Clonación UEFI

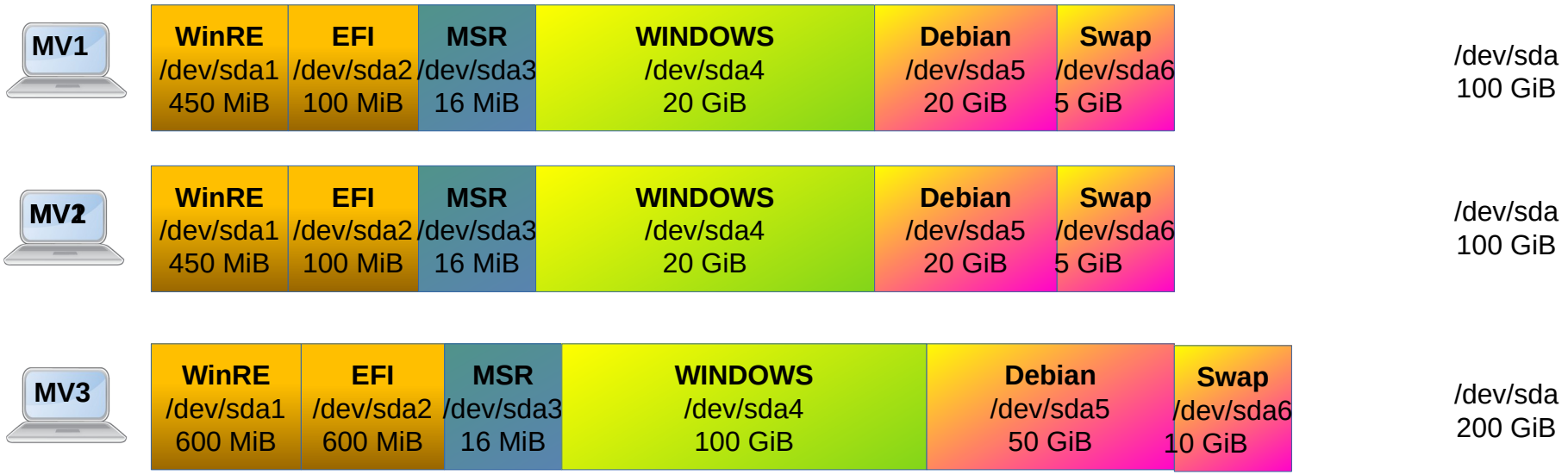
Situación Inicial

- Partimos dunha MV con Firmware UEFI
- Temos instalado Windows 10 e Debian co seguinte particionado

```
Device         Start       End   Sectors  Size Type
/dev/sda1       2048    923647    921600  450M Windows recovery environment
/dev/sda2     923648   1128447    204800  100M EFI System
/dev/sda3    1128448   1161215     32768   16M Microsoft reserved
/dev/sda4    1161216  41945087  40783872 19.5G Microsoft basic data
/dev/sda5   41945088  81006591  39061504 18.6G Linux filesystem
/dev/sda6   81006592  90771455   9764864  4.7G Linux swap
```

Obxectivo

- A MV 1 engadirémoslle un HD de imaxes e clonaremos os sistemas
- Faremos dúas MV novas- Engadirémoslle o HD de imaxes, restaurando os seus sistemas, queremos acadar as seguintes MV:



MV1: É a MV orixinal

MV2: Será unha máquina nova pero idéntica a orixinal

MV3: Sera unha máquina nova, con distinto particionado e tamaño do HD

Creación das imaxes

- Engadimos un 2º HD de 100 GiB
- Iniciamos co SRCD
  - Particionamos o 2º HD, formateamos e montamos en /mnt

```
Device     Start       End   Sectors  Size Type
/dev/sdb1   2048 209715166 209713119  100G Linux filesystem
```

- Creamos unha copia de seguridade da GPT

```
root@sysresccd /root % gdisk /dev/sda
GPT fdisk (gdisk) version 1.0.3

Partition table scan:
  MBR: protective
  BSD: not present
  APM: not present
  GPT: present

Found valid GPT with protective MBR; using GPT.

Command (? for help): b
Enter backup filename to save: /mnt/gpt.bak
The operation has completed successfully.

Command (? for help): q
```

- Clonamos os sistemas
  - Clonamos Windows

```
partclone.ntfs -c -s /dev/sda4 -o /mnt/win10.img
```

  - Clonamos Debian

```
fsarchiver savefs /mnt/debian.fsa /dev/sda5
```

  - Clonamos a partición EFI

```
partclone.fat -c -s /dev/sda2 -o /mnt/efi.img
```

  - Clonamos a partición WinRE

```
partclone.ntfs -c -s /dev/sda1 -o /mnt/winre.img
```

  - Temos os seguintes arquivos no HD de imaxes

```
root@sysresccd /root % ls /mnt
debian.fsa  efi.img  gpt.bak  lost+found  win10.img  winre.img
```

Restauración de MV1

Pasos a realizar

Creamos MV2

- HD: 100 GiB, RAM: 5 GiB, 3 CPU's, Rede Interna

Engadímoslle o HD de imaxes

Iniciamos co SRCD

- Restauramos o GPT
- Restauramos cada imaxe na súa partición
- Formateamos a partición de SWAP
- Arranxamos o /etc/fstab da partición debian

