

Dual Boot: MX Linux & Windows – Installation Guide

Dual Boot is also know as 'Install alongside Windows Boot Manager' in other distributions.

1.0 Introduction and the why questions answered

Windows being the first installed Operating System is preferred. This document only applies to all recent editions of: Windows 10, 11, and MX Linux 23. No Legacy (older) Windows!

Windows MUST be installed in UEFI Mode and not in MBR aka Legacy aka CSM.¹

Dual Booting is an option for intermediate to advanced PC users to keep an existing Windows 10/11 installation to use along with MX Linux with both OS having full access to all resources.

It is likely that 1/3 or more of this guide will not be used by most people. A lot of the added fine detail in certain areas is solely for edge cases related to a difficult make or model.

1.1 UEFI is the BIOS v2 for PCs

BIOS is still used as it is easier to say than UEFI Firmware.² Older PC's firmware is often referred to as BIOS. Firmware is used in place of BIOS throughout this document. The UEFI setting in the PCs firmware are sometimes referred to as NVRAM.

1.2 Secure Boot considerations

Secure Boot was introduced in 2012 to help ensure that a PC boots-up with software that is trusted. This was due to the greatly increasingly common Malware attacks on PC firmware.

MX Linux 23 can Dual Boot with Secure Boot off. There will be some Windows 11 programs that won't run with Secure Boot off. Windows 10 does work with Secure Boot turned On or Off. Windows 11 depending on installation method may boot with Secure Boot – Off.

1.3 BitLocker considerations

You will need the Windows BitLocker Recovery Keys if you try to disable Secure Boot before you proceed. Mostly a Windows 11 only consideration. More details are later in document.

1.6 Highly recommended to add a second hard disk drive

Some PCs may have a space for adding a second disk drive. Solid State Drives aka SSD should be considered for this as this will result in a very significant performance boost. Leaving the existing Windows installation on its own drive has a stability advantage.

1.7 Windows 10 & 11 disk space requirement

Windows 10 requires 50 Gb of free disk space and Windows 11 requires 60 Gb of free space. Windows will refuse to install with less free space.

1 MBR2GPT.EXE converts a disk from the Master Boot Record (MBR) to the GUID Partition Table (GPT) partition style without modifying or deleting data on the disk. More <https://learn.microsoft.com/en-us/windows/deployment/mbr-to-gpt>

2 <https://www.howtogeek.com/56958/htg-explains-how-uefi-will-replace-the-bios/>

1.8 MX Linux disk space requirement

MX requires a minimum of 6 Gb free space with 20 Gb recommended disk space. MX 23 KDE edition installed weighs in at around 11 Gb.

So, how much disk space is enough? MX Linux comes with many of the most commonly used programs already preinstalled. A lot of additional programs may take an addition 5 Gb to 10 Gb with some of the large program suites (Programming IDE, Steam, Video Editing, etc) each individually taking 10 Gb or more.

1.9 Data Sharing area between Windows & Linux

Consider implementing a data sharing area between Windows and MX Linux when you are setting up Dual Boot. Most USB drive come as FAT32 but you can use ExFAT or NTFS also.

Suggested partition label: 'MyData'

- Create a 3rd partition that is visible to both after the Windows disk partition.
- Setup a Cloud Storage account: Google Drive, OneDrive, DropBox, Mega, etc.
- Purchase an external Thumb drive or SSD hard drive caddy to exchange files.

1.10 Home Drive considerations

Its highly recommended keeping the Home directory in MX Linux on a separate partition *can* improve the reliability and ease of subsequent upgrades. This also makes backing up and recovery easier..

Selecting 'Preserve /home' for the Root partition during the MX Linux installation preserves the contents of the /home directory while deleting everything else of the previously installed OS. The 'Preserve /home' option can only be used when /home is on the same hard drive partition as the root / partition.

1.11 BEFORE You Start Installing MX Linux

- Run Windows Update and restart.
- Verify Secure Boot is Off/Disabled.
- Both boot USB and target hard drive are in GPT format mode.
- Verify you have the latest version of MX 23.4 October/November snapshot.
- Take notes on where MX Linux is to be install and where the EFI/ESP is located.
- Test boot with the MX installation USB first and verify **ALL** major functions work.³

³ WiFi connects and gives internet, bluetooth works, monitor can be setup, etc.

2.0 How-To steps summary

What follows are summaries of how-to steps for the two most likely installation scenarios.

2.1 All on a single hard disk How-to

- Backup your user data.
- Prepare MX boot USB – GPT preferred. Section 5.0.1
- **Windows settings changes:** section 3.0
 - Create a Windows 'Recovery Disk' - DVD or USB. section 3.2
 - Backup your BitLocker **and** Windows Keys. section 3.3
 - Disable BitLocker in Windows (if enabled). section 3.4
 - Disable Windows Fast Startup. section 3.8
 - Defragment Hard Drive. section 3.6
 - Shrink Windows C drive with 'Disk Management'. section 3.7
 - Create the new partition for MX Linux.
- **PC Firmware settings changes:** section 4.0
 - Turn off CSM/Legacy/BIOS Boot. May be in 2 places. section 4.2
 - Set SATA controller to 'AHCI' from RAID/RST/Optane. section 4.8
 - Disable/Turn OFF Secure Boot. section 4.3
 - Change the Boot Order to USB drive first (Disks). section 4.6
 - Fast Boot - Turn off/set to 'Thorough' if present. Section 4.5
- **Install MX Linux.** Section 5.0
 - Boot from this USB section 5.1
 - Create optional data sharing 'MyData' partition⁴. Section 1.9
 - Install MX Linux on the new partition.
 - Reboot.

⁴ Do this by taking a portion of what was 'shrunk' from your windows C: drive. A File System of exfat is suggested over NTFS. Also add a Label:

2.2 TWO hard disk drives How-to

Do **NOT** install the 2nd hard disk drive at first. Follow steps!

- Backup your user data.
- Prepare MX boot USB – GPT preferred. Section 5.0.1
- **Windows settings changes:** section 3.0
 - Create a Windows 'Recovery Disk' - DVD or USB. section 3.2
 - Backup your BitLocker **and** Windows Keys. section 3.3
 - Disable BitLocker in Windows (if enabled). section 3.4
 - Disable Windows Fast Startup. section 3.8
 - Create the new partition for MX Linux.
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 - Set SATA controller to 'AHCI' from RAID/RST/Optane. section 4.8
 - Disable/Turn OFF Secure Boot. section 4.3
 - Change the Boot Order to USB drive first (Disks). section 4.6
 - Fast Boot - Turn off/set to 'Thorough' if present. Section 4.5
 - Shutdown PC.
- **Install second hard disk**
 - Boot from the MX USB section 5.1
 - Prepare MX hard drive – GPT preferred.
 - Create the / root and ESP partitions for MX Linux on 2nd drive.
 - Create data sharing 'MyData' partition. Section 1.9
- **Install MX Linux.** Section 5.0
 - Install MX Linux on the 2nd hard drive partitions.
 - Reboot.

