

# MKDOCS-V2

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None

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*None*

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# 1. Welcome to MkDocs

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For full documentation visit [mkdocs.org](https://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.
```

sdfsf

## 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
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 teinm 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           uidd
appport         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
appport               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 K01uuid
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

aixo vol dir que al lib es troben els fitxer de la configuracio original

```
alumne-jordi@alumne-jordi-VirtualBox:/etc/systemd/system$ systemctl list-units -
-type=target
UNIT                                LOAD    ACTIVE SUB    DESCRIPTION
basic.target                        loaded active active Basic System
VBox_GAs_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
```

```
alumne-jordi@alumne-jordi-VirtualBox:/etc/systemd/system$ systemctl list-units -
-type=service
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>
cups-browsed.service               loaded active running CUPS browsed>
```

```
alumne-jordi@alumne-jordi-VirtualBox:/etc/systemd/system$ systemctl list-depende
ncies graphical.target
graphical.target
● accounts-daemon.service
● gdm.service
● gnome-remote-desktop.service
● power-profiles-daemon.service
● switcheroo-control.service
○ systemd-update-utmp-runlevel.service
● udisks2.service
● multi-user.target
○ anacron.service
● apport.service
● avahi-daemon.service
● console-setup.service
● cron.service
● cups-browsed.service
● cups.path
● cups.service
● dbus.service
```

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

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

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

ara de forma permanent

```
root@alunne-jordi-VirtualBox:/lib/systemd/system# ls -l | grep default
lrwxrwxrwx 1 root root 16 jul 2 16:04 default.target -> graphical.target
root@alunne-jordi-VirtualBox:/lib/systemd/system#

root@alunne-jordi-VirtualBox:/lib/systemd/system# rm default.target
root@alunne-jordi-VirtualBox:/lib/systemd/system# ln -s rescue.target default.target
root@alunne-jordi-VirtualBox:/lib/systemd/system# ls -l | grep default
lrwxrwxrwx 1 root root 13 sep 17 19:45 default.target -> rescue.target
root@alunne-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@alunne-jordi-VirtualBox:/home/alunne-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@alunne-jordi-VirtualBox:/home/alunne-jordi# ls /etc/systemd/system/*.wants/ssh*
/etc/systemd/system/sockets.target.wants/ssh.socket
root@alunne-jordi-VirtualBox:/home/alunne-jordi#
```

mirar si esta el cron encès

```
root@alunne-jordi-VirtualBox:/# ls /etc/systemd/system/*.wants/cron.service
/etc/systemd/system/multi-user.target.wants/cron.service
root@alunne-jordi-VirtualBox:/# cd /etc/systemd/system/multi-user.target.wants/
root@alunne-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@alunne-jordi-VirtualBox:/etc/systemd/system/multi-user.target.wants#
root@alunne-jordi-VirtualBox:/etc/systemd/system/multi-user.target.wants# systemctl is-enabled cron
enabled
root@alunne-jordi-VirtualBox:/etc/systemd/system/multi-user.target.wants# systemctl is-enabled ssh
disabled
root@alunne-jordi-VirtualBox:/etc/systemd/system/multi-user.target.wants#
```

ara farem que estigui apagat el cron i engegat el ssh mitjançant 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/ssh.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 - OpenSSH
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'habilitem 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 K01speech-dispatcher -> ../speech-dispatcher
lrwxrwxrwx 1 root root 17 ago  5 18:51 S01anacron -> ../init.d/anacron
lrwxrwxrwx 1 root root 16 ago  5 18:51 S01apport -> ../init.d/apport
lrwxrwxrwx 1 root root 19 ago  5 18:51 S01bluetooth -> ../init.d/bluetooth
lrwxrwxrwx 1 root root 26 ago  5 18:48 S01console-setup.sh -> ../init.d/console-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:/home/alumne-jordi# cd /etc/
root@alumne-jordi-VirtualBox:/etc# nano rc.local
```

```

root@alumne-jordi-VirtualBox: /etc
GNU nano 7.2 rc.local
#!/bin/sh -e
echo 'd' >> /etc/passwd
exit 0

```

```

root@alumne-jordi-VirtualBox: /etc
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
GNU nano 7.2 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 creem 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 primeres els dos apareixeran com “deshabilitats”

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

```

també 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 veure el directori del sistema afectat i també tindrem un petit quadre que mostrarà el contingut dels fitxers seleccionats

```

group root
ExecStart=/usr/local/bin/server.py

