

# **DRP/BXP/RKP Series Windows 11 IoT Enterprise LTSC 2024 Manual**

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# **DRP/BXP/RKP Series Windows 11 IoT Enterprise LTSC 2024 (24H2)**

## **User Manual**

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# 1. Introduction

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This Windows 11 IoT Enterprise LTSC 2024 (24H2) user manual is applicable to Moxa's x86-based computers listed below and covers the complete set of instructions for these series. Detailed instructions on configuring advanced settings are covered in the following chapters of the manual. Before referring to sections in these chapters, confirm that the hardware specification of your computer model supports the functions/settings covered therein.

## Moxa Computers and Windows

Moxa computers are integrated with Windows drivers and I/O controller utilities based on the Microsoft Windows up-to-date version so that you can use the most compatible hardware-software combinations in your application field.

## 2. System Initialization

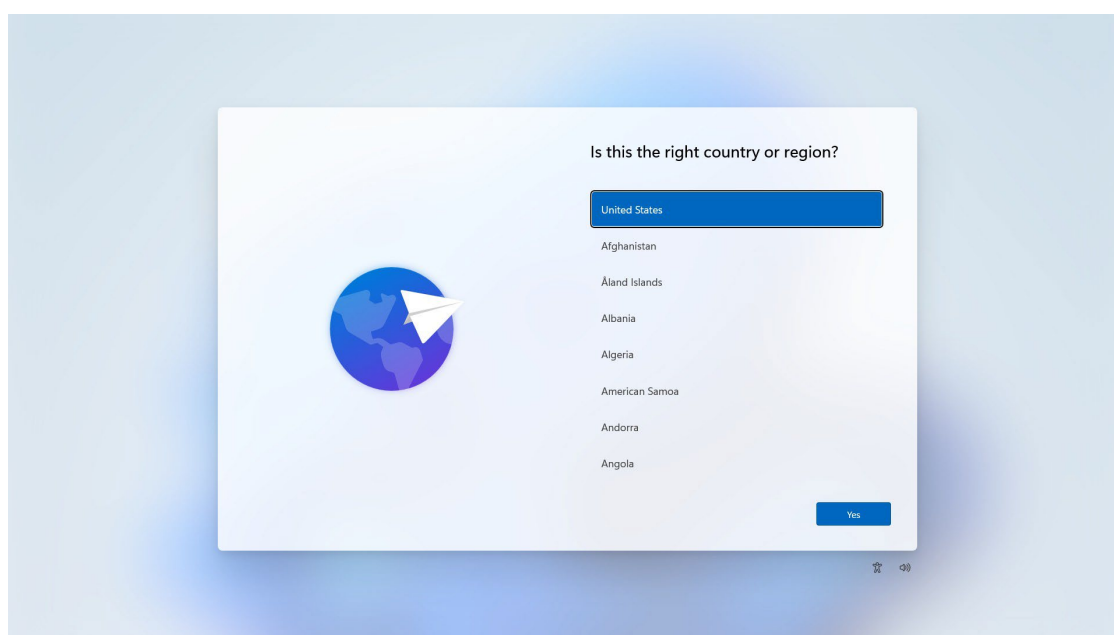
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In this chapter, we describe how to initialize the system settings when you boot up the computer for the first time. When you turn on the computer, you will see the Windows Out of Box Experience (OOBE) wizard. OOBE consists of a series of screens that require customers to accept the license agreement, connect to the internet, log in with or sign up for a Microsoft Account, and share information with the OEM.

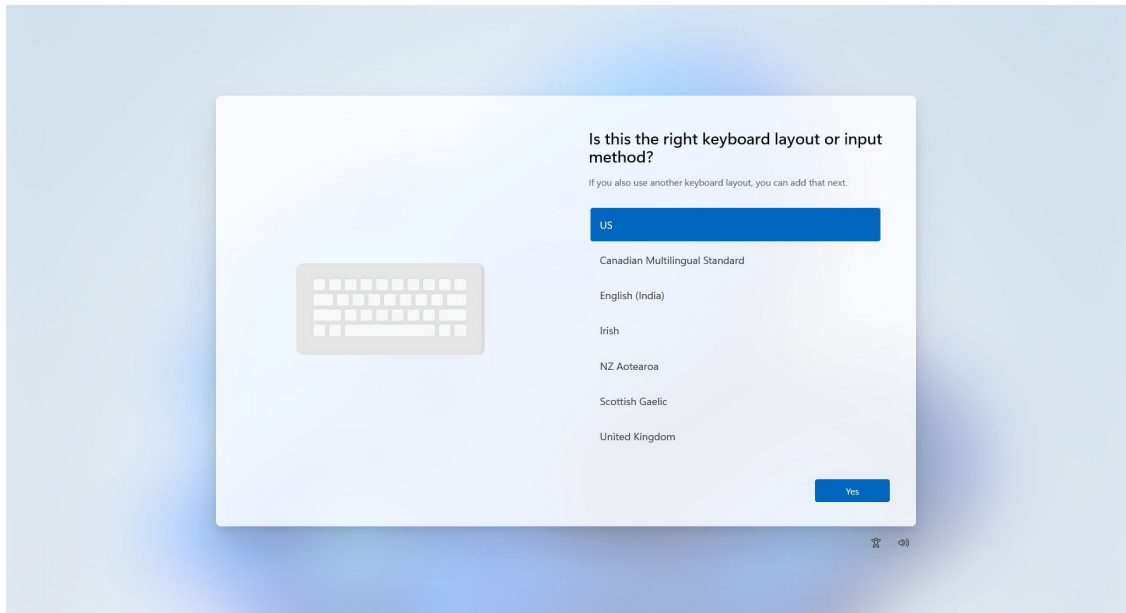
### Initializing User Settings

The following is a non-exhaustive list of OOBE screens that you will see in the order that they are listed here:

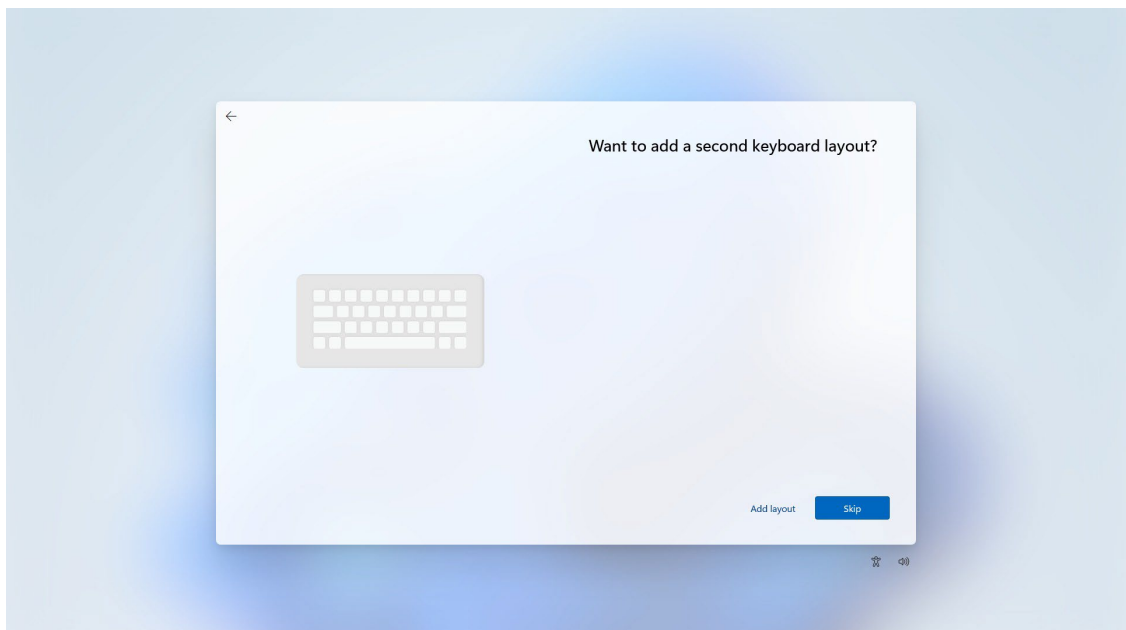
1. Select a region.



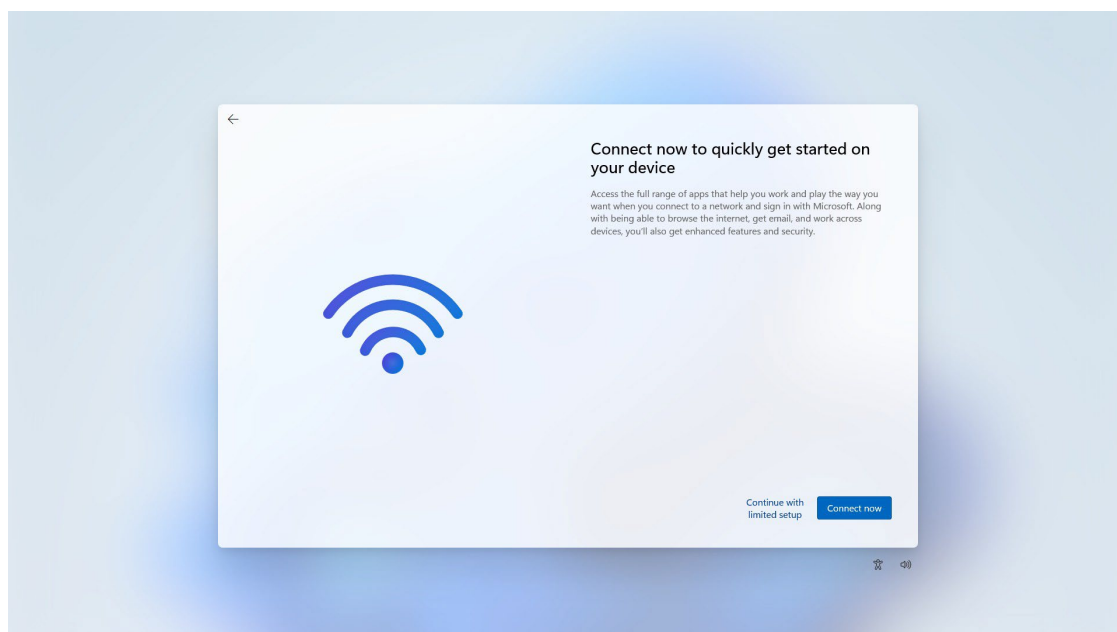
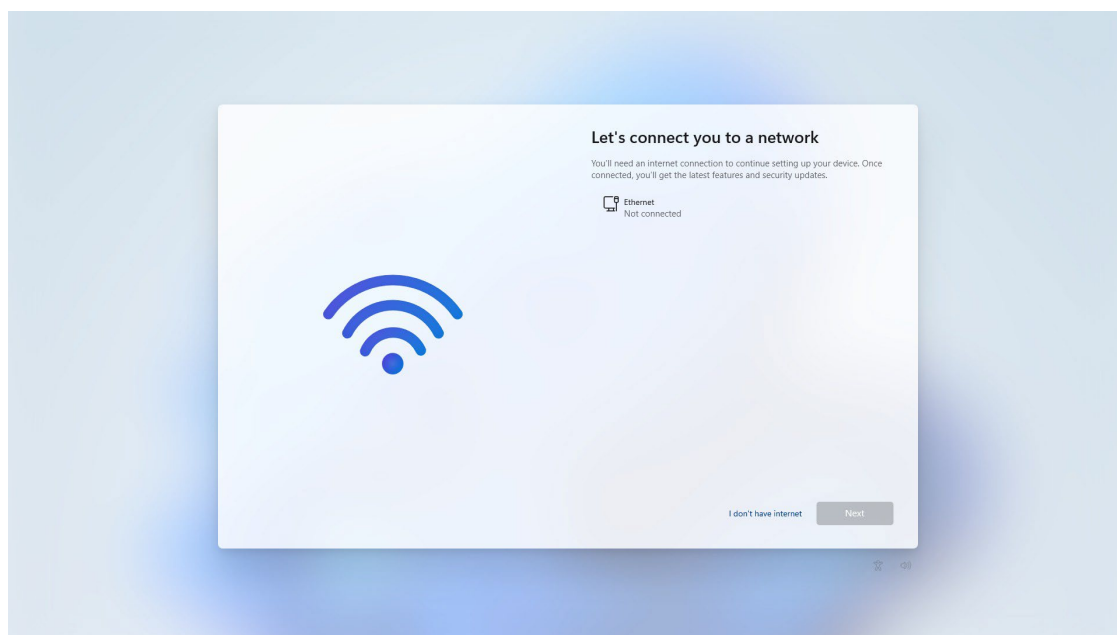
2. Select a keyboard.



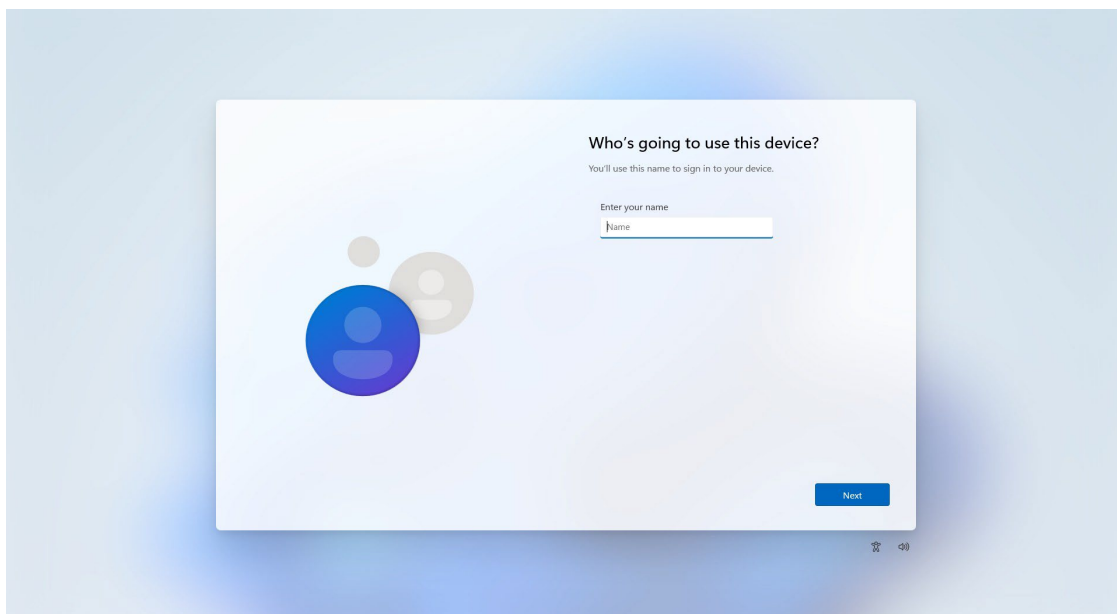
3. Select a second keyboard.



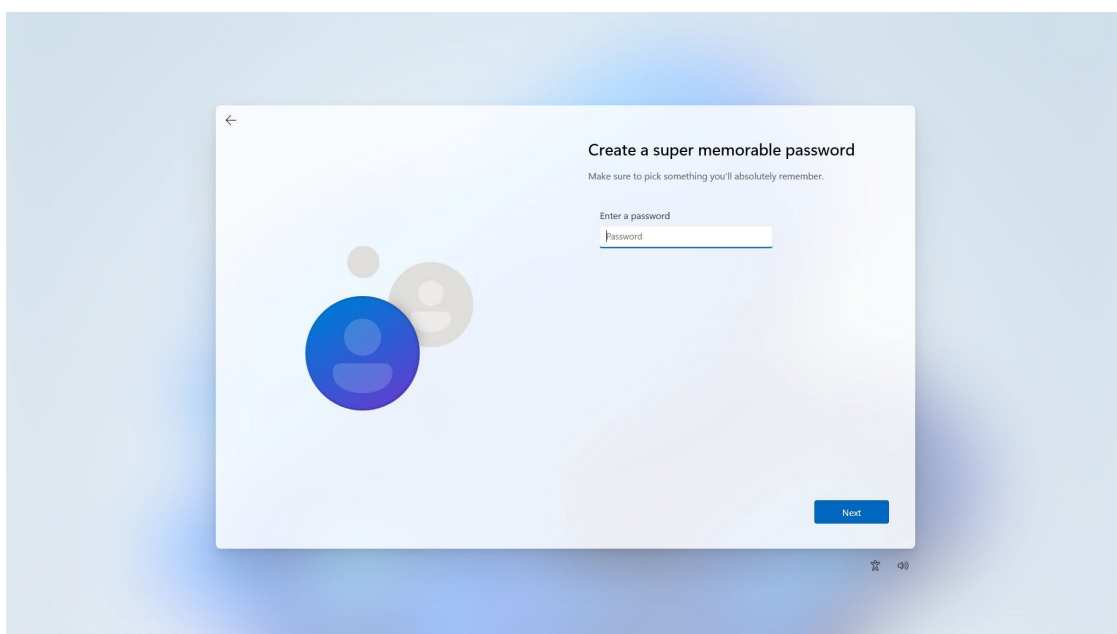
4. Connect to a network or continue with limited setup.



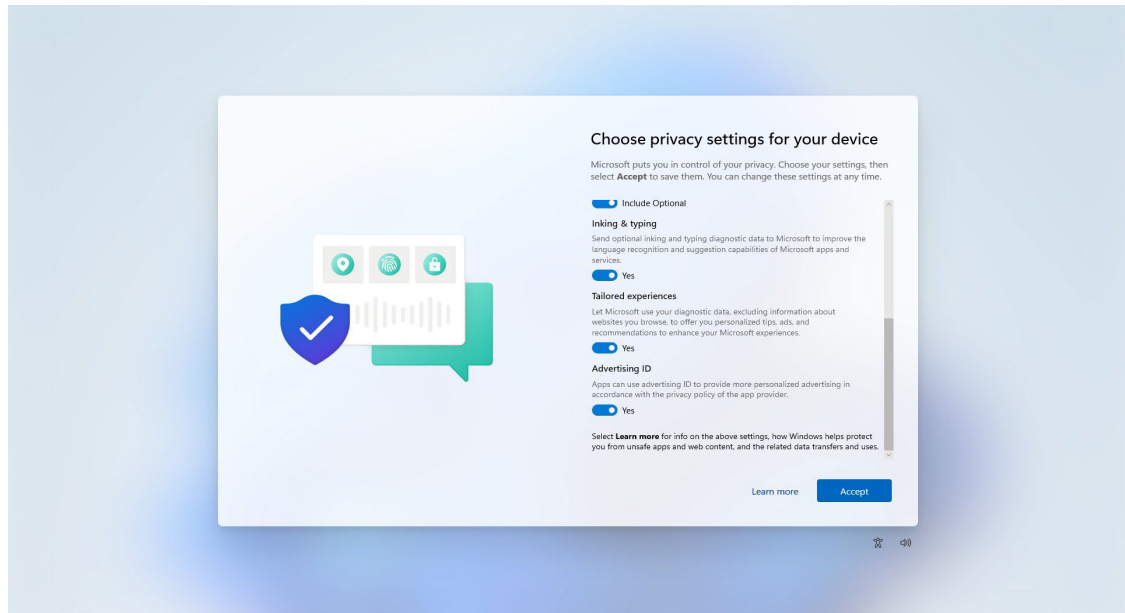
5. Sign in to or create a local account or a Microsoft account (MSA).



6. Set a password.



7. Choose your privacy settings.



## Initializing System

- After the OOBE settings, you will be redirected to the device desktop. Wait until the process is complete.

```
C:\windows\System32\cmd.exe

C:\Windows\System32>start /wait c:\windows\system32\SetOEMModel.exe
C:\Windows\System32>start /wait C:\windows\system32\SortNetName.exe

C:\Windows\System32>reg delete "HKLM\SOFTWARE\Policies\Microsoft\Windows\WindowsUpdate" /v ExcludeWUDriversInQualityUpdate /f
The operation completed successfully.

C:\Windows\System32>reg add "HKLM\SOFTWARE\Microsoft\Windows\CurrentVersion\DriverSearching" /v SearchOrderConfig /t REG_DWORD /d 1 /f
The operation completed successfully.
```

- The device will now reboot, and the new settings will take effect after the system restarts.

## 3. BitLocker

BitLocker is a Windows disk encryption feature, designed to protect data by providing encryption for entire volumes. BitLocker addresses the threats of data theft or exposure from lost, stolen, or inappropriately decommissioned devices.

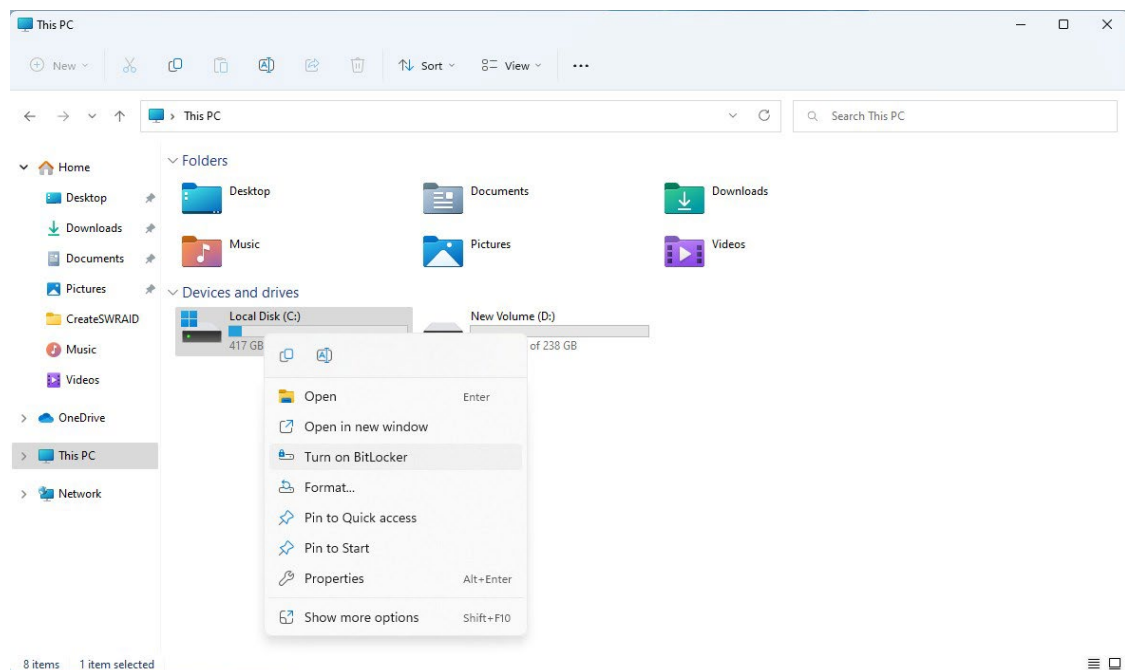
For more information about BitLocker:

<https://learn.microsoft.com/en-us/windows/security/operating-system-security/data-protection/bitlocker/>

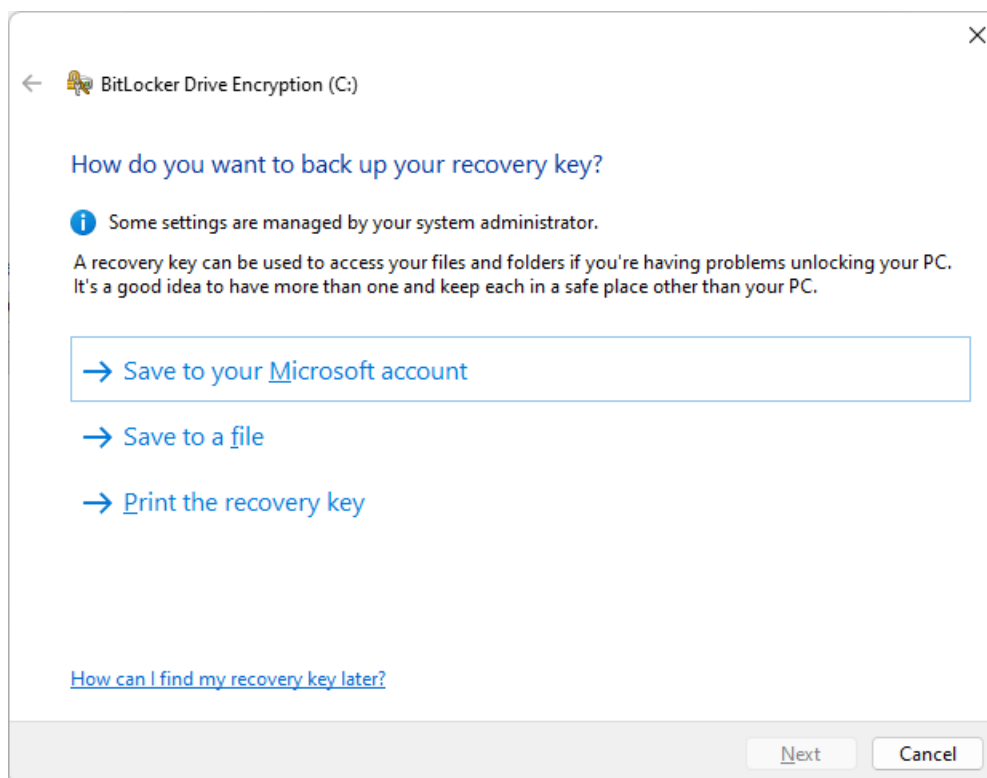
This chapter describes the BitLocker setup process.

### Enabling the BitLocker

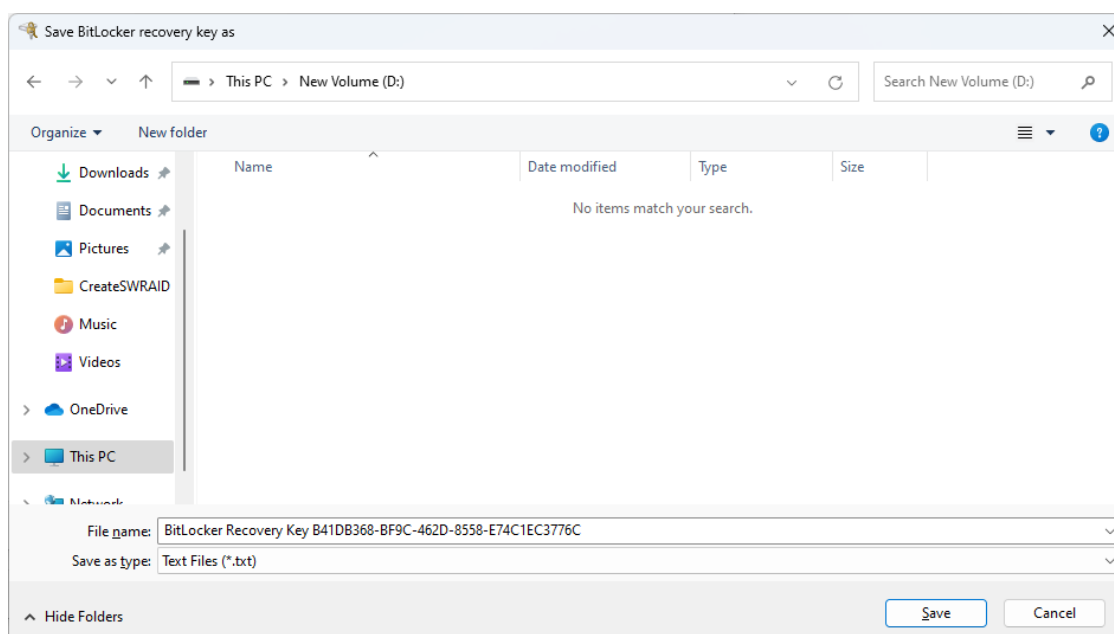
In the **Windows Devices and drives**, right-click on the drive and select **Turn on BitLocker**.



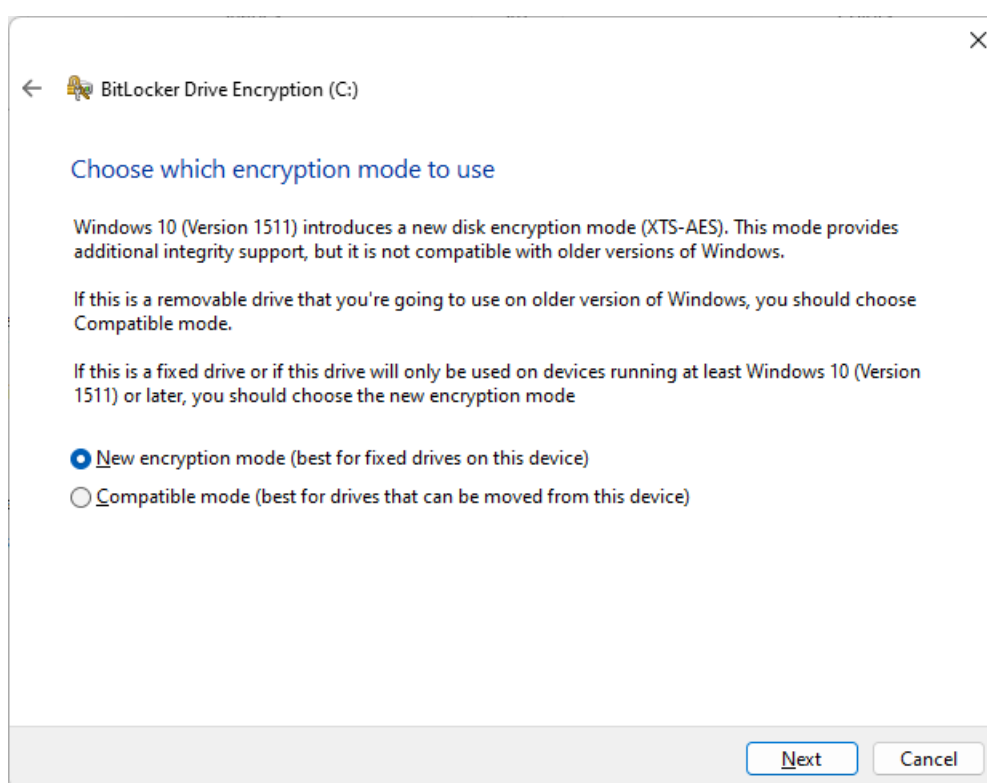
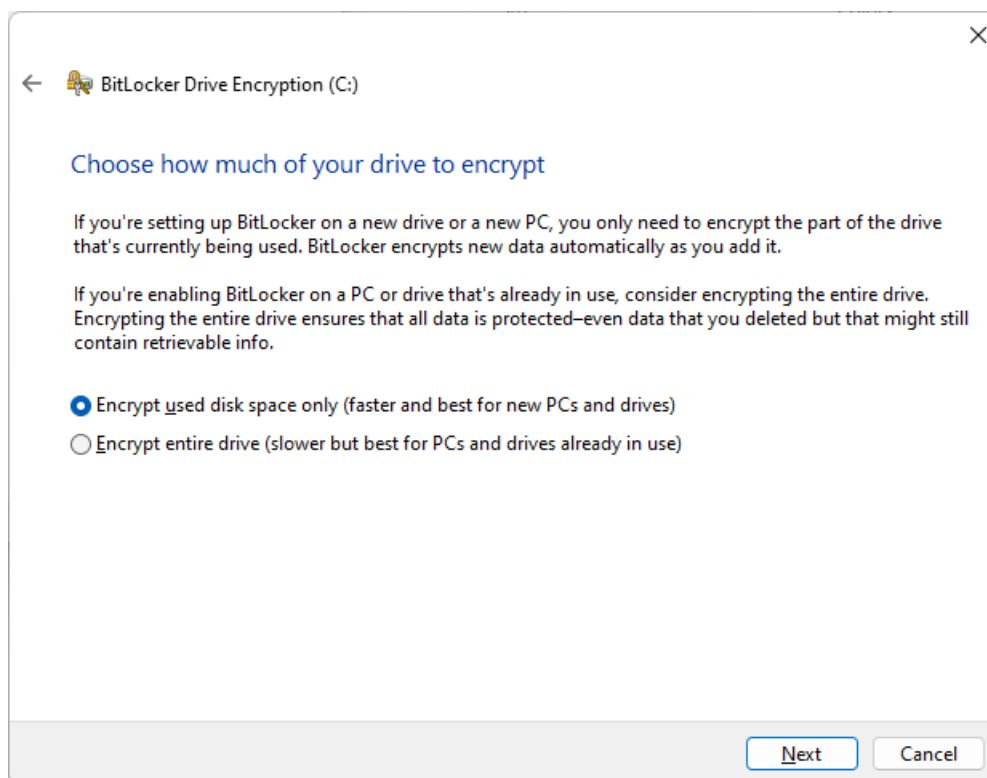
1. Select an option to back up the recovery key. For example, select **Save to a file**.



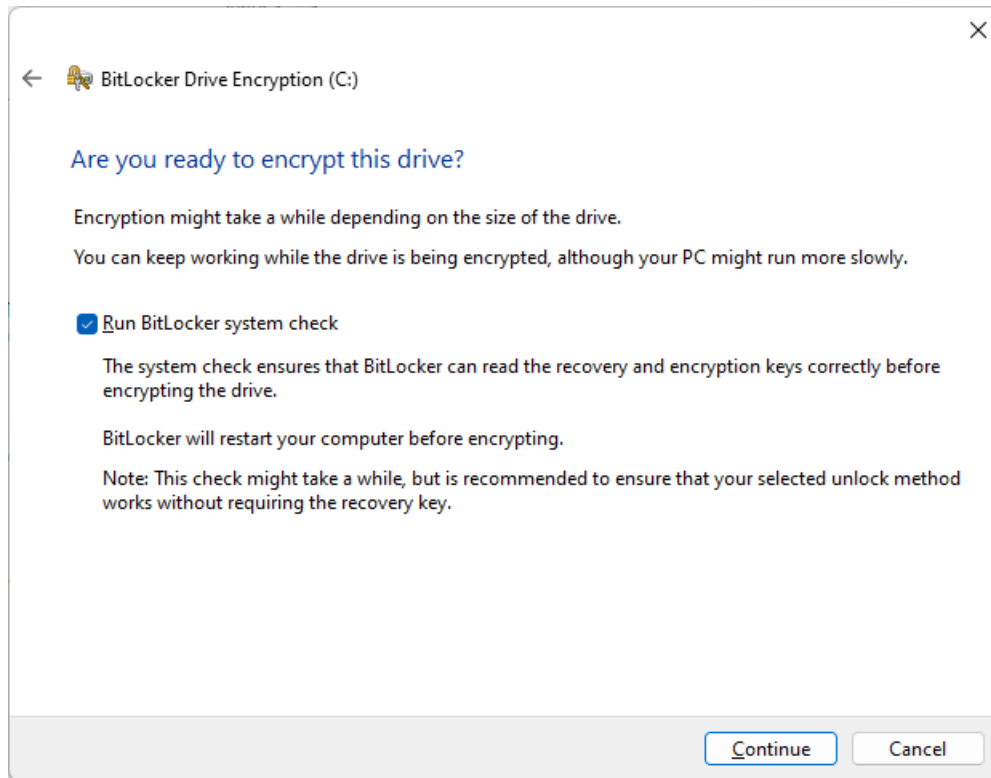
2. Select the path to store the file in.



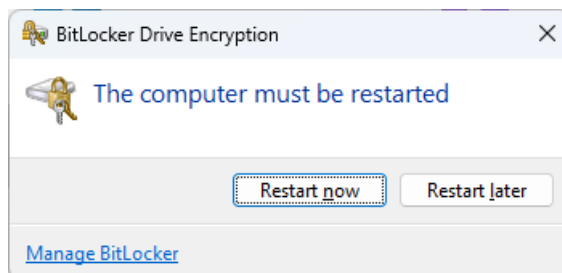
3. Follow the onscreen instructions to specify the drive encryption options.



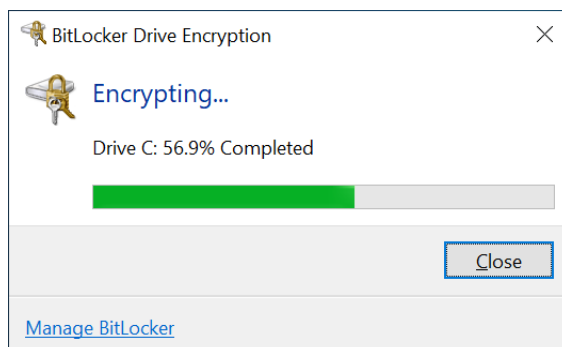
4. Click **Continue**.



