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Nondisruptive Migration

User Guide

Hitachi Virtual Storage Platform G200, G400, G600, G800

Hitachi Virtual Storage Platform G1000, G1500

Hitachi Virtual Storage Platform F1500

Hitachi Data Systems

MK-92RD8086-06

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Preface

This guide explains how to perform a nondisruptive migration.

- Intended audience
- Document conventions
- Conventions for storage capacity values
- Accessing product documentation
- Getting help
- Comments

Intended audience

Nondisruptive migration is intended for expert users. The migration process requires detailed planning and in depth-knowledge. We recommend that you consider the nondisruptive migration services available to assist or manage your migration project. See Choosing a nondisruptive migration solution on page 15 for more information.

Document conventions

This document uses the following typographic conventions:

Convention	Description
Bold	• Indicates text in a window, including window titles, menus, menu options, buttons, fields, and labels. Example: Click **OK**. • Indicates emphasized words in list items.
Italic	• Indicates a document title or emphasized words in text. • Indicates a variable, which is a placeholder for actual text provided by the user or for output by the system. Example: `pairdisplay -g group` (For exceptions to this convention for variables, see the entry for angle brackets.)
`Monospace`	Indicates text that is displayed on screen or entered by the user. Example: `pairdisplay -g oradb`
< > angle brackets	Indicates variables in the following scenarios: • Variables are not clearly separated from the surrounding text or from other variables. Example: `Status-<report-name><file-version>.csv` • Variables in headings.
[ ] 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	Label	Description
	Note	Calls attention to important or additional information.
	Tip	Provides helpful information, guidelines, or suggestions for performing tasks more effectively.
	Caution	Warns the user of adverse conditions and/or consequences (for example, disruptive operations, data loss, or a system crash).
	WARNING	Warns the user of a hazardous situation which, if not avoided, could result in death or serious injury.

Conventions 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 kilobyte (KB)	1,000 (10^3) bytes
1 megabyte (MB)	1,000 KB or $1{,}000^2$ bytes
1 gigabyte (GB)	1,000 MB or $1{,}000^3$ bytes
1 terabyte (TB)	1,000 GB or $1{,}000^4$ bytes
1 petabyte (PB)	1,000 TB or $1{,}000^5$ bytes
1 exabyte (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 cylinder	Mainframe: 870 KB Open-systems: • OPEN-V: 960 KB • Others: 720 KB
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

Product user documentation is available on Hitachi Data Systems Support Connect: https://knowledge.hds.com/Documents. Check this site for the most current documentation, including important updates that may have been made after the release of the product.

Getting help

Hitachi Data Systems Support Connect is the destination for technical support of products and solutions sold by Hitachi Data Systems. To contact technical support, log on to Hitachi Data Systems Support Connect for contact information: https://support.hds.com/en_us/contact-us.html.

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Thank you!

1

Introduction

This chapter explains the key concepts behind nondisruptive migration, how it functions, and includes a detailed walk-though of the migration workflows.

- ☐ About nondisruptive migration
- ☐ Choosing a nondisruptive migration solution
- ☐ How nondisruptive migration works
- ☐ Understanding the HCS nondisruptive migration workflow
- ☐ About the migration project model

About nondisruptive migration

Nondisruptive migration makes it possible to relocate data from data from an existing (source) storage system to a new (target) storage system without interrupting access by hosts. This is accomplished using the global storage virtualization technology of Hitachi Virtual Storage Platform G1000 and G1500 (VSP G1000 and G1500), Hitachi Virtual Storage Platform G200, G400, G600, G800 (VSP Gx00 models), and Hitachi Virtual Storage Platform F1500 (VSP F1500). Resources on the source storage system are virtualized on the target storage system. From the perspective of the host, I/O requests continue to be serviced by the source storage system during the migration process.

The following storage system combinations are supported:

Source	Target
Hitachi Universal Storage Platform V/VM	VSP G1000, VSP G1500, and VSP F1500
Hitachi Universal Storage Platform V/VM	VSP Gx00 models
Hitachi Virtual Storage Platform	VSP G1000, VSP G1500, and VSP F1500
Hitachi Unified Storage VM	VSP G1000, VSP G1500, and VSP F1500
Hitachi Unified Storage VM	VSP Gx00 models

You can migrate the following types of data:

- Volumes
- Copy pair configurations (ShadowImage)

To migrate volumes and copy pair configurations, you create a migration project for a source and target storage system. You create one or more migration jobs within a migration project. Then, you perform individual migration steps for each migration job to complete the migration over time at a sustainable work load.

When you create a migration project, a virtual storage machine is created on the target storage system. This virtual storage machine contains the information about the source storage system. Source volumes that are selected for migration are virtualized, masking the physical characteristics of the target storage system, and the data is migrated to target volumes on the target storage system. As far as the host is concerned, I/O requests are still being serviced by the source target system during the migration process.

Note: In this guide, *target volume* means the virtualized source volume that resolves to the target volume, and *target volume for data migration* means the physical target storage system volume to which migration data will be written.

HCS nondisruptive migration has several benefits:

- Data is migrated between storage systems without interrupting host applications.
- You can maintain data replication throughout the migration process by allowing the target storage system to inherit pair configurations before migrating the actual data.
- You can reduce the overall migration effort by importing configuration definition files instead of having to reconfigure pairs on the target storage system.
- The migration process is designed to be carried out in stages to reduce demands on network bandwidth.
- You can easily monitor migration project and migration job progress and status by reviewing both numerical and graphical data, which includes estimated information about how long the migration is likely to take.
- Up to seven source storage systems can be consolidated into a single target VSP G1000, VSP G1500, VSP F1500 or VSP Gx00 models.

Choosing a nondisruptive migration solution

Because no single migration solution is appropriate for every environment, multiple nondisruptive migration options are available:

- **End user nondisruptive migration**: You manage the entire migration process from planning to execution as described in this guide. The HCS nondisruptive migration workflow provides an easy-to-use navigation and streamlines the complex migration steps. It is designed for straightforward configurations and customers with in-depth knowledge of their environment and a complete understanding of the risks associated with data migration.
- **Nondisruptive migration planning service**: Because planning is the most crucial stage of the migration process, this option is strongly recommended for all customers using the end user migration solution. This invaluable service from Hitachi Data Systems Global Solution Services (GSS) helps you plan a migration that best suits your environment and needs.
- **Full nondisruptive migration service**: This option is for configurations that are not suitable for the end user solution. Hitachi Data Systems GSS has highly trained, experienced data migration consultants. GSS has extensive heterogeneous storage migration consulting expertise, as well as best practices that reduce migration risk.



