

Hitachi Unified Storage VM Block Module Hitachi Volume Shredder User Guide

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Preface

This document describes and provides instructions for performing volume shredding operations on the Hitachi Unified Storage VM (HUS VM) storage system using the Hitachi Volume Shredder software on Storage Navigator.

Please read this document carefully to understand how to use this product, and maintain a copy for reference purposes.

This preface includes the following information:

- [Intended audience](#)
- [Product version](#)
- [Release notes](#)
- [Document revision level](#)
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Intended audience

This document is intended for system administrators, Hitachi Data Systems representatives, and authorized service providers who install, configure, and operate the Unified Storage VM storage system.

Readers of this document should be familiar with the following:

- Data processing and RAID storage systems and their basic functions.
- The Unified Storage VM storage system and the *Hitachi Unified Storage VM Block Module Hardware User Guide*.
- The Storage Navigator software for the Unified Storage VM and the *Hitachi Storage Navigator User Guide*.
- Remote replication and disaster recovery configurations for enterprise storage data centers.

Product version

This document revision applies to Hitachi Unified Storage VM microcode 73-03-0x or later.

Release notes

The Hitachi Unified Storage VM Release Notes provide information about the HUS VM microcode (DKCMAIN and SVP), including new features and functions and changes. The Release Notes are available on the Hitachi Data Systems Portal: <https://portal.hds.com>

Document revision level

Revision	Date	Description
MK-92HM7021-00	September 2012	Initial release
MK-92HM7021-01	December 2012	Supersedes and replaces MK-92HM7021-00.
MK-92HM7021-02	March 2013	Supersedes and replaces MK-92HM7021-01.
MK-92HM7021-03	May 2013	Supersedes and replaces MK-92HM7021-02.
MK-92HM7021-04	October 2013	Supersedes and replaces MK-92HM7021-03.

Changes in this revision

- Added “Quorum disks that are being used by High Availability Manager” to the list of volumes you cannot shred (until the status is changed to Blocked) in [Volume shredding functions on page 1-2](#).

Referenced documents

Hitachi Unified Storage VM documents:

- *Hitachi Unified Storage VM Block Module Hardware User Guide*, MK-92HM7005




- *Hitachi Storage Navigator User Guide*, MK-92HM7016
- *Hitachi Storage Navigator Messages*, MK-92HM7017
- *Hitachi TrueCopy® User Guide*, MK-92HM7018


Conventions

This document uses the following typographic conventions:

Convention	Description
Bold	Indicates the following: <ul style="list-style-type: none"> • Text in a window or dialog box, such as menus, menu options, buttons, and labels. Example: On the Add Pair dialog box, click OK. • Text appearing on screen or entered by the user. Example: The -split option. • The name of a directory, folder, or file. Example: The horcm.conf file.
<i>Italic</i>	Indicates a variable, which is a placeholder for actual text provided by the user or system. Example: copy <i>source-file target-file</i> Angle brackets are also used to indicate variables.
Monospace	Indicates text that is displayed on screen or entered by the user. Example: # pairdisplay -g oradb
< > angle brackets	Indicates a variable, which is a placeholder for actual text provided by the user or system. Example: # pairdisplay -g <group> Italic is also used to indicate variables.
[] square brackets	Indicates optional values. Example: [a b] indicates that you can choose a, b, or nothing.
{ } braces	Indicates required or expected values. Example: { a b } indicates that you must choose either a or b.
vertical bar	Indicates that you have a choice between two or more options or arguments. Examples: [a b] indicates that you can choose a, b, or nothing. { a b } indicates that you must choose either a or b.

This document uses the following icons to draw attention to information:

Icon	Meaning	Description
	Tip	Helpful information, guidelines, or suggestions for performing tasks more effectively.
	Note	Calls attention to additional information.
	Caution	Failure to take or avoid a specified action can result in adverse conditions or consequences (for example, loss of access to data).

Icon	Meaning	Description
	WARNING	Failure to take or avoid a specified action can result in severe conditions or consequences (for example, loss of data).

Convention for storage capacity values

Physical storage capacity values (for example, disk drive capacity) are calculated based on the following values:

Physical capacity unit	Value
1 KB	1,000 (10^3) bytes
1 MB	1,000 KB or $1,000^2$ bytes
1 GB	1,000 MB or $1,000^3$ bytes
1 TB	1,000 GB or $1,000^4$ bytes
1 PB	1,000 TB or $1,000^5$ bytes
1 EB	1,000 PB or $1,000^6$ bytes

Logical storage capacity values (for example, logical device capacity) are calculated based on the following values:

Logical capacity unit	Value
1 KB	1,024 (2^{10}) bytes
1 MB	1,024 KB or $1,024^2$ bytes
1 GB	1,024 MB or $1,024^3$ bytes
1 TB	1,024 GB or $1,024^4$ bytes
1 PB	1,024 TB or $1,024^5$ bytes
1 EB	1,024 PB or $1,024^6$ bytes

Accessing product documentation

The Hitachi Unified Storage VM user documentation is available on the Hitachi Data Systems Support Portal: <https://hdssupport.hds.com>. Please check this site for the most current documentation, including important updates that may have been made after the release of the product.

Getting help

The Hitachi Data Systems customer support staff is available 24 hours a day, seven days a week. If you need technical support, log on to the Hitachi Data Systems Support Portal for contact information: <https://hdssupport.hds.com>

Comments

Please send us your comments on this document:
doc.comments@hds.com. Include the document title, number, and revision.
Please refer to specific sections and paragraphs whenever possible.

Thank you! (All comments become the property of Hitachi Data Systems.)

Introduction to Volume Shredder

Storage Navigator uses the Volume Shredder function to shred data on the Hitachi Unified Storage VM storage system. Volume shredding deletes data in volumes and prevents the deleted data from being restored. When the user of a volume is to be changed, the data stored by the previous user should be deleted for security reasons. Volume Shredder allows you to specify the number of times data is overwritten. This enables you to ensure compliance with any applicable requirements (such as DoD5220.22M).