3.0 Preparing Windows for Dual Booting

3.1 Back up important user data to free up space

After Defragmentation has finished there still may not enough free space on your hard drive. Try to move lesser used files off the PC hard drive. Alternately you may need to uninstall lesser used programs or Windows Features/Options.

3.2 Create a Recovery USB Drive for Windows

- In the search box on the taskbar type 'Create a recovery drive' and then select it.
- When the tool opens **make sure to select Back up system files.**
- Then select Next.
- Connect a USB drive to your PC
- Select it, and then select Next.
- Select Create. This will take some time to complete. Over an hour is not unusual.

Label 'Windows Recovery USB' and then store this USB in a safe place.

3.3 Backup your Windows License Key

To get the Windows Key copy/paste the output of below to a text file:

Windows Admin CMD: 'wmic path SoftwareLicensingService get OA3xOriginalProductKey'

In Linux: 'sudo strings /sys/firmware/acpi/tables/MSDM'

NOTE: The presence and contents of the MSDM ACPI table before installing Windows can vary depending on the system and BIOS manufacturer. It's not a guaranteed presence or format across all systems.

Another place the Windows key will be found is in the owner's Microsoft online profile.

Backup these keys in some place (phone, printout, MS Account) other than the PC!

3.4 Disable BitLocker

With Secure Boot Off and BitLocker (Windows Drive Encryption) Enabled, you may need to manually enter your Recovery Key every time you boot up. Windows 11 Hello will not work.

BitLocker **must be Disabled before** doing any Hard Drive reconfiguration tasks.

- **Windows 11 Home & Pro** – BitLocker is enabled and should be disabled.
- **Windows 10** – at the time of writing has BitLocker is not enabled.

Notes: there are **TWO** Recovery Keys... **First one** is for your Device. **The 2nd one** is for the locked hard disk. Chose the second one if the hard disk is BitLocked. The TPM **must** be enabled during

these steps!

More info <https://www.wikihow.com/Turn-Off-BitLocker>

3.41 Procedure to locate the BitLocker Keys

- 1) Go to: <https://onedrive.live.com/about/en-us/signin/>
- 2) Log into your Microsoft Online account and locate the BitLocker Recovery Keys:
 - o Click 'Devices'.
 - o Click 'See Details'.
 - o Click 'BitLocker Data Protection'.
 - o Click 'Manage Recovery Keys'.

Write the Key down, copy the Recovery Keys to a safe location.

NOT on this PC! Also print the Recovery Keys out.

3.42 Procedure to disable BitLocker

1. Left click the start button and type 'CMD' in the search box.
2. Right-click the search result 'Run as Admin'.
3. Type 'manage-bde -off C:' and press enter.

3.5 Check Hard Drive for surface errors

Note: this is for mechanical Hard Drives only, **NOT** for Solid State Drives!

1. In Windows File Explorer right-click on 'This PC'.
2. Left click the C drive.
3. Right click and select 'Properties'.
4. In the pop-up select the 'Tools' tab.
5. Click on 'Check' in the 'Error checking' section.
6. In the pop-up click 'Scan drive'. Windows will restart and at the bottom of the screen a row of text will appear below the rotating circle of dots. Similar to this below.

Fixing (C:) Stage 2: 27% (226414 of 822896); Total: 34% ETA 0:00:49

Once completed you will receive a summary of your hard drive health. In rare cases where a lot of errors are found and corrected it is recommended to run a second scan.

3.6 Defragmenting the Hard Drive

Note: this is for mechanical Hard Drives only, **NOT** for Solid State Drives!

1. In Windows open File Explorer and right-click on 'This PC'.

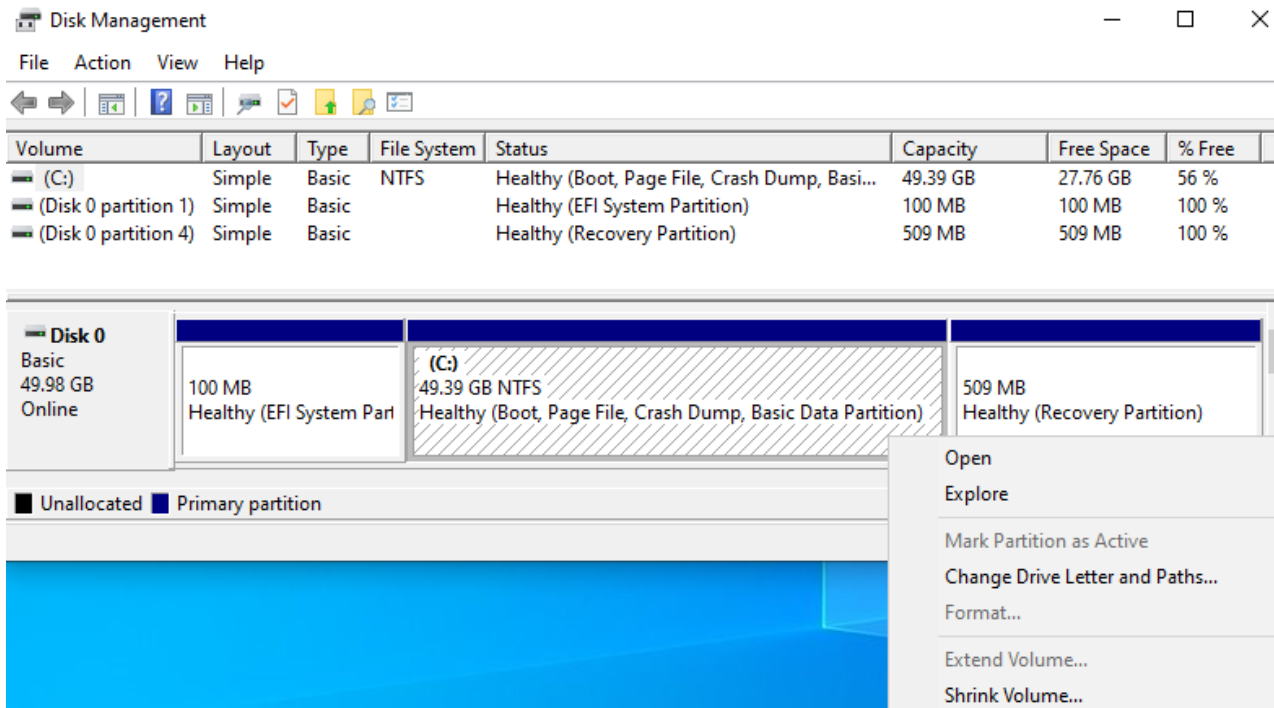
2. Left click the C drive.
3. Right click the C drive click and select 'Properties'.
4. In the pop-up click the 'Tools' tab.
5. Click on 'Optimize' in the 'Optimize and defragment drive' section.
6. In the pop-up click 'Optimize'.