5. Restart the computer.

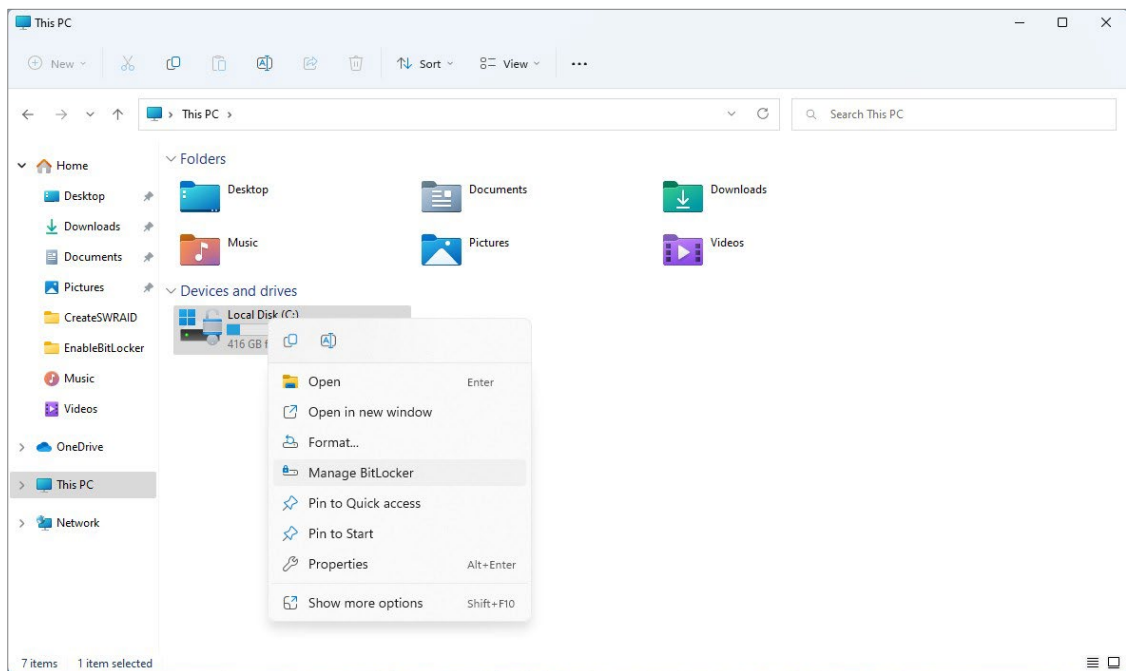


6. Wait for the encryption process to complete and then click **Close**.

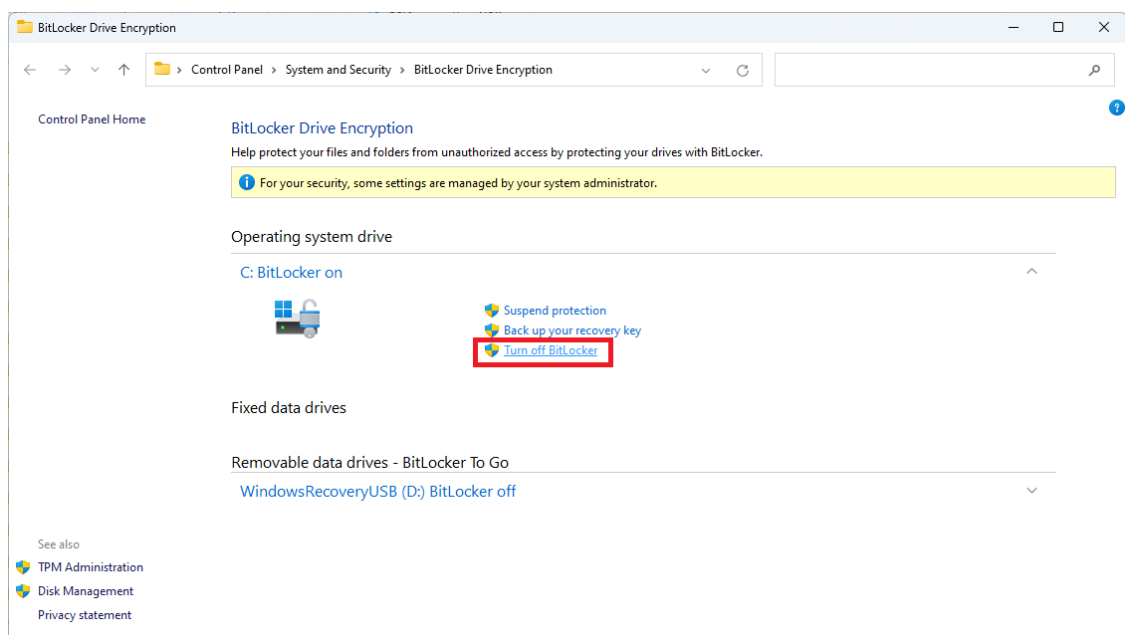


# Disabling the BitLocker

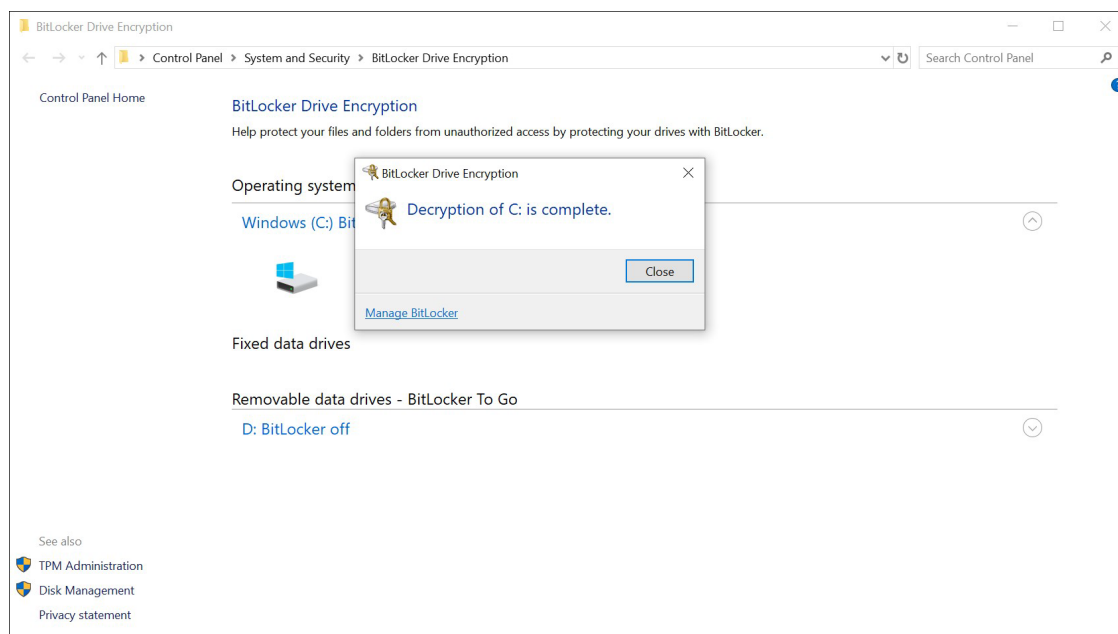
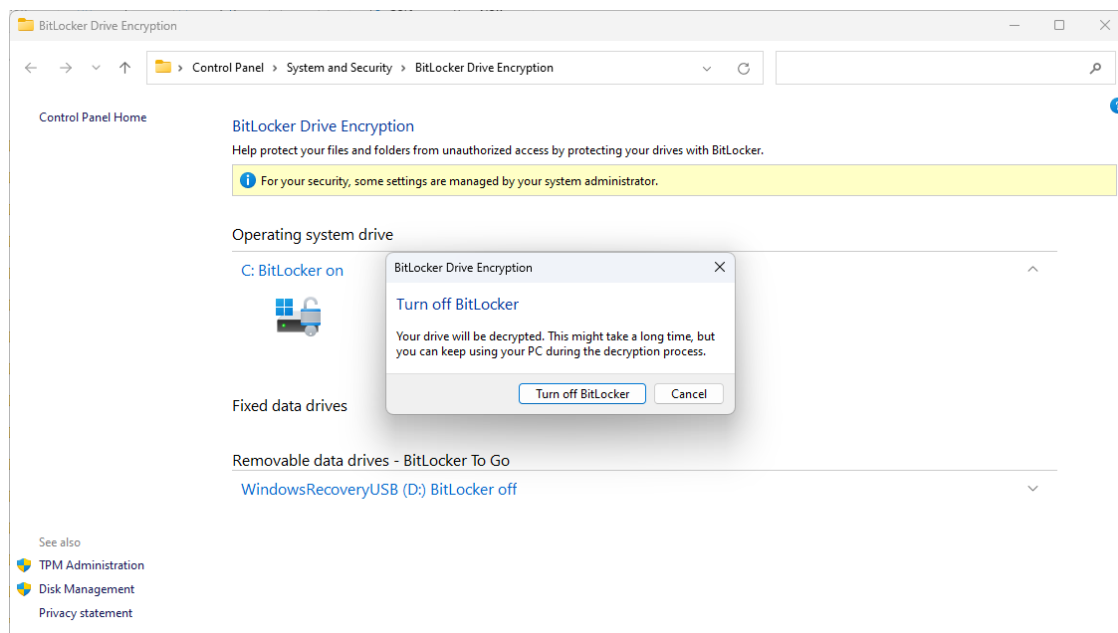
1. In the **Windows Devices and drives**, right-click on the drive and select **Manage BitLocker**.



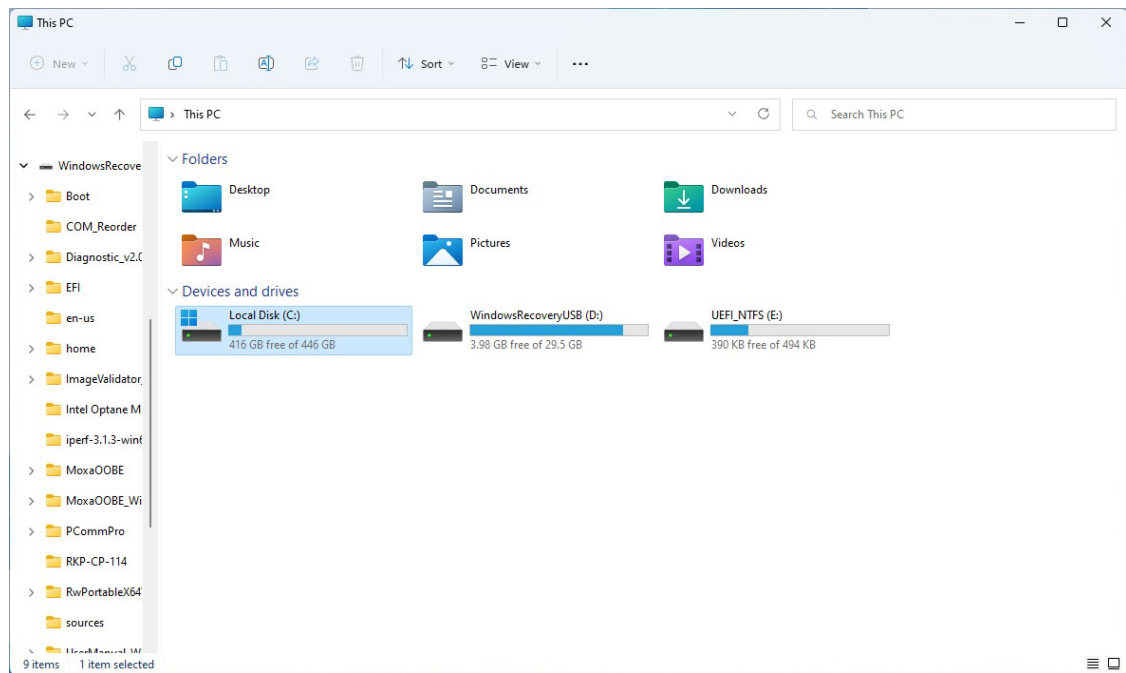
2. Click on **Turn off BitLocker**.



- Wait for the decryption process to complete and click **Close** to exit the program.



4. Check the disk status after the decryption process is completed.



## 4. RAID

RAID stands for Redundant Array of Independent Disk which enables combining multiple disks into one or more logical units for data redundancy, performance improvement, or both. This chapter describes the setup process for Intel® RAID (Intel® RST) and SW RAID.

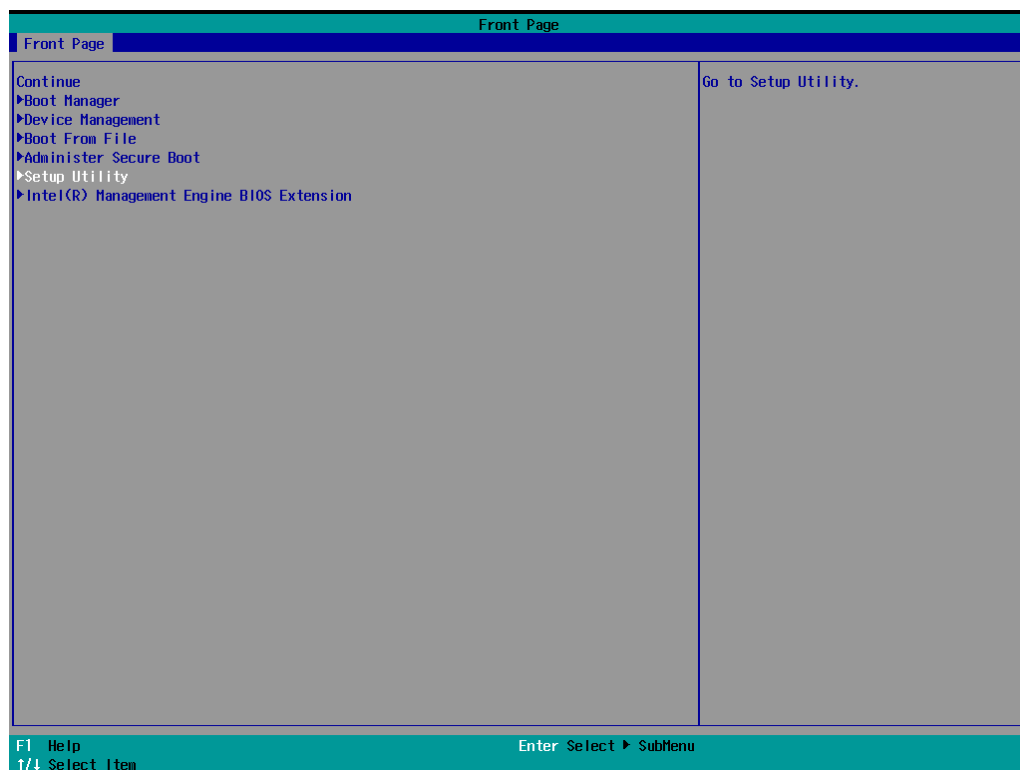


### NOTE

- The RAID function is only supported for the RKP-C110 Series (including 2HV models) and RKP-C220 Series.
- When configuring Intel® RAID, drives must be of the same type to form a RAID array. SSDs (SATA-based) can only be grouped with other SSDs, while NVMe drives must be grouped exclusively with other NVMe drives. Mixing different types of storage devices (e.g., SATA SSDs with NVMe SSDs) in the same RAID volume is not supported.

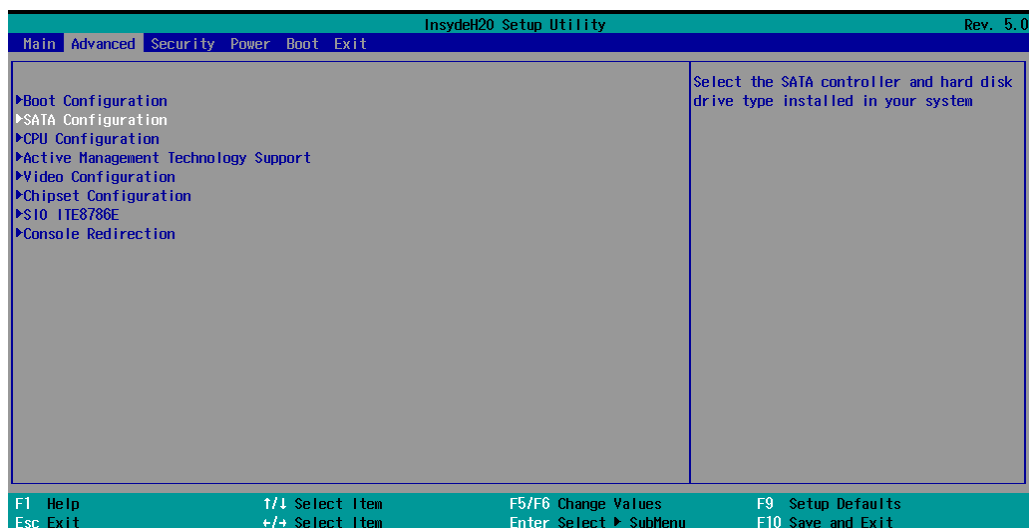
## Intel® RAID—Changing the RAID Mode

1. Power on the computer and press **F2** to enter the BIOS menu.
2. Select **Setup Utility**.



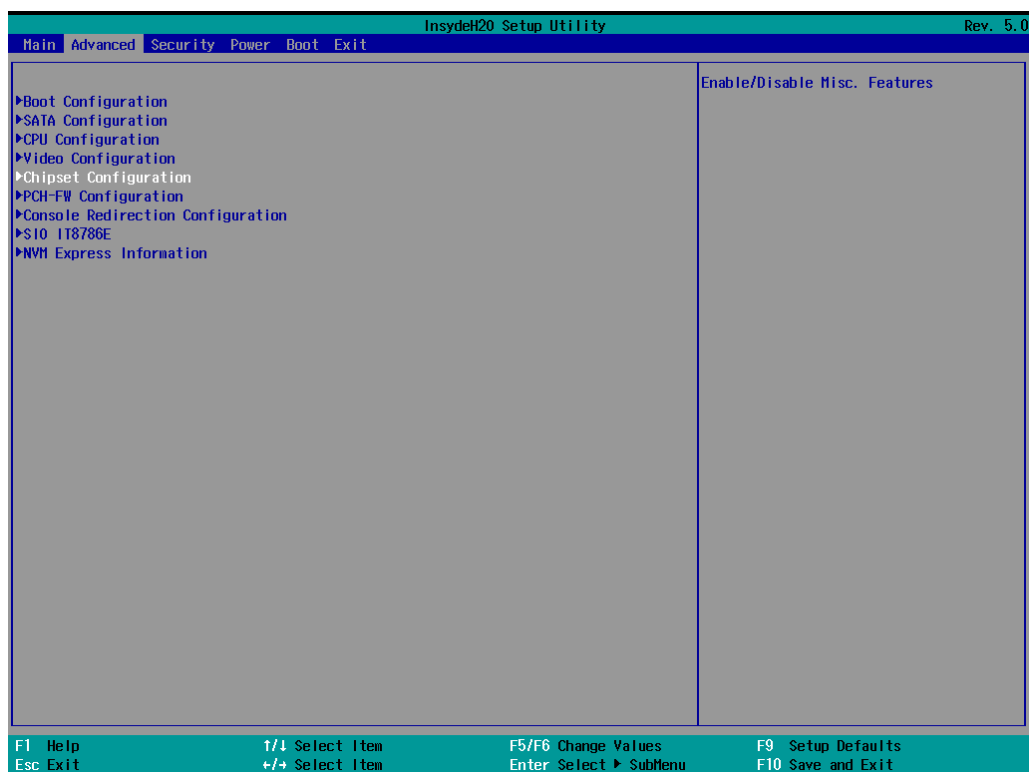
### 3. RKP-C110 Series:

Select **SATA Configuration**.



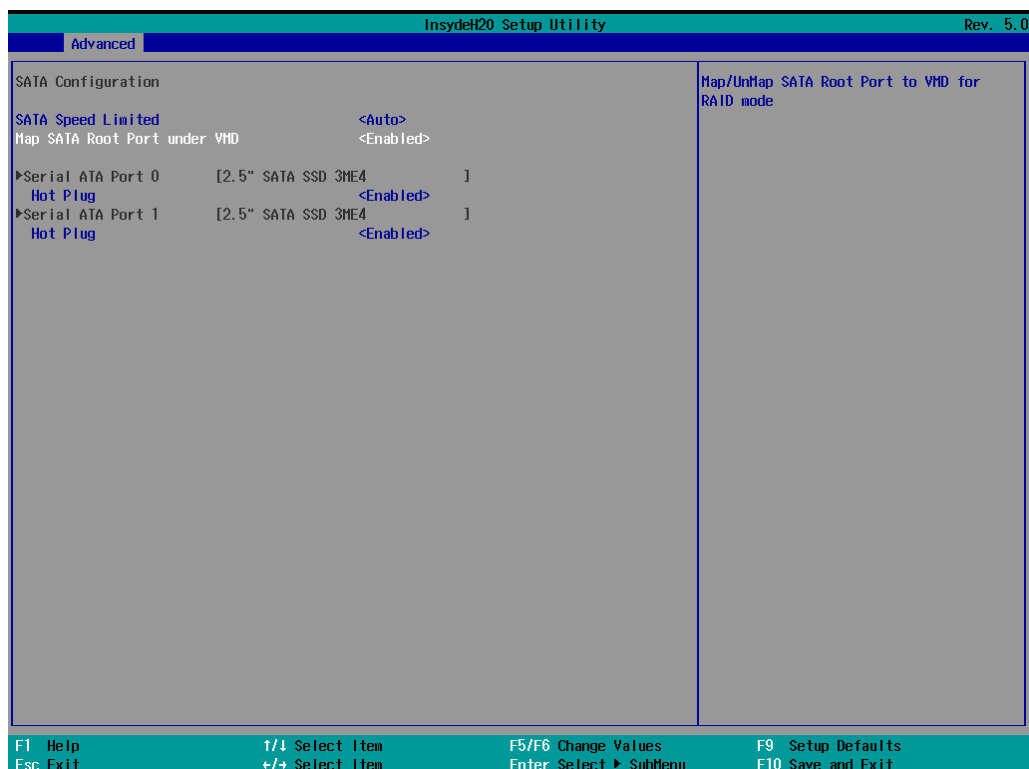
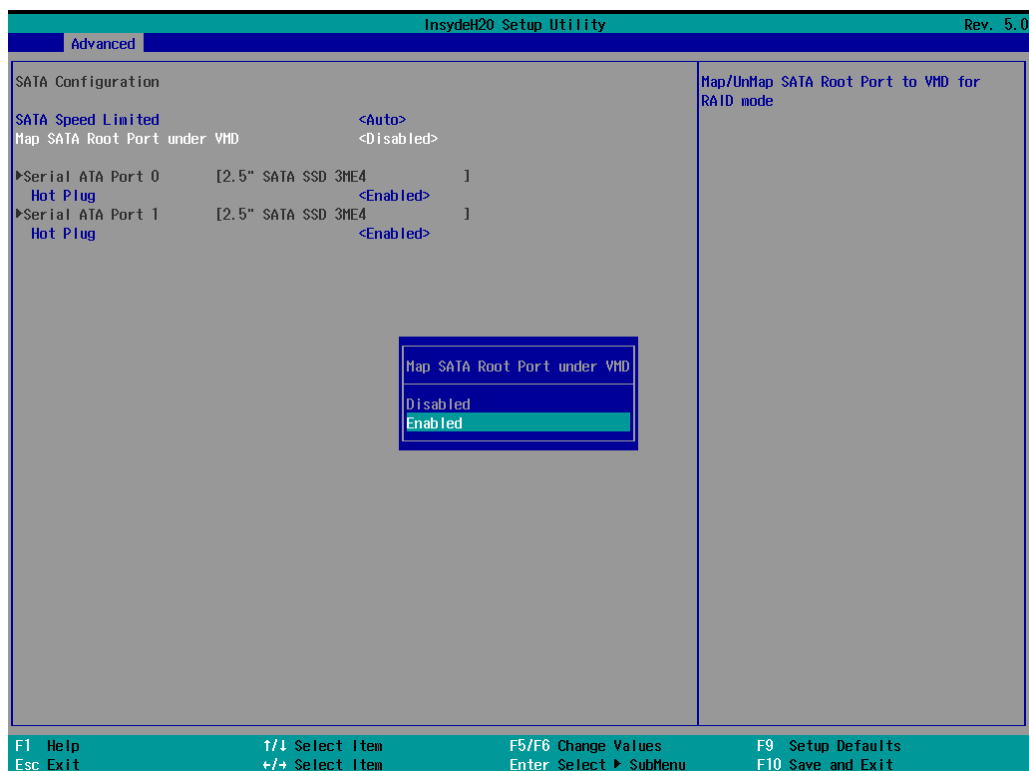
### RKP-C220 Series:

Select **Chipset Configuration**.



#### 4. RKP-C110 Series:

- Select **Map SATA Root Port under VMD** and then select **Enabled**
- Enable the **Hot Plug** function on all ports.



## RKP-C220 Series:

Enable **Map XXXX** under **VMD**.

| InsydeH20 Setup Utility             |            | Rev. 5.0                                                                                                          |
|-------------------------------------|------------|-------------------------------------------------------------------------------------------------------------------|
| Advanced                            |            |                                                                                                                   |
| <b>Chipset Configuration</b>        |            | Map/UnMap this Root Port to VMD<br>Check the text(M-Key#1/M-Key#2/M-Key#3)<br>for specific slot on the main board |
| Power ON after Power Failure        | <ON>       |                                                                                                                   |
| Load Default After Cleaning RTC     | <Enabled>  |                                                                                                                   |
| Disable Password After Cleaning RTC | <Disabled> |                                                                                                                   |
| Map M-Key #1 under VMD              | <Disabled> |                                                                                                                   |
| Map M-Key #2 under VMD              | <Enabled>  |                                                                                                                   |
| Map M-Key #3 under VMD              | <Disabled> |                                                                                                                   |
| Map SATA under VMD                  | <Disabled> |                                                                                                                   |
| D0-0 Level                          | <High>     |                                                                                                                   |
| D0-1 Level                          | <High>     |                                                                                                                   |
| D0-2 Level                          | <High>     |                                                                                                                   |
| D0-3 Level                          | <High>     |                                                                                                                   |

Map M-Key #3 under VMD

Disabled

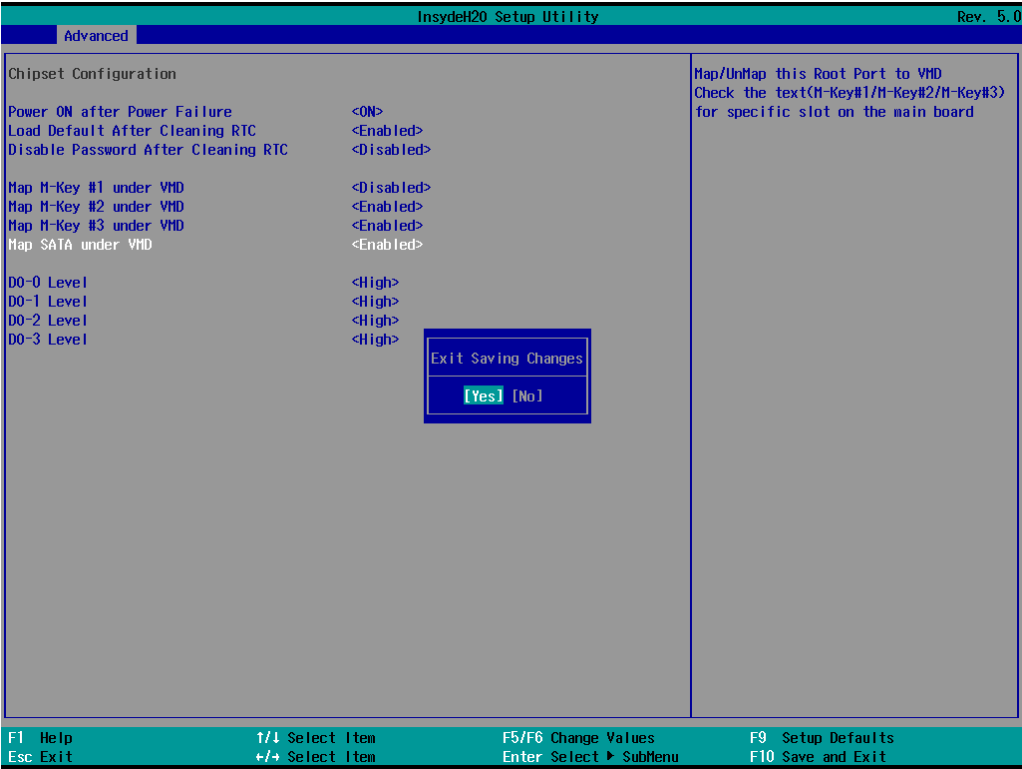
Enabled

|          |                 |                        |                   |
|----------|-----------------|------------------------|-------------------|
| F1 Help  | ↑/↓ Select Item | F5/F6 Change Values    | F9 Setup Defaults |
| Esc Exit | ←/→ Select Item | Enter Select ► SubMenu | F10 Save and Exit |

| InsydeH20 Setup Utility             |            | Rev. 5.0                                                                                                          |
|-------------------------------------|------------|-------------------------------------------------------------------------------------------------------------------|
| Advanced                            |            |                                                                                                                   |
| <b>Chipset Configuration</b>        |            | Map/UnMap this Root Port to VMD<br>Check the text(M-Key#1/M-Key#2/M-Key#3)<br>for specific slot on the main board |
| Power ON after Power Failure        | <ON>       |                                                                                                                   |
| Load Default After Cleaning RTC     | <Enabled>  |                                                                                                                   |
| Disable Password After Cleaning RTC | <Disabled> |                                                                                                                   |
| Map M-Key #1 under VMD              | <Disabled> |                                                                                                                   |
| Map M-Key #2 under VMD              | <Enabled>  |                                                                                                                   |
| Map M-Key #3 under VMD              | <Enabled>  |                                                                                                                   |
| Map SATA under VMD                  | <Enabled>  |                                                                                                                   |
| D0-0 Level                          | <High>     |                                                                                                                   |
| D0-1 Level                          | <High>     |                                                                                                                   |
| D0-2 Level                          | <High>     |                                                                                                                   |
| D0-3 Level                          | <High>     |                                                                                                                   |

|          |                 |                        |                   |
|----------|-----------------|------------------------|-------------------|
| F1 Help  | ↑/↓ Select Item | F5/F6 Change Values    | F9 Setup Defaults |
| Esc Exit | ←/→ Select Item | Enter Select ► SubMenu | F10 Save and Exit |

5. Press **F10** and select **Yes** to exit after saving the settings.



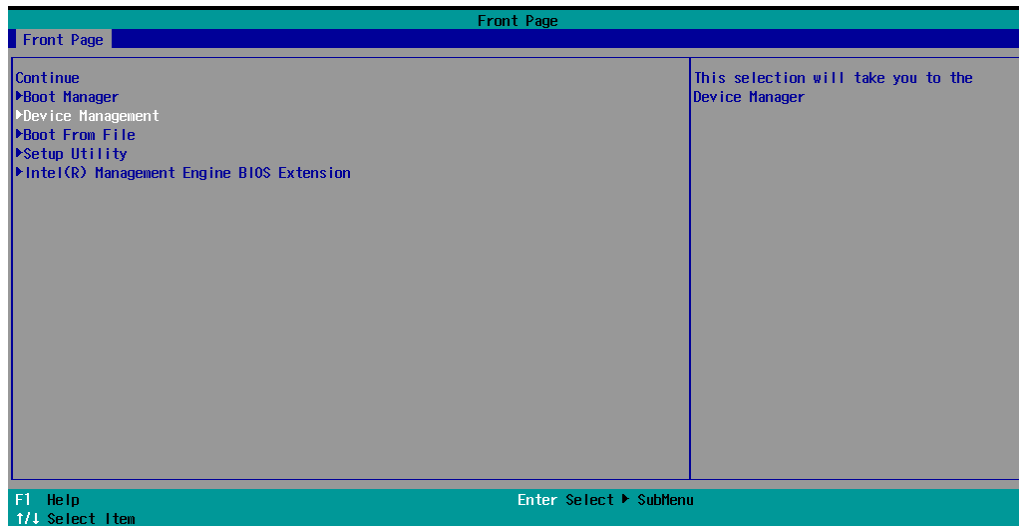
# Intel® RAID—Creating a RAID Disk in the BIOS



## NOTE

When configuring Intel RAID, drives must be of the same type to form a RAID array. SSDs (SATA-based) can only be grouped with other SSDs, while NVMe drives must be grouped exclusively with other NVMe drives. Mixing different types of storage devices (e.g., SATA SSDs with NVMe SSDs) in the same RAID volume is not supported.

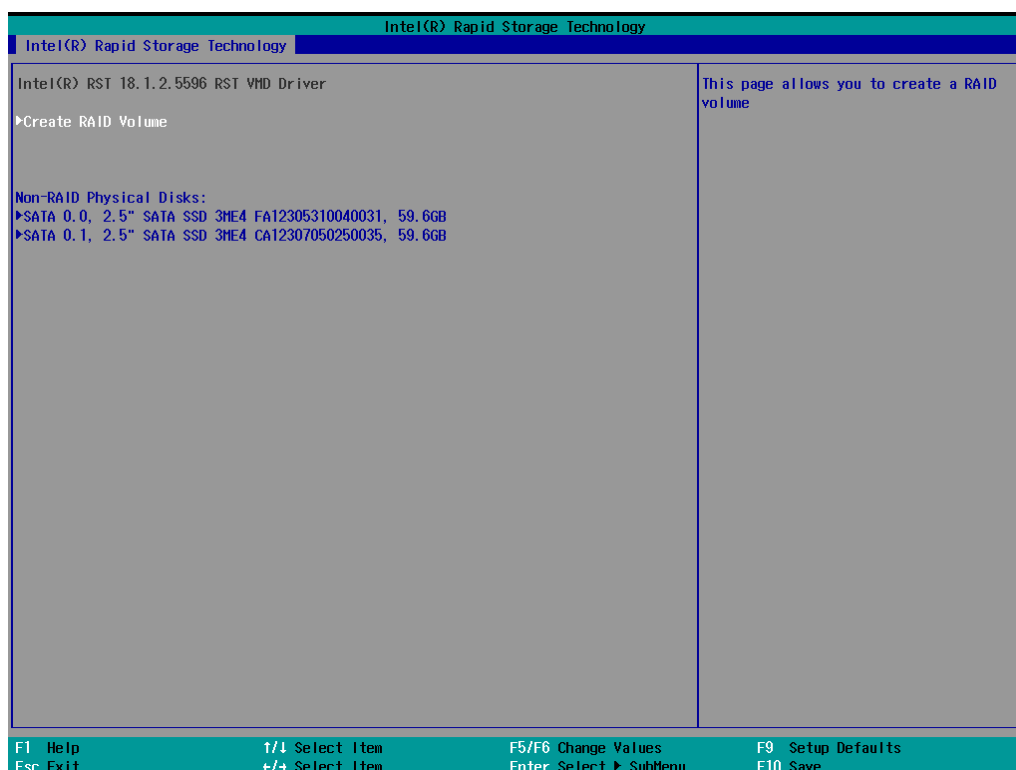
1. Power on the computer and press **F2** to enter the BIOS menu.
2. Select **Device Management**.



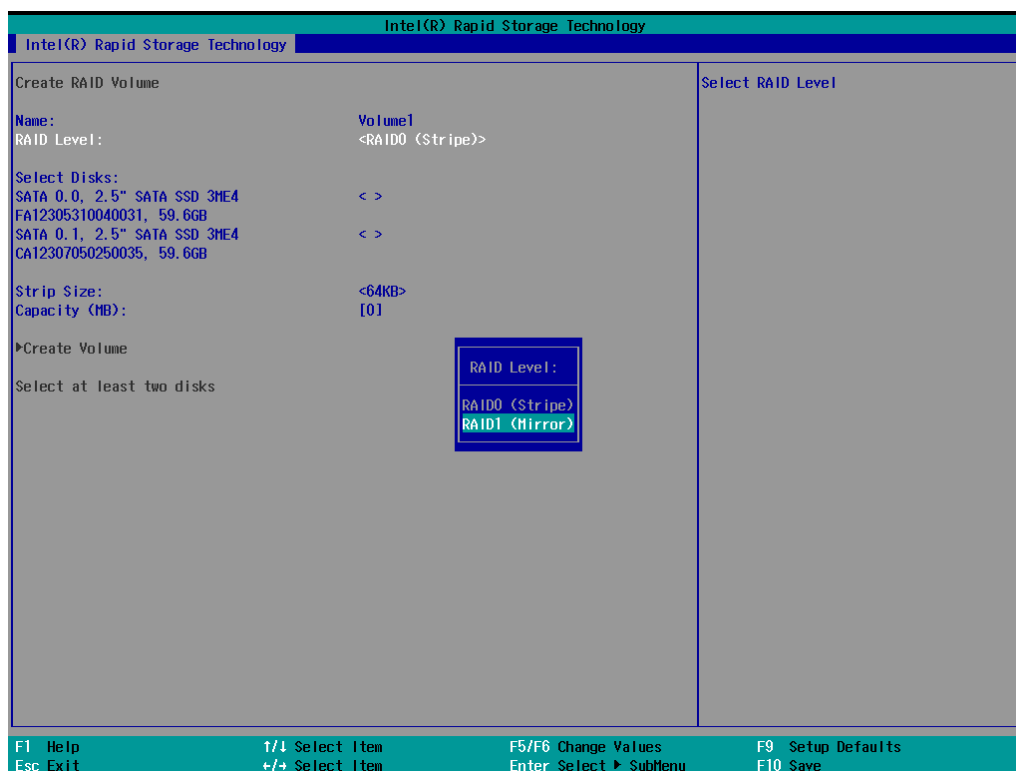
3. Select **Intel® Rapid Storage Technology**.



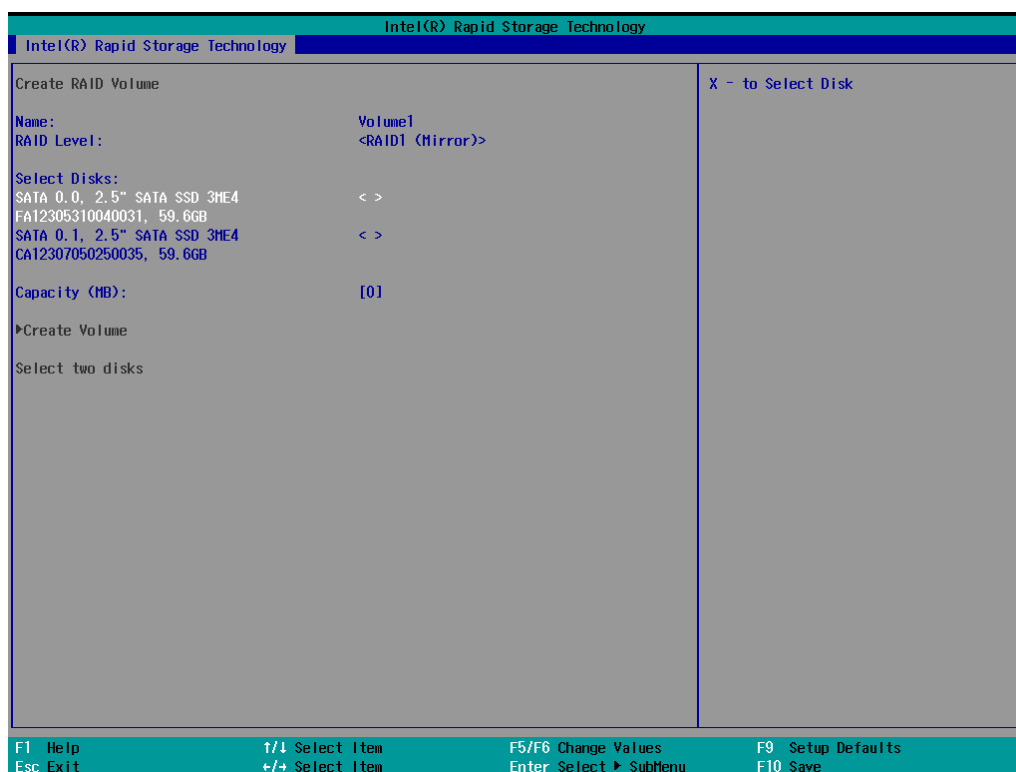
4. Select **Create RAID Volume**.



