

Hitachi Virtual Storage Platform G1000 Hitachi Volume Shredder User Guide

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Preface

This guide describes and provides instructions for Hitachi Volume Shredder secure erase software for the Hitachi Virtual Storage Platform G1000 storage system.

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](#)
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Intended audience

This document is intended for system administrators, HDS representatives, and authorized service providers who install, configure, and operate the Hitachi Virtual Storage Platform G1000 storage system.

Readers of this document should be familiar with the following:

- Data processing and RAID storage systems and their basic functions.
- The Hitachi Virtual Storage Platform G1000 storage system and the *Hitachi Virtual Storage Platform G1000 Hardware Guide*.
- The Hitachi Command Suite software or the Hitachi Device Manager - Storage Navigator software for the Hitachi Virtual Storage Platform G1000 storage system and the *Hitachi Command Suite User Guide* or the *Mainframe System Administrator Guide*.
- Data protection and security practices in enterprise storage environments, including data retention, archival, and shredding.

Product version

This document revision applies to Hitachi Virtual Storage Platform G1000 microcode 80-01-4x or later.

Document revision level

Revision	Date	Description
MK-92RD8025-00	April 2014	Initial release
MK-92RD8025-01	August 2014	Supersedes and replaces MK-92RD8025-00

Changes in this revision

- Added information about using Hitachi Command Suite to perform Volume Shredder operations.

Referenced documents

Hitachi Virtual Storage Platform G1000 documents:

- *Hitachi Virtual Storage Platform G1000 Hardware Guide*, MK-92RD8007
- *Hitachi Virtual Storage Platform G1000 Provisioning Guide for Open Systems*, MK-92RD8014
- *Hitachi Virtual Storage Platform G1000 Mainframe System Administrator Guide*, MK-92RD8016
- *Hitachi Command Suite Messages*, MK-92RD8017

Document conventions





This document uses the following terminology conventions:

Convention	Description
Hitachi Virtual Storage Platform G1000	Refers to all models of the Hitachi Virtual Storage Platform G1000 storage system, unless otherwise noted.

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. Used for variables in regular text. Example: copy <i>source-file target-file</i>
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. Used for variables in monospace text. Example: # pairdisplay -g <group>
[] 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.

The following table lists note icons that might appear in this document.

Icon	Meaning	Description
	Tip	Provides information, guidelines, or suggestions for performing tasks more effectively.
	Note	Calls attention to additional information.
	Caution	Warns that failure to take or avoid a specified action can result in adverse conditions or consequences (for example, loss of access to data).
	WARNING	Warns that 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, data 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 block	512 bytes
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 Virtual Storage Platform G1000 user documentation is available on the Hitachi Data Systems Portal: <https://portal.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 Portal for contact information: <https://portal.hds.com>

Comments

Please send us your comments on this document doc.comments@hds.com. Include the document title and number, including the revision level (for example, -07), and refer to specific sections and paragraphs whenever possible. All comments become the property of Hitachi Data Systems.

Thank you!

Overview of Hitachi Volume Shredder

This chapter provides an overview of Volume Shredder operations on the Hitachi Virtual Storage Platform G1000 storage system.

- [Data security practices and Volume Shredder](#)
- [Supported volume types](#)
- [Volume Shredder operations](#)
- [Shredding times](#)

Data security practices and Volume Shredder

The Volume Shredder software enables you to securely erase data on volumes in the Hitachi Virtual Storage Platform G1000 storage system by overwriting existing data to prevent restoration of the erased data. For example, when the user of a volume changes, you may want to purge the data stored by the previous user before giving access to the new user. This method of erasing data by overwriting it with dummy data is referred to as *shredding*.

Because of the way data is written on the drives, overwriting data once or twice might not be enough to ensure that the data cannot be restored. The best practice is to overwrite data at least three times with dummy data. Volume Shredder allows you to specify the number of times the data is overwritten, enabling you to ensure compliance with applicable requirements (for example, DoD5220.22-M).

Supported volume types

You can use Volume Shredder to shred both open-systems and mainframe systems, including logical devices (LDEVs) and custom volumes (CVs) of all emulation types. External volumes and Dynamic Provisioning virtual volumes* can also be shredded.

*When a shredding operation is performed on an unused virtual volume for Dynamic Provisioning, no dummy data is written to the volume.

