

Intel[®] Cache Acceleration Software (Intel[®] CAS) Version 2.0 for Windows*

Administrator's Guide

December 2012

Order Number: 328330-001

Contents



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Revision History

Date	Revision	Description	
December 2012	001	Initial release of document.	



1 About This Guide

This guide offers the quickest way to install and begin using Intel[®] Cache Acceleration Software (Intel[®] CAS). This guide assumes users have a basic knowledge of storage and application management, as well as knowledge of the Microsoft* Windows* Server environment.

1.1 Intel[®] Cache Acceleration Software Overview

Intel[®] CAS accelerates Microsoft* Windows* Server applications by caching active (*hot*) data to a local flash device inside servers and virtual machines. Intel[®] CAS implements caching at the server level, utilizing local high-performance flash media as the cache drive media inside the application server as close as possible to the CPU, thus reducing storage latency as much as possible.

The Intel[®] Cache Acceleration Software installs into the Windows* operating system itself, using the OS for protocol and driver support. The nature of the integration provides a cache solution that is transparent to users, VMs and applications, and your existing storage infrastructure. No storage migration effort or application changes are required.

Intel[®] CAS employs a file-based caching architecture that provides for advanced policy management, allowing you to define what data specifically is accelerated through the cache system (see <u>Section 4.2</u> for details).

Intel[®] CAS supports 64-bit Windows* Server operating systems running natively or virtually under VMware* or Hyper-V (see <u>Section 2.1</u> for details).

1.2 Reference Documents

The following resources and tools are suggested for assisting with Intel[®] CAS testing and operations and/or learning more about caching and application I/O performance management.

Table 1. Reference Documents

Document	Location	
Monitoring specific system activity using Performance Monitor	http://technet.microsoft.com/en- us/library/cc771692%28WS.10%29.aspx#BKMK_Scen2	
Iometer I/O test tool	http://www.iometer.org/	
TPC-C transactional database performance test for SQL	http://www.tpc.org/tpcc/	

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1.2.1 **Documentation Conventions**

The following conventions are used in this manual:

- Courier font code examples, command line entries, filenames, directory . paths, and executables
 - Bold text graphical user interface (GUI) entries and buttons



2 Product Specifications and System Requirements

2.1 Supported Platforms

Intel[®] CAS supports the platforms listed below for 64-bit processors.

Table 2. Supported Platforms

Platform	Notes
Windows* Server 2008 R2	
VMware* ESXi	Installed into Windows* Server 2008 R2 running as the Guest
Windows* Hyper-V	Installed into Windows* Server 2008 R2 running as the Guest
Citrix* XenServer	Installed into Windows* Server 2008 R2 running as the Guest
KVM*	Installed into Windows* Server 2008 R2 running as the Guest

2.2 System Requirements

The table below lists system requirements for Intel[®] CAS.

Table 3. System Requirements

Memory	4GB of memory minimum; 8GB or greater recommended		
CPU Overhead	Intel CAS only consumes approximately 2% of CPU resources. It is recommended that the CPU is not at maximum capacity.		
Flash/SSD	Windows* supported Flash device (SAS, SATA, PCIe, Fiber Channel) 60GB or larger recommended. Validated and supported on the Intel [®] SSD Data Center Family.		
Storage	Primary storage device including SAN, local disk, RAID, iSCSI, or Fiber Channel, etc.		
Application Support	.NET Framework version 3.5 is required. Any I/O intensive applications, including databases, Microsoft* Exchange and SharePoint, transactional web servers, etc.		



Installation Guide 3

This installation guide describes how to invoke the automated installer and describes the default settings. One of the main features of Intel[®] CAS is its simplicity; it does not have many options that are necessary to be tuned.

3.1 **Configuring the Flash Device**

Prior to installing Intel[®] CAS, you must have a Flash media device configured as an NTFS drive on the application server, VM host, or shared storage device. The Flash device can be any SSD drive (SATA or SAS) or any PCIe Flash Card supported by Windows* Server 2008 R2.

Windows* Server 2008 R2 3.1.1

Physically install the Flash device on the server, and format the device as an NTFS drive. Proceed to Section 3.2 later in this section.