5. Select the **RAID Level** and then press **Enter** to select the raid level; for example, **RAID1(Mirror)**.



6. Select the target disk.



7. Enter **X** and press **Enter**.

| Intel(R) Rapid Storage Technology                                                                                                                       |                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| Intel(R) Rapid Storage Technology                                                                                                                       |                                                       |
| Create RAID Volume                                                                                                                                      | X - to Select Disk                                    |
| Name:                                                                                                                                                   | Volume1                                               |
| RAID Level:                                                                                                                                             | <RAID1 (Mirror)>                                      |
| Select Disks:                                                                                                                                           |                                                       |
| SATA 0.0, 2.5" SATA SSD 3ME4                                                                                                                            | < >                                                   |
| FA12305310040031, 59.6GB                                                                                                                                |                                                       |
| SATA 0.1, 2.5" SATA SSD 3ME4                                                                                                                            | < >                                                   |
| CA12307050250035, 59.6GB                                                                                                                                |                                                       |
| Capacity (MB):                                                                                                                                          | [0]                                                   |
| ►Create Volume                                                                                                                                          |                                                       |
| Select two disks                                                                                                                                        |                                                       |
|                                                                                                                                                         | SATA 0.0, 2.5" SATA SSD 3ME4 FA12305310040031, 59.6GB |
|                                                                                                                                                         | X                                                     |
| F1 Help      ↑/↓ Select Item      F5/F6 Change Values      F9 Setup Defaults<br>Esc Exit      +/÷ Select Item      Enter Select ► SubMenu      F10 Save |                                                       |

The disk shows an **X** mark next to it to indicate its selection.

| Intel(R) Rapid Storage Technology                                                                                                                       |                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| Intel(R) Rapid Storage Technology                                                                                                                       |                    |
| Create RAID Volume                                                                                                                                      | X - to Select Disk |
| Name:                                                                                                                                                   | Volume1            |
| RAID Level:                                                                                                                                             | <RAID1 (Mirror)>   |
| Select Disks:                                                                                                                                           |                    |
| SATA 0.0, 2.5" SATA SSD 3ME4                                                                                                                            | <X>                |
| FA12305310040031, 59.6GB                                                                                                                                |                    |
| SATA 0.1, 2.5" SATA SSD 3ME4                                                                                                                            | <X>                |
| CA12307050250035, 59.6GB                                                                                                                                |                    |
| Capacity (MB):                                                                                                                                          | [61055]            |
| ►Create Volume                                                                                                                                          |                    |
| F1 Help      ↑/↓ Select Item      F5/F6 Change Values      F9 Setup Defaults<br>Esc Exit      +/÷ Select Item      Enter Select ► SubMenu      F10 Save |                    |

8. Select **Create Volume**.

| Intel(R) Rapid Storage Technology                                                                                                                                                                                                                 |                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| Intel(R) Rapid Storage Technology                                                                                                                                                                                                                 |                                                   |
| Create RAID Volume                                                                                                                                                                                                                                | Create a volume with the settings specified above |
| Name:                                                                                                                                                                                                                                             | Volume1                                           |
| RAID Level:                                                                                                                                                                                                                                       | <RAID1 (Mirror)>                                  |
| Select Disks:                                                                                                                                                                                                                                     |                                                   |
| SATA 0.0, 2.5" SATA SSD 3ME4                                                                                                                                                                                                                      | <X>                                               |
| FAT2305310040031, 59.6GB                                                                                                                                                                                                                          |                                                   |
| SATA 0.1, 2.5" SATA SSD 3ME4                                                                                                                                                                                                                      | <X>                                               |
| CA12307050250035, 59.6GB                                                                                                                                                                                                                          |                                                   |
| Capacity (MB):                                                                                                                                                                                                                                    | [61055]                                           |
| ▶Create Volume                                                                                                                                                                                                                                    |                                                   |
|                                                                                                                                                                                                                                                   |                                                   |
| F1 Help                      ↑/↓ Select Item                      F5/F6 Change Values                      F9 Setup Defaults<br>Esc Exit                    +/− Select Item                    Enter Select ▶ SubMenu                    F10 Save |                                                   |

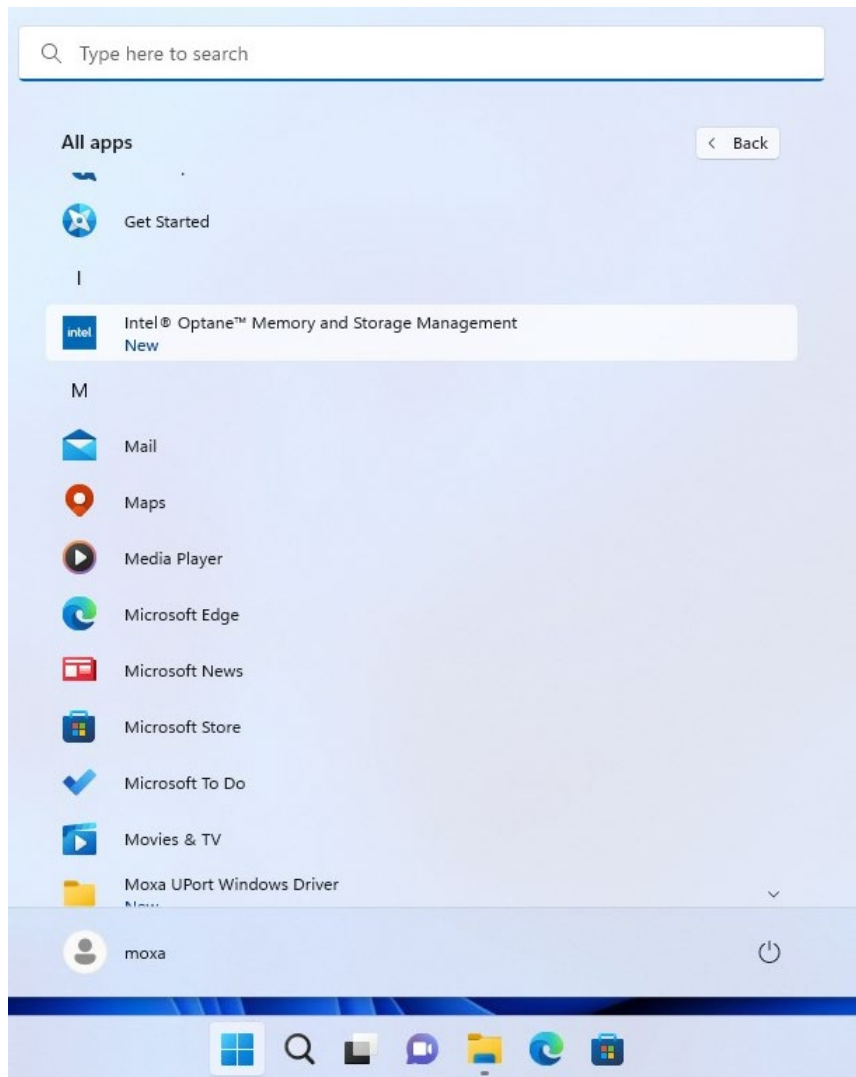
9. A RAID volume is created based on the settings specified.

| Intel(R) Rapid Storage Technology                                                                                                                                                                                                                 |                                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| Intel(R) Rapid Storage Technology                                                                                                                                                                                                                 |                                                      |
| Intel(R) RST 18.1.2.5596 RST VMD Driver                                                                                                                                                                                                           | Select to see more information about the RAID Volume |
| RAID Volumes:                                                                                                                                                                                                                                     |                                                      |
| ▶Volume1, RAID1 (Mirror), 59.6GB, Normal                                                                                                                                                                                                          |                                                      |
|                                                                                                                                                                                                                                                   |                                                      |
| F1 Help                      ↑/↓ Select Item                      F5/F6 Change Values                      F9 Setup Defaults<br>Esc Exit                    +/− Select Item                    Enter Select ▶ SubMenu                    F10 Save |                                                      |

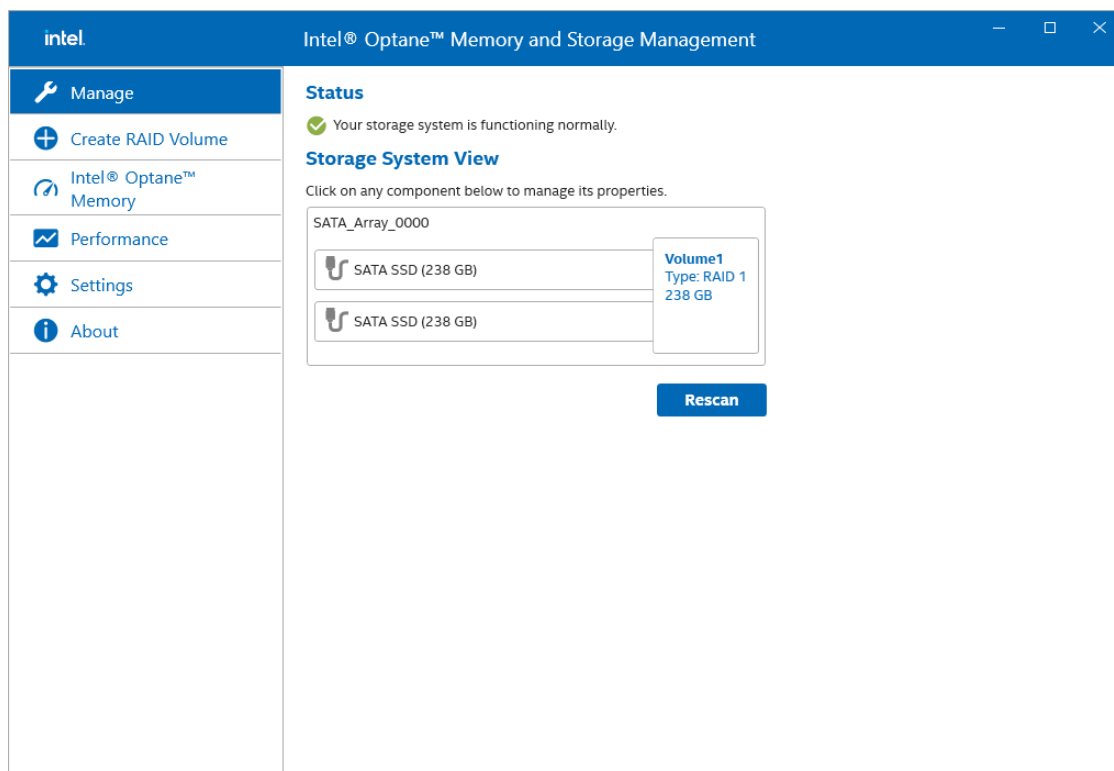
10. Press **F10** to save the settings.

# Intel® RAID—Replacing a Disk

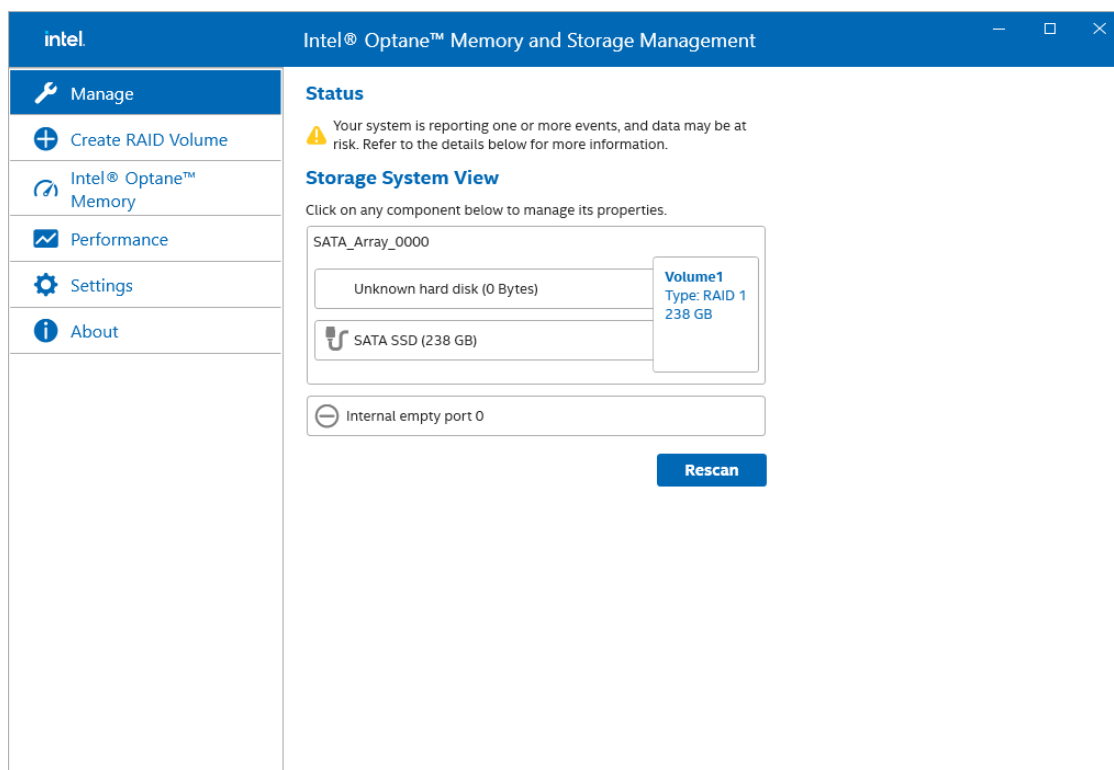
1. Run **Intel® Optane™ Memory and Storage Management** from the Windows start menu.



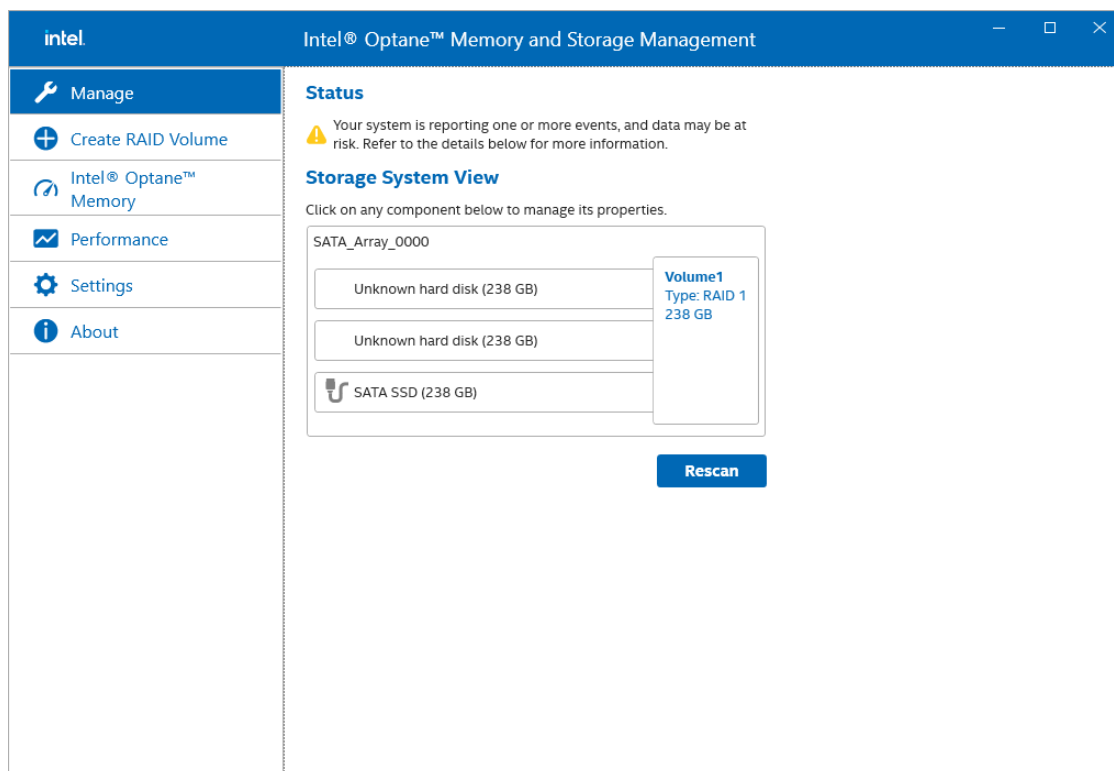
2. Physically unplug the target SSD from the computer.



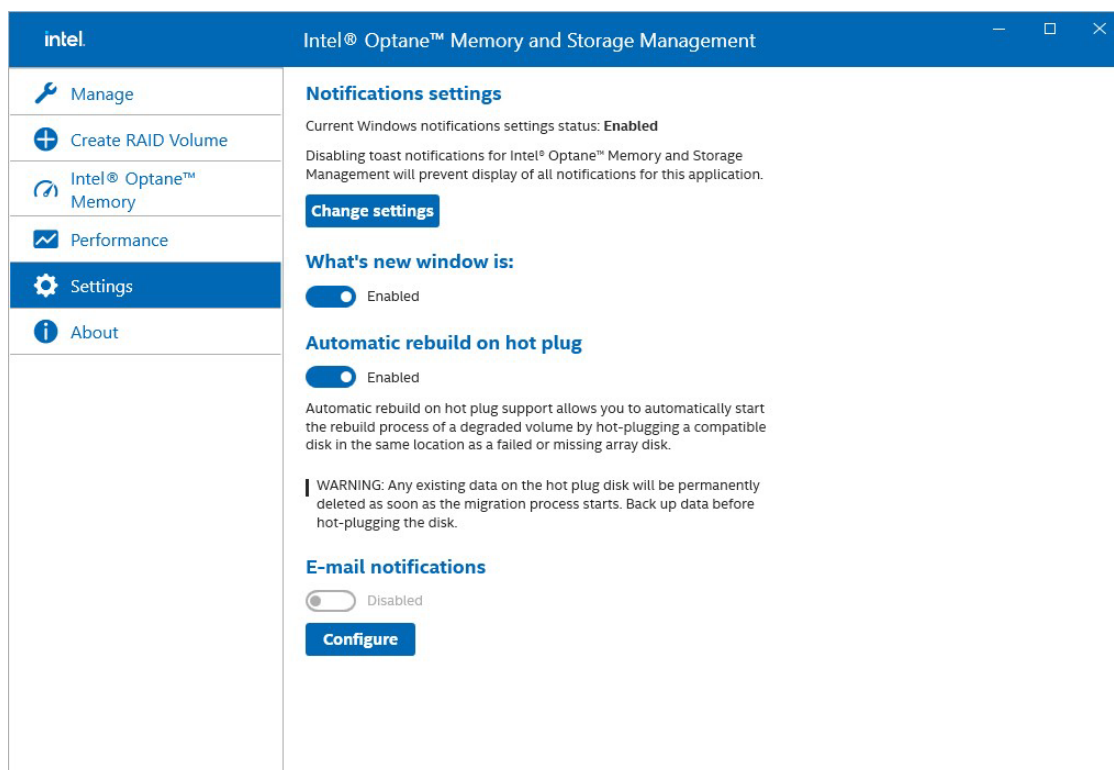
The status of the SSD that is unplugged will change to **Unknown hard disk (0 Bytes)** as shown here:



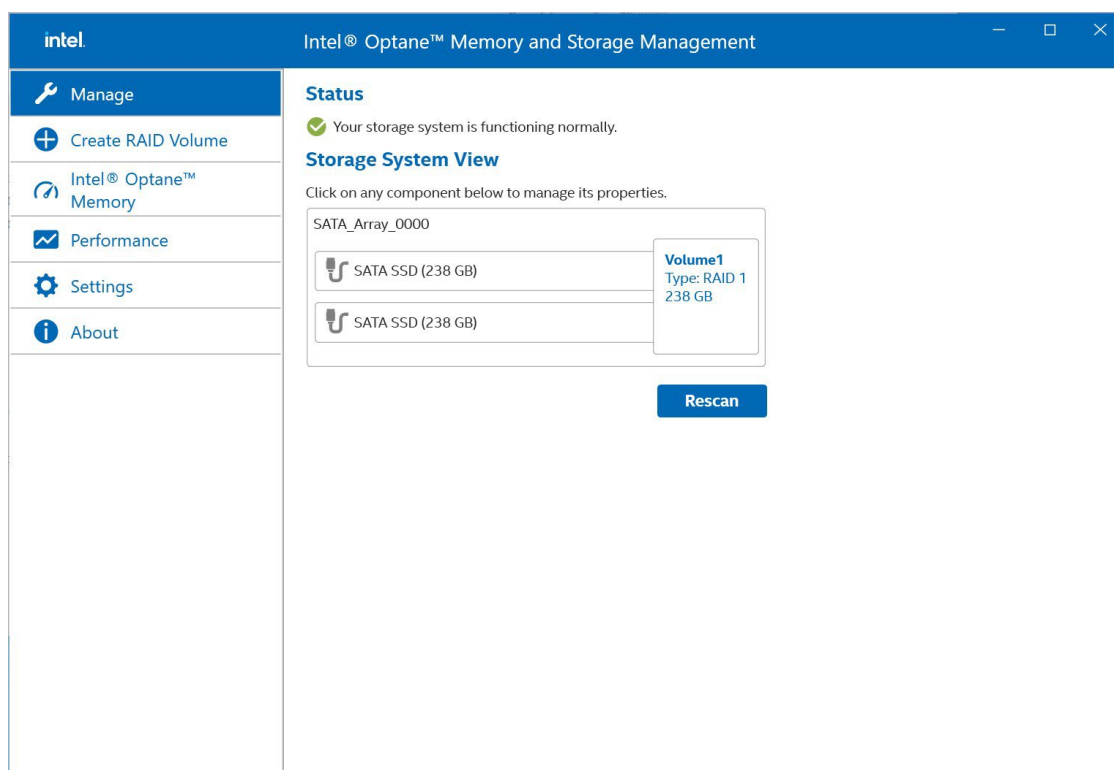
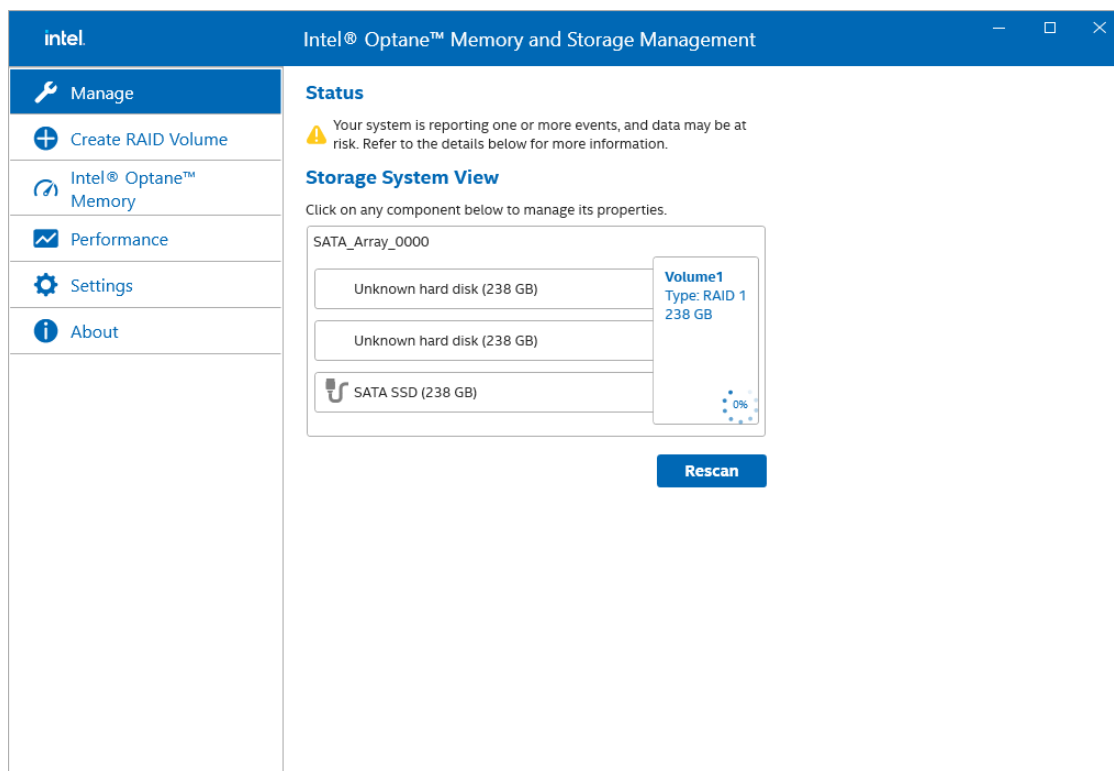
3. Install the new SSD in the same location.



4. Click **Settings** and enable **Automatic rebuild on hot plug**.

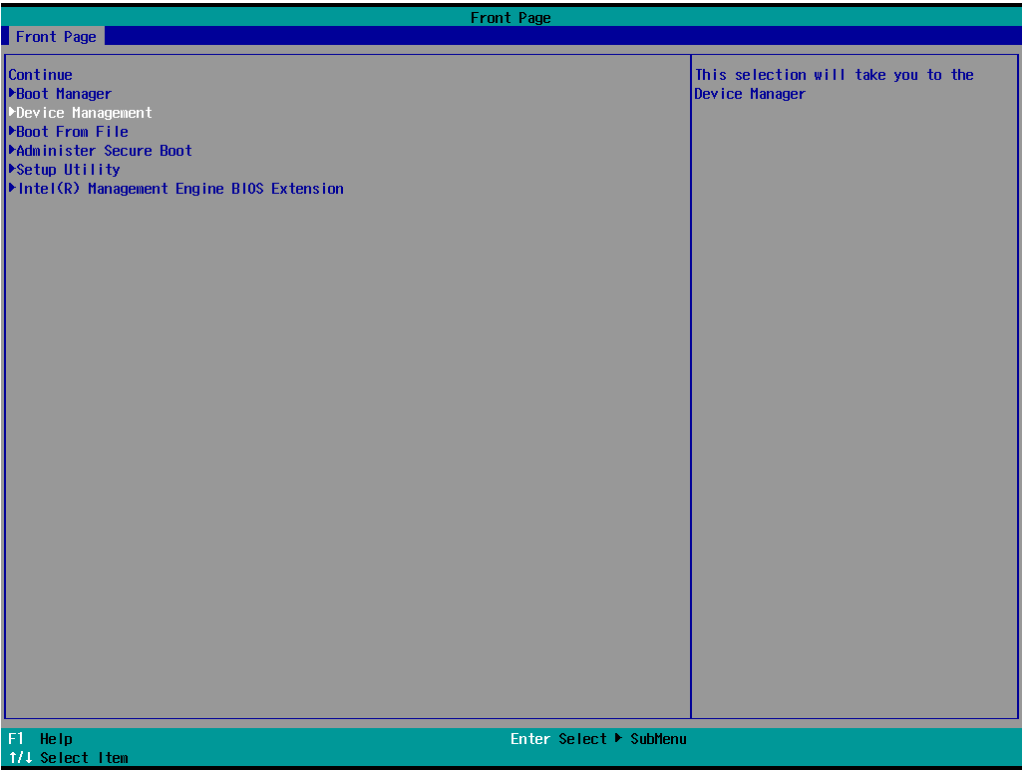


- The system will start rebuilding the storage volume.  
Wait for the rebuild process to complete.



# Intel® RAID—Removing a RAID Volume From the BIOS

1. Power on the computer and press **F2** to enter the BIOS menu.
2. Select **Device Management**.

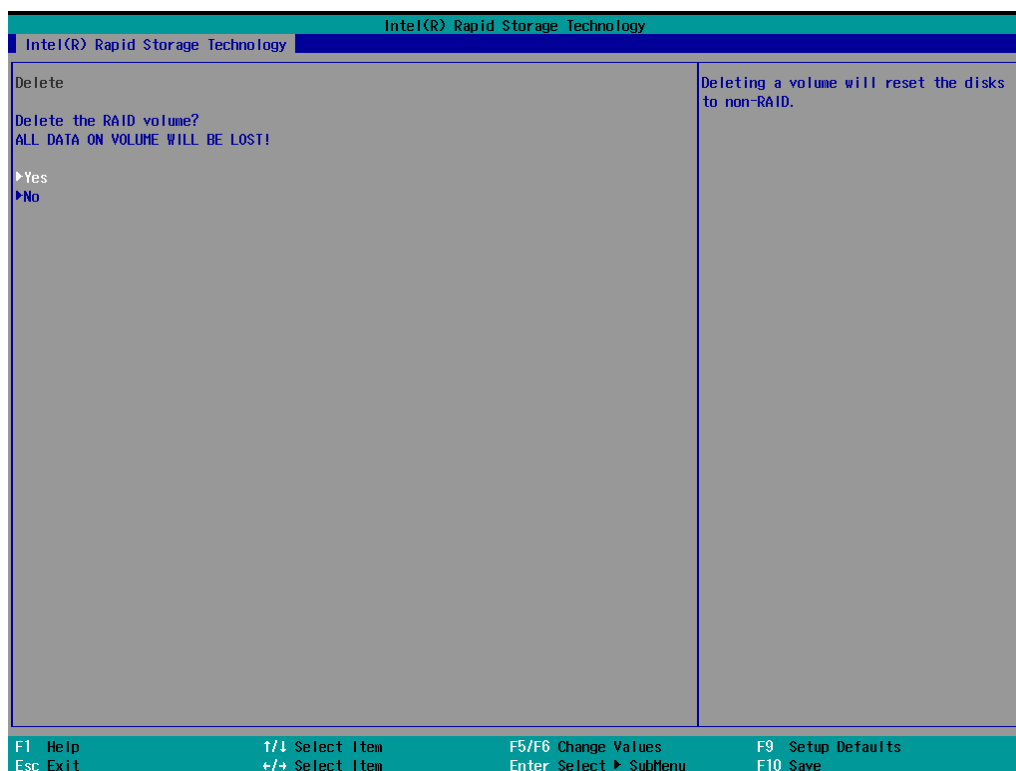


3. Select **Intel® Rapid Storage Technology**.





6. Select **Yes** to confirm and then press **Enter**.



7. Press **F10** to save the settings.

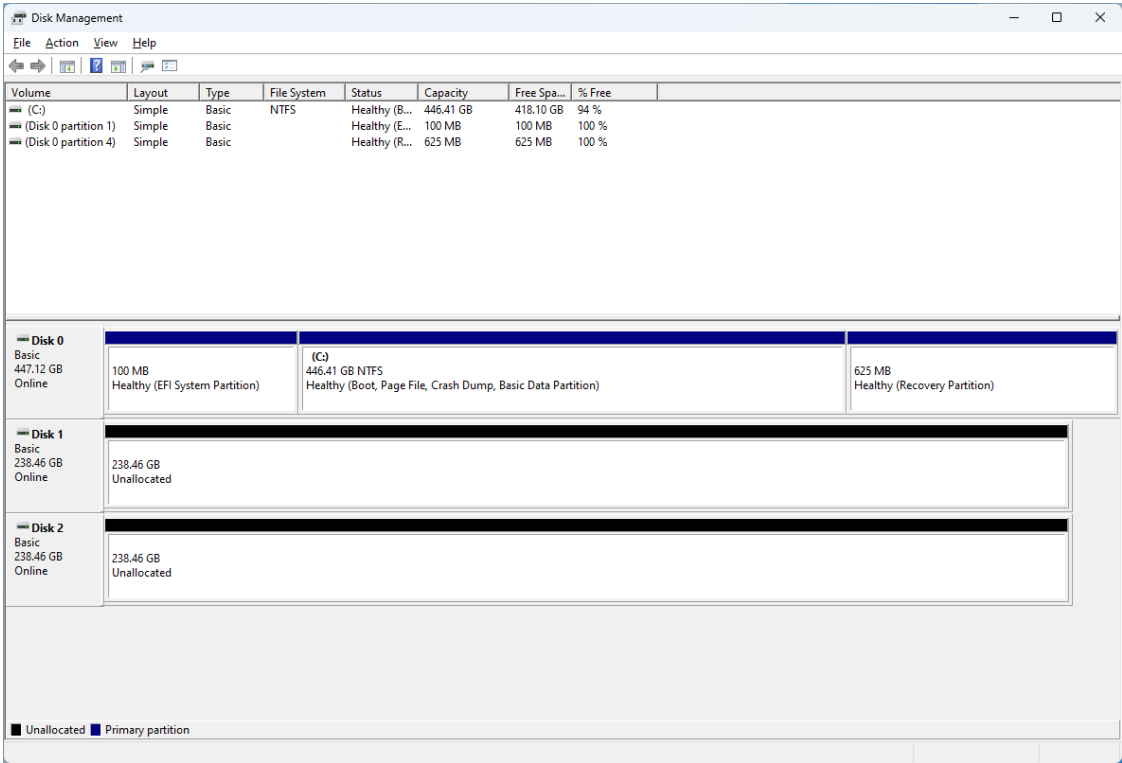
# SW RAID—Creating RAID 0 or RAID 1 From Disk Management



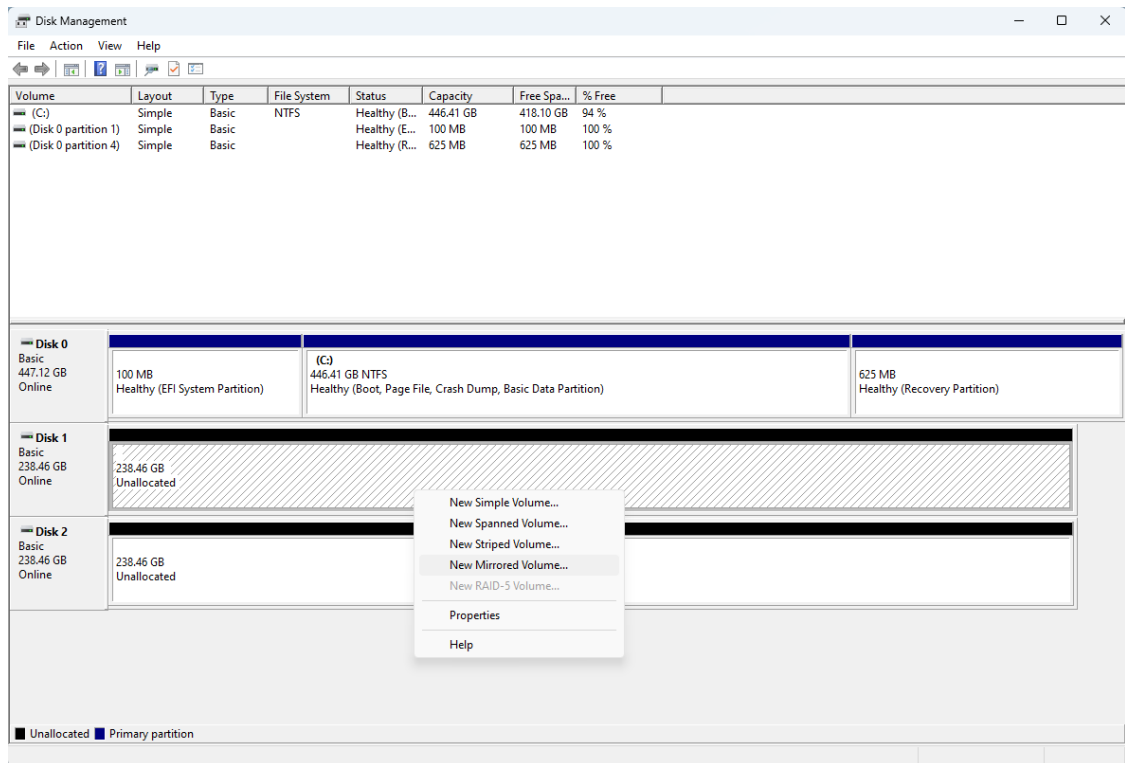
## NOTE

For best performance, use hard disks of the same brand, same model, and same capacity to create a RAID volume.

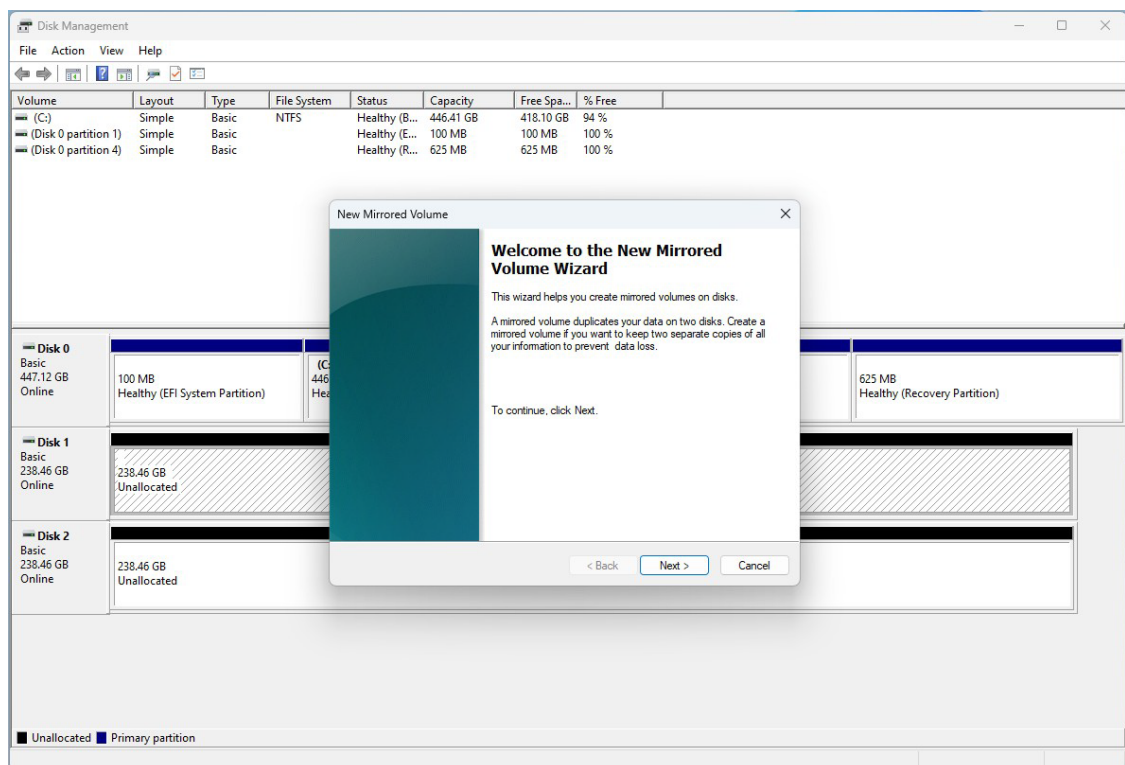
1. Run **Disk Management**.  
Connect the new disks and confirm that all disks have status **Unallocated**. If a disk status is not **Unallocated**, you can right-click on the disk and select **Delete Volume**.



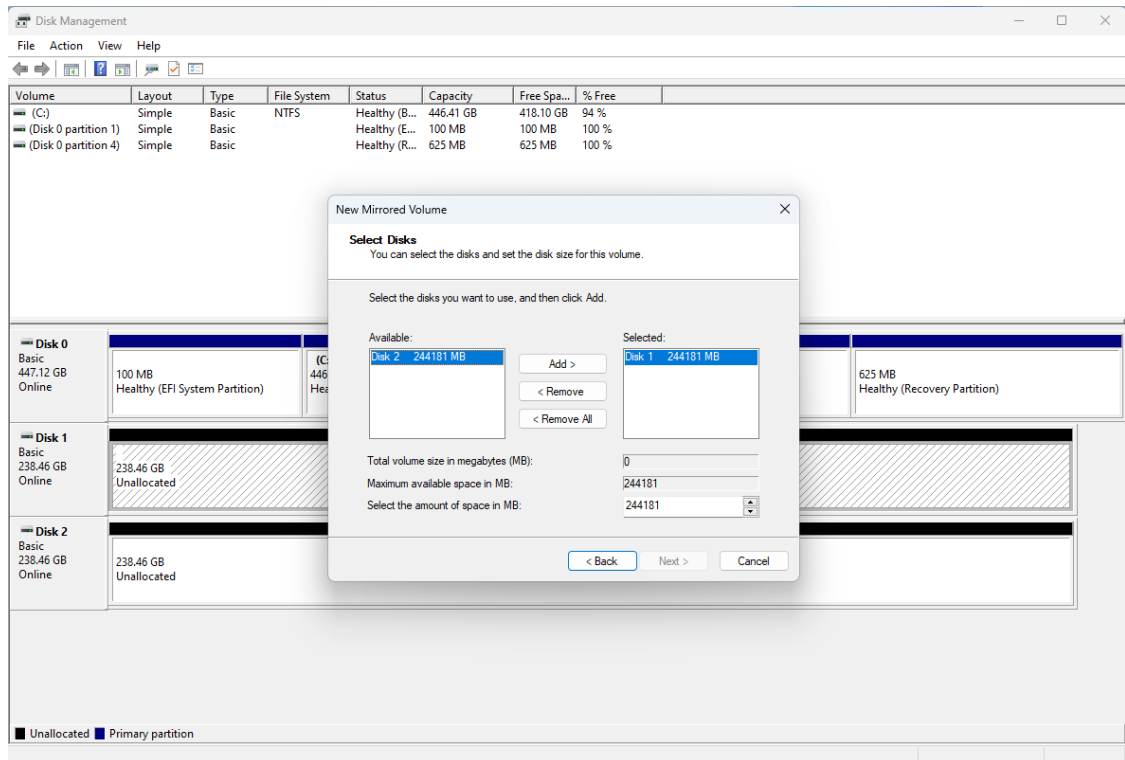
2. Right-click the target disk and select the target volume type.  
For example: **RAID1(Mirror)**.



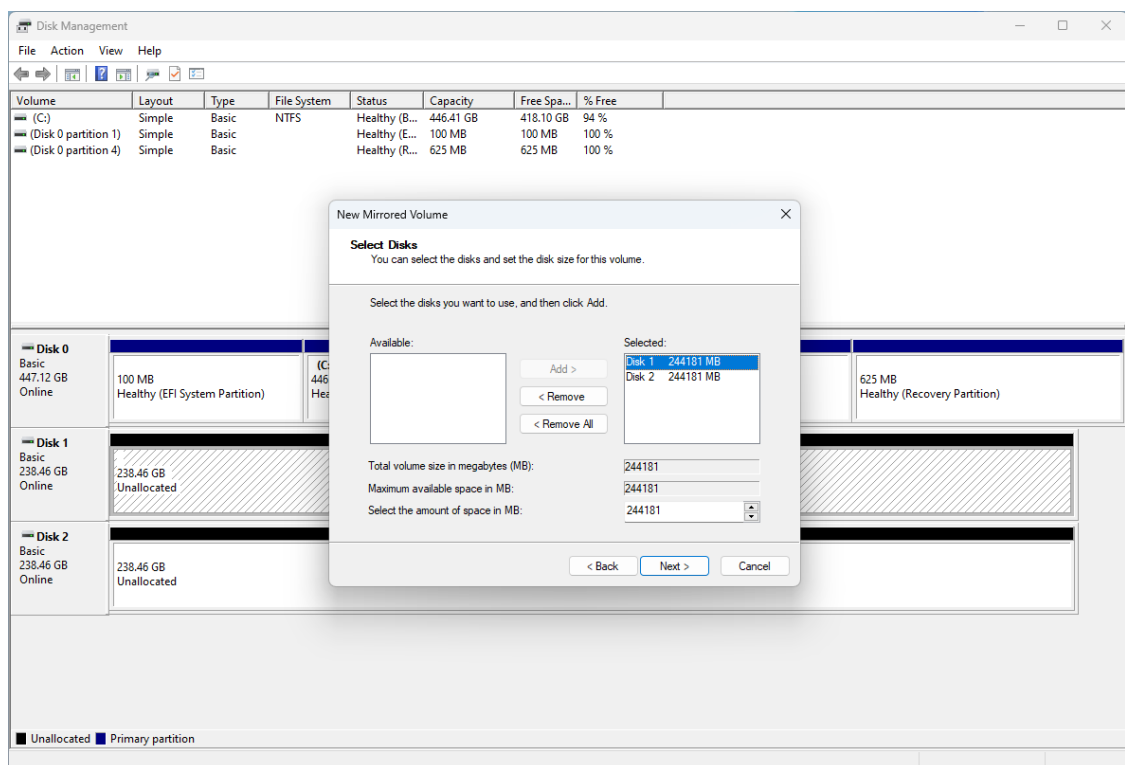
3. Click **Next** to continue with the creation of a new RAID volume.