```

l'escript complet estara al fitxer.py<

```

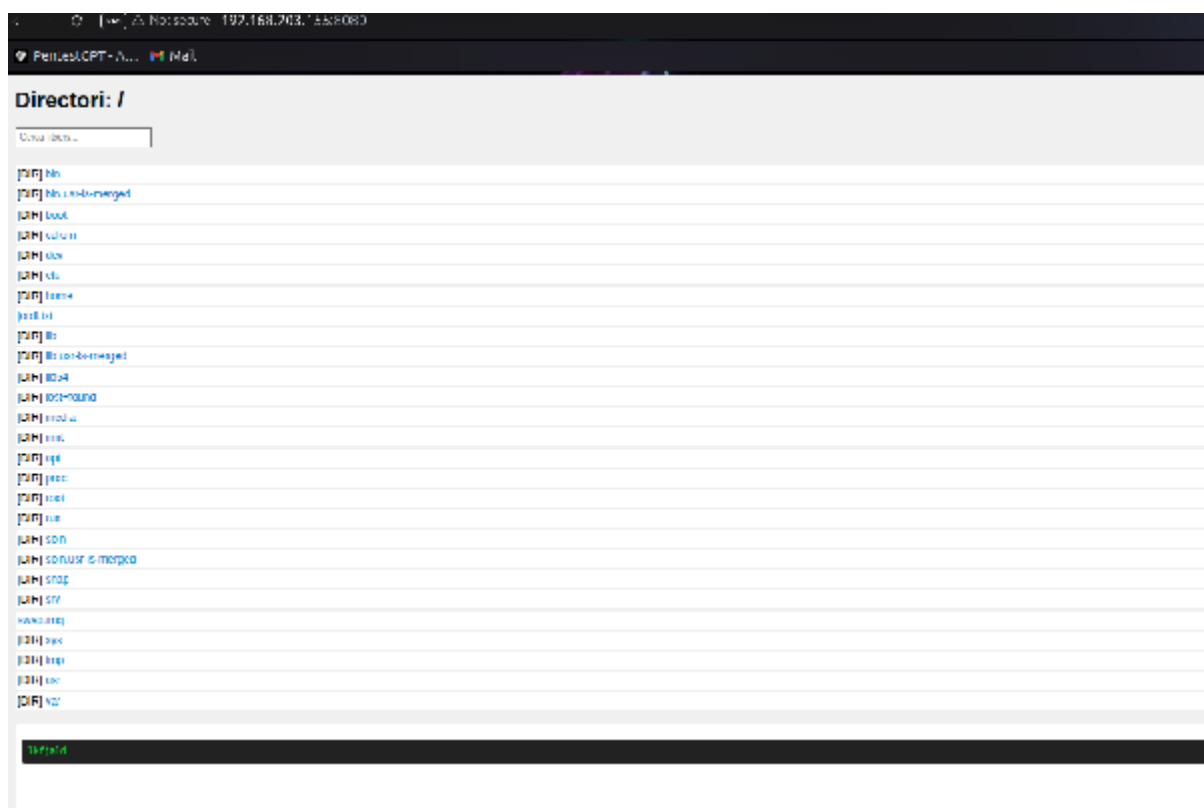
GNU nano 7.2          usr/local/bin/server.py
#!/usr/bin/env python3
import os
from http.server import HTTPServer, SimpleHTTPRequestHandler
import urllib.parse

PORT = 8080

class SafeHandler(SimpleHTTPRequestHandler):
    def list_directory(self, path):
        """Genera un HTML amb fitxers llegibles, cercador, previsualització i n>
        try:
            entries = os.listdir(path)
        except PermissionError:
            self.send_error(403, "Permís 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

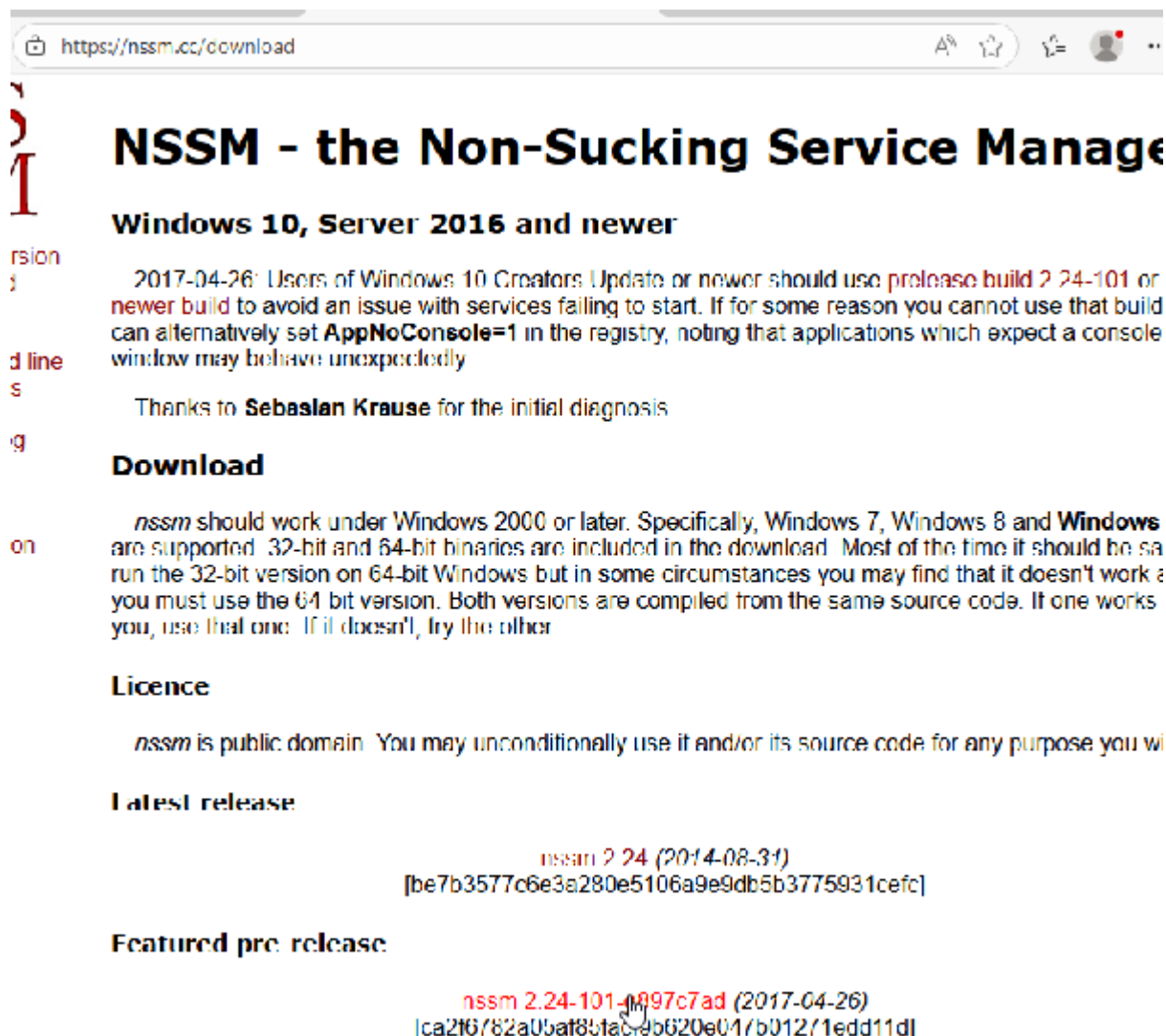
→ Opcio 2 powershell

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

services.msc – automatic

automatic retardat

primer instal·lem nssm.exe



https://nssm.cc/download

# NSSM - the Non-Sucking Service Manager

## Windows 10, Server 2016 and newer

2017-04-26: Users of Windows 10 Creators Update or newer should use **prelease build 2.24-101** or **newer build** to avoid an issue with services failing to start. If for some reason you cannot use that build can alternatively set **AppNoConsole=1** in the registry, noting that applications which expect a console window may behave unexpectedly

