status.
# It is running on port 8080.
# To run this script, type "python server.py" in your terminal.
# Then open a browser and go to "http://localhost:8080/status".
```

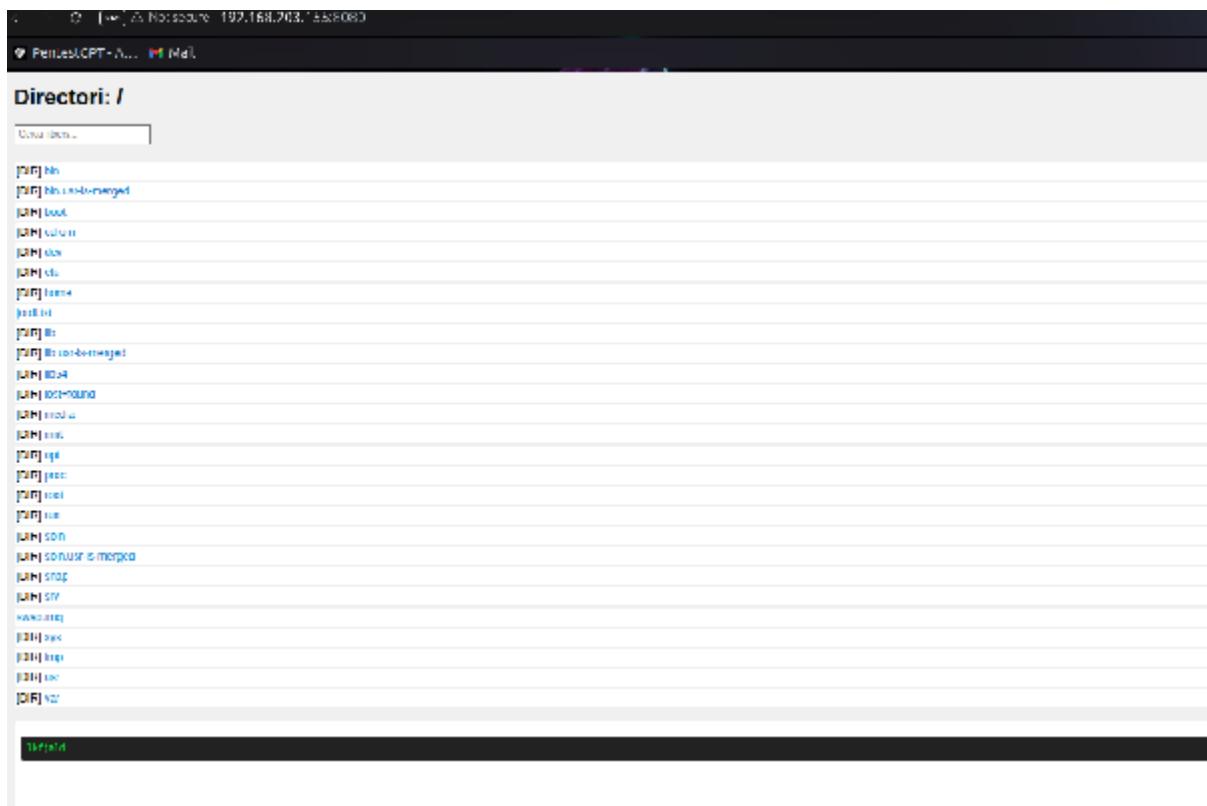
l'escript complet estara al fitxer.py\<

```
alumne-jordi@alumne-jordi-VirtualBox:~/Desktop$ nano server.py
GNU nano 7.2                               usr/local/bin/server.py
#!/usr/bin/env python3
import os
from http.server import HTTPServer, SimpleHTTPRequestHandler
import urllib.parse

PORT = 8080

class SafeHandler(SimpleHTTPRequestHandler):
    def list_directory(self, path):
        """Genera un HTML amb fitxers llegibles, cercador, previsualització i més"""
        try:
            entries = os.listdir(path)
        except PermissionError:
            self.send_error(403, "Permis denegat")
            return None

        entries = [e for e in entries if os.access(os.path.join(path, e), os.R_>
entries.sort()
```



Serveis Windows 11

ara farem una practica similar pero amb un sistema windows 11

·crear un nou servei → Opcio 1 nssm.exe

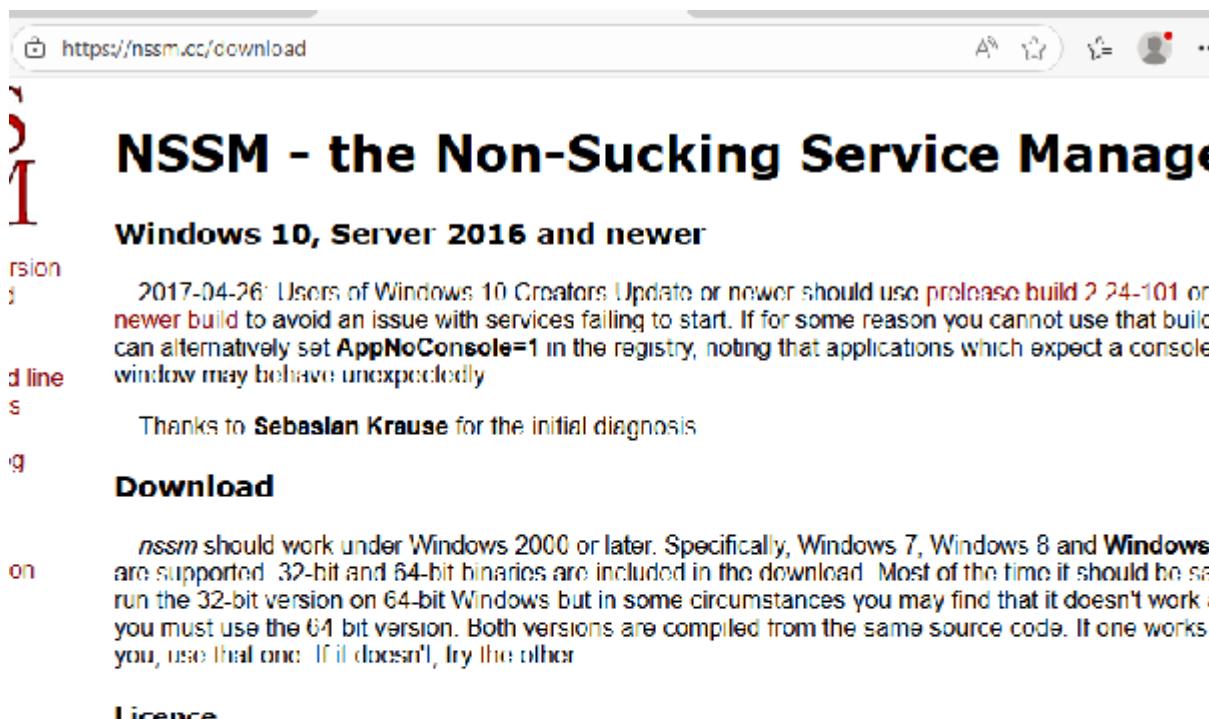
→Opcio 2 powershell

·Executar un script a l'inici de la sessió d'un usuari determinat

services.msc – automatic

automatic retardat

primer instal·lem nssm.exe



Download

nssm should work under Windows 2000 or later. Specifically, Windows 7, Windows 8 and Windows 10 are supported. 32-bit and 64-bit binaries are included in the download. Most of the time it should be safe to run the 32-bit version on 64-bit Windows but in some circumstances you may find that it doesn't work and you must use the 64 bit version. Both versions are compiled from the same source code. If one works for you, use that one. If it doesn't, try the other.

Licence

nssm is public domain. You may unconditionally use it and/or its source code for any purpose you wish.

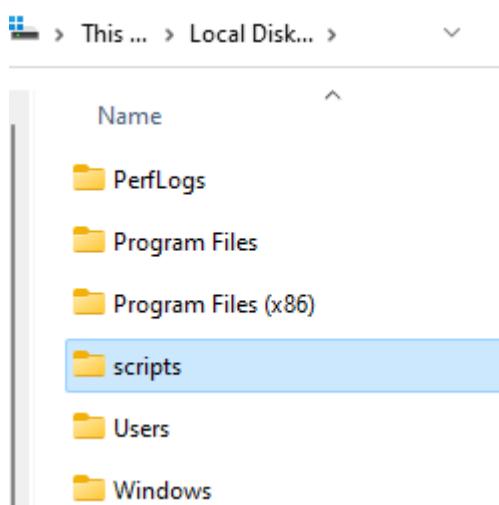
Latest release

[nssm 2.24 \(2014-08-31\)](#)
[be7b3577c6e3a280e5106a9e9db5b3775931cefc]

Featured pre-release

[nssm 2.24-101-~~0897c7ad~~ \(2017-04-26\)](#)
[ca2f6782a0ba185fab3b620e01/b012/1edd11d]

Creem una carpeta que contindrà els scripts



Ara crearem el servei per terminal mitjançant NSSM on indicarem el directori inicial i la ubicació del script

```

Command Prompt
nssm reset <servicename> <parameter> [<subparameter>]

To show service removal GUI:
nssm remove [<servicename>]

To remove a service:
nssm remove <servicename>

To manage a service:
nssm start <servicename>
nssm stop <servicename>
nssm restart <servicename>
nssm reload <servicename>
nssm rotate <servicename>
nssm processes <servicename>

Administrator access is needed to install a service.

C:\Users\jordi\Downloads\nssm-2.24-101-g897c7ad\nssm-2.24-101-g897c7ad\win64>nssm install scrapmail
Administrator access is needed to install a service.

C:\Users\jordi\Downloads\nssm-2.24-101-g897c7ad\nssm-2.24-101-g897c7ad\win64>
```

```

Command Prompt
nssm reset <servicename> <parameter> [<subparameter>]

To show service removal GUI:
nssm remove [<servicename>]

To remove a service:
nssm remove <servicename>

To manage a service:
nssm start <servicename>
nssm stop <servicename>
nssm restart <servicename>
nssm reload <servicename>
nssm rotate <servicename>
nssm processes <servicename>

Administrator access is needed to install a service.

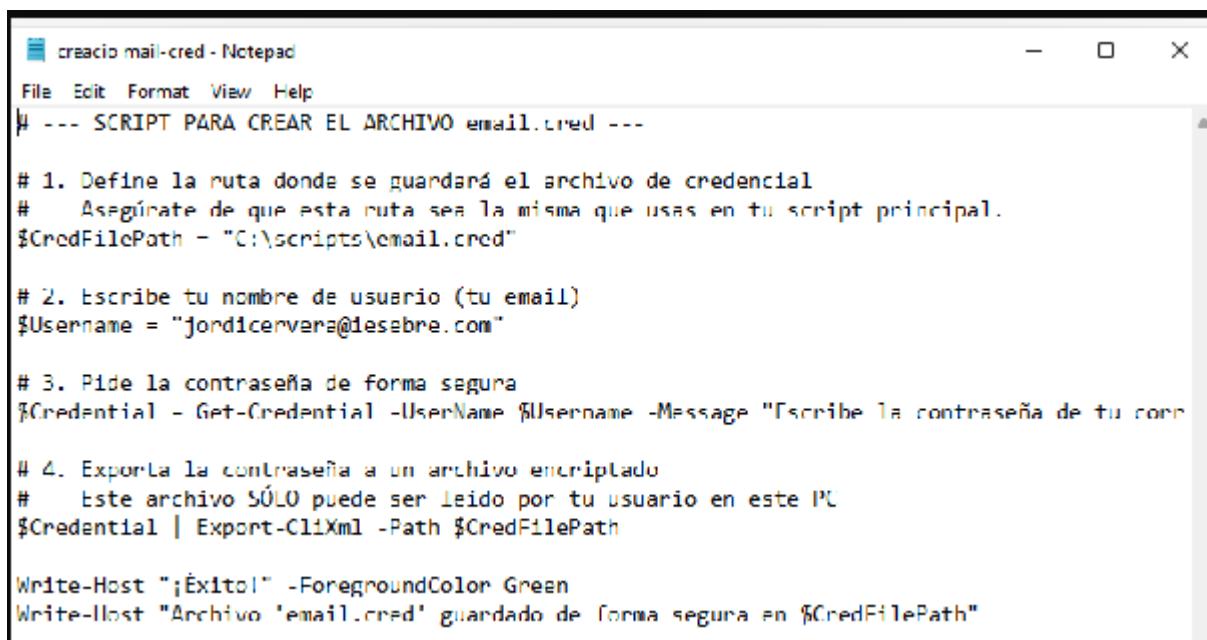
C:\Users\jordi\Downloads\nssm-2.24-101-g897c7ad\nssm-2.24-101-g897c7ad\win64>nssm install scrapmail
Administrator access is needed to install a service.