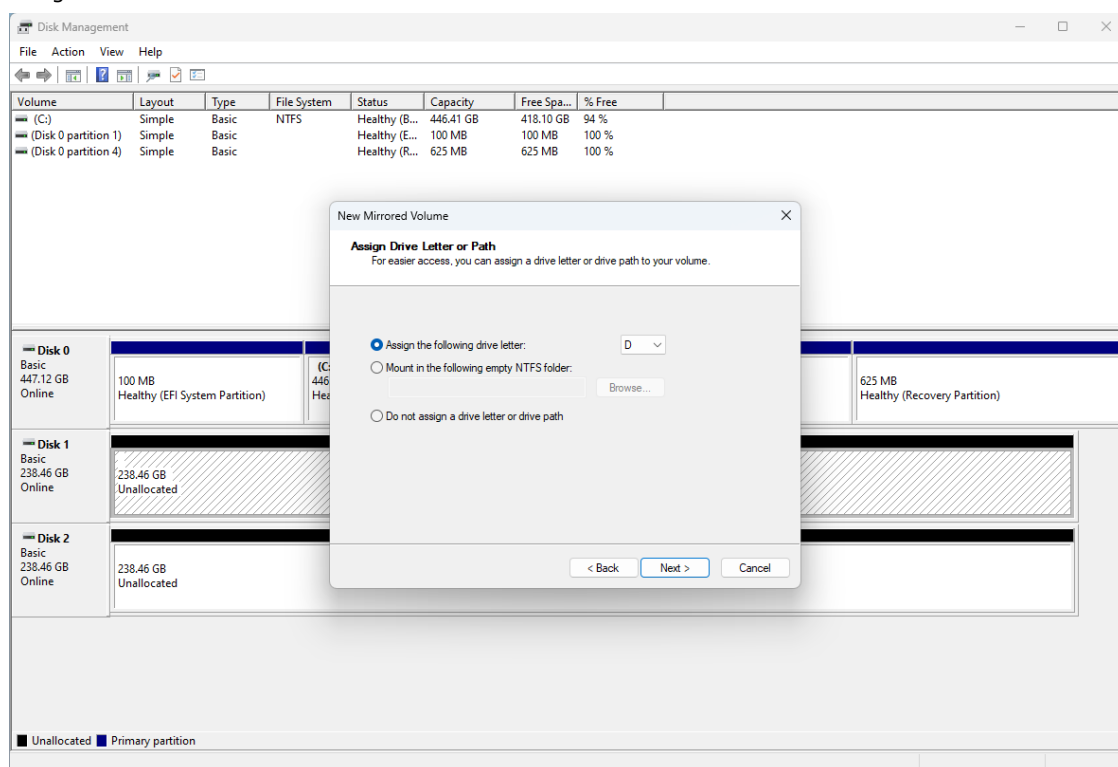
4. Select and **Add** the disks you want to use.



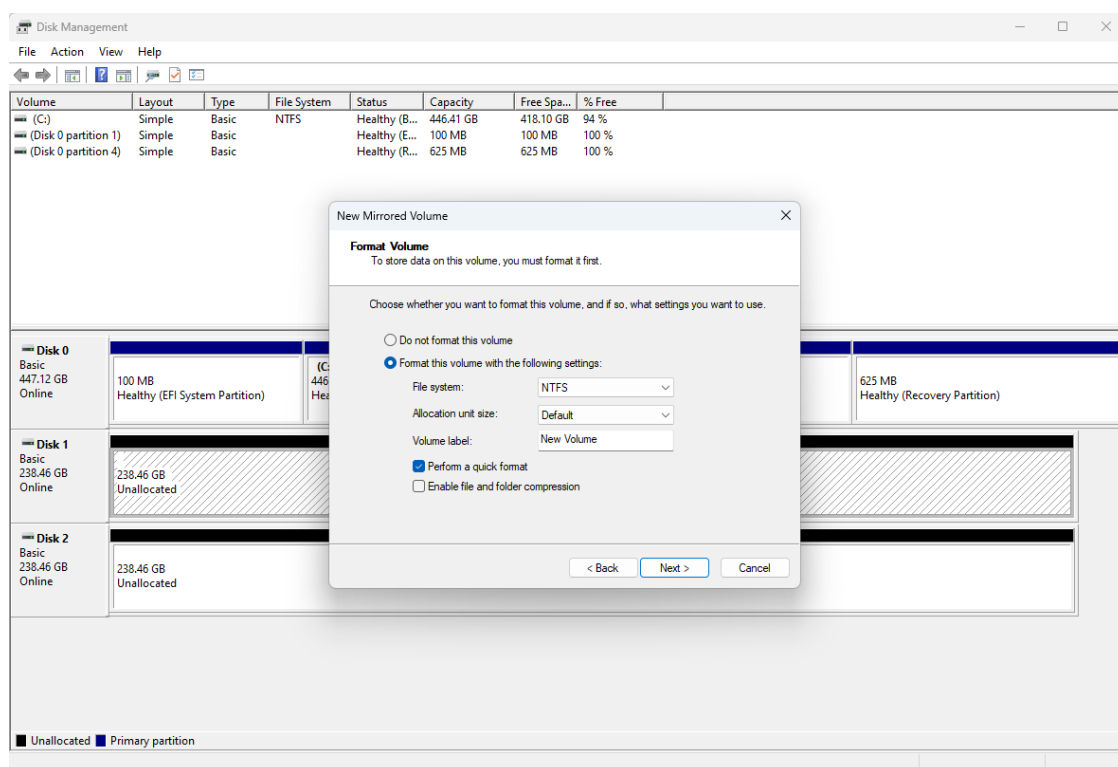
5. Click **Next**.



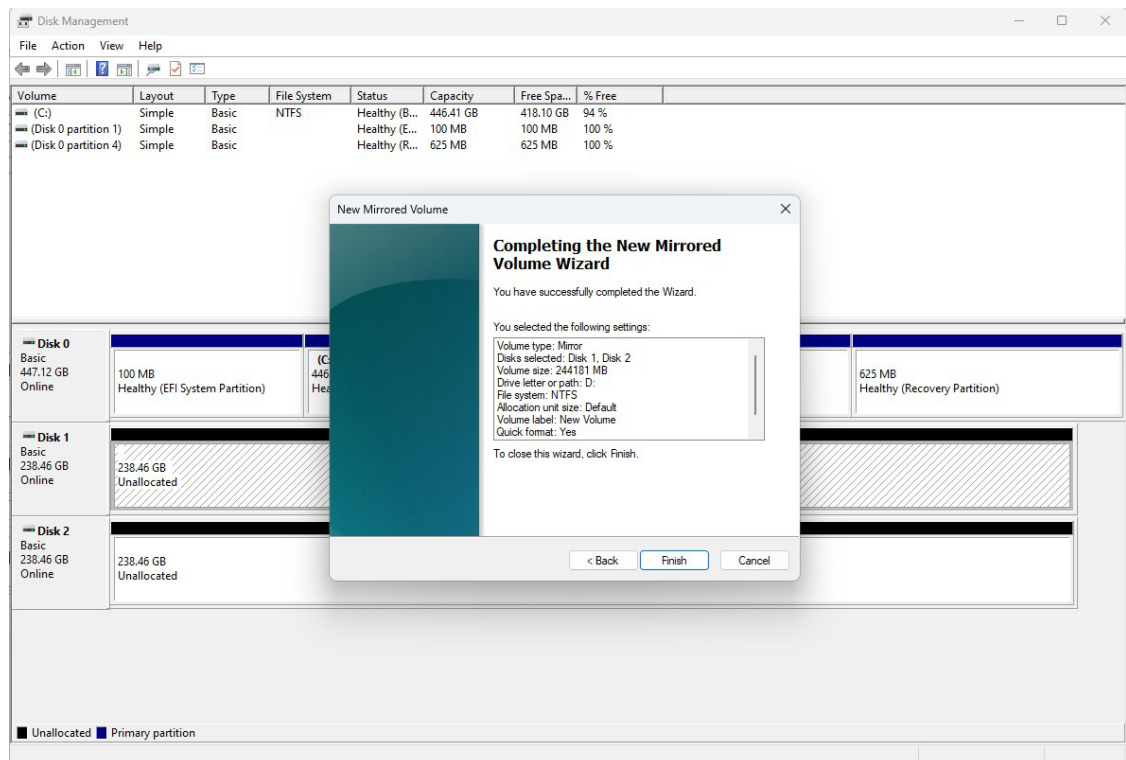
6. Assign the drive letter and click **Next**.



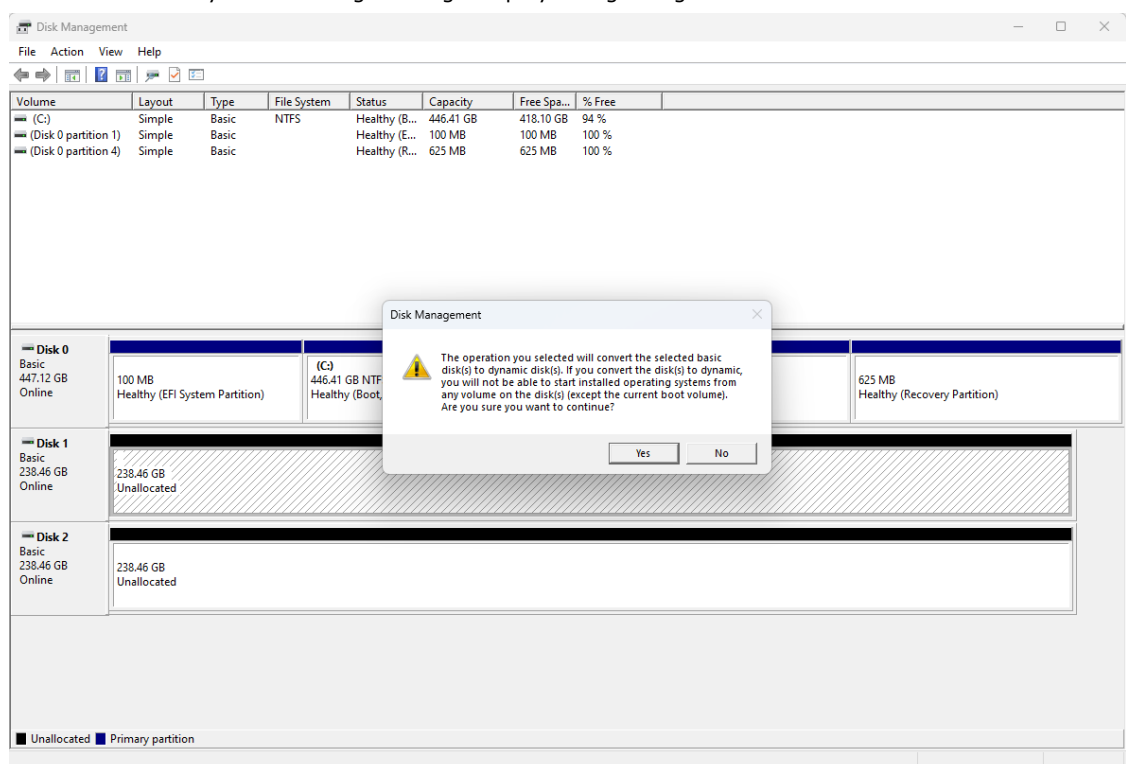
7. Select **Format the volume with...** and then **Perform a Quick Format**. Click **Next** to continue.



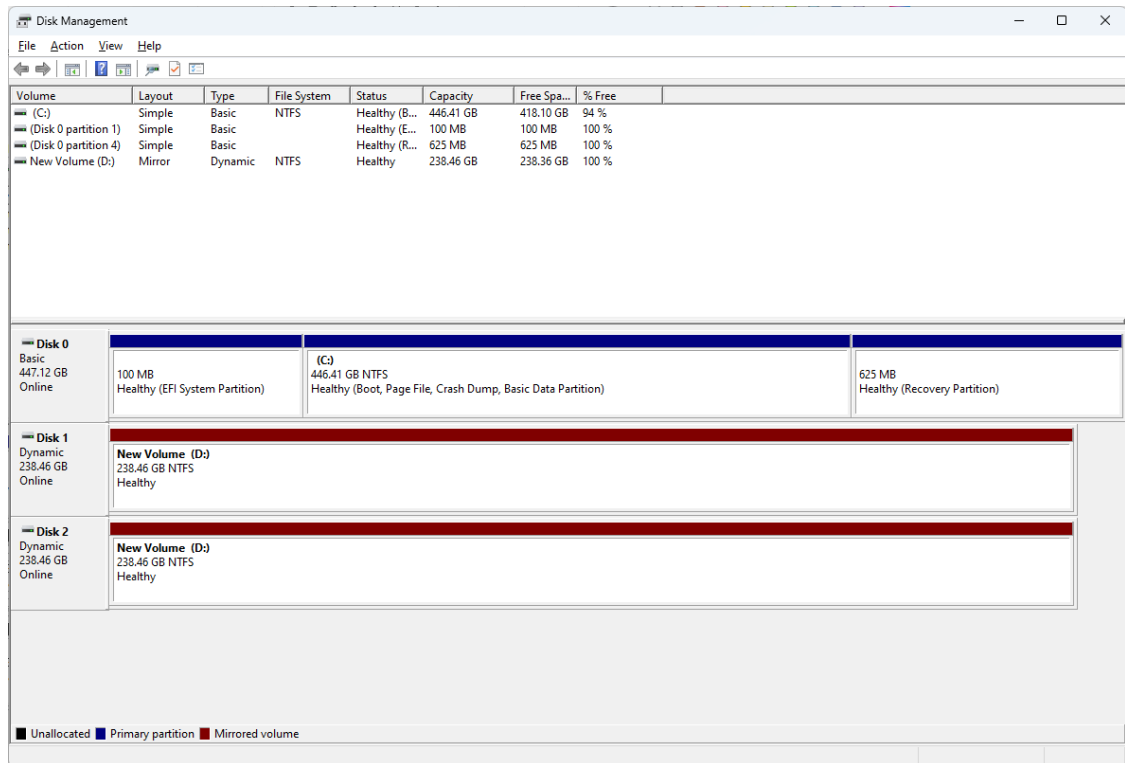
8. Check the RAID1(Mirror) information and click **Finish** to create the volume.



9. Click **Yes** for the system warning message displayed regarding SW RAID volume.

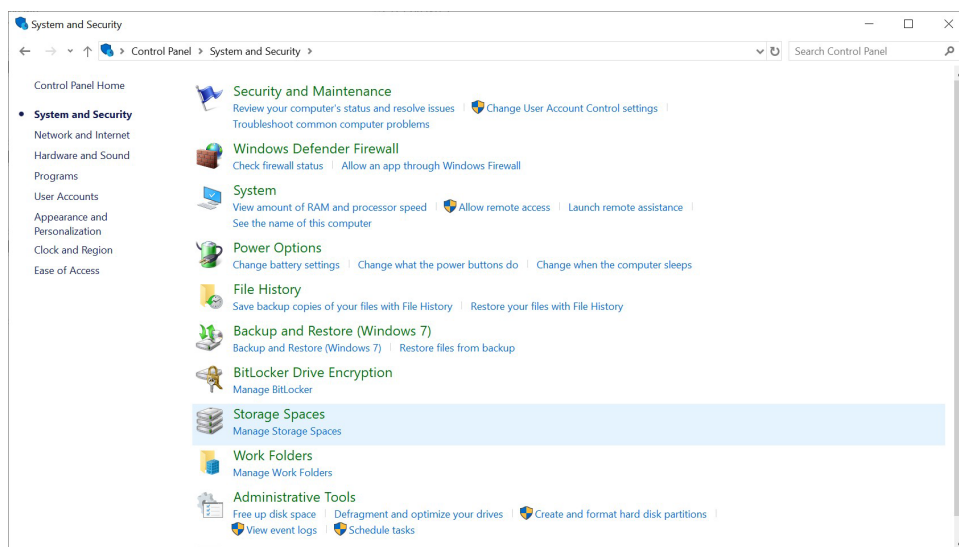


10. Check the RAID1(Mirror) information via Disk Management to confirm that the volume is created.

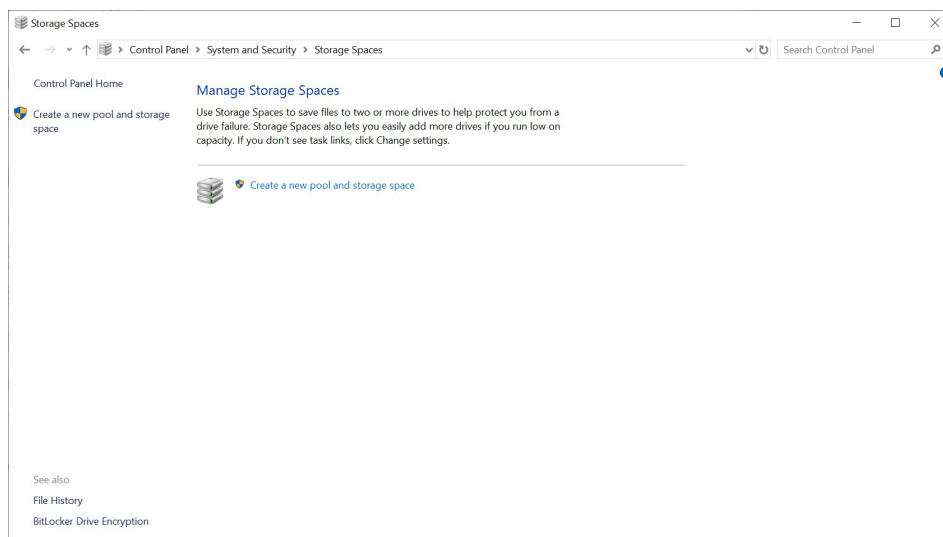


## SW RAID—Creating RAID 5 From Storage Spaces

1. Open **Control Panel > System and Security** and run the **Storage Spaces** service.



2. Click **Create a new pool and storage space**.

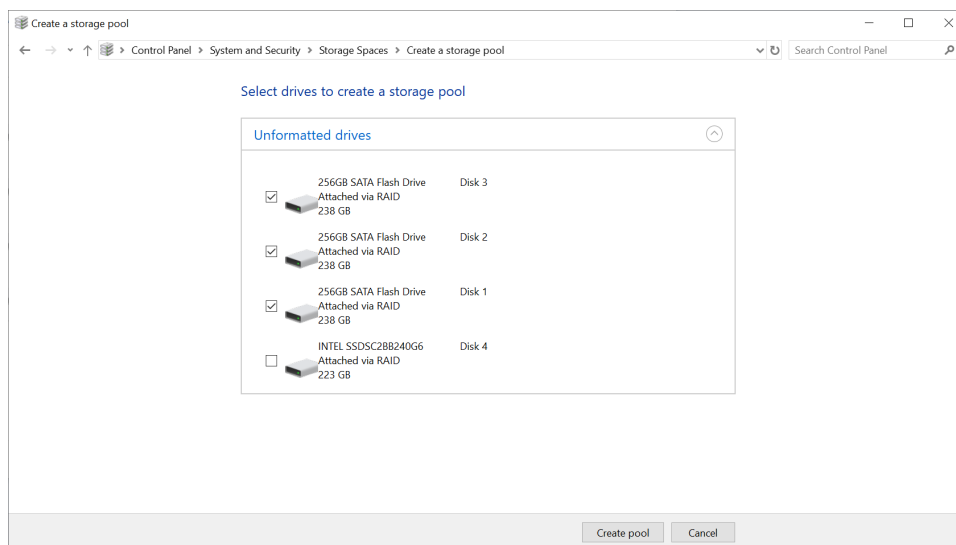


3. Select target drives to create a storage pool and click **Create pool**.



## NOTE

RAID 5 requires at least three disks.



4. Change the **Resiliency type** to **Parity** and click **Create storage space**.

Enter a name, resiliency type, and size for the storage space

Name and drive letter

Name: Storage space

Drive letter: D: ▾

File system: NTFS ▾

Resiliency

Resiliency type: Parity ▾

A parity storage space writes your data with parity information, helping to protect you from a single drive failure. A parity storage space requires at least three drives.

Size

Total pool capacity: 713 GB

Available pool capacity: 713 GB

Size (maximum): 470 GB ▾

Including resiliency: 705 GB

Create storage space Cancel

5. Check the status of the RAID 5 volume.

Storage Spaces

Control Panel Home

Create a new pool and storage space

Storage spaces

Storage space (D:) OK View files Change Delete

Parity

470 GB

Using 2.25 GB pool capacity

Physical drives

256GB SATA Flash Drive OK Rename

SN: D0119232100000000012

Attached via RAID

1.37% used

Providing 238 GB pool capacity

256GB SATA Flash Drive OK Rename

SN: D0119235600000000018

Attached via RAID

0.53% used

Providing 238 GB pool capacity

256GB SATA Flash Drive OK Rename

SN: D011926340000000006C

Attached via RAID

1.37% used

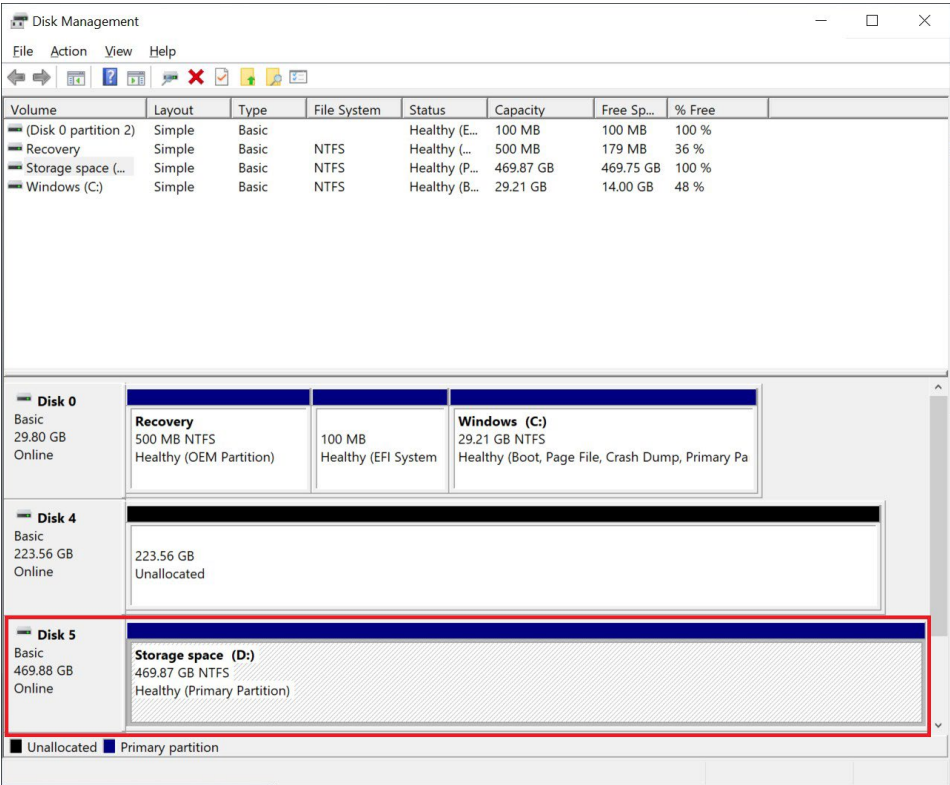
Providing 238 GB pool capacity

See also

File History

BitLocker Drive Encryption

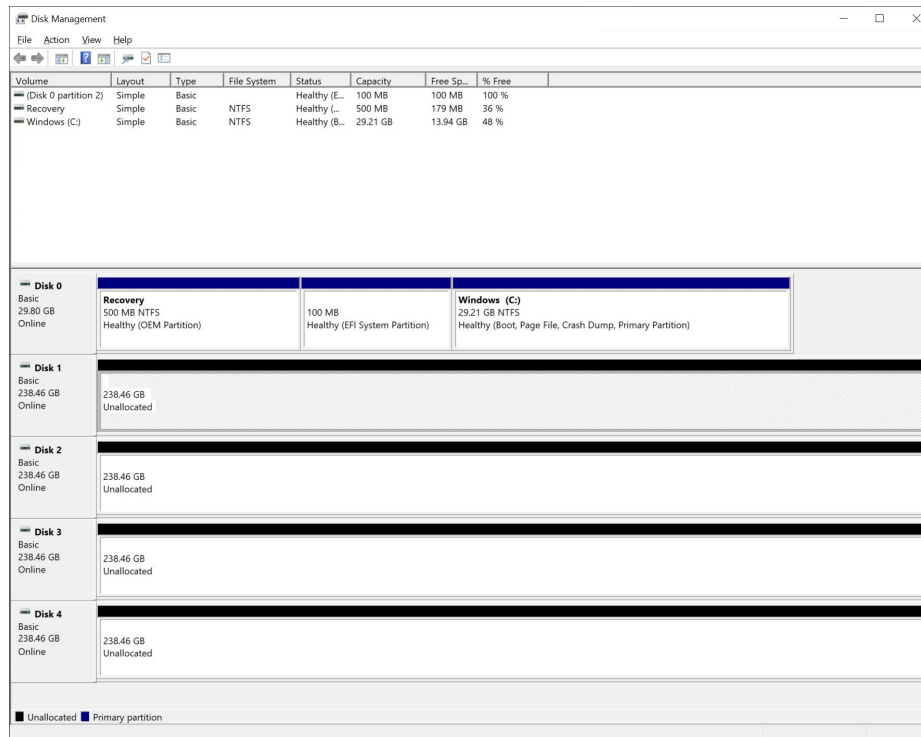
6. Check the storage space via Disk Management to confirm it is created correctly.



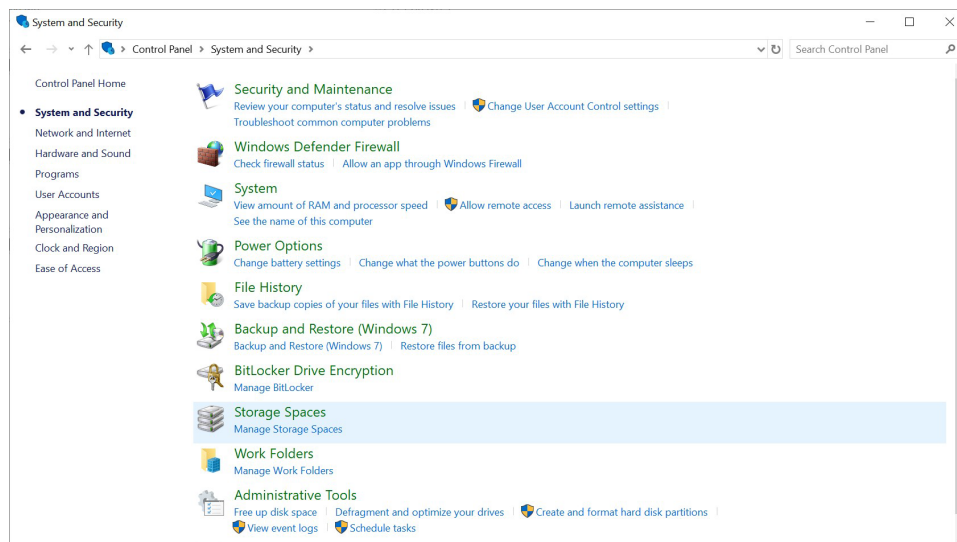
# SW RAID—Creating RAID 10 From Storage Spaces

## 1. Run the **Disk Management**.

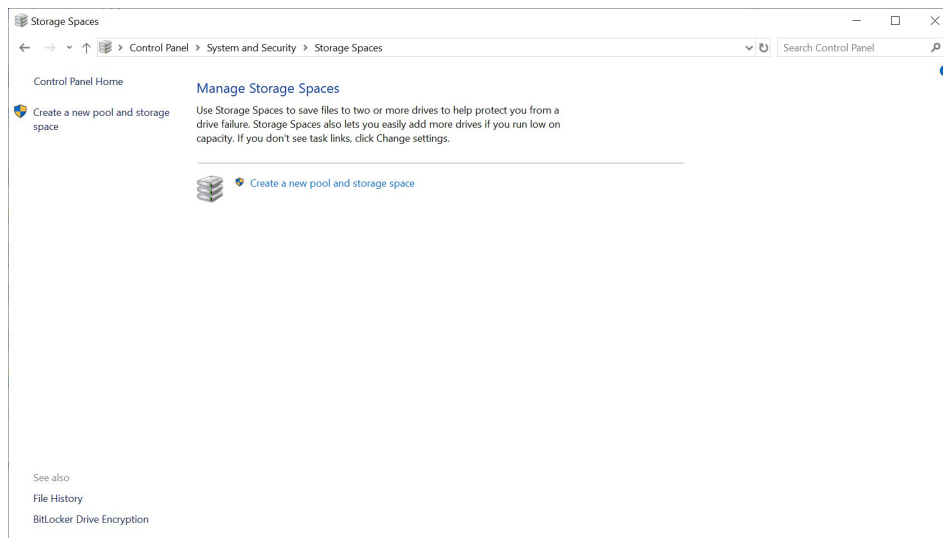
Connect the new disks and confirm that all disk statuses are **Unallocated**. If a disk status is not **Unallocated**, you can right-click the disk and select **Delete Volume**.



## 2. Open **Control Panel > System and Security** and run **Storage Spaces**.



3. Click **Create a new pool and storage space**.

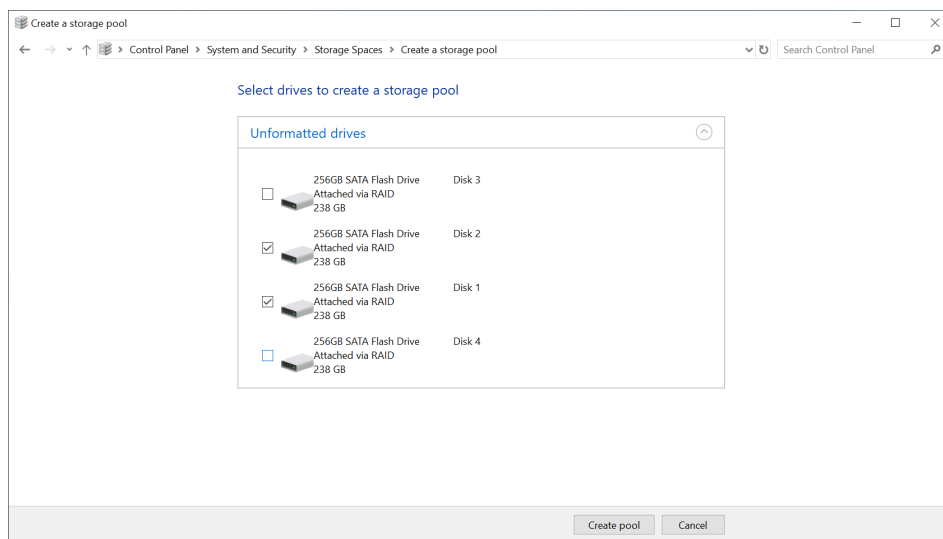


4. Select **Disk 1** and **Disk 2** to create a storage pool and click **Create a pool**.

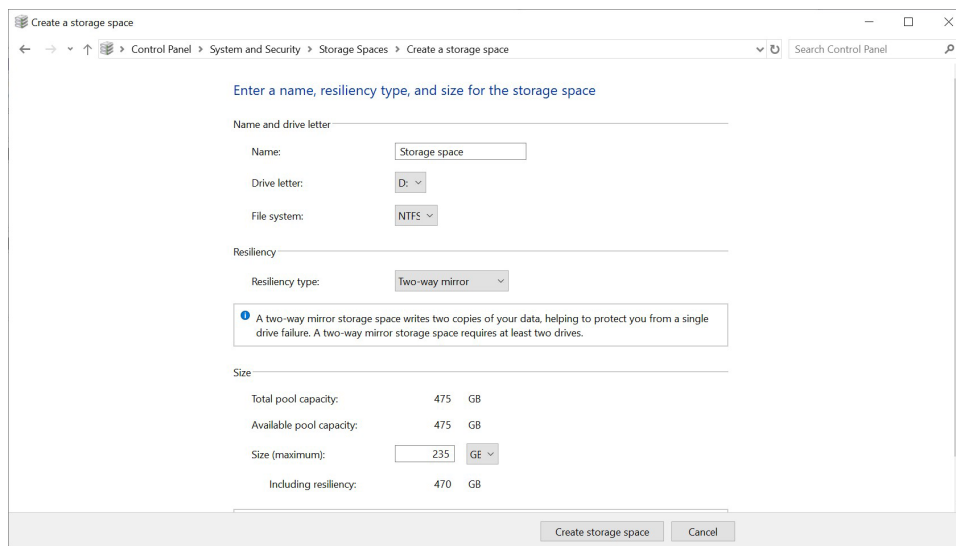


## NOTE

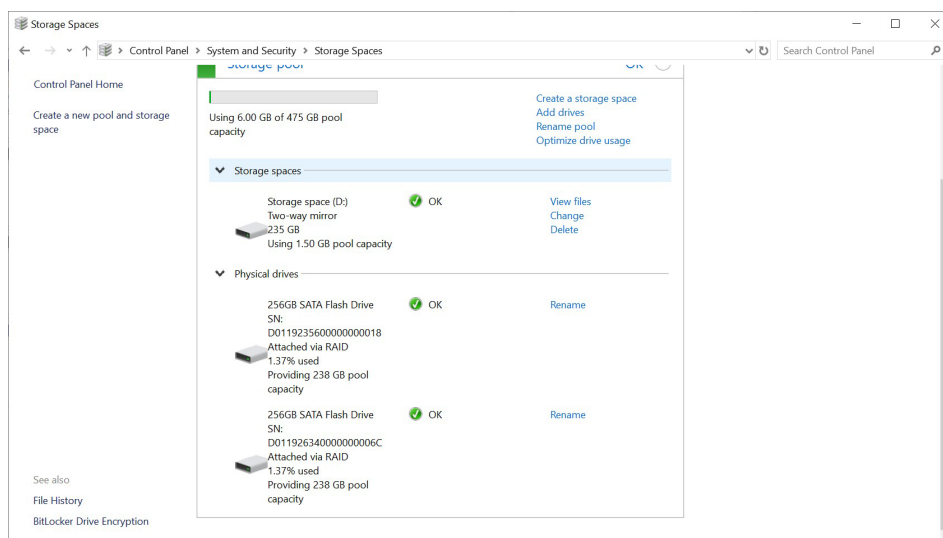
RAID 10 requires at least four disks.



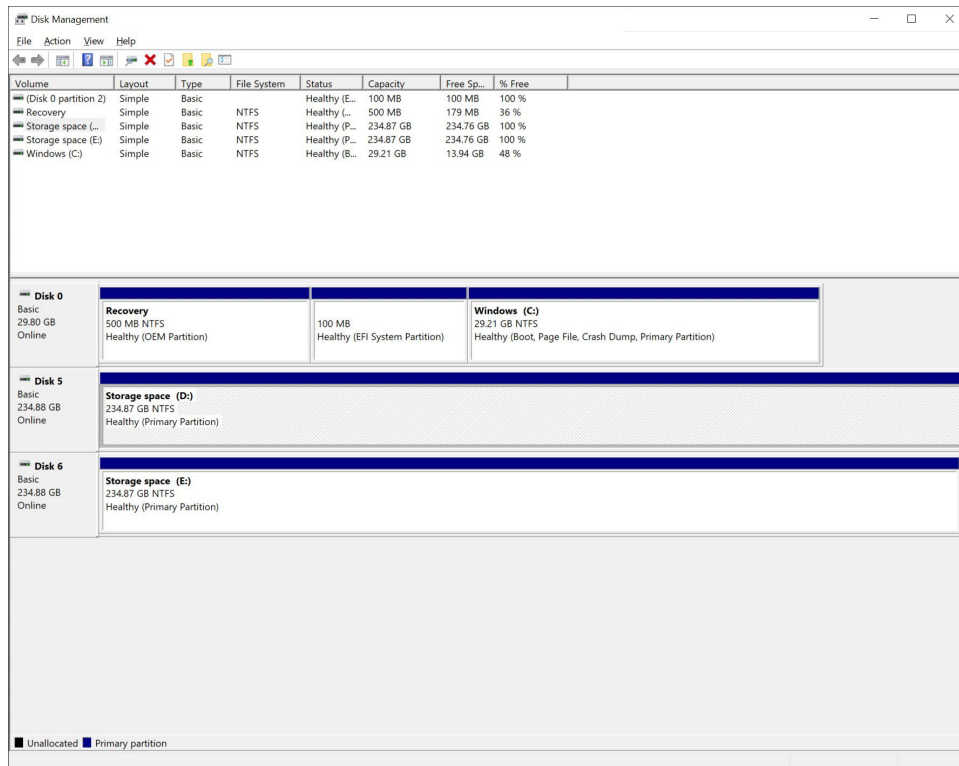
5. Set the **Resiliency type** to **Two-way mirror** and click **Create storage space**.



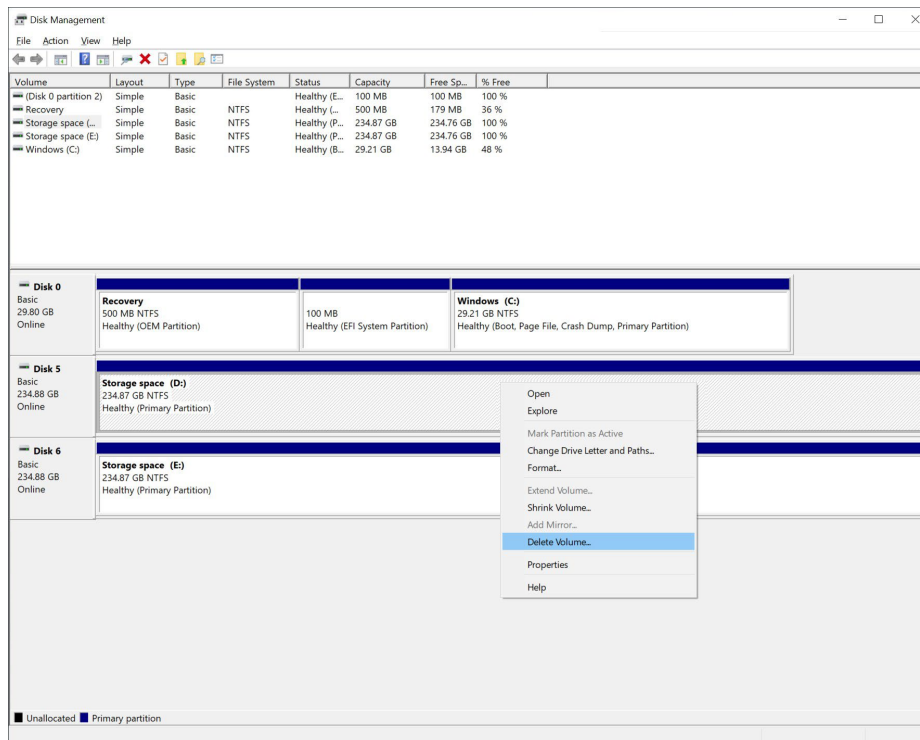
6. Create **Disk 3** and **Disk 4** in the same way by following steps 4 and 5.
7. Check the statuses of the storage spaces created.



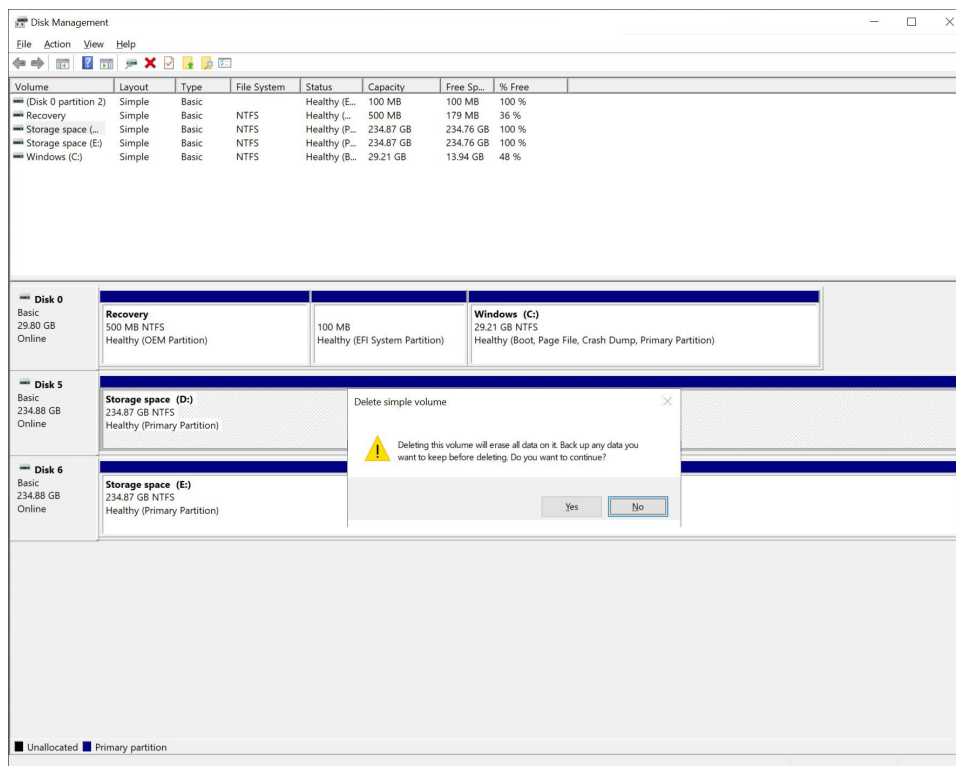
The **Storage space (D:)** and **Storage space (E:)** will be shown in **Disk Management**.



