Intel® Optane™ Memory H Series

Installation and User Guide
February 2022

Document Number: 345865-002US

Revision History

Revision Number	Description	Revision Date
001	• Initial release as stand-alone Intel® Optane™ Memory H Series Installation & User Guide. Installation information was previously released as Intel® Optane™ Memory M and H Series Installation Guide, document # 571964.	February 2021

002	• Updated multiple sections in regard to the 19.x RST driver and 12th Generation platform support changes:
	  • No longer supporting Pinning
	  • New driver links
		February 2022

Contents

1 Overview

Intel® Optane™ memory H Series is a system acceleration solution that can be used to increase responsiveness on supported Intel platforms. This solution uses the Intel® Optane™ memory media that is based on Intel® Optane™ technology, along with the Intel® Rapid Storage Technology (Intel® RST) driver. It is a dual-media solution (fast media for caching + slower media for storage capacity) that is presented to the host OS as a single SSD when properly enabled.

Intel® Optane™ memory accelerates your computer's access to frequently used documents, pictures, videos and application files and remembers them even after you power it off.

1.1 About this Document

This document provides the platform requirements and installation process for Intel® Optane™ memory H Series products, including available applications to manage these devices and the following products:

- Intel® Optane™ memory H Series (for example, Intel® Optane™ memory H10 with Solid State Storage). This device contains Intel® Optane™ memory media and Intel® QLC 3D NAND media on the same module.

Note: The Installation and User guide for the **Intel® Optane™ Memory M Series** can be found at the following location: https://www.intel.com/content/www/us/en/support/articles/000023989/memory-and-storage/intel-optane-memory.html

1.2 Minimum Requirements

Below are the system requirements to support system acceleration with the Intel® Optane™ memory H Series.

Important Notes:

- Systems branded as *Intel® Optane™ Memory Ready* are **not** necessarily ready to support the H Series. This branding only relates to the M Series (such as Intel® Optane™ memory M10).
- The Intel® Optane™ memory H Series is only available as part of a complete system purchased through your local retailer/online system vendor[1].
    - When purchased, the system will be configured and enabled properly to 'pair' the Intel® Optane™ memory portion of the device with the Intel® QLC 3D NAND portion of the device.
    - If there are issues or a need to disable acceleration, Intel recommends working with your system vendor due to customizations specific to the platform.
    - Details provided in this document are a reference for experienced users only.

- **Motherboard**: Supported motherboards will contain at least 1 M.2 PCIe x4 NVMe storage port and the proper BIOS to support Intel® Optane™ memory H Series.
    - This BIOS has the capability to recognize both parts of the drive as separate devices, so they can be managed by the Intel® RST software.
- **Drivers/Software**:
    - Driver support depends on the Processor/Chipset that is in the platform, confirm with the system vendor, and the Readme file at the links below, for supported configurations
        - 10th and 11th Generation Platforms Intel® RST Drivers
        - 11th and 12th Generation Platforms Intel® RST Drivers
    - Intel® Optane™ Memory and Storage Management application, available here

- **Intel® Optane™ Memory H Series device:** These products contain both the Intel® Optane™ memory media, or "Fast Media", and the Intel® QLC 3D NAND media, or "Slower Media", on the same M.2 drive/module. Read more here.
- **Operating System**: Microsoft Windows 10 x64 bit (Version 1703/Build 15063) or greater required

Note: The Intel® Optane™ Memory and Storage Management application (see Section 5.1) requires Microsoft Windows 10 x64 bit (Version 1803/Build 17134) or greater.

The part may be available online as a 'brown box" through some distributors. These are made available for system vendors to enable integration in a complete platform. Any individual purchase may not be supported in current platforms.

1.3 Intel® Volume Management Device (Intel® VMD) Support

The 11th Generation Intel® Core™ Processors enabled support for Intel® VMD. This changes the way these platforms are configured for Intel® RST and the related Intel® Optane™ memory technology vs. earlier processor generations.

Following is a summary of these changes, related sections in the document will specify the proper settings for Non-Intel® VMD systems vs. Intel® VMD capable systems.

For how to determine if your platform is Intel® VMD capable or not, contact your system/motherboard vendor.

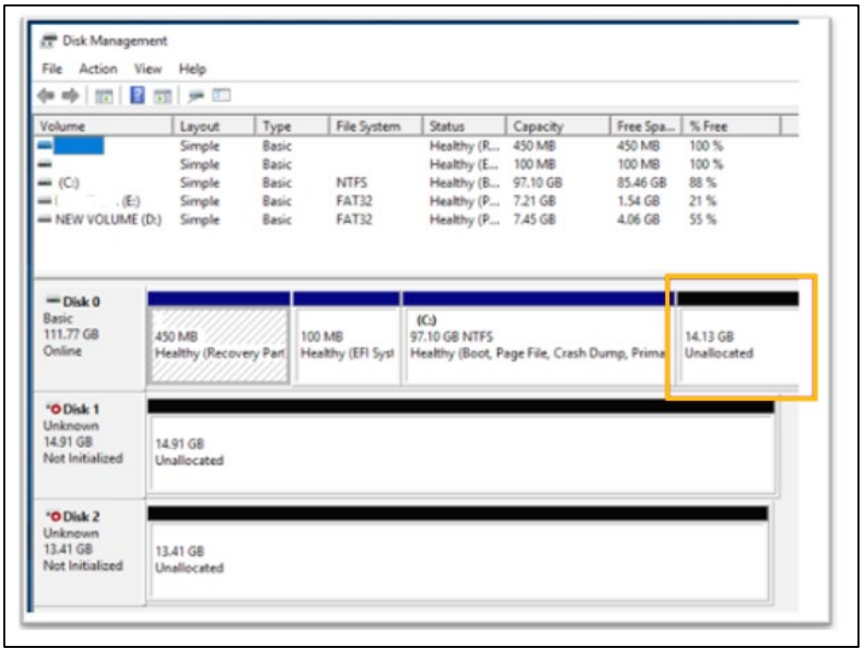
- **BIOS**: The settings in the BIOS are different from earlier, non-Intel® VMD capable platforms
- **Operating System Installation**
  - Intel® VMD support starts with driver version 18.0.x, this version is not included in current Windows 10 OS builds.
  - Drives managed by Intel® VMD will not be detected during the OS installation process.
  - The f6flpy Intel® RST driver must be loaded during the installation process to detect these drives.
- **Windows Driver name**
  - Intel® VMD Capable/Enabled Platform: 'iastorVD'
  - Non-Intel® VMD Capable Platform: 'iastorac'
- **Device Manager:** The listing will be under the 'PCI Express Root Complex' section

1.4 Limitations/Things to Keep in Mind

The following items are important to keep in mind when configuring a system with Intel® Optane™ memory H Series devices.

- The Intel® Optane™ memory portion of the device cannot be used to accelerate storage devices other than the Intel® QLC 3D NAND present on the module.
- The 'slower media' (on the Intel® Optane™ memory H series) can contain the operating system (*System Drive Acceleration*) or only data and not the OS (*Data Drive Acceleration/DDA*), see Section 6.1.
- Until acceleration is enabled (as defined in Section 5.1.1), the operating system will show both portions of the module as individual storage devices. Using the module in this state is not validated or supported; results are not guaranteed.
- Only the Intel QLC 3D NAND portion of the module will be detected by the OS until a supported Intel RST driver is installed. This will also occur if the device is plugged into a platform that does not support the H series
- Dynamic type drives are not supported, only Basic type.

- MBR Partition structure is not supported, the operating system must be installed as the UEFI boot type which will result in the GUID Partition Structure (GPT), which is supported. See Section 2.2 for options to check the partition structure and make changes if needed.
- Only one Intel® Optane™ memory volume is allowed per system. If more than one volume is detected during boot, the second volume will be placed offline.
    - When a drive is placed "offline" it means that the drive is put in a state where the operating system is unable to detect it. The drive can still be detected in the Intel® Optane™ Memory and Storage Management application and the System BIOS (Under the Intel® RST menu).
- There must be at least 5 MB "Unallocated" space at the end of the disk (max LBA) that will be accelerated, in this case on the Intel® 3D QLC NAND portion of the module.
    - If this needs to be modified after installation, see Section 8.



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2 System Configuration Setup

Storage acceleration with Intel® Optane™ memory devices is a platform feature and capability. Along with the minimum requirements as noted in Section 1.2, specific settings must be made in the system BIOS.

To make setup easy, follow the steps and actions below depending on if this is a new system build or an Intel® Optane™ memory device being added to an existing system, i.e. setup with OS installed.

2.1 New System Build and Setup

This is defined as a new system (Motherboard, Processor, DRAM etc. installed) with no operating system installed.