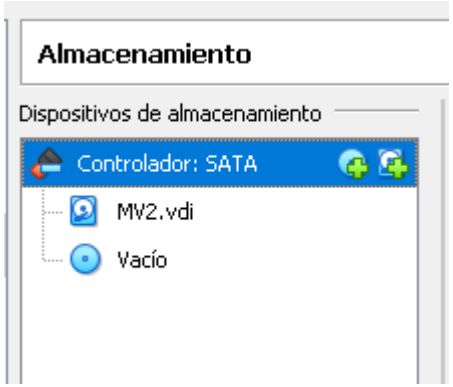
Reiniciamos

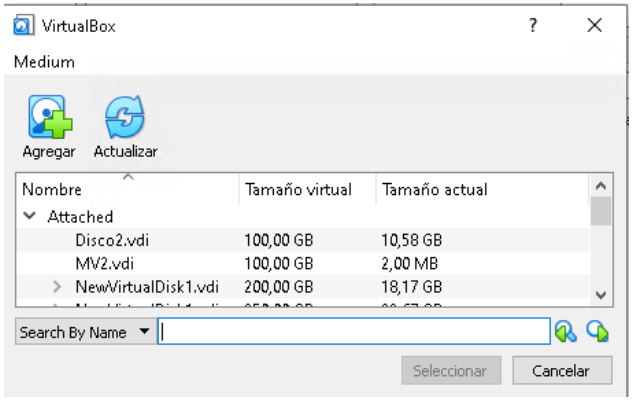
- Xa funciona

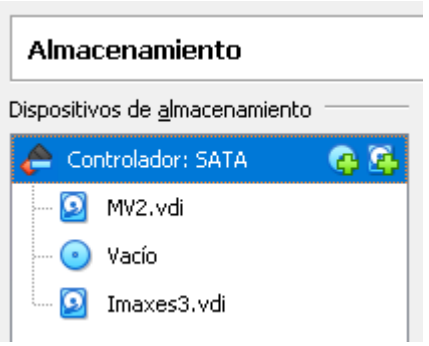
Paso 1: Creamos MV2

Creamos MV2

- HD: 100 GiB, RAM: 5 GiB, 3 CPU's
- Firmware tipo UEFI
- Engadimos o HD de imaxes







Paso 2- Restauración das imaxes

- Montamos a partición do 2º HD

```
mount /dev/sdb1 /mnt
```

- Restauramos o GPT

```
root@sysresccd /root % gdisk /dev/sda
GPT fdisk (gdisk) version 1.0.3

Partition table scan:
  MBR: not present
  BSD: not present
  APM: not present
  GPT: not present

Creating new GPT entries.

Command (? for help): r

Recovery/transformation command (? for help): l
Enter backup filename to load: /mnt/gpt.bak

Recovery/transformation command (? for help): w

Final checks complete. About to write GPT data. THIS WILL OVERWRITE EXISTING
PARTITIONS!!

Do you want to proceed? (Y/N): y
OK; writing new GUID partition table (GPT) to /dev/sda.
The operation has completed successfully.
```

Antes

```
Disk /dev/sda: 100 GiB, 107374182400 bytes, 209715200 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
```

Despois

```
Disk /dev/sda: 100 GiB, 107374182400 bytes, 209715200 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: gpt
Disk identifier: C2E785F4-C743-44FF-BC19-BD71B1C9C534

Device         Start      End  Sectors  Size Type
/dev/sda1       2048   923647   921600  450M Windows recovery environment
/dev/sda2     923648  1128447   204800  100M EFI System
/dev/sda3    1128448  1161215    32768   16M Microsoft reserved
/dev/sda4    1161216 41945087 40783872 19.5G Microsoft basic data
/dev/sda5   41945088 81006591 39061504 18.6G Linux filesystem
/dev/sda6   81006592 90771455  9764864  4.7G Linux swap
```

- Restauramos os sistemas
  - Restauramos Windows

```
partclone.ntfs -r -s /mnt/win10.img -o /dev/sda4
```

  - Restauramos Debian

```
fsarchiver restfs /mnt/debian.fsa id=0,dest=/dev/sda5
```

  - Restauramos a partición EFI

```
partclone.fat -r -s /mnt/efi.img -o /dev/sda2
```

  - Restauramos a partición WinRE

```
partclone.ntfs -r -s /mnt/winre.img -o /dev/sda1
```

  - Formateamos a partición de swap

```
root@sysresccd /root % mkswap /dev/sda6
Setting up swapspace version 1, size = 4.7 GiB (4999606272 bytes)
no label, UUID=f12a1d8d-d5b2-4604-9aa2-bfa08b1393a2
```

- O formatear a partición de swap o seu código cabiou, se iniciamos un debian daría un erro o intentar montala

```
Gave up waiting for suspend/resume device
/dev/sda5: clean, 42372/1222992 files, 410927/4882432 blocks
[    **] A start job is running for dev-disk-by\x2duuid-4214551c\x2d…d40cd\x2d86f4\x2daf42c86f0a67.device (1min 10s / 1min 30
```

- Para solucionar o erro modificamos o **/etc/fstab**
  - Arranxamos o identificador da partición de swap

Antes

```
# <file system> <mount point>   <type>  <options>       <dump>  <pass>
# / was on /dev/sda5 during installation
UUID=e76561ca-db59-4cca-8422-418c9d537301 /               ext4    errors=remount-ro 0       1
# /boot/efi was on /dev/sda2 during installation
UUID=F04E-CFCD  /boot/efi       vfat    umask=0077      0       1
# swap was on /dev/sda6 during installation
UUID=4214551c-af97-40cd-86f4-af42c86f0a67 none            swap    sw              0       0
/dev/sr0        /media/cdrom0   udf,iso9660 user,noauto     0       0
~
```

Despois

```
# <file system> <mount point>   <type>  <options>       <dump>  <pass>
# / was on /dev/sda5 during installation
UUID=e76561ca-db59-4cca-8422-418c9d537301 /               ext4    errors=remount-ro 0       1
# /boot/efi was on /dev/sda2 during installation
UUID=F04E-CFCD  /boot/efi       vfat    umask=0077      0       1
# swap was on /dev/sda6 during installation
/dev/sda6        none            swap    sw              0       0
/dev/sr0        /media/cdrom0   udf,iso9660 user,noauto     0       0
~
```

Paso 3: Reiniciamos

- Probamos o arranque de ambos sistemas
  - Iniciamos Windows todo correcto
- No MBR tíñamos que escribir o MBR co xestor de arranque por defecto. Por que con UEFI non é necesario?