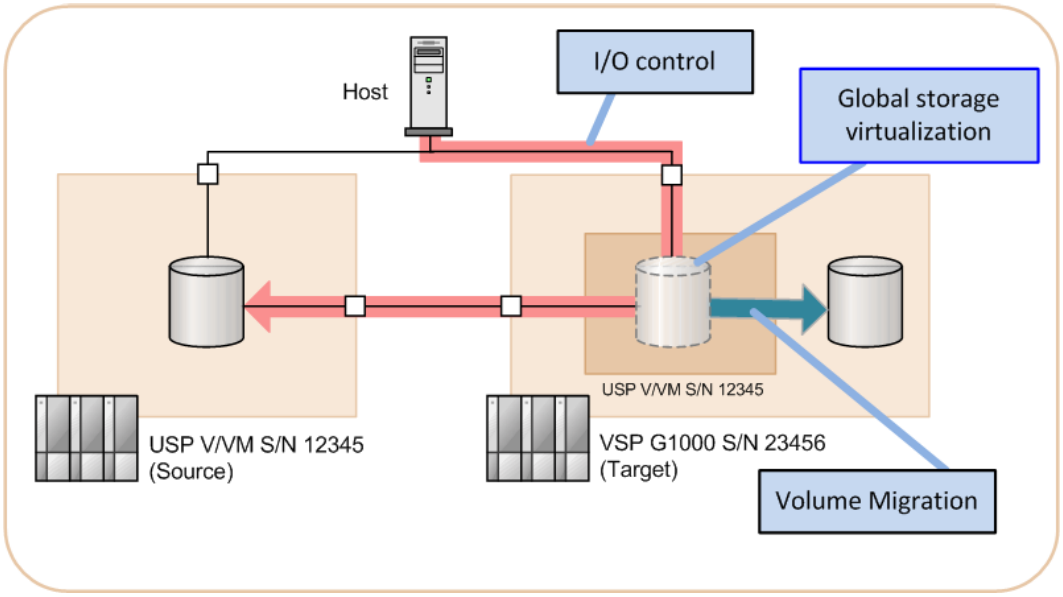
Note: Carefully review the requirements and restrictions provided in the planning chapter of this guide. A thorough assessment of your environment will help you choose the most appropriate solution.

How nondisruptive migration works

The nondisruptive migration process is based on three mechanisms:

- Global storage virtualization
- I/O control
- Volume Migration

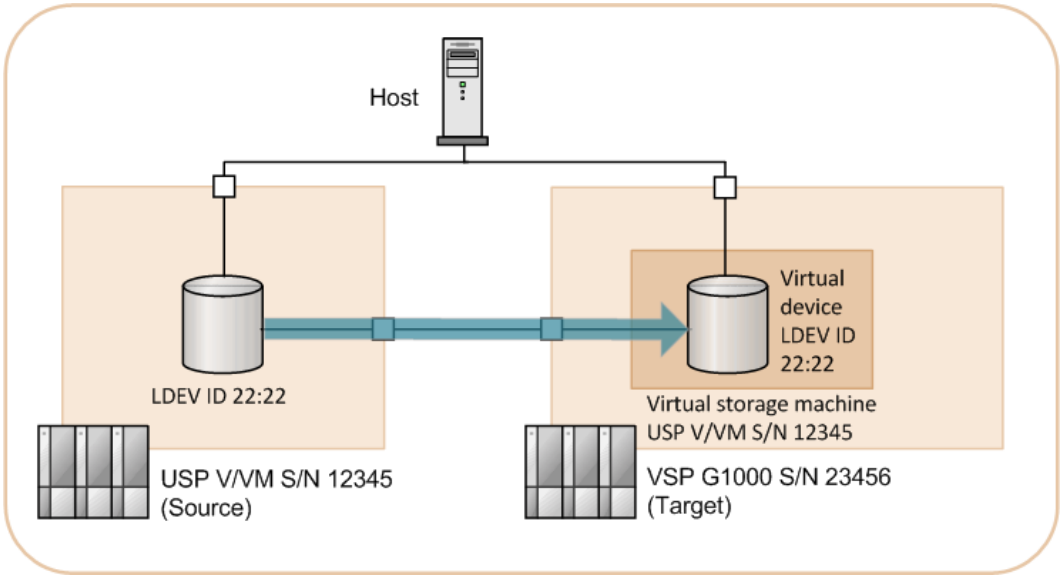
Note: This topic only describes the migration of primary volumes because secondary volumes are re-created on the target system at a subsequent point in the migration process (described later in this chapter).



Global storage virtualization

This is the primary mechanism of nondisruptive migration:

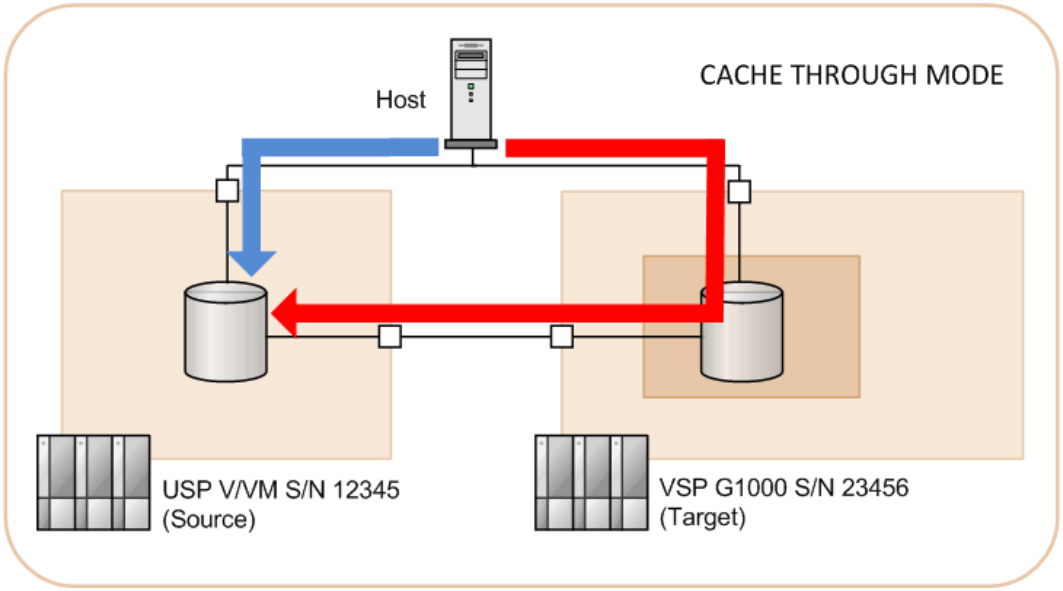
- A virtual storage machine is created in the target storage system, a representation of the source storage system that behaves exactly like its physical counterpart (with the same name and serial number (S/N) as the hardware).
- The source volume is mapped within the virtual storage machine as a virtual device (with the same LDEV ID as the source volume). This is known as the *target volume*.