Follow the steps below to properly configure a system for the Intel® Optane™ memory H series.

1. Review the Minimum Requirements (Section 1.2) and Limitations to Keep in Mind (Section 1.4) before proceeding.
2. Install Hardware:
    a. Intel® Optane™ memory H Series module to the supported PCIe x4 NVMe M.2 connector on the motherboard. (See here for the proper way to do this.)

    Note: Confirm supported connector with the System/Board manufacturer.
3. Configure the System BIOS (see Section 3).
4. Install the Latest Windows 10 x64 bit or greater Operating System (see Section 4).

    Note: The OS should NOT be installed on the Intel® Optane™ memory portion of the module.
5. Install the Intel® Optane™ Memory Capable Software (see Section 5).

2.2 Upgrade a Current System by Adding an Intel® Optane™ Memory H Series Device

This is defined as a system that contains a supported Windows x64 bit Operating System and an Intel® Optane™ memory H Series module will be added to the system without reinstalling the OS.

Note: If any issues are encountered during the upgrade process, see Section 7 for Troubleshooting options.

Follow the steps below to properly upgrade a system:

1. Review the minimum requirements (Section 1.2) and Limitations to Keep in Mind (Section 1.4) before proceeding.
2. Install Hardware:
    a. Intel® Optane™ memory H Series module to the supported PCIe x4 NVMe M.2 connector on the motherboard. (See here for the proper way to do this).

    Note: Confirm supported connector with the System/Board manufacturer.
3. Check the Disk Partition Structure (MBR vs. GPT, see Section 9).
    a. GPT is supported, MBR is not. The process in Section 9 describes methods to check the current structure and update to GPT if necessary. This will also update the Boot Settings to the required UEFI if needed.
    b. If this process cannot be completed, backup all data and start the process as outlined in Section 2.1 as the Operating System will need to be reinstalled.

4. Once the Disk Partition Structure is GPT, next step is to Confirm the BIOS settings are the following:

   Important Note: If the settings in system do not match these, do not change them directly in the BIOS as this could result in the drive no longer booting to the OS, or data loss.

   a. **Boot Settings** = *UEFI* (Should already be set as a result of step 3).

   b. Non-Intel® VMD Capable Platforms (Intel® Optane™ memory H Series capable platforms before 11th Generation Core™ platforms).

      Note: If settings are not set as noted below, backup all data and start the process as outlined in Section 2.1.

      i. **SATA Mode** = *Intel® RST Premium….*

      ii. **Remapping** = *Disable* or *Not RST Controlled*

         1. This must be disabled for the ports that contain both sides of the Intel® Optane™ memory H Series module.

   c. Intel® VMD Capable Platforms (see Section 1.3).

      Note: If settings are not set as noted below, backup all data and start the process as outlined in Section 2.1.

      i. **VMD Controller** = *Enable*

      ii. **VMD Storage Ports** = *Enable*

         1. This needs to be enabled for both sides of the Intel® Optane™ memory H Series module.

5. Install the Intel® Optane™ Memory and Storage Management application (Section 5);

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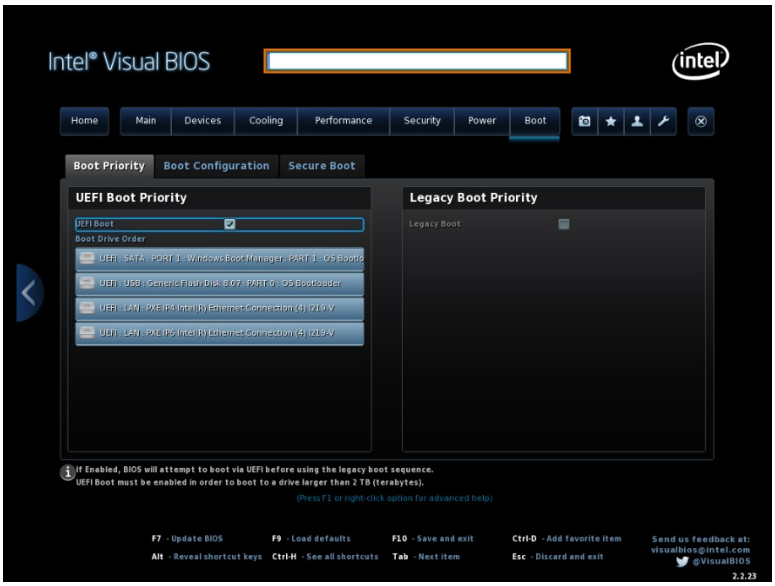
3 System BIOS Settings

UEFI-compliant system BIOS that includes the latest supported Intel® Rapid Storage Technology (Intel® RST) pre-OS UEFI driver. Check with the system vendor to confirm this support, and to verify the current version included in your system's BIOS.

Note: For best compatibility, Intel recommends having the same baseline (i.e. 17.x) pre-OS driver in the system BIOS as the Intel® RST Windows runtime driver version.

The 11th Generation Intel® Core™ Processors enabled support for Intel® VMD. This changes the way the BIOS is configured for Intel® Optane™ memory devices vs. earlier platforms. This section will separate these into Intel® VMD capable and Non-Intel® VMD capable. Check with the system vendor to determine if your platform/processor is Intel® VMD capable or not. The differences between these two platform setups for the Intel® Optane™ Memory H Series are summarized in Section 1.3.

In both cases, Intel® Optane™ memory devices only support UEFI, make sure the Boot Settings are set properly before installation of the OS.



3.1 Non-Intel® VMD Capable Platforms

This section describes the specific BIOS settings that must be set on systems that do not support Intel® VMD. This would include all Intel® Optane™ memory H Series capable platforms before the 11th Generation Core™ Processor Platforms.

Note: The field names and menu locations in the BIOS may vary depending on the vendor; confirm the location in the manufacturer's user guide/support site.

After enabling *UEFI* in the Boot Settings, set the SATA Mode to *Intel® RST Premium* and make sure that remapping for the ports (PCIe connectors) that contain the Intel® Optane™ memory H Series device are *Disabled* or *Not RST Controlled.*

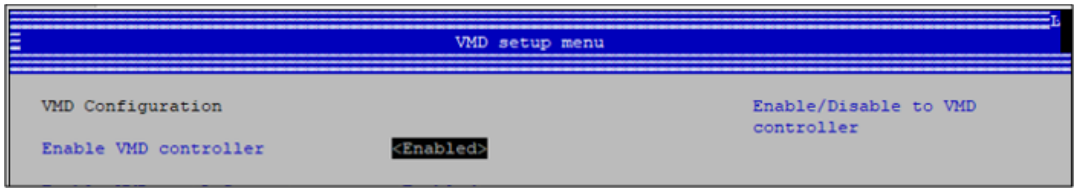
Keep in mind that until acceleration is enabled, both sides of the Intel® Optane™ memory H Series module will be detected as two separate storage devices in the OS.

3.2 Intel® VMD Capable Platforms

This section describes the specific BIOS settings that must be set on systems that support Intel® VMD. The 11th Generation Intel® Core™ Processors enabled this support with Intel® RST driver version 18.0.1.x and greater.

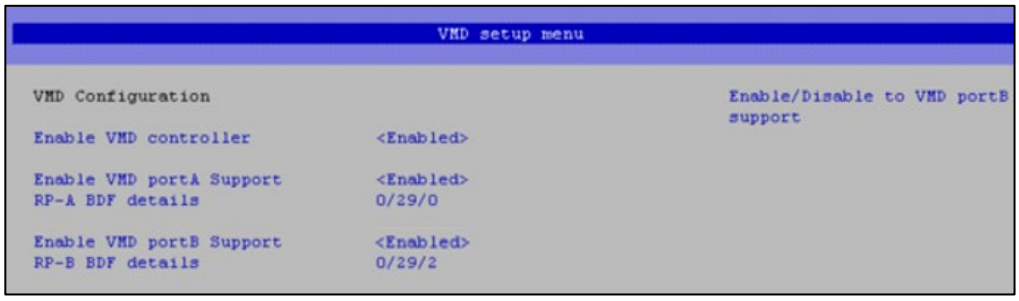
Note: The field names and menu locations in the BIOS may vary depending on the vendor, confirm the location in the manufacturer's user guide/support site.

Step 1: After enabling *UEFI* in the Boot Settings, *Enable* the VMD Controller.



Step 2: Set the Ports for both sides (the Intel® Optane™ memory media 'fast media' and the Intel® QLC 3D NAND media 'slower media') to *Enabled*. This will align the module to be Intel® VMD controlled.

