

# Intel® Optane™ Memory: Deployment and Management Guide for Enterprise IT

## Everything you need to know about PC fleet management for systems with Intel® Optane™ memory, from initial deployment to end of life

This implementation guide provides key learnings and configuration insights to integrate Intel® Optane™ memory with optimal business value.

If you are responsible for...

- **Business strategy:**  
You will better understand how implementation options can impact business capabilities.
- **Technology decisions:**  
You will learn about available technology alternatives, proven methods to mitigate risk, and techniques to maximize value before starting a project.

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### Introduction

Intel® Optane™ memory is a system acceleration solution for compatible Intel® platforms. This solution utilizes Intel® Optane™ technology, based on Intel® Optane™ memory media, along with the Intel® Rapid Storage Technology (Intel® RST) driver. By conceptually placing this new memory media between the processor and slower storage devices such as hard disk drives (HDDs) or NAND-based solid state drives (SSDs), commonly used applications and files are stored closer to the processor. This allows the system to access this information more quickly and improve overall system responsiveness.

The Intel Optane memory system acceleration solution uses Intel RST to concatenate Intel Optane memory (sometimes called the “fast drive”) and data storage drive (sometimes called the “slow drive” or “backing store”) into one virtual drive called the Intel Optane memory volume. To the end user and to OS management tools, the Intel Optane memory volume appears as a single drive.

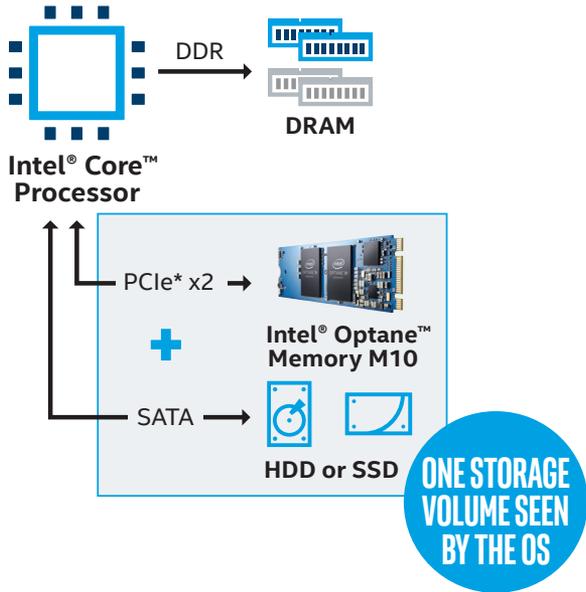
The Intel Optane memory system acceleration solution is currently delivered with three products: Intel® Optane™ memory M10, Intel® Optane™ memory H10 with solid state storage, and Intel® Optane™ memory H20 with solid state storage. Intel Optane memory M10 is a discrete module that can accelerate any SATA backing store, and select NVMe Intel SSDs. Intel Optane memory H10 with solid state storage and Intel Optane memory H20 with solid state storage both contain Intel Optane memory media and Intel® QLC 3D NAND on a single M.2 device.

Intel Optane memory can be added to a PC in two main ways:

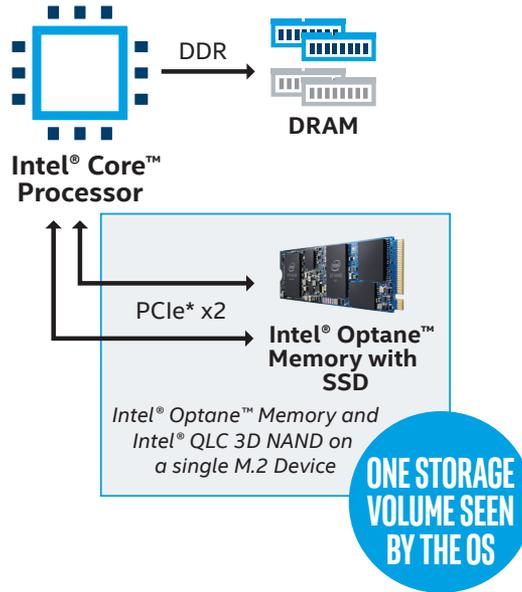
- An end user purchases and installs an Intel Optane memory module, downloads and installs Intel RST software, then enables acceleration.
- An OEM builds a PC with Intel Optane memory and Intel RST installed, configures the appropriate BIOS settings, and enables the acceleration features.