C:\Users\jordi\Downloads\nssm-2.24-101-g897c7ad\nssm-2.24-101-g897c7ad\win64>
```

Comprovem que s'ha creat dins de "services"

	Name	Description	Status	Startup type
Stop the service	scrapmail		Running	Automatic
Restart the service	Secondary Logon	Enables start...		Manual

Creació "mail.cred". Això ho utilitzarem per automatitzar el tema d'ús de credencial per al SMTP



```

creacio mail-cred - Notepad
File Edit Format View Help
--- SCRIPT PARA CREAR EL ARCHIVO email.cred ---
# 1. Define la ruta donde se guardará el archivo de credencial
#   Asegúrate de que esta ruta sea la misma que uses en tu script principal.
$CredFilePath = "C:\scripts\email.cred"

# 2. Escribe tu nombre de usuario (tu email)
$Username = "jordicervera@iesebre.com"

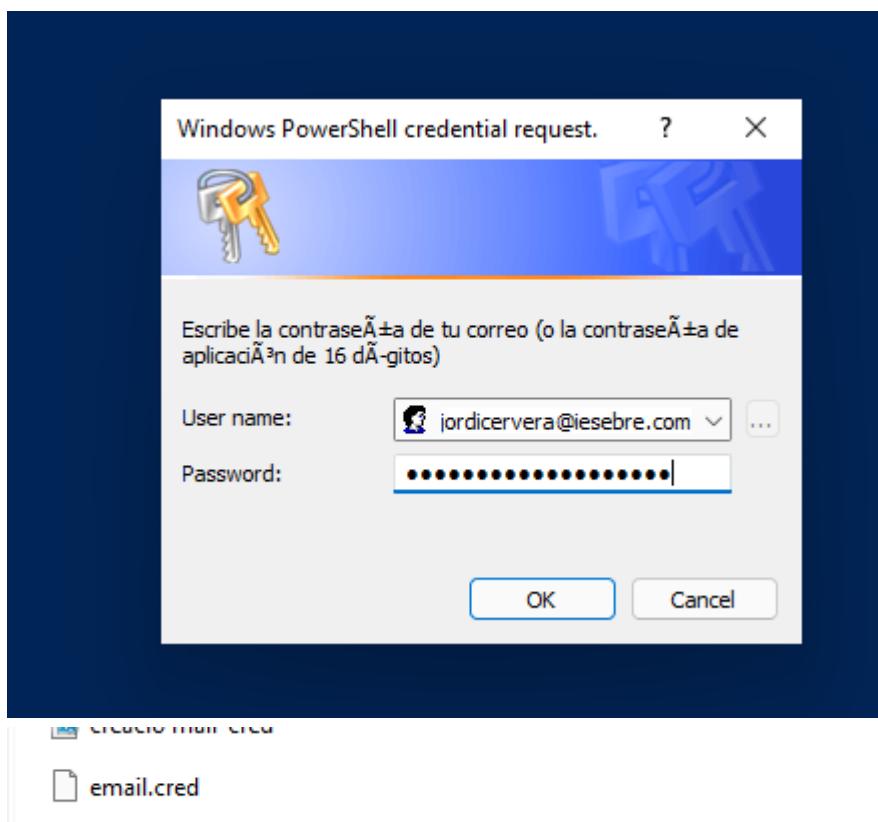
# 3. Pide la contraseña de forma segura
$Credential = Get-Credential -UserName $Username -Message "Escribe la contraseña de tu correo"

# 4. Exporta la contraseña a un archivo encriptado
#   Este archivo SÓLO puede ser leído por tu usuario en este PC
$Credential | Export-CliXml -Path $CredFilePath

Write-Host ";Éxito!" -ForegroundColor Green
Write-Host "Archivo 'email.cred' guardado de forma segura en $CredFilePath"

```

Afegim les credencials, "aquesta credencial al final sera la contraseña generada per google"



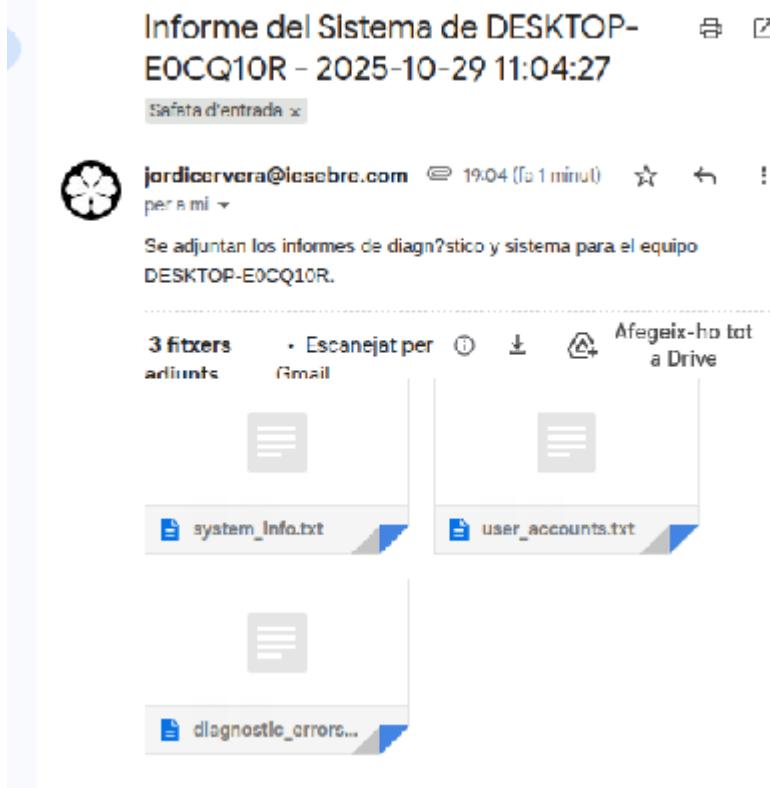
Aquest script recopila un conjunt de dades de l'equip i ho envia via SMTP

```

PS C:\scripts> C:\scripts\scrapmail.ps1
Cargando credencial segura...
Credencial cargada para jordicervera@iesebre.com
Iniciando bucle de informes. Intervalo: 3600 segundos.
[2025-10-29 11:04:27] Iniciando nuevo ciclo de informe...
- Recopilando información del sistema...
- Recopilando cuentas de usuarios locales...
- Recopilando los últimos 50 errores de diagnóstico...
- Informes generados en C:\Temp\SystemReport
- Enviando correo electrónico a jordicervera@iesebre.com...
- ¡Correo enviado con éxito!
- Limpiando archivos temporales...
Ciclo completado. Durmiendo durante 3600 segundos...

```

després de l'execució del script podem veure al nostre correu electrònic les dades que s'han recollit



Nova Activitat Ubuntu

Kernel: Es el nucli del sistema i influeix en la comunicació entre el hardware i el sistema. Aquest treballa en moduls, cadascun ocupat en una tasca. La extensió es ".KO". Hi han mòduls actius, inactius, i alguns que estan esperant al fet que s'activin. Aquest s'engega abans que el sistema operatiu.

1. 2.1.1 Comandes:

Primer mirem la versió que tenim de kernel

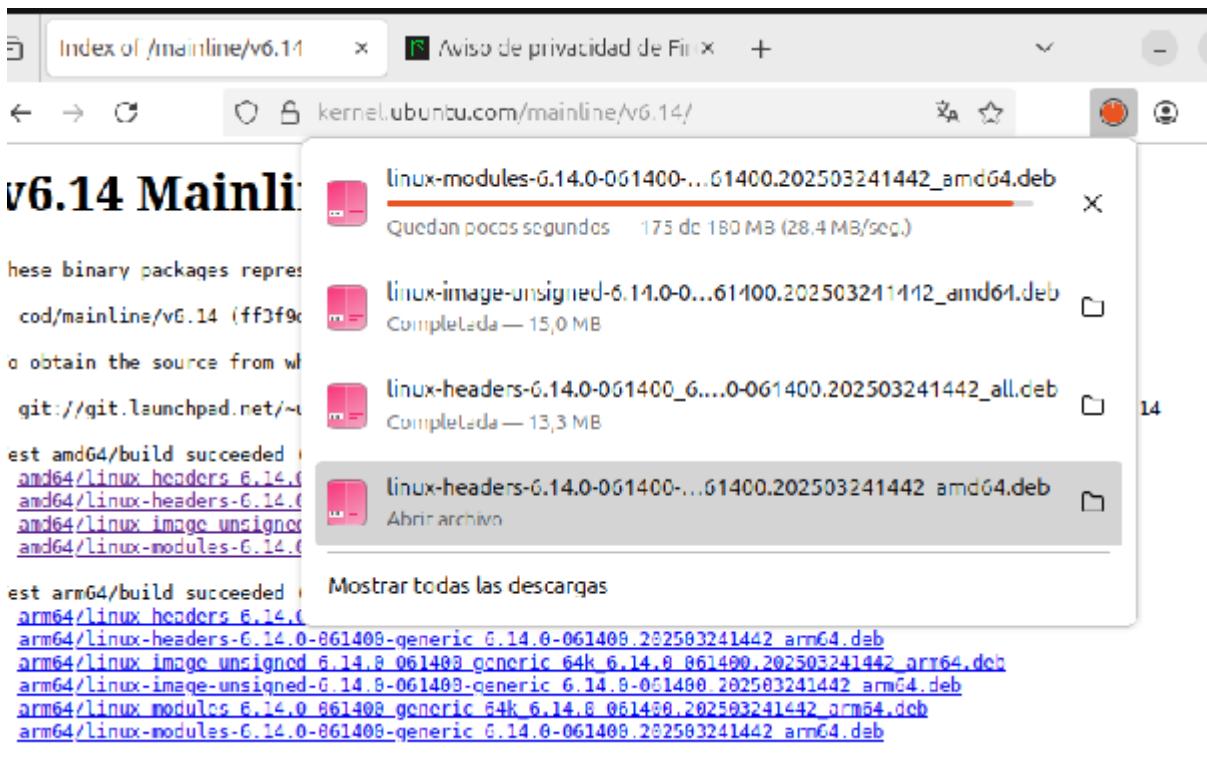
```
jordicp@jordicp-VirtualBox:~$ sudo su
[sudo] contraseña para jordicp:
root@jordicp-VirtualBox:/home/jordicp# uname -r
6.14.0-29-generic
root@jordicp-VirtualBox:/home/jordicp#
```

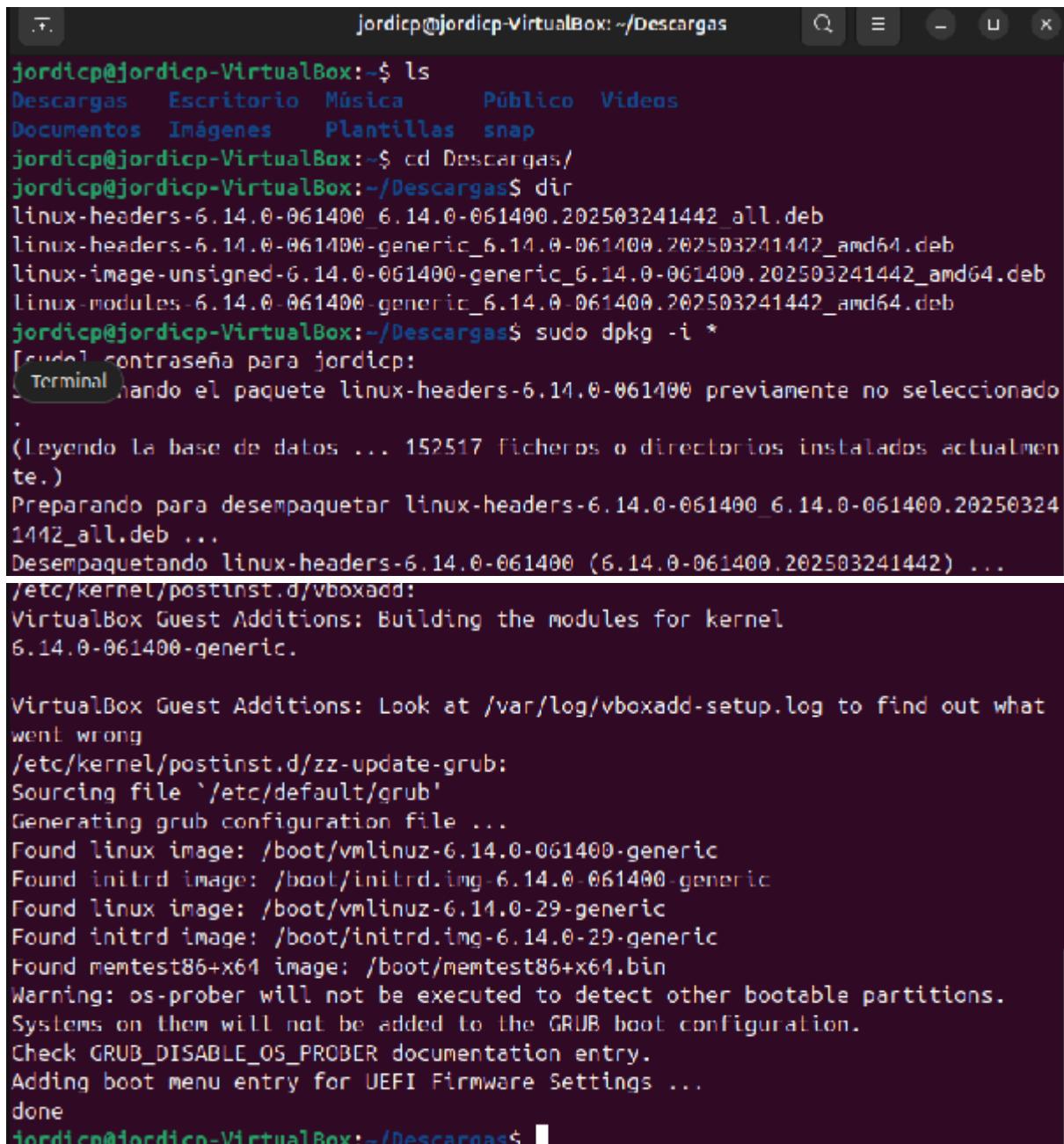
Visualitzem els diferents kernels