- [Volume shredding functions](#)
- [Example of volume shredding](#)
- [Shredding times](#)
- [System requirements](#)
- [Resources that can be executed for each function](#)

Volume shredding functions

Volume shredding is the process of deleting all user data in a volume by overwriting the data with dummy data. The volume shredding function is performed from Storage Navigator using the Hitachi Volume Shredder software. See an [Example of volume shredding on page 1-3](#).

Because of the nature of hard disks, one overwrite pass might not be enough to ensure that user data is completely deleted, and it is possible that some deleted user data could be restored. The best practice is to overwrite a volume at least three times using dummy data, which is the default setting. You can configure the system to overwrite a volume up to eight times. For more information on Volume Shredder settings, see [Defining shredding settings on page 2-4](#).

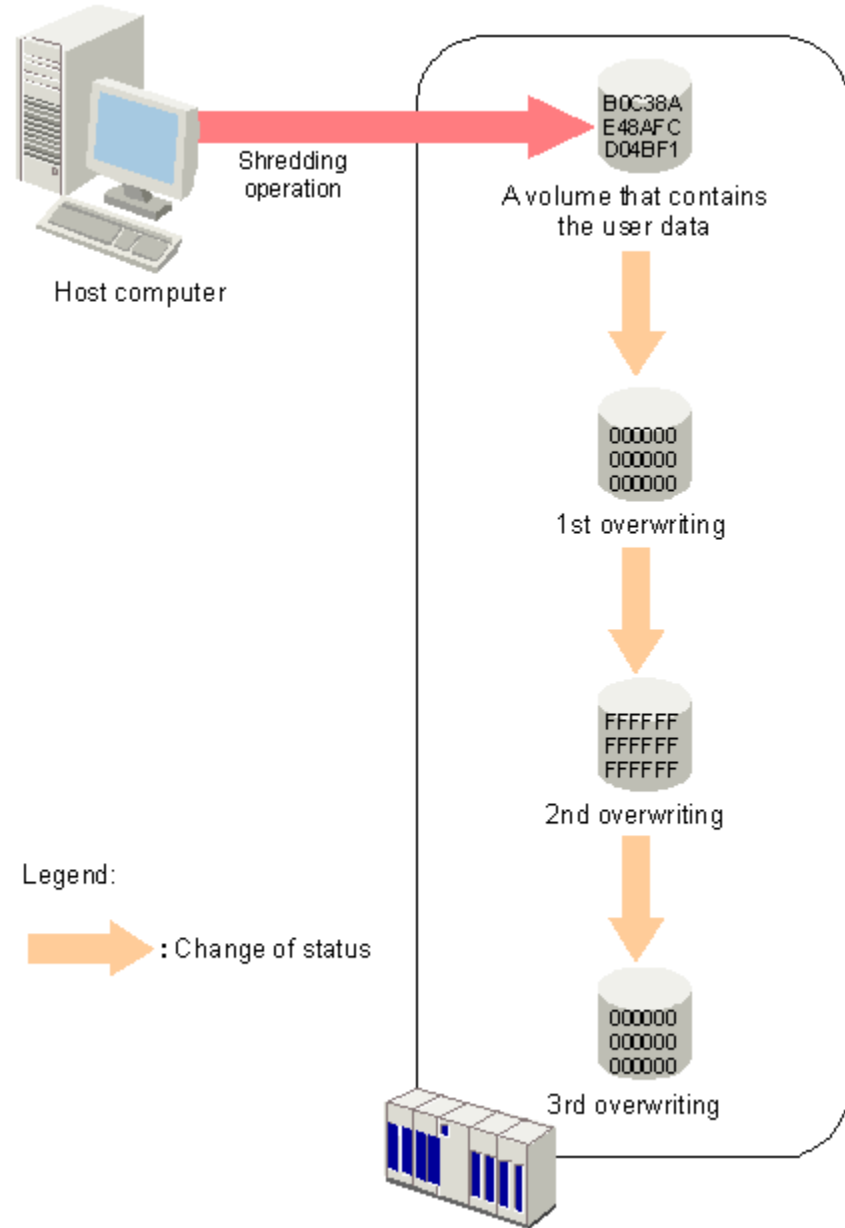
You can shred all volume types (for example, LDEV or CV), but the status of the volumes must be **Blocked**. If the status of a volume is **Normal**, the volume cannot be shredded. For how to change the status of the volume to **Blocked**, see [Blocking volumes on page 2-2](#). You can select the target volumes for the shredding function in the Shred LDEVs window.

You cannot shred the following volumes:

- Pool volumes
- Thin Image virtual volumes
- Journal volumes
- Volumes whose access attribute is not read/write
- Quorum disk that is being used by High Availability Manager
- Volumes having the nondisruptive migration attribute

For how to shred a volume, see [Shredding volumes on page 2-5](#).

Example of volume shredding



Shredding times

If you shred a large number of LDEVs, the operation will affect host I/O operations. To avoid this, execute the shredding function at times of day when the host load is low. Use the following formula to calculate the approximate shredding times.

Time required for executing the shredding function = time required for one dummy data write (standard required time) x number of times that dummy data is written (n).

The following tables show the standard required times for shredding without I/O, by hard disk type. The same standards also apply to executing the shredding function for encrypted hard disk drives. However, the actual required shredding time may be different between generations of drives.

Table 1-1

RAID level		Standard required time for 1TB in one parity group		
		15Krpm	10Krpm	7.2Krpm
RAID1	2D+2D	125 minutes	175 minutes	240 minutes
RAID5	3D+1P	85 minutes	115 minutes	160 minutes
	7D+1P	35 minutes	50 minutes	70 minutes
RAID7	6D+2P	45 minutes	60 minutes	80 minutes
	14D+2P	20 minutes	25 minutes	35 minutes

Table 1-2 For SSD drives:

RAID level		Standard required time for 1TB in one parity group
RAID1	2D+2D	50 minutes
RAID5	3D+1P	35 minutes
	7D+1P	15 minutes
RAID6	6D+2P	20 minutes
	14D+2P	10 minutes

If SSDs are used, until 16 units of SSDs regardless of the number of parity groups, the required times of SSDs are same.