This implementation guide focuses on the second use case, where an IT department purchases pre-configured Intel Optane memory-enabled PCs and needs to know how to deploy and manage those PCs throughout their lifecycle.

## Intel® Optane™ Memory M10



## Intel® Optane™ Memory with Solid State Storage



**Figure 1.** Intel® Optane™ memory is available as a discrete M.2 memory module and as a memory module integrated with an SSD on a single M.2 device.

For example, enterprise IT organizations typically do not use the OEM-provided image, preferring instead to re-image the new PC with a custom build. Over a PC’s lifecycle, other IT tasks will be required, such as replacing a failed HDD, upgrading the capacity of Intel Optane memory, and securely wiping the PC at its end of life (EOL) or when a user leaves the company. All of these tasks are possible with Intel Optane memory-ready PCs; this guide highlights any special considerations.

The information in this guide assumes a technical familiarity with standard PC fleet management processes such as accessing the BIOS, using operating system management tools, performing device driver management, and connecting/disconnecting hardware. Links are provided to more detailed documentation in certain cases, and a list of additional resources is included at the end of this guide.

## Solution Overview and System Requirements

This guide assumes you have the following components:

- **Hardware:** Intel® processor-based PC that already has Intel® Optane™ memory enabled by the OEM
- **Software:**
  - Microsoft Windows 10
  - Intel® RST driver

See the [Learn More](#) section at the end of this guide for more detailed information on requirements.

### Intel® Rapid Storage Technology (Intel® RST)

The Intel RST driver provides the intelligence for the Intel Optane memory system acceleration solution, and the user interface (UI) allows you to enable and disable Intel Optane memory. The Intel RST suite contains these core components:

1. Intel RST driver stack
2. Graphical and command-line applications to manage the status of your Intel Optane memory volume

The Intel® Optane Memory and Storage Management application is the primary GUI application and Intel® RSTCLIPro is the primary CLI application for managing the status of your Intel Optane memory volume.

Intel RST is delivered by the OEM on the pre-configured platform and is typically available for download on the OEM support site.

## Service Testing and Validation

Several tools are available to help you test and validate Intel Optane memory (also see Figure 2):

- **Intel® Optane™ Memory and Storage Management**, which has replaced the Intel® RST UI and Intel Optane memory applications, provides the user interface to enable or disable acceleration and show information about the configuration. Intel® RSTCLIPro is a command-line companion to the Intel Optane Memory and Storage Management application.
- **Intel® Memory and Storage Tool** (Intel® MAS), which has replaced the Intel® SSD Toolbox, enables Windows users to update the firmware and run diagnostic tests on an Intel® SSD. It displays used and free space and projected life of the drive. Intel MAS can also produce a log file that's vital for Intel engineers when diagnosing Intel SSD problems. To download and install Intel MAS, go to <https://www.intel.com/content/www/us/en/support/articles/000055927/memory-and-storage.html>. Note that if you are using an Intel SSD as part of the Intel Optane memory volume, Intel MAS will show all details, including SMART (Self-Monitoring, Analysis, and Reporting Technology) data for both the SSD and the memory module. If you are not using an Intel SSD, the tool shows details for the memory module, but not for the HDD or SSD. Intel MAS provides both a graphical user interface (GUI) and command line interface (CLI).
- **Windows PE (WinPE)** is a small OS used to install, deploy, and repair Windows 10. WinPE works with an Intel Optane memory-enabled system just as it would with a system with a stand-alone drive. In order for WinPE to recognize the Intel Optane memory volume, the Intel RST driver must be injected into the WinPE image. More information on WinPE is available at this Microsoft site: <https://docs.microsoft.com/en-us/windows-hardware/manufacture/desktop/winpe-intro>, and more information on injecting the Intel RST driver is available in the Corporate Reimaging Guide for Intel® Optane™ Memory System Acceleration ([intel.com/content/www/us/en/support/articles/000025947/memory-and-storage/intel-optane-memory.html](https://www.intel.com/content/www/us/en/support/articles/000025947/memory-and-storage/intel-optane-memory.html)).
- **Several free SSD health-checking tools** can access SMART data. These tools will see the drive but may not see the Intel Optane memory module. To access SMART data on the Intel Optane memory module, use Intel MAS.
- **DiskPart** is a command-line disk partitioning utility included in Windows. Basically, it is a command-line equivalent to the Disk Management tool and is used for partitioning internal hard drives. DiskPart supports the use of scripts to automate its usage. DiskPart works with an Intel Optane memory-enabled system similar to how it would with a system with a stand-alone drive. See Removing Partitions with Microsoft DiskPart ([intel.com/content/www/us/en/support/articles/000022179/memory-and-storage.html](https://www.intel.com/content/www/us/en/support/articles/000022179/memory-and-storage.html)) and DiskPart Scripts and Examples ([docs.microsoft.com/en-us/windows-server/administration/windows-commands/diskpart-scripts-and-examples](https://docs.microsoft.com/en-us/windows-server/administration/windows-commands/diskpart-scripts-and-examples)) for more information about this tool.