3.1.2 Windows* Hyper-V with Windows* Guest

Intel[®] CAS is installed into Windows* Server 2008 R2 running as the guest.

Start by physically installing the Flash device on the Windows* Server 2008 R2 host or shared storage resource, and formatting the device as an NTFS drive and then create a VHD on the Flash drive and attach it to the guest as described below.

- 1. Launch the Hyper-V Manager and select the Guest VM to be accelerated.
- 2. Click on New in the Actions Menu and then choose Hard Disk...
- 3. Step through the wizard.
- 4. Provide an appropriate name for the newly created VHD file. For Location, select the physical flash drive.
- 5. Select the guest VM and then choose Settings from the Actions Menu
- 6. Select IDE Controller Hard Drive
- 7. Click Add
- 8. In the Virtual hard disk (.vhd) file text field, select the location of the VHD file created earlier, and click Apply
- 9. Select the guest VM and then choose Start from the Actions Menu
- 10. Login to the guest VM and launch Computer Management and select Disk Management
- 11. Right-click the newly created hard drive and select Format. Assign a driver letter, for example, S:

Proceed to Section 3.2 later in this section.



Note: To install into multiple guest instances of Windows* Server 2008 R2, you must create separate VHDs on the Flash drive for each guest and attach them individually to each guest. Multiple guests can not share the same VHD as the cache drive.

3.1.3 VMware* ESX, ESXi with Windows* Guest

Intel[®] CAS is installed into Windows* Server 2008 R2 running as the guest.

Start by physically installing the Flash device on the ESX host or shared storage resource, and then add the drive to VMware* using the vSphere Client as described below.

- *Note:* In order to support vMotion while maintaining a "hot" cache, it is necessary to install the Flash device on a shared storage resource that is accessible by all the VMware* host machines.
 - 1. Start the Add Hardware wizard.
 - 2. Select Hard Disk, and click Next
 - 3. Select Create a New Virtual Disk, and click Next
 - 4. Enter the disk capacity, and select the location as Specify a Datastore
 - 5. Browse for the datastore location, and click Next
 - 6. Specify the virtual device node.
 - 7. It is recommended you set the **virtual disk mode options** to **Independent**, followed by **Persistent**, and click **Next**
 - 8. Click Finish
 - 9. Launch the VM and initialize the disk using Windows* Disk Management tools as an NTFS formatted drive.

Proceed to <u>Section 3.2</u> below.

Note: To install into multiple guest instances of Windows* Server 2008 R2, you must create separate VHDs on the Flash drive for each guest and attach them individually to each guest. Multiple guests can not share the same VHD as the cache drive.

3.2 Installation Instructions

- *Note:* You must be logged in as an Administrator to install the software.
- *Note:* If an earlier version of the software is already installed, you must manually uninstall it before continuing. See <u>Section 3.3</u> for details on uninstalling.
 - Download or copy the Intel[®] CAS Installer onto the target Microsoft* Server 2008 R2 server or VM guest.



2. Double-click IntelCacheAccelerationSoftware_x64.msi to start the install. A security warning is displayed before launching the install Wizard.

pen File	- Security Warning X				
Do you	want to run this file?				
Name: \Desktop\IntelCacheAccelerationSoftware_x64.msi Publisher: Attached Platform Storage Solutions Type: Windows Installer Package From: C:\Users\Administrator\Desktop\IntelCacheAcceler Run Cancel					
☑ Al <u>w</u> a	ys ask before opening this file				
While files from the Internet can be useful, this file type can potentially harm your computer. Only run software from publishers you trust. What's the risk?					

3. Click **Run** to accept the security exception. The install wizard is displayed.

Welcome to the Intel(R) Software 2.0 Setup Wiza	Cache Acco ard	eleration	
The installer will guide you through the st 2.0 on your computer.	eps required to insta	ill Intel(R) Cache Acce	leration Software
WARNING: This computer program is pro Unauthorized duplication or distribution o or criminal penalties, and will be prosecul	otected by copyright f this program, or an ted to the maximum	law and international y portion of it, may resu extent possible under t	treaties. Ilt in severe civil he law.
	Cancel	< <u>B</u> ack	<u>N</u> ext>



Click **Next** to proceed to the License Agreement. Clicking **Cancel** at any time cancels the install.