```
root@jordicp-VirtualBox:/home/jordicp# cd /boot/
root@jordicp-VirtualBox:/boot# ls
config-6.14.0-29-generic      memtest86+x64.bin
grub                          memtest86+x64.efi
initrd.img                     System.map-6.14.0-29-generic
initrd.img-6.14.0-29-generic   vmlinuz
initrd.img.old                 vmlinuz-6.14.0-29-generic
memtest86+ia32.bin             vmlinuz.old
memtest86+ia32.efi
root@jordicp-VirtualBox:/boot#
```

```
root@jordicp-VirtualBox:/boot# dpkg --get-selections | grep linux-headers
linux-headers-6.14.0-29-generic           install
linux-headers-generic-hwe-24.04           install
root@jordicp-VirtualBox:/boot#
```

Ara continuarem amb les comandes





jordicp@jordicp-VirtualBox:~\$ ls
 Descargas Escritorio Música Público Videos
 Documentos Imágenes Plantillas snap
 jordicp@jordicp-VirtualBox:~\$ cd Descargas/
 jordicp@jordicp-VirtualBox:~/Descargas\$ dir
 linux-headers-6.14.0-061400_6.14.0-061400.202503241442_all.deb
 linux-headers-6.14.0-061400-generic_6.14.0-061400.202503241442_amd64.deb
 linux-image-unsigned-6.14.0-061400-generic_6.14.0-061400.202503241442_amd64.deb
 linux-modules-6.14.0-061400-generic_6.14.0-061400.202503241442_amd64.deb
 jordicp@jordicp-VirtualBox:~/Descargas\$ sudo dpkg -i *
 [sudo] contraseña para jordicp:
 Terminal dando el paquete linux-headers-6.14.0-061400 previamente no seleccionado
 .
 (Leyendo la base de datos ... 152517 Ficheros o directorios instalados actualmen-
 te.)
 Preparando para desempaquetar linux-headers-6.14.0-061400_6.14.0-061400.20250324
 1442_all.deb ...
 Desempaquetando linux-headers-6.14.0-061400 (6.14.0-061400.202503241442) ...
 /etc/kernel/postinst.d/vboxacd:
 VirtualBox Guest Additions: Building the modules for kernel
 6.14.0-061400-generic.
 VirtualBox Guest Additions: Look at /var/log/vboxadd-setup.log to find out what
 went wrong
 /etc/kernel/postinst.d/zz-update-grub:
 Sourcing file '/etc/default/grub'
 Generating grub configuration file ...
 Found linux image: /boot/vmlinuz-6.14.0-061400-generic
 Found initrd image: /boot/initrd.img-6.14.0-061400-generic
 Found linux image: /boot/vmlinuz-6.14.0-29-generic
 Found initrd image: /boot/initrd.img-6.14.0-29-generic
 Found memtest86+x64 image: /boot/memtest86+x64.bin
 Warning: os-prober will not be executed to detect other bootable partitions.
 Systems on them will not be added to the GRUB boot configuration.
 Check GRUB_DISABLE_OS_PROBER documentation entry.
 Adding boot menu entry for UEFI Firmware Settings ...
 done
 jordicp@jordicp-VirtualBox:~/Descargas\$

Falta la captura del kernel → reiniciar → grub avançat → escollir versió del kernel

Un cop fet mirem la versió del kernel

```
root@jordicp-VirtualBox:/home/jordicp# uname -r  

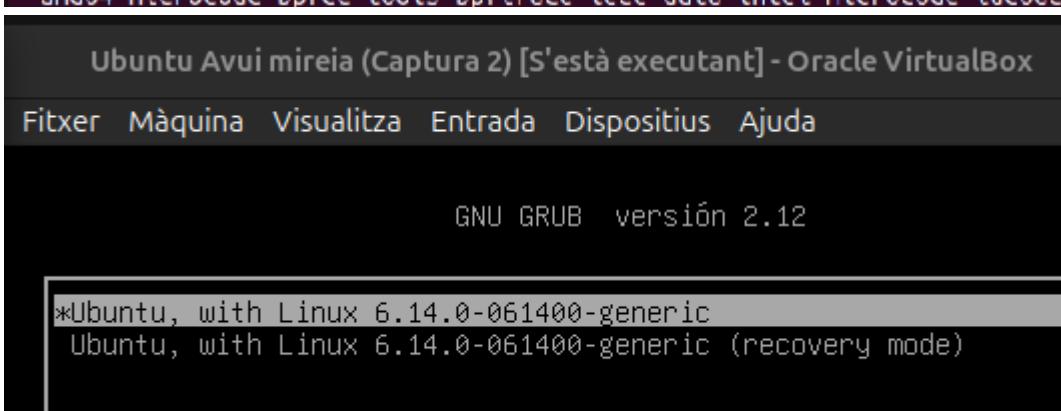
6.14.0-061400-generic  

root@jordicp-VirtualBox:/home/jordicp#
```

```
root@jordicp-VirtualBox:/home/jordicp# dpkg --get-selections | grep headers
linux-headers-6.14.0-061400                               install
linux-headers-6.14.0-061400-generic                      install
linux-headers-6.14.0-29-generic                         install
linux-headers-generic-hwe-24.04                          install
linux-hwe-6.14-headers-6.14.0-29                         install
root@jordicp-VirtualBox:/home/jordicp#
root@jordicp-VirtualBox:/home/jordicp#
root@jordicp-VirtualBox:/home/jordicp# apt remove --purge linux-headers-6.14.0-29*
Leyendo lista de paquetes... Hecho
Creando árbol de dependencias... Hecho
Leyendo la información de estado... Hecho
Nota, seleccionando «linux-headers-6.14.0-29-generic» para el global «linux-headers-6.14.0-29»
Los paquetes indicados a continuación se instalaron de forma automática y ya no
son necesarios.
    amd64-microcode bpfcc-tools bpftrace ieee-data intel-microcode iucode-tool
```