8. Right-click **Storage space (D:)** and select **Delete Volume**.

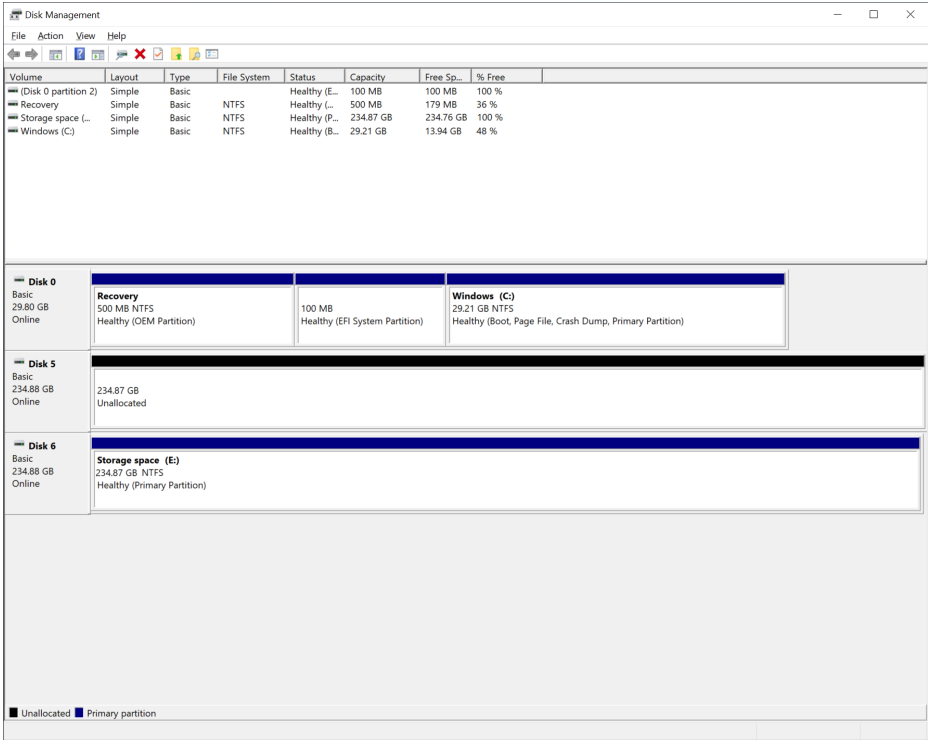


9. Click **Yes** for the warning message shown.

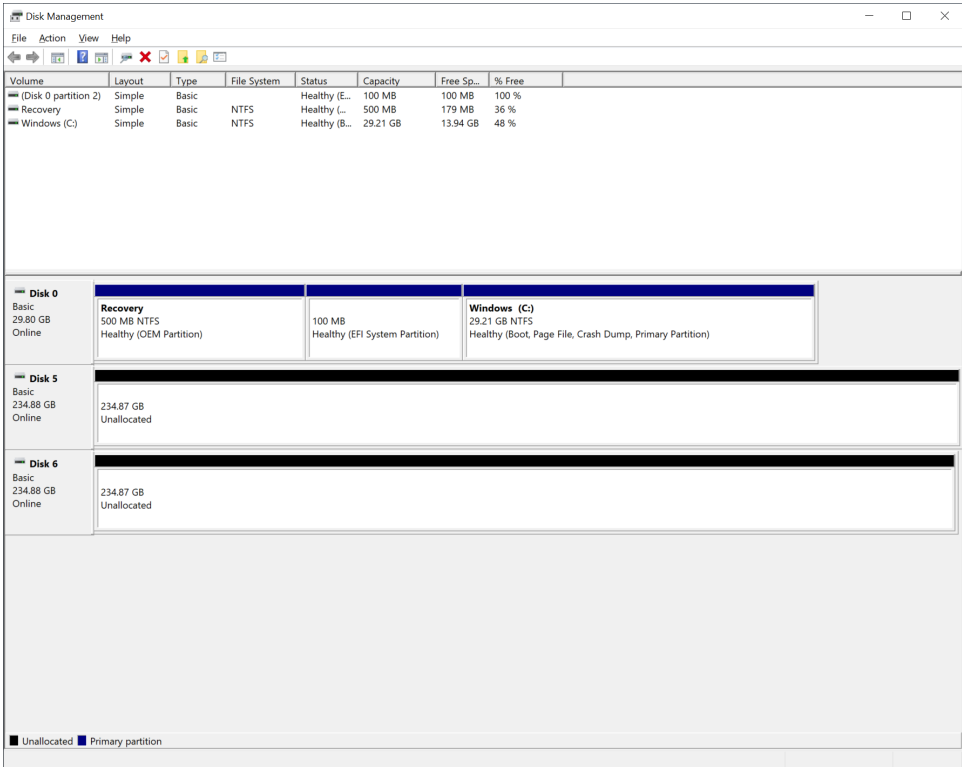


The storage space status will change to **Unallocated**.

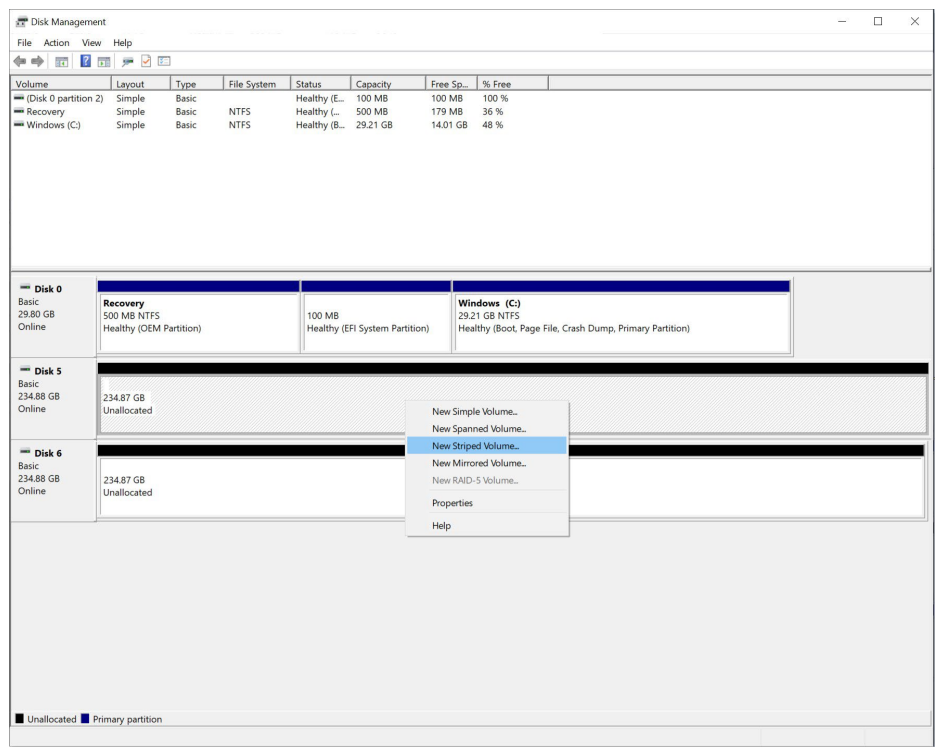
10. Do the same for **Storage space (E:)** to change the status to **Unallocated**.



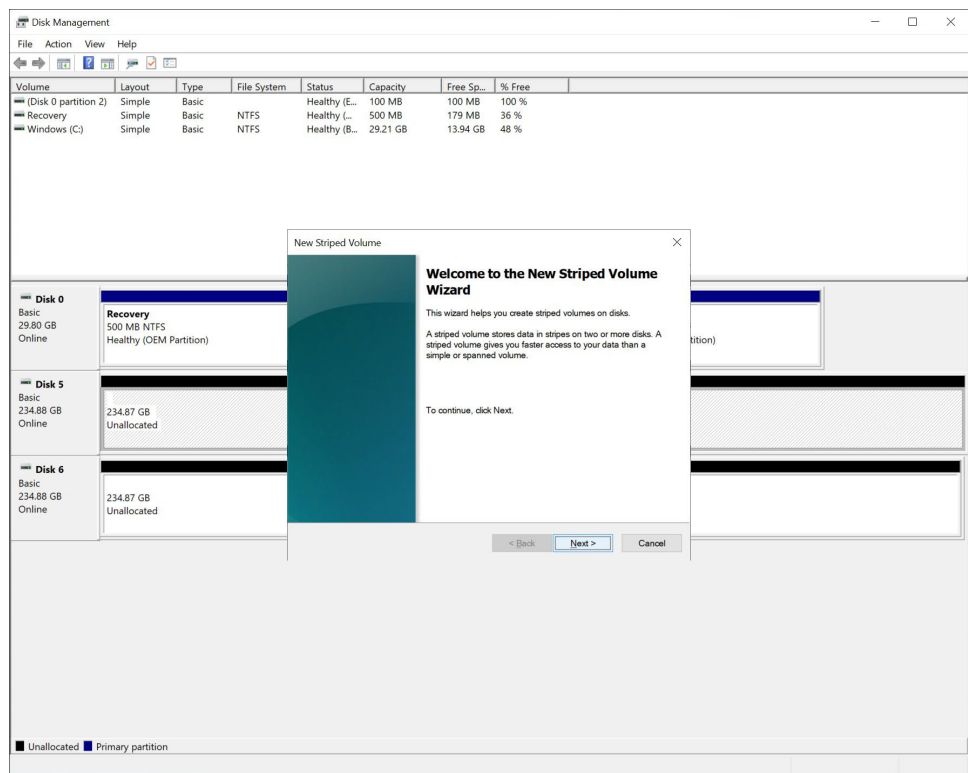
Confirm that the status of all storage spaces is **Unallocated**.



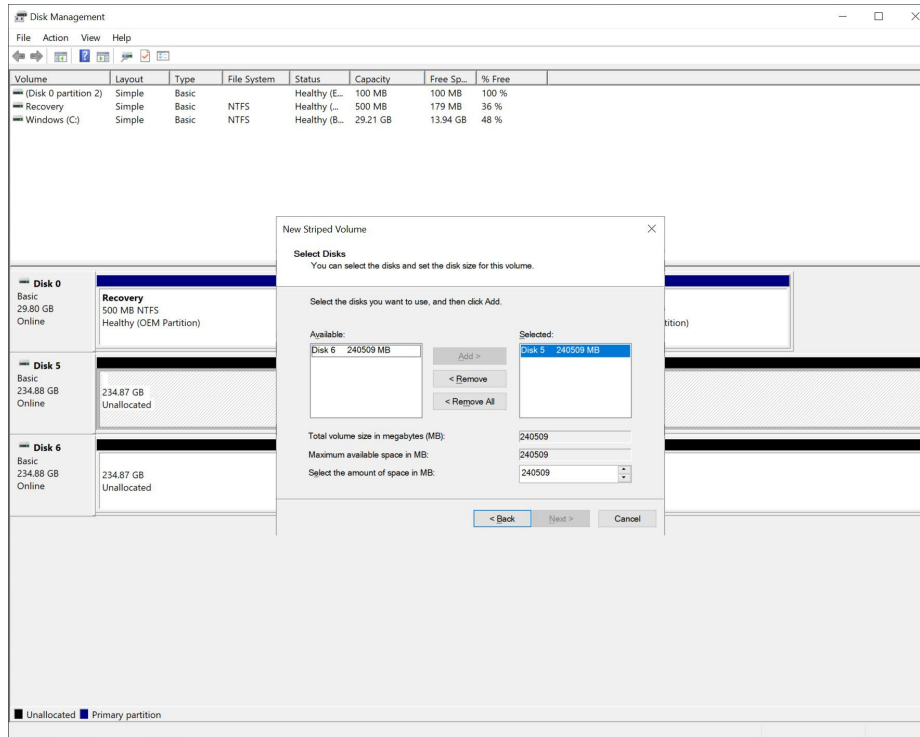
11. Right-click on the **Disk 5** and select **New Striped Volume**.



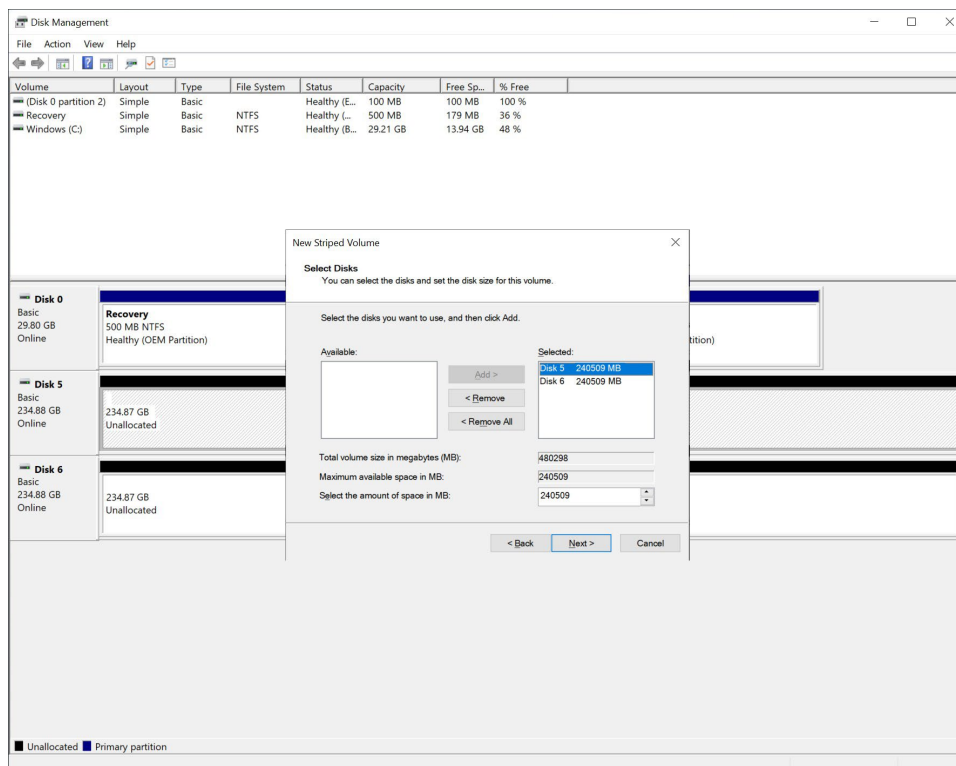
12. To continue, click **Next**.



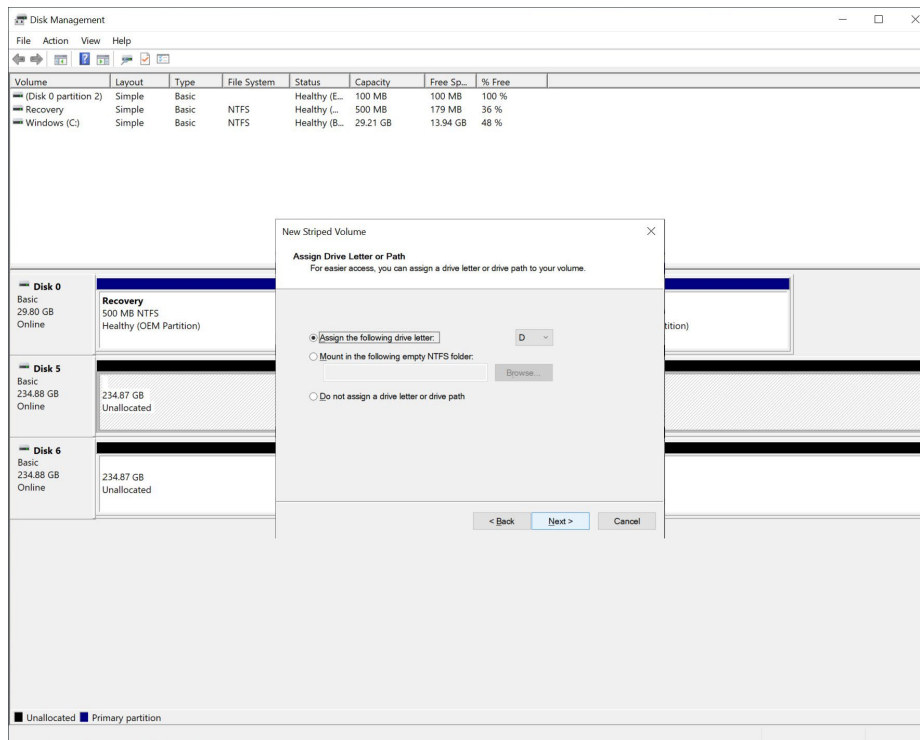
13. Select the disks you want to use and click **Add**.



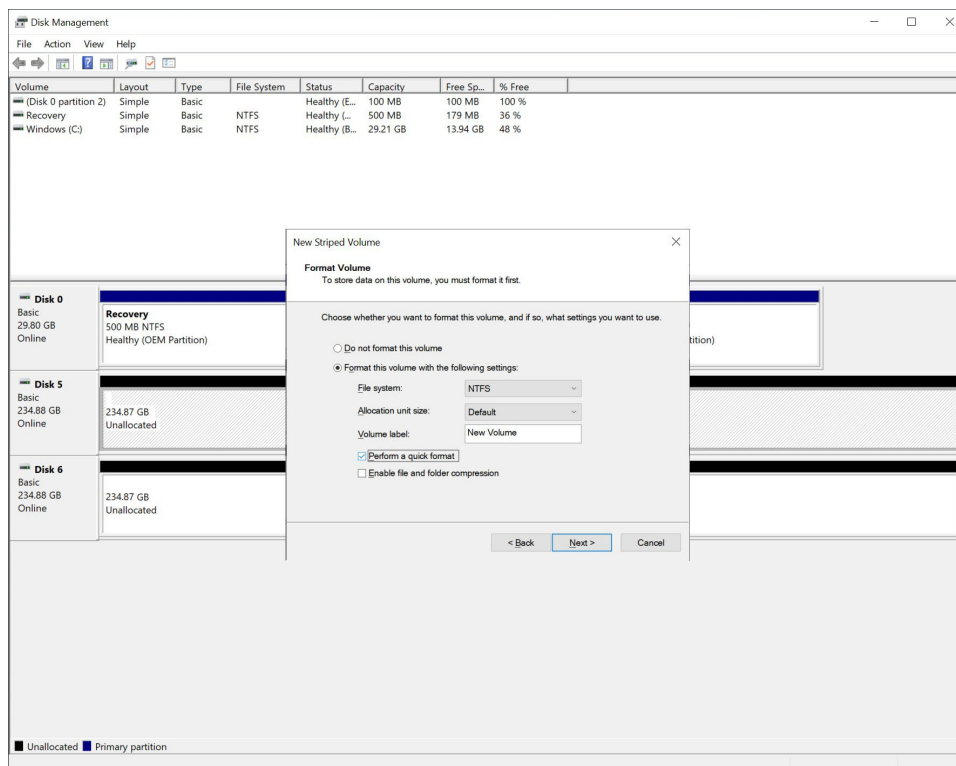
14. Click **Next**.



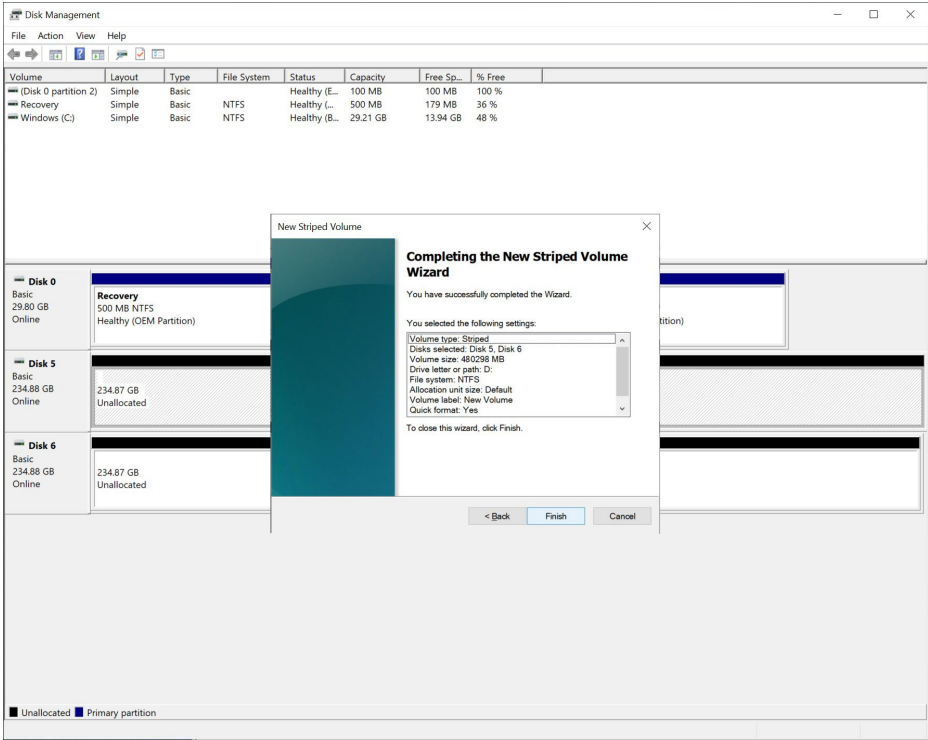
15. Assign drive letters to the drives and click **Next**.



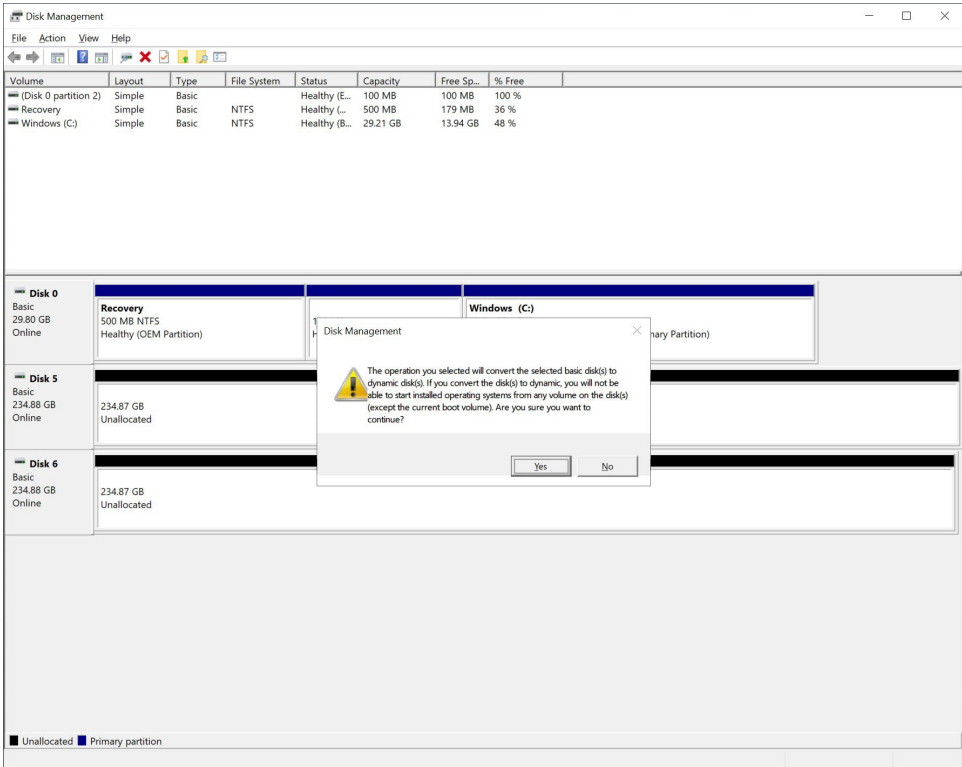
16. Select **Quick Format** for the drive volumes and click **Next** to format them.



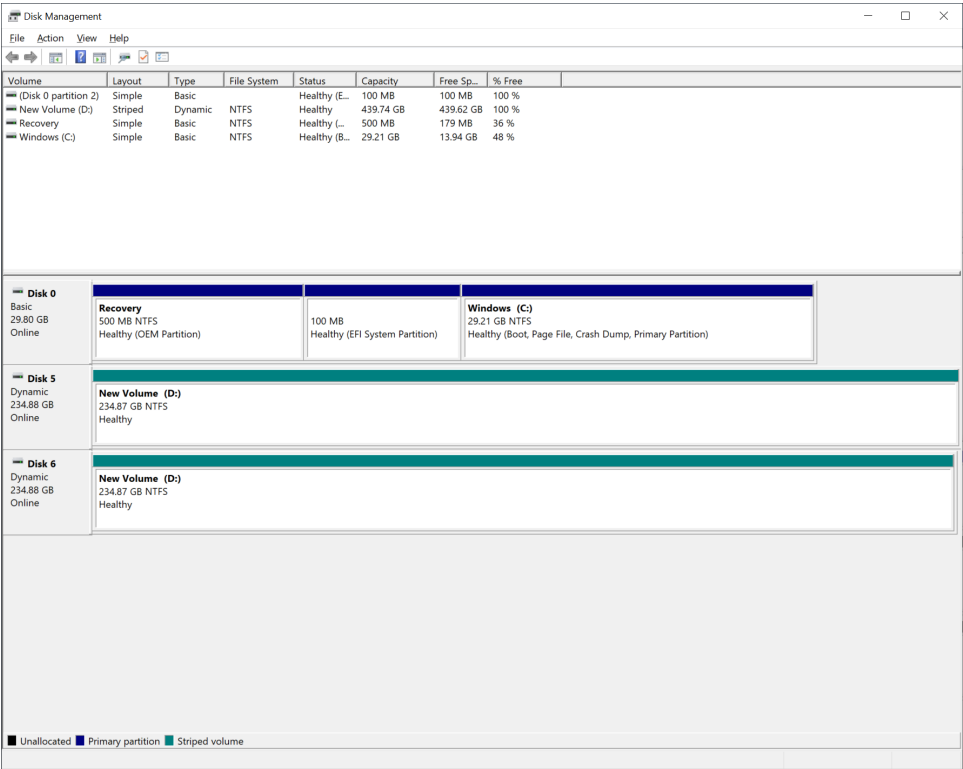
17. Check the drive volume information and click **Finish** to create the striped volume.



18. Click **Yes** to the system warning messages shown about SW RAID volume.



19. Check the striped volume information in Disk Management to confirm the creation of the drives.



## 5. Unified Write Filter

Unified Write Filter (UWF) is an optional feature that helps to protect your drives by intercepting and redirecting any writes to the drive (app installations, settings changes, saved data) to a virtual overlay. The virtual overlay is a temporary location that is usually cleared during a reboot or when a guest user logs off.

UWF provides a clean experience for thin clients and workspaces that have frequent guests, like schools, library, or hotel computers. Guests can work, change settings, and install software. After the device reboots, the next guest receives a clean experience. It increases security and reliability for kiosks, IoT-embedded devices, and other devices where new apps are not expected to be frequently added.

This chapter describes how to use the Unified the Write Filter (UWF).

To use the UWF, you must first install the feature and enable it; the default is disable.

The first time you enable UWF on your device, UWF makes the following changes to your system to improve its performance:

- **Paging files are disabled.**
- **System restore is disabled.**
- **SuperFetch is disabled.**
- **File indexing service is turned off.**
- **Fast boot is disabled.**
- **Defragmentation service is turned off.**
- **BCD setting bootstatuspolicy is set to ignoreallfailures.**

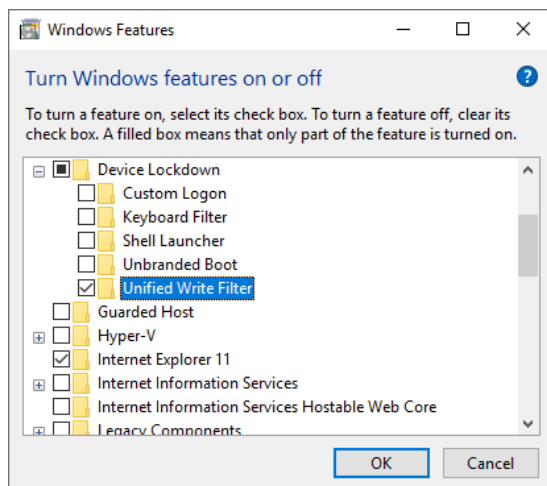
After UWF is enabled, you can select a drive that you want to protect and start using UWF. UWF can help you manage PCs and devices remotely using WMI.

### Turning on UWF on a Running PC

- Install UWF.
  - In the Windows **Start** window, type **Turn Windows features on or off**.
  - Open the **Windows Features** window and expand the **Device Lockdown** node.
  - Select **Unified Write Filter** and click **OK**.
  - Windows searches for the required files and displays a progress bar.

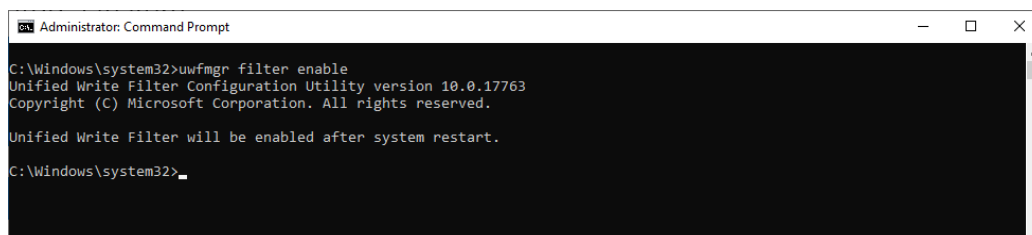
Once the files are found, Windows applies the changes. When the changes are complete, a message to this effect is displayed.

- Click **Close**.



- Enable the following filter as an Administrator:

**cmd uwfmgr filter enable**



```
Administrator: Command Prompt

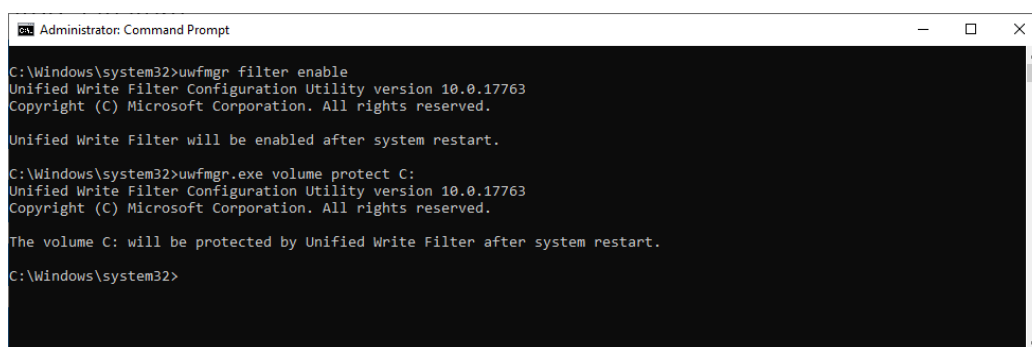
C:\Windows\system32>uwfmgr filter enable
Unified Write Filter Configuration Utility version 10.0.17763
Copyright (C) Microsoft Corporation. All rights reserved.

Unified Write Filter will be enabled after system restart.

C:\Windows\system32>
```

- Enable write protection for a drive:

**cmd uwfmgr.exe volume protect C:**



```
Administrator: Command Prompt

C:\Windows\system32>uwfmgr filter enable
Unified Write Filter Configuration Utility version 10.0.17763
Copyright (C) Microsoft Corporation. All rights reserved.

Unified Write Filter will be enabled after system restart.

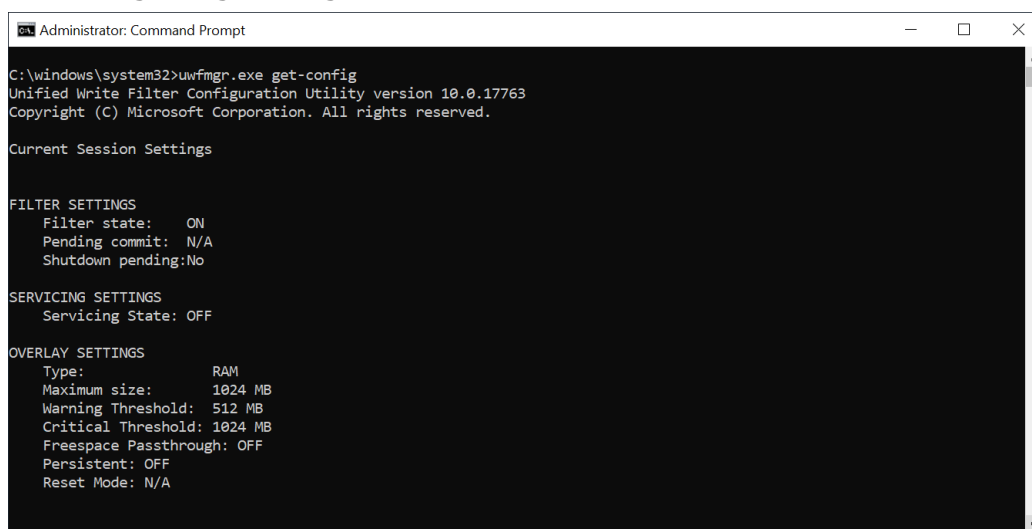
C:\Windows\system32>uwfmgr.exe volume protect C:
Unified Write Filter Configuration Utility version 10.0.17763
Copyright (C) Microsoft Corporation. All rights reserved.

The volume C: will be protected by Unified Write Filter after system restart.

C:\Windows\system32>
```

- Restart your computer.
- Confirm that UWF is running:

**cmd uwfmgr.exe get-config**



```
Administrator: Command Prompt

C:\Windows\system32>uwfmgr.exe get-config
Unified Write Filter Configuration Utility version 10.0.17763
Copyright (C) Microsoft Corporation. All rights reserved.

Current Session Settings

FILTER SETTINGS
  Filter state:    ON
  Pending commit: N/A
  Shutdown pending: No

SERVICING SETTINGS
  Servicing State: OFF

OVERLAY SETTINGS
  Type:            RAM
  Maximum size:    1024 MB
  Warning Threshold: 512 MB
  Critical Threshold: 1024 MB
  Freespace Passthrough: OFF
  Persistent:      OFF
  Reset Mode:      N/A
```

# Installing UWF Using WMI

If you have already installed Windows on your computer and you do not want to use a provisioning package, you can configure UWF by using Windows Management Instrumentation (WMI) providers.

To turn on UWF using WMI, use the **UWF\_Filter** function, specifically the **UWF\_Filter.Enable** method in one of the following ways:

- Use the WMI providers directly in a PowerShell script
- Use the WMI providers directly in an application
- Use the command line tool, uwfmgr.exe



## NOTE

You must restart your computer after you turn on or turn off UWF for the changes to take effect.

You can also change the settings after you turn on UWF. For example, you can move the page file location to an unprotected volume and re-enable paging files.



## IMPORTANT!

If you add UWF to your image by using SMI settings in the unattend.xml file, turning on UWF only sets the bootstatuspolicy BCD setting and turns off the defragmentation service. You must manually turn off the other features and services if you want to increase the performance of UWF.

After the device is restarted, UWF maintains configuration settings for the current session in a registry. UWF automatically excludes these registry entries from its filter. Static configuration changes do not take effect until after a device restarts; the changes are saved in registry entries for use in the next session. Dynamic configuration changes occur immediately and persist after a device restarts.

## 6. Intel® Active Management Technology

Intel® AMT is part of the Intel® vPro technology offering. Platforms equipped with Intel® AMT can be managed remotely, regardless of its power state or whether it has a functioning OS or not. The Intel® Converged Security and Management Engine (Intel® CSME) powers the Intel® AMT system. As a component of the Intel® vPro platform, Intel® AMT uses several elements in the Intel® vPro platform architecture.

This chapter describes the setup process for the Intel® Active Management Technology. For more information about Intel® Active Management Technology :

<https://www.intel.com/content/www/us/en/developer/articles/guide/getting-started-with-active-management-technology.html?wapkw=AMT>



### NOTE

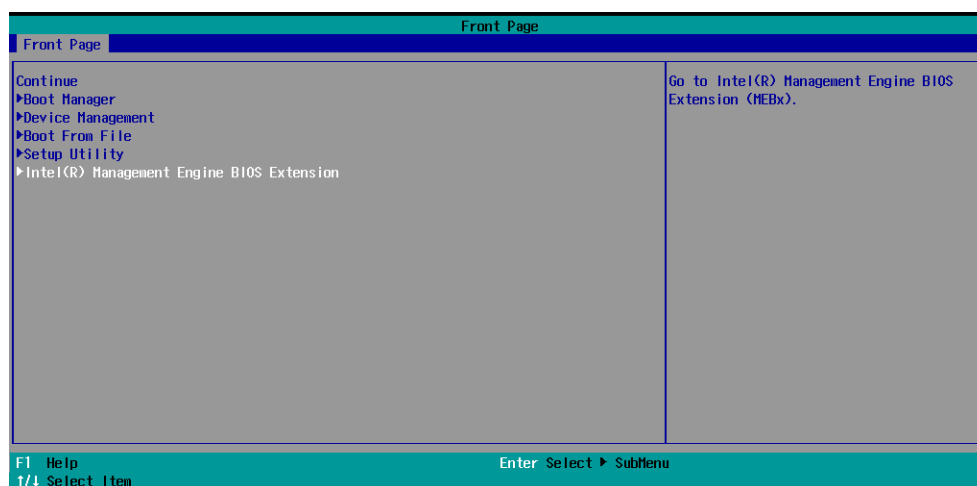
Intel® AMT is not supported in models with Intel® Celeron®, Intel® Core™ i3, and Intel Atom® processors.

## Applicable Series

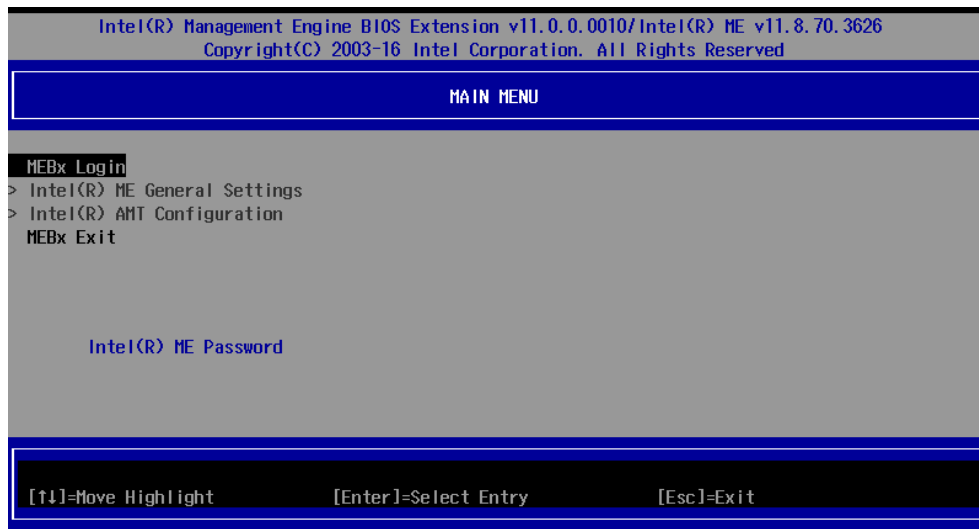
- BXP-C100 Series
- DRP-C100 Series
- RKP-C110 Series
- RKP-C220 Series

## Turning on Intel® AMT on PC

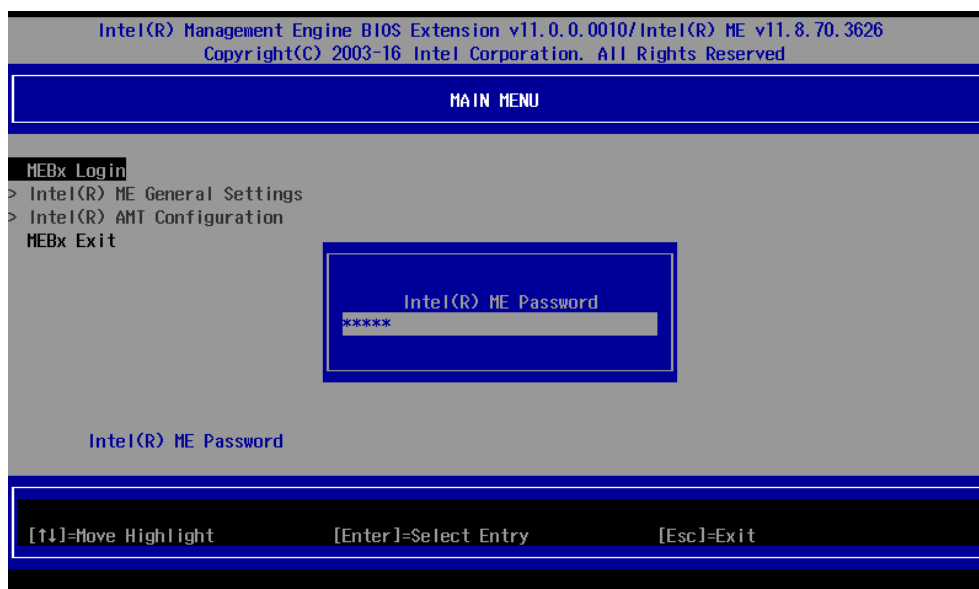
1. Power on the computer and press **F2** to enter the BIOS menu.
2. Select **Intel(R) Management Engine BIOS Extension**.