4. In order to proceed with the install, you must read and mark that you agree to the License agreement.

🕞 Intel(R) Cache Acceleration	Software 2.0		_ 🗆 🗵
License Agreement			
Please take a moment to read the li Agree", then "Next". Otherwise clic	cense agreement now. I k "Cancel".	f you accept the terms belo	w, click ''l
END	USER LICENSE AGR	EEMENT	
BY DOWNLOADIN INTEL SOFTWARE ("SOFT BY THE TERMS OF THIS E DO NOT ACCEPT AND A NOT DOWNLOAD, INSTAI THE NATURAL PERSON O BY THIS EULA. "INTEL WORLDWIDE SUBSIDIARI	IG, INSTALLING, CO WARE"), YOU ACCE IND USER LICENSE A GREE TO THE TERN LL, COPY OR USE TH IR THE ENTITY THA " MEANS INTEL ES.	PYING OR OTHERWIS PT AND AGREE TO BE AGREEMENT ("EULA") MS OF THIS EULA, YO E SOFTWARE. "YOU" .T IS AGREEING TO BE CORPORATION AND	E USING BOUND IF YOU DU MAY MEANS BOUND /OR ITS
C I <u>D</u> o Not Agree	• Agree		
	Cancel	< Back	<u>N</u> ext >

Click I Agree followed by Next to continue.

It is recommended you accept the default installation folder in Program Files. To change the location, select **Browse...** to pick another folder location.
 The **Disk Cost...** option provides information on your available disk space and the space required for this install on the currently selected drive.

🐺 Intel(R) Cache Acceleration Software 2.0	
Select Installation Folder	
The installer will install Intel(R) Cache Acceleration Software 2.0 to the follow	ving folder.
To install in this folder, click "Next". To install to a different folder, enter it be	low or click "Browse".
Eolder: C:\Program Files\Intel\Cache Acceleration Software\	Browse
	<u>D</u> isk Cost
Cancel < <u>B</u> ack	<u>N</u> ext >



Click **Next** to proceed to the Confirm Installation window.

6. Click **Next** to proceed, **Cancel** to quit the install, and **Back** to make any required changes.

Intel(R) Cache Acceleration Softw	vare 2.0		_ 🗆 🗙
Confirm Installation			
The installer is ready to install Intel(R) Cac	he Acceleration S	oftware 2.0 on your c	:omputer.
Click "Next" to start the installation.			• COME ■ Come Dect 270
	Cancel	< Back	Next >

7. During installation, a progress dialog is displayed.

You are prompted to select the drive to be used as a cache drive. Select the drive letter that matches your flash drive. Click **OK** to continue.

Intel® Cache Acceleration Software Installer
Cache Drive: H:\
Software to Accelerate
Automatically accelerate Microsoft SQL data files
If checked, Intel® Cache Acceleration Software will accelerate all Microsoft SQL data files (.mdf and .ndf files) across the server. For other applications, the Intel® CAS GUI provides the ability after installation to add or remove file types, files, and directories from the acceleration list.
<u></u> K



8. If Intel[®] Cache Acceleration Software detects any files on the cache drive, even hidden or system files, the following dialog box is displayed to warn you that Intel[®] Cache Acceleration Software is expecting to use the entire drive.



9. At the end of the install you are prompted to restart your system.

incensy co		
?	A system restart is needed in order to activate the application. Click Yes to restart now, or No if you plan to manually restart later.	
	Yes No	

10. The server must be restarted in order for Intel[®] CAS to update system drivers. It is recommended that you close all open application and select **Yes** to restart now. You can, however, choose **No** and reboot the system at a later date and time. Please note that Intel[®] CAS does not start until after reboot.

If you choose to restart later, an Installation Complete dialog is displayed.