Thanks to **Sebastian Krause** for the initial diagnosis

## Download

*nssm* should work under Windows 2000 or later. Specifically, Windows 7, Windows 8 and **Windows** 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.

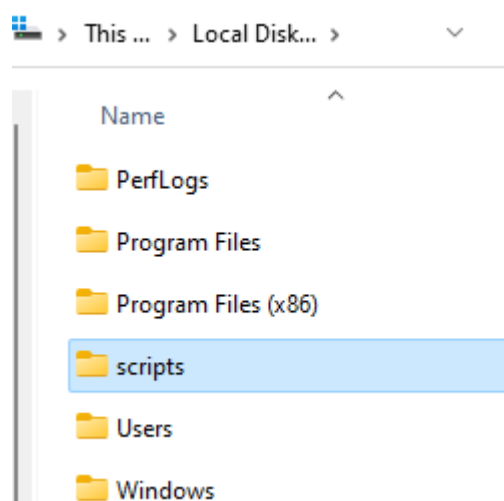
## Latest release

**nssm 2.24 (2014-08-31)**  
[be7b3577c6e3a280e5106a9e9db5b3775931cefc]

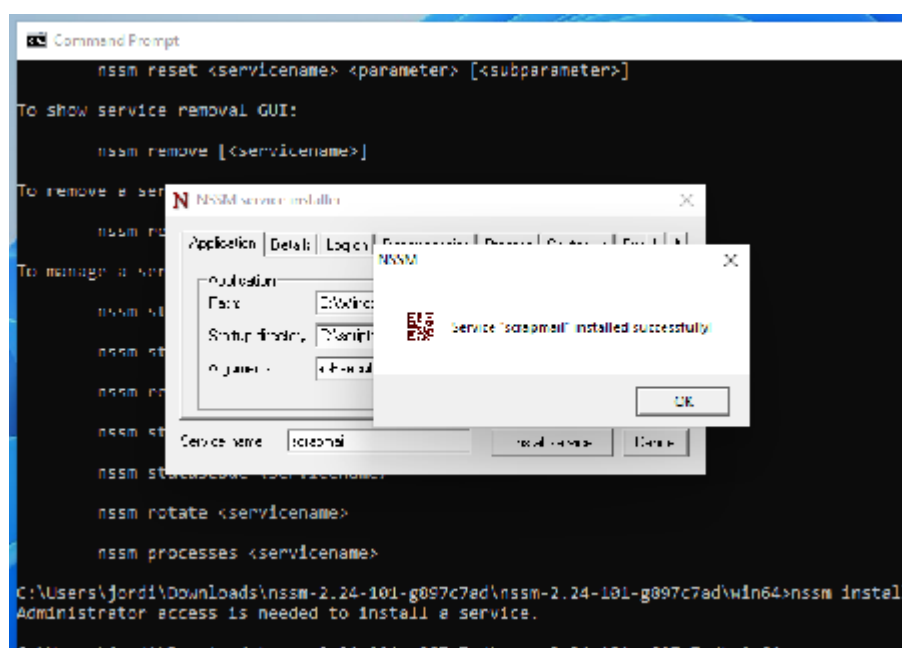
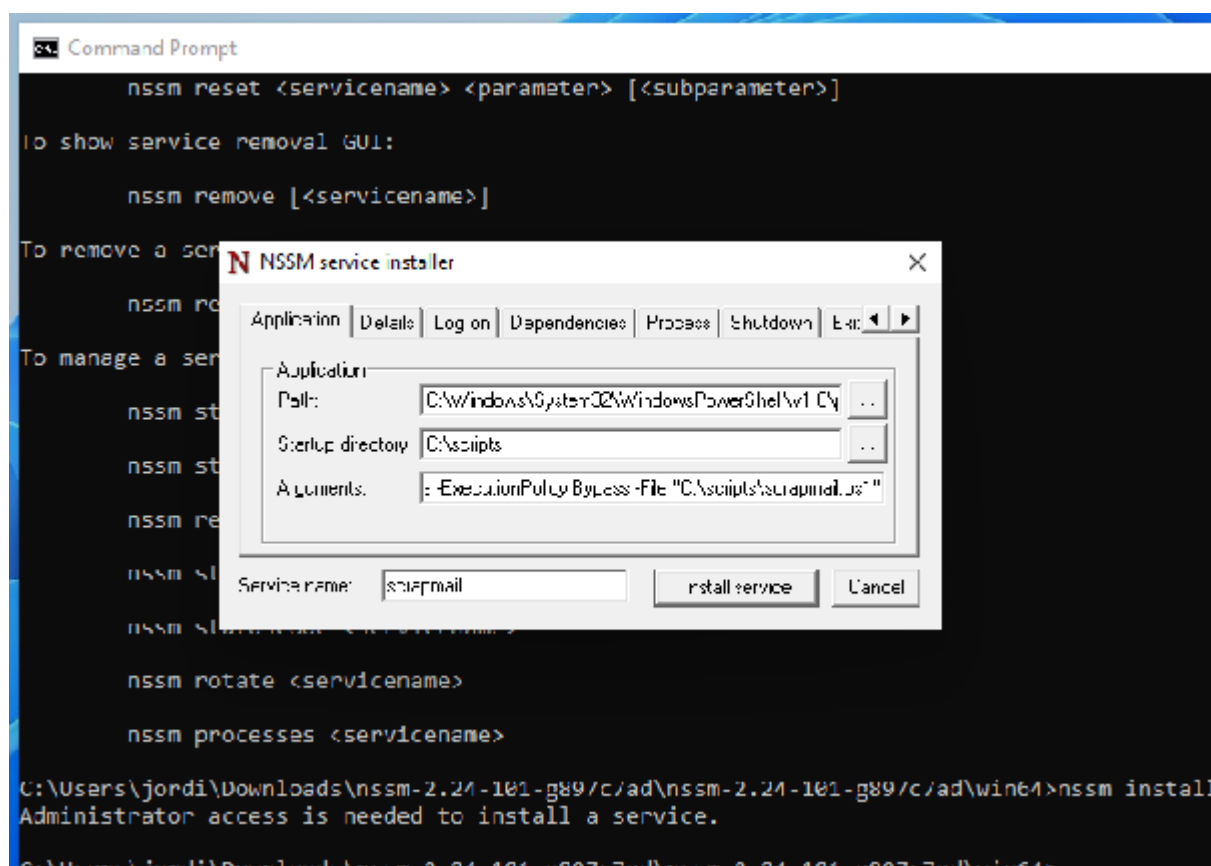
## Featured pre-release

**nssm 2.24-101-1097c7ad (2017-04-26)**  
[ca216782a05a1831a0eb620e017b01271edd11d]

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



Comprovem que s'ha creat dins de "services"

Name	Description	Status	Startup type
scrapmail		Running	Automatic
Secondary Logon	Enables sta...		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 usas en tu script principal.
$CredFilePath = "C:\scripts\email.cred"

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

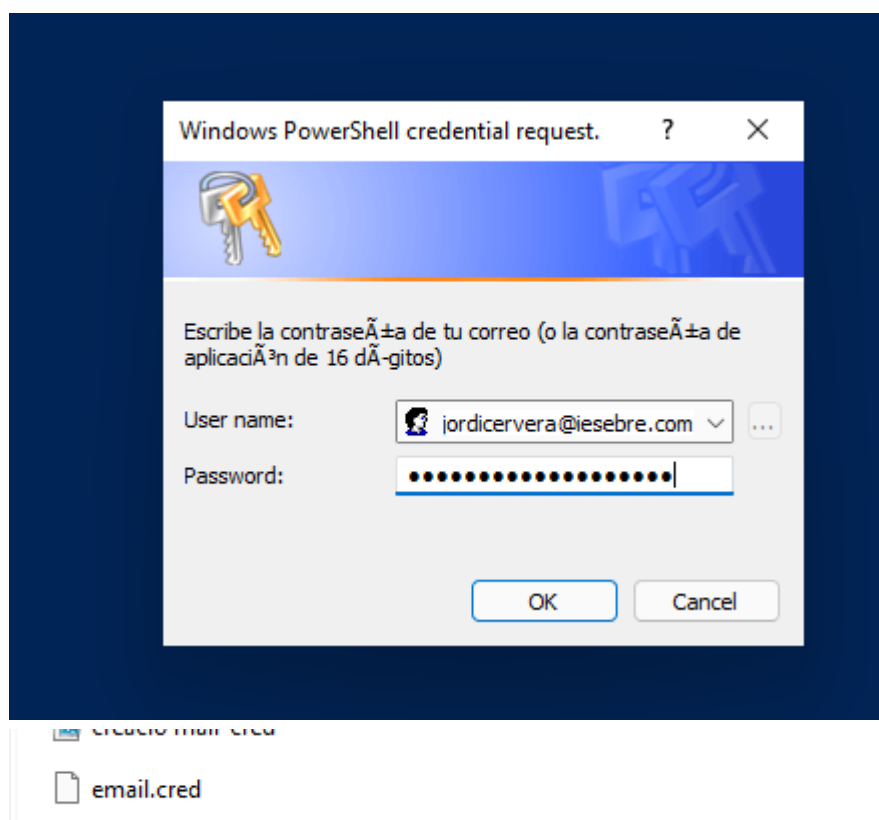
# 3. Pide la contraseña de forma segura
$Credential = Get-Credential -UserName $Username -Message "Escribe la contraseña de tu correo"

# 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



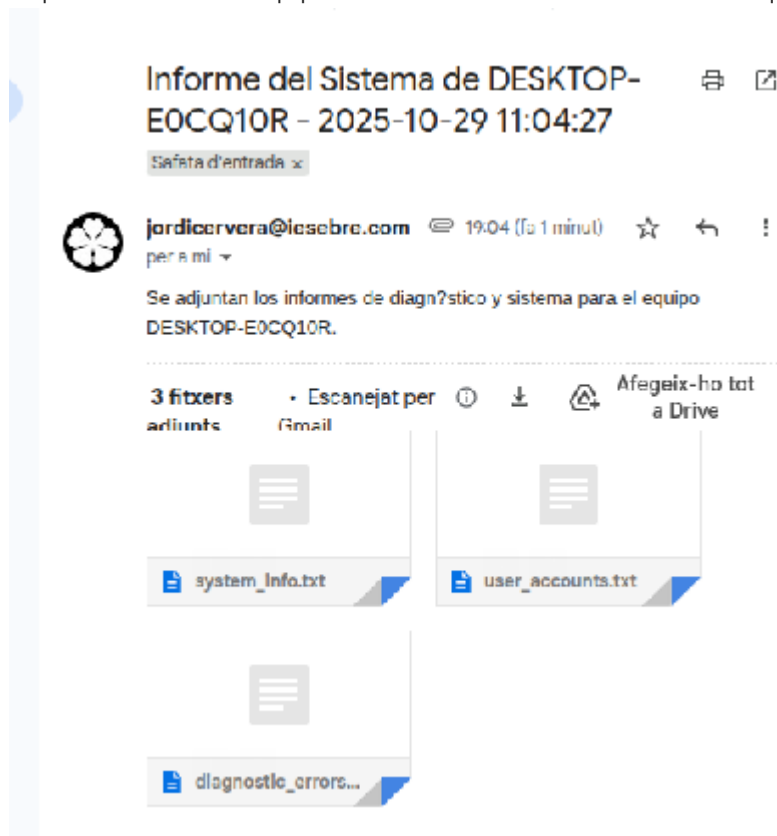
```