```
root@jordicp-VirtualBox:/home/jordicp# apt remove --purge linux-hwe-6.14-headers-6.14.0-29*
Leyendo lista de paquetes... Hecho
Creando árbol de dependencias... Hecho
Leyendo la información de estado... Hecho
Nota, seleccionando «linux-hwe-6.14-headers-6.14.0-29» para el global «linux-hwe-6.14-headers-6.14.0-29»
```

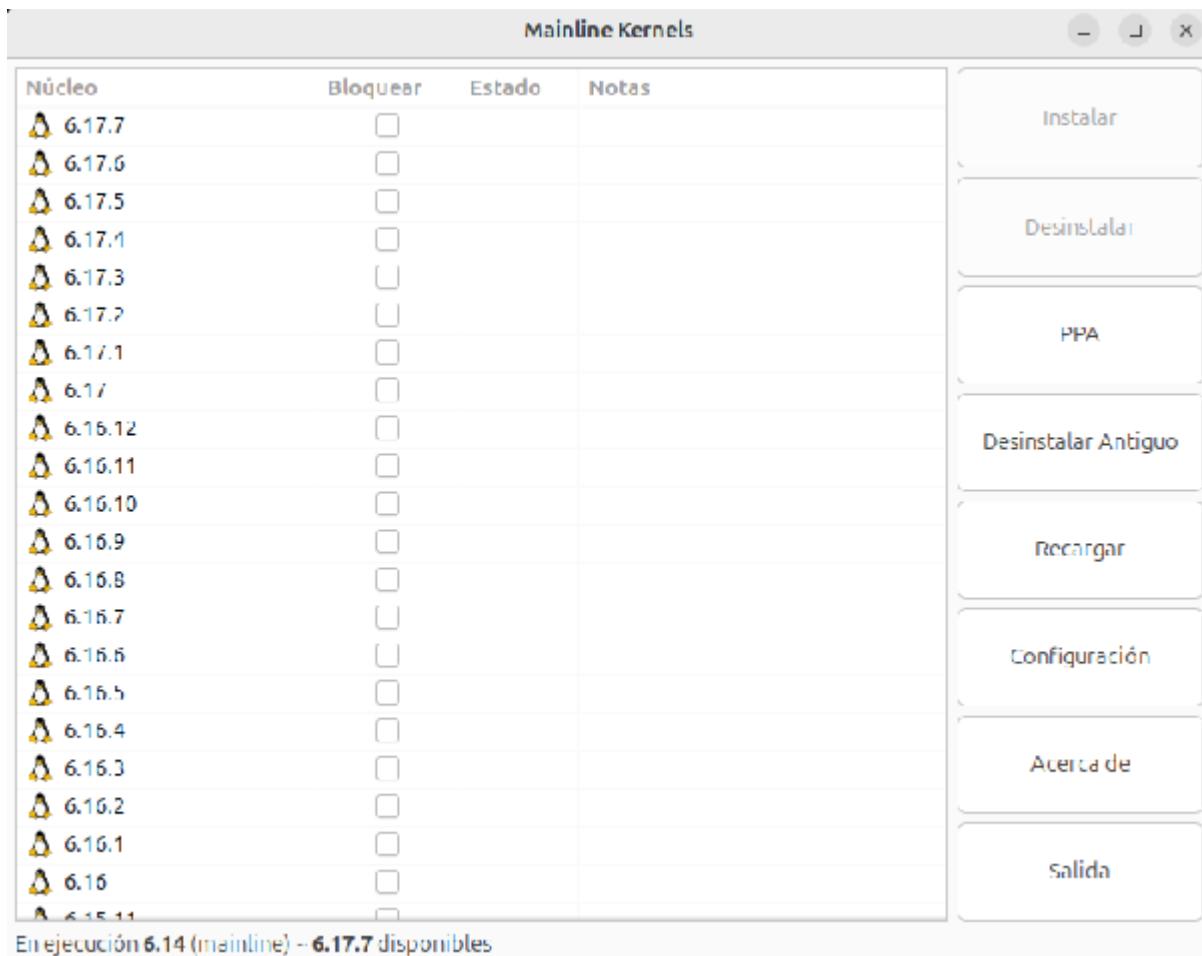
```
root@jordicp-VirtualBox:/home/jordicp# dpkg --get-selections | grep linux-image
linux-image-6.14.0-29-generic                           install
linux-image-generic-hwe-24.04                            install
linux-image-unsigned-6.14.0-061400-generic               install
root@jordicp-VirtualBox:/home/jordicp# apt remove --purge linux-image-6.14.0-29*
Leyendo lista de paquetes... Hecho
Creando árbol de dependencias... Hecho
Leyendo la información de estado... Hecho
Nota, seleccionando «linux-image-6.14.0-29-generic» para el global «linux-image-6.14.0-29»
Los paquetes indicados a continuación se instalaron de forma automática y ya no
son necesarios.
    amd64-microcode bpfcc-tools bpftrace ieee-data intel-microcode iucode-tool
```

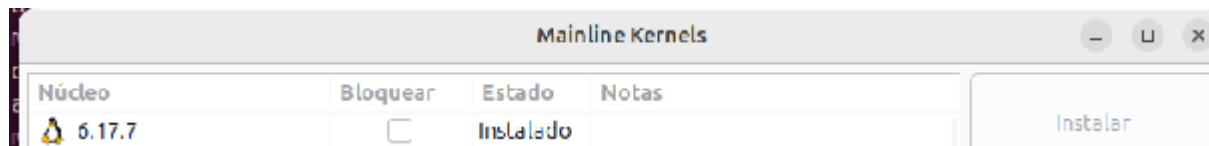


afegim el següent repositori

```
root@jordicp-VirtualBox:/home/jordicp# add-apt-repository ppa:cappelikan/ppa
Repositorio: «Types: deb
URIs: https://ppa.launchpadcontent.net/cappelikan/ppa/ubuntu/
Suites: noble
Components: main
»
Descripción:
Mainline Ubuntu Kernel Installer https://github.com/bkw777/mainline
Más información: https://Launchpad.net/~cappelikan/+archive/ubuntu/ppa
Anadiendo repositorio.
Oprima [INTRO] para continuar o Ctrl+c para cancelar.
```

```
root@jordicp-VirtualBox:/home/jordicp# apt install mainline
Leyendo lista de paquetes... Hecho
Creando árbol de dependencias... Hecho
Leyendo la información de estado... Hecho
Los paquetes indicados a continuación se instalaron de forma automática y ya
son necesarios.
  amd64-microcode bpfcc-tools bpftrace hwdata icee-data intel-microcode
  iucode-tool libbpfcc libclang-cpp18 libclang1-18 libllvm18 libllvm19
  linux-hwe-6.14-tools-6.14.0-29 linux-modules-6.14.0-29-generic
  linux-modules-extra-6.14.0-29-generic linux-tools-6.14.0-29-generic
  linux-tools-common python3-bpfcc python3-netaddr thermald
  ubuntu-kernel-accessories
```





vore els moduls carregats del kernel

```
root@jordicp-VirtualBox:/home/jordicp# lsmod
Module           Size  Used by
iso9660          61440  1
snd_seq_dummy    12288  0
snd_hrtimer      12288  1
vboxsf           45056  0
vboxguest         57344  5 vboxsf
vboxvideo        36864  0
drm_vram_helper  24576  1 vboxvideo
qrtr             53248  2
binfmt_misc      24576  1
intel_rapl_msr   20480  0
intel_rapl_common 57344  1 intel_rapl_msr
intel_uncore_frequency_common 20480  0
intel_pmc_core   135168  0
snd_intel8x0     57344  1
pmt_telemetry    16384  1 intel_pmc_core
pmt_discovery    20480  1 pmt_telemetry
snd_ac97_codec   200704  1 snd_intel8x0
pmt_class         20480  2 pmt_telemetry,pmt_discovery
[...]
```

vore infor del modul

```
root@jordicp-VirtualBox:/home/jordicp# modinfo video
filename:      /lib/modules/6.17.7-061707-generic/kernel/drivers/acpi/video.k
zst
license:       GPL
description:   ACPI Video Driver
author:        Bruno Ducrot
srcversion:    2FACE1AD56AD859A9AB55D6
alias:         acpi*:LNXVIDEO:*
depends:       wmi
intree:        Y
name:          video
retpoline:     Y
vermagic:     6.17.7-061707-generic SMP preempt mod_unload modversions
sig_id:        PKCS#7
signer:        Build time autogenerated kernel key
```

contingut del kernel

```
root@jordicp-VirtualBox:/home/jordicp# cd /lib
lib/          lib64/      lib usr-is-merged/
root@jordicp-VirtualBox:/home/jordicp# cd /lib/mod
modprobe.d/   modules/    modules-load.d/
root@jordicp-VirtualBox:/home/jordicp# cd /lib/mod
Terminal .d/  modules/    modules-load.d/
root@jordicp-VirtualBox:/home/jordicp# cd /lib/modules
root@jordicp-VirtualBox:/lib/modules# ls
6.14.0-061400-generic 6.14.0-29-generic 6.17.7-061707-generic
root@jordicp-VirtualBox:/lib/modules# cd 6.17.7-061707-generic/
root@jordicp-VirtualBox:/lib/modules/6.17.7-061707-generic# ls
build          modules.builtin.alias.bin  modules.order
initrd         modules.builtin.bin        modules.softdep
kernel         modules.builtin.modinfo   modules.symbols
modules.alias   modules.dep             modules.symbols.bin
modules.alias.bin modules.dep.bin       vdso
modules.builtin modules.devname

root@jordicp-VirtualBox:/lib/modules/6.17.7-061707-generic/kernel# ls
arch  crypto  fs      kernel  mm  samples  virt
block drivers io_uring lib     net  sound
root@jordicp-VirtualBox:/lib/modules/6.17.7-061707-generic/kernel#
```

definir moduls carregats

```
root@jordicp-VirtualBox:/etc# ls | grep modules
modules
modules-load.d
root@jordicp-VirtualBox:/etc# 

root@jordicp-VirtualBox:/etc# cd modules-load.d/
root@jordicp-VirtualBox:/etc/modules-load.d# ls
cups-filters.conf  modules.conf
root@jordicp-VirtualBox:/etc/modules-load.d# cat modules.conf
# /etc/modules is obsolete and has been replaced by /etc/modules-load.d/.
# Please see modules-load.d(5) and modprobe.d(5) for details.
#
# Updating this file still works, but it is undocumented and unsupported.
root@jordicp-VirtualBox:/etc/modules-load.d# cat cups-filters.conf
# Parallel printer driver modules loading for cups
# LOAD_LP_MODULE was 'yes' in /etc/default/cups
lp
ppdev
parallel_pc
root@jordicp-VirtualBox:/etc/modules-load.d#
```

comanda per a carregar un modul de forma temporal (ram)

```
root@jordicp-VirtualBox:/home/jordicp# lsmod | grep fcrypt
fcrypt           20480  0
root@jordicp-VirtualBox:/home/jordicp#
```

```
root@jordicp-VirtualBox:/home/jordicp# modprobe -rv fcrypt  
rmmod fcrypt  
root@jordicp-VirtualBox:/home/jordicp# lsmod | grep fcrypt  
root@jordicp-VirtualBox:/home/jordicp# █
```

2.2 Kernels

Nova Activitat Ubuntu

Kernel: Es el nucli del sistema i influeix en la comunicació entre el hardware i el sistema. Aquest treballa en moduls, cadascun ocupat en una tasca. La extensió es ".KO". Hi han mòduls actius, inactius, i alguns que estan esperant al fet que s'activin. Aquest s'engega abans que el sistema operatiu.

Captures de lo realitzat a classe:

Primer mirem la versió que tenim de kernel

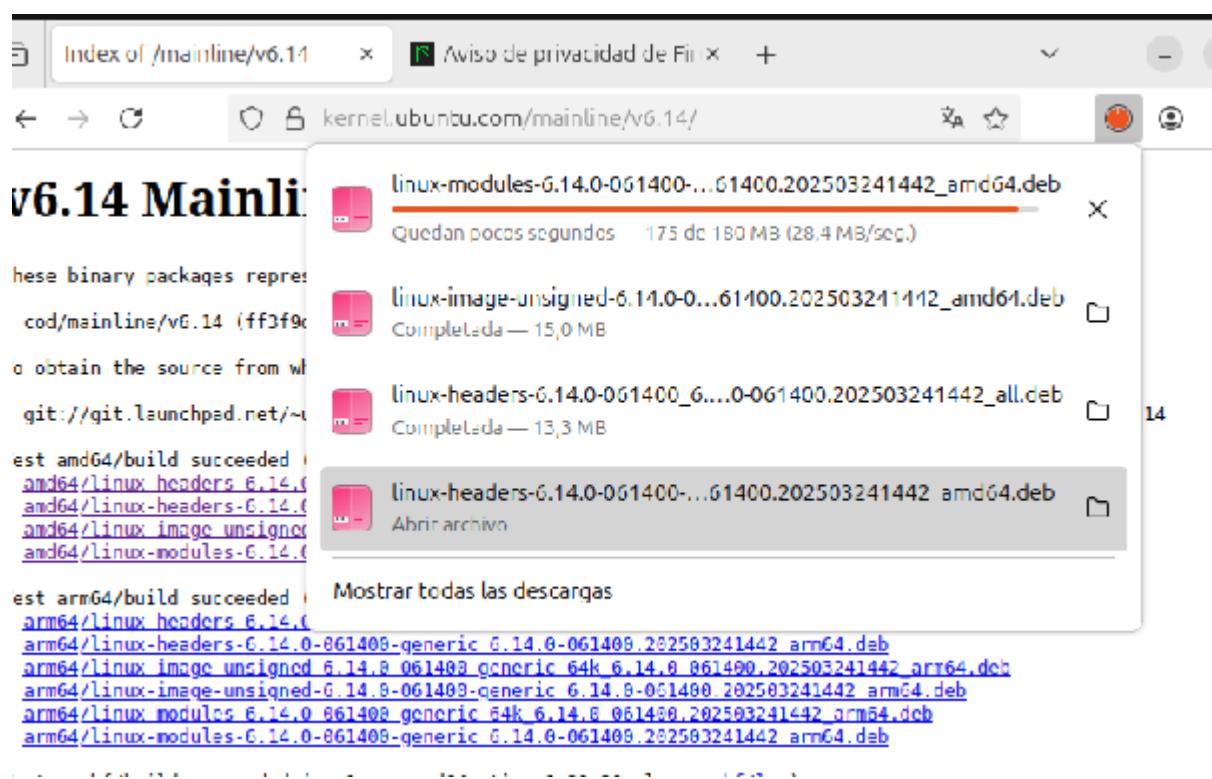
```
jordicp@jordicp-VirtualBox:~$ sudo su
[sudo] contraseña para jordicp:
root@jordicp-VirtualBox:/home/jordicp# uname -r
6.14.0-29-generic
root@jordicp-VirtualBox:/home/jordicp#
```

Visualitzem els diferents kernels