Keep in mind that until acceleration is enabled, both sides of the Intel® Optane™ memory H Series module will be detected as two separate storage devices in the OS.



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4 Operating System Installation

This section describes the Operating System installation process and how this is different between Intel® VMD capable platforms and Non-Intel® VMD capable platforms (see Section 1.3).

Requirements:

Microsoft Windows 10 x64 bit (Version 1703/Build 15063) or greater required.

Note: The Intel® Optane™ Memory and Storage Management application (see Section 5.1) requires Microsoft Windows 10 x64 bit (Version 1803/Build 17134) or greater.

Non-Intel® VMD capable platforms

No additional steps required; the OS installation software should detect all drives in the system during the installation process. Follow the instructions and guidance to complete installation.

Intel® VMD Enabled platforms

An additional step during the OS installation process is required for the operating system to detect drives under Intel® VMD control.

The Intel® RST driver version 18.0.1.x and greater is required for Intel® VMD capable platforms. This driver version is not yet part of the Microsoft Windows installation package.

During the OS installation, any drives that have been enabled in the BIOS for Intel® VMD management will not be detected until a supported driver is *loaded.* Follow the instructions below for loading.

1. Go to the appropriate download link below for the platform and **select/download** the

   f6flpy-x64 - VMD.zip package 10th and 11th Generation Platforms Intel® RST Drivers

   f6vmdflpy-x64.zip package 11th and 12th Generation Platforms Intel® RST Drivers
2. **Unzip** the package to a USB drive.
3. Start the Windows OS Installation process with the USB drive connected to the system.
4. Follow the prompts until it asks for the 'drive to install to' page.
5. If the drive for installation is not shown, do the following to load the Intel® RST driver downloaded in Step 1 above.
   a. **Click** *Load Driver*
   b. **Browse** to the driver on the USB drive
   c. **Select** the driver, *iastorVD*, and **Click** *Next* (The drive should now be available for OS installation.)

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5 Intel® Optane™ Memory Capable Applications

The Intel® Optane Memory and Storage Management application provides management functionality for the various capabilities of the Intel® Rapid Storage Technology (Intel® RST) management storage subsystem.

This section will explore the capabilities specific to the Intel® Optane™ memory functionality.

5.1 Intel® Optane™ Memory and Storage Management Application

This section provides an overview of the steps to configure the Intel® Optane™ memory capable device with the Intel® Optane™ Memory and Storage Management application on a computer with the operating system already installed on a platform that meets the requirements outlined in Section 1.2.

This application is only available through the Microsoft Store and requires the Intel® RST Windows driver to be installed on the system before downloading.

Intel® RST version 17.9.1.x and greater do the following to make this easy:

- Install the Intel® RST driver
- Uninstall Legacy applications that have been EOL'd, if found on the system. See here for more information.
- Starts the installation process of the Intel® Optane™ Memory and Storage application from the Microsoft Store.

Download/install the application:

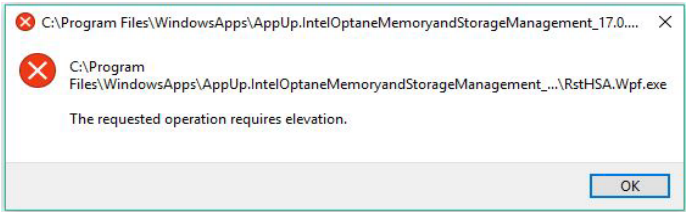
1. **Download** the latest version of the software, *SetupRST.exe*

   10th and 11th Generation Platforms Intel® RST Drivers

   11th and 12th Generation Platforms Intel® RST Drivers

2. Follow the installation process and select options that apply to your system.
3. **Reboot** the system once installation completes.
4. Once the system resumes, the process will start in the background to download the application from the Microsoft Store. This may take several minutes, please be patient, a notification will appear in the notification area by the clock in the taskbar and the program will be in the Start menu when complete.

After the installation is complete, when launching the application, you may encounter the following error message. These extra steps are not required in version Windows 10 (version 1809) and later.



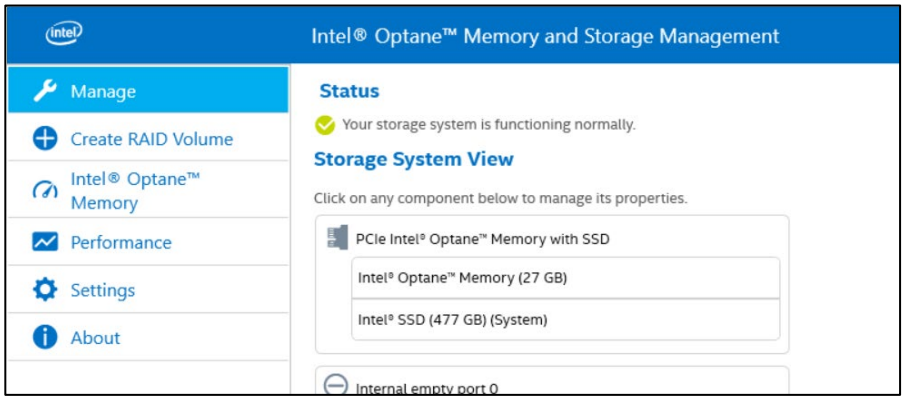
In some operating system versions this error may occur when the application is not 'Run as Administrator'. To run the application as Administrator:

1. **Press** the *Windows key* and locate the application (this may be under the *Intel* folder)
2. **Right-click** on the application
3. **Click** *More* in the drop over menu
4. **Click** *Run as Administrator* in the resulting menu

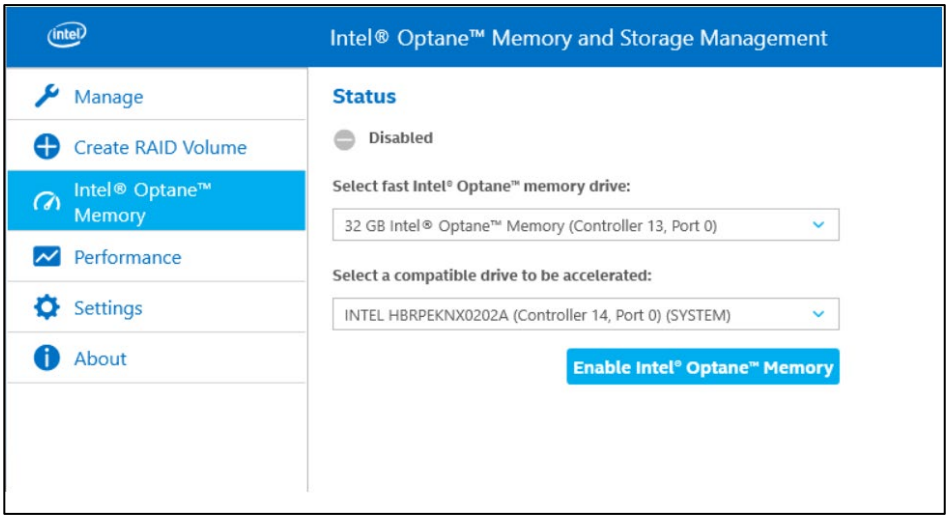
5.1.1 Enabling Acceleration

Note: When enabling acceleration on the Intel® Optane™ memory H Series in a mobile platform, it is required that the system be plugged in (using AC power).

1. **Open** the application and you will see the storage devices and volumes currently contained in the system in the 'Manage' tab.



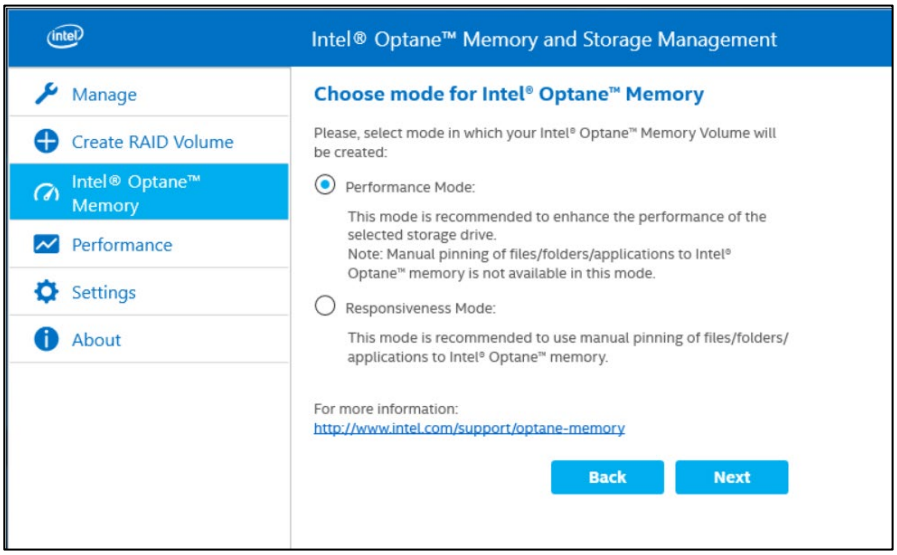
2. **Navigate** to the *Intel® Optane™ Memory* tab, where you will see the current state of the volume. The drop-down menu will display the available Intel® Optane™ memory combinations that can be selected.
    a. If the word (SYSTEM) appears beside the compatible drive to be accelerated, this indicates that the operating system is installed on that device.
3. **Click** the *Enable Intel® Optane™ Memory* button.