3.3 Uninstalling the Software

- From the Start Menu, click on Control Panel and under the Programs section select Uninstall a Program. A list of installed software is displayed. Select Intel[®] Cache Acceleration Software from the list and then choose Uninstall from the menu bar. A confirmation message is displayed.
- 2. Click **Yes** to uninstall Intel[®] CAS. The Windows* Installer appears, making preparations to uninstall the software from your system.
- 3. If the following screen appears, it means that Intel[®] CAS or the installed Intel[®] CAS Service is still running, and Windows* needs your permission to close them before the uninstall can continue.

	Intel(R) Cache Acceleration Software 2.0	×
	The following applications should be closed before continuing the install:	
	Windows Explorer	
	 Automatically close applications and attempt to restart them after setup is complete. Do not close applications. (A Reboot may be required.) 	
4. Click O	K to continue. A progress dialog is displayed until the uninstal	l is complete.
	Please wait while Windows configures Intel(R) Cache Acceleration Software 2.0	
	Cancel	

5. If you chose not to close the applications, you need to reboot your system in order to complete the uninstallation procedure. Otherwise, it is recommended, but not required, to reboot your system after uninstall.



4 Configuring Intel[®] Cache Acceleration Software

Note: You must be logged in as an Administrator to make any configuration changes.

After installation, the ${\rm Intel}^{\$}$ CAS icon (below) is shown in the Start Menu and the Desktop.



Intel[®] CAS is configured using a GUI.

To bring up the GUI, double-click the Intel[®] CAS Service icon in the system tray.



The following screen is displayed.

Intel® Cache Acceleration Software	×
Policy About	
Cache On Demand	
Intel® CAS Cache <u>D</u> rive: H:\	
Accelerator Type: Read Only	
Cache List:	
Stop Service Apply Close	



Starting or Stopping the Intel[®] Cache 4.1 Acceleration Software Service

If the Intel[®] CAS Service is not running (there is no Intel[®] CAS icon in the system tray) you can start it using a Start Menu item or by double-clicking the installed desktop icon.

Note: If the Intel[®] CAS icon is present in the system tray, the Start Menu or Desktop icon items do **not** launch the GUI. This will be fixed in a future release.

You can also start the Intel[®] CAS Service by launching **Computer Management**:

- 1. Select Services and Applications
- 2. Click on Services
- 3. Select Intel[®] Cache Acceleration Software from the list of services.
- 4. Click Start

To stop the Intel[®] CAS Service, double-click the Intel[®] CAS Service Icon in the system tray to bring up the GUI. On the main screen, click the Stop Service button. The button title changes to Start Service, and can be used to re-start the Intel[®] CAS Service.

Note: If the Intel[®] CAS icon is not present, you can stop the service by launching **Computer** Management. Select Services and Applications and click on Services. Select Intel[®] Cache Acceleration Software from the list of services and click Stop.

The Intel[®] CAS Service icon in the system tray is blue when the service is running and the icon is red when the service is stopped.



You can also see the status in the log file which is located by default in:

C:\ProgramData\Intel\Cache Acceleration Software\logs\IntelCAS.log

4.2 Managing the Cache Include List

To accelerate server applications or focus the cache on a particular SQL Server database, you must manually set the associated data files in the Intel[®] CAS include list.



- **Note:** For files that are locked and in use (such as Microsoft SQL Server database files), it is recommended that you stop the application before adding those files to the cache.
 - 1. To add or remove files from the include list, open the GUI and click the **Include** button from the main screen.

Intel® Cache Acceleration Software - Include	e List	×
Filter Items		
>c:\Databases\Database_pool\data\master.mdf d:\Databases\Database_lottery\data*.mdf d:\Databases\Database_lottery\data*.ndf	F	
Automatically accelerate Microsoft <u>SQL</u> data files (*	.mdf and *.ndf)	
The list can include all files of a given type (*.xyz Name\File Name) or specific directories (X:\Fold An entry marked with (>) indicates a pinned file cached.	r), specific files der Name\Fold which is perma	(X:\Folder er Name*). anently
	<u>о</u> к	<u>C</u> ancel

- 2. Click **OK** to close the Include list dialog.
- 3. Click **Apply** in the main GUI window.
- 4. You must restart the service for the changes to take effect.