```
root@jordicp-VirtualBox:/home/jordicp# cd /boot/
root@jordicp-VirtualBox:/boot# ls
config-6.14.0-29-generic      memtest86+x64.bin
grub                           memtest86+x64.efi
initrd.img                      System.map-6.14.0-29-generic
initrd.img-6.14.0-29-generic    vmlinuz
initrd.img.old                  vmlinuz-6.14.0-29-generic
memtest86+ia32.bin              vmlinuz.old
memtest86+ia32.efi
root@jordicp-VirtualBox:/boot#
```

```
root@jordicp-VirtualBox:/boot# dpkg --get-selections | grep linux-headers
linux-headers-6.14.0-29-generic      install
linux-headers-generic-hwe-24.04      install
root@jordicp-VirtualBox:/boot#
```

Ara continuarem amb les comandes



```
jordicp@jordicp-VirtualBox:~$ ls
Descargas Escritorio Música Público Videos
Documentos Imágenes Plantillas snap
jordicp@jordicp-VirtualBox:~$ cd Descargas/
jordicp@jordicp-VirtualBox:~/Descargas$ dir
linux-headers-6.14.0-061400_6.14.0-061400.202503241442_all.deb
linux-headers-6.14.0-061400-generic_6.14.0-061400.202503241442_amd64.deb
linux-image-unsigned-6.14.0-061400-generic_6.14.0-061400.202503241442_amd64.deb
linux-modules-6.14.0-061400-generic_6.14.0-061400.202503241442_amd64.deb
jordicp@jordicp-VirtualBox:~/Descargas$ sudo dpkg -i *
[sudo] contraseña para jordicp:
[Terminal] Haciendo el paquete linux-headers-6.14.0-061400 previamente no seleccionado
.
(Leyendo la base de datos ... 152517 Ficheros o directorios instalados actualmen
te.)
Preparando para desempaquetar linux-headers-6.14.0-061400_6.14.0-061400.20250324
1442_all.deb ...
Desempaquetando linux-headers-6.14.0-061400 (6.14.0-061400.202503241442) ...
/etc/kernel/postinst.d/vboxacd:
VirtualBox Guest Additions: Building the modules for kernel
6.14.0-061400-generic.

VirtualBox Guest Additions: Look at /var/log/vboxadd-setup.log to find out what
went wrong
/etc/kernel/postinst.d/zz-update-grub:
Sourcing file '/etc/default/grub'
Generating grub configuration file ...
Found linux image: /boot/vmlinuz-6.14.0-061400-generic
Found initrd image: /boot/initrd.img-6.14.0-061400-generic
Found linux image: /boot/vmlinuz-6.14.0-29-generic
Found initrd image: /boot/initrd.img-6.14.0-29-generic
Found memtest86+x64 image: /boot/memtest86+x64.bin
Warning: os-prober will not be executed to detect other bootable partitions.
Systems on them will not be added to the GRUB boot configuration.
Check GRUB_DISABLE_OS_PROBER documentation entry.
Adding boot menu entry for UEFI Firmware Settings ...
done
jordicp@jordicp-VirtualBox:~/Descargas$
```

Falta la captura del kernel → reiniciar → grub avançat → escollir versió del kernel

Un cop fet mirem la versió del kernel

```
root@jordicp-VirtualBox:/home/jordicp# uname -r
6.14.0-061400-generic
root@jordicp-VirtualBox:/home/jordicp#
```

```
root@jordicp-VirtualBox:/home/jordicp# dpkg --get-selections | grep headers
linux-headers-6.14.0-061400                               install
linux-headers-6.14.0-061400-generic                      install
linux-headers-6.14.0-29-generic                          install
linux-headers-generic-hwe-24.04                         install
linux-hwe-6.14-headers-6.14.0-29                         install
root@jordicp-VirtualBox:/home/jordicp#
root@jordicp-VirtualBox:/home/jordicp#
root@jordicp-VirtualBox:/home/jordicp# apt remove --purge linux-headers-6.14.0-29*
Leyendo lista de paquetes... Hecho
Creando árbol de dependencias... Hecho
Leyendo la información de estado... Hecho
Nota, seleccionando «linux-headers-6.14.0-29-generic» para el global «linux-headers-6.14.0-29»
Los paquetes indicados a continuación se instalaron de forma automática y ya no
son necesarios.
    amd64-microcode bpfcc-tools bpftrace ieee-data intel-microcode iucode-tool
```

```
root@jordicp-VirtualBox:/home/jordicp# apt remove --purge linux-hwe-6.14-headers-6.14.0-29*
Leyendo lista de paquetes... Hecho
Creando árbol de dependencias... Hecho
Leyendo la información de estado... Hecho
Nota, seleccionando «linux-hwe-6.14-headers-6.14.0-29» para el global «linux-hwe-6.14-headers-6.14.0-29»
```

```
root@jordicp-VirtualBox:/home/jordicp# dpkg --get-selections | grep linux-image
linux-image-6.14.0-29-generic                           install
linux-image-generic-hwe-24.04                           install
linux-image-unsigned-6.14.0-061400-generic              install
root@jordicp-VirtualBox:/home/jordicp# apt remove --purge linux-image-6.14.0-29*
Leyendo lista de paquetes... Hecho
Creando árbol de dependencias... Hecho
Leyendo la información de estado... Hecho
Nota, seleccionando «linux-image-6.14.0-29-generic» para el global «linux-image-6.14.0-29»
Los paquetes indicados a continuación se instalaron de forma automática y ya no
son necesarios.
    amd64-microcode bpfcc-tools bpftrace ieee-data intel-microcode iucode-tool
```

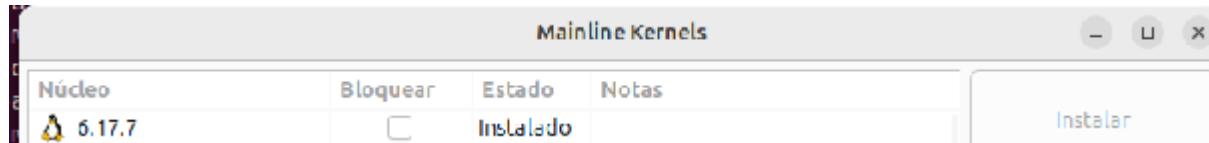


afegeim el seguent repositori

```
root@jordicp-VirtualBox:/home/jordicp# add-apt-repository ppa:cappelikan/ppa
Repositorio: «Types: deb
URIs: https://ppa.launchpadcontent.net/cappelikan/ppa/ubuntu/
Suites: noble
Components: main
»
Descripción:
Mainline Ubuntu Kernel Installer https://github.com/bkw777/mainline
Más información: https://Launchpad.net/~cappelikan/+archive/ubuntu/ppa
Anadiendo repositorio.
Oprima [INTRO] para continuar o Ctrl+c para cancelar.
```

```
root@jordicp-VirtualBox:/home/jordicp# apt install mainline
Leyendo lista de paquetes... Hecho
Creando árbol de dependencias... Hecho
Leyendo la información de estado... Hecho
Los paquetes indicados a continuación se instalaron de forma automática y ya
son necesarios.
  amd64-microcode bpfcc-tools bpftrace hwdata icee-data intel-microcode
  iucode-tool libbpfcc libclang-cpp18 libclang1-18 libllvm18 libllvm19
  linux-hwe-6.14-tools-6.14.0-29 linux-modules-6.14.0-29-generic
  linux-modules-extra-6.14.0-29-generic linux-tools-6.14.0-29-generic
  linux-tools-common python3-bpfcc python3-netaddr thermald
  ubuntu-kernel-accessories
```





vore els moduls carregats del kernel

```
root@jordicp-VirtualBox:/home/jordicp# lsmod
Module           Size  Used by
iso9660          61440  1
snd_seq_dummy    12288  0
snd_hrtimer     12288  1
vboxsf          45056  0
vboxguest        57344  5 vboxsf
vboxvideo        36864  0
drm_vram_helper 24576  1 vboxvideo
qrtr            53248  2
binfmt_misc     24576  1
intel_rapl_msr  20480  0
intel_rapl_common 57344  1 intel_rapl_msr
intel_uncore_frequency_common 20480  0
intel_pmc_core  135168  0
snd_intel8x0    57344  1
pmt_telemetry   16384  1 intel_pmc_core
pmt_discovery   20480  1 pmt_telemetry
snd_ac97_codec  200704  1 snd_intel8x0
pmt_class        20480  2 pmt_telemetry,pmt_discovery

```

vore infor del modul

```
root@jordicp-VirtualBox:/home/jordicp# modinfo video
filename:      /lib/modules/6.17.7-061707-generic/kernel/drivers/acpi/video.k
zst
license:       GPL
description:   ACPI Video Driver
author:        Bruno Ducrot
srcversion:    2FACE1AD56AD859A9AB55D6
alias:         acpi*:LNXVIDEO:*
depends:       wmi
intree:        Y
name:          video
retpoline:     Y
vermagic:     6.17.7-061707-generic SMP preempt mod_unload modversions
sig_id:        PKCS#7
signer:        Build time autogenerated kernel key
```

contingut del kernel