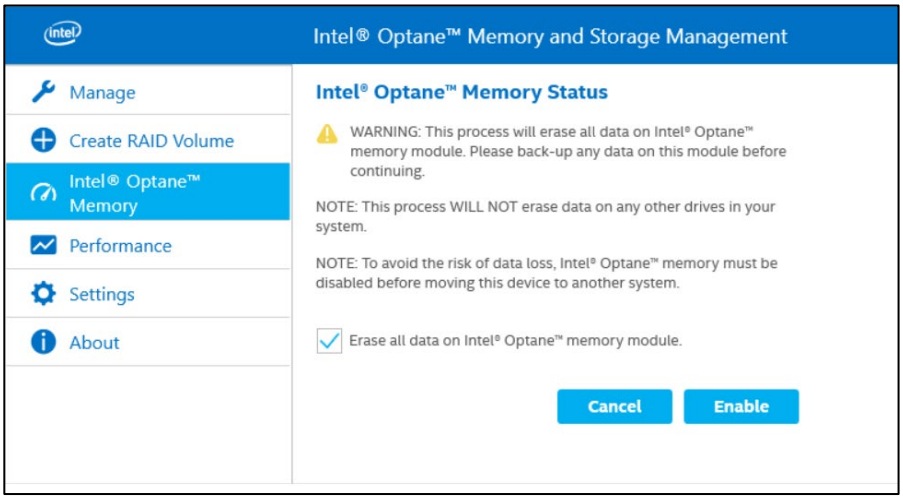
4. **Select** *Performance* or *Responsiveness Mode*, **Click** *Next.*

Note: Starting with the Intel® RST driver version 17.8.x there is an additional step to select Performance or Responsiveness mode. Please see Section 6.2 for more information as this relates to the Pinning capability.

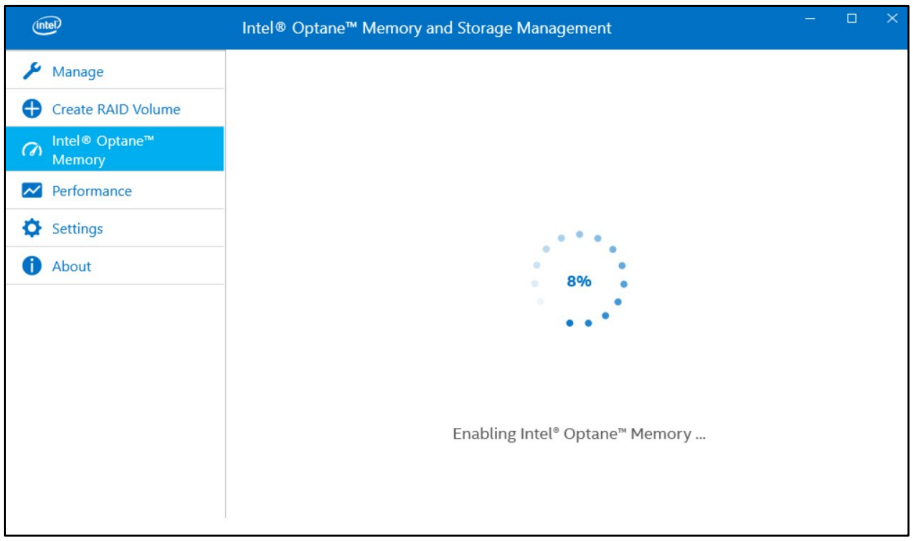
Note: Intel RST driver version 19.x and later will no longer support the pinning functionality



5. Confirm understanding that all data will be removed from the Intel® Optane™ memory portion of the device, **Click** *Enable.*

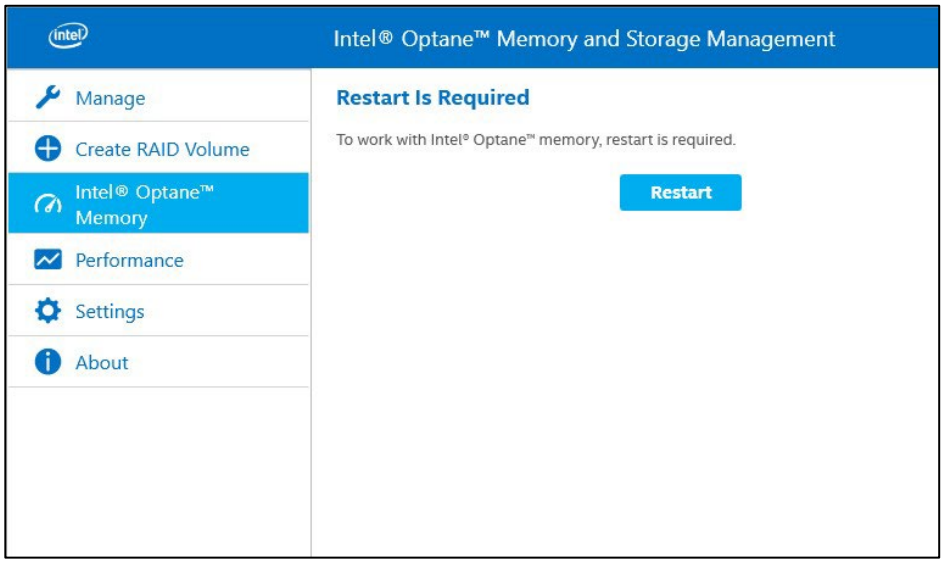


6. Acceleration is being enabled. The Intel® Optane™ memory 'fast media' and the 'slower media' are being 'paired' into a single volume.



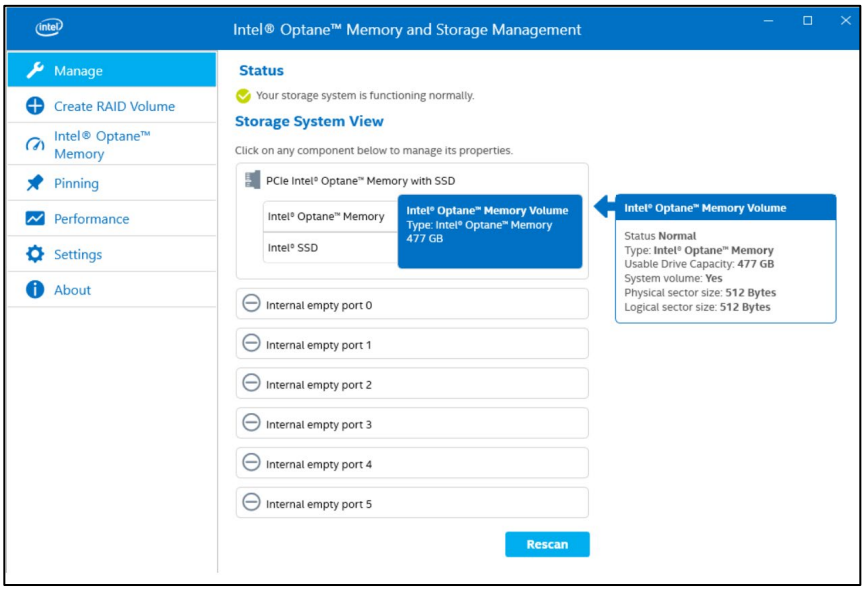
7. A restart is required once volume creation is complete; do so by **clicking** *Restart*.

   a. If the module contains at least 32 GB of Intel® Optane™ memory capacity, just before entering the OS you may see a screen that shows some finishing details of the enabling process. This is related to the scheduling of data cache and is not supported on 16 GB devices.