Cached files are defined by type of file (such as *.pdf), filename, partial filename (such as *Intel*), or directory path (such as D:\Directory*). Files that are permanently included in the cache (pinned files) are denoted by a > in the include list.

The following structure is used for the include list:

- Global application file type match is in the form *.xyz
- File paths in the form X:\Folder Name\File Name
- Folder paths are in the form X:\Folder Name\Folder Name*
- Always cached files (pinned files) begin with a > symbol

Please note the following restrictions and specifics:

- Drive name requires the \ character (path should be C:*.xyz not C:*.xyz)
- * .* in a valid path is automatically changed to *
- Intel[®] CAS does not check for the existence of files or folders in the include list
- · You cannot include files or folders on the cache drive itself
- The following items are always excluded:
 - C:\Windows
 - Intel[®] CAS program files directory and log directory
 - Cache drive itself



4.3 Pinning Files in the Cache

Intel[®] CAS supports pinning files into the cache. These files are cached immediately and are never evicted, unless they are subsequently unpinned.

Pinning or un-pinning using the GUI

- 1. Open the GUI and click the **Include** button from the main screen.
- In the Filter Items box, enter the > symbol, followed by the filename with complete path, and click Enter. Repeat for all the files you wish to pin to the cache. To un-pin, select the file you wish to un-pin, and click Delete.
- 3. Click **OK** to close the Include list dialog.
- 4. Click **Apply** in the main GUI window.
- 5. You must restart the service for the changes to take effect.

Pinning using the mouse

- 1. Open Windows Explorer and browse to the file(s) you wish to pin.
- Select the right-mouse property menu option Intel[®] Cache Acceleration Software, followed by sub-menu item Add to Intel[®] Cache Acceleration Software Include List.
- 3. Once you have finished pinning files, click **Apply** in the GUI window.
- 4. You must restart the service for the changes to take effect.

4.4 Setting the Cache Drive or Accelerator Type

Intel[®] Cache Acceleration Software Version 2.0 only supports **Read Only** as the **Accelerator Type**. Read Only acceleration means that only read operations are accelerated by the cache, but both read and write operations populate the cache (Read with Write-Through caching). Future versions will include write acceleration (Read with Write-Back caching).

To change the drive used for the cache files, open the GUI, and from the main screen:

- 1. If Intel[®] CAS is running, select **Stop Service**.
- 2. Select the drive letter for the new cache drive in the cache drive pulldown and click **Apply**.
- *Note:* The selected drive must be formatted as an NTFS drive and must be empty. The cache starts from scratch; cache data is not copied from the previous drive.
- 3. Select Start Service.



4.5 Viewing the Build Number

To view the build number for your installed version of Intel[®] CAS, open the GUI, and select the **About** tab.

Intel® Cache Acceleration Software	×
Policy About	
Intel® Cache Acceleration Software Version: 2.0.0.11071 Copyright © 2009 - 2013, Intel Corporation	
Contact: <u>cwsupport@intel.com</u>	
Stop Service Apply Close	

4.6 Multi-Level Caching

Intel[®] CAS can work with either a one-level or two-level cache (multi-level caching). When using a two-level cache, Intel[®] CAS integrates with the Windows* file cache in DRAM memory. However, there is an operating system restriction on the Windows* DRAM cache processing speed. Therefore, choosing a one-level or two-level cache depends on the application, CPU speed, and/or the flash device type and throughput. For example, for Microsoft SQL Server acceleration on a high-performance server with PCIe Flash, a one-level cache provides the best performance. Conversely, for a non-database application and an SSD-based Flash device, a two-level cache provides the best performance.

The default is a two-level cache. If the performance of the caching system is not as expected, change to a one-level cache to see if results improve.

4.6.1 Setting up a one-level cache

Perform the following:

- 1. Stop the service.
- 2. Open IntelCASService.exe.config in the install directory using a text editor.



- 4. Save the IntelCASService.exe.config file.
- 5. Re-start Intel[®] CAS.

4.6.2 Setting up a two-level cache

Perform the following:

- 1. Stop the service.
- 2. Open IntelCASService.exe.config in the install directory using a text editor.