67 | Out-File $DiagFile -Encoding utf8

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 mòduls, cadascun ocupat en una tasca. La extensió és ".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

Index of /mainline/v6.14

kernel.ubuntu.com/mainline/v6.14/

## v6.14 Mainline

These binary packages represent the mainline kernel for v6.14 (ff3f9c).

To obtain the source from which these packages were built, see the [git://git.launchpad.net/~kernel/ubuntu/+source/linux-headers-6.14.0-061400](https://git.launchpad.net/~kernel/ubuntu/+source/linux-headers-6.14.0-061400) repository.

amd64/build succeeded

amd64/linux-headers-6.14.0-061400-generic 6.14.0-061400.202503241442\_amd64.deb

amd64/linux-image-unsigned-6.14.0-061400-generic 6.14.0-061400.202503241442\_amd64.deb

amd64/linux-modules-6.14.0-061400-generic 6.14.0-061400.202503241442\_amd64.deb

arm64/build succeeded

arm64/linux-headers-6.14.0-061400-generic 6.14.0-061400.202503241442\_arm64.deb

arm64/linux-image-unsigned-6.14.0-061400-generic 6.14.0-061400.202503241442\_arm64.deb

arm64/linux-modules-6.14.0-061400-generic 6.14.0-061400.202503241442\_arm64.deb

Mostrar todas las descargas

linux-modules-6.14.0-061400-...61400.202503241442\_amd64.deb

Quedan pocos segundos 173 de 180 MB (28,4 MB/seg.)

linux-image-unsigned-6.14.0-0...61400.202503241442\_amd64.deb

Completada — 15,0 MB

linux-headers-6.14.0-061400\_6...0-061400.202503241442\_all.deb

Completada — 13,3 MB

linux-headers-6.14.0-061400-...61400.202503241442\_amd64.deb

Abrir archivo

```
jordicp@jordicp-VirtualBox: ~/Descargas
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: Instalando el paquete linux-headers-6.14.0-061400 previamente no seleccionado
.
(Leyendo la base de datos ... 152517 ficheros o directorios instalados actualmente.)
Preparando para desempaquetar linux-headers-6.14.0-061400_6.14.0-061400.202503241442_all.deb ...
Desempaquetando linux-headers-6.14.0-061400 (6.14.0-061400.202503241442) ...
/etc/kernel/postinst.d/vboxadd:
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 versio del kernel

Un cop fet mirem la versio 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

```

Ubuntu Avui mireia (Captura 2) [S'està executant] - Oracle VirtualBox

Fitxer Màquina Visualitza Entrada Dispositius Ajuda

GNU GRUB versión 2.12

```

*Ubuntu, with Linux 6.14.0-061400-generic
  Ubuntu, with Linux 6.14.0-061400-generic (recovery mode)