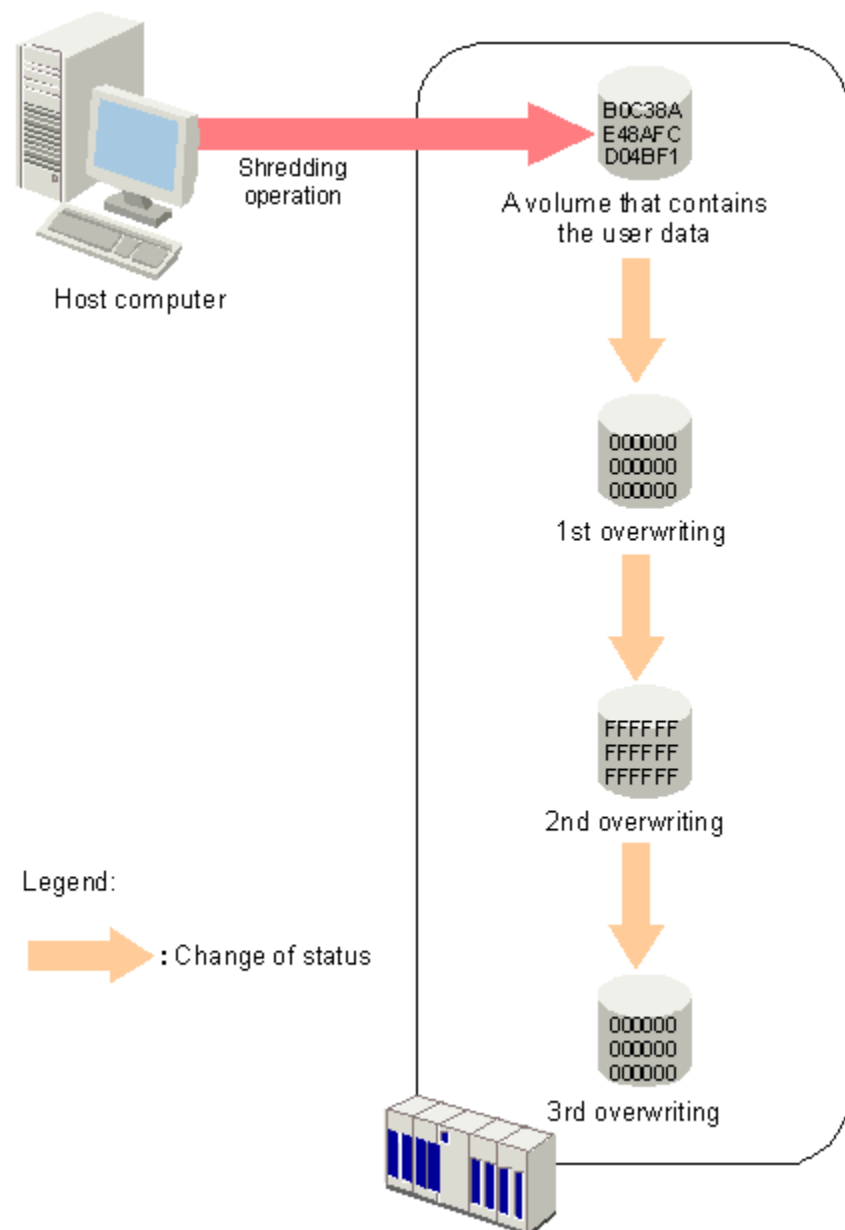
You cannot use Volume Shredder to shred the following types of volumes:

- Pool volumes
- Virtual volumes for Thin Image
- Journal volumes
- Volumes that are not write-enabled (access attribute is not read/write)
- TSE-VOL

Volume Shredder operations

The following figure shows user data that is being overwritten three times (default value for number of overwrites). Volume Shredder overwrites data using the following dummy data values:

- The first overwrite is 00.
- The second overwrite is FF.
- The third overwrite is 00.



You can configure Volume Shredder to overwrite data from three to eight times, and each time the system overwrites the data you can configure the dummy data to be any hexadecimal number from 0 to FFFF.

After the system finishes overwriting data, you can view the results in the user interface or, if configured, you can open the compressed results files.

We recommend that you execute the shredding function at times of day when the host I/O load is lowest. If the number of LDEVs to be shredded is large, shredding operations might affect host I/O operations. Use the following formula to determine the standard required time for a shredding operation.

$$(\text{time required for shredding}) = (\text{time required for one dummy data write (standard required time)}) \times (\text{number of times dummy data is written (n)})$$

Shredding times

The following tables show the standard required times for shredding without host I/O, listed by drive type. The same standard times also apply to shredding encrypted drives. The standard required time in each table assumes the use of OPEN-V volumes.

For DKxxx-JxxxSS/KxxxSS/HxxxSS disk drives:

Rotation per minute	RAID level		Standard required time*
15 Krpm	RAID 1	2D+2D	85 minutes
	RAID 5	3D+1P	65 minutes
		7D+1P	30 minutes
	RAID 6	6D+2P	35 minutes
		14D+2P	20 minutes
10 Krpm	RAID 1	2D+2D	110 minutes
	RAID 5	3D+1P	70 minutes
		7D+1P	35 minutes
	RAID 6	6D+2P	35 minutes
		14D+2P	20 minutes
7.2Krpm	RAID 1	2D+2D	185 minutes
	RAID 5	3D+1P	120 minutes
		7D+1P	50 minutes
	RAID 6	6D+2P	65 minutes
		14D+2P	25 minutes
*Data drive capacity is assumed to be 1 TB.			

For flash drives (SSDs):

Number of parity groups	RAID level		Standard required time*
From 1 to 4	RAID 1	2D+2D	30 minutes
	RAID 5	3D+1P	20 minutes
		7D+1P	15 minutes
	RAID 6	6D+2P	15 minutes
		14D+2P	10 minutes
*Flash drive capacity is assumed to be 1 TB.			

For FMDs:

Number of parity groups	RAID level		Standard required time*
From 1 to 4	RAID 1	2D+2D	20 minutes
	RAID 5	3D+1P	10 minutes
		7D+1P	10 minutes
	RAID 6	6D+2P	10 minutes
		14D+2P	5 minutes
*FMD capacity is assumed to be 1 TB.			

When host I/Os are performed, the required shredding time is at least six times that of when no host I/Os are performed. If a DKxxx-HxxxAT data drive is used for creating a parity group on an encrypted data 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, you should arrange the drives into those with the same standard required times, and then add drives starting with those volume types requiring the least shredding time.

Fibre-channel connectivity is required for both mainframe and open-systems volumes.

Volume Shredder operations

This chapter describes and provides instructions for performing Hitachi Volume Shredder operations:

- [Workflow for shredding](#)
- [Blocking a volume](#)
- [Blocking volumes in a parity group](#)
- [Calculating the number of overwrite passes for flash drives](#)
- [Calculating the number of overwrite passes for FMDs](#)
- [Defining shredding conditions](#)
- [Shredding a volume](#)
- [Shredding volumes in parity groups](#)
- [Viewing shredding status with the Tasks window](#)
- [Viewing shredding status with the Logical Devices window](#)
- [Stopping a shredding operation](#)
- [Viewing shredding results with the Tasks window](#)
- [Viewing shredding results in the compressed files](#)

Workflow for shredding

Use the following workflow to shred volumes using Volume Shredder:

1. [Viewing shredding status with the Logical Devices window on page 2-10](#) (Volume status should be **Normal**.)
2. [Blocking a volume on page 2-2](#)
3. [Calculating the number of overwrite passes for flash drives on page 2-4](#) if you are shredding a volume on a flash drive.
Or, [Calculating the number of overwrite passes for FMDs on page 2-5](#) if you are shredding a volume on an FMD.
4. [Defining shredding conditions on page 2-6](#)
5. [Shredding a volume on page 2-7](#)
6. [Stopping a shredding operation on page 2-10](#)
7. [Viewing shredding results in the compressed files on page 2-12](#) to check results in the results file.