Table 1-3 For flash module drives:

RAID level		Standard required time for 1TB in one parity group
RAID1	2D+2D	15 minutes
RAID5	3D+1P	15 minutes
	7D+1P	10 minutes
RAID6	6D+2P	10 minutes
	14D+2P	5 minutes

When an I/O operation is performed, the required shredding time depends on I/O loads, and the shredding time is required at least six times that of if no I/O operation is performed. If a DKxxx-HxxxAT hard disk drive is used for the ECC when creating a parity group on an encrypted hard disk drive, the time required for shredding that parity group is the maximum time listed. If the volumes to be shredded belong to drives of mixed types or mixed configurations, the longest required times associated with the drive type or drive configuration apply to all volumes. Thus, mixed types and configurations take more time for the volumes to become available for use than when the drive type and drive configuration are the same. When you add drives or change drive configurations, try to arrange the drives into those with the same standard required times, then add drives starting with those volume types requiring the least shredding time.

System requirements

The following items are required to run Volume Shredder:

- Hitachi Unified Storage VM storage system
- Hitachi Storage Navigator software
- Hitachi Volume Shredder software

Resources that can be executed for each function

You must have correct resources available and configured appropriately to use Volume Shredder. Storage Navigator main window shows only the resources that are assigned to a user who logs into the Storage Navigator. The window can also show the related resources that are required to manage the assigned resources.

Storage Navigator secondary window shows all the resources in the storage system. When you run a function in the Storage Navigator secondary window, verify the resource group ID in the Basic Information Display dialog boxes, and then run the operations for the resources assigned to the user account.

For more information on the conditions of the resources, see *Hitachi Unified Storage VM Block Module Provisioning Guide*.

Shredding volumes

To begin shredding volumes, you need to block the volumes, configure the shredding settings, and then run the application. A mechanism exists to stop the shredding process.

- [Volume shredding workflow](#)
- [Blocking volumes](#)
- [Calculating number of overwrite passes for flash drives](#)
- [Calculating number of overwrite passes for FMDs](#)
- [Defining shredding settings](#)
- [Shredding volumes](#)
- [Stopping volume shredding](#)
- [Checking results of volume shredding](#)

Volume shredding workflow

- [Blocking volumes on page 2-2](#)
- [Calculating number of overwrite passes for flash drives on page 2-2](#)
- [Defining shredding settings on page 2-4](#)
- [Shredding volumes on page 2-5](#)
- [Stopping volume shredding on page 2-6](#)
- [Checking results of volume shredding on page 2-7](#)

Blocking volumes

The volume to be shredded must be in blocked status before the shredding begins. When a volume is blocked, I/O operations cannot be performed on the volume.

1. Display the Storage Navigator main window.
2. Select **Storage System** in **Explorer**.
3. Select the resource under the **Storage System** folder.
 - When you select a parity group in **Parity Group**, the **LDEVs** tab becomes available.
 - When you select an LDEV in **Logical Device**, The **LDEVs** tab becomes available.
4. Check the status of the volume in the **Status** column.
 - If a status other than **Block** appears, the volume is not blocked. Continue to the next step.
 - If **Block** appears, the volume is already blocked, and you can proceed directly to calculating the number of overwrite passes (for flash drives and FMDs only) and shredding the volume (skip steps 5 and 6).
5. Select the volume and click **Block LDEVs**.
6. When the confirmation message appears, click **Apply** to block the selected volume.

Calculating number of overwrite passes for flash drives

Because of the way space is allocated in flash drives, the dummy data that is used to overwrite the volume must exceed the capacity of the target volume. Therefore, before you shred a volume on flash drives, you need to calculate the number of times the system must overwrite the volume with dummy data.

1. Select an LDEV in **Logical Device** and write down its capacity and the amount of data in the RAID configuration (found on the **LDEVs** tab).

Examples of amounts of data in a RAID configuration:

n of RAID5($n \times D + 1P$)

n of RAID6($n \times D + 2P$)

2. Use the following formula to calculate the number of times to overwrite the data (N):

$$N = (\text{User-capacity-for-Data} \times 2) / \text{Capacity-of-target-volume}$$

When the capacity of the flash drive is 72 GB, 72 GB x n

Example: The capacity of the flash drive is 72 GB, the RAID configuration is 3D+1P, and the LDEV capacity is 100 GB.

$$[(72 \times 3) \times 2] / 100 = 4.32 = \text{five times}$$

Round up the value (4.32) to the nearest whole number. You need to overwrite the data five times.

Example of shredding data on flash drives

In this sample configuration, the flash drive capacity is 200 GB, the RAID configuration is 3D+1P, and the LDEV capacity is 220 GB.

1. Calculate the number of shredding operations.

$$[(200 \times 3) \times 2] / 220 = 5.45 = \text{six times}$$

Round up the value (5.45) to the nearest whole number. You need to overwrite the data six times.

2. Define the shredding settings.

Refer to [Defining shredding settings on page 2-4](#), enter the dummy data **00** in the text box and add a row to the **Data Pattern (User Setting)** list (add rows for performing the shredding operation six times).

3. Erase the volume data.

Refer to [Defining shredding settings on page 2-4](#) and execute the shredding operation.

4. Repeat steps 2 and 3 using the dummy data **FF**.
5. Repeat steps 2 and 3 using the dummy data **00**.

Calculating number of overwrite passes for FMDs

Because of the way space is allocated in FMDs, the dummy data that is used to overwrite the volume must exceed the capacity of the target volume. Therefore, before you shred a volume on FMDs, you need to calculate the number of times the system must overwrite the volume with dummy data.

1. Select an LDEV in **Logical Device** and write down its capacity and the amount of data in the RAID configuration (found on the **LDEVs** tab).

Examples amounts of data in a RAID configuration:

n of RAID5(nxD + 1P)

n of RAID6(nxD + 2P)

2. Use the following formula to calculate the number of times to overwrite the data (N):

$$N = (\text{User-capacity-for-Data} \times 2) / \text{Capacity-of-target-volume}$$

When the capacity of the FMD is 1,600 GB, 1,600GB x n

Example: The capacity of the FMD is 1,600 GB, the RAID configuration is 3D+1P, and the LDEV capacity is 880 GB.

$$[(1,600 \times 3) \times 2] / 880 = 10.9 = 11 \text{ times}$$

Round up the value (10.9) to the nearest whole number. You need to overwrite the data 11 times.