3. Select **MEBx Login**.



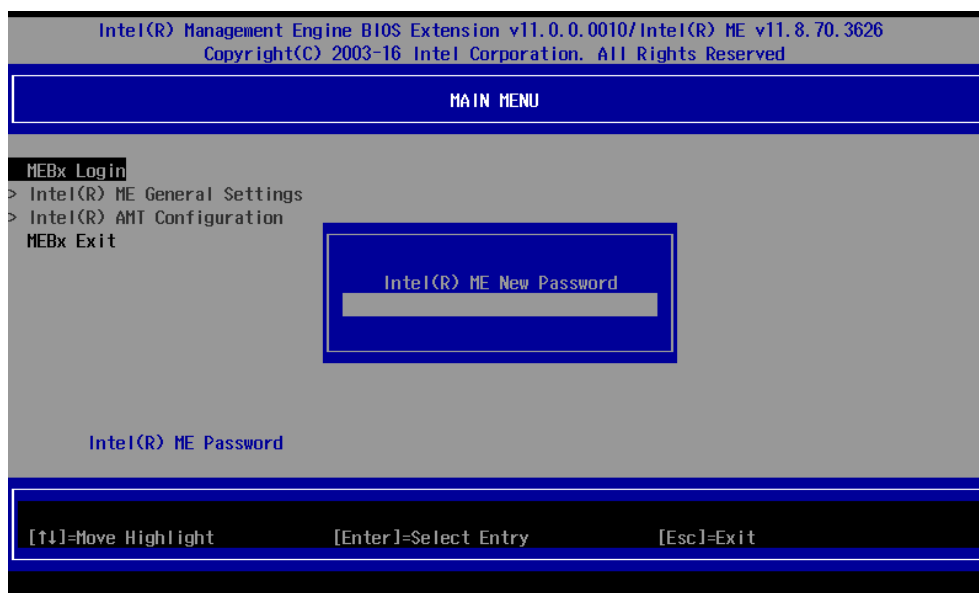
4. Enter the Intel® ME default password **admin**.



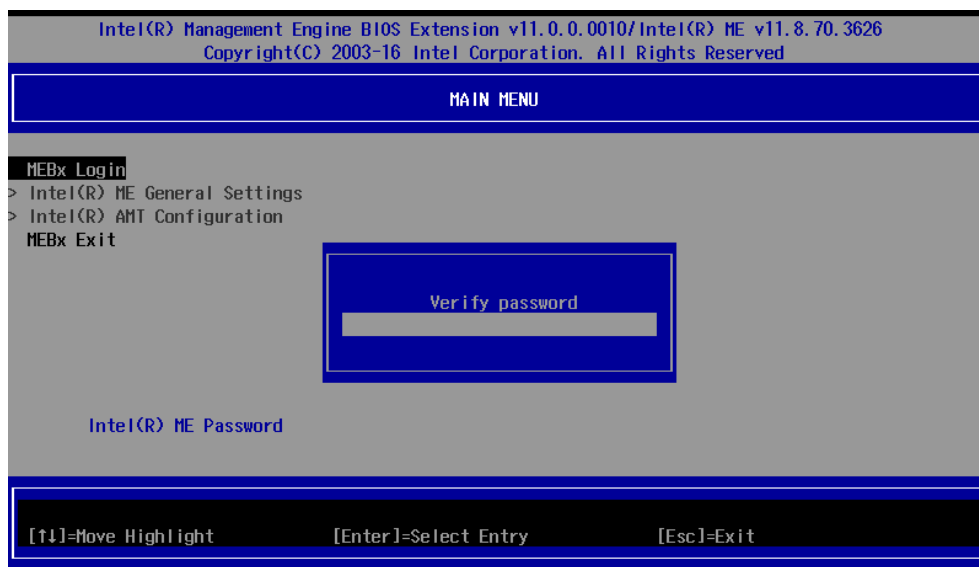
5. Enter a new password.

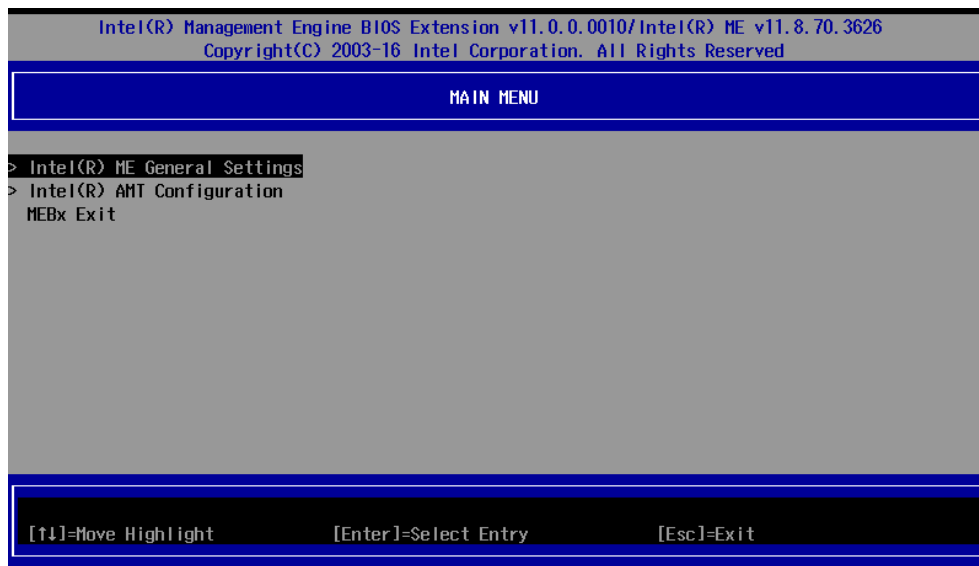
The Intel® MEBX password must meet the following requirements for strong passwords:

- **Password Length:** At least 8 characters, and no more than 32.
- **Password Complexity:** Password must include the following:
  - ☐ At least one digit character ('0', '1', ... '9')
  - ☐ At least one 7-bit ASCII non alphanumeric character (e.g., '!', '\$', ';'), but excluding ':', ',', and '' characters.
  - ☐ At least one lower-case letter ('a', 'b'...'z') and at least one upper case letter ('A', 'B'...'Z').

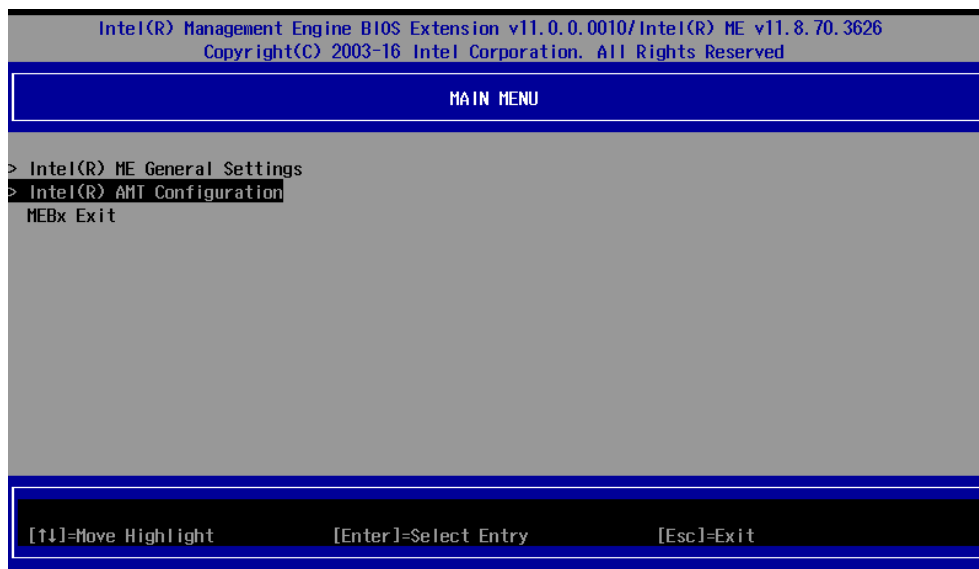


6. Verify password and login MEBx.

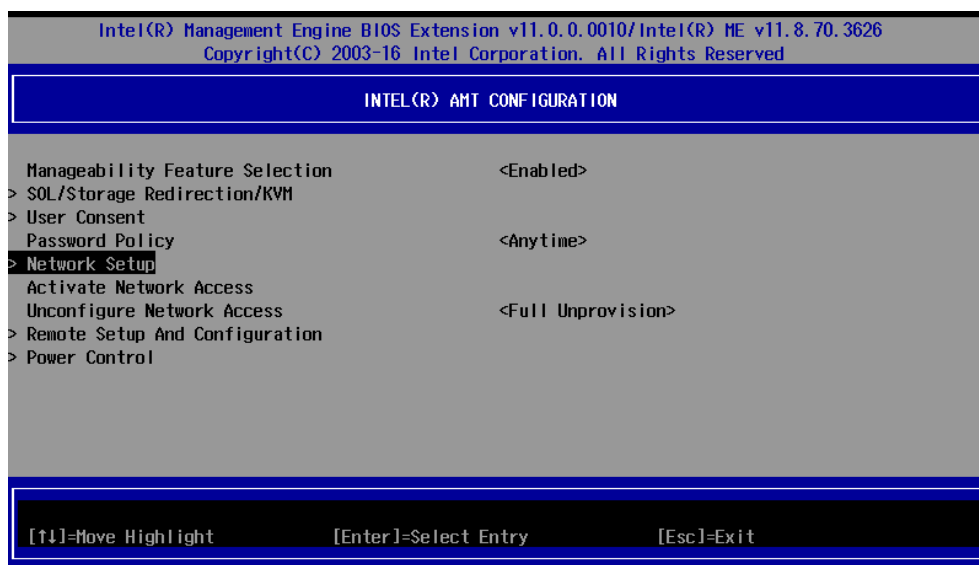




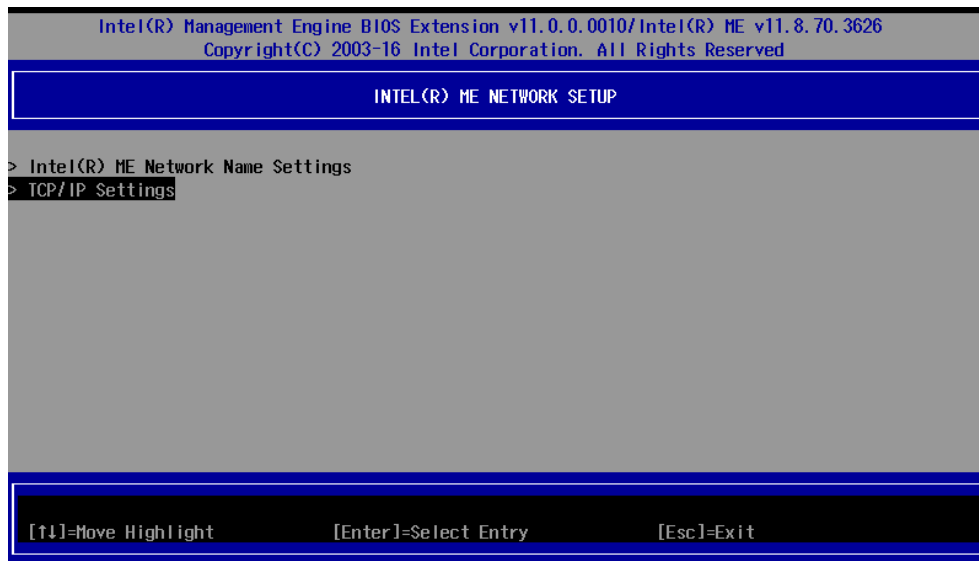
7. Select **Intel(R) AMT Configuration**.



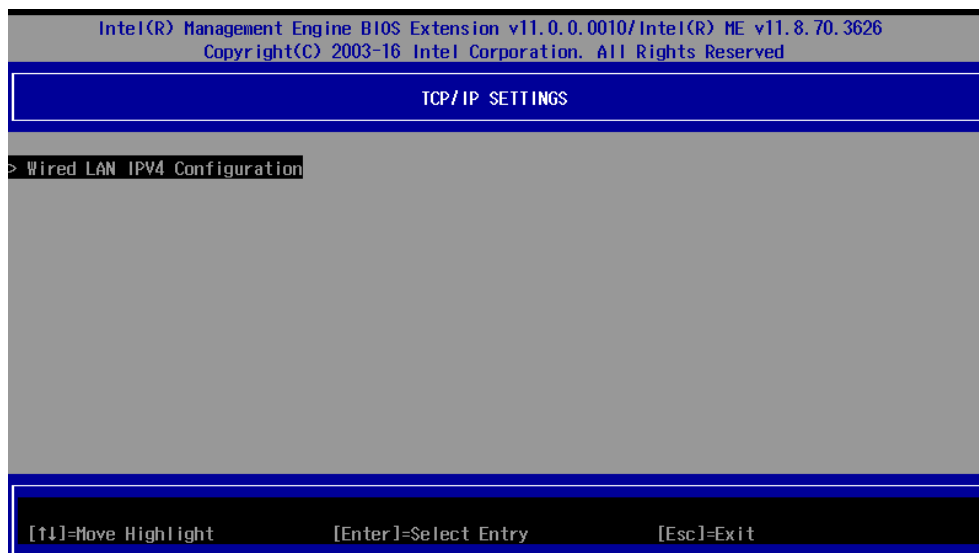
8. Select **Network Setup**.



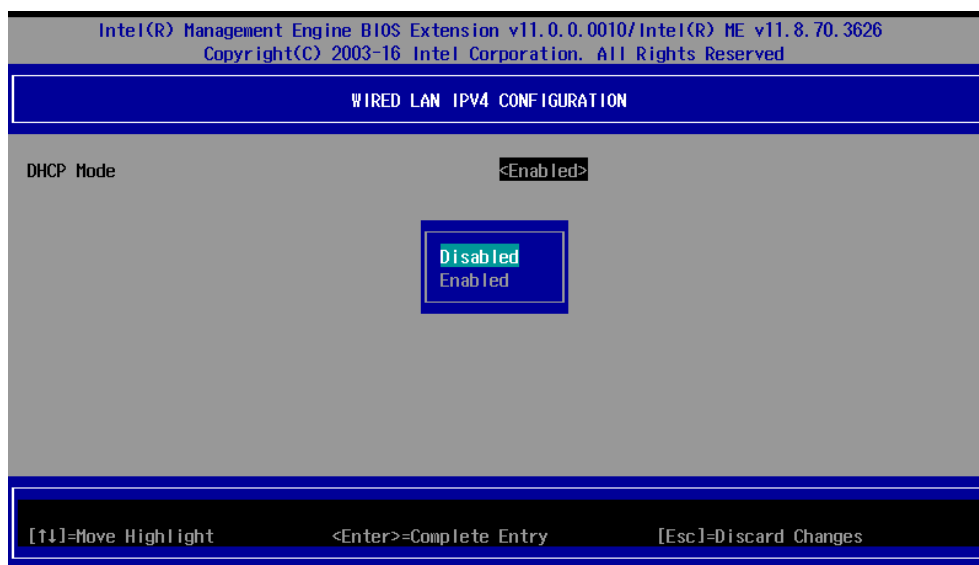
9. Select **TCP/IP Settings**.



10. Select **Wired LAN IPv4 Configuration**.



11. Select **DHCP Mode** and disable DHCP mode.



12. Enter the network settings for Intel® Active Management Technology.

Intel(R) Management Engine BIOS Extension v11.0.0.0010/Intel(R) ME v11.8.70.3626  
Copyright(C) 2003-16 Intel Corporation. All Rights Reserved

WIRED LAN IPV4 CONFIGURATION

|                         |            |
|-------------------------|------------|
| DHCP Mode               | <Disabled> |
| IPV4 Address            | 0.0.0.0    |
| Subnet Mask Address     | 0.0.0.0    |
| Default Gateway Address | 0.0.0.0    |
| Preferred DNS Address   | 0.0.0.0    |
| Alternate DNS Address   | 0.0.0.0    |

IP address (e.g. 123.123.123.100)

[↑↓]=Move Highlight      [Enter]=Select Entry      [Esc]=Exit

13. Back to the **Intel(R) AMT Configuration** page. Select **Activate Network Access**. Enter **Y** to continue.

Intel(R) Management Engine BIOS Extension v11.0.0.0010/Intel(R) ME v11.8.70.3626  
Copyright(C) 2003-16 Intel Corporation. All Rights Reserved

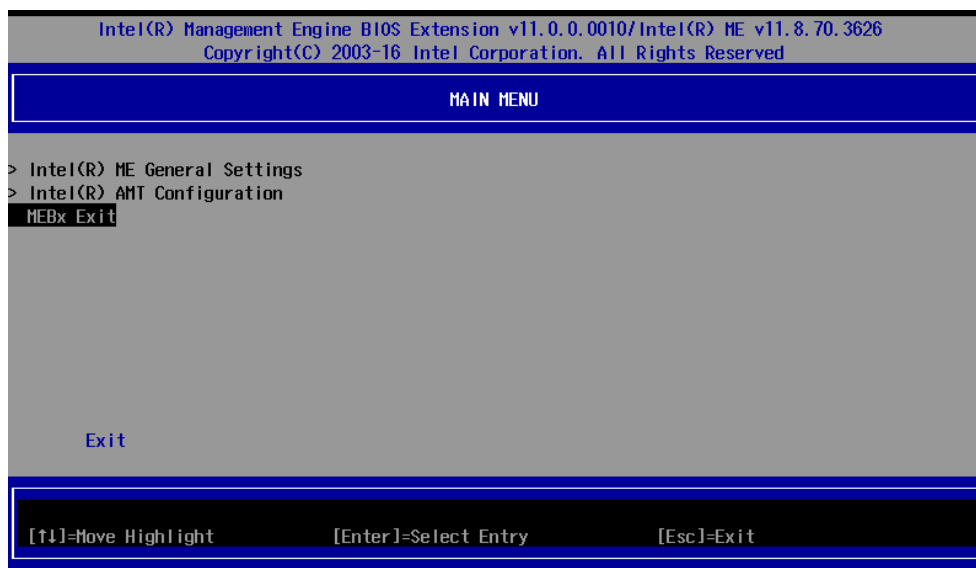
INTEL(R) AMT CONFIGURATION

|                                 |           |
|---------------------------------|-----------|
| Manageability Feature Selection | <Enabled> |
| > SOL/Storage Redirection/KVM   |           |
| > User Consent                  |           |
| Password Policy                 | <Anytime> |
| > Network Setup                 |           |
| <b>Activate Network Access</b>  |           |
| Unconfigure Network Access      |           |
| > Remote Setup And Configurati  |           |
| > Power Control                 |           |

Activates the current network settings  
and opens the ME network interface  
Continue:(Y/N)

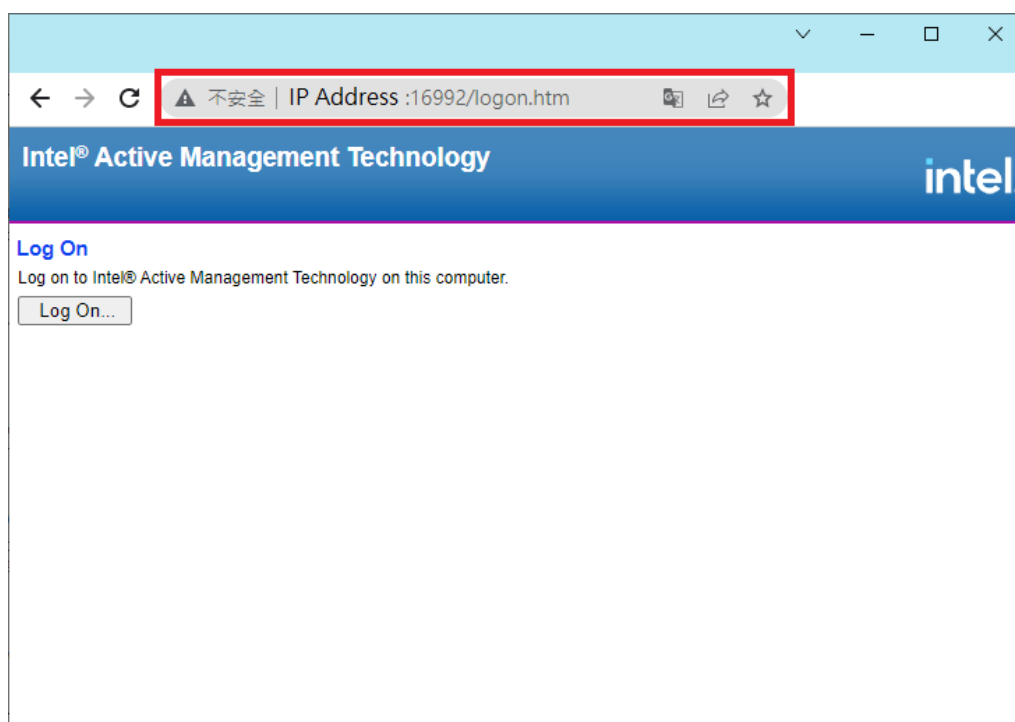
[↑↓]=Move Highlight      [Enter]=Select Entry      [Esc]=Exit

- Back to the main menu. Select **MEBx Exit** to finish the **Intel® Active Management Technology** configuration.

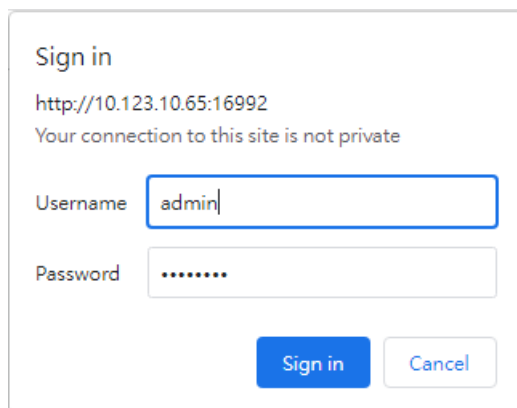


## Accessing Intel® AMT From the Website

- Open the web browser and enter **Intel® AMT IP Address:16992** (e.g.: 192.168.1.1:16992).



2. In the **Sign in** box, enter the **Username** and **Password** for Intel® AMT. The default **Username** is **admin**.



Sign in

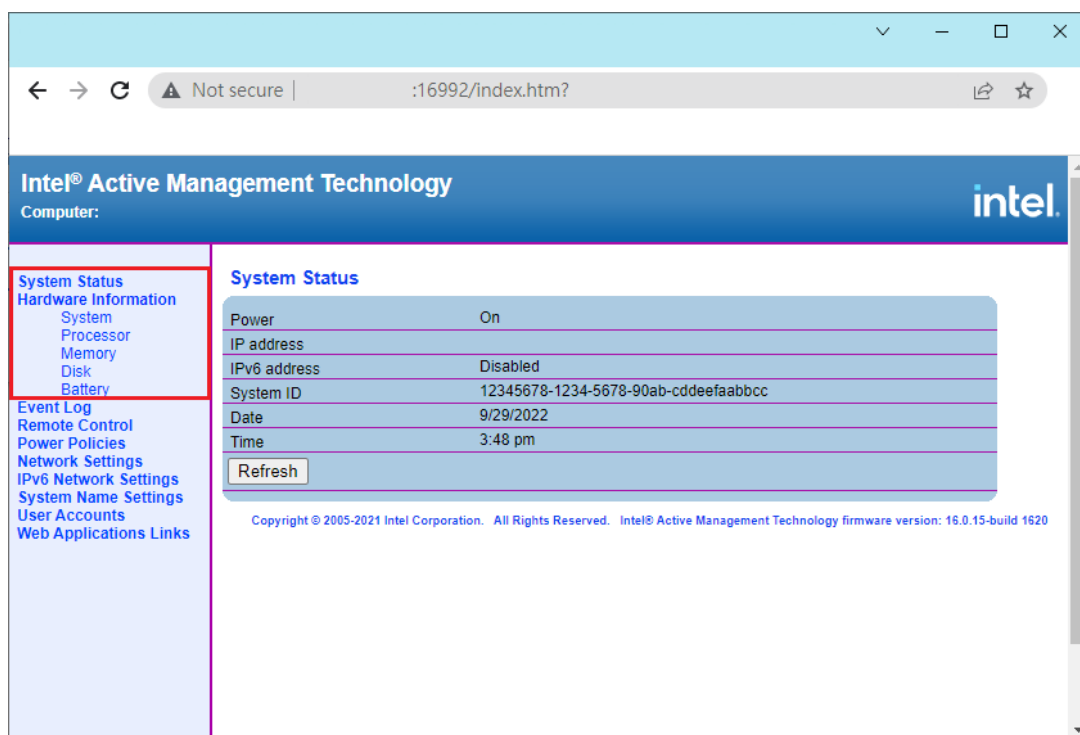
http://10.123.10.65:16992

Your connection to this site is not private

Username

Password

- a. After signing in, you can check the system status and hardware information of your managed device.



Intel® Active Management Technology

Computer:

**System Status**

|              |                                       |
|--------------|---------------------------------------|
| Power        | On                                    |
| IP address   |                                       |
| IPv6 address | Disabled                              |
| System ID    | 12345678-1234-5678-90ab-cddeefaaabccc |
| Date         | 9/29/2022                             |
| Time         | 3:48 pm                               |

Copyright © 2005-2021 Intel Corporation. All Rights Reserved. Intel® Active Management Technology firmware version: 16.0.15-build 1620

**System Status**

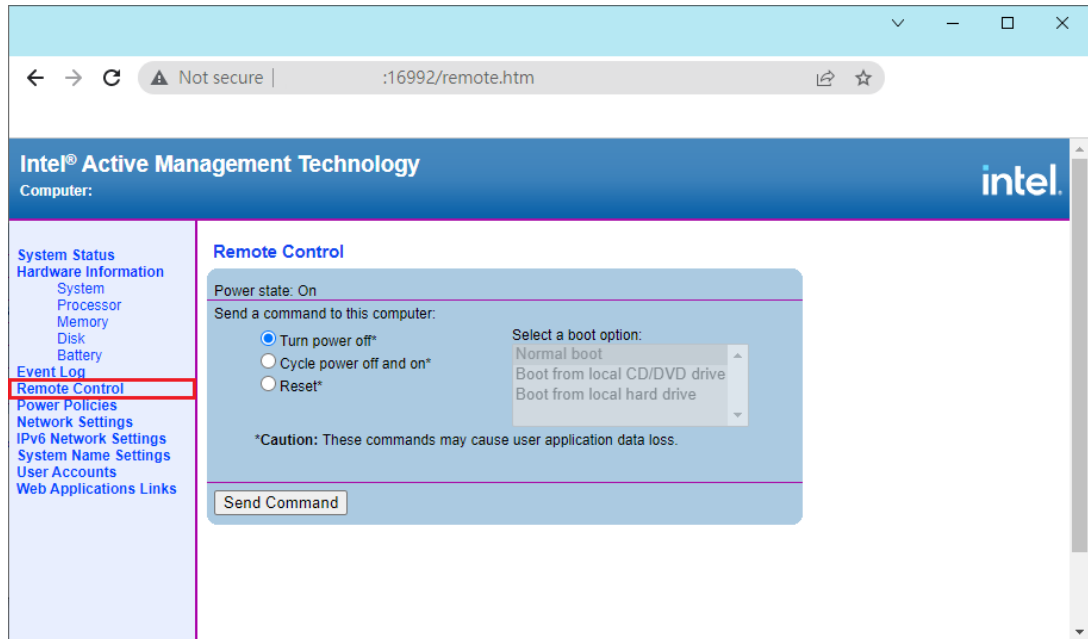
**Hardware Information**

- System
- Processor
- Memory
- Disk
- Battery

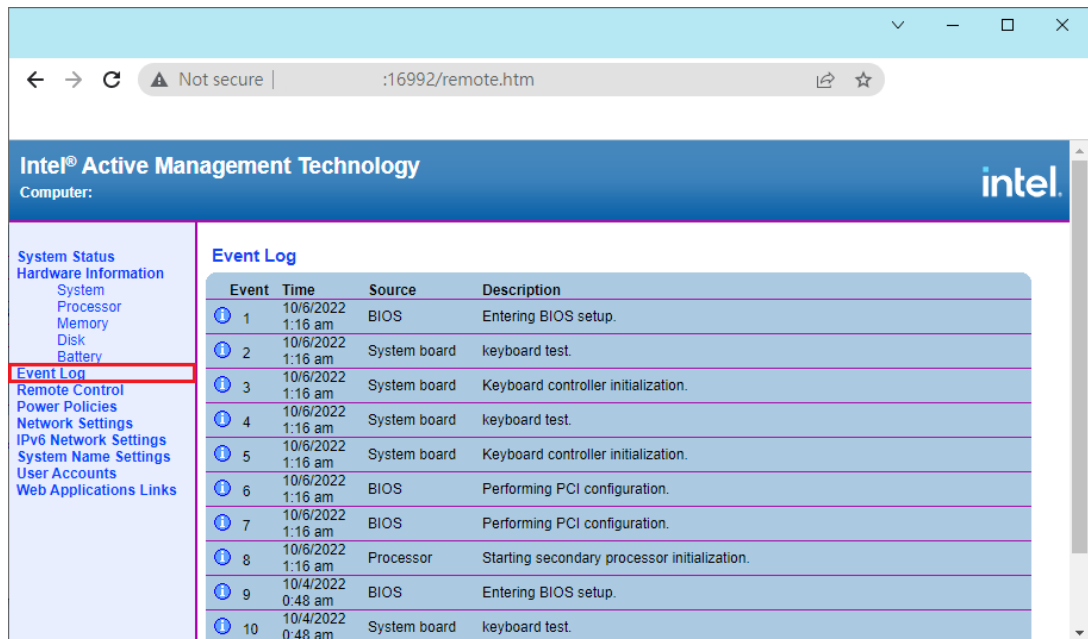
**Event Log**

- Remote Control
- Power Policies
- Network Settings
- IPv6 Network Settings
- System Name Settings
- User Accounts
- Web Applications Links

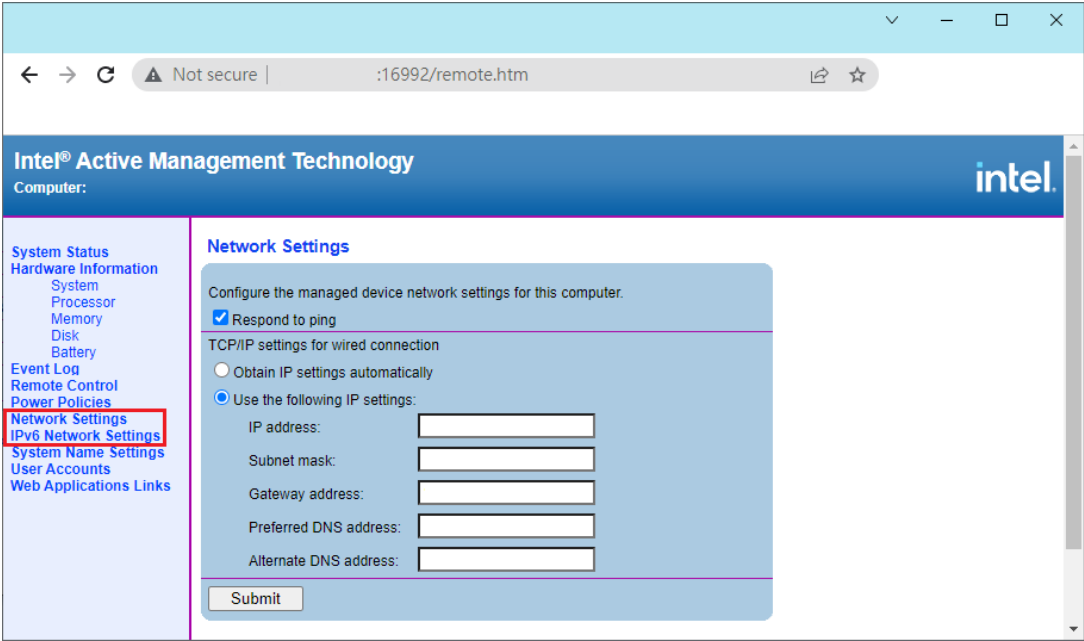
- b. The Intel® AMT website provides the basic remote power control feature for the managed device. Advanced remote power control and remote KVM features require a management tool that supports Intel® AMT, such as Intel® Endpoint Management Assistant (Intel® EMA) or the third-party tool MeshCommander. For installation and usage instructions, refer to the official documentation of the selected tool.



- c. The Event Manager deals with internal alerts that occur in both the host platform and the Intel® AMT device, regardless of the power state.



d. You can configure the managed device network settings via the web GUI.



**NOTE**

The AMT management tool can also be used to remotely manage devices.

## 7. Driver

Moxa provide verified drivers for each device on official website. Please access the Moxa support page (<https://www.moxa.com/en/support>) and search for the device from the searching window (For Example: MC-3201).

The screenshot shows the Moxa website's support section. At the top, there is a navigation bar with the Moxa logo and links for Products, Solutions, Support, How to Buy, and About Us. A search icon is also present. Below the navigation bar, a teal banner reads 'Support' with the subtext 'Find product resources, request support, or send in your product for repair.' Underneath the banner, the 'Select a Product Series' dropdown menu is highlighted with a red box. The dropdown shows '--Select--' at the top, a search input field containing 'MC-3201', and a list of results starting with 'MC-3201 Series'. To the right of the dropdown, there are three main resource categories: 'Software & Documentation' (with a download icon), 'Product Repair Service/RMA' (with a gear icon), and 'Literature Library' (with a book icon). Each category has a brief description of the services offered.

**Select a Product Series**

--Select--

MC-3201

**MC-3201 Series**

**Software & Documentation**  
Easily find drivers, software, and documentation for a specific product.

**Product Repair Service/RMA**  
Moxa's product repair service centers provide quick, quality service with complete traceability of your product.

**Literature Library**  
Moxa offers a wealth of resources to help you find in-depth information on our products and solutions as well as the technologies that drive them.

From the **Software & Documentation** page filtered by **Driver** and download the driver package. The driver packages are categorized by OS version, with separate sections for **Peripheral** and **Expansion modules**.

[Software & Documentation](#)[Product FAQs](#)[Security Advisories](#)

**Related Software, Firmware, and Drivers**

FILTER

Operating System

All

Driver(4)

Software Package(3)

Utility(2)

| NAME                                                                                              | TYPE   | CHECKSUM | VERSION | OPERATING SYSTEM                      | RELEASE DATE                                  |
|---------------------------------------------------------------------------------------------------|--------|----------|---------|---------------------------------------|-----------------------------------------------|
| Driver for MC-3201 Series (wireless for Windows 10 IoT Enterprise LTSC 2021)<br>143.6 MB          | Driver | SHA-512  | v1.0    | - Windows 10 IoT Enterprise LTSC 2021 | May 11, 2023<br><a href="#">Release notes</a> |
| Driver for MC-3201 Series (Peripherals for Windows 10 Enterprise LTSC 21H2)<br>~1.0 bytes         | Driver | SHA-512  | v1.0    | - Windows 10 IoT Enterprise LTSC 2019 | May 11, 2023<br><a href="#">Release notes</a> |
| Driver for MC-3201 Series (Peripherals for Windows 10 IoT Enterprise LTSC 2019)<br>1.2 GB         | Driver | SHA-512  | v1.0    | - Windows 10 IoT Enterprise LTSC 2019 | May 11, 2023<br><a href="#">Release notes</a> |
| Driver for MC-3201 Series (Expansion modules for Windows 10 IoT Enterprise LTSC 2019)<br>157.9 MB | Driver | SHA-512  | v1.0    | - Windows 10 IoT Enterprise LTSC 2019 | May 11, 2023<br><a href="#">Release notes</a> |

## 8. Utility

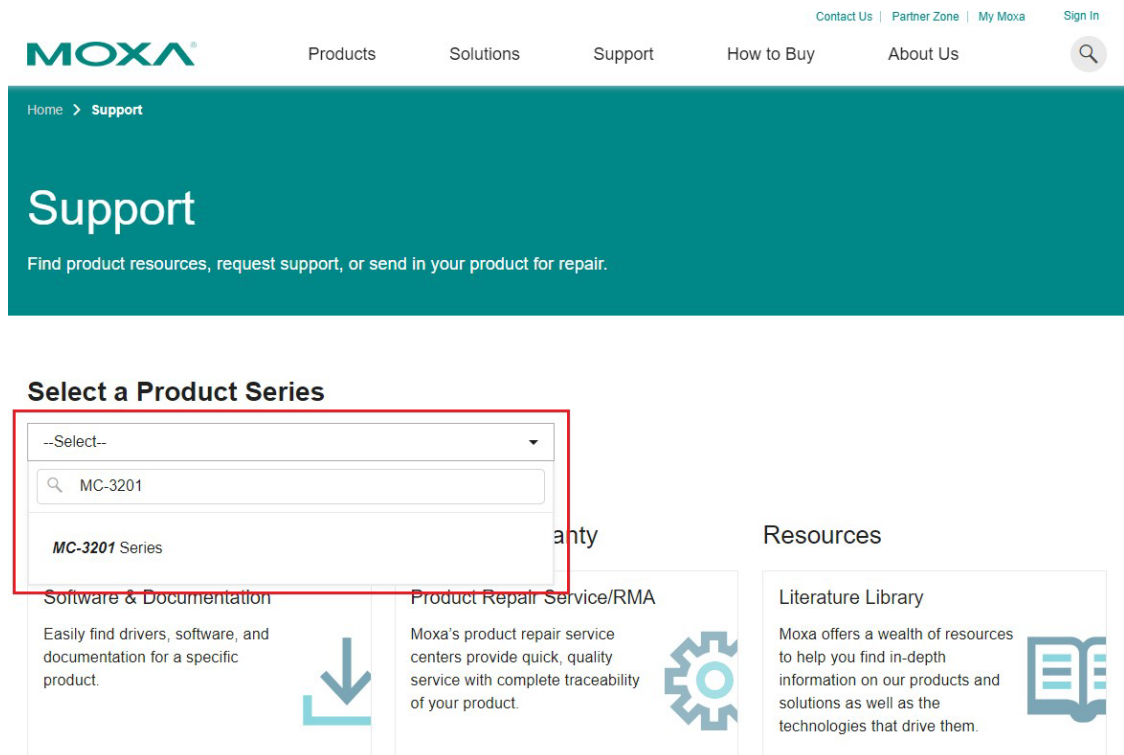
This chapter describes the usage of the following:

- **Moxa IO Controller Utility**
- **Serial Interface Utility**
- **Moxa Sort Net Name Utility**
- **Moxa CAN Port Sort Utility**

### Where to Find the Windows Utility

The utilities are preinstalled on your device if the Windows 11 OS is provided by Moxa. If you have installed Windows 11 on your own, go to the Moxa support page (<https://www.moxa.com/en/support>) to download the utility.

1. Search for the device from the searching window (example: MC-3201).



2. Go to the **Software & Documentation** page, filter by **Utility** and download the required file. The installation file for the device is in a \*.zip file.