Paso 3: Reiniciamos

- Probamos o arranque de ambos sistemas
  - Iniciamos Windows todo correcto
- No MBR tíñamos que escribir o MBR co xestor de arranque por defecto. Por que con UEFI non é necesario?
  - MBR
    - Necesita un progrma de arranque por defecto que lea a partición activa e lle pase o control
    - Se o HD está baleiro temos que reescribilo
  - UEFI
    - En función das variables da NVRAM executa na partición EFI o OS Loader por defecto

Restauración de MV2

Pasos a realizar

Creamos MV2

- HD: 200 GiB, RAM: 5 GiB, 3 CPU's, Rede Interna

Engadímoslle o HD de imaxes

Iniciamos co SRCD

- Creamos as particións a man
- Restauramos cada imaxe na súa partición
- Formateamos a partición de SWAP

Reiniciamos

- Erro: Windows Non arranca
- Arranxamos o arranque de Windows
- Eliminamos entrada duplicada

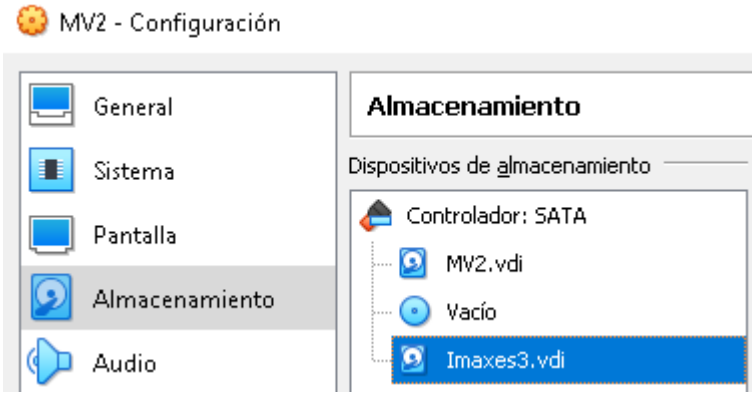
Problema

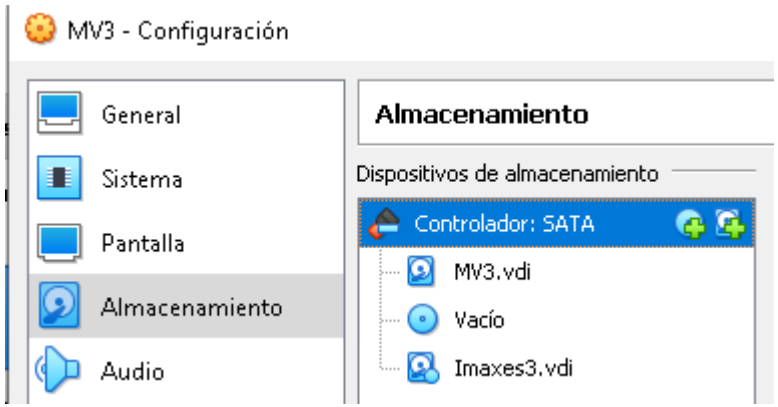
- Tamaño das particións

Paso 1: Creamos MV3

Creamos MV3

- HD: 200 GiB, RAM: 5 GiB, 3 CPU's
- Firmware UEFI
- Quitamos o HD de imaxes de MV2
- Engadimos o HD de imaxes a MV3