## Operations/Run/Maintain

The following sections describe several operational tasks relating to Intel Optane memory.

### Re-imaging Using Standard OS Management Tools

In an enterprise IT environment, when a new PC is purchased, it is common practice to overwrite the OS image delivered by the OEM and apply a custom image. Re-imaging a PC with Intel Optane memory is similar to re-imaging any PC. By injecting the Intel RST driver into your boot image and deployment process, no additional steps are required to configure Intel Optane memory.

For a detailed discussion of creating the custom image and deploying it to PCs with Intel Optane memory, refer to the [Corporate Reimaging Guide for Intel® Optane™ Memory System Acceleration](https://www.intel.com/content/www/us/en/support/articles/000025947/memory-and-storage/intel-optane-memory.html) ([intel.com/content/www/us/en/support/articles/000025947/memory-and-storage/intel-optane-memory.html](https://www.intel.com/content/www/us/en/support/articles/000025947/memory-and-storage/intel-optane-memory.html)).

### Service Testing and Validation Tools



Figure 2. These tools can help you test and validate your Intel® Optane™ memory configuration.

## Re-imaging Using Windows 10 Reset Function

While wiping a PC and installing the corporate image is a time-honored way to re-image a PC, modern tools from Microsoft offer an alternative that may be worth exploring. You can use the Windows 10 Reset function instead of wiping as part of the re-imaging flow. Windows 10 Reset restores the OS to a “vanilla” build, while maintaining the required Intel RST driver. Conceptually, the next phase of the workflow would be to install the company-specific settings and applications. In this scenario, there is no need to re-inject the required platform drivers, including Intel RST.

## Encryption

BitLocker\* software-based encryption is supported with the Intel Optane memory solution. Because the OS and management tools see a single volume, encryption management is no different than on a system without Intel Optane memory. Data on both the Intel Optane memory module and the backing store are encrypted.

Due to the way Intel RST software migrates data during the Intel Optane memory enabling process, there is a small region on the backing store that will be kept hidden from the host operating system. If BitLocker enablement occurs after enabling Intel Optane memory acceleration, this small region will not benefit from the encryption, and as a result, end-user data in the small region could possibly be at risk. Therefore, enable encryption before enabling Intel Optane memory acceleration.

A suggested deployment flow for using Intel Optane memory and encryption would be:

- Image/build the OS
- Enable encryption
- Enable Intel Optane memory acceleration
- Add confidential data

TIP

Enable encryption and acceleration before adding confidential data to the system.

## Remote Management Tools

In general, asset management and software deployment tools work with an Intel Optane memory-enabled system as with any other system. Again, the OS and management tools see a single volume, as if it were a single drive installed. Specific to the asset data that is displayed for a system, on an Intel Optane memory-enabled system, rather than seeing the drive model string only, the drive model string will appear as in the following example (for a 2 TB HDD):

```
Intel Optane+1.8TBHDD
```

If physical drive information, such as model string and serial number, is tracked by your asset management system, collect this information using the Intel® Memory and Storage Tool, or collect this information before enabling acceleration. The details for the Intel Optane memory module and backing store model string are not available from Windows Management Instrumentation (WMI) once Intel Optane memory is enabled, as shown in Figure 3, although the operational status and health status are still shown.