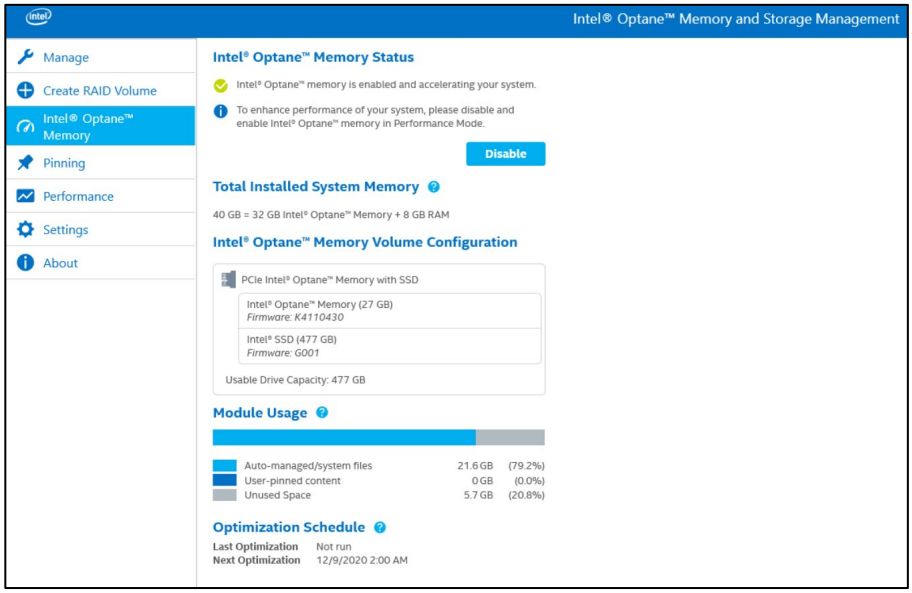


8. After rebooting the system, enter the application and the volume will be shown in the Manage and Intel® Optane™ Memory tabs.

    a. The volume will also be shown in the OS-related applications such as Device Manager and Disk Management. The individual drives will no longer be visible in these windows.

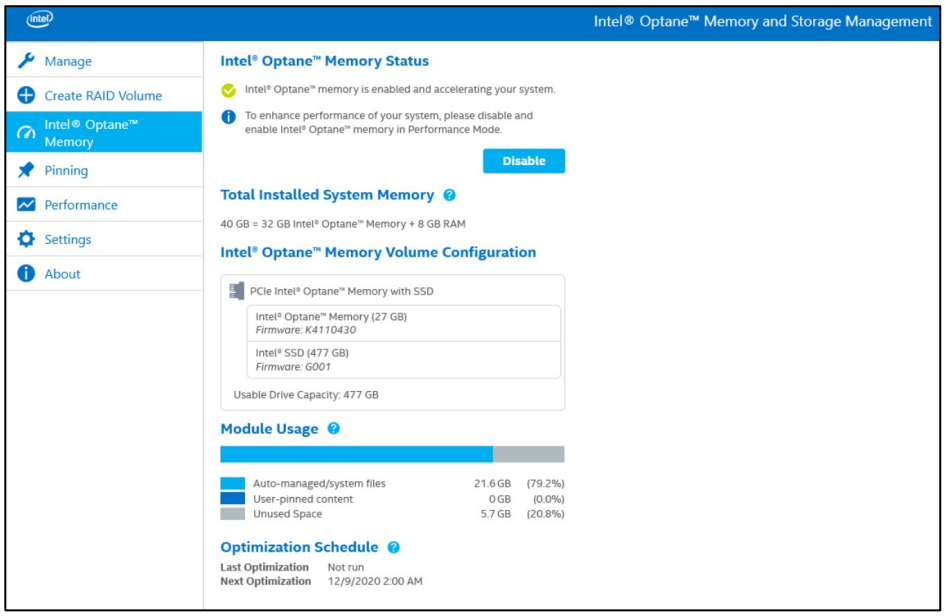


On devices with 32 GB or more Intel® Optane™ memory capacity, additional features such as Pinning and Optimization (cache) scheduling will be available. For these devices the 'Intel® Optane™ Memory' page will look like the following image:

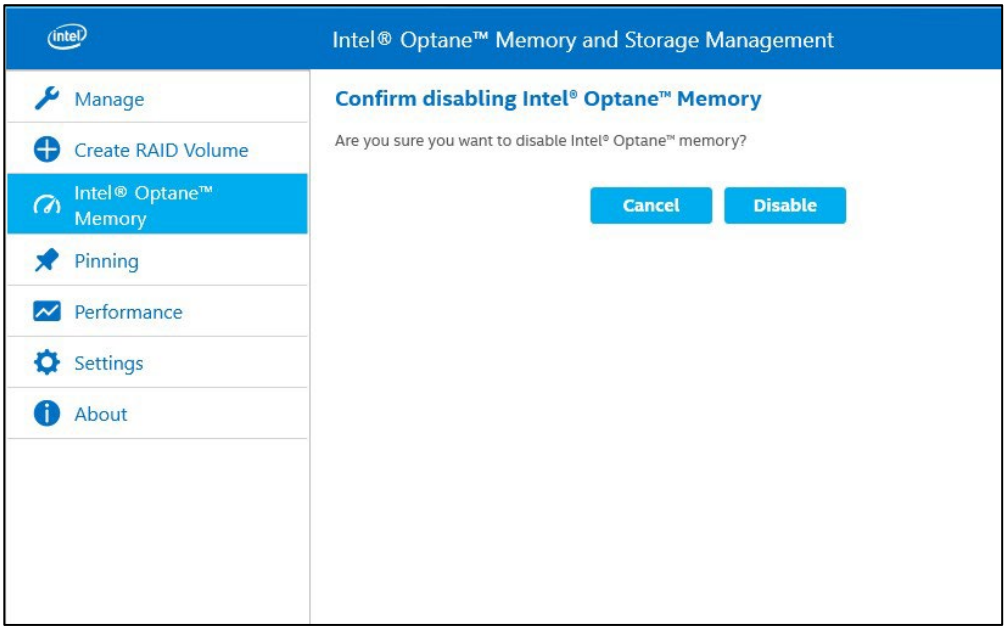


5.1.2 Disabling Acceleration

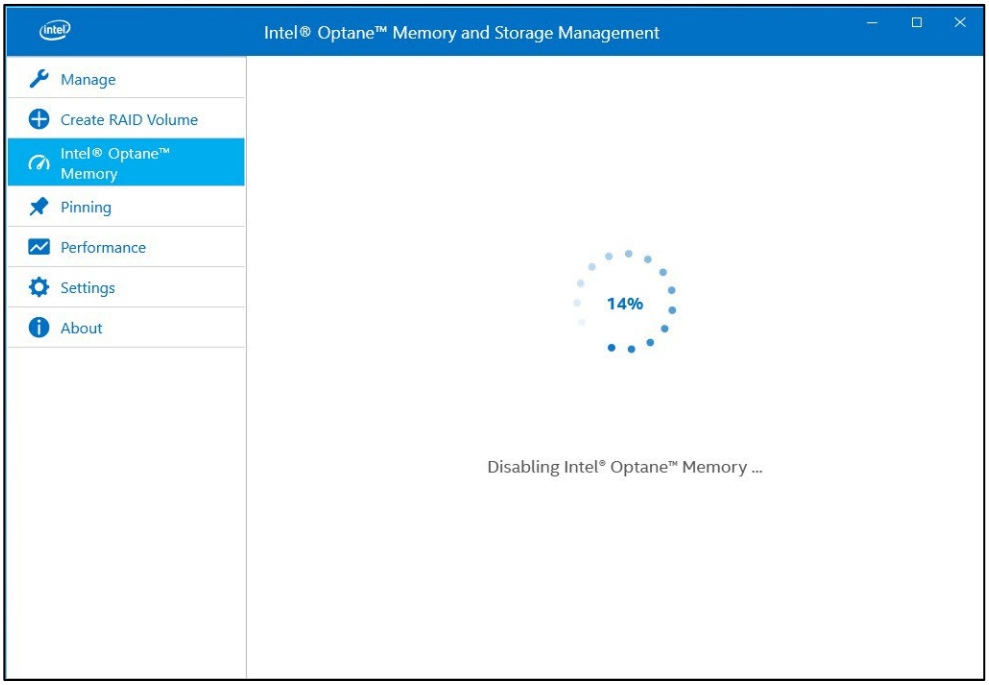
1. **Open** the application and **navigate** to the *Intel® Optane™ Memory* tab and **click** *Disable*.