I/O control

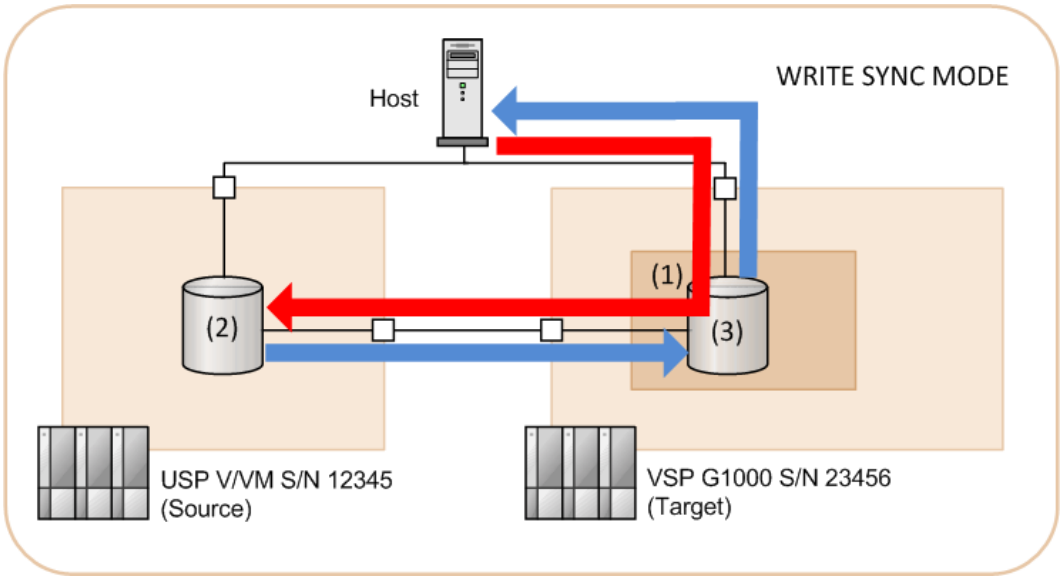
I/O control maintains the multipath device in the source and target storage systems:

- As shown in the following figure, after the volume is mapped, reads and writes are performed using the source volume as the master. This is known as *cache through* mode, and is in effect while the volume on the source storage system remains connected to the host:



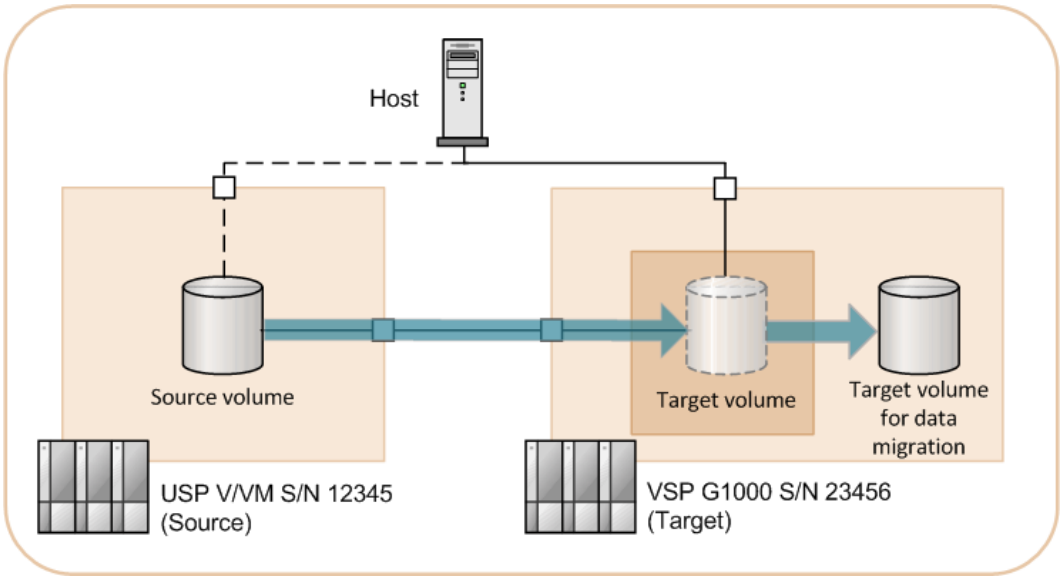
  - When the host issues a write request, data is written to the source storage system without using the cache of the target storage system (red line in the figure).
  - When the source storage system receives all the data to be written from the host, the source storage system informs the host that the processing has completed.
  - When the host issues a read request, data from the source storage system is used (blue line).
- After you confirm that the connection between the host and the volume on the source storage system has been disabled (the LUN paths are deleted), the cache is switched to *write sync* mode and the target storage system becomes the master of I/O operations. The numbers of the following I/O operations correspond to the numbers in the figure.
  1. The target system sends I/O received from the host to the source system.
  2. The source system writes data to the source volume and responds to the target system.
  3. The target system writes data to the target volume and responds to the host.

Note: In write sync mode, when the host issues a read request while data is being written to the source storage system, the read processing does not start until the write is complete.



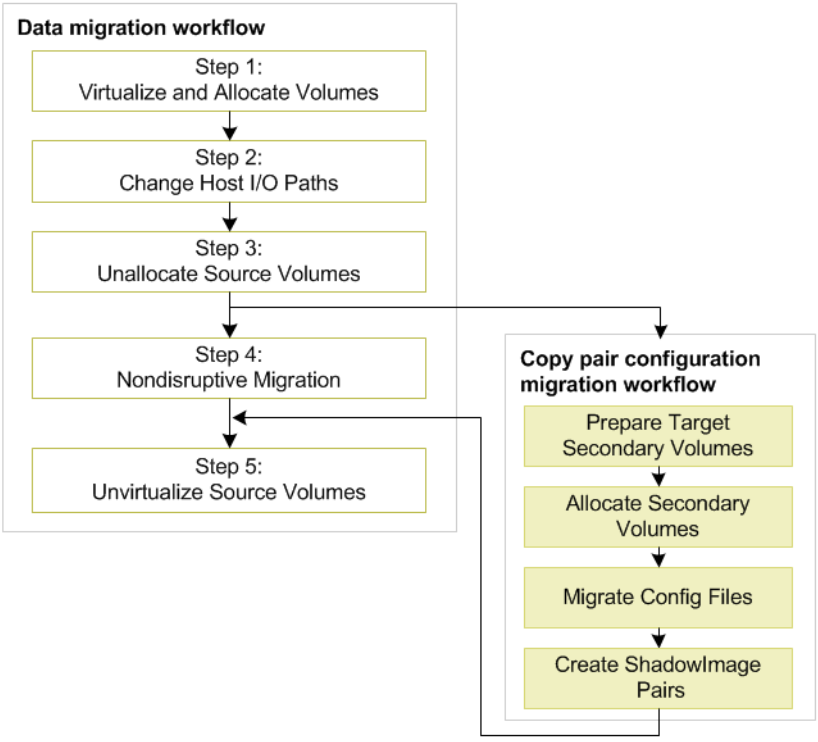
Volume Migration

Before migration, the data resides on a volume on the source storage system. This is the stage where the data is copied from the virtualized source volume to a physical volume on the target storage system, known as the *target volume for data migration*. Volume Migration uses cached data for reads and writes, reducing the demand on the source storage system and accelerating the migration process. When the data migration is complete, the IDs of the target volume and the target volume for data migration are swapped and the (now redundant) volume is deleted.



Understanding the HCS nondisruptive migration workflow

The HCS nondisruptive migration workflow consists of two parts: The primary workflow is strictly for data migration, and the secondary workflow is for the migration of copy pair configurations. The following diagram shows the order of the tasks in the migration process. Each task corresponds to a selection in the HCS nondisruptive migration workflow GUI.