```
root@jordicp-VirtualBox:/home/jordicp# cd /lib
lib/          lib64/      lib usr-is-merged/
root@jordicp-VirtualBox:/home/jordicp# cd /lib/mod
modprobe.d/   modules/    modules-load.d/
root@jordicp-VirtualBox:/home/jordicp# cd /lib/mod
Terminal.d/  modules/    modules-load.d/
root@jordicp-VirtualBox:/home/jordicp# cd /lib/modules
root@jordicp-VirtualBox:/lib/modules# ls
6.14.0-061400-generic 6.14.0-29-generic 6.17.7-061707-generic
root@jordicp-VirtualBox:/lib/modules# cd 6.17.7-061707-generic/
root@jordicp-VirtualBox:/lib/modules/6.17.7-061707-generic# ls
build          modules.builtin.alias.bin  modules.order
initrd         modules.builtin.bin        modules.softdep
kernel         modules.builtin.modinfo   modules.symbols
modules.alias  modules.dep             modules.symbols.bin
modules.alias.bin modules.dep.bin       vdso
modules.builtin modules.devname

root@jordicp-VirtualBox:/lib/modules/6.17.7-061707-generic/kernel# ls
arch  crypto  fs      kernel  mm  samples  virt
block drivers io_uring lib     net  sound
root@jordicp-VirtualBox:/lib/modules/6.17.7-061707-generic/kernel#
```

definir moduls carregats

```
root@jordicp-VirtualBox:/etc# ls | grep modules
modules
modules-load.d
root@jordicp-VirtualBox:/etc# 

root@jordicp-VirtualBox:/etc# cd modules-load.d/
root@jordicp-VirtualBox:/etc/modules-load.d# ls
cups-filters.conf  modules.conf
root@jordicp-VirtualBox:/etc/modules-load.d# cat modules.conf
# /etc/modules is obsolete and has been replaced by /etc/modules-load.d/.
# Please see modules-load.d(5) and modprobe.d(5) for details.
#
# Updating this file still works, but it is undocumented and unsupported.
root@jordicp-VirtualBox:/etc/modules-load.d# cat cups-filters.conf
# Parallel printer driver modules loading for cups
# LOAD_LP_MODULE was 'yes' in /etc/default/cups
lp
ppdev
parallel_pc
root@jordicp-VirtualBox:/etc/modules-load.d#
```

comanda per a carregar un modul de forma temporal (ram)

```
root@jordicp-VirtualBox:/home/jordicp# lsmod | grep fcrypt
fcrypt           20480  0
root@jordicp-VirtualBox:/home/jordicp#
```

```
root@jordicp-VirtualBox:/home/jordicp# modprobe -rv fcrypt
rmmod fcrypt
root@jordicp-VirtualBox:/home/jordicp# lsmod | grep fcrypt
root@jordicp-VirtualBox:/home/jordicp# 
```

parches de kernel

```
root@insebre:/home/alumnat/Baixades/linux-5.9# ls
arch      CREDITS      fs      Kbuild    LICENSES    net      security   virt
block     crypto       include  Kconfig   MAINTAINERS README   sound
certs     Documentation init    kernel   Makefile   samples  tools
COPYING   drivers      ipc     lib      mm        scripts  usr
root@insebre:/home/alumnat/Baixades/linux-5.9# cp init/main.c init/main.c.copia
root@insebre:/home/alumnat/Baixades/linux-5.9# nano init/main.c.copia 
```

```
build_all_zonelists(NULL);
page_alloc_init();

pr_notice("Kernel command line: %s\n", saved_command_line);
pr_notice("Hola Jordi");
/* parameters may set static keys */
jump_label_init();
parse_early_param();
after_dashes = parse_args("Booting kernel",
                          static_command_line, __start__param,
                          __stop__param - __start__param,
                          NULL, NULL, boot_params.boot_start); 
```

fem lo parche

```
root@insebre:/home/alumnat/Baixades/linux-5.9# nano init/main.c.copia
root@insebre:/home/alumnat/Baixades/linux-5.9# diff -u init/main.c init/main.c.copia > parche.patch
root@insebre:/home/alumnat/Baixades/linux-5.9# ls
arch      CREDITS      fs      Kbuild    LICENSES    net      scripts  usr
block     crypto       include  Kconfig   MAINTAINERS parche.patch  security   virt
certs     Documentation init    kernel   Makefile   README   sound
COPYING   drivers      ipc     lib      mm        samples  tools
root@insebre:/home/alumnat/Baixades/linux-5.9# 
```

podem vore la informacio del parche amb un cat

```
root@insebre:/home/alumnat/Baixades/linux-5.9# cat parche.patch
--- init/main.c 2020-10-11 23:15:50.000000000 +0200
+++ init/main.c.copia 2025-11-12 17:25:50.651472819 +0100
@@ -867,6 +867,7 @@
     page_alloc_init();

     pr_notice("Kernel command line: %s\n", saved_command_line);
+    pr_notice("Hola Jordi");
     /* parameters may set static keys */
     jump_label_init();
     parse_early_param();
root@insebre:/home/alumnat/Baixades/linux-5.9# 
```

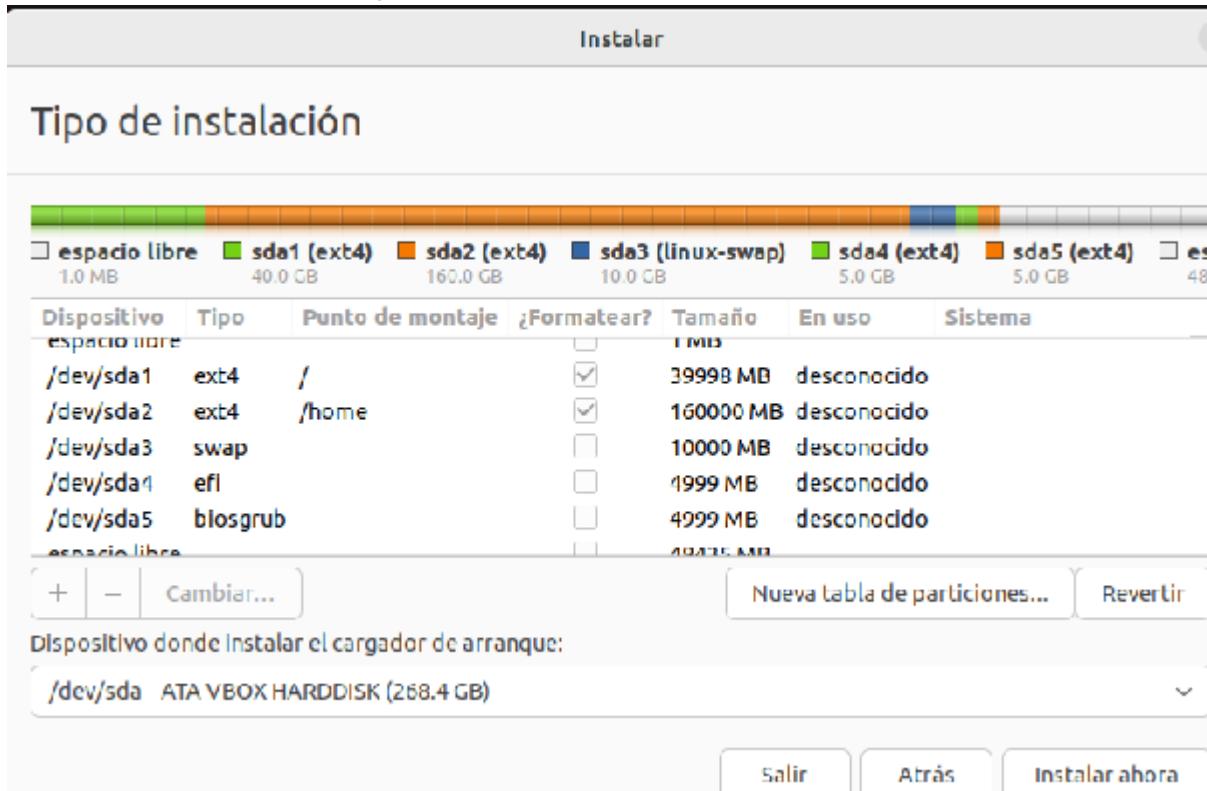
lo apliquem

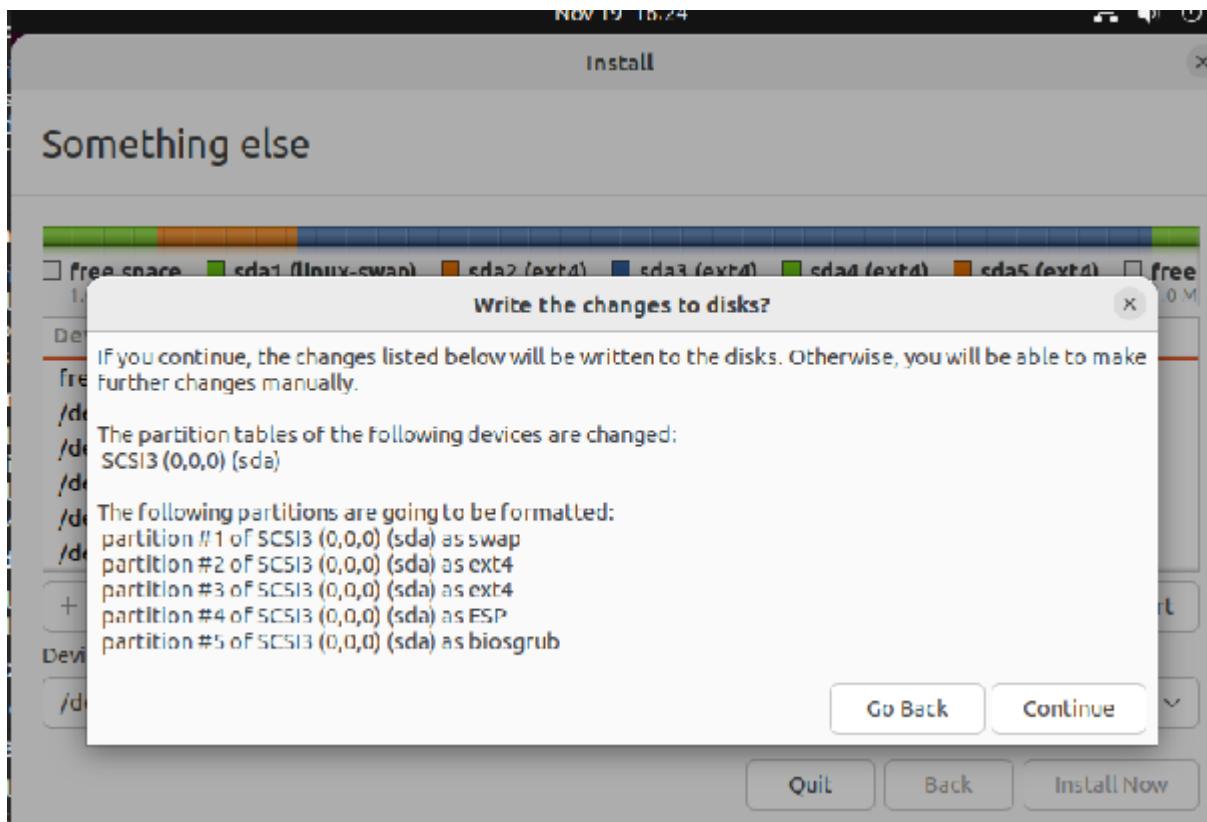
```
root@insebre:/home/alumnat/Baixades/linux-5.9# patch -p0 < parche.patch
patching file init/main.c
root@insebre:/home/alumnat/Baixades/linux-5.9#
```

comprovem que funciona

```
root@insebre:/home/alumnat/Baixades/linux-5.9# grep Jordi init/main.c
    pr_notice("Hola Jordi");
root@insebre:/home/alumnat/Baixades/linux-5.9#
```

Practica individual de modificació i compilació de kernel:





Primer installem els paquets necessaris