Blocking a volume

You must have the Storage Administrator (Provisioning) role to perform this task.

To block a volume:

1. Display the volume to be blocked:

In Hitachi Command Suite:

- a. On the **Resources** tab, click **Storage Systems**, expand **All Storage Systems**, and then expand the target storage system.
- b. Right-click one of the following, depending on the location of the volume, **Volumes**, **DP Pools**, or **Parity Groups**, and then select **System GUI**.
- c. If you selected **DP Pools** in step (b), select the pool that contains the virtual volume you want to block, and then click the **Virtual Volumes** tab.

In Device Manager - Storage Navigator (mainframe-only environment):
Choose one of the following steps, depending on the location of the volume:

- o To display the **LDEVs** tab, in the **Storage Systems** tree, select **Parity Groups**, **Internal**, or **External**, and then select the parity group that contains the volume you want to block.
 - o To display the **LDEVs** tab, in the **Storage Systems** tree, select **Logical Devices**.
 - o To display the **Virtual Volumes** tab, in the **Storage Systems** tree, select **Pools**, and then select the pool that contains the virtual volume you want to block.
2. Confirm the current status of the volume you want to block by viewing the **Status** column of the table.

- If the volume is already blocked, **Blocked** appears in the status column.
 - If the volume is not blocked, a status other than **Blocked** appears in the status column.
3. Select the volume you want to block, click **More Actions**, and then select **Block LDEVs**. The **Block LDEVs** window opens.
 4. Note the settings in the **Block LDEVs** window, enter a unique task name or accept the default name, and then click **Apply**.
If **Go to tasks window for status** is selected, the **Tasks** window will open.

Related topics

- The *Block LDEVs* section in the *Hitachi Virtual Storage Platform G1000 Provisioning Guide for Open Systems*.
- The *Top window when selecting Logical Device* section in the *Hitachi Virtual Storage Platform G1000 Provisioning Guide for Open Systems*.
- The *Top window when selecting Internal or External of Parity Group* section in the *Hitachi Virtual Storage Platform G1000 Provisioning Guide for Open Systems*.

Blocking volumes in a parity group

You must have the Storage Administrator (Provisioning) role to perform this task.

To block volumes in a parity group:

1. Display the parity group to be blocked:
 - In Hitachi Command Suite:
 - a. On the **Resources** tab, click **Storage Systems**, and then expand **All Storage Systems**.
 - b. Expand the target storage system, right-click **Parity Groups**, and then select **System GUI**.
 - In Device Manager - Storage Navigator (mainframe-only environment):
Display the **Parity Groups** tab by choosing one of the following steps, depending on the location of the parity group:
 - In the **Storage Systems** tree, select **Parity Groups**.
 - In the **Storage Systems** tree, select **Parity Groups** and then select **Internal** or **External**.
2. Confirm the current status of the volumes you want to block by viewing the **LDEV Status** column of the table.
 - If the volume is already blocked, **Blocked** appears in the status column.
 - If the volume is not blocked, a status other than **Blocked** appears in the status column.
3. Select the parity group you want to block, click **More Actions**, and then select **Block LDEVs**. The **Block LDEVs** window opens.

- Note the settings in the **Block LDEVs** window, enter a unique task name or accept the default name, and then click **Apply**.

If **Go to tasks window for status** is selected, the **Tasks** window will open.

Related topics

- The *Block LDEVs* section in the *Hitachi Virtual Storage Platform G1000 Provisioning Guide for Open Systems*.
- The *Top window when selecting Logical Device* section in the *Hitachi Virtual Storage Platform G1000 Provisioning Guide for Open Systems*.
- The *Top window when selecting Internal or External of Parity Group* section in the *Hitachi Virtual Storage Platform G1000 Provisioning Guide for Open Systems*.

Calculating the 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.

You must have the Storage Administrator (Provisioning) role to perform this task.

- Select an LDEV on the **LDEVs** tab in the **Logical Devices** window, and write down its capacity and the amount of data in the RAID configuration.

Examples of amounts of data in a RAID configuration:

n of RAID5(nxD + 1P)

n of RAID6(nxD + 2P)

- 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 400 GB, 400 GB x n

Example: The capacity of the flash drive is 400 GB, the RAID configuration is 3D+1P, and the LDEV capacity is 440 GB.

$$[(400 \times 3) \times 2] / 440 = 5.45 = \text{six times}$$

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

Example of shredding data on flash drives

In this sample configuration, the flash drive capacity is 400 GB, the RAID configuration is 3D+1P, and the LDEV capacity is 440 GB.

- Calculate the number of shredding operations.

$$[(400 \times 3) \times 2] / 440 = 5.45 = \text{six times}$$

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 conditions on page 2-6](#), 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 conditions on page 2-6](#) 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**.

For more information, see the *Top window when selecting Logical Device* section in the *Hitachi Virtual Storage Platform G1000 Provisioning Guide for Open Systems*.

Calculating the 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.

You must have the Storage Administrator (Provisioning) role to perform this task.

1. Select an LDEV on the **LDEVs** tab in the **Logical Devices** window, and write down its capacity and the amount of data in the RAID configuration.