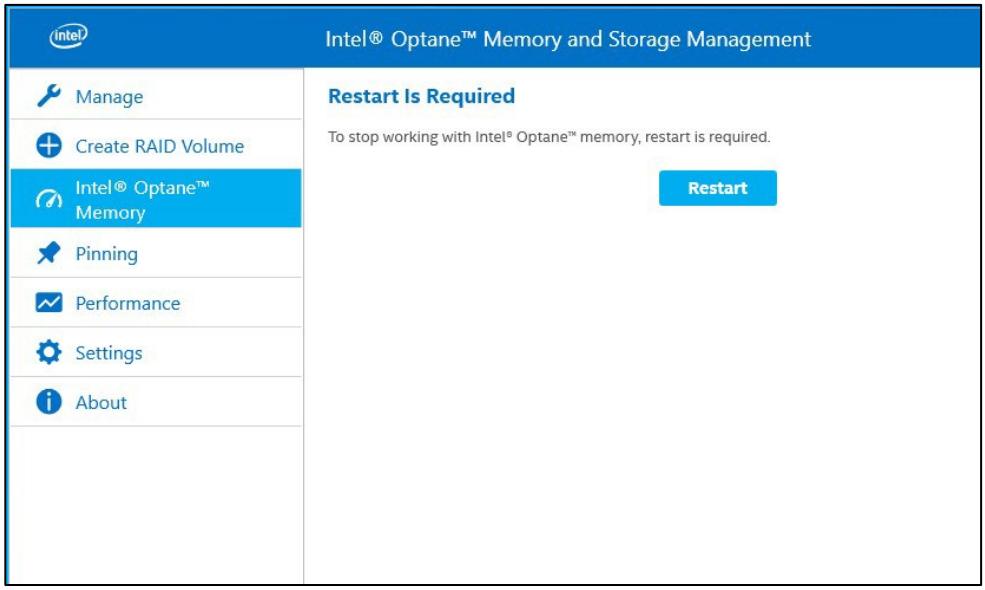
2. Confirm that you wish to disable acceleration; **click** *Disable*.



3. Acceleration is being disabled. The Intel® Optane™ memory 'fast media' and the 'slower media' are being separated (un-paired).

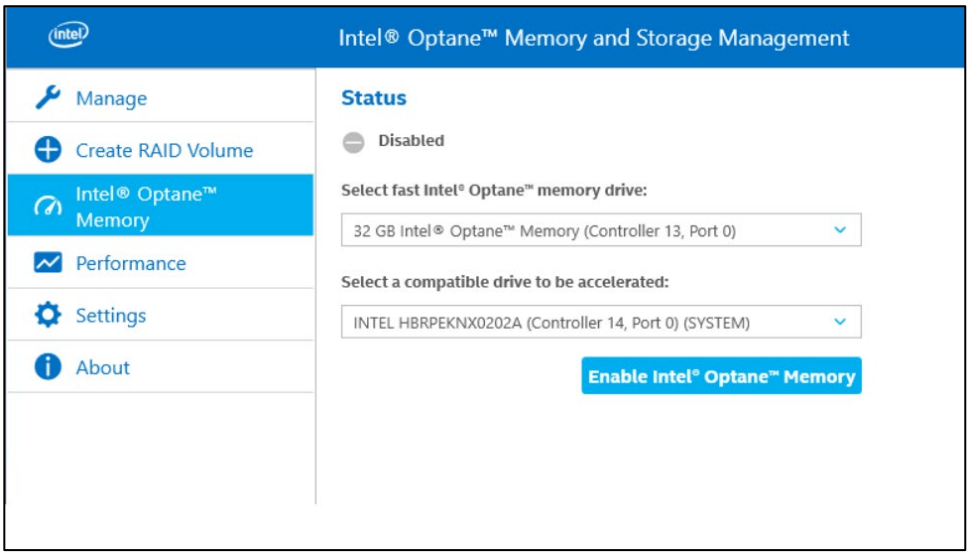


4. Once complete, **click** *Restart*.

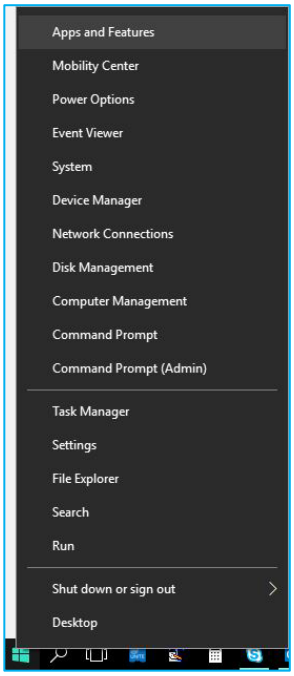


5.1.3 Uninstalling the Application

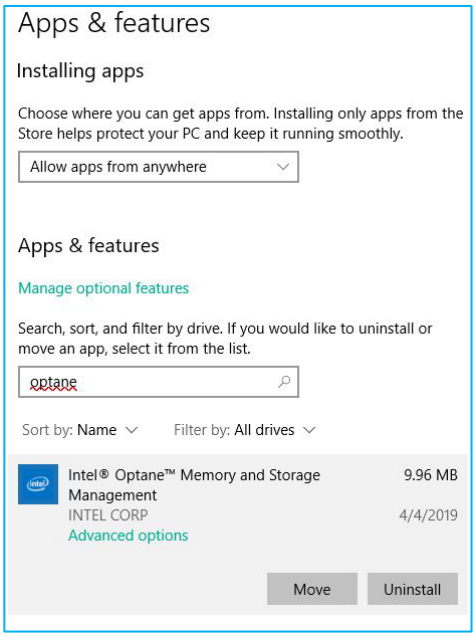
1. Verify that acceleration has been disabled before uninstalling the user interface (UI).



2. **Right-click** on the *Windows start menu* and **click** *Apps and Features*.



3. **Search** for *Optane* and **click** *Uninstall*.



4. Once complete, a system restart is required.

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6 Additional Features/Capabilities

This chapter provides information on additional features/capabilities provided by Intel® Optane™ memory capable applications.

6.1 Data Drive Acceleration (DDA)

Data drive acceleration, or DDA, is the capability to accelerate a 'slower media' which does not contain an operating system, only data, with Intel® Optane™ memory.

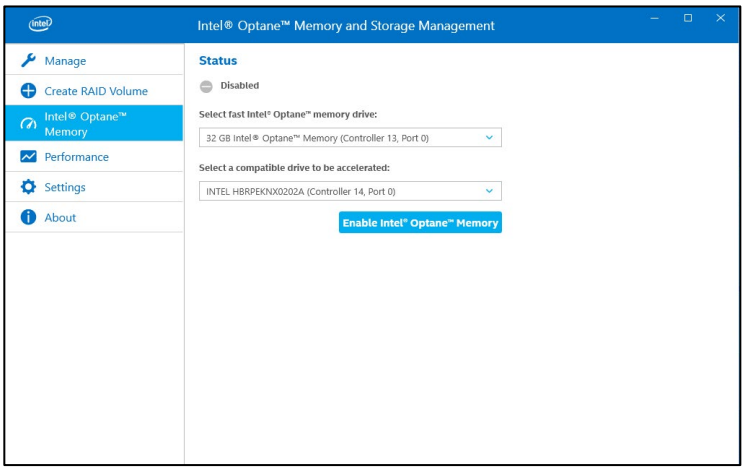
- Statistics, as shown in the Intel® Optane™ memory application, are not available with DDA
- Systems with more than one bootable drive are not supported and results cannot be guaranteed

Note: Data drives must still be formatted with a GPT partition and Type Basic.

6.1.1 Enable/Disable Acceleration

The process to Enable/Disable acceleration (Section 5) continue to apply to DDA.

Note: When selecting a drive for acceleration, make sure to select the NAND side of the Intel® Optane™ memory H Series, this should look something like the image below.

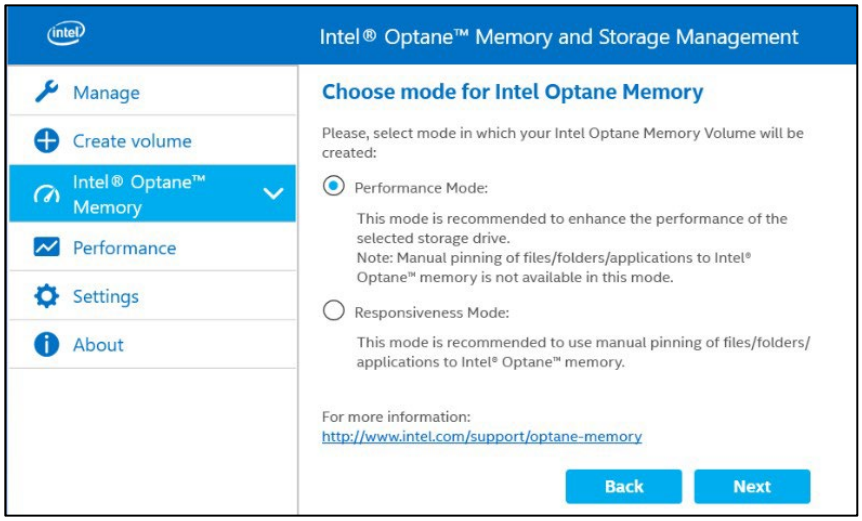


6.2 Pinning

Pinning enables customized responsiveness by allowing the selection of specific files, folders, and applications to be accelerated.