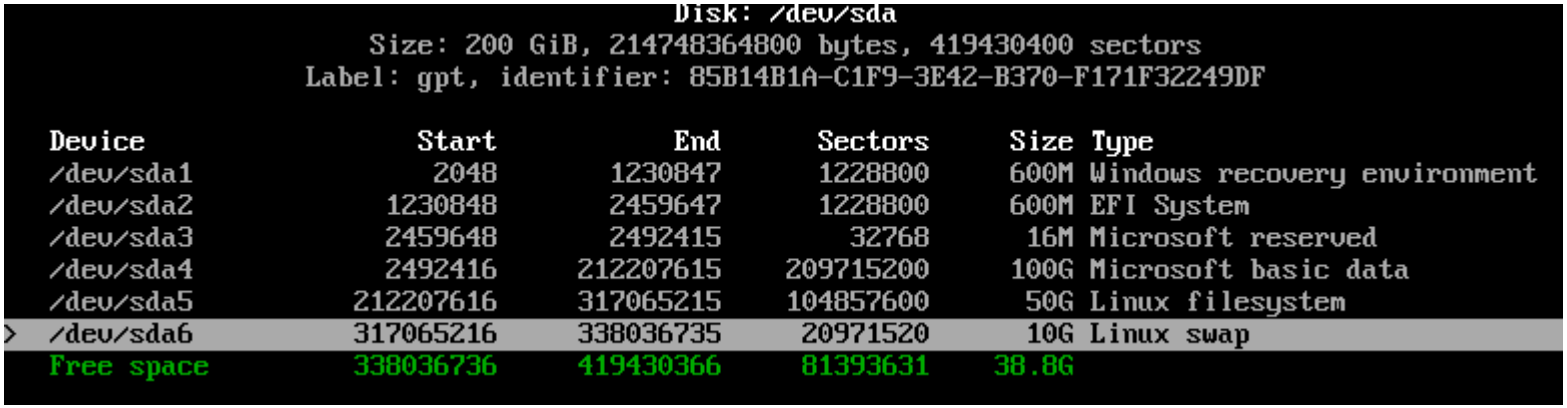




Paso 2: Creamos as particións

Arrancamos co SRCD

- `cfdisk /dev/sda`
- Escollemos particionado tipo GPT
- Creamos as particións do novo sistema



Paso 3: Restauramos as imaxes

- Restauramos os sistemas
  - Restauramos Windows

```
partclone.ntfs -r -s /mnt/win10.img -o /dev/sda4
```

  - Restauramos Debian

```
fsarchiver restfs /mnt/debian.fsa id=0,dest=/dev/sda5
```

  - Restauramos a partición EFI

```
partclone.fat -r -s /mnt/efi.img -o /dev/sda2
```

  - Restauramos a partición WinRE

```
partclone.ntfs -r -s /mnt/winre.img -o /dev/sda1
```

  - Formateamos a partición de swap

```
root@sysresccd /root % mkswap /dev/sda6
Setting up swapspace version 1, size = 4.7 GiB (4999606272 bytes)
no label, UUID=f12a1d8d-d5b2-4604-9aa2-bfa08b1393a2
```

Paso 3: Restauramos as imaxes

- Comprobamos como unha vez restaurados, todos os sitemas teñen o seu correspondente UUID

```
                                Disk: /dev/sda
                Size: 200 GiB, 214748364800 bytes, 419430400 sectors
              Label: gpt, identifier: 85B14B1A-C1F9-3E42-B370-F171F32249DF

  Device              Start          End      Sectors     Size Type
  /dev/sda1            2048      1230847      1228800     600M Windows recovery environment
  /dev/sda2         1230848      2459647      1228800     600M EFI System
  /dev/sda3         2459648      2492415        32768      16M Microsoft reserved
  /dev/sda4         2492416    212207615    209715200     100G Microsoft basic data
  /dev/sda5       212207616    317065215    104857600      50G Linux filesystem
> /dev/sda6       317065216    338036735     20971520      10G Linux swap
  Free space      338036736    419430366     81393631    38.8G
```

```
/dev/sda1: LABEL="RecuperaciM-CM-3n" UUID="7470C74C70C71430" TYPE="ntfs" PARTUUID
="3aa26027-1e8e-7e43-b181-754102dfc40b"
/dev/sda4: UUID="760AE1320AE0F053" TYPE="ntfs" PARTUUID="554646a6-f124-f54c-b497-
0d8eb71bf5b7"
/dev/sda2: UUID="C0C7-61F1" TYPE="vfat" PARTUUID="e06eff0a-b7c8-b249-9b3f-cbdf4fa
afbef"
/dev/sda3: PARTUUID="a6e39ad8-be95-2c41-9fec-bd8e3fb2ae9d"
/dev/sda5: UUID="02dc8161-56a6-466e-81bd-3189d662b057" TYPE="ext4" PARTUUID="7c22
172e-cfb5-d04f-b42e-3c0ff002b0a5"
/dev/sda6: UUID="62c9f767-78d2-479a-9539-8ad6725a7a06" TYPE="swap" PARTUUID="68bc
a0c9-e732-9a49-8206-996e27be4e7d"
```

- O formatear a partición de swap o seu código cabiou, se iniciamos un debian daría un erro o intentar montala

```
Gave up waiting for suspend/resume device
/dev/sda5: clean, 42372/1222992 files, 410927/4882432 blocks
[    **] A start job is running for dev-disk-by\x2duuid-4214551c\x2d…d40cd\x2d86f4\x2daf42c86f0a67.device (1min 10s / 1min 30
```

- Para solucionar o erro modificamos o **/etc/fstab**
  - Arranxamos o identificador da partición de swap

Antes

```
# <file system> <mount point>   <type>  <options>       <dump>  <pass>
# / was on /dev/sda5 during installation
UUID=e76561ca-db59-4cca-8422-418c9d537301 /               ext4    errors=remount-ro 0       1
# /boot/efi was on /dev/sda2 during installation
UUID=F04E-CFCD  /boot/efi       vfat    umask=0077      0       1
# swap was on /dev/sda6 during installation
UUID=4214551c-af97-40cd-86f4-af42c86f0a67 none            swap    sw              0       0
/dev/sr0        /media/cdrom0   udf,iso9660 user,noauto     0       0
~
```

Despois

```
# <file system> <mount point>   <type>  <options>       <dump>  <pass>
# / was on /dev/sda5 during installation
UUID=e76561ca-db59-4cca-8422-418c9d537301 /               ext4    errors=remount-ro 0       1
# /boot/efi was on /dev/sda2 during installation
UUID=F04E-CFCD  /boot/efi       vfat    umask=0077      0       1
# swap was on /dev/sda6 during installation
/dev/sda6        none            swap    sw              0       0
/dev/sr0        /media/cdrom0   udf,iso9660 user,noauto     0       0
~
```