3.7 Freeing space for Linux on the Windows Drive C

MX Linux needs a minimum of 8.5 Gb of free space and preferably 20 Gb is recommended.

3.71 Shrinking the C drive

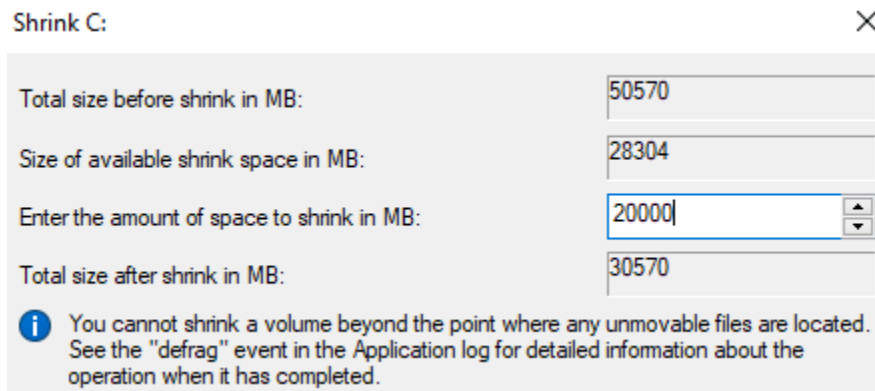
Right click on the Windows Start Menu and select 'Disk Management'.



Above is a single hard drive PC. Disk 0 shows: 100 MB (EFI) and 49.39 GB (C:) drive (highlighted ///). Also shown is the right-click menu content.

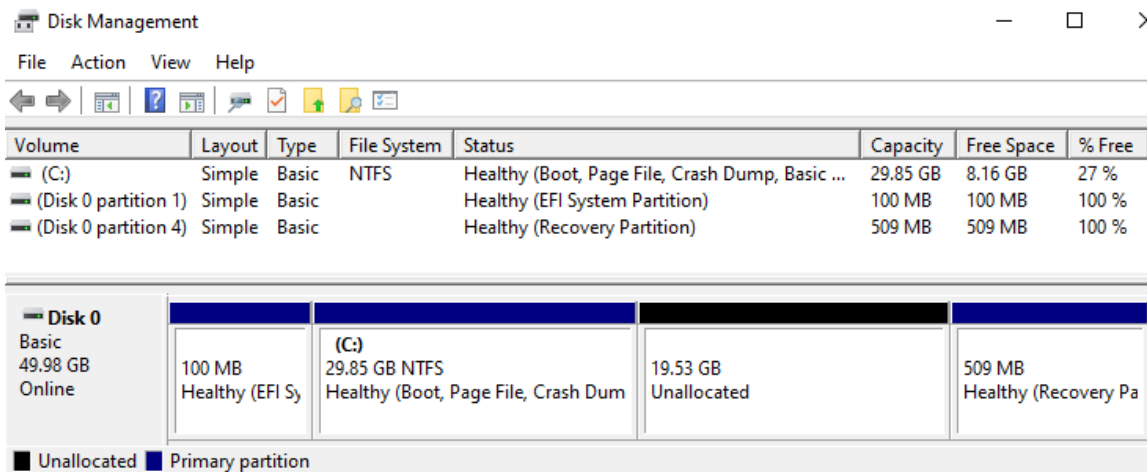
To do the resizing

Right click on the (C:) drive and select 'Shrink Volume...'



In the pop-up above:

- Type in 20,000 in the white box for a new size of 20 Gb.
- Click the 'Shrink' button.



3.72 Creating the free space for MX Linux – all on one disk

NOTE: If encryption is being setup a separate / and a 1 Gb /boot partition (ext4) is required.

- Right click in the newly created free space (black bar with 'Unallocated' showing)
- Click 'New Simple Volume'.
- Click 'Next' and 'Next'.
- Select 'Basic Volume'.
- As the wizard run skip assigning a drive letter.
- Give it a Label and leave 'Format this volume...' selected.

Example below:

New Simple Volume Wizard

Format Partition

To store data on this partition, you must format it first.

Choose whether you want to format this volume, and if so, what settings you want to use.

- Do not format this volume
- Format this volume with the following settings:

File system: FAT32

Allocation unit size: Default

Volume label: MX21

**Make note of the size shown and volume Label of this new partition.
You will use it to identify the drive where you will install MX Linux later.**

- Click 'Finish'.

3.8 Turn off Windows Fast Startup

1. Left click the start button and type 'CMD' in the search box.
2. In the search results click on 'Run as Administrator'.
3. Click 'Yes' to the question: 'Do you want to allow this app to make changes to your device?'
4. Type '*powercfg /h off*' and press enter. See footnote below⁵

Restart your PC...do NOT select Shut down and power back on!

NOTE: on some PCs not turning this **OFF** will interfere with the WiFi functionality in MX Linux.

Windows Update *may* turn it back on!

5 How to Disable/Enable Fast Startup on Windows 11- <https://techcommunity.microsoft.com/t5/windows-11/how-to-disable-enable-fast-startup-on-windows-11/m-p/3712330>

4.0 PC Firmware (BIOS) changes to allow Dual Boot

A few settings in this section are unlocked/made visible in the 'advanced mode' (MSI & others).

[List of PC brands with their corresponding hot-keys](#)

Set the Admin/Supervisor Password

A few of the newest PCs require (Acer & other brands too) a non blank Supervisor/Admin Password for the MX Grub EFI files to be 'trusted'.⁶ Many times there are menu selections under major topics that only become visible once an admin password is entered and saved.

4.1 Accessing your PC's Firmware

Advanced method – Hold the Shift button down and then click the Start button. While still holding the Shift button click the Power button and then the Reset choice.

Windows 11

1. Click Start Button and click the Settings (gear) icon.
2. type in search 'UEFI'.
3. Click on 'Change advanced startup options'.
4. Under 'Advanced startup' click 'Restart now' and again 'Restart now'.
The PC will restart in UEFI mode.
5. Click 'Troubleshoot' and then 'Advanced options'.
6. Click 'UEFI Firmware Settings' and then click 'Restart'.

Windows 10 and Windows 8

1. Click the Start Button and then click Settings aka the gear icon.
2. Search on 'Reset this PC' and click it.
3. In 'Advanced Startup' click 'Restart now'. The PC will restart in UEFI mode.
4. After it restarts click 'Troubleshoot' and then click 'Advanced Options'.
5. Click 'UEFI Firmware Settings' and then click 'Restart'.

4.2 Turn off CSM/Legacy/BIOS Boot

This forces the PC into 'UEFI Only' Boot Mode. If this is left ON it can cause several boot up problems. The white text below is highlighted indicating a menu will come up if you press enter.