You can write dummy data up to eight times in one shredding operation. To write dummy data nine or more times, perform the shredding operation for the volume as many times as required.

Example of shredding data on FMDs

This example assumes that the capacity of the FMD is 1,600 GB, the RAID configuration is 3D+1P, and the LDEV capacity is 880 GB.

1. Calculate the number of times to overwrite the data:

$$[(1,600 \times 3) \times 2] / 880 = 10.9 = 11 \text{ times}$$

Round up the value (10.9) to the nearest whole number. You need to overwrite the data 11 times.

2. Define the shredding settings.

Refer to [Defining shredding settings on page 2-4](#), select **Data Pattern (User Setting)** list and **Random Data**, then click **Add** eight times.

3. Erase the volume data.

Refer to [Defining shredding settings on page 2-4](#) for procedures on erasing the volume data.

4. Repeat steps 2 and 3, three more times, clicking **Add** three times.

Defining shredding settings

The default and user-specified shredding settings are defined in the **Edit Shredding Data Pattern** window. The user-specified shredding settings are maintained while the **Shred LDEVs** window appears.

1. Display the Storage Navigator main window.
2. Select the resource to display the tab windows:
 - Select a parity group in **Parity Group** to display the **LDEVs** tab.
 - Select an LDEV in **LDEVs** to display the **LDEVs** tab.
3. Select the volume to be shredded and click **Shred LDEVs**.

The **Shred LDEVs** window appears.

4. Click **Edit Data Pattern**.

The **Edit Shredding Data Pattern** window appears.

5. To use the default value, select **Default Pattern (00-FF-00)**, and click **OK**. To specify the settings, select **User Setting** in ***Data Pattern** and continue to the next step.



Caution: For Flash Module drives, select **Random Data**.

6. To use the random data setting, select **Random Data**, and click **Add**. Random numbers are added in the **Data Pattern(User Setting)** table. Click **OK** to close the **Edit Shredding Data Pattern** window.
7. To specify the data pattern, select **Define Data**, and enter the following settings:
 - o Enter a number that you want to use as dummy data in the text box, and click **Add**. You can enter a hexadecimal number up to four digits (0 to FFFF). The number is added in the **Data Pattern(User Setting)** table.

We recommend that you enter three or more numbers to use as dummy data. If you perform a shredding operation with one or two numbers, all data may not be completely deleted from the volume.

To delete the numbers that you entered, click **Clear** and re-enter the desired numbers. If you click **Clear**, values other than **00** in the bottom row are deleted.
 - o When you are finished entering the desired numbers, click **OK** to close the **Edit Shredding Data Pattern** window.

Shredding volumes

After ensuring the volumes are blocked, calculating shredding repetitions, and defining shredding settings, you are ready to start the shredding operation to delete data from the volume.

1. Display the Storage Navigator main window.
2. Select the resource to display the tab windows:
 - o Select a parity group in **Parity Group** to display the **LDEVs** tab.
 - o Select an LDEV in **Logical device** to display **LDEVs** tab.
3. Check the volumes to make sure that they are in **Blocked** status.

If the volumes are not **Blocked**, change the status to **Blocked**. See [Blocking volumes on page 2-2](#).
4. Select the volume to be shredded, and click **Shred LDEVs**.

The **Shred LDEVs** window appears.
5. To save the result of the volume shredding operation as the file, click **Set Data Output**. If not, click **Cancel Data Output**. Up to three volumes can be saved as the result of the volume shredding operation.
6. Click **Finish** in the **Shred LDEV** window.

The confirmation window appears.
7. Click **Apply**.

The shredding operation starts. To stop the shredding operation, see [Stopping volume shredding on page 2-6](#).

When the shredding operation is finished, the system changes the volume status to **Normal**.

Stopping volume shredding



Caution: If you stop a shredding operation, you cannot restart the shredding operation, and the integrity of the data on the volume is not guaranteed.

1. Display the Storage Navigator main window.
2. Select **Storage System** in **Explorer**.
3. Select the **Tasks**.
The task list appears.
4. In the task list, click the name of the task you want to stop.
The **Task Properties** dialog box appears.
5. Click **Abort** in the **Shredding Data pattern** field.

The screenshot shows the 'Task Properties' dialog box with the following content:

Task Name: 120315-ShredLDEVs

Selected LDEVs						
LDEV ID	LDEV Name	Parity Group ID	Pool Name(ID)	Capacity	Provisioning Type	A
00:1A:01		1-1	-	8.00 GB	Basic	-

Total: 1

Shredding Data pattern		
Pass Number	Data Pattern	Result
1	00	-
2	FF	-
3	00	-

Buttons: Abort, Close, Help

6. Verify the displayed settings and click **Yes**.The shredding operation stops.
7. Click **Close** in the **Task Properties** dialog box.