### Intel® Optane™ Memory Disabled

FriendlyName	SerialNumber	MediaType	CanPool	OperationalStatus	HealthStatus	Usage	Size
SA4000TH001-1WZ198	M5M7DG32	HDD	False	OK	Healthy	Auto-Select	1.82 GB
INTEL MEMPEK1Z432ABC	RDMF4321001Q765A	SSD	True	OK	Healthy	Auto-Select	13.41 GB

### Intel® Optane™ Memory Enabled

```
PS C:\Users\aperson.AMR> Get-PhysicalDisk
```

FriendlyName	SerialNumber	MediaType	CanPool	OperationalStatus	HealthStatus	Usage	Size
Intel Optane+1.8TBHDD	Optane_0000	SSD	False	OK	Healthy	Auto-Select	1.82 GB

```
PS C:\Users\aperson.AMR>
```

Figure 3. Windows Management Instrumentation (WMI) information changes once Intel® Optane™ memory is enabled.

## Including Intel® Optane™ Memory in Windows Recovery Environment (WinRE)

If your corporate image includes provisions for the WinRE partition, then be sure to inject the Intel RST driver into the Boot.wim, Install.wim, and WinRE.wim image files. For more details, refer to the [“Installation Guide for Intel® Optane™ Memory.”](#)

## Upgrade/Replace

During a PC's useful life, you may encounter hardware support issues. The following sections describe some of the most common scenarios and how to handle them.

### Replacing a Functioning Backing Store or Memory Module

At some point, a user may need more capacity, or your proactive management tools suggest a pending failure on an HDD. Proceed with replacing the memory module or backing store (HDD) as you would on any other system. The only thing you need to consider is to manually disable Intel Optane memory BEFORE swapping out the drive. This is easily done with the Intel Optane Memory and Storage Management application, and usually takes only a minute or two. After replacing the backing store, simply re-enable Intel Optane memory using the same UI.

If the backing store or Intel Optane memory module is removed without first disabling, then the system cannot boot up and the previous drive (or module) will have to be re-installed for the system to work. There is no impact on Intel Optane memory either way (if the drive or module is re-installed then the system will work normally).

Here are the steps for swapping out the backing store or memory module:

1. Back up important data.
2. Disable Intel Optane memory using the Intel Optane Memory and Storage Management application.
3. Restart the PC, then perform a full shutdown.
4. Replace the old drive with the new drive by either cloning the old drive or re-installing the OS/corporate image, or replace the old Intel Optane memory module with the new one.
5. Re-enable Intel Optane memory using the Intel Optane Memory and Storage Management application.

### Replacing the Backing Store After a Failure

While IT departments strive for preventative maintenance and zero down-time, unplanned HDD failures unfortunately do occur. If this happens, the backing store must be replaced and the Intel Optane memory volume restored, followed by re-imaging and data restoration from backup. The exact steps required depend on how the OEM supports disassociation of the Intel Optane memory module.

Disassociation of the Intel Optane memory module is required to be able to reuse the module with the replacement HDD. Disassociation removes the Intel Optane memory configuration information and deletes all data (data which is unusable cached data from the inoperable disk that is being replaced).

Here are the steps for swapping out a backing store after it has failed:

1. Disassociate Intel Optane memory through the BIOS, according to OEM instructions.
2. Install the new drive.
3. Re-install or recover Windows 10.
4. Re-associate Intel Optane memory through the BIOS.

## Sanitize/End of Life

Whether you are discarding a PC at its end of life or sanitizing it after an employee leaves the company, the sanitation process is the same for the Intel Optane memory volume:

1. Disable Intel Optane memory using the Intel Optane Memory and Storage Management application or Intel RSTCLIPro utility. (This is optional if you are performing a secure erase or destroying both the Intel Optane memory module and backing store.)
2. Wipe the physical drives using your currently approved information-security policies.
  - a. The Intel Optane memory module can be wiped using the secure erase capability commonly used with NAND-based SSDs.
  - b. The backing store should be wiped using your company's approved method specific to HDD or SSD (that is, overwrite, secure erase, or physical destruction).



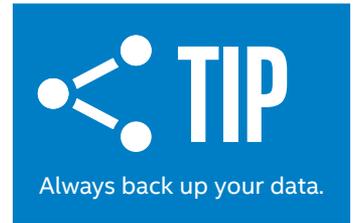
Disable Intel® Optane™ memory before removing the memory module or backing store.