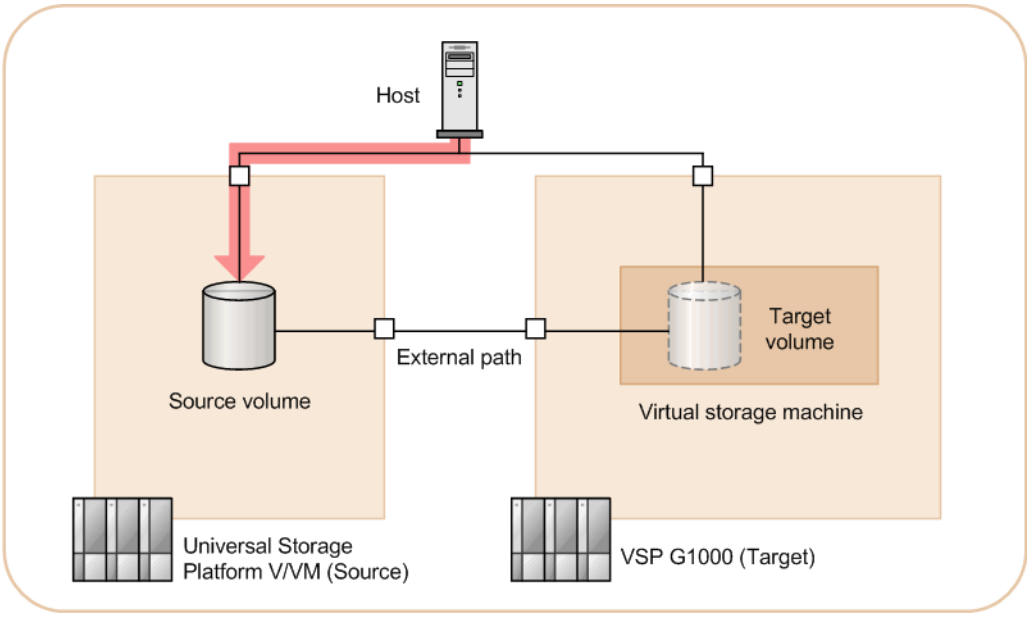
Note: The copy pair migration workflow can be started any time after **Step 3: Unallocate Source Volumes** in the primary (data migration) workflow, but it must be completed before proceeding to **Step 5: Unvirtualize Source Volumes**. In the interests of data protection, it is ideal to complete the workflow prior to starting **Step 4: Nondisruptive Migration**.

Data migration workflow

1. **Virtualize and Allocate Volumes**

   As shown in the following diagram, after a virtual storage machine is created on the target storage system, the source volume is virtualized as the target volume and allocated to the same host as the source volume.

This ensures that the LUN path between the source storage system and the host is duplicated on the target side.



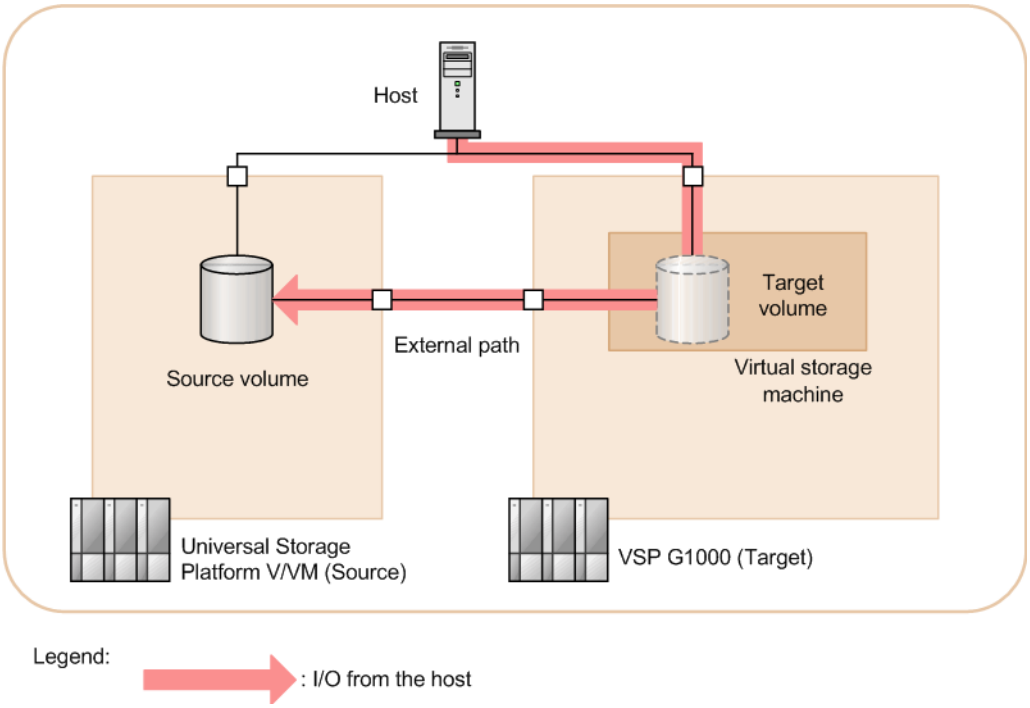
2. Change Host I/O Paths

The HCS nondisruptive migration workflow prompts you to perform the following operations manually:

- Initiate I/O between the target storage system and the host.
- Disable I/O between the source storage system and the host.

You must do this using path management software, OS native multipath functions, or by changing the zoning configuration. When you confirm

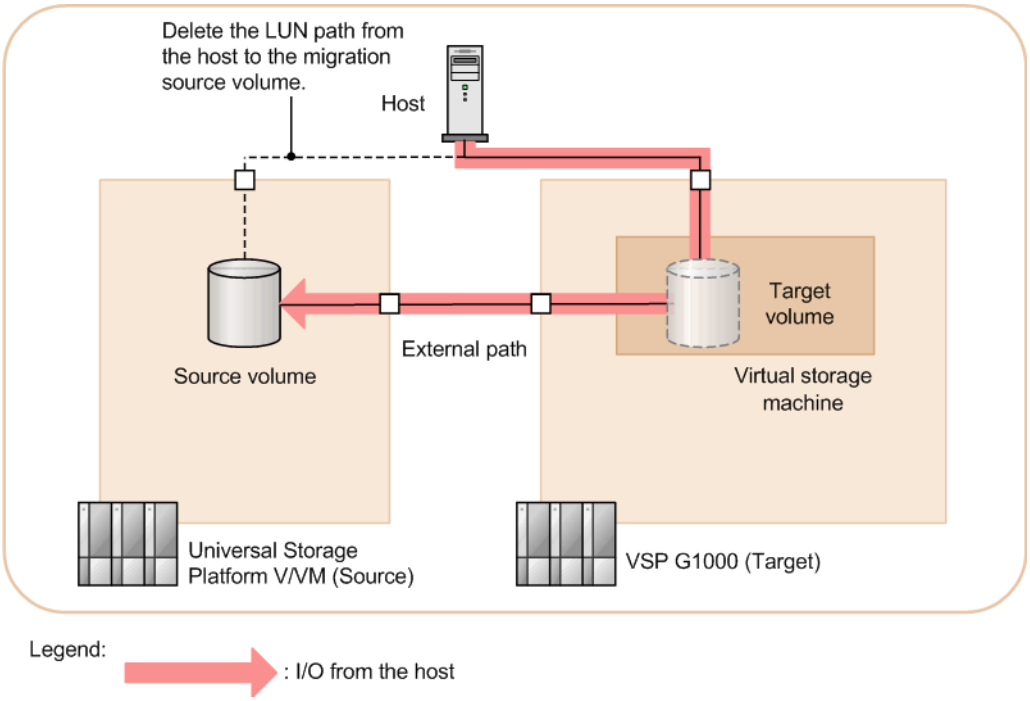
that the switch was successful, the I/O path is changed as shown in the figure.