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 conditions on page 2-6](#), select the **Data Pattern (User Setting)** list and **Random Data**, then click **Add** eight times.

3. Erase the volume data.

Refer to [Defining shredding conditions on page 2-6](#) for procedures on erasing the volume data.

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

Defining shredding conditions

Configure data overwrite patterns and the number of overwrite passes in the **Shredding Data Pattern** window. By default the number of overwrite passes is three; but you can change this number from three to up to eight times. The system keeps user-specified settings while the **Shred LDEVs** window is open.

You must have the Storage Administrator (Provisioning) role to perform this task.

1. Open the **Shred LDEVs** window:

In Hitachi Command Suite:

- a. On the **Resources** tab, click **Storage Systems**, and then expand **All Storage Systems**.
- b. Expand the target storage system, right-click **Volumes**, and then select **System GUI**.

In Device Manager - Storage Navigator (mainframe-only environments):
In the **Storage Systems** tree, select **Logical Devices** to display the **LDEVs** tab.

2. Select a blocked volume, click **More Actions**, and then select **Shred LDEVs** to open the **Shred LDEVs** window.
3. Click **Edit Data Pattern**.

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

4. To use the default pattern, click **Default Pattern (00-FF-00)**.

To specify custom settings, click **Data Pattern (User Setting)** and specify the data pattern as follows:



Caution: For FMDs, make sure you select **Random Data** as the specified Data Pattern.

- a. To add a random data pass, select **Random Data**, and click **Add**. A random data pass is added in the **Data Pattern (User Setting)** table.
- b. To define a data pattern, click **Define Data**, enter the number that you want to use as dummy data in the text box, and click **Add**. You can enter a hexadecimal number of up to four digits (0 to FFFF). The data pattern is added in the **Data Pattern (User Setting)** table.



Caution: You should enter three or more numbers to use as dummy data. If you overwrite data with less than three numbers, some or all data might be recoverable.

- c. If you make a mistake, click **Clear** and re-enter the desired numbers.
5. When the data pattern is correct (default or user-defined), click **OK** to save your settings and close the **Edit Shredding Data Pattern** window.
6. Click **Cancel** to close the **Shred LDEVs** window.

Related topics

- [Shred LDEVs window on page A-2](#)
- [Edit Shredding Data Pattern window on page A-5](#)

Shredding a volume

You must have the Storage Administrator (Provisioning) role to perform this task.

To shred a volume:

1. Display the volume to be shredded:
 - In Hitachi Command Suite:
 - a. On the **Resources** tab, click **Storage Systems**, expand **All Storage Systems**, and then expand the target storage system.
 - b. Right-click one of the following, depending on the location of the volume, **Volumes**, **DP Pools**, or **Parity Groups**, and then select **System GUI**.
 - c. If you selected **DP Pools** in step (b), select the pool that contain the virtual volume you want to block, and then click the **Virtual Volumes** tab.

In Device Manager - Storage Navigator (mainframe-only environment):
Choose one of the following steps, depending on the location of the volume:

- o To display the **LDEVs** tab, in the **Storage Systems** tree, select **Logical Devices**, or select **Parity Groups**, **Internal**, or **External** and then select the parity group that contains the volume you want to shred.
 - o To display the **Virtual Volumes** tab, in the **Storage Systems** tree, select **Pools**, and then select the pool that contains the virtual volume you want to shred.
2. Select the volume you want to shred and confirm the current status of the volume by viewing the **Status** column of the table.

- If the volume is already blocked, **Blocked** appears in the status column.
 - If the volume is not blocked, a status other than **Blocked** appears in the status column. In this case, you need to block the volume before you can shred it. See [Blocking a volume on page 2-2](#).
3. Click **More Actions > Shred LDEVs**.
 4. To save the shredding results to a file, click **Set Data Output** (you can output the shredding results of up to three volumes). If you don't want to save the results to a file, click **Cancel Data Output**.
 5. Click **Finish**.
 6. Verify the settings in the **Shred LDEVs** window.
When the settings are correct, enter a unique task name or accept the default name, and click **Apply**.
If **Go to tasks window for status** is selected, the **Tasks** window will open.

Related topics

- [Shred LDEVs window on page A-2](#)
- [Shred LDEVs wizard Confirm window on page A-3](#)
- [Blocking a volume on page 2-2](#)
- [Stopping a shredding operation on page 2-10](#)

Shredding volumes in parity groups

You must have the Storage Administrator (Provisioning) role to perform this task.

To shred a volume in a parity group:

1. Display the parity group to be shredded:
 - In Hitachi Command Suite:
 - a. On the **Resources** tab, click **Storage Systems**, and then expand **All Storage Systems**.
 - b. Expand the target storage system, right-click **Parity Groups**, and then select **System GUI**.
 - In Device Manager - Storage Navigator (mainframe-only environment):
Display the **Parity Groups** tab by choosing one of the following steps, depending on the location of the parity group:
 - In the **Storage Systems** tree, select **Parity Groups**.
 - In the **Storage Systems** tree, select **Parity Groups**, and then select **Internal** or **External**.
2. Select the parity group you want to shred and confirm the current status by viewing the **Status** column of the table.
 - If the parity group is already blocked, **Blocked** appears in the status column.

- o If the parity group is not blocked, a status other than **Blocked** appears in the status column. In this case, you need to block the parity group before you can shred it. See [Blocking volumes in a parity group on page 2-3](#).
3. Click **More Actions > Shred LDEVs**.
 4. To save the shredding results to a file, click **Set Data Output** (you can output the shredding results of up to three volumes). If you don't want to save the results to a file, click **Cancel Data Output**.
 5. Click **Finish**.
 6. Verify the settings in the **Shred LDEVs** window.

When the settings are correct, enter a unique task name or accept the default name, and click **Apply**.