- O formatear a partición de swap o seu código cabiou, se iniciamos un debian daría un erro o intentar montala

```
Gave up waiting for suspend/resume device
/dev/sda5: clean, 42372/1222992 files, 410927/4882432 blocks
[    **] A start job is running for dev-disk-by\x2duuid-4214551c\x2d…d40cd\x2d86f4\x2daf42c86f0a67.device (1min 10s / 1min 30
```

- Para solucionar o erro modificamos o **/etc/fstab**
  - Arranxamos o identificador da partición de swap

Antes

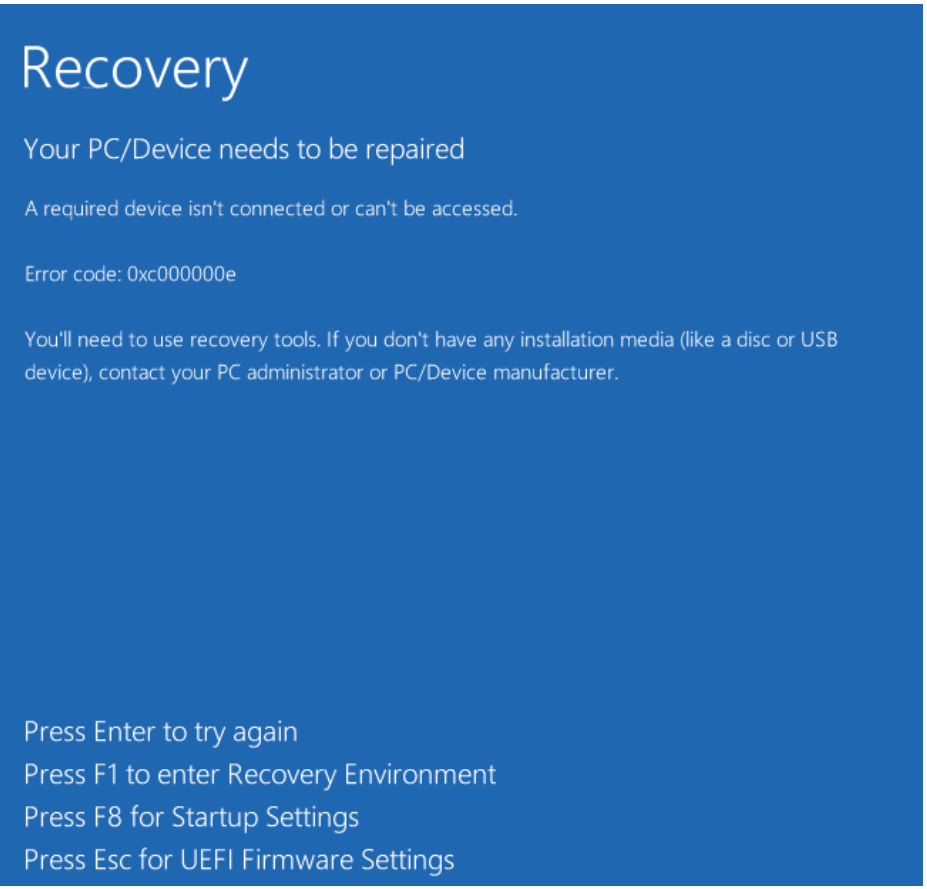
```
# <file system> <mount point>   <type>  <options>       <dump>  <pass>
# / was on /dev/sda5 during installation
UUID=e76561ca-db59-4cca-8422-418c9d537301 /               ext4    errors=remount-ro 0       1
# /boot/efi was on /dev/sda2 during installation
UUID=F04E-CFCD  /boot/efi       vfat    umask=0077      0       1
# swap was on /dev/sda6 during installation
UUID=4214551c-af97-40cd-86f4-af42c86f0a67 none            swap    sw              0       0
/dev/sr0        /media/cdrom0   udf,iso9660 user,noauto     0       0
~
```

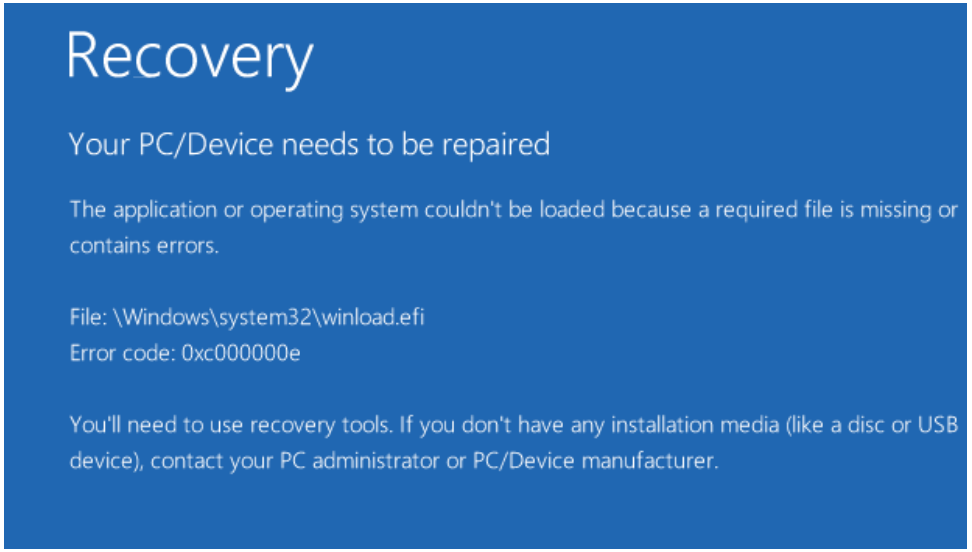
Despois

```
# <file system> <mount point>   <type>  <options>       <dump>  <pass>
# / was on /dev/sda5 during installation
UUID=e76561ca-db59-4cca-8422-418c9d537301 /               ext4    errors=remount-ro 0       1
# /boot/efi was on /dev/sda2 during installation
UUID=F04E-CFCD  /boot/efi       vfat    umask=0077      0       1
# swap was on /dev/sda6 during installation
/dev/sda6        none            swap    sw              0       0
/dev/sr0        /media/cdrom0   udf,iso9660 user,noauto     0       0
~
```