## Best Practices

This section provides some tips for getting the most out of the Intel Optane memory solution.

### Data Backup

Enterprise data backup solutions are still an important way to protect data in the case of a storage failure. All file and folder-level backup tools work with Intel Optane memory since Intel Optane memory appears to the OS as part of a single drive volume.



### AC Power

Intel recommends that enabling/disabling Intel Optane memory, imaging, and other support actions be performed with the target PC connected to AC power.

### Recovering Data from a Non-bootable Intel Optane Memory Volume

If the Intel Optane memory volume is functional but the OS is not bootable, it is possible to access the data on the Intel Optane memory volume by booting from a WinPE device that includes the Intel RST storage driver. Data will not be accessible without forensic tools if you attempt to connect to another computer using the Intel Optane memory module or the backing store individually.

### Recovering from a Power Failure

Intel RST includes protection mechanisms for unexpected power loss. It automatically attempts to recover from power failures and operates no differently than a power failure on a single drive system.

### Switching PCH SATA Controller Mode

If switching the Platform Controller Hub (PCH) SATA controller mode to Advanced Host Controller Interface (AHCI) is necessary for any reason, first disable Intel Optane memory using the Intel Optane Memory and Storage Management application. Changing the PCH SATA controller mode to AHCI with an active Intel Optane memory volume may result in file corruption and data loss.

### Drive Maintenance

There is no need to defragment an Intel Optane memory volume. However, you can use the Disk Cleanup facility. Firmware updates may be periodically necessary.

### Predicting Failure

Use Intel MAS to receive proactive notifications about the health of your drive. The Intel MAS provides information about drive health and the estimated life remaining, along with other SMART details.

### Switching Intel Optane Memory Volumes between PCs

Note: It is recommended to always back up important data before performing any support actions when possible.

If a PC component has failed but the drives (backing store and Intel Optane memory module) still function, you can move the intact Intel Optane memory volume between the failing system and a new system. The exact process varies by OEM implementation and which Intel Optane memory product is in use. If resources permit, the easiest and most reliable process to boot to your functioning volume is to insert the Intel Optane memory volume member disks into a target computer of the same make and model that has Intel Optane memory already enabled.

WARNING! Corruption of the Intel Optane memory volume and data loss can occur if you attempt to boot to an Intel Optane memory volume in an incorrectly configured PC.

## Summary

Intel Optane memory is a smart technology that accelerates a computer's responsiveness. It accesses frequently used documents, pictures, videos, and applications quickly and remembers them even if the PC is powered off. The performance gains can be substantial and are possible with minimal disruption to standard IT practices and system management.

Find the solution that is right for your organization. Contact your Intel representative or visit [intel.com/OptaneMemory](https://www.intel.com/OptaneMemory).

## Learn More

You may also find the following resources useful:

- Intel® Optane™ Memory overview: [intel.com/content/www/us/en/architecture-and-technology/optane-memory.html](https://intel.com/content/www/us/en/architecture-and-technology/optane-memory.html)
- Installation Guide for Intel® Optane™ Memory: [intel.com/content/www/us/en/support/articles/000023989/memory-and-storage/intel-optane-memory.html](https://intel.com/content/www/us/en/support/articles/000023989/memory-and-storage/intel-optane-memory.html)
- Corporate Reimaging Guide for Intel® Optane™ Memory System Acceleration: [intel.com/content/www/us/en/support/articles/000025947/memory-and-storage/intel-optane-memory.html](https://intel.com/content/www/us/en/support/articles/000025947/memory-and-storage/intel-optane-memory.html)
- Intel® Optane™ Memory technical support page: [intel.com/support/optane-memory](https://intel.com/support/optane-memory)
- Intel® Rapid Storage Technology driver download: [downloadcenter.intel.com/download/29978?v=t](https://downloadcenter.intel.com/download/29978?v=t)
- Intel® Rapid Storage Technology RSTCLIPro Utility: [downloadcenter.intel.com/download/29986/Intel-RSTCLI-Pro-for-Intel-Optane-Memory?v=t](https://downloadcenter.intel.com/download/29986/Intel-RSTCLI-Pro-for-Intel-Optane-Memory?v=t)



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