Checking results of volume shredding

In the Tasks window

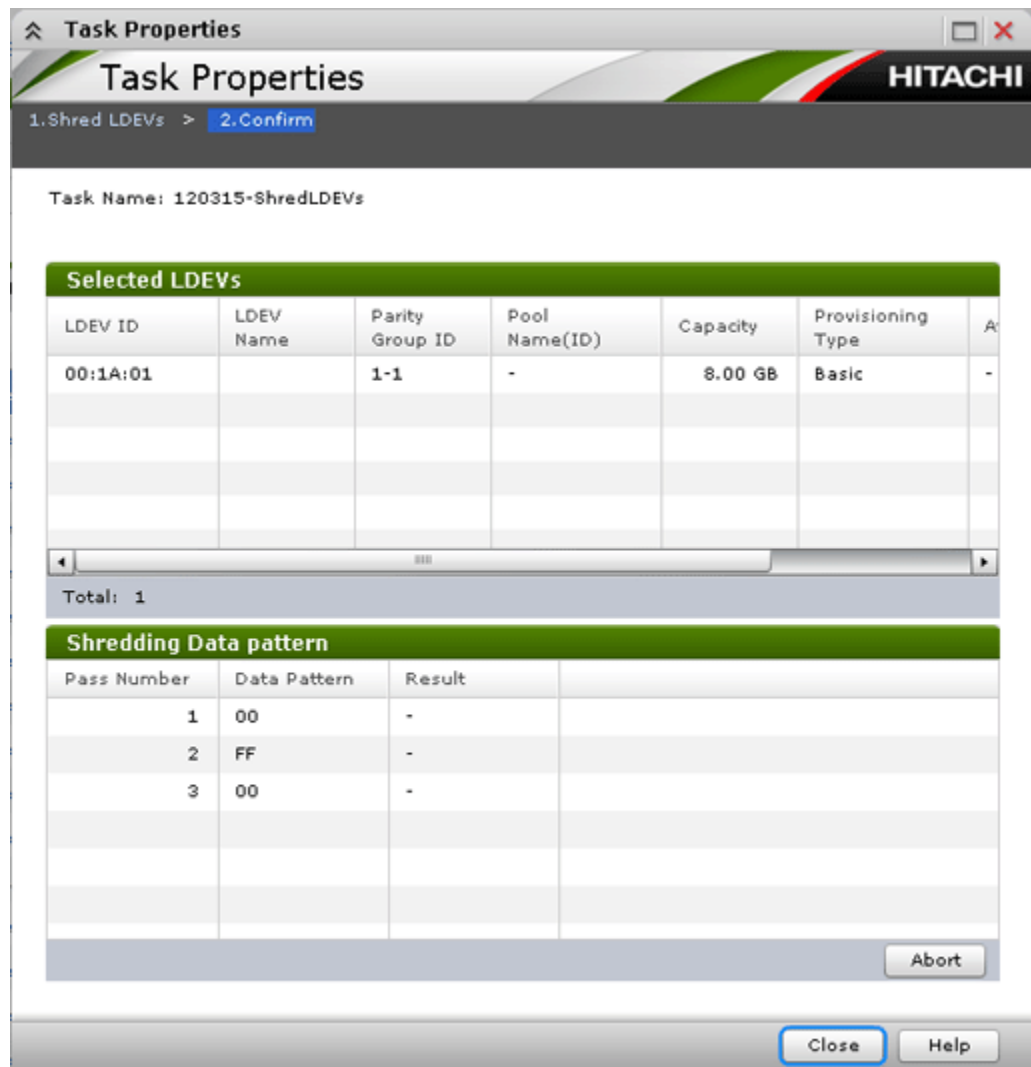
After the system shreds a volume, check the result in the **Tasks** window.

1. Display the Storage Navigator main window.
2. Select **Storage System** in **Explorer**.
3. Select **Tasks**.

The list of task appears.

4. Click the task name for which you want to check the results.

The **Task Properties** dialog box appears.



5. Check the status of **Result** in the **Shredding Data pattern** field. Verify that all the overwriting operations have ended normally. The **Shredding Data pattern** field shows **Normal** when an overwriting operation ends normally.

If any overwriting operation ends abnormally, the shredding operation fail. If the shredding failed, try to shred the volume again. If the shredding operation fails again, call the Hitachi Data Systems Support Center to identify the cause of the failure.

If the power supply fails while the system is overwriting a volume, the system returns the **Shredding operation canceled** or **Shredding operation Failed** message.

Status	Meaning
-	The task is not performed.
Shredding operation Normal.	The shredding operation was successful.
Writing.	The shredding operation is progress.
Shredding operation not executed.	The system cannot run the software as configured.
Shredding operation canceled.	The shredding operation was cancelled.
Shredding operation Failed.	The shredding operation ended with errors.
Shredding data transfer error.	The system could not write results to a file.
Shredding data verify error.	An error was detected while verifying the file containing the result of the shredding operation.
No-data assigned.	When you try to shred an unused Dynamic Provisioning virtual volume and open the file that contains the result of the shredding operation, this file will contain the text No-data assigned . In this case, no dummy data will be written to the unused Dynamic Provisioning virtual volume. However, if the following volumes are included in the target of a shredding operation, dummy data will be written to the following volumes: <ul style="list-style-type: none"> • Dynamic Provisioning virtual volumes that are being used • Internal volumes • External volumes

6. Click **Close** in the **Task Properties** dialog box.

On the downloaded file

In the **Selected LDEVs** table on the **Shred LDEVs** window, if the **Data Output** column is set to **YES**, the result of shredding a volume can be saved as a file on the Storage Navigator computer. You can use this file to check the results of shredding a volume.

1. On the menu bar, select **Reports > Shredding Report >** and **Download Latest Report** or **Download Other Reports**.

Select **Download Latest Report** to download the latest result file.
Select **Download Other Reports** to download the past ten times result files.

The message that the preparation for download is completed appears.

2. Click **OK**.

A dialog box opens for you to select where to download the file.

3. Specify the folder in which to download the file.
4. Click **Save**.

Compression files are downloaded. To decompress the compression file, you will obtain binary files containing the results of the shredding operation and text files containing contents and results of the shredding operation.

The name of the binary file indicates the LDKC, CU, and LDEV numbers of the shredded volumes, and the number of times dummy data was written to the volumes. For example, if a binary file is named 00-01 11 03.bin, the LDKC number is 00, the CU number is 01, and the LDEV number is 11. The filename also indicates that dummy data was written to that volume three times. A binary file contains the first 512 bytes of data of a shredded volume (LDEV).

The file naming convention is:

shred_the-finish-time-of-shredding-operation.txt

The compressed file is saved with the time zone setting of SVP. If the compressed file is decompressed on the Storage Navigator computer, the time stamp of the decompressed file appears with the time zone setting of the Storage Navigator computer. Therefore, the time stamp of the decompressed file might be different from the actual finish time of a shredding operation.

The text file contains the following summary information of a shredding operation:

- Results of a shredding operation
- Contents of the dummy data
- Shredded volumes
- Start and finish time of a shredding operation

Troubleshooting

Troubleshooting information and technical support is available for Volume Shredder.