If **Go to tasks window for status** is selected, the **Tasks** window will open.

Related topics

- [Shred LDEVs window on page A-2](#)
- [Shred LDEVs wizard Confirm window on page A-3](#)
- [Blocking a volume on page 2-2](#)
- [Stopping a shredding operation on page 2-10](#)

Viewing shredding status with the Tasks window

You can verify the progress of shredding operations using either the **Tasks** window or the **Logical Devices** window. For details about using the **Logical Devices** window, see [Viewing shredding status with the Logical Devices window on page 2-10](#).

To verify the shredding status in the **Tasks** window:

1. Open the **Tasks** window:
 - In Hitachi Command Suite:
 - a. On the **Tasks & Alerts** tab, click **All Tasks**, select the **System Tasks** tab, and then click **Manage System Tasks**.
 - b. In the **Manage System Tasks** window, select the desired storage system, and then click **OK**.
 - In Device Manager - Storage Navigator (mainframe-only environment):
In the **Storage Systems** tree, select **Tasks**.
2. Verify the shredding status in the **Tasks** window. For detailed information, click the task name in the **Task Name** column to open the **Task Properties** window.

For more information, see the *Managing tasks* section in the *Hitachi Command Suite User Guide* or the *Hitachi Virtual Storage Platform G1000 Mainframe System Administrator Guide*.

Viewing shredding status with the Logical Devices window

You can verify the progress of shredding operations using either the **Logical Devices** window or the **Tasks** window. For details about using the **Tasks** window, see [Viewing shredding status with the Tasks window on page 2-9](#).

To view the shredding status in the **Logical Devices** window:

1. Open the **Logical Devices** window:

In Hitachi Command Suite:

- a. On the **Resources** tab, expand the **Storage Systems** tree, and then expand the target storage system.
- b. Right-click **Volumes**, and then select **System GUI**.

In Device Manager - Storage Navigator (mainframe-only environment):
In the **Storage Systems** tree, click **Logical Devices**.

2. Verify the shredding progress in the **Logical Devices** window. When the volume shredding is in progress, the **Status** column displays **Shredding**.

For details about the **Logical Devices** window, see the *Hitachi Virtual Storage Platform G1000 Provisioning Guide for Open Systems* or the *Hitachi Virtual Storage Platform G1000 Provisioning Guide for Mainframe Systems*.

Stopping a shredding operation

You can stop the volume shredding process.



Caution: If you stop the shredding process, you cannot restart the process. Data integrity of the volume is not guaranteed.

You must have the Storage Administrator (Provisioning) role to perform this task.

1. Open the **Tasks** window:

In Hitachi Command Suite:

- a. On the **Tasks & Alerts** tab, click **All Tasks**, select the **System Tasks** tab, and then click **Manage System Tasks**.
- b. In the **Manage System Tasks** window, select the desired storage system, and then click **OK**.

In Device Manager - Storage Navigator (mainframe-only environment):
In the **Storage Systems** tree, select **Tasks**.

2. Click the task name of the desired task in the **Task Name** column.
The **Task Properties** window opens.
3. Click **Abort** in the **Shredding Data pattern** field.
4. Verify the displayed settings and click **Yes**. The shredding process stops.
5. Click **Close** in the **Task Properties** window.

Viewing shredding results with the Tasks window

To verify the results of shredding with the **Tasks** window.

1. Open the **Tasks** window:
In Hitachi Command Suite:
 - a. On the **Tasks & Alerts** tab, click **All Tasks**, select the **System Tasks** tab, and then click **Manage System Tasks**.
 - b. In the **Manage System Tasks** window, select the desired storage system, and then click **OK**.In Device Manager - Storage Navigator (mainframe-only environment):
In the **Storage Systems** tree, select **Tasks**.
2. Click the task name of the desired task in the **Task Name** column.
The **Task Properties** window opens.
3. In the **Task Properties** window, see the **Result** column in the **Shredding Data Pattern** table.
Check the contents to verify whether all the overwriting operations have been completed normally. If an overwriting pass is not completed normally, it means the shredding was not successful. If shredding fails, try shredding the volume again. If shredding fails again, contact the Hitachi Data Systems Support Center to resolve the error. If the storage system experiences a power outage during the shredding process, one of the follow error messages will appear:
 - o **Shredding operation canceled**
 - o **Shredding operation failed**
4. Click **Close** to close the **Task Properties** window.

For more information, see the *Managing Tasks* section of the *Hitachi Command Suite User Guide* or the *Hitachi Virtual Storage Platform G1000 Mainframe System Administrator Guide*.

The following table lists and describes the Volume Shredder status messages that are displayed in the shredding results.

Status	Description
—	The shredding operation was not performed.
Shredding operation Normal.	The shredding operation was successful.
Writing.	The shredding operation is in progress.
Shredding operation not executed.	The shredding operation did not occur as specified.
Shredding operation canceled.	The shredding operation was canceled, or power to the system was interrupted.
Shredding operation Failed.	The shredding operation was not successful, or power to the system was interrupted.
Shredding data transfer error.	The system could not write the shredding results to a file.

Status	Description
Shredding data verify error.	An error was detected in the file containing the shredding results.
No-data assigned.	When you shred an unused Dynamic Provisioning virtual volume, no dummy data is written to the volume. In this case the status of the shredding operation in the shredding results file is No-data assigned .

Viewing shredding results in the compressed files

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 files on the computer. Use this file to check the results of shredding a volume.

You must have the Storage Administrator (Provisioning) role to perform this task.

1. Navigate to the **Reports** menu for the storage system:

In Hitachi Command Suite: On the **Resources** tab, expand the **Storage Systems** tree, right-click the target storage system, and then select **Other Functions**.

In Device Manager - Storage Navigator (mainframe-only environments): Display the Device Manager - Storage Navigator main window.