- Pinning is supported on 32 GB or greater capacity Intel® Optane™ memory devices only
- Intel RST driver version 19.x and later will no longer support the pinning functionality

Note: Starting with the Intel® RST driver version 17.8.x, when enabling acceleration in the Intel® Optane™ Memory and Storage Management application the 'Responsiveness' selection must be made for Pinning to be offered.



See additional information about the Pinning feature here:
https://www.intel.com/content/www/us/en/support/articles/000028779.html

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7 Troubleshooting

This section includes examples of errors that could occur during installation of the Intel® Optane™ memory SW/driver packages. For more information and help on these errors, please also refer to the error code and message article for more details: https://www.intel.com/content/www/us/en/support/memory-and-storage/intel-optane-memory/000024113.html or contact Intel Customer Support.

Additional Troubleshooting options can be found here:
https://www.intel.com/content/www/us/en/support/articles/000055140.html

- Images are current at the time of publication. Some text may change as application updates are made.
- Errors listed below are only samples and not a comprehensive list of errors for all applications.

7.1 Device Detection Issues

If the module is not detected in the Windows environment, or system BIOS, see the following for some troubleshooting to try and determine what the issue may be.

For Intel® Optane™ memory H Series devices:
https://www.intel.com/content/www/us/en/support/articles/000033122.html

7.2 Cache Rebuild Occurs on Reboot

If a hard reboot (user presses the power button) or unexpected power loss occurs on a system with acceleration enabled, upon reboot a message will display stating a cache rebuild is in process. This state is expected, as a result of the power loss.

7.3 System will not Boot to OS, or volume not detected in OS

If the either side of the Intel® Optane™ memory H Series (the Intel® Optane™ memory 'fast media' or Intel® 3D QLC NAND 'slower media') is not detected by the Intel® RST UEFI driver, the driver will protect the current data on the drive by disabling it and not exposing it to the boot manager. This gives the user an opportunity to take additional steps to determine what the issue may be.

It is recommended that the end user power down the platform and try the following to resolve this issue.

1. Enter the BIOS and **navigate** to the *Intel® RST menu*.
2. If the 'fast media' and/or 'slower media' portion of the device is not present, exit the Intel® RST menu and confirm all BIOS settings as defined in Section 3 are correctly applied.
3. If the settings are correct, make sure the module does not appear damaged.

If the 'fast media' and/or 'slower media' portion of the device is present, check the system BIOS state of the module and contact your system vendor support team or Intel Customer Support for assistance.

7.4 Hardware Failure

7.4.1 Media Failure and Data Recovery

No Intel® RST data recovery tools are available for a drive that has experienced mechanical or electrical failure and is considered 'inoperable'. If the system encounters an unrecoverable failure of the media, there is no recovery/repair available.

7.4.2 Media Replacement Procedure

This section documents support for Intel® Optane™ memory capable module upgrades or replacements for systems that already have acceleration enabled. Whether upgrading/replacing the module, the following steps will apply.

Note: To mitigate potential data loss, it is critical to backup all data before proceeding with the steps below.

1. Disable Acceleration
   a) Option 1: Within the Operating System
      i) Follow steps in Section 5.1.2 for how to do this through the application.
   b) Option 2: Within the system BIOS:
      i) **Enter** the *system BIOS*
      ii) **Navigate** to the *Intel® RST menu*
      iii) **Double Click** on each of the volume members and 'Disassociate' or 'Reset to non-optane'
2. Swap out the Intel® Optane™ memory H Series module to be replaced.
   a) Power down the computer.
   b) Open the computer and locate the media to be replaced.

Note: Consult the computer manufacturer for the location of the slot for the media and instructions to remove/insert the M.2 module.

   c) Close the computer and power it on.
   d) Boot into the Windows OS.

Note: If the OS was installed on the Intel® Optane™ memory H Series, follow the steps in Section 4 to install the OS, and Section 5 to install the application.

3. Re-enable Acceleration
   a) Follow the steps in Section 5.1.1

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8 Error Related to Last Partition Resizing

At least 5 MB of continuous unallocated space must be left free for the Intel® RST package to use for metadata when building and management of the Intel® Optane™ memory volume.

For options on utilities that can be used to free this space after installation, see the following article:

Unsupported System Drive: Last Partition Unable to Resize Error

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9 Verify/Make Changes to Drive Partition Structure (MBR vs. GPT)

System acceleration with Intel® Optane™ memory devices is only supported with drives that are formatted with the GPT (GUID Partition Table) partition structure.

Depending on how the Operating System on your system was originally installed, this structure may be the Legacy MBR (Master Boot Record) supported on previous Windows versions.

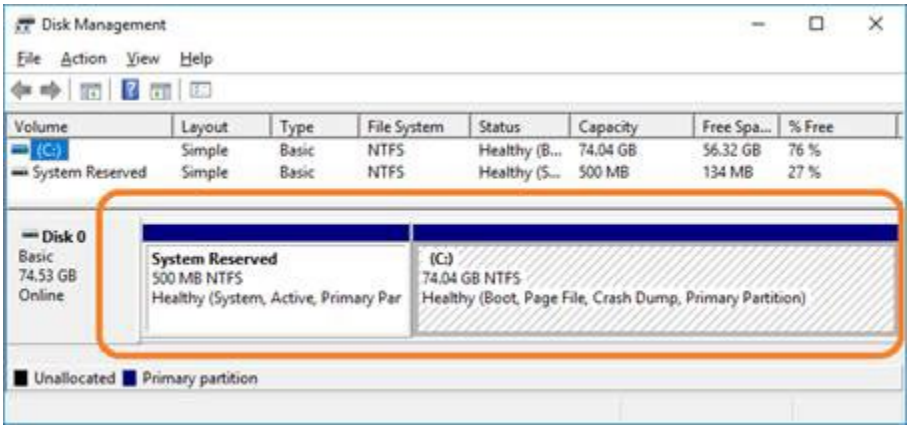
Use the information below to

- Verify the current Structure drive to be accelerated
- Process to convert Structure to GPT (if needed)

9.1 Verify Current Drive Partition Structure

1. **Boot** into *Windows*
2. Open Disk Manager (**Windows +x key**, then **click** *Disk Manager*)
3. Locate the disk that you want to accelerate. (Image below is an example of a primary system boot disk.)

Note: For the Intel® Optane™ Memory H Series this would be the Intel™ 3D QLC NAND portion of the device. Since acceleration is not enabled, this will be listed as a separate storage device.



4. **Right-click** the *disk* shown as (Disk x, Basic, Capacity, Online) on the left. (Where it says Disk 0 as example in this image.)
5. **Select** *Properties*
6. **Click** the *Volumes tab*
7. Here you can confirm the Partition style
8. If MBR, continue onto Section 9.2

9.2 Convert from MBR to GPT with MBR2GPT.exe

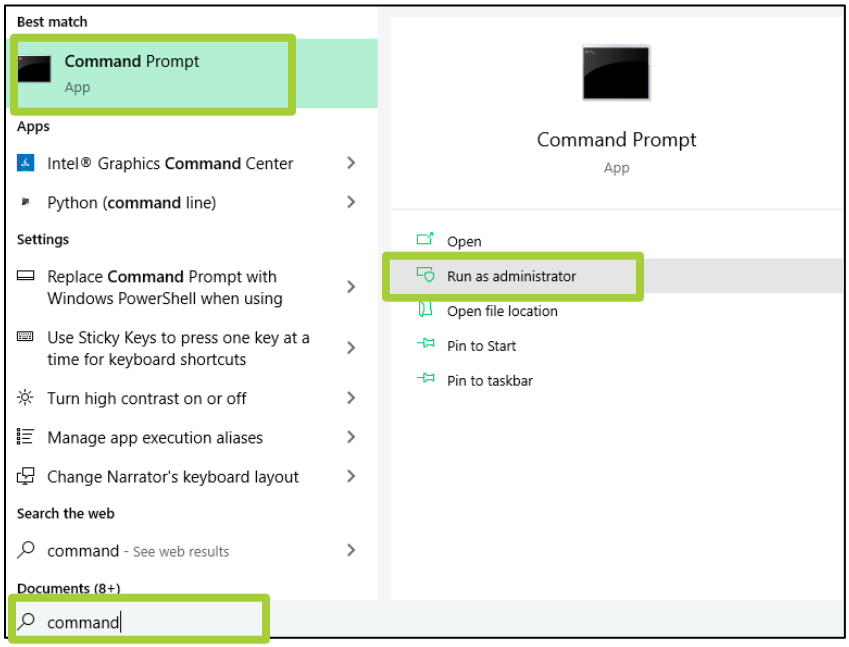
Requirements:

- Windows 10 Creators Update x64 (Version 1703, Build 10.0.15063) or later.
- A computer able to boot UEFI. In the BIOS setup, you should see options for UEFI boot. Confirm with your computer manufacturer for support.