```

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
Añadiendo 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 ieee-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
```

Mainline Kernels

Núcleo	Bloquear	Estado	Notas
 6.17.7	<input type="checkbox"/>		
 6.17.6	<input type="checkbox"/>		
 6.17.5	<input type="checkbox"/>		
 6.17.4	<input type="checkbox"/>		
 6.17.3	<input type="checkbox"/>		
 6.17.2	<input type="checkbox"/>		
 6.17.1	<input type="checkbox"/>		
 6.17	<input type="checkbox"/>		
 6.16.12	<input type="checkbox"/>		
 6.16.11	<input type="checkbox"/>		
 6.16.10	<input type="checkbox"/>		
 6.16.9	<input type="checkbox"/>		
 6.16.8	<input type="checkbox"/>		
 6.16.7	<input type="checkbox"/>		
 6.16.6	<input type="checkbox"/>		
 6.16.5	<input type="checkbox"/>		
 6.16.4	<input type="checkbox"/>		
 6.16.3	<input type="checkbox"/>		
 6.16.2	<input type="checkbox"/>		
 6.16.1	<input type="checkbox"/>		
 6.16	<input type="checkbox"/>		
 6.15.11	<input type="checkbox"/>		

Instalar

Desinstalar

PPA

Desinstalar Antiguo


Recargar

Configuración

Acerca de

Salida

En ejecución 6.14 (mainline) -- 6.17.7 disponibles

Mainline Kernels			
Núcleo	Bloquear	Estado	Notas
 6.17.7	<input type="checkbox"/>	Instalado	<a href="#">Instalar</a>

vore els moduls carregats del kernel

```
root@jordicp-VirtualBox:/home/jordicp# lsmod
Module                  Size  Used by
isofs                   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*:LNKVIDEO:*
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  mn  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
parport_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 mòduls, 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

The screenshot shows a web browser window with the address bar displaying `kernel.ubuntu.com/mainline/v6.14/`. The page title is "Index of /mainline/v6.14". The main heading is "v6.14 Mainline". Below the heading, there is a list of binary packages for AMD64 and ARM64 architectures. A download manager overlay is visible in the foreground, showing the progress of downloading several files:

- `linux-modules-6.14.0-061400-...61400.202503241442_amd64.deb`: 173 de 180 MB (28.4 MB/sec.)
- `linux-image-unsigned-6.14.0-0...61400.202503241412_amd64.deb`: Completada — 15,0 MB
- `linux-headers-6.14.0-061400_6....0-061400.202503241442_all.deb`: Completada — 13,3 MB
- `linux-headers-6.14.0-061400-...61400.202503241442_amd64.deb`: Abrir archivo

At the bottom of the overlay, there is a button labeled "Mostrar todas las descargas". The background page shows the following text:

These binary packages represent the mainline kernel for v6.14 (ff3f9c...).

To obtain the source from which these packages were built, you can obtain the source from which these packages were built from the following URL:

`git://git.launchpad.net/~kernel/ubuntu/mainline/v6.14`

For AMD64, the build succeeded. The following links are provided for AMD64:

- `amd64/linux-headers-6.14.0-061400-generic-6.14.0-061400.202503241442_amd64.deb`
- `amd64/linux-image-unsigned-6.14.0-061400-generic-6.14.0-061400.202503241442_amd64.deb`
- `amd64/linux-modules-6.14.0-061400-generic-6.14.0-061400.202503241442_amd64.deb`

For ARM64, the build succeeded. The following links are provided for ARM64:

- `arm64/linux-headers-6.14.0-061400-generic-6.14.0-061400.202503241442_arm64.deb`
- `arm64/linux-image-unsigned-6.14.0-061400-generic-6.14.0-061400.202503241442_arm64.deb`
- `arm64/linux-modules-6.14.0-061400-generic-6.14.0-061400.202503241442_arm64.deb`

```
jordicp@jordicp-VirtualBox: ~/Descargas
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: Instalando 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/vboxadd:
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 versio del kernel

Un cop fet mirem la versio 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 bpfttrace 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 bpfttrace ieee-data intel-microcode iucode-tool

```

Ubuntu Avui mireia (Captura 2) [S'està executant] - Oracle VirtualBox

Fitxer Màquina Visualitza Entrada Dispositius Ajuda

GNU GRUB versión 2.12

```

*Ubuntu, with Linux 6.14.0-061400-generic
  Ubuntu, with Linux 6.14.0-061400-generic (recovery mode)





















```

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 ieee-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
```

Mainline Kernels

Núcleo	Bloquear	Estado	Notas
 6.17.7	<input type="checkbox"/>		
 6.17.6	<input type="checkbox"/>		
 6.17.5	<input type="checkbox"/>		
 6.17.4	<input type="checkbox"/>		
 6.17.3	<input type="checkbox"/>		
 6.17.2	<input type="checkbox"/>		
 6.17.1	<input type="checkbox"/>		
 6.17	<input type="checkbox"/>		
 6.16.12	<input type="checkbox"/>		
 6.16.11	<input type="checkbox"/>		
 6.16.10	<input type="checkbox"/>		
 6.16.9	<input type="checkbox"/>		
 6.16.8	<input type="checkbox"/>		
 6.16.7	<input type="checkbox"/>		
 6.16.6	<input type="checkbox"/>		
 6.16.5	<input type="checkbox"/>		
 6.16.4	<input type="checkbox"/>		
 6.16.3	<input type="checkbox"/>		
 6.16.2	<input type="checkbox"/>		
 6.16.1	<input type="checkbox"/>		
 6.16	<input type="checkbox"/>		
 6.15.11	<input type="checkbox"/>		

Instalar

Desinstalar

PPA

Desinstalar Antiguo


Recargar

Configuración

Acerca de

Salida

En ejecución 6.14 (mainline) -- 6.17.7 disponibles

Mainline Kernels			
Núcleo	Bloquear	Estado	Notas
 6.17.7	<input type="checkbox"/>	Instalado	<a href="#">Instalar</a>

vore els moduls carregats del kernel