- [Troubleshooting](#)
- [Calling the Hitachi Data Systems Support Center](#)

Troubleshooting

- For troubleshooting information about the Unified Storage VM storage system, see the *Hitachi Unified Storage VM Block Module Hardware User Guide*.
- For troubleshooting information about Storage Navigator, see the *Hitachi Storage Navigator User Guide*.
- For information about the Storage Navigator error messages, see the *Hitachi Storage Navigator Messages*.

Calling the Hitachi Data Systems Support Center

When calling the Hitachi Data Systems Support Center, provide as much information about the problem as possible, including:

- The circumstances surrounding the error or failure.
- The content of any messages displayed on Storage Navigator.
- The Storage Navigator configuration information (use the FD Dump Tool).
- The service information messages (SIMs), including reference codes and severity levels, displayed by Storage Navigator.

The HDS customer support staff is available 24 hours a day, seven days a week. If you need technical support, log on to the HDS Support Portal for contact information: <https://hdssupport.hds.com>



Volume Shredder GUI reference

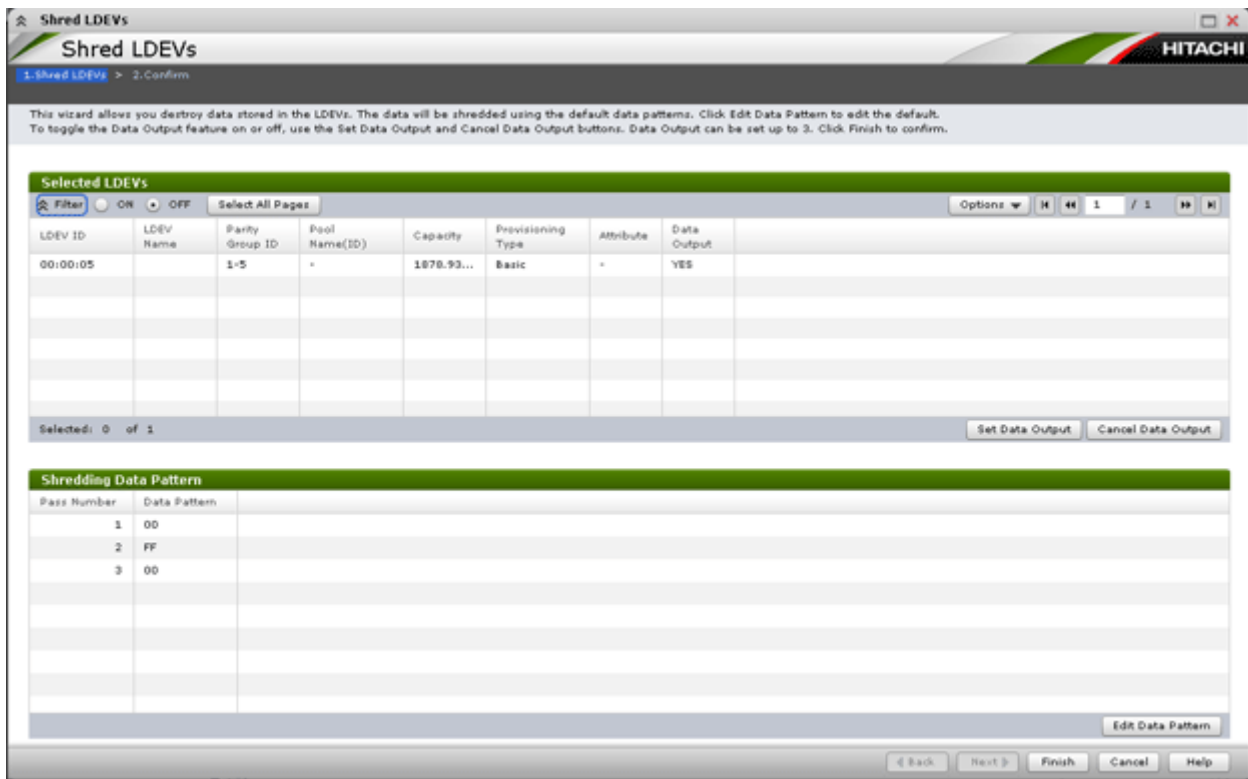
You access data deletion features through Storage Navigator.

- [Shred LDEVs wizard](#)
- [Edit Shredding Data Pattern window](#)

Shred LDEVs wizard

Shred LDEVs window

Use this window to select the LDEVs to be shredded.



Selected LDEVs table

The following table contains the items on the Selected LDEVs table and their descriptions.

Item	Description
LDEV ID	The ID of the LDEV selected for shredding. The ID is a combination of a logical disk controller (LDKC) number, a control unit (CU) number, and a logical device (LDEV) number. Free indicates free space.
LDEV Name	Name of the LDEV selected for shredding.
Parity Group ID	The parity group number (for example, 1-1) of which the selected LDEV is a member.
Pool Name(ID)	Pool name, if the volume is a pool volume (pool-VOL). The pool ID is enclosed by parentheses.
Capacity	The capacity of the LDEV selected for shredding. Change the unit of capacity by selecting Option > Capacity Unit .
Provisioning Type	The provisioning type of the selected LDEV. <ul style="list-style-type: none">• Basic: Internal volume.• External: External volume• DP: Virtual volume of Dynamic Provisioning.

Item	Description
Attribute	Displays the attribute of the LDEV. Command Device: Command device. System Disk: System disk. Reserved VOL: Reserved volume. -: Volume in which the attribute is not defined.
Data Output	Indicates whether the results of the shredding operation will be saved in a file. Click Set Data Output to save the results. Results can be saved for up to three volumes. Yes: The result of the shredding operation will be saved. No: The result of the shredding operation is not saved.
Set Data Output	Click to save the result of the shredding operation.
Cancel Data Output	Click to not save the result of the shredding operation.