- 4. Save the IntelCASService.exe.config file.
- 5. Re-start Intel[®] CAS.



5 Monitoring Intel[®] Cache Acceleration Software

The performance and operation statistics of Intel[®] CAS are managed using Windows* Performance Monitor (perfmon), which is included by default with Windows* Server 2008 R2.

Intel[®] CAS records the following statistics (counters) for Performance Monitor.

Total Cache (MB)	Number of MB present in the cache
Write Cache (MB)	Number of MB that are dirty in the cache
Writes	Number of write operations
Writes/sec	Number of write operations per second
Reads	Number of read operations
Reads/sec	Number of read operations per second
Read Hits %	Percentage of cache hits
Read Hits/sec	Number of read hits per second
Read Hits + Read Misses	Base for % of cache hits
Read Misses %	Percentage of cache misses
Read Misses/sec	Number of reads missed per second
Read Misses + Read Hits	Base for % of cache misses
Lazy Written (MB)	Number of MB cleaned from the cache
Lazy Written (MB/s)	Number of MB/s cleaned from the cache
Cache Freed (MB)	Number of MB freed in the cache
Cache Freed (MB/s)	Number of MB/s freed in the cache

5.1 Starting Performance Monitor

To start Performance Monitor:

1. Click Start, click in the Start Search box, type perfmon, and press ENTER.



 In the navigation tree, expand Monitoring Tools, and then click Performance Monitor. The following screen is displayed.

Performance Houlton
e fie Actor per Medae
🛤 🕹 🖬 🖬 🖷 🖷
Performance Mentang Sob Mentang Sob Departs Departs

5.2 Adding Statistics

To add Intel[®] CAS statistics:

1. Select the green + icon on the toolbar or type **CTRL-N**, which brings up the **Add Counters** screen.

et counters from cogputer:	(C)	Counter	Parent	Inst	Computer
ocal computer >	Browse				
CMP					
ICMPv6	æ				
Intel® Cache Acceleration Software	⊞ —				
PHTTPS Global	Œ				
PHTTPS Session	III				
Psec AuthIP IPv4	⊞				
woes of universid street.					
*	TRADAT				
-					



2. Scroll to Intel[®] Cache Acceleration Software and double-click it or select the down arrow to display the list of available counters.

Selecting the **Show Description** checkbox on the bottom left of the page displays the full description of the selected counter.

AVORIGHE COUNTER'S		Added gounters				
Select counters from cogputers		Counter	Parent	Inst	Computer	
<local computer=""></local>	growse	Intel® Cache Acce	leration	Software	e	Ð
Intel® Cache Acceleration Software	E A	Cache Read Hits/sec				
Annual statements of		MB Active Cache Sze		20		
% Cache Read Htts/sec	1.0	Reads		10		
% Cache Read Misses/sec						
% Cumulative Cache Read Hits						
% Cumulative Cache Read Misses	-					
Cache Read Hbs/sec	_					
Cache Read Misses/sec						
MB Active Cache Size	-					
<u>.</u>	Jearth					
*	fearth Add >>	Biacon qu				
stow description	jeanta Adg>>	Employee	etp [ax		Cancel
Show description scription	jearch Adg>>	Emove de	ep _	OK		Cancel
Show description scription: uniter of read hills per second.	(erti Adg>>	Emove <<	ep	OK		Cancel



 Select the desired counters and click Add >> to move them to the Added Counters box, then click OK to return to the main screen.



- 4. Click the **Show** checkbox to include (or hide) the counters in the graphical display.
- 5. Intel[®] CAS counters are updated every 10 seconds and are reset only at the time of the installation.
- **Note:** If an error Setting up performance counters failed is displayed, you must rebuild the configuration registry key by running lodctr /R from a Windows* command prompt. This is a known issue with Windows* performance counters.



6 Frequently Asked Questions

How do I contact support?

Contact support by phone at 800-538-3373 or at the following URL: <u>http://www.intel.com/support/ssdc/cache/cas/</u>

Nothing happens when I click on Intel[®] Cache Acceleration Software on the Start Menu or desktop icon?