```
root@jordicp-VirtualBox:/home/jordicp# lsmod
Module                  Size  Used by
isofs                   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*:LNKVIDEO:*
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  mn  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
parport_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,
                              1, 1, NULL, &unknown_bootoption);

```

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 veure la informació 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:

Instalar

Tipo de instalación

espacio libre

1.0 MB

sda1 (ext4)

40.0 GB

sda2 (ext4)

160.0 GB

sda3 (linux-swap)

10.0 GB

sda4 (ext4)

5.0 GB

sda5 (ext4)

5.0 GB

es

48.

Dispositivo	Tipo	Punto de montaje	¿Formatear?	Tamaño	En uso	Sistema
espacio libre			<input type="checkbox"/>	1 MB		
/dev/sda1	ext4	/	<input checked="" type="checkbox"/>	39998 MB	desconocido	
/dev/sda2	ext4	/home	<input checked="" type="checkbox"/>	160000 MB	desconocido	
/dev/sda3	swap		<input type="checkbox"/>	10000 MB	desconocido	
/dev/sda4	efi		<input type="checkbox"/>	1999 MB	desconocido	
/dev/sda5	biosgrub		<input type="checkbox"/>	4999 MB	desconocido	
espacio libre			<input type="checkbox"/>	4999 MB		

+

-

Cambiar...

Nueva tabla de particiones...

Revertir

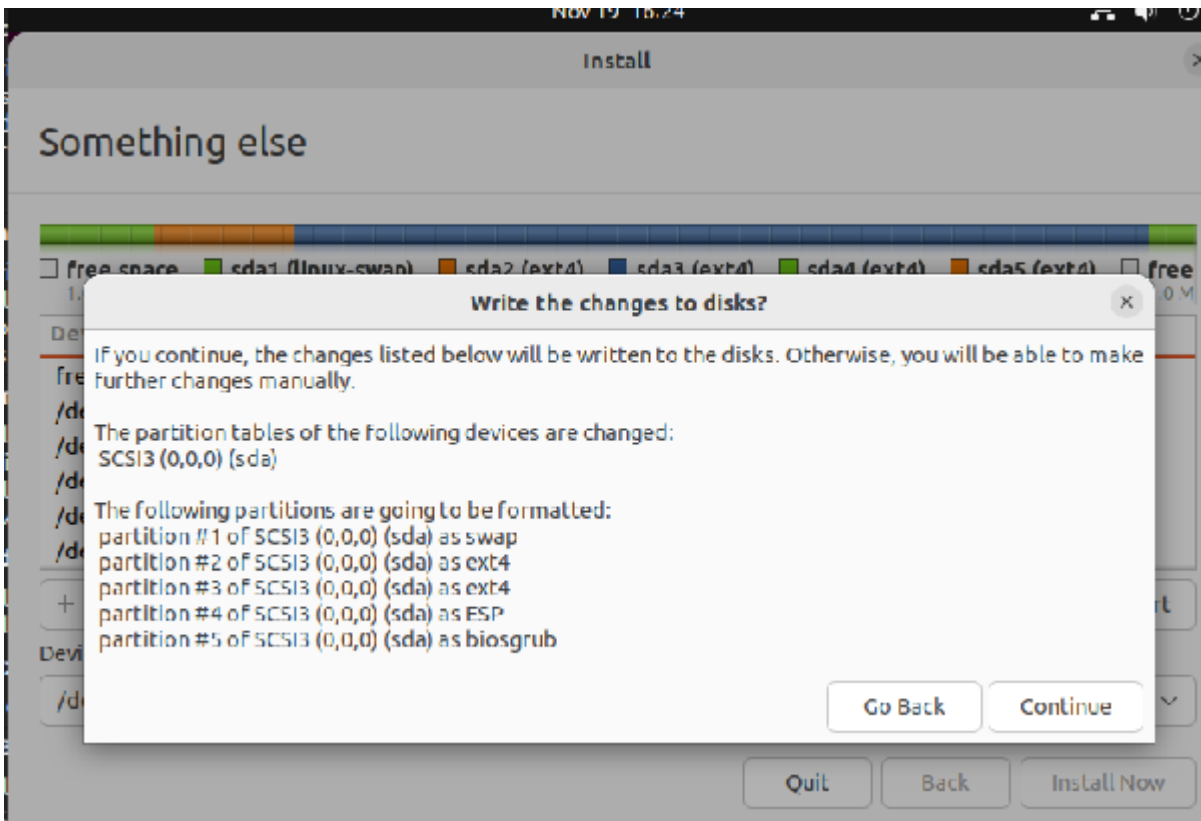
Dispositivo donde instalar el cargador de arranque:

/dev/sda ATA VBOX HARDDISK (268.4 GB)

Salir

Atrás

Instalar ahora



Primer instalem 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
```