Paso 4: Reiniciamos

- Windows non é capaz de atopar o seu dispositivo de arranque





Se prememos F8

Paso 6: Reparamos o inicio

- Iniciamos co WinRE e comprobamos como non atopa a partición EFI

```
X:\Sources>bcdedit

Administrador de arranque de Windows
---------------------------------
Identificador           {bootmgr}
device                  unknown
path                    \EFI\Microsoft\Boot\bootmgfw.efi
description             Windows Boot Manager
locale                  es-ES
inherit                 {globalsettings}
default                 {default}
resumeobject            {1f226a16-09e5-11ea-9729-d4ca554cf4b5}
displayorder            {default}
toolsdisplayorder       {memdiag}
timeout                 30

E:\>bootrec /rebuildbcd
Examinando todos los discos en busca de instalaciones de Windows.

Espere, esta operación puede tardar unos minutos...

Instalaciones de Windows examinadas correctamente.
Total de instalaciones de Windows identificadas: 1
[1]  D:\Windows
¿Desea agregar la instalación a la lista de arranque? Sí(S)/No(N)/Todo(t):s
Acceso denegado.
```

Non pode arranxalo porque a carpeta C:\Boot non está accesible, está na partición EFI

- Asignámoslle a unidade Z: á partición EFI

```
E:\>diskpart

Microsoft DiskPart versión 10.0.18362.1

Copyright (C) Microsoft Corporation.
En el equipo: MINWINPC

DISKPART> select disk 0

El disco 0 es ahora el disco seleccionado.

DISKPART> select volume 2

El volumen 2 es el volumen seleccionado.

DISKPART> assign letter=Z

DiskPart asignó correctamente una letra de unidad o punto de montaje.

DISKPART> exit
```

- Comprobamos como na unidade Z: se atopa o arquivo BCD, é dicir, a configuración do arranque de Windows

```
Z:\EFI\Microsoft\Boot>dir bcd*
 El volumen de la unidad Z no tiene etiqueta.
 El número de serie del volumen es: C0C7-61F1

 Directorio de Z:\EFI\Microsoft\Boot

23/11/2019  23:15            32.768 BCD
               1 archivos         32.768 bytes
               0 dirs      66.803.712 bytes libres
```

- Na unidade D: temos a partición de Windows

```
Z:\EFI\Microsoft\Boot>dir d:
 El volumen de la unidad D no tiene etiqueta.
 El número de serie del volumen es: 0AE0-F053

 Directorio de D:\

19/03/2019  05:52    <DIR>          PerfLogs
18/11/2019  10:29    <DIR>          Program Files
19/03/2019  13:02    <DIR>          Program Files (x86)
23/11/2019  18:50    <DIR>          Users
18/11/2019  10:30    <DIR>          Windows
               0 archivos              0 bytes
               5 dirs  96.578.461.696 bytes libres
```

- Xeramos unha opción de arranque para un Windows con esas configuracións

```
Z:\EFI\Microsoft\Boot>bcdboot D:\windows /s z: /f uefi
Archivos de arranque creados correctamente.
```

```
/s          Especifica un parámetro de la letra del volumen opcional para designar
            la partición del sistema de destino donde se copian los archivos
            del entorno de arranque. El valor predeterminado es la partición del sistema que se identifica mediante
            el firmware.
```

```
/f          Si se usa con el comando /s, se especifica el tipo de firmware de la
            partición del sistema de destino. Las opciones para el firmware <firmware> son "UEFI",
            "BIOS" o "ALL".
```

- Comprobamos como a información da opción de arranque é correcta

```
Administrador de arranque de Windows
------------------------------------
Identificador           {bootmgr}
device                  partition=Z:
path                    \EFI\Microsoft\Boot\bootmgfw.efi
description             Windows Boot Manager
locale                  en-us
inherit                 {globalsettings}
default                 {default}
resumeobject            {667c493f-0e3f-11ea-8ae0-9c9d91756058}
displayorder            {default}
                        {1f226a17-09e5-11ea-9729-d4ca554cf4b5}
toolsdisplayorder       {memdiag}
timeout                 30
```

Paso 7: Recuperamos WinRE

- Se amosamos as configuracións de arranque con máis detalle, comprobamos que hai un erro nas opcións de arranque do WinRE

```
C:\windows\system32>bcdedit /enum all

Opciones de dispositivo
----------------------
Identificador           {3c673451-6b86-11eb-b8f0-9f6da8b621ef}
description             Windows Recovery
ramdisksdidevice        unknown
ramdisksdipath          \Recovery\WindowsRE\boot.sdi

Opciones de dispositivo
----------------------
Identificador           {be585ce0-6bcd-11eb-a25d-d2a43e731409}
description             Windows Recovery
ramdisksdidevice        partition=C:
ramdisksdipath          \Recovery\WindowsRE\boot.sdi
```