⁶ <https://ubuntuforums.org/showthread.php?t=2297947&p=13369742#post13369742>



In a few rare cases CSM/Legacy/BIOS needs to be turned off in **TWO** places: 'Boot Mode' (default) and 'Boot fallback' aka LEGACY+UEFI. Dell refers to Advanced Boot Options.

Boot Mode Select – MSI

[LEGACY+UEFI] is the default. Enables both Legacy BIOS boot mode and UEFI BIOS boot mode. This used to allow boot when UEFI boot fails. **Turn Off – set to UEFI [only].**

This may need to Disabled / turned Off to resume showing the Grub Boot menu at bootup.

4.3 Turn off Secure Boot

In the 'Security' section 'Disable' or turn 'Off' in the 'Secure Boot'. This might also be called 'Platform Trust Technology' aka 'PTT'.

On some PCs 'Secure Boot Mode' aka 'Custom' needs to be selected to allow the configuration of Secure Boot settings and make manual (non Windows) changes. This setting may be located in the Security section.

NOTE: In 2022 the Secured-core PCs⁷ MS required that 3rd Party Certificates to be disabled by default. (Lenovo) Extra step(s) are needed to allow MX Linux to boot.⁸

Windows WHQL Support

Under **Windows OS Configuration**. Enables the support for Windows 10 or disables for other operating systems. **Disable/Turn OFF**. This setting may also be found under **OS Type**. Set the **OS Type > Other OS** (rather than Windows UEFI mode).

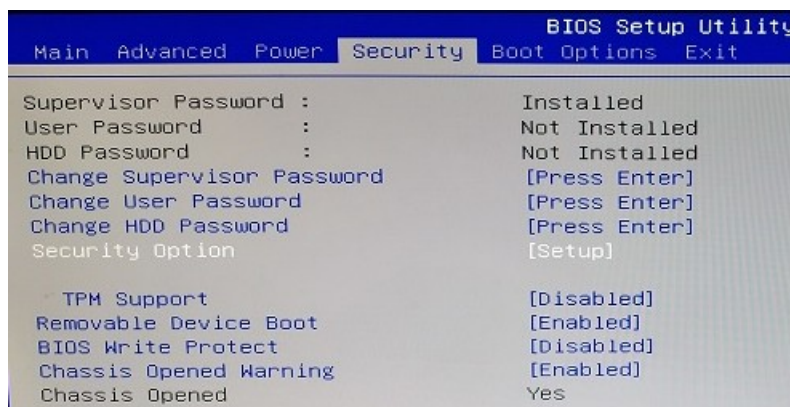
When left enabled the entry in the UEFI Boot Order may be forced/locked to the top when 'Windows WHQL Support' is Enabled. (Windows Hardware Quality Labs aka WHQL).

Secure Boot [Standard] or [Custom] - MSI

Set to **Custom** – this allows the user to configure the Secure Boot settings and manually load the secure keys. Standard has Microsoft hard-coded Windows settings.

4.4 USB Configuration/USB Emulation

USB Configuration (Dell & others) allows you to enable or disable the USB controller for PC booting.



In the example above ensure 'Removable Device Boot' is 'Enabled'.

⁷ <https://learn.microsoft.com/en-us/windows-hardware/design/device-experiences/oem-highly-secure-11>

⁸ https://download.lenovo.com/pccbbs/mobiles_pdf/Enable_Secure_Boot_for_Linux_Secured-core_PCs.pdf

Below shows a Dell Dimension 9200 PC that has Boot From USB set to 'No Boot' aka disabled. Many PCs have 'USB Booting' disabled by default as a security measure.

USB for FlexBay This field enables and disables the internal USB for FlexBay.

- Off — Internal USB for FlexBay is disabled.
- On — Internal USB for FlexBay is enabled.
- No Boot — Internal USB for FlexBay is enabled but not bootable.

The factory default setting is No Boot.

NOTE: This USB option appears only if a FlexBay device is installed.

Enable Boot Support at a minimum; enabling both is more functional desirable.

4.5 Turn off Fast Boot (aka Quick Boot)

Fast Boot is used to reduce your PCs motherboard startup time. It will disable more devices to speed up system boot time. When Fast Boot is enabled, you may not be able to boot from a USB flash drive.

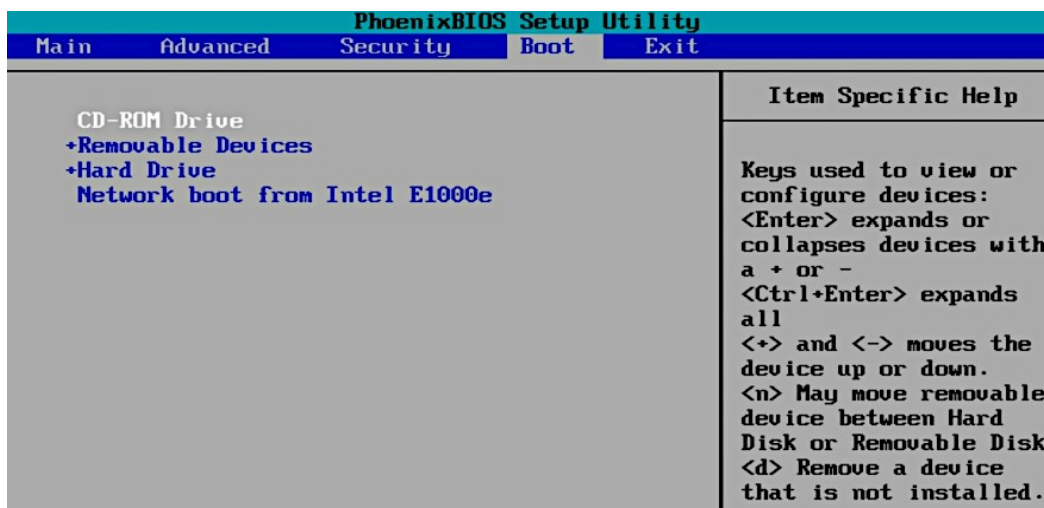
With Fast Boot enabled: Boot from Network, Optical WiFi and secondary USB outlets may be disabled. So, they may not be available until an Operating System fully loads.

These settings *may* have several functional levels or just on/off. Often seen: Minimal (often the default), Thorough (the system does not skip any steps in the boot process), and Auto.

NOTE: Set Fast Boot to 'OFF' / 'Disabled' or 'Thorough' if 'OFF' is NOT an option.

4.6 Reset Boot Order/Priority/Boot Sequence

Navigate to the place where 'Boot Order' is set. UEFI PCs list Hard Drives as choices.