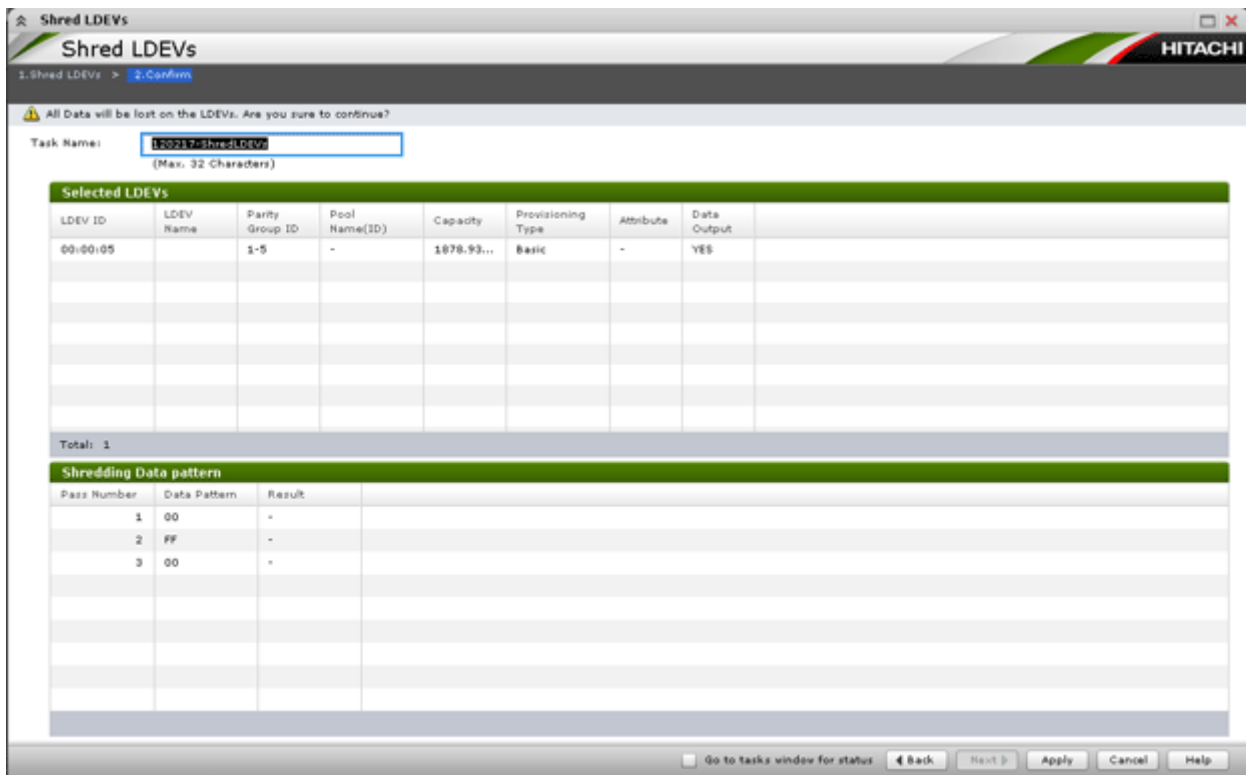
Shredding Data Pattern table

This table lists the shredding data pattern and the number of passes that will be performed when the LDEVs are shredded.

Item	Description
Pass Number	Shows the order of overwriting.
Data Pattern	The dummy data that will overwrite data on the volume.
Edit Data Pattern	Opens the Edit Shredding Data Pattern dialog box, where you can change the shredding data pattern information shown in this list.

Confirm window

In this window, review the information about the LDEVs selected to be shredded, review the shredding data pattern to be used, type a unique name for this shredding task, and then click Apply to start shredding the volume.



Selected LDEVs table

The following table contains the items on the Selected LDEVs table and their descriptions.

Item	Description
LDEV ID	The ID of the LDEV selected for shredding. A combination of a logical disk controller (LDKC) number, a control unit (CU) number, and a logical device (LDEV) number. Free indicates free space.
LDEV Name	Name of the LDEV selected for shredding.
Parity Group ID	The parity group number (for example, 1-1) of the LDEV selected for shredding.
Pool Name(ID)	Pool name and pool ID. This information is available if the volume is a pool volume (pool-VOL). The pool ID is enclosed in parentheses.
Capacity	Capacity of the LDEV shown for the unit selected by Option > Capacity Unit .
Provisioning Type	The provisioning types of the selected LDEVs: <ul style="list-style-type: none"> • Basic: Internal volume. • External: External volume • DP: Virtual volume of Dynamic Provisioning.

Item	Description
Attribute	Displays the attribute of the LDEV. Command Device: Command device. System Disk: System disk. Reserved VOL: Reserved volume. -: Volume in which the attribute is not defined.
Data Output	Indicates whether the results of the shredding operation will be saved in a file. Click Set Data Output to save the results. Results can be saved for up to three volumes. Yes: The result of the shredding operation will be saved. No: The result of the shredding operation is not saved.

Shredding Data Pattern table

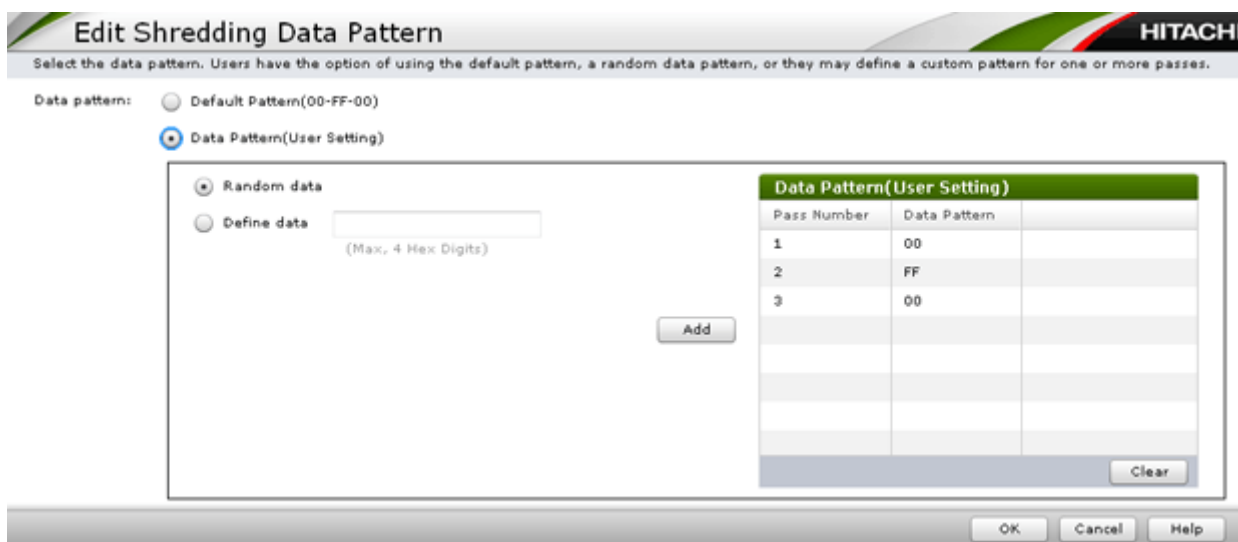
This table lists the shredding data pattern and the number of passes that will be performed to shred the selected LDEVs.