There is a known issue with the shortcut links where they only launch Intel[®] CAS if it is not already running. If the Intel[®] CAS icon is present in the system tray, the Start Menu or Desktop icon items does **not** launch the GUI. This will be fixed in a future release.

To bring up the GUI, double-click the icon in the system tray.

How do I tell what applications need more I/O?

Disk usage statistics are recorded in Windows* Performance Monitor (perfmon), which is included by default with Windows* Server 2008 R2. Two counters that can be monitored to determine overall disk I/O activity are:

- PhysicalDisk: % Disk Time (percentage of time that the disk is busy with I/O)
- PhysicalDisk: Avg. Disk Queue Length (how many system requests are waiting for disk access)

Individual applications may have specific counters to determine the amount of I/O generated by the application. For example, in Microsoft* SQL Server:

- SQL Server: Buffer Manager: Page reads/sec
- SQL Server: Buffer Manager: Page writes/sec

Refer to <u>Section 5</u> in this document for more information on using Windows* Performance Monitor.

How do I test performance?

In addition to Windows* Performance Monitor (see above), there are several thirdparty tools which can help you test I/O performance on your applications and system, including Iometer (<u>http://www.iometer.org/</u>) for overall I/O performance, and the TPC-C transactional database performance test for SQL (<u>http://www.tpc.org/tpcc/</u>).

Performance is slower than I expect, what can I do?

Intel[®] CAS can run as a one or two level caching system. It is possible that your application or hardware require you to run in a particular configuration. You should try switching between one and two level caches to see if that solves your performance issue. See <u>Section 4.6</u> for details.

Where are the cached files located?

Cached files are located in the folder <drive>:\IntelCAS\ on your cache drive.



How do I delete all the cache files?

You can clear the cache by stopping the service, deleting all the data under <drive>:\IntelCAS\ on your cache drive, and then re-starting the service.

Does Intel[®] Cache Acceleration Software support write-back caching?

No. The current release of Intel[®] CAS supports 'read with write-through' caching only. In this mode, both read and write operations build the cache data, but only read operations are accelerated (writes are written into the cache and to backend storage concurrently). Data integrity is never a concern with write-through.

A future release will support write-back caching, in which writes are written first to the cache and sync'd to backend storage when I/O is available. That release will also allow you to specify what applications or data is set to write-through versus write-back modes.

How do I change the cache drive used by the service?

Launch Intel[®] Cache Acceleration Software. In the Policy tab, drop down the Cache Drive combo-box and select the drive you want to use. Click Apply.

How do I add to or change the list of files to be accelerated?

Launch Intel[®] Cache Acceleration Software. In the Policy tab, click the Include button. Type the names of the specific files you want to accelerate or all files of a given type (*.xyz) or specific directories (X:\Folder Name\Folder Name*). Click Apply.

How can I tell if all the operations are being performed without errors?

The Intel[®] CAS service logs all important operations in a log file called IntelCAS.log. This file resides in the folder on the drive where the software is installed. Any errors or exceptions thrown by the software are logged in this file.

By default, the logs folder is located at: C:\ProgramData\Intel\Cache Acceleration Software\logs\

Where is the log file located?

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How can I report debug messages in the log file?

Browse to the folder where Intel[®] Cache Acceleration Software is installed. By default, this is: C:\Program Files\Intel\Cache Acceleration Software\

Open IntelCASDebug.log in Notepad (or another text editor) and find the line: Element <rules> <logger Name="*" minlevel="Info" writeTo="file" />

Change Info to Debug.

Note: This should be done for support and diagnostic purposes only, because logging debug messages slows down performance considerably.

After launching the software, the icon is not in the taskbar, where is it?

If Intel[®] CAS is already running, the software resides in the system tray. Double-click the icon in the system tray to bring up the **Configuration** screen.

The log file returns an exception, what do I do?

If the exception Setting up performance counters failed is displayed, you must rebuild the configuration registry key by running lodctr /R from a Windows* command prompt. Information regarding Performance Monitor Counters is stored in the registry and this exception implies that the configuration registry key is invalid. This is a known issue with Windows* performance counters.