Paso 7: Recuperamos WinRE

- Reparamos e comprobamos

```
C:\windows\system32>bcdedit /set {current} recoverysequence  {be585cdf-6bcd-11eb-a25d-d2a43e731409}
La operación se completó correctamente.
```

```
Cargador de arranque de Windows
-------------------------------
Identificador           {current}
device                  partition=C:
path                    \windows\system32\winload.efi
description             Windows 10
locale                  es-ES
inherit                 {bootloadersettings}
recoverysequence        {be585cdf-6bcd-11eb-a25d-d2a43e731409}
displaymessageoverride  Recovery
recoveryenabled         Yes
isolatedcontext         Yes
allowedinmemorysettings 0x15000075
osdevice                partition=C:
systemroot              \windows
resumeobject            {be585cdd-6bcd-11eb-a25d-d2a43e731409}
nx                      OptIn
bootmenupolicy          Standard
```

Paso 8: Eliminamos opción de arranque

- Agora xa arranca, pero amosa dúas opcións, a vella (que non funciona) e a nova

Paso 8: Eliminamos opción de arranque

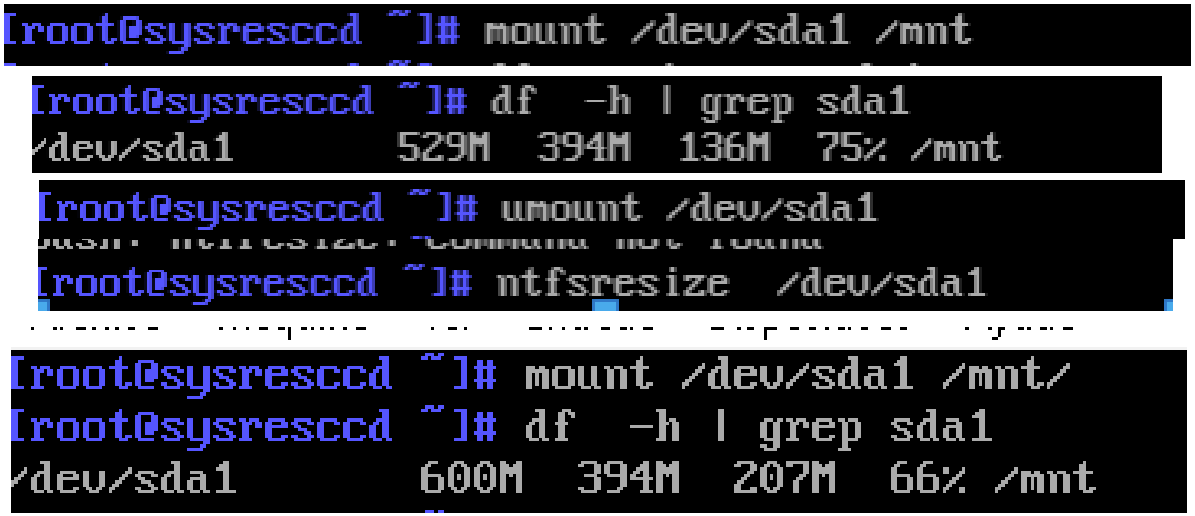
- Dende Windows iniciamos unha consola como administrador
- Borramos a entrada incorrecta

```
Cargador de arranque de Windows
-------------------------------
Identificador           {1f226a17-09e5-11ea-9729-d4ca554cf4b5}
device                  unknown
path                    \Windows\system32\winload.efi
description             Windows 10
locale                  es-ES
inherit                 {bootloadersettings}
recoverysequence        {1f226a18-09e5-11ea-9729-d4ca554cf4b5}
displaymessageoverride  Recovery
recoveryenabled         Yes
isolatedcontext         Yes
allowedinmemorysettings 0x15000075
osdevice                unknown
systemroot              \Windows
resumeobject            {1f226a16-09e5-11ea-9729-d4ca554cf4b5}
nx                      OptIn
bootmenupolicy          Standard

C:\windows\system32>bcdedit /delete {1f226a17-09e5-11ea-9729-d4ca554cf4b5}
La operación se completó correctamente.
```

Paso 9: Redimensionamos os sistemas de arquivos

- Como as particións de destino son maiores que as orixinais, temos que redimensionalas.