2. On the menu bar, select **Reports > Shredding Report**, and then click either **Download Latest Report** to download the latest result file or **Download Other Reports** to download the past ten times result files.

When the preparation for download is complete, a message appears.

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

Compressed files are downloaded.

6. Decompress the file. The binary file showing the results of shredding, the text file showing the contents of shredding operation, and its result are output.

Understanding shredding results in compressed files

When you open the compressed file, you see binary and text files that contain shredding results.

- The name of the binary file indicates LDKC, CU, and LDEV numbers of the shredded volumes, and the number of times the system wrote dummy data 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 the system wrote dummy data to that volume three times. A binary file contains the first 512 bytes of data of a shredded volume (LDEV).
- The file name of a text file appears as follows:

shred_finish-time-of-shredding-operation.txt

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

The text file contains the following summary information:

- Results of the shredding operation (see [Viewing shredding status with the Logical Devices window on page 2-10](#))
- Contents of the dummy data
- Shredded volumes
- Start and finish time of the shredding operation



Volume Shredder GUI reference

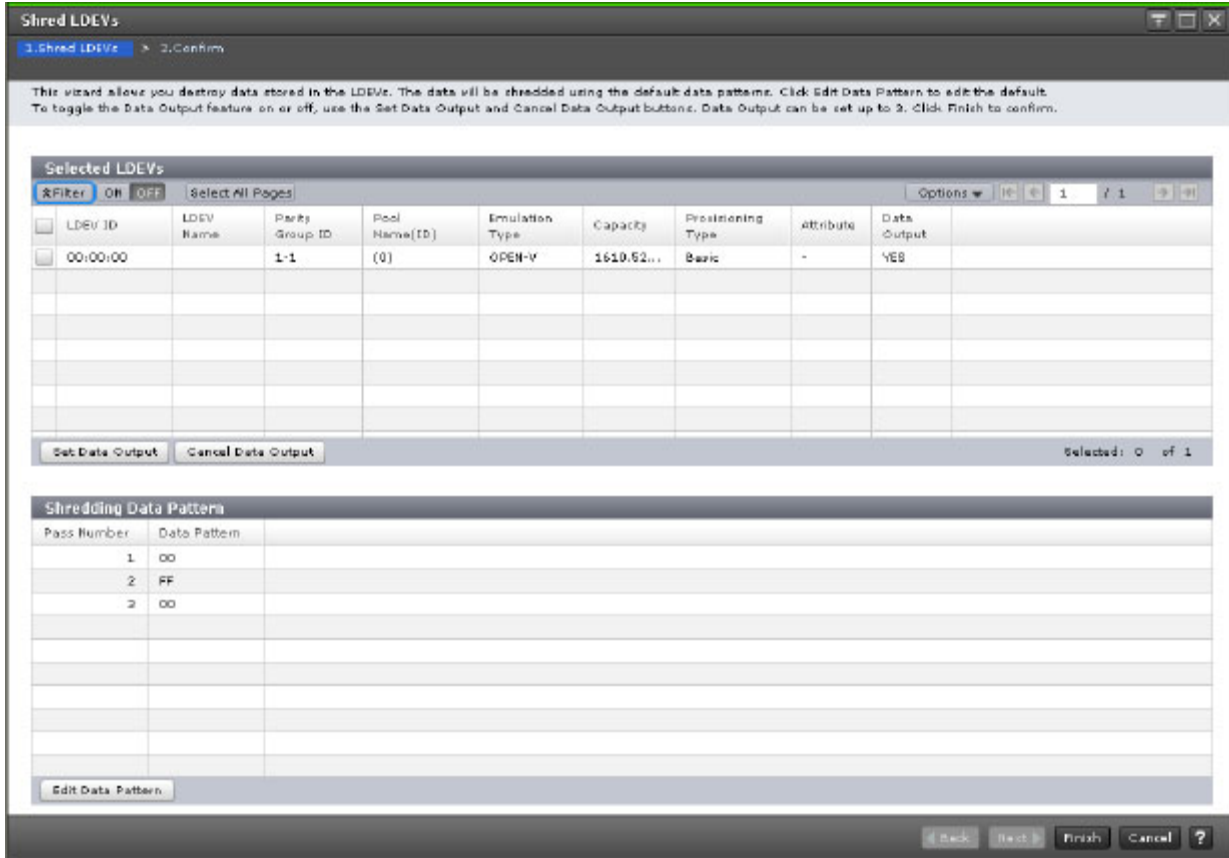
This section describes the Device Manager - Storage Navigator windows for Volume Shredder.

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

Shred LDEVs wizard

Shred LDEVs window

Use the **Shred LDEVs** window to select the volumes (LDEVs) to be shredded, configure the shredding operations (number of overwrite passes, data patterns), and enable/disable the output of shredding results to files.



Selected LDEVs table in the Shred LDEVs window

Item	Description
LDEV ID	ID of the selected LDEV. The ID is a combination of the logical disk controller (LDKC) number, control unit (CU) number, and LDEV number. Free indicates free space.
LDEV Name	Name of the selected LDEV.
Parity Group ID	Parity group number (for example, 1-1) of the selected LDEV. <ul style="list-style-type: none">• A parity group number starting with E (for example, E1-1) indicates that the parity group contains one or more external volumes.• A parity group number starting with V (for example, V1-1) indicates that the parity group contains one or more Copy-on-Write Snapshot virtual volumes.• A parity group number starting with X (for example, X1-1) indicates that the parity group contains one or more Dynamic Provisioning virtual volumes.