Item	Description
Pass Number	Shows the order of overwriting.
Data Pattern	Shows the dummy data that will be used each time.

Item	Description
Result	<p>Shows the results of the shredding operation.</p> <ul style="list-style-type: none"> • - The task is not performed. • Shredding operation Normal. The shredding operation ended normally. • Writing. The shredding operation is being performed. • Shredding operation not executed. The shredding operation was not performed according to the specified parameters. • Shredding operation canceled. The shredding operation was cancelled. • Shredding operation Failed. The shredding operation was ended abnormally. • Shredding data transfer error. The result of the shredding operation could not be output to a file. • Shredding data verify error. An error was detected while verifying the file containing the result of the shredding operation. • No-data assigned. When you shred an unused Dynamic Provisioning virtual volume and open the file that contains the result of the shredding operation, this file will contain the text No-data assigned. In this case, no dummy data is written to the unused Dynamic Provisioning virtual volume. However, if the following volumes are included in the target of a shredding operation, dummy data will be written to the following volumes: <ul style="list-style-type: none"> - Dynamic Provisioning virtual volumes that are being used - Internal volumes - External volumes

Edit Shredding Data Pattern window

Use this window to define the settings of the shredding operation.



Item	Description
Data Pattern	<p>Select whether to use the default settings of the shredding operation or to define the settings of the shredding operation yourself.</p> <ul style="list-style-type: none"> Default (00-FF-00): Uses the default data pattern. Deletes the data in a volume by overwriting the volume three times with dummy data. When the volume is overwritten for the first and the third times, volume shredding uses "00" (hexadecimal number) for the dummy data. When the volume is overwritten for the second time, volume shredding uses "FF" (hexadecimal number) for the dummy data. Data Pattern (User Setting): Uses a user-defined data pattern. You define the dummy data and how many times you want to overwrite the volume.
Random Data	When selected, volume shredding selects 4-digit hexadecimal numbers at random for the dummy data.
Define Data	When selected, you can enter hexadecimal numbers, from 0 to FFFF, to be used as the dummy data.
Add	Adds the user-defined dummy data to the Data Pattern list. This button is not available when you select the default data pattern.

Data Pattern (User Setting)

Item	Description
Pass Number	Shows the order of overwriting.
Data Pattern	Shows the dummy data to be used with each pass.
Clear	Clears all values other than 00 in the bottom row in the Data Pattern(User Setting) table.
OK	Applies the settings to the storage system.
Cancel	Cancel the selections made in this window.

Item	Description
Help	Opens the help topic.



Glossary

This glossary defines the special terms used in the Hitachi Unified Storage VM user documentation and Hitachi Storage Navigator online help. Click the letter links below to navigate.

C

CCI

Hitachi Command Control Interface software

CU

control unit

CV

customized volume

D

D

data (as in 7D+1P)

data pattern

The sequence of hexadecimal numbers (between 0 and FFFF) used for the overwrite passes of a volume shredding operation. The default data pattern is 00-FF-00 for three overwrite passes.

DP

Dynamic Provisioning

DP-VOL

virtual volume for Dynamic Provisioning

#	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
---	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------

dummy data

The data that is used to overwrite the existing data on a volume during volume shredding. The dummy data can be any hexadecimal number between 0 and FFFF.

E

ECC

error checking and correction

H

HUS VM

Hitachi Unified Storage VM

LDKC

logical disk controller

L

LDEV

logical device

LDKC

logical disk controller

O

overwrite pass

The process of overwriting the entire volume once with dummy data during volume shredding. There can be from three to eight overwrite passes in a single shredding operation.

P

P

parity (as in 7D+1P)

pool-VOL

pool volume

#	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
---	---	---	-------------------	-------------------	-------------------	---	---	-------------------	---	---	---	-------------------	---	---	-------------------	-------------------	---	-------------------	-------------------	---	---	-------------------	---	---	---	---

Glossary–2

R

RAID

redundant array of independent disks

rpm

rotations per minute

S

shredding

Erasing the data on a volume by overwriting it with dummy data multiple times.

SIM

service information message

SSD

solid-state drive. Another name for a flash drive.

SVP

service processor

V

VDEV

virtual device

V-VOL

virtual volume

#	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
---	---	---	-------------------	-------------------	-------------------	---	---	-------------------	---	---	---	-------------------	---	---	-------------------	-------------------	---	-------------------	-------------------	---	---	-------------------	---	---	---	---

#	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
---	---	---	-------------------	-------------------	-------------------	---	---	-------------------	---	---	---	-------------------	---	---	-------------------	-------------------	---	-------------------	-------------------	---	---	-------------------	---	---	---	---

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Hitachi Data Systems

Corporate Headquarters

2845 Lafayette Street
Santa Clara, California 95050-2639
U.S.A.

www.hds.com

Regional Contact Information

Americas

+1 408 970 1000

info@hds.com

Europe, Middle East, and Africa

+44 (0)1753 618000

info.emea@hds.com

Asia Pacific

+852 3189 7900

hds.marketing.apac@hds.com



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