### MC-3201 Series

Compact computers with 11th Gen Intel® Core™ processor, designed for IIoT, AI, and marine applications, -20 to 55°C operating temperature

[GO TO PRODUCT PAGE](#)

[Save](#)

[Software & Documentation](#) [Product FAQs](#) [Security Advisories](#)

#### Related Software, Firmware, and Drivers

FILTER Operating System

All

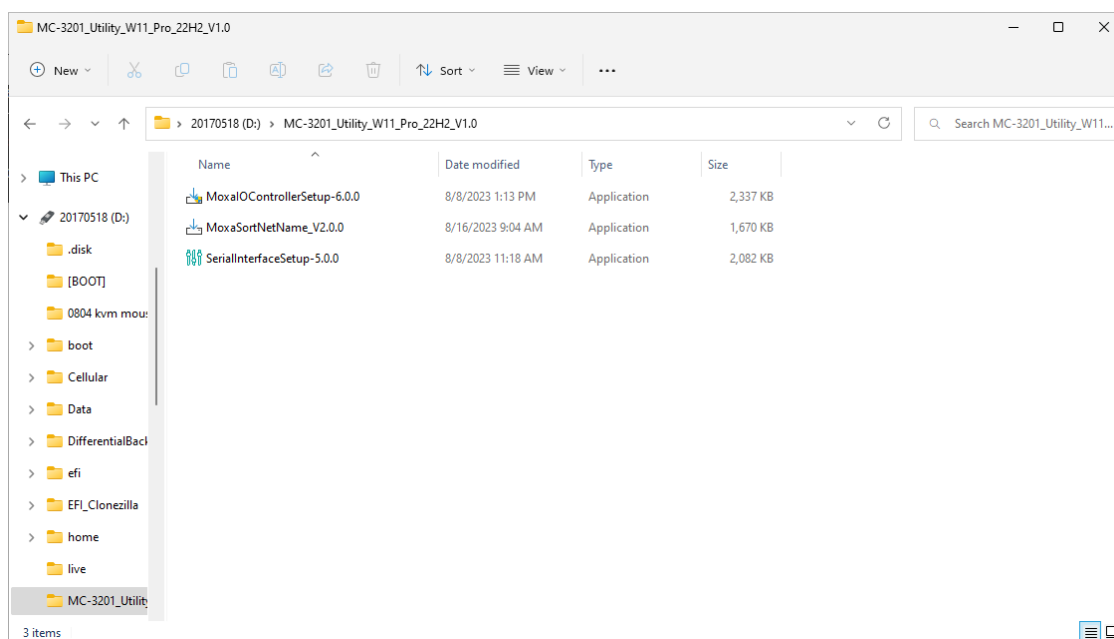
Driver(4)

Software Package(3)

**Utility(2)**

| NAME                                                                       | TYPE           | CHECKSUM | VERSION | OPERATING SYSTEM                      | RELEASE DATE                                  |
|----------------------------------------------------------------------------|----------------|----------|---------|---------------------------------------|-----------------------------------------------|
| Utility for MC-3201 Series (Windows 10 IoT Enterprise LTSC 2021)<br>5.9 MB | Utility        | SHA-512  | v1.0    | - Windows 10 IoT Enterprise LTSC 2021 | May 11, 2023<br><a href="#">Release notes</a> |
| Utility for MC-3201 Series (Windows 10 IoT Enterprise LTSC 2019)<br>5.1 MB | <b>Utility</b> | SHA-512  | v1.0    | - Windows 10 IoT Enterprise LTSC 2019 | May 11, 2023<br><a href="#">Release notes</a> |

3. After extracting the files, you will obtain the following setup files.



# Dependent Packages

- After the installation of Windows 11 LTSC 24H2 and drivers are completed, you will need to install **dependent packages** to ensure the smooth operation of the utility. Use the following links to download and install the packages.
- Microsoft Visual C++ Redistributable:  
<https://learn.microsoft.com/en-us/cpp/windows/latest-supported-vc-redist?view=msvc-170>
- Microsoft .NET Framework 4.8:  
<https://support.microsoft.com/en-us/topic/microsoft-net-framework-4-8-offline-installer-for-windows-9d23f658-3b97-68ab-d013-aa3c3e7495e0>

## Moxa IO Controller Utility

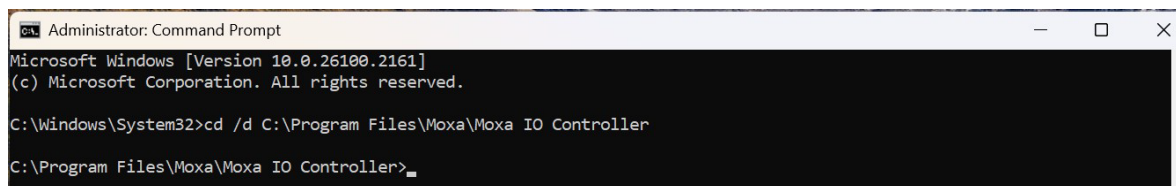
Moxa IO Controller Utility is developed to control the peripherals' IO as well as expansion modules interface of the device.

This section describes how to use the Moxa IO Controller utility and the following content will be included.

- **Setting the DIO status**
- **Setting the UART mode**
- **Setting the PCIe slot power status (only for BXP-A101 Series)**
- **Setting the PCIe reset pin status (only for BXP-A101 Series)**

Use the pre-installed utility or install the **MoxaIOControllerSetup** utility from the Moxa support page.

To use the Moxa IO Controller utility, first install the utility and enable the utility to configure the DIO, UART, Relay and LED mode. After the installation process is complete, run the Windows command prompt as an Administrator and change the path to C:\Program Files\Moxa\Moxa IO Controller.



```
Administrator: Command Prompt
Microsoft Windows [Version 10.0.26100.2161]
(c) Microsoft Corporation. All rights reserved.

C:\Windows\System32>cd /d C:\Program Files\Moxa\Moxa IO Controller
C:\Program Files\Moxa\Moxa IO Controller>
```

## Setting the DIO Status

Type the **mx-dio-ctl --help** command to see the instructions on using this utility and follow them to get or set the DIO status.



### IMPORTANT!

The DIN and DOUT indices start at 0. Even though the console output starts at 1, the indices still start at 0.

```
Select Administrator: Command Prompt
C:\Program Files\Moxa\Moxa IO Controller>mx-dio-ctl.exe --help
mx-dio-ctl 2.0.2307.10000
Copyright (C) 2019 Moxa Inc. All rights reserved.

-i          -i <#DIN index> (Start from 0)

-o          -o <#DOUT index> (Start from 0)

-m          -m <status>
            0 --> LOW
            1 --> HIGH

-c          -c <#DIN:0 /DOUT:1>

--help      Display this help screen.

--version   Display version information.

C:\Program Files\Moxa\Moxa IO Controller>
```

## Example:

```
Administrator: Command Prompt
C:\Program Files\Moxa\Moxa IO Controller>mx-dio-ctl.exe -c 0
DIN port count: 4

C:\Program Files\Moxa\Moxa IO Controller>mx-dio-ctl.exe -c 1
DOUT port count: 2

C:\Program Files\Moxa\Moxa IO Controller>mx-dio-ctl.exe -i 0
DIN port 0 status: 1

C:\Program Files\Moxa\Moxa IO Controller>mx-dio-ctl.exe -o 0
DOUT port 0 status: 1

C:\Program Files\Moxa\Moxa IO Controller>mx-dio-ctl.exe -o 0 -m 0
DOUT port 0 status: 0

C:\Program Files\Moxa\Moxa IO Controller>mx-dio-ctl.exe -i 0
DIN port 0 status: 1

C:\Program Files\Moxa\Moxa IO Controller>
```

## Setting the UART Mode

Type the **mx-uart-ctl --help** command to see instructions on using this utility and follow the onscreen instructions to get or set the UART mode.



### IMPORTANT!

The UART index starts from 0. Even though the console output starts at 1, the index still starts at 0.

```
Administrator: Command Prompt
C:\Program Files\Moxa\Moxa IO Controller>mx-uart-ctl.exe --help
mx-uart-ctl 2.0.2307.10000
Copyright (C) 2019 Moxa Inc. All rights reserved.

-p          -p <#port index> (Start from 0)

-m          -m <#uart mode>
            0 --> set to RS232 mode
            1 --> set to RS485-2W mode
            2 --> set to RS485-4W mode
            3 --> set to RS422 mode

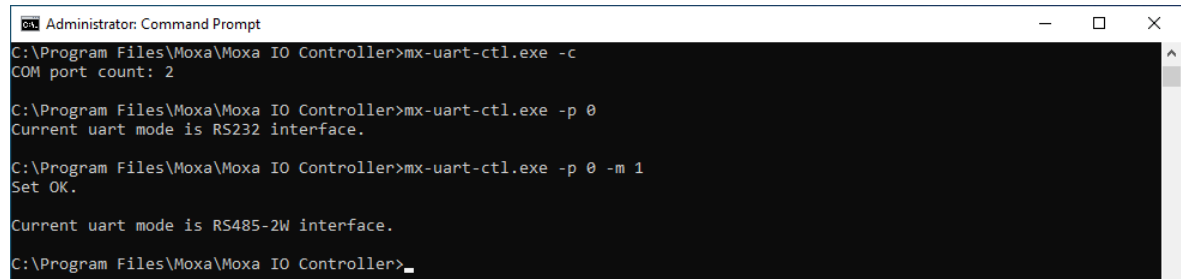
-c          -c

--help      Display this help screen.

--version   Display version information.

C:\Program Files\Moxa\Moxa IO Controller>
```

## Example:



```
Administrator: Command Prompt
C:\Program Files\Moxa\Moxa IO Controller>mx-uart-ctl.exe -c
COM port count: 2

C:\Program Files\Moxa\Moxa IO Controller>mx-uart-ctl.exe -p 0
Current uart mode is RS232 interface.

C:\Program Files\Moxa\Moxa IO Controller>mx-uart-ctl.exe -p 0 -m 1
Set OK.

Current uart mode is RS485-2W interface.

C:\Program Files\Moxa\Moxa IO Controller>
```

# Setting the PCIe Slot Power Status (only for BXP-A101 Series)

Run the **mx-pcie-ctl --help** command to see instructions on using this utility and follow the onscreen instructions to get or set the status of the PCIe slot power.



## IMPORTANT

The PCIe slot index starts from 0. Even though the console output starts at 1, the index still starts at 0.

```
Administrator: Command Prompt

C:\Program Files\Moxa\Moxa IO Controller>mx-pcie-ctl.exe --help
mx-pcie-ctl 1.2.1907.10000
Copyright (C) 2019 Moxa Inc. All rights reserved.
USAGE:
Get pcie power status from pcie slot 1:
  mx-pcie-ctl -i 1
Set pcie slot 1 power on:
  mx-pcie-ctl -i 1 -m 1
Set pcie slot 1 power on with delay Time 200ms:
  mx-pcie-ctl -i 1 -m 1 -t 200

-i      Required. -i <#PCIe Slot index> (Start from 0)

-m      -m <pcie power status>
        0 --> PCIe power off
        1 --> PCIe power on

-t      -t <#PCIe Reset Delay time(ms)>

--help  Display this help screen.

--version Display version information.

C:\Program Files\Moxa\Moxa IO Controller>
```

## Example:

```
Administrator: Command Prompt

C:\Program Files\Moxa\Moxa IO Controller>mx-pcie-ctl.exe -i 0
PCIE slot 0 power status: 1

C:\Program Files\Moxa\Moxa IO Controller>mx-pcie-ctl.exe -i 0 -m 0
PCIE slot 0 power status: 0

C:\Program Files\Moxa\Moxa IO Controller>
```

# Setting the PCIe Reset Pin Status (only for BXP-A101 Series)

Run the **mx-pciereset-ctl --help** command to see instructions on using this utility and follow the onscreen instructions to get or set the PCIe reset pin status and delay time.



## IMPORTANT

The PCIe reset pin index starts from 0. Even though the console output starts at 1, the index still starts at 0.

```
Administrator: Command Prompt

C:\Program Files\Moxa\Moxa IO Controller>mx-pciereset-ctl.exe --help
mx-reset-ctl 2.0.2203.10000
Copyright (C) 2019 Moxa Inc. All rights reserved.
USAGE:
Reset PCIe slot 1 :
  mx-pciereset-ctl -i 1
Reset PCIe slot 1 DelayTime 200ms:
  mx-pciereset-ctl -i 1 -t 200

-i          Required. -i <#PCIe Reset Slot index> (Start from 0)
-t          -t <#PCIe Reset Delay time(ms)>
--help      Display this help screen.
--version   Display version information.

C:\Program Files\Moxa\Moxa IO Controller>
```

## Example:

```
Administrator: Command Prompt

C:\Program Files\Moxa\Moxa IO Controller>mx-pciereset-ctl.exe -i 0
PCIe slot 0 reset status: 1

C:\Program Files\Moxa\Moxa IO Controller>mx-pciereset-ctl.exe -i 0 -t 200
PCIe slot 0 reset status: 1

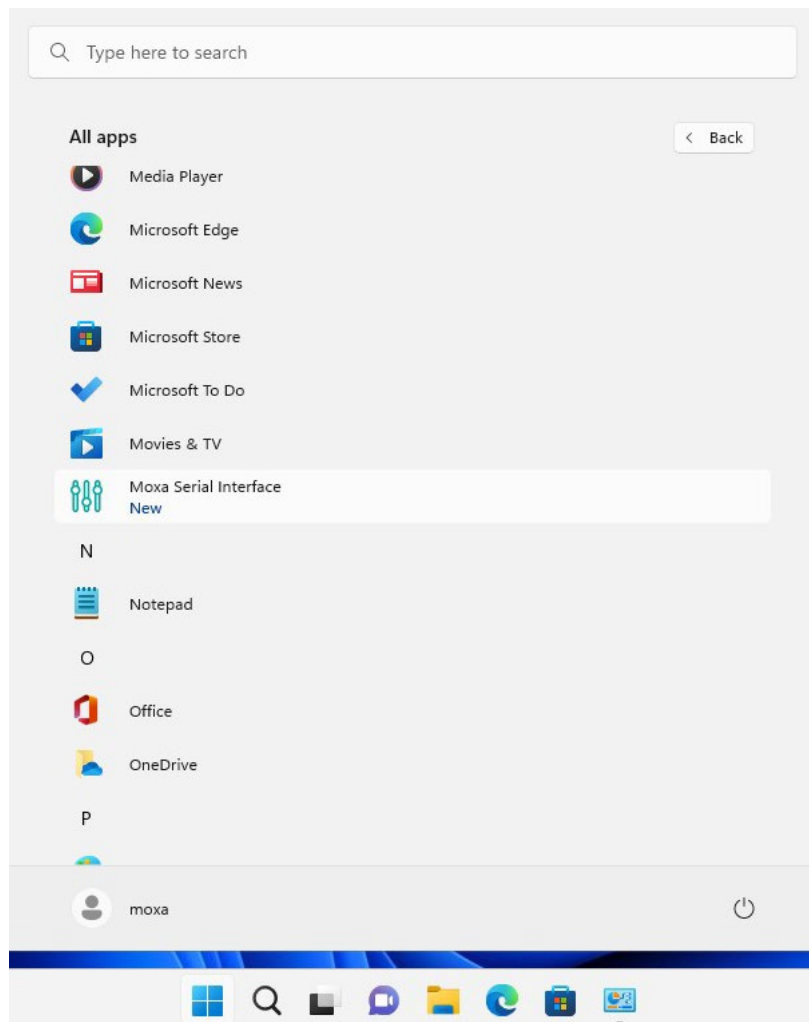
C:\Program Files\Moxa\Moxa IO Controller>
```

# Moxa Serial Interface Utility

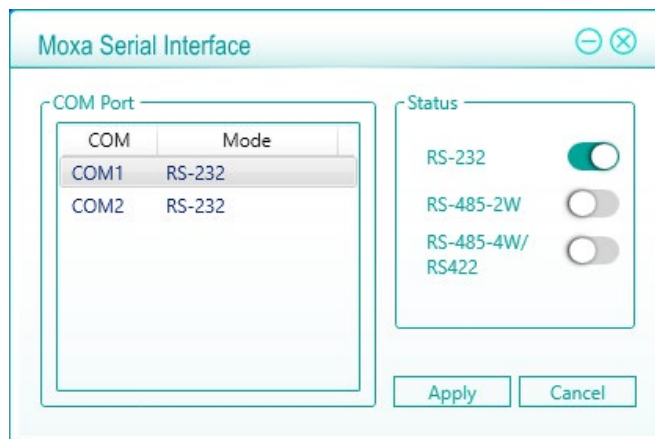
In this section, we describe how to use the Moxa Serial Interface utility to set the UART mode in your computer's serial interface.

## Setting the Serial Port Mode

1. Use the preinstalled **SerialInterfaceSetup** utility or install it from the Moxa support page.
2. From the Windows Start menu, run the **Moxa Serial Interface utility**.



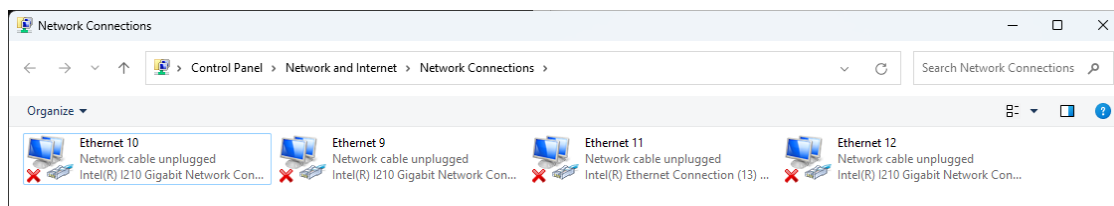
3. Select the target COM port and UART mode and click **Apply** to save the settings.



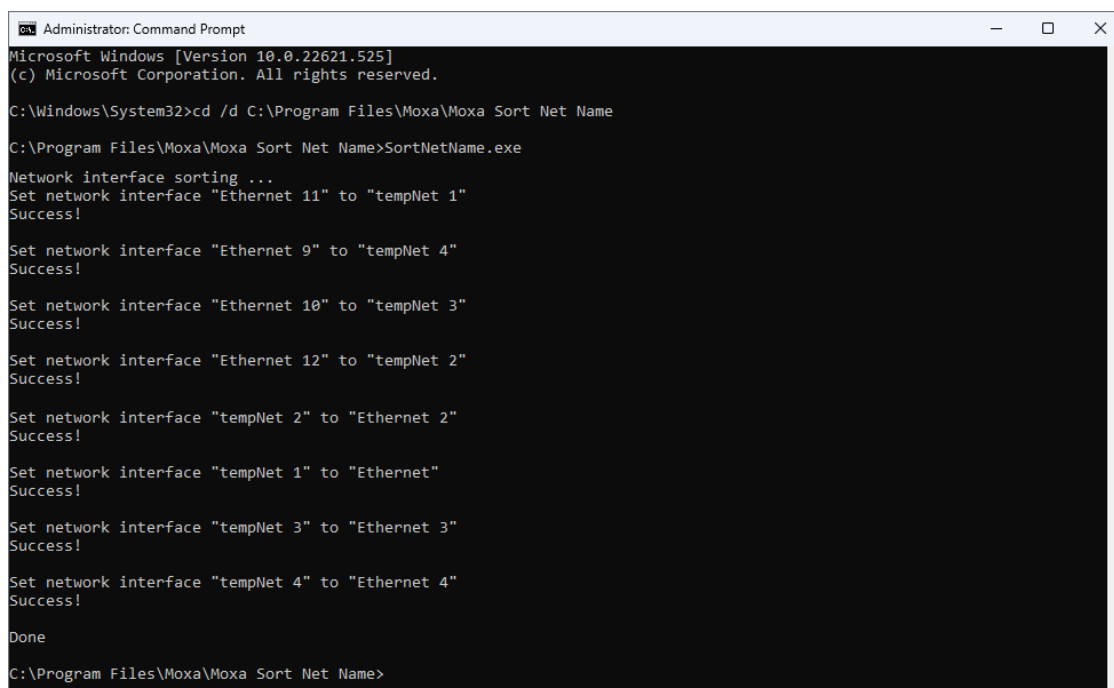
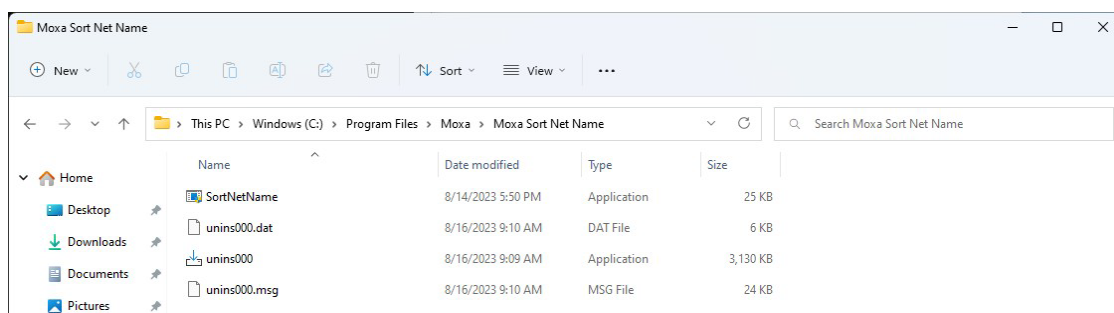
# Moxa Sort Net Name Utility

In this section, we describe how to use the Moxa Sort Net Name utility to rename Ethernet adapter for mapping physical LAN port order on chassis.

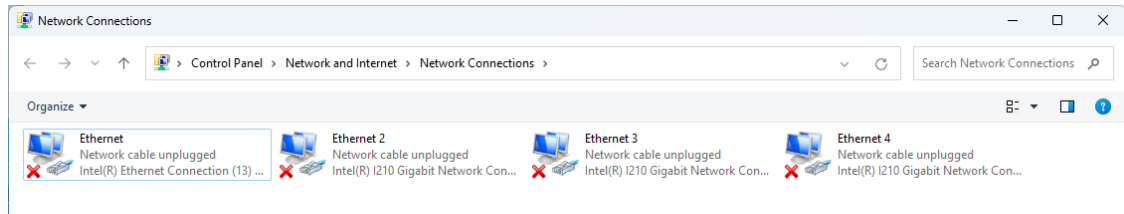
1. Use the pre-installed utility or install the **MoxaSortNetName** utility from the Moxa support page.
2. The initial order of network names may be random.



3. Run the **SortNetName.exe** from **C:\Program Files\Moxa\Moxa Sort Net Name** as an Administrator.



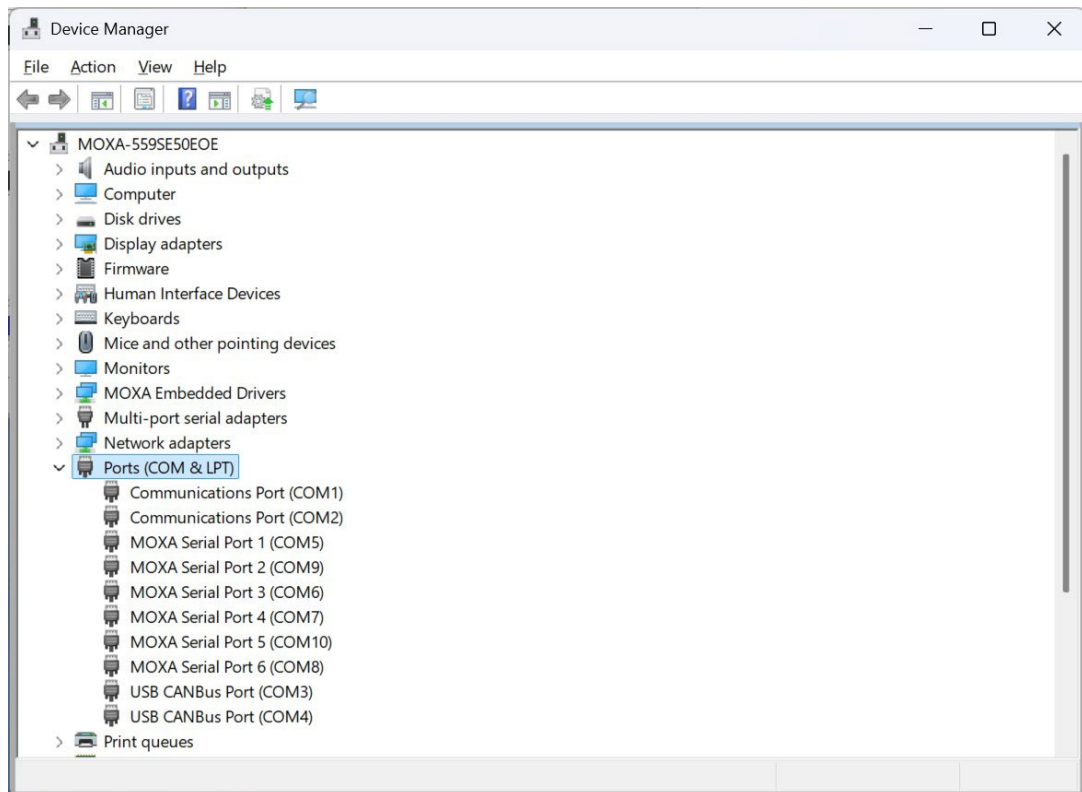
- Wait for the process to complete to rename Ethernet adapter. The order of the Ethernet adapter will correspond to the order of label (e.g., LAN 2 on chassis is mapping to Ethernet 2 in Windows).



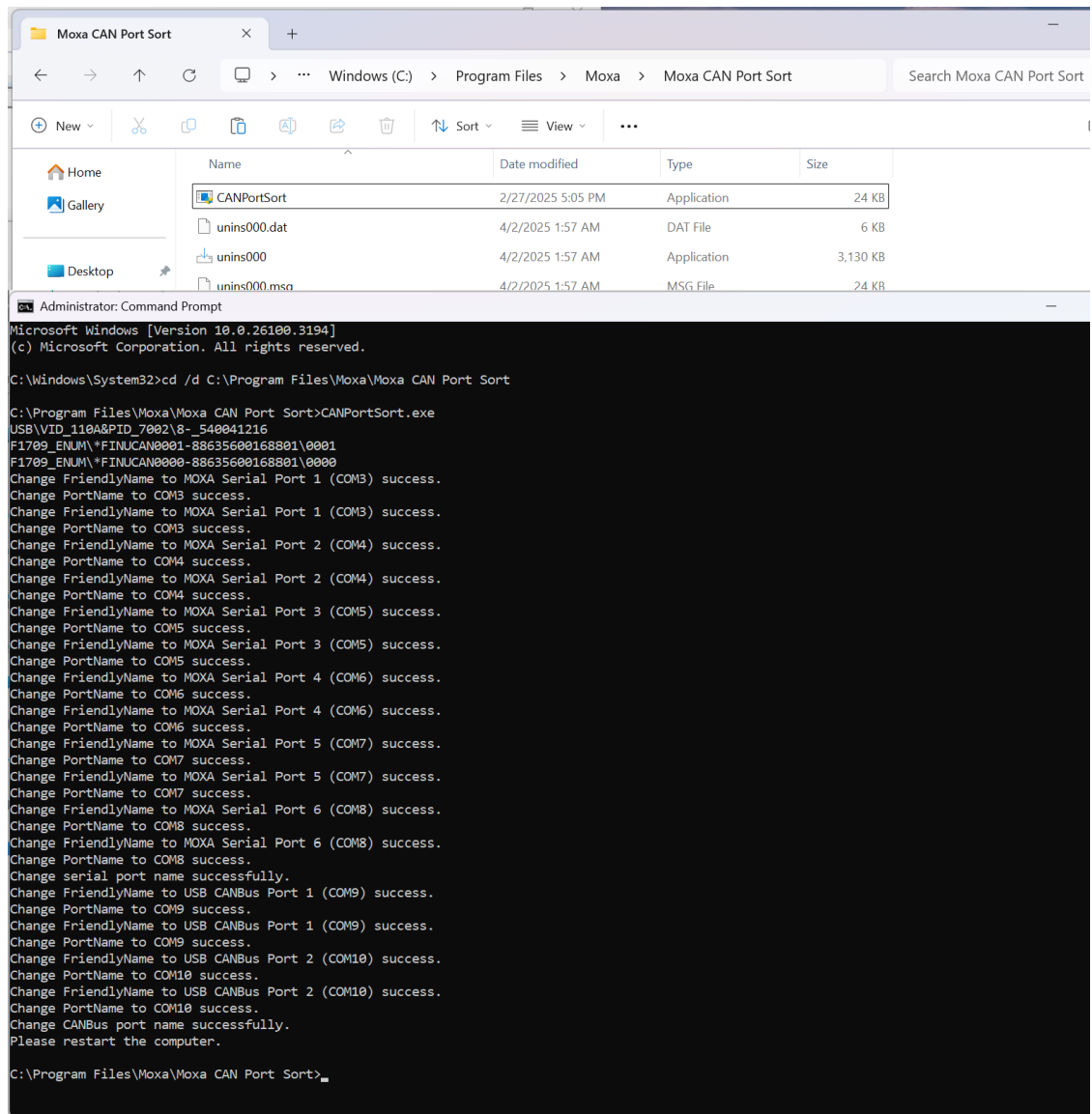
## Moxa CAN Port Sort Utility (only for RKP-C220 Series)

In this section, we describe how to use the Moxa CAN Port Sort utility to assign COM port numbers for mapping the physical CAN ports to the UART port order on the chassis (compatible with the 6 COM 2 CAN model).

- Use the pre-installed utility or install the **MoxaCANPortSort** utility from the Moxa support page. The initial COM port number assigned may differ from the chassis.



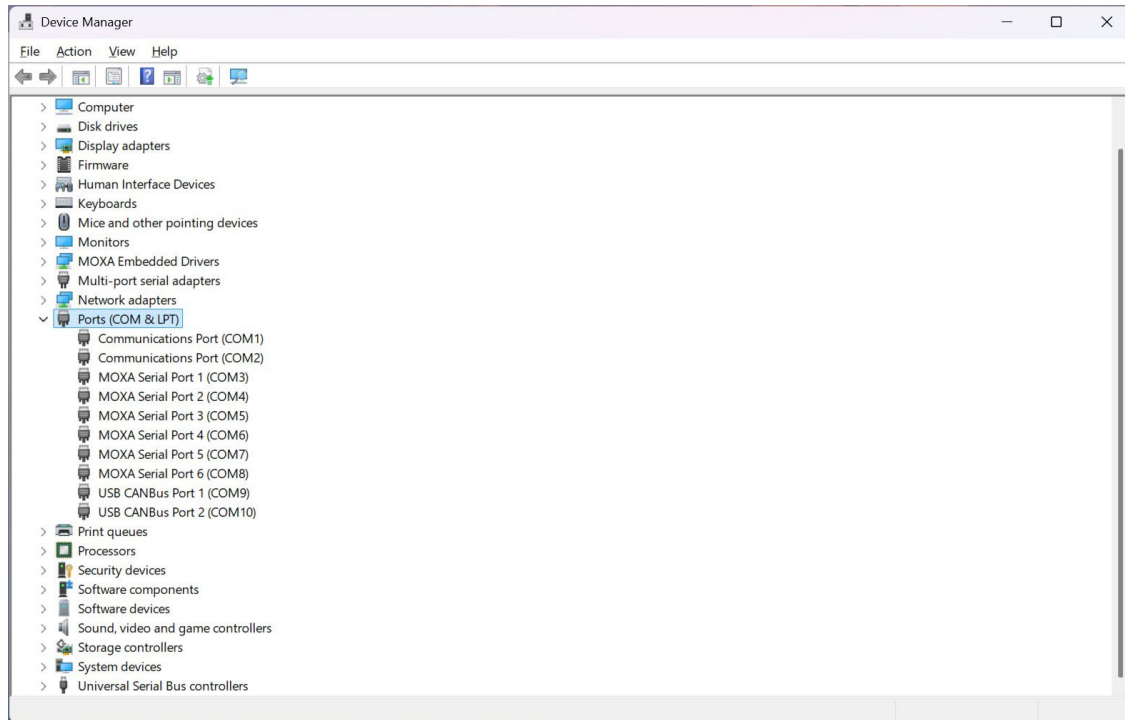
2. Run the **CANPortSort.exe** as an Administrator from **C:\Program Files\Moxa\Moxa CAN Port Sort**.



3. Wait for the process to complete to then assign the COM port numbers.

4. Restart the computer.

The order of the CANBus ports and UART ports will correspond to the order of labels on the chassis.

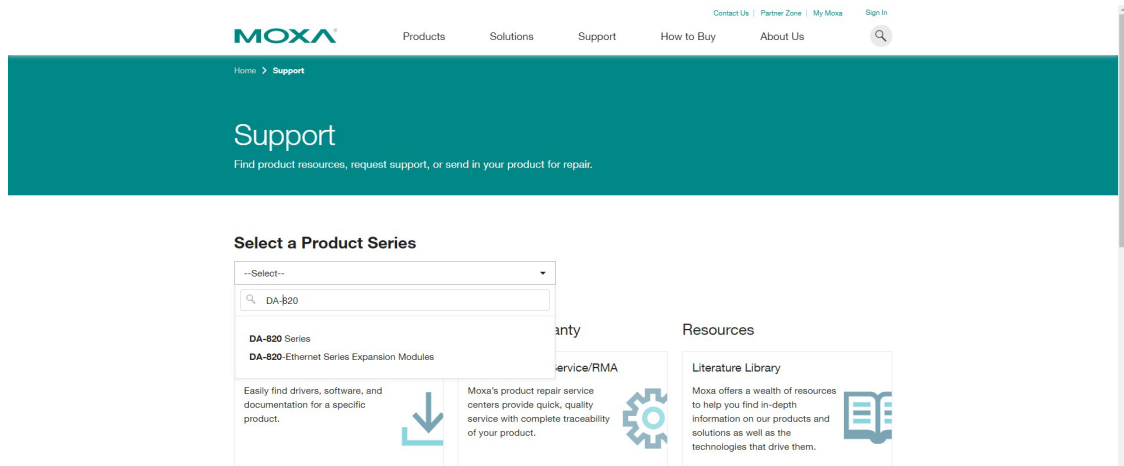


## 9. IO Control API

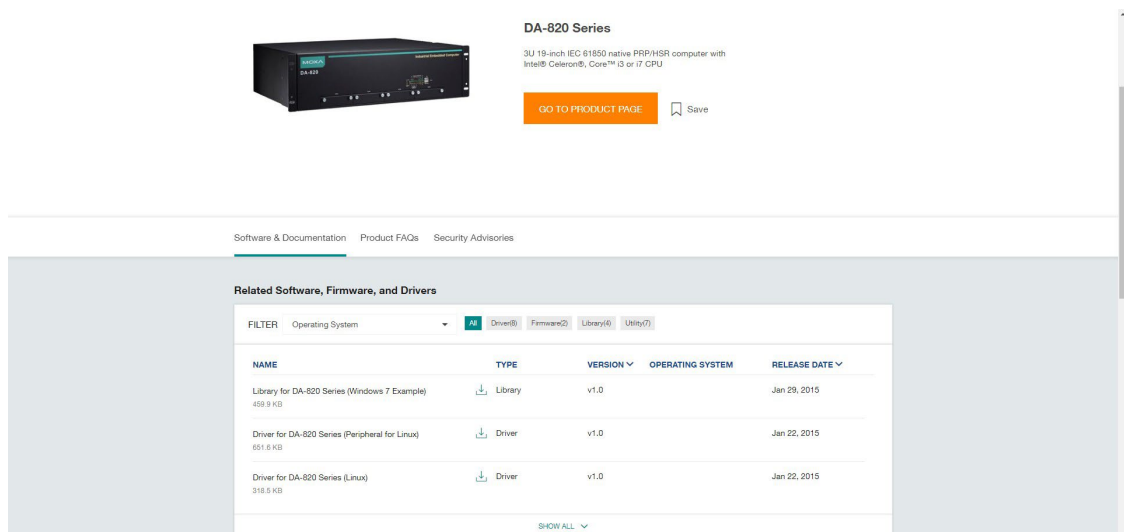
This chapter describes how to use the IO Control API.

### Downloading the API

1. Access the Moxa support page: <https://www.moxa.com/en/support>
2. Select the product series (example: DA-820).



3. Download the related files.



# mxdbgio

The **mxdbgio** library operates on the digital I/Os and consists of the following:

- **GetDinCount**
- **GetOutCount**
- **GetDinStatus**
- **GetDoutStatus**
- **SetDoutStatus**

## GetDinCount

### Syntax

```
int GetDinCount();
```

### Description

Get the numbers of a digital input port.

### Parameters

N/A.

### Return Value

The numbers of the digital input port.

### Error codes

The following error codes can be retrieved using the **DIO\_STATUS** function.

| Name                | Value | Meaning                                                              |
|---------------------|-------|----------------------------------------------------------------------|
| LIB_INITIALIZE_FAIL | -1    | The mxdbgio library initialization failed. Cannot open json profile. |

### Requirements

| Name    | Items                                  |
|---------|----------------------------------------|
| Header  | mxdbgio.h                              |
| Library | mxdbgio.lib                            |
| DLL     | mxdbgio.dll                            |
| Profile | MxdgioProfile[ <i>ModelName</i> ].json |

# GetDoutCount

## Syntax

```
int GetDoutCount();
```

## Description

Get the numbers of a digital output port.

## Parameters

N/A.

## Return Value

The numbers of the digital output port.

## Error codes

The following error codes can be retrieved using the **DIO\_STATUS** function.

| Name                | Value | Meaning                                                             |
|---------------------|-------|---------------------------------------------------------------------|
| LIB_INITIALIZE_FAIL | -1    | The mxdgio library initialization failed. Cannot open json profile. |

## Requirements

| Name    | Items                         |
|---------|-------------------------------|
| Header  | mxdgio.h                      |
| Library | mxdgio.lib                    |
| DLL     | mxdgio.dll                    |
| Profile | MxdgioProfile[ModelName].json |

# GetDinStatus

## Syntax

```
int GetDinStatus(int port);
```

## Description

Gets the status of a digital input port.

## Parameters

*port*: The index of the digital input port; starts at 0.

## Return Value

The status of the digital input port; 0 for low and 1 for high.

## Error codes

The following error codes can be retrieved using the **DIO\_STATUS** function.

| Name                | Value | Meaning                                                             |
|---------------------|-------|---------------------------------------------------------------------|
| LIB_INITIALIZE_FAIL | -1    | The mxdgio library initialization failed. Cannot open json profile. |
| PORT_OUTOF_INDEX    | -2    | Target port index is out of range.                                  |

## Requirements

| Name    | Items                         |
|---------|-------------------------------|
| Header  | mxdgio.h                      |
| Library | mxdgio.lib                    |
| DLL     | mxdgio.dll                    |
| Profile | MxdgioProfile[ModelName].json |

# GetDoutStatus

## Syntax

```
int GetDoutStatus(int port);
```

## Description

Gets the status of a digital output port.

## Parameters

*port*: The index of the digital output port; starts at 0.

## Return Value

The status of the digital output port; 0 for low and 1 for high.

## Error codes

The following error codes can be retrieved using the **DIO\_STATUS** function.

| Name                | Value | Meaning                                                              |
|---------------------|-------|----------------------------------------------------------------------|
| LIB_INITIALIZE_FAIL | -1    | The mxduino library initialization failed. Cannot open json profile. |
| PORT_OUTOF_INDEX    | -2    | Target port index is out of range.                                   |

## Requirements

| Name    | Items                          |
|---------|--------------------------------|
| Header  | mxduino.h                      |
| Library | mxduino.lib                    |
| DLL     | mxduino.dll                    |
| Profile | MxduinoProfile[ModelName].json |

# SetDoutStatus

## Syntax

```
int SetDoutStatus(int port, int status);
```

## Description

Sets the status of a digital output port.

## Parameters

*port*: The index of the digital output port; starts at 0.

*status*: The status of the digital output port; 0 for low and 1 for high.

## Return Value

Returns the value 0 if the digital output status is successfully set.

## Error codes

The following error codes can be retrieved using the **DIO\_STATUS** function.

| Name                | Value | Meaning                                                              |
|---------------------|-------|----------------------------------------------------------------------|
| LIB_INITIALIZE_FAIL | -1    | The mxduino library initialization failed. Cannot open json profile. |
| PORT_OUTOF_INDEX    | -2    | Target port index is out of range.                                   |
| SET_STATUS_ERR      | -3    | Status setting failed or is defined with a bad format.               |

## Requirements

| Name    | Items                          |
|---------|--------------------------------|
| Header  | mxduino.h                      |
| Library | mxduino.lib                    |
| DLL     | mxduino.dll                    |
| Profile | MxduinoProfile[ModelName].json |

# mxsp

The **mxsp** library operates on the serial port and consists of the following:

- **GetUartCount**
- **GetUartMode**
- **SetUartMode**

## GetUartCount

### Syntax

```
int GetUartCount();
```

### Description

Gets the numbers of the UART port.