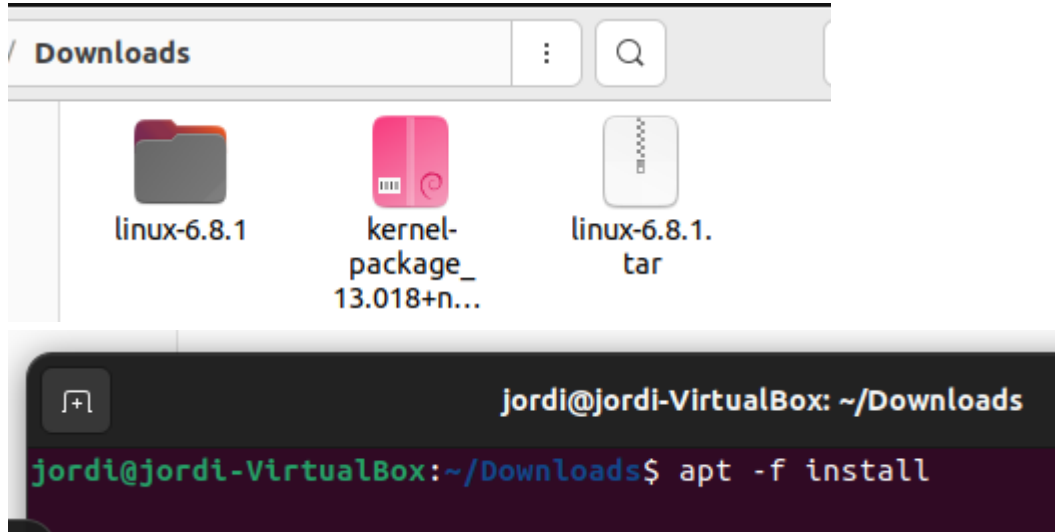
També depenent de la versió del sistema hem de descomentar unes línies dels sources.list

```
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

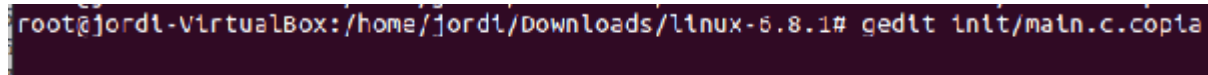
```
jordi@jordi-VirtualBox:~$ uname -r
6.8.0-87-generic
jordi@jordi-VirtualBox:~$
```

Baixem i descomprimim una versió més actualitzada

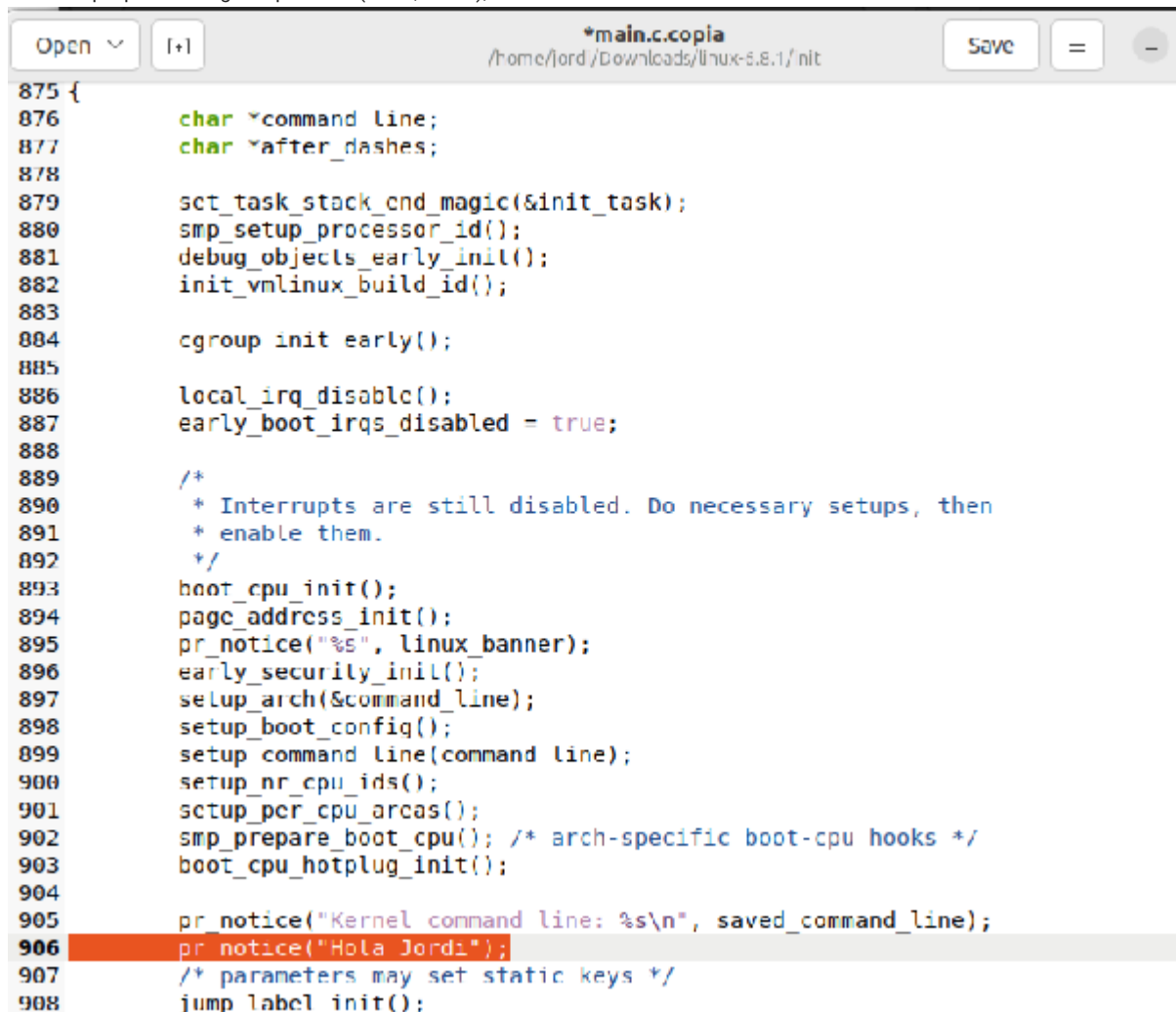


fem una copia del ini main: `cp init/main.c init/main.c.copia`

la editem



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



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  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#
```

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
The following packages have been automatically installed, along with linux:
  linux-base linux-doc
```

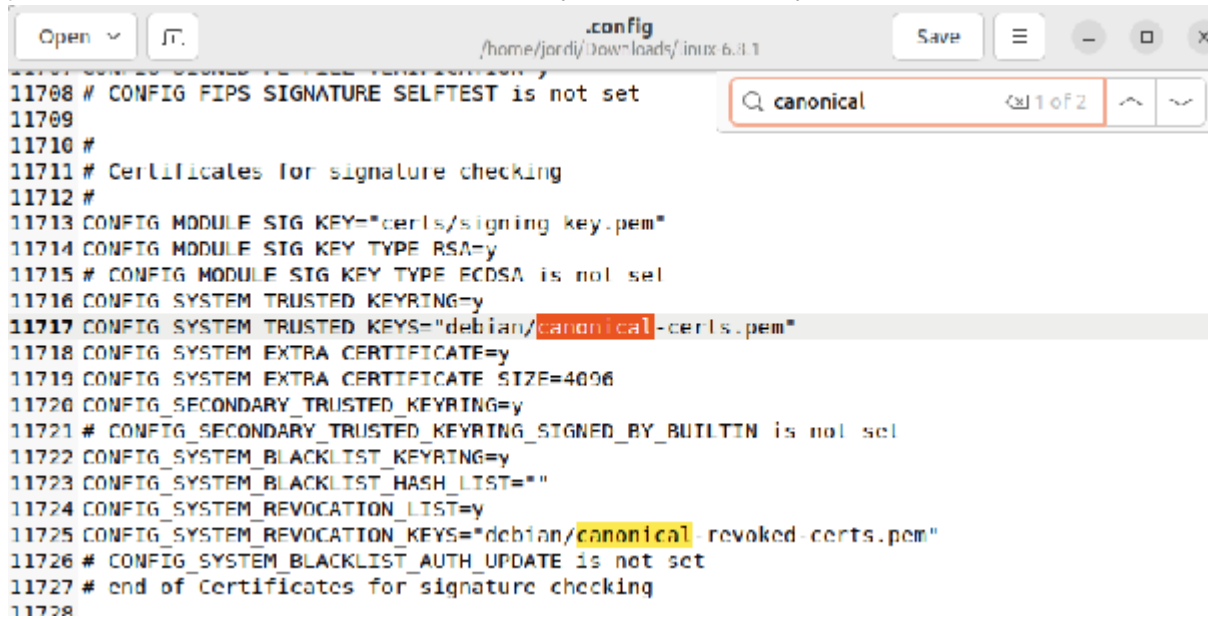
podem copiar la configuració del nostre kernel per si la volem recuperar més endavant