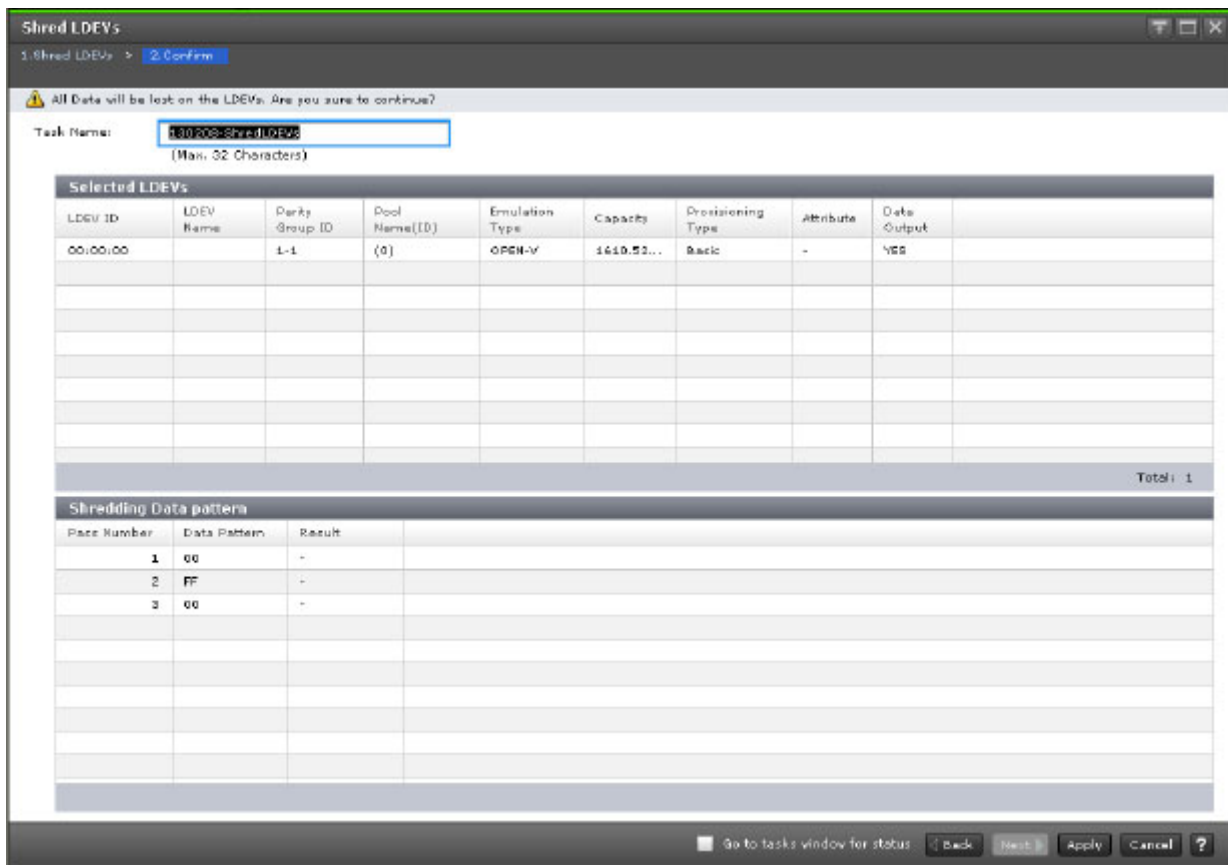
Item	Description
Pool Name(ID)	Pool volume (pool-VOL) name and ID.
Emulation Type	Emulation type of the selected LDEV.
Capacity	Capacity of the selected LDEV. To change the capacity unit, select Option > Capacity Unit .
Provisioning Type	Provisioning type of the selected LDEV: <ul style="list-style-type: none"> • Basic: Internal volume • External: External volume • DP: Virtual volume of Dynamic Provisioning
Attribute	The following LDEV attributes are displayed: <ul style="list-style-type: none"> • Command device • Volumes not having LDEV attribute with hyphen (-)
Data Output	YES : The results of the shredding operation will be saved in a file. NO : The results of the shredding operation will be not saved in a file.
Set Data Output	If this button is selected, Yes appears in the Data Output column. If the data output setting is enabled, the results of the shredding operation will be saved in a file. Results can be saved for up to three volumes.
Cancel Data Output	If this button is selected, No appears in the Data Output column. If the data output setting is disabled, the results of the shredding operation will be not saved in a file.

Shredding Data Pattern table in the Shred LDEVs window

Item	Description
Pass Number	Order of the overwrite pass.
Data Pattern	Dummy data pattern for the overwrite pass.
Edit Data Pattern	Click to open the Edit Shredding Data Pattern dialog box, which allows you to change the data pattern setting.

Shred LDEVs wizard Confirm window

Use the **Confirm** window to review the information for the volume shredding operations and start the shredding task. When you are ready to start the specified volume shredding operations, enter a unique name for the shredding task, and then click **Apply** to start the shredding operations.



Selected LDEVs table in the Confirm window

Item	Description
LDEV ID	ID of the LDEV to be shredded. The ID is a combination of the logical disk controller (LDKC) number, control unit (CU) number, and LDEV number. Free indicates free space.
LDEV Name	Name of the LDEV to be shredded.
Parity Group ID	Parity group number (for example, 1-1) of the LDEV to be shredded. <ul style="list-style-type: none"> A parity group number starting with E (for example, E1-1) indicates that the parity group contains one or more external volumes. A parity group number starting with V (for example, V1-1) indicates that the parity group contains one or more Copy-on-Write Snapshot virtual volumes. A parity group number starting with X (for example, X1-1) indicates that the parity group contains one or more Dynamic Provisioning virtual volumes.
Pool Name(ID)	Pool volume (pool-VOL) name and ID.
Emulation Type	Emulation type of the LDEV to be shredded.
Capacity	Capacity of the LDEV to be shredded. To change the capacity unit, select Option > Capacity Unit .