3. **Unallocate Source Volumes**

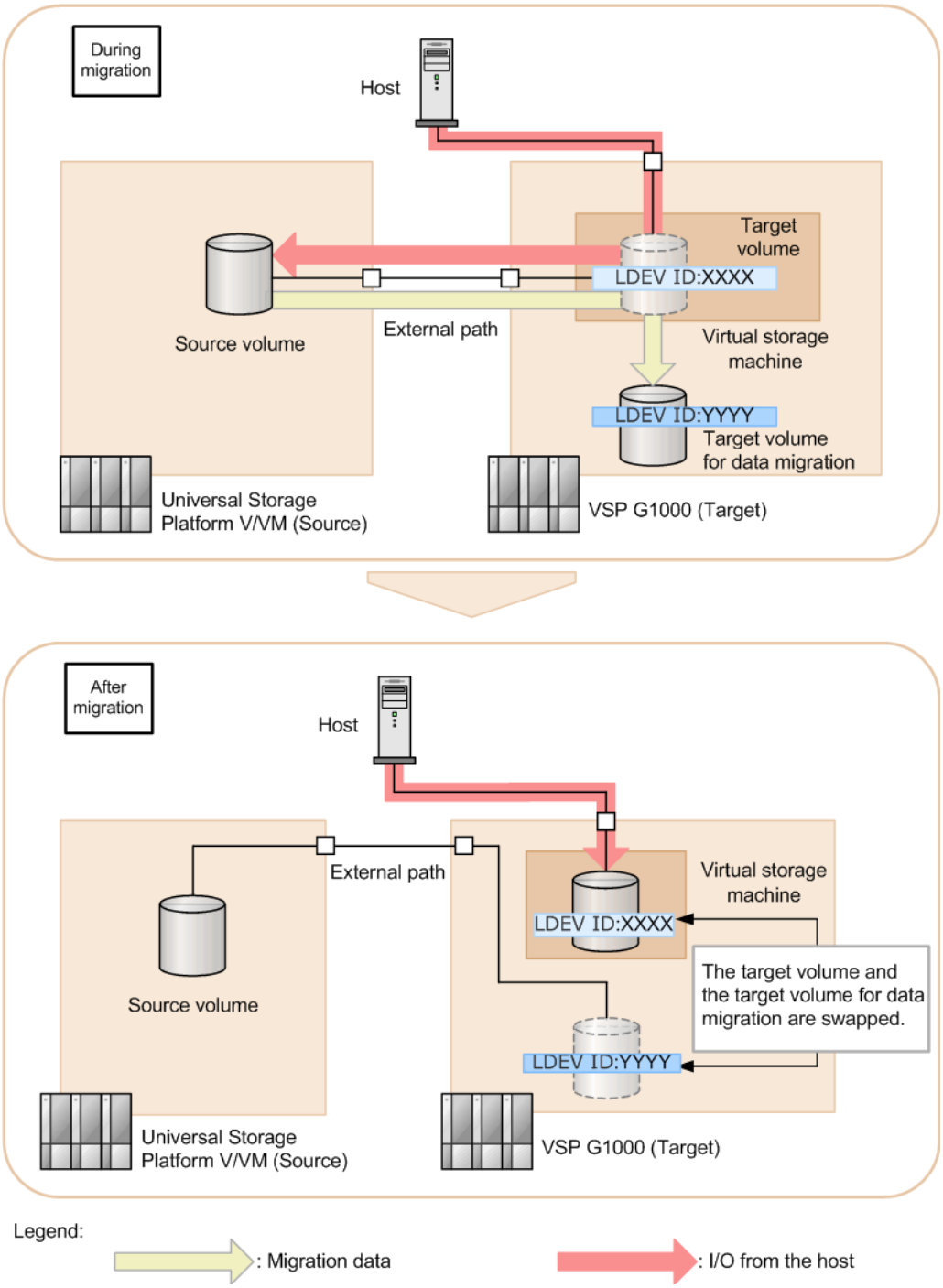
   To prevent the host from accessing the source volume through the source storage system, the LUN path must be deleted between the source volumes and the host. After you confirm the path deletion in the

GUI, HCS changes the cache mode of the target volume from *cache through* to *write sync*.



4. **Nondisruptive Migration**
   In this step, the data is copied to its final destination on the target storage system. When the migration is finished, the LDEV ID and host

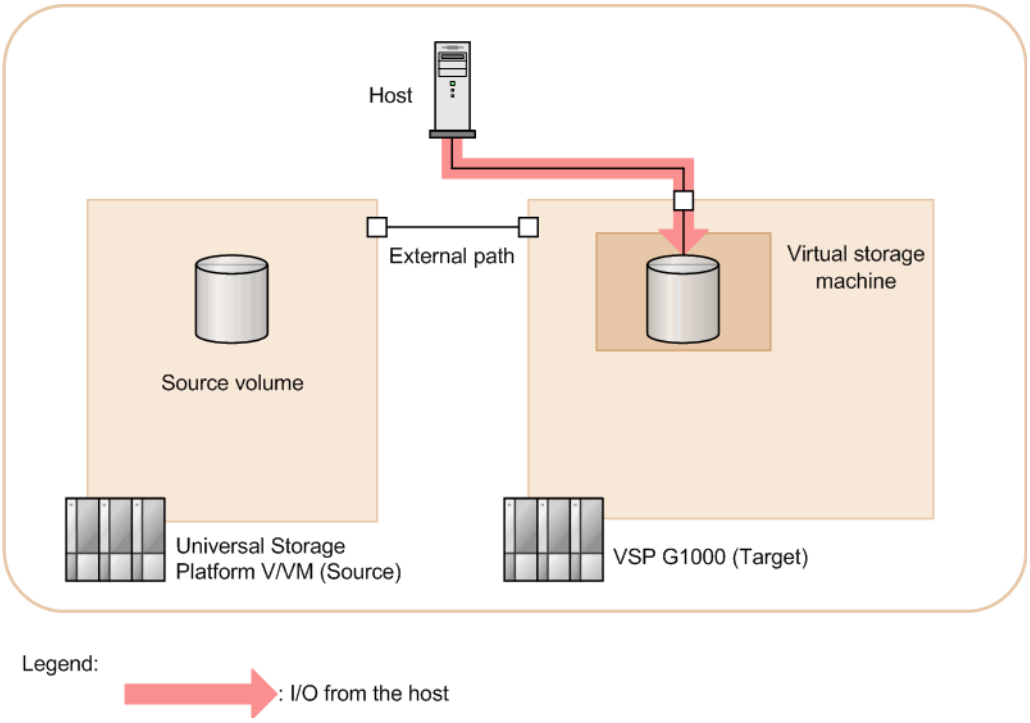
I/O associated with the target volume are swapped with those of the target volume for data migration, as shown in the following figure.