Above shows the hardware boot order one might see for installation. Hard Drive **MUST** be on top after MX Linux is installed. **Note:** BIOS specific help screen: place 'Removable Devices' above the 'Hard Drive'. On a UEFI PC the hard drives would be listed individually to be selected. Sometimes listed as 'UEFI Hard Drive BBS Priority'.⁹

9 BIOS Boot Specification

Boot Sequence (UEFI) - Allows you to change the order in which the computer attempts to find an operating system. The options are: *Windows Boot Manager or Boot List Option-UEFI – the latter is what we want!*¹⁰

HP additional configuration requirement

1. Go to boot configuration and add a 'Customized Boot'.
2. Point 'Customized Boot' to \EFI\IMX\grubx64.efi and change UEFI boot order with 'Customized Boot' on top.

Boot Sequence – UEFI NVME Drive BBS Priorities (AMI)

Allows you to change the order in which the computer attempts to find an operating system. All the options are selected: Diskette Drive, Internal HDD, USB Storage Device, or CD/DVD/CD-RW Drive.

UEFI Boot Path Security

Allows you to control whether the system prompts the user to enter the Admin password when booting to a UEFI boot path. Also known as BIOS write protect.

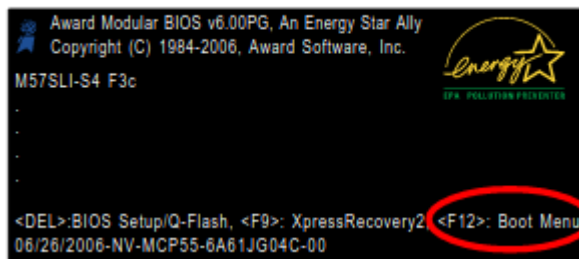
Choose one of these options: Always, Except Internal HDD—**Default**
or
BIOS Override lock (AMI) – unlock.

The PC going back to old setup after reboot is a sign that these setting exists...may be a similar name that is not above.

4.7 Enable the F12/ESC/F9 Boot Override Menu

There are some PC brands or models that have the ESC (Acer/Asus), F9 (HP), F12 (Dell) or other key to display a '**One time Boot Menu**'. This menu *may* be disabled by default on *some* PCs.

Select boot sequence for onboard (or add-on cards) device.



Enable/Turn ON the F12 this menu if it exists in your PC firmware.

Exit the Firmware settings and select 'Save Changes and Restart'.

¹⁰ Some motherboards will maintain in NVRAM a separate UEFI boot order list PER DRIVE. (MSI)

4.8 SATA Controller Mode - Changing from RAID/RSTe to AHCI

NOTE:

- You cannot change out of RAID if your system has Intel Optane Memory in use.
- It is required to disable Optane to change the SATA mode from Raid (RSTe) to AHCI.¹¹
- On some motherboards these settings may be under 'Advanced Windows OS configuration.'

Disabling Intel Optane Memory (Dell)

- On the taskbar, click the search box.
- Type Intel Rapid Storage Technology.
- Click Intel Rapid Storage Technology.
- On the Intel Optane Memory tab, click Disable to disable the Intel Optane Memory.

The MX Linux Installer program may not see SSD Hard Drives if the motherboard Firmware has the SATA Controller 'Mode' set to 'RAID' mode or 'RST' mode (aka IRST/RST/Optane). The PC's motherboard SATA Controller's Mode **must** be set to 'AHCI' Mode.

Windows most likely was installed when the SATA controller mode was set to RAID. Changes must be made before changing the controller's mode to AHCI.

Disable the VMD Controller – ASUS

To turn RST OFF in MAIN BIOS: press Ctrl Key and S simultaneously (with the Caps Lock Key ON). This will bring up VMD Controller aka VMD Configuration Settings underneath F 12 Boot Menu.¹²

Disable the VMD Controller

Warning: If you have BitLocker enabled, save your Recovery Keys elsewhere (or write it on paper) **before** attempting to change the SATA mode to AHCI. You will need it for Safe Mode boot. Alternately disable BitLocker before performing this change.

Also Know As – Intel Volume Management Device. This was the original. Above are many captures of brand specific 'marketing spins' of the VMD feature used by many manufacturers.

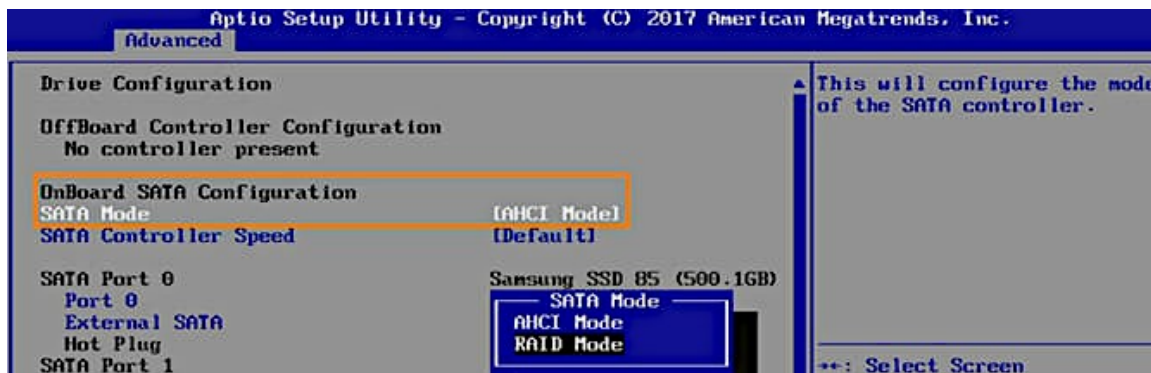


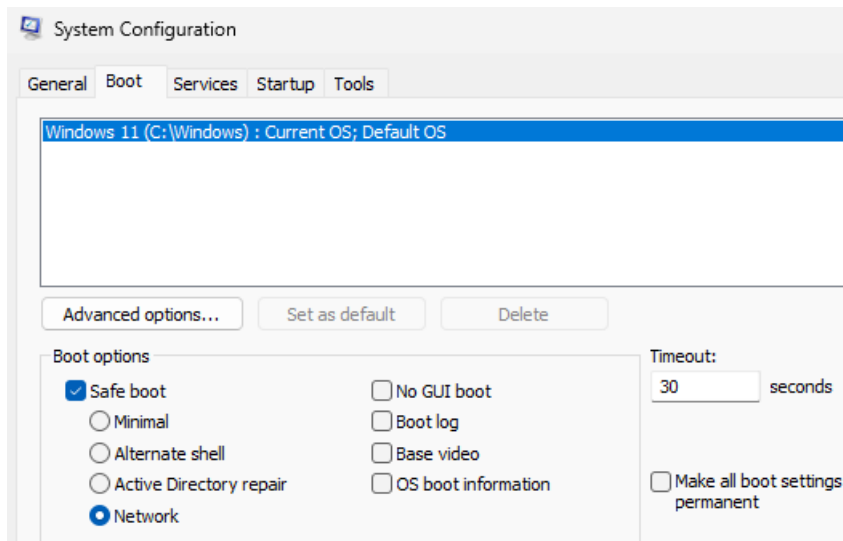
Figure is an example - your PC could be different.