### Parameters

N/A

### Return Value

The numbers of the UART port.

### Error codes

The following error codes can be retrieved using the **UART\_STATUS** function.

| Name                | Value | Meaning                                                           |
|---------------------|-------|-------------------------------------------------------------------|
| LIB_INITIALIZE_FAIL | -1    | The mxsp library initialization failed. Cannot open json profile. |

### Requirements

| Name    | Items                                |
|---------|--------------------------------------|
| Header  | mxsp.h                               |
| Library | mxsp.lib                             |
| DLL     | mxsp.dll                             |
| Profile | MxspProfile[ <i>ModelName</i> ].json |

# GetUartMode

## Syntax

```
int GetUartMode(int port);
```

## Description

Gets the status of the UART port.

## Parameters

port: The index of the UART port; starts at 0.

## Return Value

The mode of a UART interface; 0 for RS-232, 1 for RS-485-2W, 2 for RS-485-4W and 3 for RS-422.

## Error codes

The following error codes can be retrieved using the **UART\_STATUS** function.

| Name                | Value | Meaning                                                           |
|---------------------|-------|-------------------------------------------------------------------|
| LIB_INITIALIZE_FAIL | -1    | The mxsp library initialization failed. Cannot open json profile. |
| PORT_OUTOF_INDEX    | -2    | Target port index is out of range.                                |

## Requirements

| Name    | Items                       |
|---------|-----------------------------|
| Library | mxsp.lib                    |
| DLL     | mxsp.dll                    |
| Profile | MxspProfile[ModelName].json |

# SetUartMode

## Syntax

```
int SetUartMode(int port, int mode);
```

## Description

Sets the status of the UART port.

## Parameters

port: The index of the UART port; starts at 0.

mode: The mode of a UART interface; 0 for RS-232, 1 for RS-485-2W, 2 for RS-485-4W and 3 for RS-422.

## Return Value

Returns 0 if the UART mode is successfully set.

## Error codes

The following error codes can be retrieved using the **UART\_STATUS** function.

| Name                | Value | Meaning                                                           |
|---------------------|-------|-------------------------------------------------------------------|
| LIB_INITIALIZE_FAIL | -1    | The mxsp library initialization failed. Cannot open json profile. |
| PORT_OUTOF_INDEX    | -2    | Target port index is out of range.                                |
| SET_STATUS_ERR      | -3    | Status setting failed or is defined with a bad format.            |
| NOT_SUPPORT_MODE    | -4    | Target mode is not supported for this port.                       |

## Requirements

| Name    | Items                       |
|---------|-----------------------------|
| Header  | mxsp.h                      |
| Library | mxsp.lib                    |
| DLL     | mxsp.dll                    |
| Profile | MxspProfile[ModelName].json |

# mxpcie (only for BXP-A101 Series)

The mxpcie library operates on the power of PCIE slot and consists of the following:

- **GetPCIESlotStatus**
- **SetPCIESlotStatus**
- **SetPCIESlotStatusWithReset**

## GetPCIESlotStatus

### Syntax

```
int GetPCIESlotStatus(int port);
```

### Description

Gets the PCIE slot power status.

### Parameters

*port*: The index of the PCIE slot; starts at 0.

### Return Value

The status of a PCIE slot power; 0 for OFF, 1 for ON.

### Error codes

The following error codes can be retrieved using the **PCIE\_STATUS** function.

| Name                | Value | Meaning                                                             |
|---------------------|-------|---------------------------------------------------------------------|
| LIB_INITIALIZE_FAIL | -1    | The mxpcie library initialization failed. Cannot open json profile. |
| PORT_OUTOF_INDEX    | -2    | Target port index is out of range.                                  |

### Requirements

| Name    | Items                                  |
|---------|----------------------------------------|
| Header  | mxpcie.h                               |
| Library | mxpcie.lib                             |
| DLL     | mxpcie.dll                             |
| Profile | MxpcieProfile[ <i>ModelName</i> ].json |

# SetPCIESlotStatus

## Syntax

```
int SetPCIESlotStatus(int port, int status);
```

## Description

Sets the PCIE slot power status.

## Parameters

*port*: The index of the PCIE slot; starts at 0.

*status*: The status of the PCIE slot power; 0 for OFF, 1 for ON.

## Return Value

Returns 0 if the PCIE slot power is successfully set.

## Error codes

The following error codes can be retrieved using the **PCIE\_STATUS** function.

| Name                | Value | Meaning                                                             |
|---------------------|-------|---------------------------------------------------------------------|
| LIB_INITIALIZE_FAIL | -1    | The mxpcie library initialization failed. Cannot open json profile. |
| PORT_OUTOF_INDEX    | -2    | Target port index is out of range.                                  |
| SET_STATUS_ERR      | -3    | Status setting failed or is defined with a bad format.              |

## Requirements

| Name    | Items                         |
|---------|-------------------------------|
| Header  | mxpcie.h                      |
| Library | mxpcie.lib                    |
| DLL     | mxpcie.dll                    |
| Profile | MxpcieProfile[ModelName].json |

# SetPCIESlotStatusWithReset

## Syntax

```
int SetPCIESlotStatusWithReset(int port, int status, int time);
```

## Description

Sets the PCIE slot power status and PCIE slot reset pin turn ON and OFF.

## Parameters

*port*: The index of the PCIE slot; starts at 0.

*status*: The status of the PCIE slot power and PICE reset pin; 0 for OFF, 1 for ON.

*time*: The delay time between PCIE slot reset pin turn ON and OFF.

## Return Value

Returns 0 if the PCIE slot power and PCIE reset pin are successfully set.

## Error codes

The following error codes can be retrieved using the **PCIE\_STATUS** function.

| Name                | Value | Meaning                                                             |
|---------------------|-------|---------------------------------------------------------------------|
| LIB_INITIALIZE_FAIL | -1    | The mxpcie library initialization failed. Cannot open json profile. |
| PORT_OUTOF_INDEX    | -2    | Target port index is out of range.                                  |
| SET_STATUS_ERR      | -3    | Status setting failed or is defined with a bad format.              |

## Requirements

| Name    | Items                         |
|---------|-------------------------------|
| Header  | mxpcie.h                      |
| Library | mxpcie.lib                    |
| DLL     | mxpcie.dll                    |
| Profile | MxpcieProfile[ModelName].json |

# mxpciereset (only for BXP-A101 Series)

The mxpciereset library operates on the PCIE reset pin status and consists of the following:

- **GetRESETSlotStatus**
- **SetRESETSlotStatus**

## GetRESETSlotStatus

### Syntax

```
int GetRESETSlotStatus(int port);
```

### Description

Gets the PCIE slot reset pin status.

### Parameters

*port*: The index of the PCIE slot; starts at 0.

### Return Value

The status of a PCIE slot reset pin; 0 for OFF, 1 for ON.

### Error codes

The following error codes can be retrieved using the **RESET\_STATUS** function.

| Name                | Value | Meaning                                                                  |
|---------------------|-------|--------------------------------------------------------------------------|
| LIB_INITIALIZE_FAIL | -1    | The mxpciereset library initialization failed. Cannot open json profile. |
| PORT_OUTOF_INDEX    | -2    | Target port index is out of range.                                       |

### Requirements

| Name    | Items                                       |
|---------|---------------------------------------------|
| Header  | mxpciereset.h                               |
| Library | mxpciereset.lib                             |
| DLL     | mxpciereset.dll                             |
| Profile | MxpcieresetProfile[ <i>ModelName</i> ].json |

# SetRESETSlotStatus

## Syntax

```
int SetRESETSlotStatus(int port, int time);
```

## Description

Sets the PCIE slot reset pin ON/OFF cycle and delay time.

## Parameters

*port*: The index of the PCIE slot; starts at 0.

*time*: The delay time between PCIE slot reset pin turn ON and OFF.

## Return Value

Returns 0 if the PCIE slot reset pin is successfully set.

## Error codes

The following error codes can be retrieved using the **RESET\_STATUS** function.

| Name                | Value | Meaning                                                                   |
|---------------------|-------|---------------------------------------------------------------------------|
| LIB_INITIALIZE_FAIL | -1    | The mxpcierreset library initialization failed. Cannot open json profile. |
| PORT_OUTOF_INDEX    | -2    | Target port index is out of range.                                        |
| SET_STATUS_ERR      | -3    | Status setting failed or is defined with a bad format.                    |

## Requirements

| Name    | Items                               |
|---------|-------------------------------------|
| Header  | mxpcierreset.h                      |
| Library | mxpcierreset.lib                    |
| DLL     | mxpcierreset.dll                    |
| Profile | MxpcierresetProfile[ModelName].json |

# mxwdg

The **mxwdg** library operates on the watchdog and consists of the following:

- **mxwdg\_open**
- **mxwdg\_refresh**
- **mxwdg\_close**

# mxwdg\_open

## Syntax

```
PVOID mxwdg_open(unsigned long time);
```

## Description

Initializes the watchdog timer.

## Parameters

*time*: The interval at which the watchdog timer is refreshed; the unit is seconds.

## Return Value

Returns the pointer to the watchdog handle; returns -1 on failure to initialize the watchdog timer.

## Requirements

| Name    | Items     |
|---------|-----------|
| Header  | mxwdg.h   |
| Library | mxwdg.lib |
| DLL     | mxwdg.dll |

## mxwdg\_refresh

### **Syntax**

```
int mxwdg_refresh(PVOID fd);
```

### **Description**

Refreshes the watchdog timer.

### **Parameters**

*fd*: The handle of the watchdog timer.

### **Return Value**

Returns 0 on success; otherwise, the function has failed.

### **Requirements**

| Name    | Items     |
|---------|-----------|
| Header  | mxwdg.h   |
| Library | mxwdg.lib |
| DLL     | mxwdg.dll |

## mxwdg\_close

### **Syntax**

```
void mxwdg_close(PVOID fd);
```

### **Description**

Disables the watchdog timer.

### **Parameters**

*fd*: The handle of the watchdog timer.

### **Return Value**

This function does not return a value.

### **Requirements**

| Name    | Items     |
|---------|-----------|
| Header  | mxwdg.h   |
| Library | mxwdg.lib |
| DLL     | mxwdg.dll |

# 10. System Backup and Restore

This chapter describes the usage of the following tools for system backup and restoration.

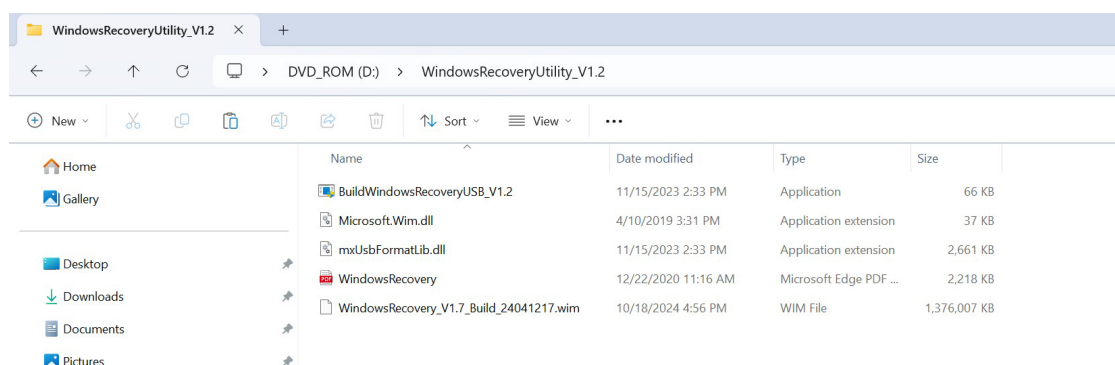
- **WindowsRecovery**

## WindowsRecovery

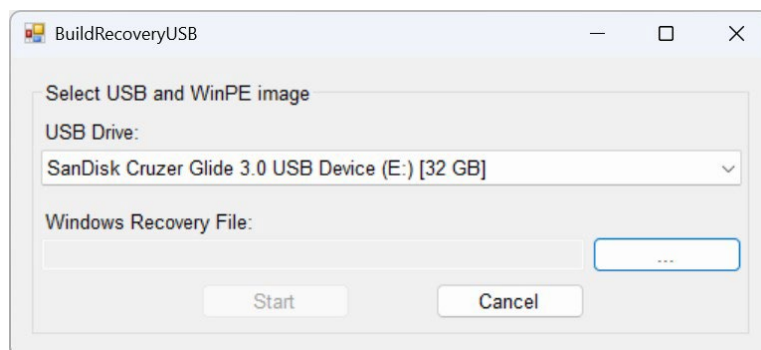
WindowsRecovery is an OS image backup and restore program for system deployment, backup, and recovery. You will first need to create a WindowsRecovery USB disk. This WindowsRecovery disk can only be used to boot a **UEFI BIOS** machine.

## Preparing the USB device

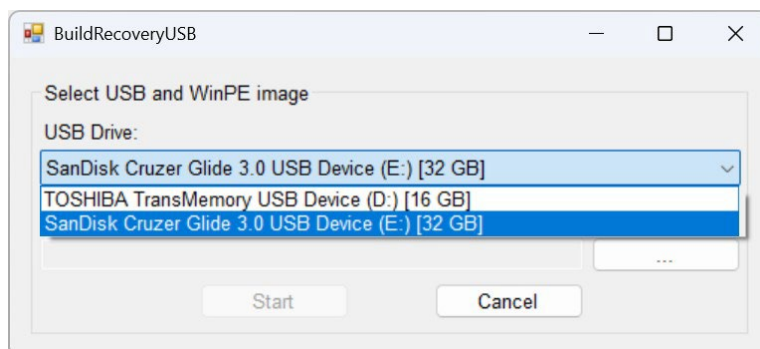
1. Contact a Moxa technical staff and get the required file.



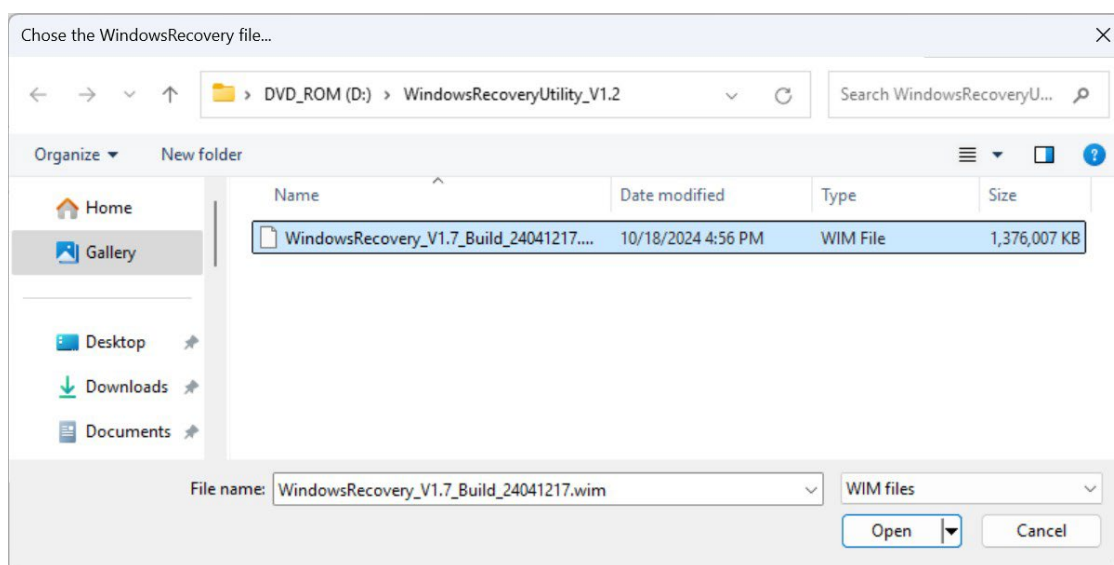
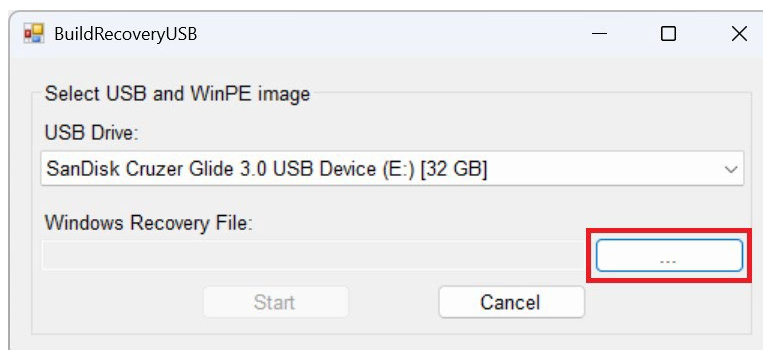
2. Run the **BuildWindowsRecoveryUSB\_V1.2.0.exe**.



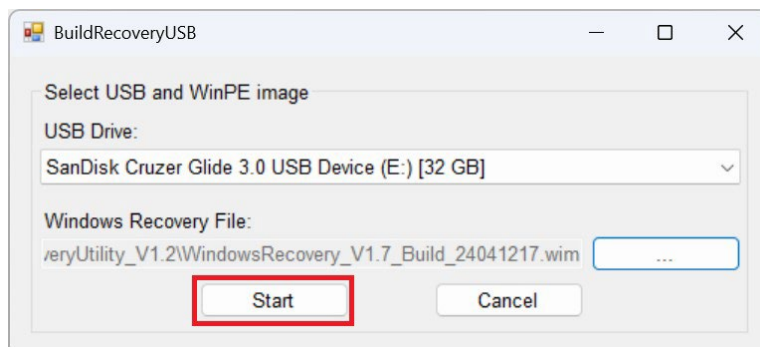
3. Select the USB drive to format.



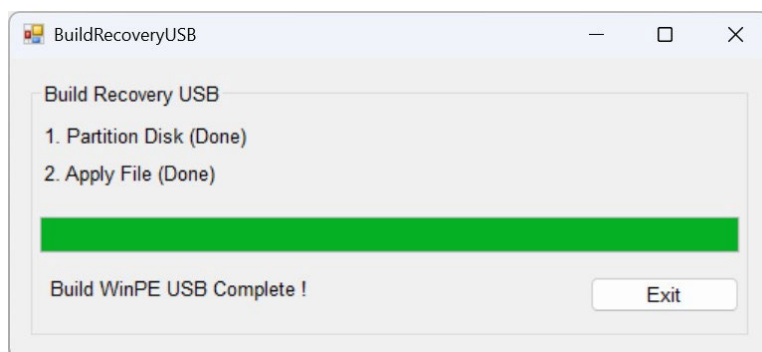
4. Click ... to select .wim file from the folder.



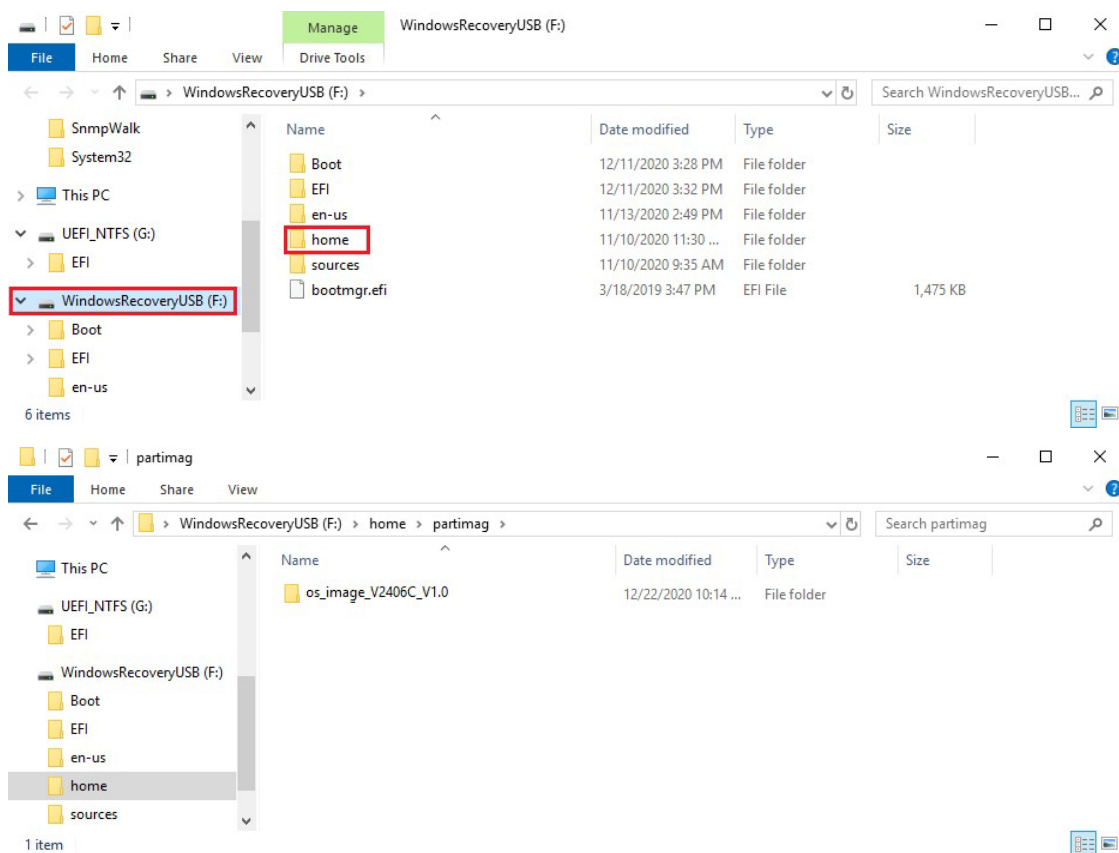
5. Click **Start** and make sure the selected USB can be formatted. Click **Yes** to start creating the recovery USB.



- Wait for the process to finish. The program will format the USB device and create a UEFI bootable volume and a WinPE volume. You may see additional windows about folder information; do not close these. You can close the windows after the process finishes.

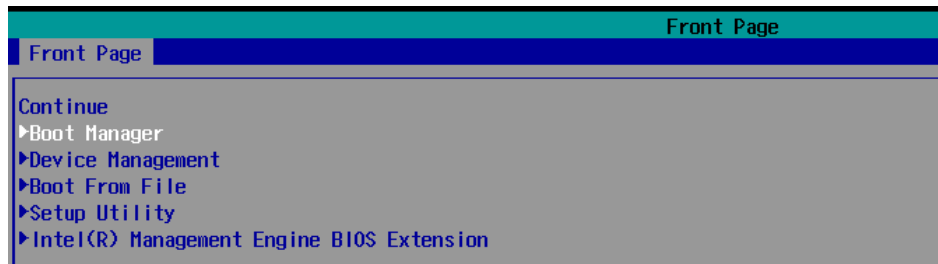


- To create a recovery USB disk with the Windows 11 image, copy the **os\_image\_ModelName** directory to the **\home\partimag** folder in the USB drive.

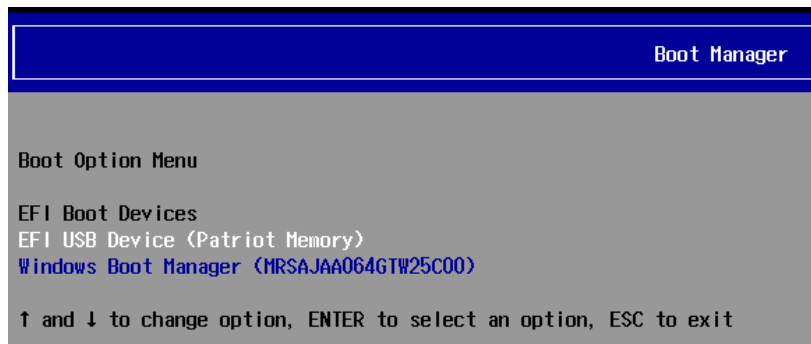


# Booting From the USB Disk

1. Turn on the computer and press **F2** when you hear the beep sound to enter the BIOS setup menu, select **Boot Manager** and press **Enter** to continue.



2. Select the **EFI USB Device** on the computer and press **Enter** to continue to boot from the USB device.



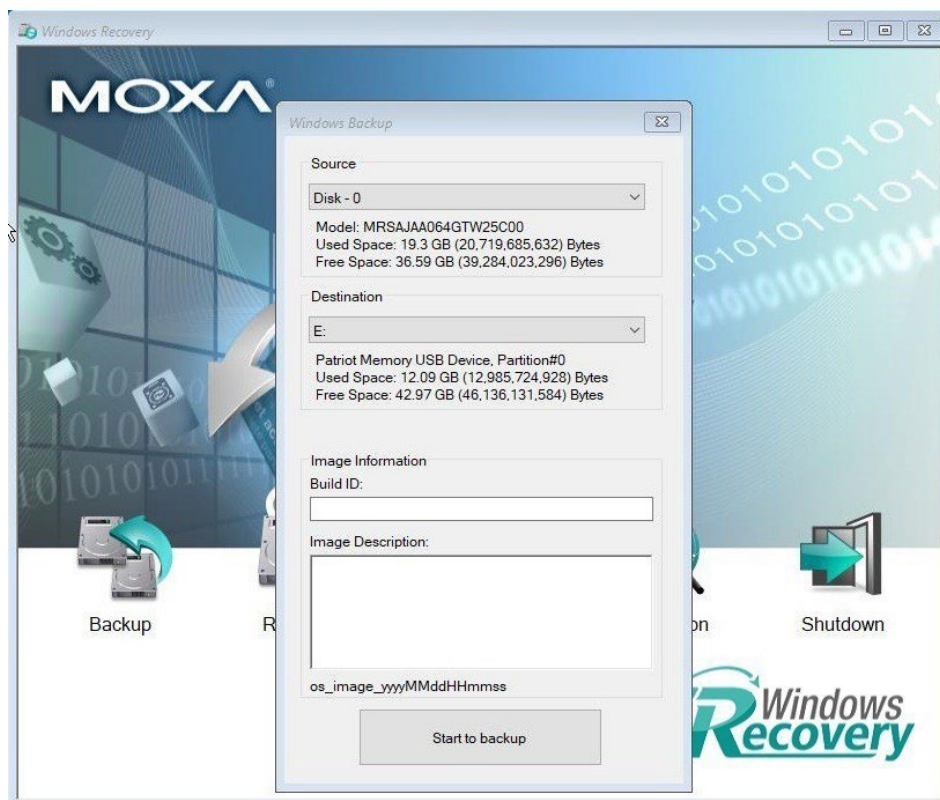
# System Image Backup

To back up the image from the USB disk, run **Windows Preinstallation Environment(WinPE)** and the **Windows Recovery utility** will display. Follow these steps.

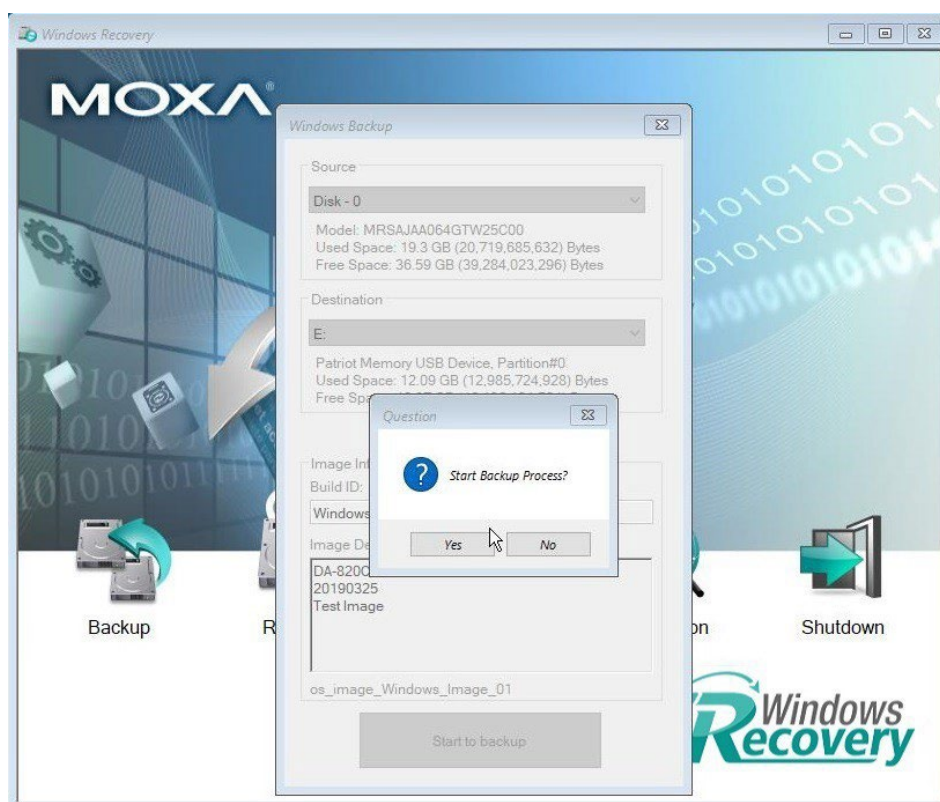
1. Click **Backup**.



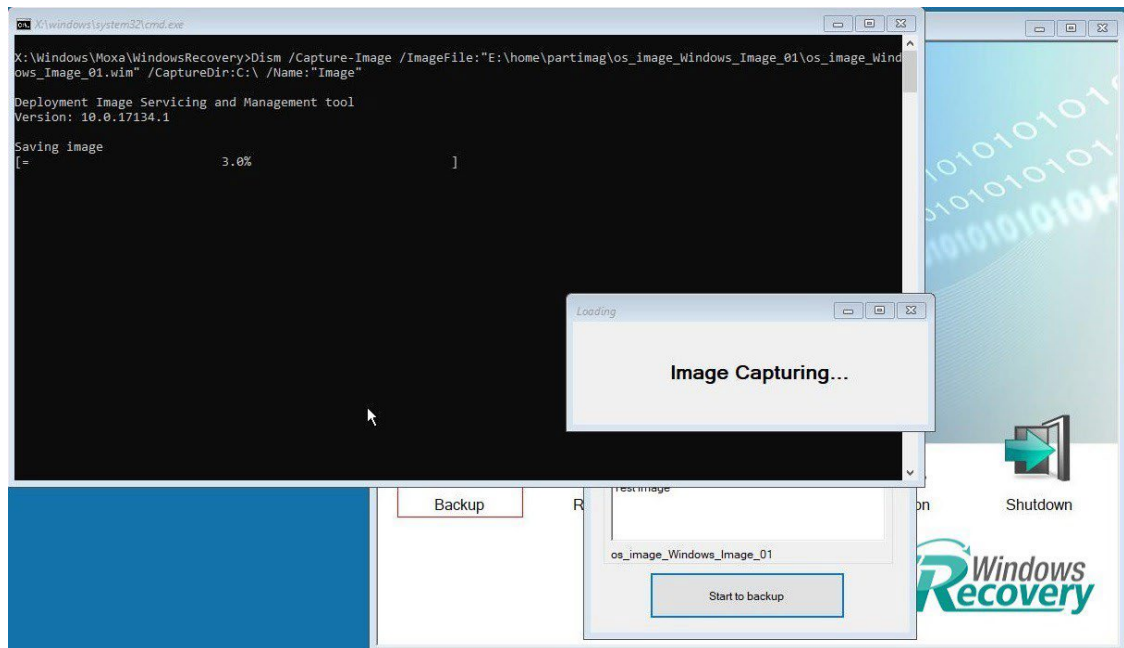
2. Select the **Source disk** to backup and **Destination USB** to store the OS image, also give an image name and description. Click **Start to backup**.



3. Click **Yes** to continue.



4. Wait for the backup process to complete.



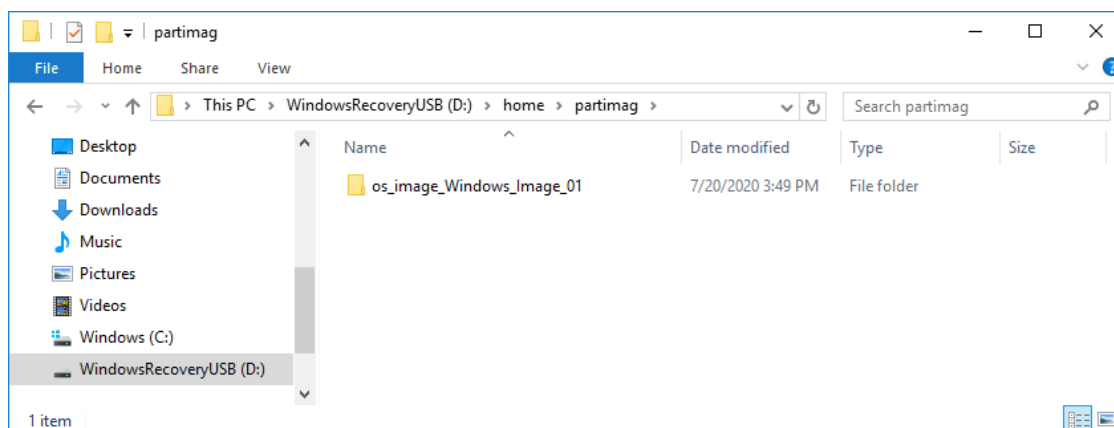
5. When the process is done, click **OK**.



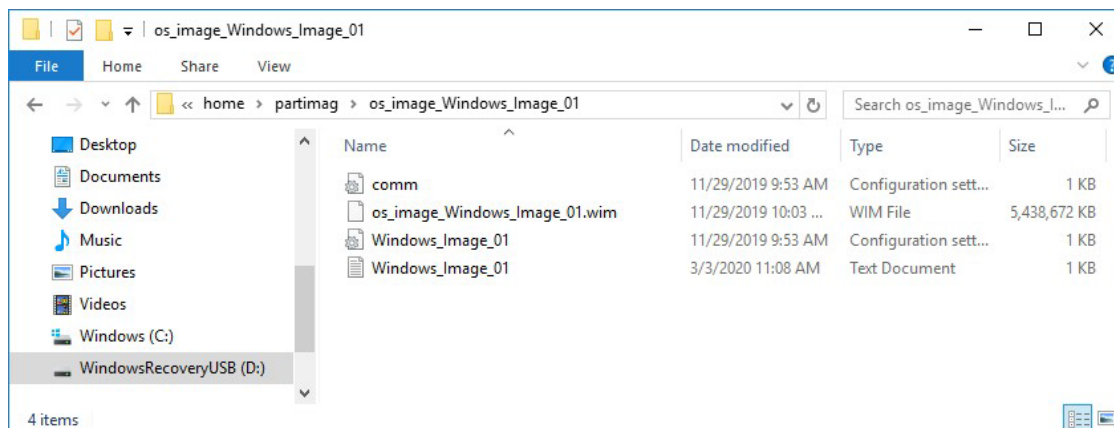
6. Click **OK**, the computer will shut down.



7. The OS image will be saved in USB disk **home\partimag**.



8. In the **os\_image** folder you can view the backup information and the image files.



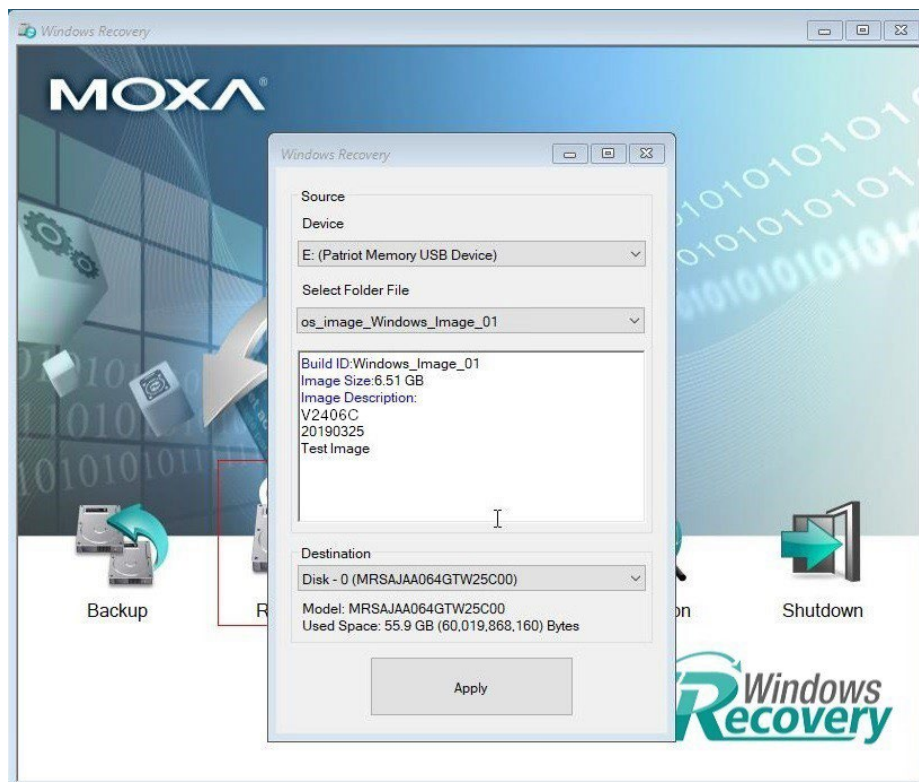
# Restoring the System From a Backup

To restore the image, run the **Windows Preinstallation Environment(WinPE)** and the **Windows Recovery utility** will display. Follow these steps.

1. Click **Recovery**.



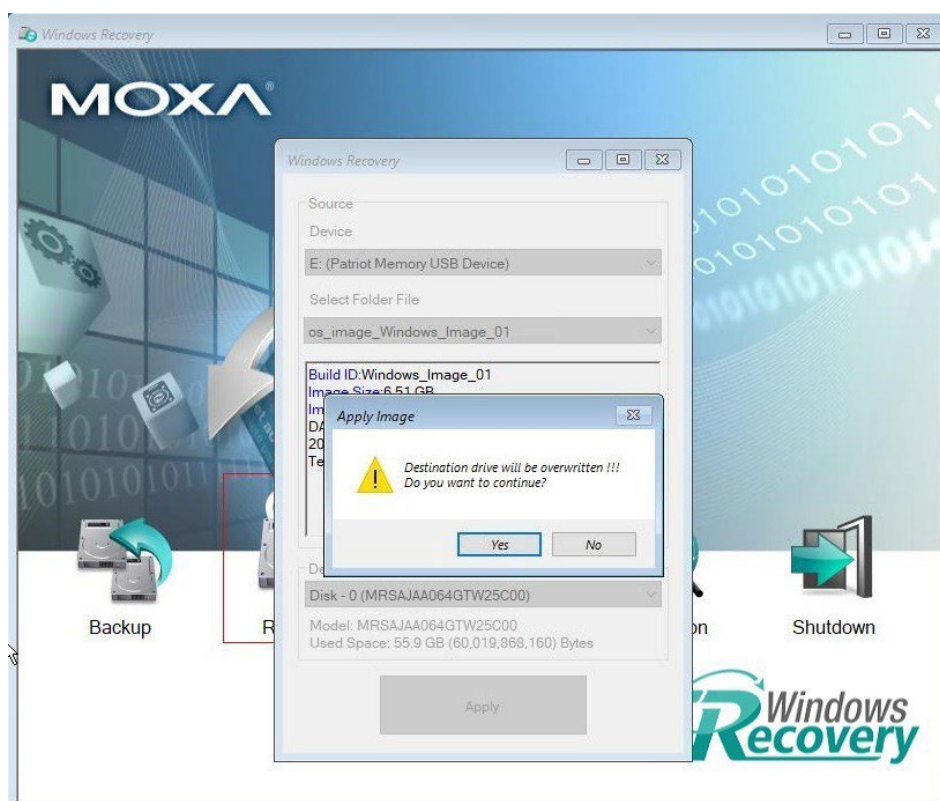
2. Select the **Source USB Device, Image Folder File** and check the image information, select the **Destination Drive** to restore. Click **Apply**.



3. Click **Yes** to continue the process.



4. Click **Yes** to overwrite the destination drive.



5. Wait for the process to complete.



6. Click **OK**.



## NOTE

When you restart the computer, you will need to wait about 5 minutes for the computer to go through two cycles of the reboot process. The system configuration files will be initialized during the first bootup process. Do not turn off or shut down the computer while the system is restarting.