Appendix A Glossary

Term	Definition
Cache	The transparent storage of data so that future requests for that data can be served faster.
Cache Hit	When requested data is contained in (and returned from) the cache.
Cache Miss	When requested data is not in the cache, and therefore must be retrieved from its primary storage location.
CCN (Content Centric Networking)	An alternative approach to networking that allows for data storage to be disseminated across the network infrastructure.
DAS (Direct-Attached Storage)	A storage system directly attached to a server or workstation, without a storage network in between, mainly used to differentiate non-networked storage from SAN and NAS.
De-duplication	A way to compress storage data size by eliminating redundant copies of data and replacing them with pointers to the reference copy.
Dirty data	When data is modified within cache but not modified in main memory, the data in the cache is called dirty data.
Guest	An operating system running on a Virtual Machine (VM) environment.
Host	The operating system running (hosting) the Virtual Machine (VM) environment, on which guest Operating Systems can be installed.
Hyper-V*	Microsoft's Virtual Machine (VM) platform, supported on Windows* Server 2008 and Windows* Server 2008 R2.
Hypervisor*	A hardware virtualization technique that allow multiple operating systems, termed guests, to run concurrently on a host computer.
1/0	Abbreviation for Input/Output as it relates to the flow of data.
I/O Blender	A special case of the I/O Bottleneck seen in VM environments, where the varying levels of I/O demands from all the virtual applications are merged through the virtual layer onto a single physical server, creating a constantly high blended I/O level.
I/O Bottleneck	A term used to describe application slowdown due to the inability of storage I/O to keep up with application demand.



Term	Definition
IOPS	Abbreviation for Input/output Operations Per Second.
L1 (L2, L3,) Cache	Represents the cache Level in a multi-level cache hierarchy. Generally operates by checking the smallest and fastest Level 1 (L1) cache first, then proceeds to the next levels.
Latency (also Lag, Response Time)	As it relates to storage, the measure of time delay from a requested I/O operation to its response.
Lazy Write	See Write-Back.
LUN (Logical Unit Number)	A number used to identify a device accessed by storage protocols which supports read/write operations (usually a logical disk). The term is often also used to refer to the disk itself.
NAND Flash	The type of memory primarily used in Flash cards and SSD drives, which is connected in a way that resembles a NAND (Negated AND) style circuit gate.
NAS (Network-Attached Storage)	File-level data storage (such as fixed disk and magnetic tape drives) that are directly linked to a storage area network or other network.
Over-Provisioning	As it relates to primary storage, the allocation of additional physical disks to provide higher IOPS/performance via load balancing.
Primary Storage	As it relates to caching, the storage system or location (DAS, SAN, NAS, etc.) where the data is stored.
SAN (Storage Area Network)	Framework used to attach remote computer storage devices to servers. Storage devices appear as if they were attached locally to the operating system.
Sparse File	A type of file that utilizes file system space more efficiently by only storing the necessary blocks of a file, with the unneeded pieces represented by empty space.
SSD (Solid-State Disk)	A device used for data storage that utilizes memory chips instead of a revolving disk.
Storage Virtualization	An abstraction layer between users (servers and applications) and storage hardware that allows a common set of features to be applied to storage devices of different brands or types.
Tiered Storage	A data storage technique that moves data between two or more kinds of storage, which are differentiated by four primary attributes: Price, Performance, Capacity, and Function.
трс-с	TPC (Transaction Processing Performance Council) Benchmark C is an industry standard OLTP (On-Line Transaction Processing) benchmark for comparing database performance.

Glossary



Term	Definition
VM Density	The measure of the number of virtual machines that can be supported per physical server. The greater the VM density, the less infrastructure required to support a given number of virtual applications, and therefore, less cost per application.
Write-Around	A write caching policy where data is written only to primary storage, bypassing the cache, as well as evicting any old versions of that data from cache.
Write-Back	A write caching policy where data is written first to the cache and then mirrored to primary storage when I/O is available. The process of mirroring to primary storage is known as a Lazy Write.
Write-Through	A write caching policy where every write to the cache causes a synchronous write to primary storage.