5. Unvirtualize Source Volumes

When the migration is complete, you must confirm that the source volumes on the target storage system are ready to be *unvirtualized*, where the LUN paths between the source volume and target storage system are deleted. (The deletion of the actual source volumes is not

part of the nondisruptive migration workflow but is part of the process described in Completing the migration on page 87.)

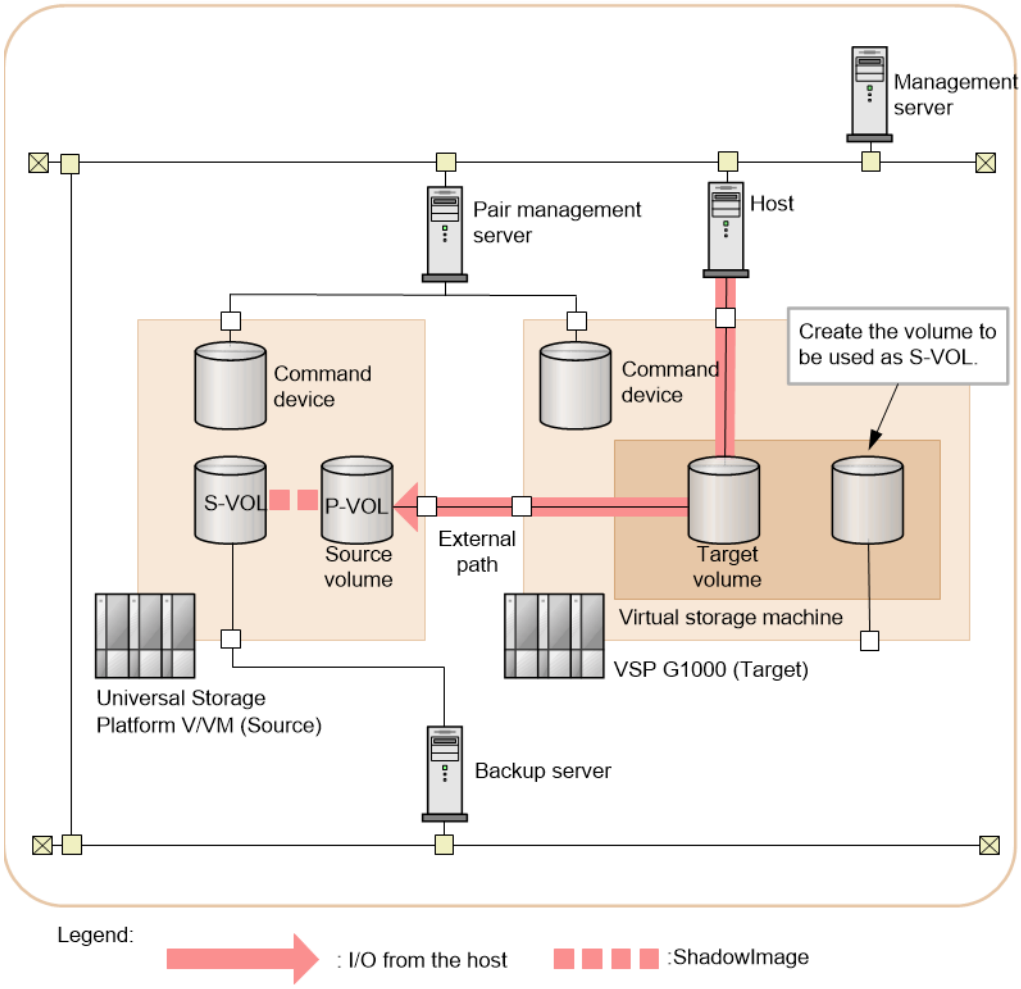


Copy pair migration workflow

The following steps comprise the secondary workflow for migrating existing ShadowImage copy pair configurations.

1. **Prepare Target Secondary Volumes**
   To duplicate the copy pair configurations of the source storage system, the GUI directs you to create the (ShadowImage) secondary volumes on the target storage system. Virtual IDs are assigned to the volumes, and

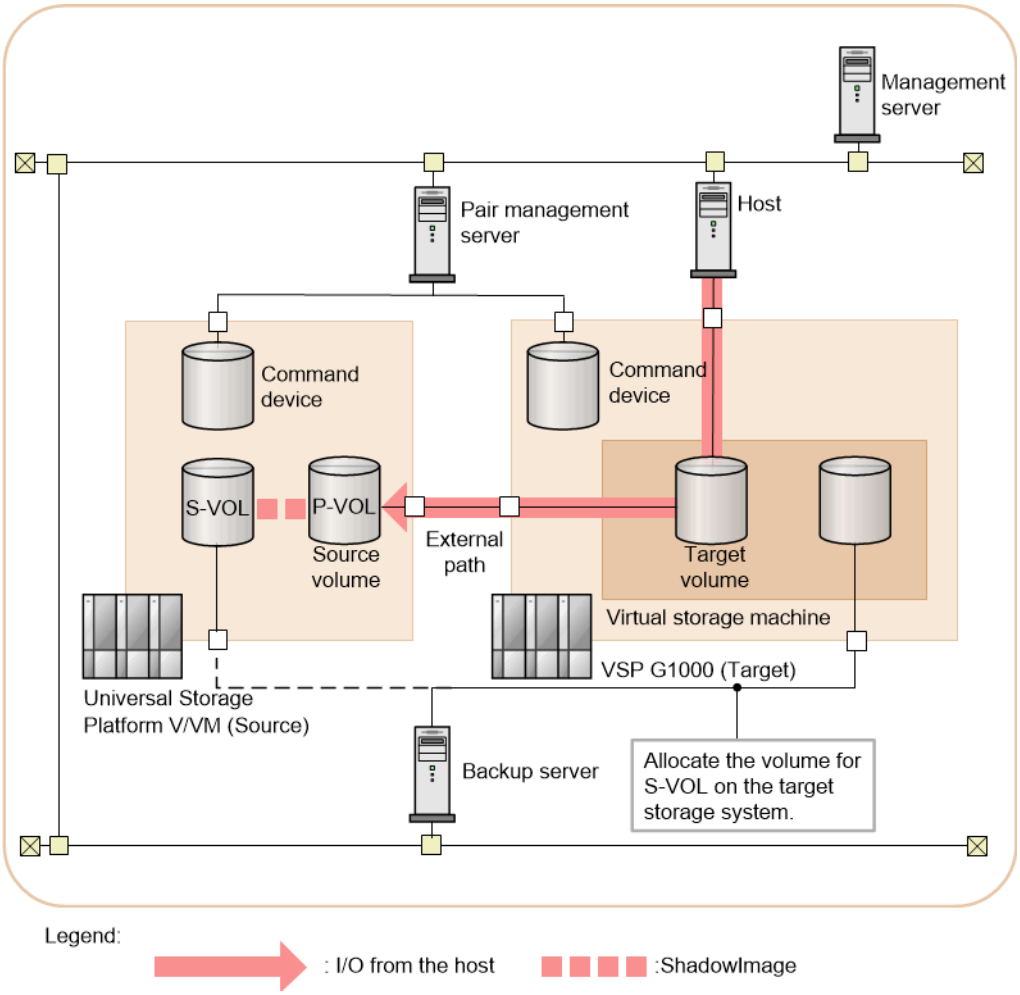
LUN paths are configured to ports according to the mapping defined in the migration project.