¹¹ Intel RST <https://help.ubuntu.com/rst/>

¹² Resolve Missing SATA Mode Operation on Asus Laptops https://youtu.be/yL73D_m2Y3o?si=pbWdTyzMfYwXlCRD

Using MSConfig to Change Windows SATA Controller to AHCI mode

- Type 'msconfig' in the search box and press enter.



- Click 'Run as Administrator'. Select the 'Boot' tab and check 'Safe boot'.
 - Check 'Network' then click 'Apply' and 'OK'.
 - Reboot PC.
 - Enter the firmware and change the SATA Controller 'Mode' from 'RAID/RST' to 'AHCI'.
 - Save changes and exit. Windows will boot into Safe Mode again.
 - Once in Safe Mode, run MSconfig as Administrator.
 - Select the 'Boot' tab and UN-check 'Safe boot'.
 - Reboot. Click 'Apply' and 'OK'.
- Windows will the restart in normal mode with the AHCI drivers enabled.

To verify AHCI mode is set (in Windows 10/11)

- Open Device Manager and expand IDE ATA/ATAPI Controller.
- Left click Standard SATA AHCI Controller.
- Right click and then left click on Properties.
- Select the Driver tab.
- Click Driver Details.
- The 'Driver files:' shows: 'C:\Windows\system32\DRIVERS\storageahci.sys'.

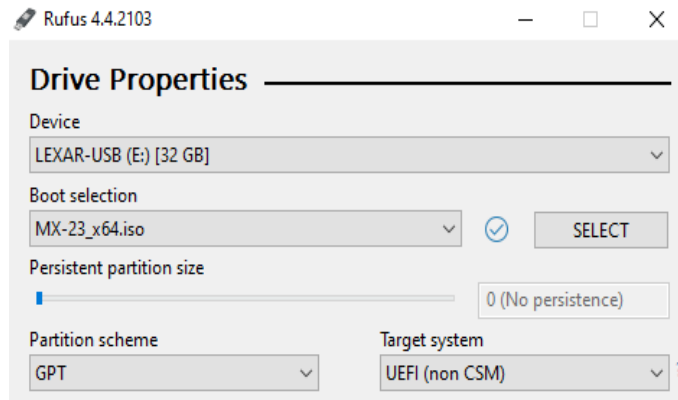
5.0 Installing MX Linux on the new partition

5.0.1 Make the MX Linux USB

It is recommended to Make the MX Linux USB on Windows using a 'partition aware' burner program such as 'Rufus' or 'UNetbootin'.

Rufus

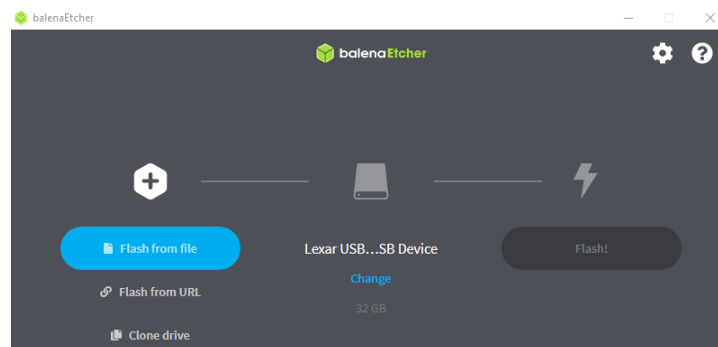
Rufus will change the 'Partition scheme' to GPT and the 'Target system' automatically to 'UEFI (non CSM)' based on what type of ISO is detected.



Detailed instructions for Rufus – URL in footnote.¹³

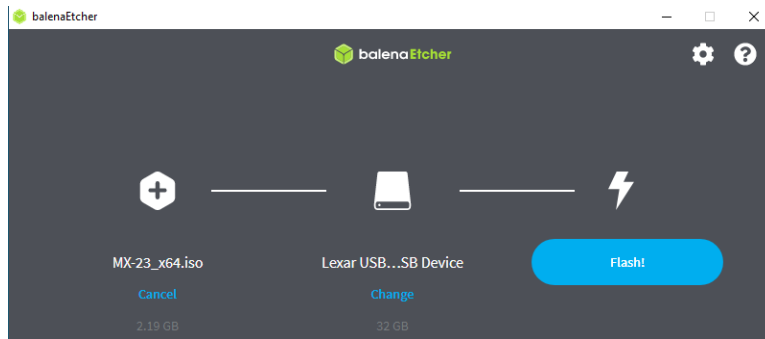
balena Etcher

Etcher has detected a USB is present (Lexar USB...SB Device) as shown in the center.



Choose 'Flash from file' and select the MX Linux ISO from where it was downloaded.

¹³ **How to Burn an ISO File to a USB Drive** - The free Rufus tool can be used to 'burn' an ISO image to a USB flash drive. <https://www.lifewire.com/how-to-burn-an-iso-file-to-a-usb-drive-2619270>

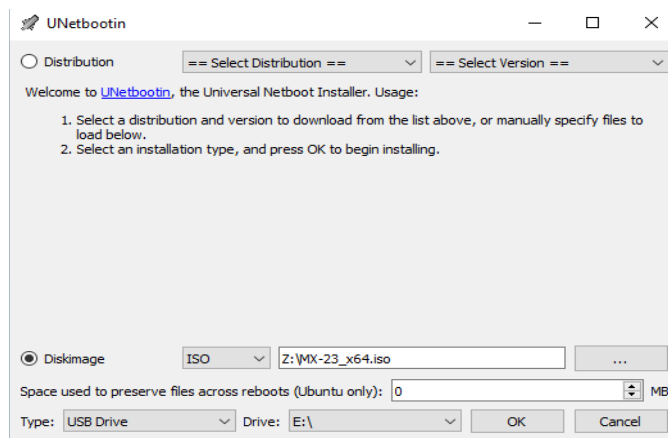


Click 'Flash!'.

Note: Etcher makes the USB as a universal drive that should universally boot.

UNetbootin

You should insert the USB drive prior to opening UNetbootin.



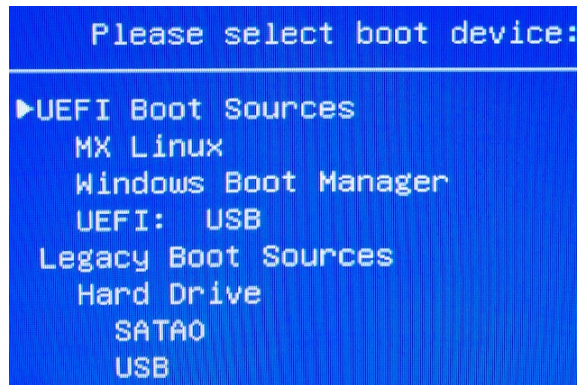
- Select the ISO file.
- Choose the USB drive you want to write to.
- Click on the 'OK' button to start the process.