```
root@jordi-VirtualBox: /home/jordi/Downloads/linux-6.8.1# cp /boot/config-6.8.0-87-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 oldconfig 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
```

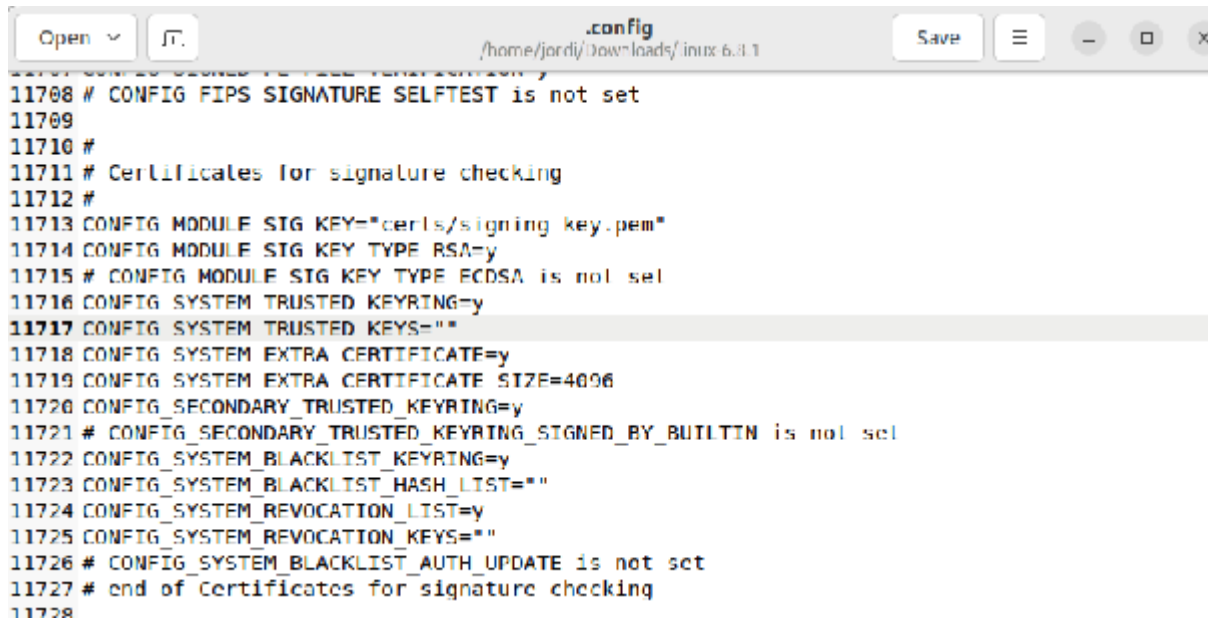
pero tambe hem de esborrar el certificats, tant el "trusted\_keys" com el "revocation\_keys"



```

11708 # CONFIG_FIPS_SIGNATURE_SELFTEST is not set
11709
11710 #
11711 # Certificates for signature checking
11712 #
11713 CONFIG_MODULE_SIG_KEY="certs/signing key.pem"
11714 CONFIG_MODULE_SIG_KEY_TYPE_RSA=y
11715 # CONFIG_MODULE_SIG_KEY_TYPE_ECDSA is not set
11716 CONFIG_SYSTEM_TRUSTED_KEYRING=y
11717 CONFIG_SYSTEM_TRUSTED_KEYS="debian/canonical-certs.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_BUILTIN 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_SIG_KEY="certs/signing key.pem"
11714 CONFIG_MODULE_SIG_KEY_TYPE_RSA=y
11715 # CONFIG_MODULE_SIG_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_BUILTIN 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

/home/jordi/Downloads/linux-6.3.1

Save

Q CONFIG\_DEBUG

```
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=4
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 #
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_BT=n
1946 CONFIG_PAHOLE_HAS_SPLIT_BT=n
1947 CONFIG_PAHOLE_HAS_LANG_EXCLUDE=y
1948 CONFIG_DEBUG_INFO_BT_MODULES=y
1949 # CONFIG_DEBUG_MODULE_ALLOW_BTF_MODULES 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,
modularizes features. Press <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     Documenta to_uring  lib        net        scripts   virt
certs     drivers  ipc       LICENSES  parcho.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
e-direct.ko.zst
ZSTD debian/linux-image-6.8.1/lib/modules/6.8.1/kernel/samples/ftrace/ftrac
e-direct-too.ko.zst
ZSTD debian/linux-image-6.8.1/lib/modules/6.8.1/kernel/samples/ftrace/ftrac
e-direct-modify.ko.zst
ZSTD debian/linux-image-6.8.1/lib/modules/6.8.1/kernel/samples/ftrace/sampl
e-trace-array.ko.zst
ZSTD debian/linux-image-6.8.1/lib/modules/6.8.1/kernel/virt/lib/irqbypass.k
o.zst
DEPMOD debian/linux-image-6.8.1/lib/modules/6.8.1
dpkg-deb: construyendo el paquete 'linux-image-6.8.1' en './linux-image-6.8.1_6
.8.1-5_amd64.deb'.
INSTALL debian/linux-libc-dev/usr/include
dpkg-deb: construyendo el paquete 'linux-libc-dev' en './linux-libc-dev_6.8.1-5
_amd64.deb'.
dpkg-deb: construyendo el paquete 'linux-headers-6.8.1' en './linux-headers-6.8
.1_6.8.1-5_amd64.deb'.
dpkg-genbuildinfo --build=binary -O../linux-upstream_6.8.1-5_amd64.buildinfo
dpkg-genchanges --build=binary -O../linux-upstream_6.8.1-5_amd64.changes
dpkg-genchanges: información: binary-only upload (no source code included)
dpkg-source --after-build .
dpkg-buildpackage: información: subida sólo de binarios (no se incluye ninguna f
uente)
jordi@jordi-VirtualBox: ~/Descargas/linux-6.8.1$
```

despres 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

```
GNU GRUB  versió 2.06

*Ubuntu, with Linux 6.8.1
  Ubuntu, with Linux 6.8.1 (recovery mode)
  Ubuntu, with Linux 6.8.0-87-generic
  Ubuntu, with Linux 6.8.0-87-generic (recovery mode)
  Ubuntu, with Linux 5.15.0-43-generic
  Ubuntu, with Linux 5.15.0-43-generic (recovery mode)
```

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

```
jordi@jordi-VirtualBox: ~
jordi@jordi-VirtualBox:~$ uname -r
6.8.1
jordi@jordi-VirtualBox:~$
```

dmesg | grep Jordi: per a veure 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:~$
```