2. Allocate Secondary Volumes

To ensure that the backup server can access the secondary volumes on the target storage system (rather than those on the source storage system), you must delete the backup server WWN from the host group of

the source storage system, and then add the backup server WWN to the host group of the target storage system.

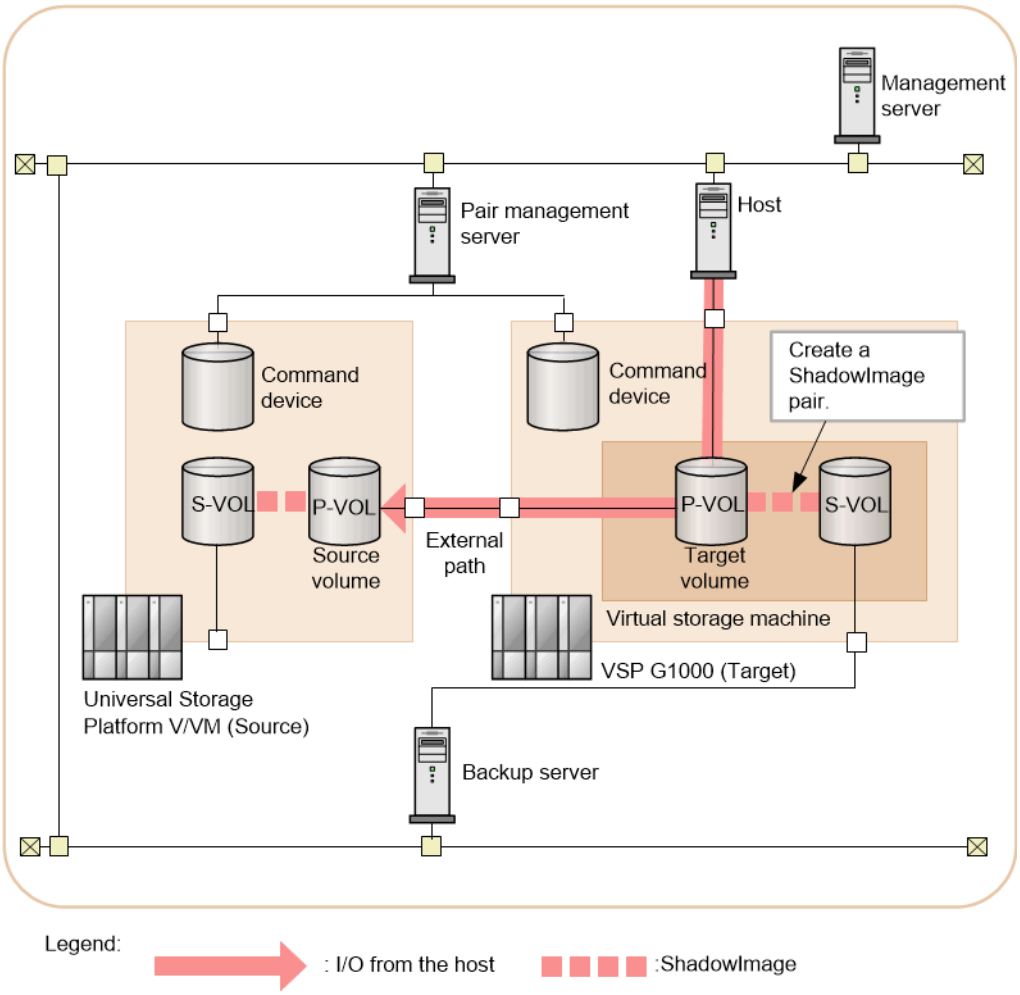


3. **Migrate Config Files**

   The configuration definition files available for migration are listed for selection in the GUI for use on the target storage system.

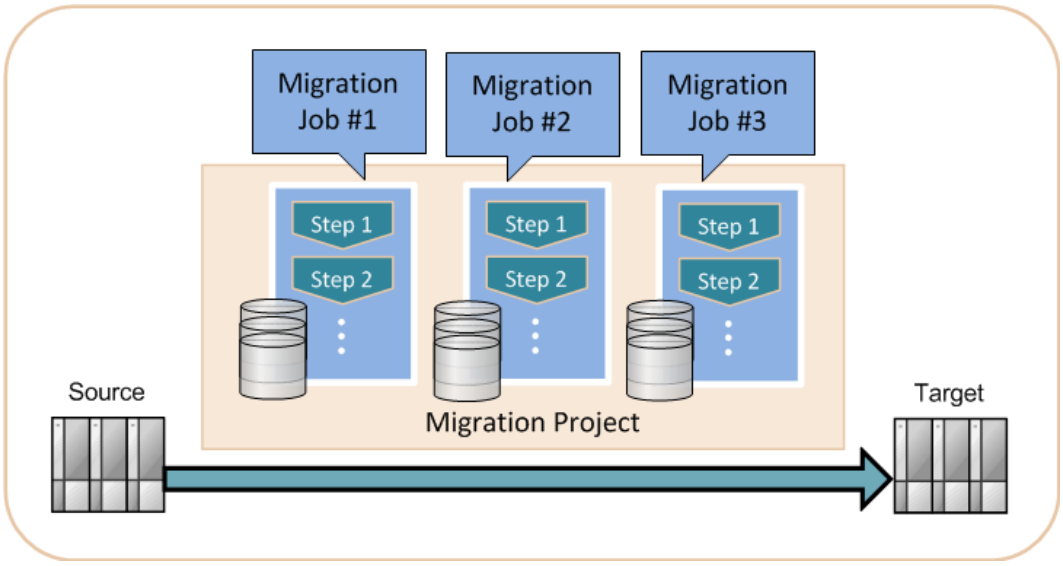
Note: Repeat this step for all the configuration definition files on each pair management server if the pair management servers are in a redundant configuration. See Migration of existing ShadowImage copy pairs on page 37 for a list of configuration definition file requirements.

4. **Create ShadowImage Pairs**
   Using the Change Pair Status wizard, you create the necessary ShadowImage pairs in the target storage system using the migrated configuration definition files.



About the migration project model

A nondisruptive migration can be a lengthy undertaking depending on the amount of data to be moved. To assist you in this process, the HCS nondisruptive migration workflow uses a model that divides a migration project into jobs, as illustrated in the following diagram.



A migration project consists of:

- The selected source and target storage systems
- Port mappings that allow host I/O paths to be switched between source storage system and the target
- External path settings that define the physical connections between the two storage systems
- One or more jobs that divide the total number of volumes to be migrated into logical, manageable units

A migration project might consist of a few jobs that take a day each to complete, or many jobs to be run over the course of weeks. When you have designed and created a set of jobs, you execute each one using the same step-by-step procedure under the guidance of the HCS nondisruptive migration workflow. (HCS also provides tabular and graphical displays to help you keep track of the progress of individual jobs or the entire project.)