Ventoy

See https://www.ventoy.net/en/doc_linux_gui.html

5.1 Booting and installing MX Linux

- Insert the LiveMedium USB in the fastest available USB port (blue) and restart the PC.
- After the PC powers on tap the ESC, F9 or F12 key to bring up the Boot Menu.
- Alternately on some PCs you may need to instead use the F2, F8, F10 or F9 key.
- Some PCs *may* offer TWO options to boot; if offered always take the one labeled UEFI

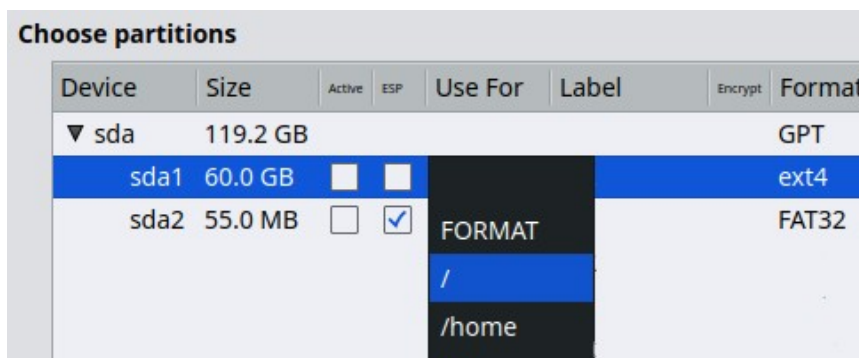


- Click the 'Install MX Linux' on the Welcome Screen or desktop.
- Ensure that the MX Installer automatically selects 'Customize the disk layout'.

5.2 Root partition selection

The MX Linux Installer needs you to select where to place root. In the listing of Devices:

- Select the new partition in the 'Device' column you had created for MX Linux. This highlights it blue.
- Click in the 'Use For' entry to change it from blank to / aka the Root partition.



5.3 EFI System Partition

This partition is also known as the ESP, short for 'EFI System Partition'. Modern PCs use an Extensible Firmware Interface (EFI) Boot Loader as a part of UEFI Boot.

The ESP partition is required to be formatted with a FAT32 file system **AND** marked as an ESP partition with the ESP flags set in the MX installer. This also sets a boot flag (that is not displayed).

Windows 11 requires a minimum of 100 Mb for the EFI, Windows 10 the minimum is 50 Mb.

5.3.1 Choosing the EFI location

A critical aspect of Dual Boot setup is the MX Linux Installer needs to know which partition to install the EFI portion of the boot files. Below shows that the existing EFI partition is sda1.

How do I know this? The Format column shows 'FAT32' for sda1.

Device	Size	Use For	Label	Encrypt	Format	Check	Options
▼ sda	953.9 GB				GPT		
sda1†	100.0 MB	▼			FAT32		
sda2	16.0 MB	▼					
sda3	127.2 GB	▼	Windows 10		ntfs		
sda6*	355.5 GB	▼	rootMX23		ext4		

Note in the above example the 'Format' column says GPT for 'Device' sda.

5.3.2 How to tell the MX Linux Installer where to place it's EFI data.

The next step after 'Customize the disk layout' is 'Choose partitions'. Do the following:

- Left click to choose your EFI partition. Above it has in the 'Format' column 'FAT32'.
- Click the 'Use For' on the FAT32 partition.
- Use the down arrow pull-down to select 'ESP'.

▼ sda	953.9 GB						
sda1†	100.0 MB	---					
sda2	16.0 MB						
sda3	127.2 GB	FORMAT			Window		
sda6*	355.5 GB	ESP			rootMX2		
sda4	194.6 GB	/boot			MX21		

- When this is done the MX Linux Installer will change the 'Format' to 'Preserve (FAT32)'. This is to ensure that the Windows EFI data is kept.

Device	Size	Use For	Label	Encrypt	Format
└ sda	596.2 GB				GPT
└┬ sda1	256.0 MB	ESP			Preserve (FAT32)
└┬ sda2	506.2 GB		MX23KDE		ext4
└┬ sda3	16.0 MB				
└┬ sda4	77.6 GB		Windows10		ntfs

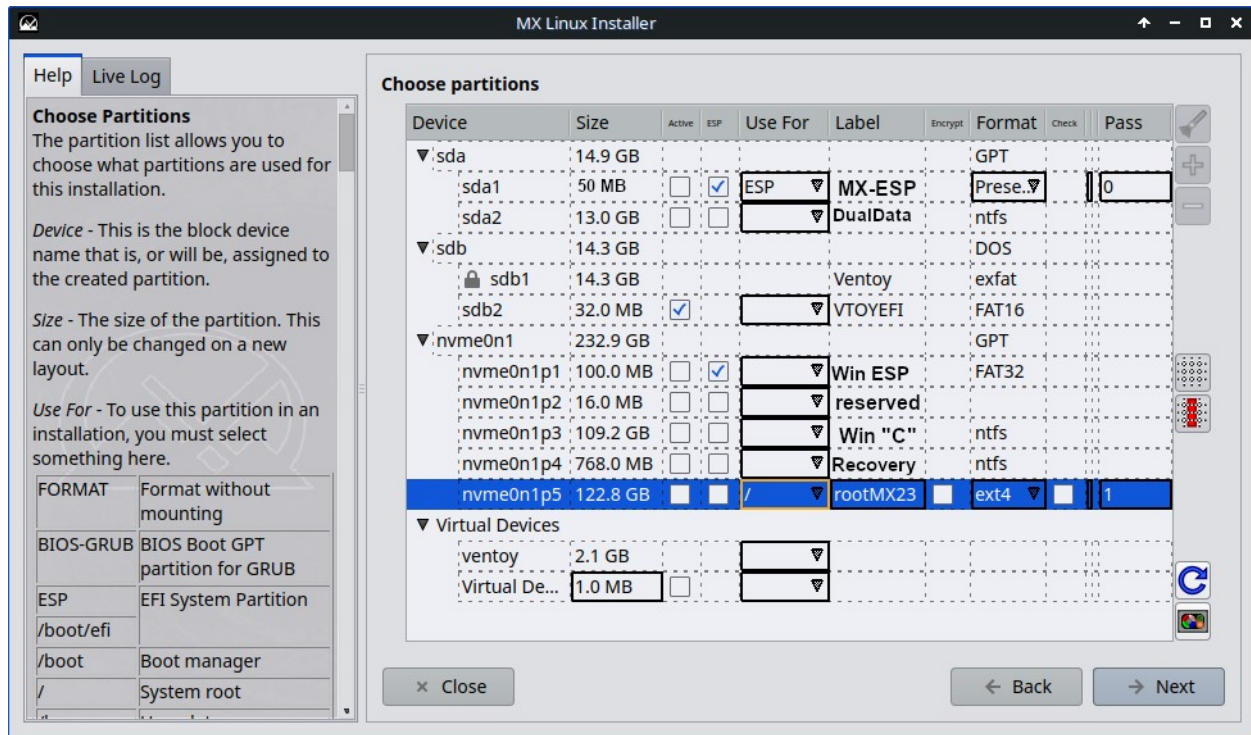
5.5 Dual Hard Disk considerations

This is done for resiliency to lessen the chances of a Windows Update obliterating the MX Linux bootup info. By dual it means multiple disks drives, IE one for MX Linux and one for Windows.