```
jordi@jordi-VirtualBox:~$ sudo apt install -y build-essential libncurses-dev flex bison openssl libssl-dev dkms libelf-dev libudev-dev libpci-dev libiberty-dev autoconf dwarves
[sudo] password for jordi:
Reading package lists... done
```

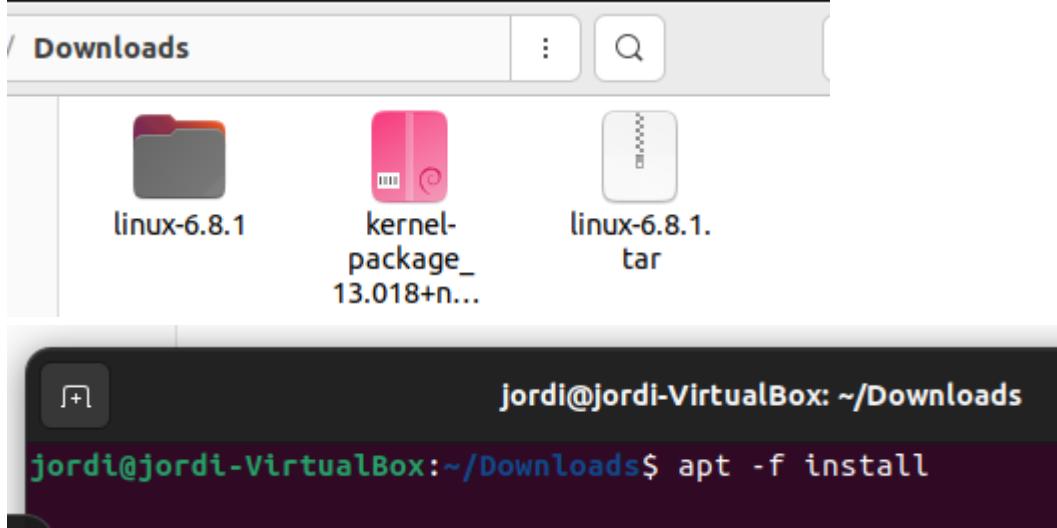
També depenen de la versió del sistema hem de descomentar unes línies dels sources.list

```
multiverse
deb-src: command not found
deb-src: command not found
deb-src: command not found
jordi@jordi-VirtualBox:~$ nano /etc/apt/sources.list
jordi@jordi-VirtualBox:~$ sudo nano /etc/apt/sources.list
jordi@jordi-VirtualBox:~$ sudo apt update
Hit:1 http://es.archive.ubuntu.com/ubuntu jammy InRelease
Get:2 http://security.ubuntu.com/ubuntu jammy-security InRelease [129 kB]
Get:3 http://es.archive.ubuntu.com/ubuntu jammy-updates InRelease [128 kB]
Get:4 http://archive.ubuntu.com/ubuntu jammy InRelease [270 kB]
Get:5 http://es.archive.ubuntu.com/ubuntu jammy-backports InRelease [127 kB]
```

Mirem la nostra versió del kernel

```
jordi@jordi-VirtualBox:~$ uname -r
5.8.0-87-generic
jordi@jordi-VirtualBox:~$ 
```

Baixem i descomprimim una versió més actualitzada



fem una copia del ini main: cp init/main.c init/main.c.copia

la editem

```
jordi@jordi-VirtualBox:~/Downloads/linux-6.8.1# gedit init/main.c.copia
```

Per exemple podem afegir un pr_notice("Hola, Jordi");

```

875 {
876     char *command_line;
877     char *after_dashes;
878
879     set_task_stack_cnd_magic(&init_task);
880     smp_setup_processor_id();
881     debug_objects_early_init();
882     init_vmlinux_build_id();
883
884     cgroup_init_early();
885
886     local_irq_disable();
887     early_boot_irqs_disabled = true;
888
889     /*
890      * Interrupts are still disabled. Do necessary setups, then
891      * enable them.
892      */
893     boot_cpu_init();
894     page_address_init();
895     pr_notice("%s", linux_banner);
896     early_security_init();
897     setup_arch(&command_line);
898     setup_boot_config();
899     setup_command_line(command_line);
900     setup_nr_cpu_ids();
901     setup_pcr_cpu_arcs();
902     smp_prepare_boot_cpu(); /* arch-specific boot-cpu hooks */
903     boot_cpu_hotplug_init();
904
905     pr_notice("Kernel command line: %s\n", saved_command_line);
906     pr_notice("Hola Jordi");
907     /* parameters may set static keys */
908     jump_label init();

```

ara creem un parche

```
root@jordi-VirtualBox: /home/jordi/Downloads/linux-6.8.1
root@jordi-VirtualBox: /home/jordi/Downloads/linux-6.8.1# diff -u init/main.c init/main.c.copia > parche.patch
root@jordi-VirtualBox: /home/jordi/Downloads/linux-6.8.1# ls
arch      crypto      init      kernel      mm      samples      usr
block    Documentation  ioURING  lib       net      scripts      virt
certs     drivers      ipc       LICENSES   parche.patch security
COPYING    fs          Kbuild    MAINTAINERS README   sound
CREDITS   include      Kconfig   Makefile   rust     tools
root@jordi-VirtualBox: /home/jordi/Downloads/linux-6.8.1#
```

i l'apliquem al paquet del kernel

```
root@jordi-VirtualBox:/home/jordi/Downloads/linux-6.8.1# patch -p0 < parche.patch
patching file init/main.c
root@jordi-VirtualBox:/home/jordi/Downloads/linux-6.8.1#
```

fem un build

```
root@jordi-VirtualBox:/home/jordi/Downloads/linux-6.8.1# apt build-dep linux  
Reading package lists... Done  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done
```

podem copiar la configuració del nostre kernel per si la volem recuperar més endavant

```
root@jordi-VirtualBox:/home/jordi/Downloads/linux-6.8.1# cp /boot/config-6.8.0-8  
7-generic .config  
root@jordi-VirtualBox:/home/jordi/Downloads/linux-6.8.1# ls  
arch      crypto      init      kernel      mm          samples      usr  
block     Documentation io_uring  lib          net          scripts      virt  
certs     drivers      ipc       LICENSES    parche.patch security  
COPYING   fs          Kbuild    MAINTAINERS README      sound  
CREDITS  include     Kconfig   Makefile    rust        tools  
root@jordi-VirtualBox:/home/jordi/Downloads/linux-6.8.1#
```

amb el make old config actualitzem el fitxer de configuració existent

```
root@jordi-VirtualBox:/home/jordi/Downloads/linux-6.8.1# make oldconfig
HOSTCC  scripts/basic/fixdep
HOSTCC  scripts/kconfig/conf.o
HOSTCC  scripts/kconfig/confdata.o
```

pero també hem de esborrar el certificats, tant el "trusted_keys" com el "revocation_keys"

```

11708 # CONFIG_FIPS_SIGNATURE_SELFTEST is not set
11709
11710 #
11711 # Certificates for signature checking
11712 #
11713 CONFIG_MODULE_STG_KEY="certs/signing_key.pem"
11714 CONFIG_MODULE_STG_KEY_TYPE RSA=y
11715 # CONFIG_MODULE_STG_KEY_TYPE ECDSA is not set
11716 CONFIG_SYSTEM_TRUSTED_KEYRING=y
11717 CONFIG_SYSTEM_TRUSTED_KEYS="debian/canonical-cert.pem"
11718 CONFIG_SYSTEM_EXTRA_CERTIFICATE=y
11719 CONFIG_SYSTEM_EXTRA_CERTIFICATE_SIZE=4096
11720 CONFIG_SECONDARY_TRUSTED_KEYRING=y
11721 # CONFIG_SECONDARY_TRUSTED_KEYRING_SIGNED_BY_BUILTTIN is not set
11722 CONFIG_SYSTEM_BLACKLIST_KEYRING=y
11723 CONFIG_SYSTEM_BLACKLIST_HASH_LIST=""
11724 CONFIG_SYSTEM_REVOCATION_LIST=y
11725 CONFIG_SYSTEM_REVOCATION_KEYS="debian/canonical-revoked-certs.pem"
11726 # CONFIG_SYSTEM_BLACKLIST_AUTH_UPDATE is not set
11727 # end of certificates for signature checking
11728

11708 # CONFIG_FIPS_SIGNATURE_SELFTEST is not set
11709
11710 #
11711 # Certificates for signature checking
11712 #
11713 CONFIG_MODULE_STG_KEY="certs/signing_key.pem"
11714 CONFIG_MODULE_STG_KEY_TYPE RSA=y
11715 # CONFIG_MODULE_STG_KEY_TYPE ECDSA is not set
11716 CONFIG_SYSTEM_TRUSTED_KEYRING=y
11717 CONFIG_SYSTEM_TRUSTED_KEYS=""
11718 CONFIG_SYSTEM_EXTRA_CERTIFICATE=y
11719 CONFIG_SYSTEM_EXTRA_CERTIFICATE_SIZE=4096
11720 CONFIG_SECONDARY_TRUSTED_KEYRING=y
11721 # CONFIG_SECONDARY_TRUSTED_KEYRING_SIGNED_BY_BUILTTIN is not set
11722 CONFIG_SYSTEM_BLACKLIST_KEYRING=y
11723 CONFIG_SYSTEM_BLACKLIST_HASH_LIST=""
11724 CONFIG_SYSTEM_REVOCATION_LIST=y
11725 CONFIG_SYSTEM_REVOCATION_KEYS=""
11726 # CONFIG_SYSTEM_BLACKLIST_AUTH_UPDATE is not set
11727 # end of certificates for signature checking
11728

```

Ara desactivarem les següents configuracions de debug per facilitar la compilació del kernel

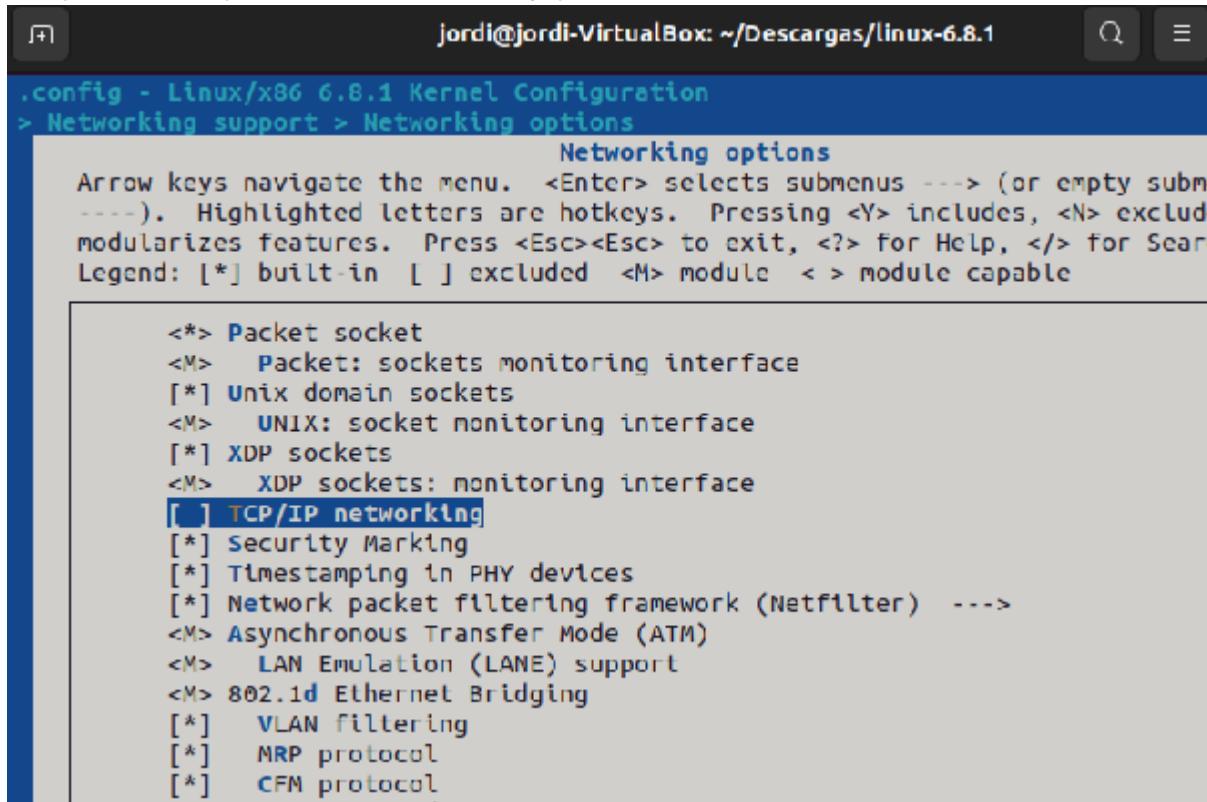
```