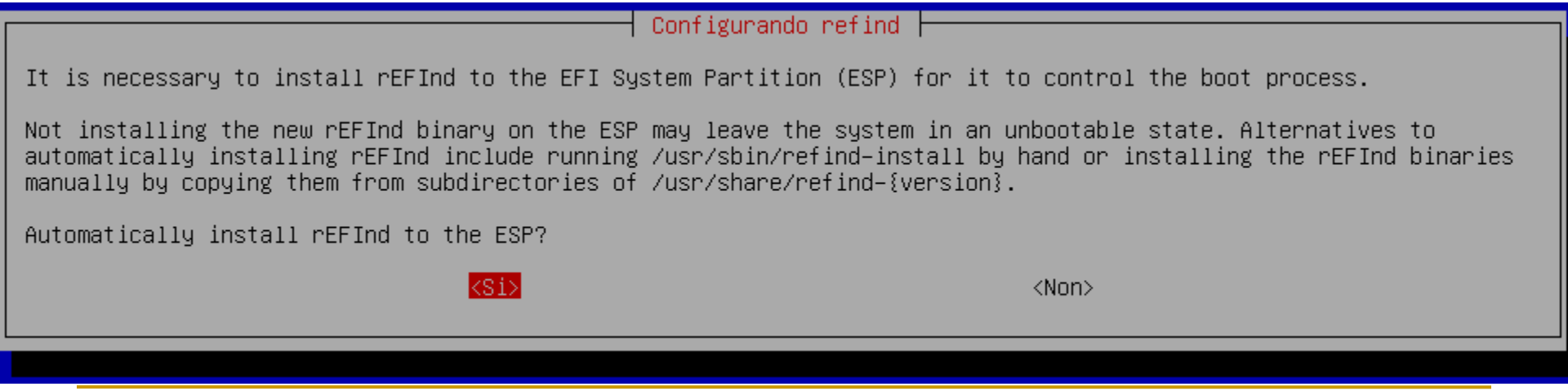


rEFInd

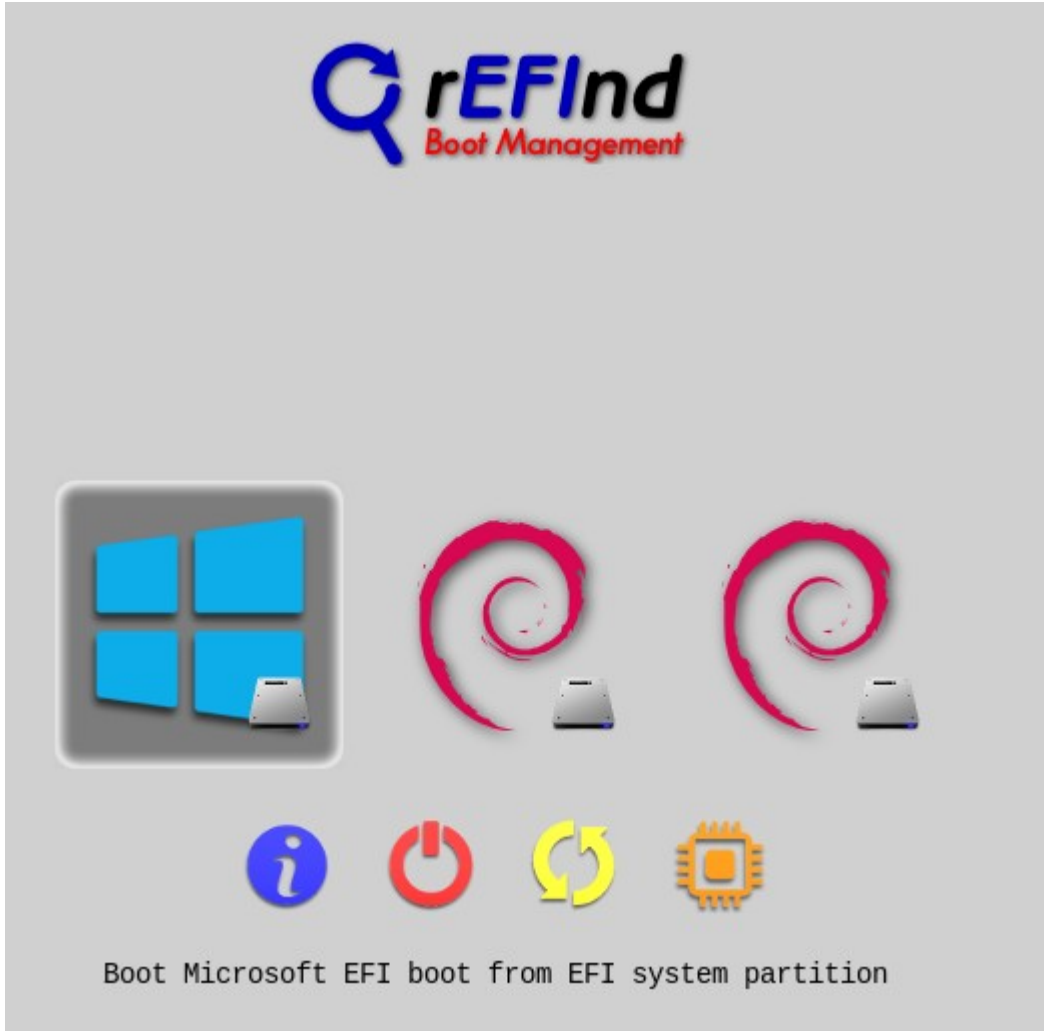
Probando outro xestor de arranque

- **rEFInd** é un xestor de arranque con soporte para arranque en sistemas UEFI
- Instalación
  - Iniciamos Debian
  - instalamos o paquete correspondente
  - Durante o proceso de instalación se instala como bootloader

```
root@debian:~# apt-cache search refind
refind - boot manager for EFI-based computers
root@debian:~# apt-get install refind
```



- Reiniciamos e xa aparece o novo xestor de arranque



- Durante a súa instalación rEFInd copia os seus arquivos de de arranque á partición UEFI

```
root@debian:~# ls /boot/efi/EFI/refind/
drivers_x64  icons  keys  refind.conf  refind_x64.efi
```

- Se queremos restaurar o grub

```
root@debian:~# grub-install /dev/sda
Installing for x86_64-efi platform.
A instalación finalizou. Non se informou de ningún erro.
```

- Se queremos restaurar rEFInd

```
root@debian:~# refind-install
ShimSource is none
Installing rEFInd on Linux....
ESP was found at /boot/efi using vfat
Found rEFInd installation in /boot/efi/EFI/refind; upgrading it.
Installing driver for ext4 (ext4_x64.efi)
Copied rEFInd binary files

Notice: Backed up existing icons directory as icons-backup.
Existing refind.conf file found; copying sample file as refind.conf-sample
to avoid overwriting your customizations.

Installing it!
rEFInd has been set as the default boot manager.
Existing //boot/refind_linux.conf found; not overwriting.

Installation has completed successfully.
```