You create a second EFI partition (FAT32 100 Mb) on the second drive (not two on the same drive).

Some people advocate delaying installing the 2nd hard drive until just before you install MX Linux.

An example of how to configure Dual Boot with two hard disks

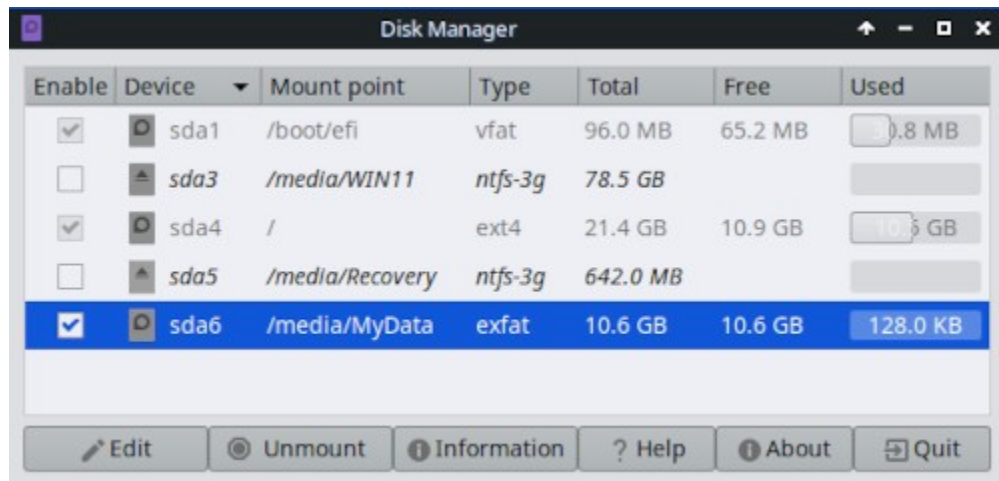


Notes:

- There are two ESP partitions; MX-ESP and Win ESP.
- The Windows Labels (Win C, reserved & Recovery) were added; usually blank.
- An optional DualData partition exists for data sharing between Windows and MX Linux.

5.4 MyData partition setup

The previous steps in making the MyData partition adds a bookmark in Thunar. Use Disk Manager to ensure it continues to appear by checking 'Enable' next to it and then 'Quit'.



6.0 Troubleshooting and common issues

Also see MX Linux 23 User Manual - Troubleshooting, section 2.6

6.1 No operating System found!

The Boot Order **has to be set** such that the disk (group) that has the EFI partition (where MX Linux Installer put Grub) is the one booted. The firmware NVRAM holds the 'path' to the Grub boot code. This 'path' in Grub's configuration is a combination of physical drive and partitions. MX Boot Repair from a Live USB boot many times can fix this.

6.2 Black or blank screen

Display distortions and even a blank screen are sometimes seen. To fix go to the 'Advanced Options' on Welcome Screen select nomodeset (failsafe nomodeset) then finish booting.

Some PCs need, instead of quiet splash: `acpi_osi=Linux acpi_backlight=vendor` or `pci=noms`. Some laptops may just have backlight set way down, press f key to make it brighter. You can use the F12 key in the boot loader to see a menu of what boot options are selected by your current menu choices. Boot codes not listed in these menus must be added manually. More boot parameters: <https://mxlinux.org/wiki/system/boot-parameters/>

6.3 Incorrect Windows Time In Dual Boot and turn on Time Sync

Windows assumes Local Time and Linux expects UTC. Making Linux use local time the same way Windows does is a good option. Do **ONE** of these two ways to address the difference.

- 1) **LINUX**: Change the time setting for Linux: <https://mxlinux.org/wiki/help-files/date-time/>
- 2) **WINDOWS**: perform the following steps (may cause issues with some 3rd party apps):

- Open Regedit on Windows and navigate to:
- `HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\TimeZoneInformation\`
- Right-click the "TimeZoneInformation" key.
- Select "New" => DWORD (32-bit) Value. (or QWORD on 64-bit systems).
- Name your new value RealTimeUniversal.
- Double-click the RealTimeUniversal value you've just created, set its value to 1.
- Click "OK" to exit Regedit.

Right click time.

Left click Adjust date/time.

Turn OFF 'Set Time Automatically'.

6.4 Grub Boot Menu disappears

The 'Windows Features Update' many times [often bi-annually] will insert itself as the first entry in your PC Motherboard's UEFI firmware listings. This will cause the PC to boot directly into Windows with no MX Linux Grub Boot Menu being presented to you.

First, check if the Grub Menu entry is present in your PC's Motherboard UEFI list is still present in the one time boot menu (F9 or F12).

Reboot the PC with the MX Linux USB and run MX Boot Options. Click 'Manage UEFI Boot Options'. If the Grub Menu entry is there move it to the top with move up. Reboot.

If the entry is missing go to section 5.4 in this guide.

OS Boot Manager – HP

This HP firmware places an entry 'OS Boot Manager' within hardware '**UEFI Boot Order**' entries. This, when navigated to via arrow becomes highlighted (white below). Press enter to see the selections in the sub-menu it presents.

In the example below '**ubuntu**' is the Linux entry to be selected; 'Windows Boot Manager' was selected initially on entry to this sub-menu.



Arrow to the correct item then press enter to accept your choice.

6.5 TPM aka Trusted Platform Module

TPM aka **Trusted Platform Module**. Older PCs, made prior to Windows 8 will NOT have one.

BitLocker Drive Encryption and Secure Boot require a TPM. TPM is a local database store of security keys and digital certificates. Sometimes the TPM is bundled in a different name implying security. This varies by PC brand and year.

Do NOT disable the TPM as some guides found on the internet suggest!

6.6 Security Certificates

Some online guides also suggest you should delete these. **DO NOT DELETE THEM!!!** They take up very little space. Restoring them if needed in the future is an expert level task!

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Please direct **ALL** support requests to the MX Linux Forum -- <https://forum.mxlinux.org>