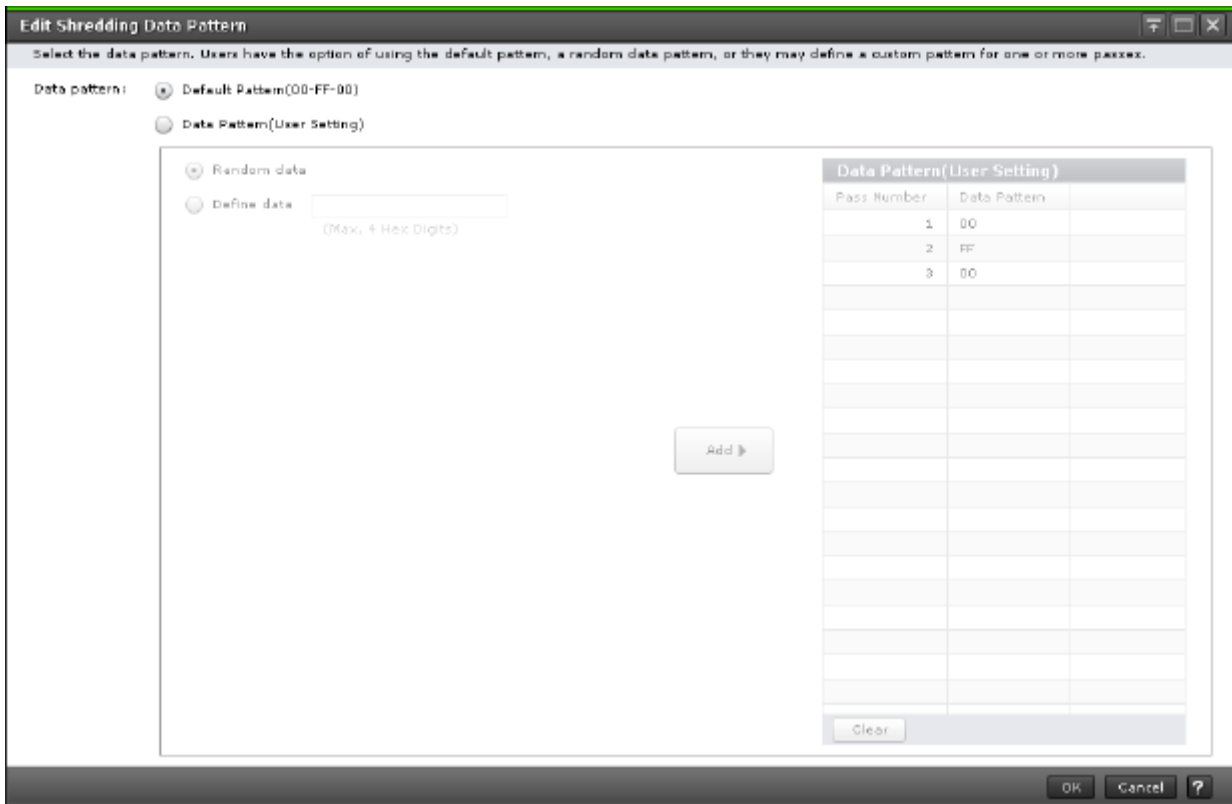
Item	Description
Provisioning Type	Provisioning type of the LDEV to be shredded: <ul style="list-style-type: none"> • Basic: Internal volume • External: External volume • DP: Virtual volume of Dynamic Provisioning
Attribute	The following LDEV attributes are displayed: <ul style="list-style-type: none"> • Command device. • Volumes not having an LDEV attribute with a hyphen (-).
Data Output	YES: The results of the shredding operation will be saved in a file. NO: The results of the shredding operation will be not saved in a file.

Shredding Data Pattern table in the Confirm window

Item	Description
Pass Number	Order of the overwrite pass.
Data Pattern	Dummy data pattern for the overwrite pass.
Result	Results of the shredding operations: <ul style="list-style-type: none"> • -: The system did not overwrite the volume. • Shredding operation Normal: The system successfully overwrote the volume. • Writing: The system is overwriting the volume now. • Shredding operation not executed: The system did not overwrite the volume as configured. • Shredding operation canceled: The system or user cancelled the overwrite request. • Shredding operation Failed: The overwrite process ended unsuccessfully. • Shredding data transfer error: The results could not be written to a file. • Shredding data verify error: An error was detected while verifying the file containing the result. • No-data assigned: The Dynamic Provisioning virtual volume was unused; no dummy data was written to the volume. However, if the following volumes are included in the shredding volumes, the dummy data is written to volumes: Used Dynamic Provisioning virtual volumes, Internal volumes with normal status, and External volumes.

Edit Shredding Data Pattern window

Use the **Edit Shredding Data Pattern** window to configure the volume shredding settings, including number of overwrite passes and dummy data patterns.



Item	Description
Data Pattern	Type of data pattern: default data pattern or custom. <ul style="list-style-type: none"> Default Pattern(00-FF-00): Three passes with the following dummy data patterns: "00" for the first pass, "FF" for the second pass, and "00" for the third pass. Data Pattern(User Setting): Selected to define the number of passes and the data pattern for each pass.
Random Data	Volume Shredder selects a 4-digit hexadecimal number at random to be used as the dummy data pattern for the pass.
Define Data	Enter a hexadecimal number (from 0 to FFFF) to be used as the dummy data for the user-defined pass.
Add	Adds the user-defined data pattern to the Data Pattern(User Setting) table. This button is available only when you select Data Pattern(User Setting) for the Data pattern type.

Data Pattern (User Setting) table in the Edit Shredding Data Pattern window

Item	Description
Pass Number	Order of the overwrite pass.
Data Pattern	Dummy data pattern for the overwrite pass.
Clear	Clears the values (other than 00) in the bottom row of the Data Pattern(User Setting) table.

Related topics

- [Defining shredding conditions on page 2-6](#)



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MK-92RD8025-01