Open . config Save
/.config
/home/jordi/Downloads/linux-6.3.1

1917 # CONFIG_PRINTK_CALLER is not set
1918 # CONFIG_STACKTRACE_BUILD_ID is not set
1919 CONFIG_CONSOLE_LOGLEVEL_DEFAULT=7
1920 CONFIG_CONSOLE_LOGLEVEL QUIET=3
1921 CONFIG_MESSAGE_LOGLEVEL_DEFAULT=1
1922 CONFIG_BOOT_PRINTK_DELAY=y
1923 CONFIG_DYNAMIC_DEBUG=y
1924 CONFIG_DYNAMIC_DEBUG_CORE=y
1925 CONFIG_SYMBOLIC_ERRNAME=y
1926 CONFIG_DEBUG_BUGVERBOSE=y
1927 # end of printk and dmesg options
1928
1929 CONFIG_DEBUG_KERNEL=y
1930 CONFIG_DEBUG_MISC=y
1931
1932 #
1933 # Compile-time checks and compiler options
1934 #
Terminal CONFIG_DEBUG_INFO=n
CONFIG_AS_HAS_NON_CONST_ULEB128=y
1937 # CONFIG_DEBUG_INFO_NONE is not set
1938 # CONFIG_DEBUG_INFO_DWARF_TOOLCHAIN_DEFAULT is not set
1939 # CONFIG_DEBUG_INFO_DWARF4 is not set
1940 CONFIG_DEBUG_INFO_DWARF5=n
1941 # CONFIG_DEBUG_INFO_REDUCED is not set
1942 CONFIG_DEBUG_INFO_COMPRESSED_NONE=n
1943 # CONFIG_DEBUG_INFO_COMPRESSED_ZLIB is not set
1944 # CONFIG_DEBUG_INFO_SPLIT is not set
1945 CONFIG_DEBUG_INFO_BTF=n
1946 CONFIG_PAHOLE_HAS_SPLIT_BTF=n
1947 CONFIG_PAHOLE_HAS_LANG_EXCLUDE=y
1948 CONFIG_DEBUG_INFO_BTF_MODULES=y
1949 # CONFIG_DEBUG_INFO_ALL_CODE_INSTRUMENTED is not set
11934 #
11935 CONFIG_DEBUG_INFO=n
11936 CONFIG_AS_HAS_NON_CONST_ULEB128=y

```

extra: podem modificar parts del kernel amb "menu config" que és la versió més moderna



```
jordi@jordi-VirtualBox: ~/Descargas/linux-6.8.1
.config - Linux/x86 6.8.1 Kernel Configuration
> Networking support > Networking options
      Networking options
Arrow keys navigate the menu. <Enter> selects submenus ---> (or empty submenu). Highlighted letters are hotkeys. Pressing <Y> includes, <N> excludes. Pressing <Esc><Esc> to exit, <?> for Help, </> for Search. Legend: [*] built-in [ ] excluded <M> module <> module capable

<*> Packet socket
<M>   Packet: sockets monitoring interface
[*] Unix domain sockets
<M>   UNIX: socket monitoring interface
[*] XDP sockets
<M>   XDP sockets: monitoring interface
[ ] TCP/IP networking
[*] Security Marking
[*] Timestamping in PHY devices
[*] Network packet filtering framework (Netfilter) --->
<M> Asynchronous Transfer Mode (ATM)
<M>   LAN Emulation (LANE) support
<M> 802.1d Ethernet Bridging
[*]   VLAN Filtering
[*]   MRP protocol
[*]   CFM protocol
```

fem un make clean per si acas ja havíem iniciat prèviament una compilació, i després començem a compilar com toca

```
jordi@jordi-VirtualBox:~/Descargas/linux-6.8.1$ make clean
jordi@jordi-VirtualBox:~/Descargas/linux-6.8.1$ ls
arch    crypto      init     kernel      mm          samples   usr
block   Documentation  to_uring  ltb        net          scripts   virt
certs   drivers      ipc      LICENSES   parche.patch security
COPYING fs          Kbuild   MAINTAINERS README   sound
CREDITS include     Kconfig  Makefile   rust       tools
jordi@jordi-VirtualBox:~/Descargas/linux-6.8.1$ gedit .config
jordi@jordi-VirtualBox:~/Descargas/linux-6.8.1$ make -j$(nproc) bindeb-pkg
  SYNC  include/config/auto.conf.cmd
 HOSTCC scripts/basic/fixdep
 HOSTCC scripts/kconfig/conf.o
 HOSTCC scripts/kconfig/confdata.o
 HOSTCC scripts/kconfig/expr.o
```

```
jordi@jordi-VirtualBox:~/Descargas/linux-6.8.1$ cd ..
jordi@jordi-VirtualBox:~/Descargas$ ls
linux-6.8.1                               linux-libc-dev_6.8.1-2_amd64.deb
linux-6.8.1.tar.gz                         linux-upstream_6.8.1-2_amd64.buildinfo
linux-headers-6.8.1_6.8.1-2_amd64.deb      linux-upstream_6.8.1-2_amd64.changes
linux-image-6.8.1_6.8.1-2_amd64.deb
jordi@jordi-VirtualBox:~/Descargas$
```

després de compilar anem a la ruta dels paquets.deb generats i apliquem la següent comanda

```
jordi@jordi-VirtualBox:~/Descargas/linux-6.8.1$ cd ..
jordi@jordi-VirtualBox:~/Descargas$ ls
linux-6.8.1                               linux-libc-dev_6.8.1-2_amd64.deb
linux-6.8.1.tar.gz                         linux-upstream_6.8.1-2_amd64.buildinfo
linux-headers-6.8.1_6.8.1-2_amd64.deb      linux-upstream_6.8.1-2_amd64.changes
linux-image-6.8.1_6.8.1-2_amd64.deb
jordi@jordi-VirtualBox:~/Descargas$
```

`sudo dpkg -i linux-*.deb`

```
jordi@jordi-VirtualBox:~/Descargas$ sudo dpkg -i linux-*.deb
[sudo] contraseña para jordi:
Seleccionando el paquete linux-headers-6.8.1 previamente no seleccionado.
(Leyendo la base de datos ... 226534 ficheros o directorios instalados actualmente.)
Preparando para desempaquetar linux-headers-6.8.1_6.8.1-2_amd64.deb ...
Desempaquetando linux-headers-6.8.1 (6.8.1-2) ...
Seleccionando el paquete linux-image-6.8.1 previamente no seleccionado.
Preparando para desempaquetar linux-image-6.8.1_6.8.1-2_amd64.deb ...
Desempaquetando linux-image-6.8.1 (6.8.1-2) ...
Preparando para desempaquetar linux-libc-dev_6.8.1-2_amd64.deb ...
Desempaquetando linux-libc-dev:amd64 (6.8.1-2) sobre (5.15.0-163.173) ...
```

editem el menu del grub, tan per habilitar-lo com per a ficar un "timer" mes alt

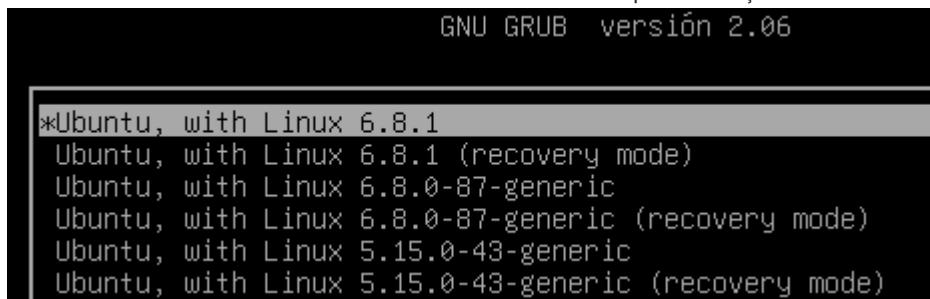
```
Jordi@Jordi-VirtualBox: ~
GNU nano 6.2          /etc/default/grub
# If you change this file, run 'update grub' afterwards to update
# /boot/grub/grub.cfg.
# For full documentation of the options in this file, see:
#   info -f grub -n 'Simple configuration'

GRUB_DEFAULT=0
GRUB_TIMEOUT_STYLE=menu
GRUB_TIMEOUT=10
GRUB_DISTRIBUTOR='lsb release -i -s 2> /dev/null || echo Debian'
GRUB_CMDLINE_LINUX_DEFAULT="quiet splash"
GRUB_CMDLINE_LINUX=""
```

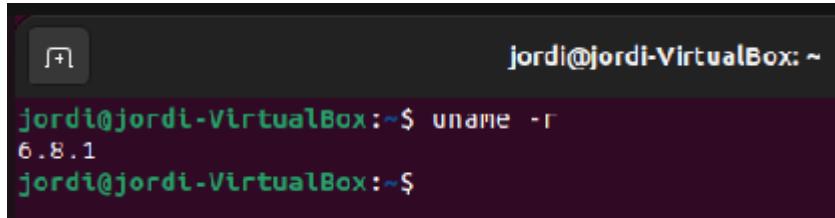
sudo update-grub: actualitzem el grub

```
jordi@jordi-VirtualBox:~/Descargas$ sudo update-grub
Sourcing file `/etc/default/grub'
Sourcing file `/etc/default/grub.d/init-select.cfg'
Generating grub configuration file ...
Found linux image: /boot/vmlinuz-6.8.1
Found initrd image: /boot/initrd.img-6.8.1
Found linux image: /boot/vmlinuz-6.8.0-87-generic
Found initrd image: /boot/initrd.img-6.8.0-87-generic
Found linux image: /boot/vmlinuz-5.15.0-43-generic
Found initrd image: /boot/initrd.img-5.15.0-43-generic
Found memtest86+ image: /boot/memtest86+.elf
Found memtest86+ image: /boot/memtest86+.bin
Warning: os-prober will not be executed to detect other bootable partitions.
Systems on them will not be added to the GRUB boot configuration.
Check GRUB_DISABLE_OS_PROBER documentation entry.
done
```

fem un "reboot" i escollim la versió del kernel nova dins del menú d'opcions avançades



uname -r: mirem si tenim el kernel actualitzat a la versió corresponent



dmesg | grep Jordi: per a vore el missatge que hem creat amb "pr_"

```
jordi@jordi-VirtualBox:~$ sudo dmesg | grep Jordi
[sudo] contraseña para jordi:
[    0.103603] Hola Jordi
jordi@jordi-VirtualBox:~$
```