Instructions:

1. Open Command Prompt with administrator privileges:

   a. **Press** *Windows Key +x*
   b. **Type** `command` and **select** *Run as administrator* from right side panel.



2. **Type** the following: `mbr2gpt.exe /convert /allowfullOS`
3. Shut down and boot into the BIOS.
4. Change your settings to UEFI mode.

Note: This will be a change in your Boot settings from 'Legacy' to 'UEFI'. Confirm with your system manual on the location of this setting.

For more information see: https://www.intel.com/content/www/us/en/support/articles/000024558.html

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10 Windows Recovery Environment

10.1 Preparing the Windows 10 OS Recovery (Advanced)

This section steps through the process of preparing a Windows 10 OS image for Windows Recovery. 'Injecting' the Intel® RST driver into the OS Recovery Image/tools before installing the OS allows for the possible recovery of a system in the event of damage to the OS image.

Requirements:

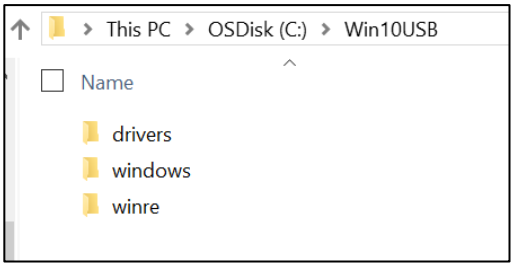
- Windows Assessment and Deployment Kit (ADK) installed
- Windows 10 64b ISO
- Latest F6 Intel® Rapid Storage Technology SW/driver package available from
  - *f6flpy-x64 - VMD.zip* package 10th and 11th Generation Platforms Intel® RST Drivers
  - *f6vmdflpy-x64.zip* package 11th and 12th Generation Platforms Intel® RST Drivers
- USB Key for installation

Steps:

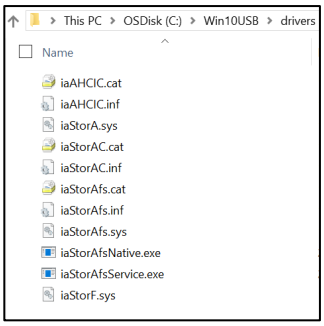
1. Create a USB Bootable Key from the Windows 10 OS ISO Image.

Note: Consult the computer manufacturer for the location of the slot for the media and instructions to remove/insert the M.2 module.

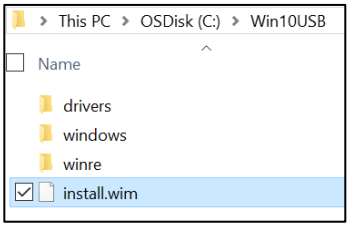
2. Create a temporary working directory on the local PC (e.g. C:\Win10USB).
3. In the working directory, **create** 3 sub directories named *windows, winre and drivers.*



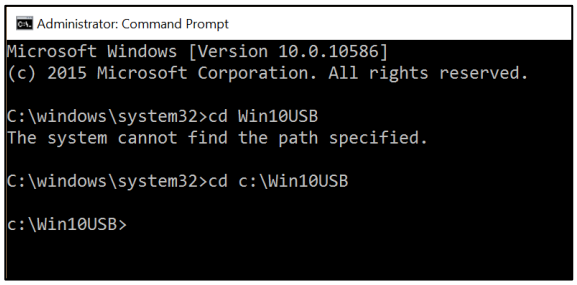
4. **Extract** the *Intel® Rapid Storage Technology driver* to the "drivers" subdirectory.



5. From the Windows 10 USB Install key, **copy** the *install.wim* file from the "sources" directory to the working directory C:\Win10USB.



6. **Open** a *Command Prompt as Administrator* and change to the working directory (e.g. cd C:\Win10USB). Make sure that all folders and Windows Explorer are closed before starting this process.



7. Based on the Windows 10 version, determine which index number to modify. Choose the index that matches the Windows 10 version being used.

To determine the index, run the command: `dism /get-wiminfo /wimfile:install.wim`

The example below modifies Index 2. Steps can be repeated to modify additional versions.

```
c:\Win10USB>dism /get-wiminfo /wimfile:install.wim

Deployment Image Servicing and Management tool
Version: 10.0.10586.0

Details for image : install.wim

Index : 1
Name : Windows 10 Pro
Description : Windows 10 Pro
Size : 14,747,431,455 bytes

Index : 2
Name : Windows 10 Home
Description : Windows 10 Home
Size : 14,586,404,734 bytes

The operation completed successfully.

c:\Win10USB>
```

8. Modify the "install.wim" file by running the following commands.
   Mount the Windows Image:
   `dism /mount-image /imagefile:install.wim /index:2 /mountdir:windows`

```
c:\Win10USB>dism /mount-image /imagefile:install.wim /index:2 /mountdir:windows

Deployment Image Servicing and Management tool
Version: 10.0.10586.0

Mounting image
[==========================100.0%==========================]
The operation completed successfully.
```

9. Add the Intel® Rapid Storage Technology drivers to the Windows Image:
   `dism /image:windows /add-driver /driver:drivers /forceunsigned /recurse`

```
c:\Win10USB>dism /image:windows /add-driver /driver:drivers /forceunsigned /recurse

Deployment Image Servicing and Management tool
Version: 10.0.10586.0

Image Version: 10.0.14393.0

Searching for driver packages to install...
Found 3 driver package(s) to install.
Installing 1 of 3 - c:\Win10USB\drivers\iaAHCIC.inf: The driver package was successfully installed.
Installing 2 of 3 - c:\Win10USB\drivers\iaStorAC.inf: The driver package was successfully installed.
Installing 3 of 3 - c:\Win10USB\drivers\iaStorAfs.inf: The driver package was successfully installed.
The operation completed successfully.
```

10. Mount the Windows Recovery Image:
    `dism /mount-image /imagefile:c:\Win10USB\windows\windows\system32\recovery\winre.wim /Index:1 /mountdir:winre`

```
c:\Win10USB>dism /mount-image /imagefile:c:\Win10USB\windows\windows\system32\recovery\winre.wim /Index
:1 /mountdir:winre

Deployment Image Servicing and Management tool
Version: 10.0.10586.0

Mounting image
[==========================100.0%==========================]
The operation completed successfully.
```

11. Add the Intel® Rapid Storage Technology driver to the Windows Recovery Image:
    `dism /image:winre /add-driver /driver:drivers /forceunsigned /recurse`

```
c:\Win10USB>dism /image:winre /add-driver /driver:drivers /forceunsigned /recurse

Deployment Image Servicing and Management tool
Version: 10.0.10586.0

Image Version: 10.0.14393.0

Searching for driver packages to install...
Found 3 driver package(s) to install.
Installing 1 of 3 - c:\Win10USB\drivers\iaAHCIC.inf: The driver package was successfully installed.
Installing 2 of 3 - c:\Win10USB\drivers\iaStorAC.inf: The driver package was successfully installed.
Installing 3 of 3 - c:\Win10USB\drivers\iaStorAfs.inf: The driver package was successfully installed.
The operation completed successfully.
```

12. Un-mount the Windows Recovery Image:
    `dism /unmount-wim /mountdir:winre /commit`

```
c:\Win10USB>dism /unmount-wim /mountdir:winre /commit

Deployment Image Servicing and Management tool
Version: 10.0.10586.0

Image File : c:\Win10USB\windows\windows\system32\recovery\winre.wim
Image Index : 1
Saving image
[==========================100.0%==========================]
Unmounting image
[==========================100.0%==========================]
The operation completed successfully.
```

13. Un-Mount the Windows Image:
    `dism /unmount-wim /mountdir:windows /commit`

```
c:\Win10USB>dism /unmount-wim /mountdir:windows /commit

Deployment Image Servicing and Management tool
Version: 10.0.10586.0

Image File : c:\Win10USB\install.wim
Image Index : 2
Saving image
[==========================100.0%==========================]
Unmounting image
[==========================100.0%==========================]
The operation completed successfully.
```

14. **Copy** the updated *install.wim* in the working directory back to the "sources" directory on the USB install key.

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