Migrating a large number of volumes is time-consuming and can affect performance. The most critical decision is how to divide the source volumes into a series of migration jobs. Depending on the complexity of your environment, this can be as simple as defining a job according to the host or organization with which the volumes are associated. Jobs are the core element of your migration planning effort.

2

Requirements and restrictions

This chapter establishes the system requirements for nondisruptive migration and restrictions that affect specific operations. It also explains the difference between what is supported by the HCS nondisruptive migration workflow and what can be done manually using the functions of Hitachi Command Suite.

- ☐ System requirements
- ☐ Operational limits and restrictions
- ☐ Restrictions on the number of PGR Keys
- ☐ Migration of existing ShadowImage copy pairs
- ☐ Migration of copy types not supported by the HCS nondisruptive migration workflow

System requirements

The following tables list the hardware, software, and configuration requirements for nondisruptive migration.

Table 1 Hardware requirements

Source storage systems		Target storage systems	
Model	**Microcode**	**Model**	**Microcode**
USP V/VM	60-08-51-XX/XX or later	VSP G1000	80-02-00-XX/XX or later
		VSP Gx00 models	83-03-00-XX/XX or later
		VSP G1500 and VSP F1500	80-05-0X-XX/XX or later
VSP [1, 2]	70-06-33-XX/XX or later	VSP G1000	80-03-1X-XX/XX or later
		VSP G1500 and VSP F1500	80-05-0X-XX/XX or later
HUS VM	73-03-44-XX/XX or later	VSP Gx00 models	83-03-00-XX/XX or later
		VSP G1000	80-04-00-XX/XX or later
		VSP G1500 and VSP F1500	80-05-0X-XX/XX or later

Notes

1. VSP storage systems that include either of the following resources are not supported:
   - A resource group created in HCS
   - A resource to which data was migrated by using a virtual ID
2. A service engagement is required for migrating data from volumes that were previously migrated to VSP.

Table 2 System requirements

Item	Requirements
Licenses	**Source storage system:** No additional licenses required **Target storage system:** • nondisruptive migration • Resource Partition Manager • ShadowImage (if migrating copy pair configurations)
HCS roles and resource groups	To perform all nondisruptive migration tasks, the user must be assigned the **Admin** role and be a member of the **All Resources** group. (For details on the functions accessible with the **Modify** role, see the *Hitachi Command Suite User Guide*.) **Note:** lesser roles will restrict access to some functions (and in some cases prevent them from being displayed in the GUI).

Item	Requirements
Host server	The host server connected to the source storage system must be supported by the target. For the latest information about supported host OS and multipath software, see the nondisruptive migration support matrix at http://www.hds.com/products/interoperability/. **Caution:** The procedures for operating a server are established by the standards and specifications of the vendor. Server behavior is affected by factors such as the OS, multipath software, HBAs, drivers, switches, and cable connections. Before starting a migration, we strongly recommend that you investigate and test server behavior (for example, when adding alternate paths to the target storage system or when recognizing devices).
Management server	You must have a management server running Hitachi Command Suite. For details about the management server system requirements, such as supported operating systems, see *Hitachi Command Suite System Requirements*. The management server requires the following licenses: • Device Manager • Hitachi Tiered Storage Manager
Pair management server	If you plan to migrate copy pair configurations, the following must be installed on the pair management server: • Device Manager agent 8.1.1 or later • CCI 01-32-03/XX or later
Source volumes	The following volumes can be used as migration source volumes: • Emulation type: OPEN-V or OPEN-3/8/9/E/K/L • Volume type: internal, external, LUSE. For details about external volumes, see External volumes on page 44. • Maximum capacity: 4 TB (8,589,934,592 blocks) • Maximum number of source volumes per storage system: see **Target volumes** • Dynamic Provisioning virtual volumes When you migrate the data from a Dynamic Provisioning virtual volume, the target volume does not take over the page assignment status of the source volume. Therefore, you must use pools with a capacity consistent with the pool capacity of the source virtual volumes. • Dynamic Tiering virtual volumes Dynamic Tiering volumes can be used as migration target volumes. Verify that any target destination pool has free capacity consistent with the total allocated capacity of the source volumes. (After migration you may be able to reduce capacity with the Zero Page Reclamation feature.) • ShadowImage primary volumes. For details, see Migration of existing ShadowImage copy pairs on page 37. • TrueCopy primary volumes are not supported by the HCS nondisruptive migration workflow. For details, see TrueCopy volumes on page 41. • Universal Replicator primary volumes are not supported by the HCS nondisruptive migration workflow. For details, see Universal Replicator volumes on page 43. Data on the following volumes cannot be migrated: • Unallocated volumes • Mainframe volumes • Multiplatform volumes • Command devices • Secondary volumes of ShadowImage, TrueCopy, or Universal Replicator • Virtual volumes of Thin Image or Copy-on-Write Snapshot

Item	Requirements
	• Volumes on which Data Retention Utility is set • Volumes on which Database Validator is set • DP-VOLs with Product ID OPEN-0V (created using Dynamic Provisioning version 60-02-04 or earlier on USP V/VM) • Internal volumes with Product ID OPEN-0V (containing data migrated using Volume Migration from a DP-VOL created using Dynamic Provisioning version 60-02-04 or earlier on USP V/VM)
Target volumes	The following volumes can be used as migration target volumes: • Emulation type: OPEN-V • Maximum capacity: 4 TB (8,589,934,592 blocks) • Volume type: internal, external, Dynamic Provisioning virtual volume • Maximum number of target volumes per storage system: ○ VSP G200: 1,024 ○ VSP G400, G600: 2,048 ○ VSP G800: 8,192 ○ VSP G1000, VSP G1500, and VSP F1500: 65,279 If the target storage system is already in use, the LDEV IDs available for migration target volumes are limited. (LDEV IDs that are already in use cannot be used for migration target volumes.) The following volumes cannot be used as migration target volumes: • Mainframe volumes • Thin Image pair volumes Nondisruptive migration does not support Thin Image pair volumes. If you are using Thin Image in the source storage system, you must re-create the Thin Image pairs on the target storage system after data migration is complete. • Dynamic Provisioning pool volumes • Volumes on which Cache Residency Manager is set • Deduplication system data volumes

Operational limits and restrictions

The following tables include limits and restrictions that apply to nondisruptive migration.

Table 3 Migration and virtualization limits

Item	Limit
Source-to-target connections	• Maximum number of source storage systems connected to one target storage system: 7 • Maximum number of target storage systems connected to one source storage system: 1
Virtual ID limits per target storage system	• Maximum number of resource groups on which virtual IDs can be set: 7 • Maximum number of volumes on which virtual IDs can be set: ○ VSP G200: 2,048 ○ VSP G400, G600: 4,096

Item	Limit
	○ VSP G800: 14,080 ○ VSP G1000, VSP G1500, and VSP F1500: 65,279
Maximum number of migration projects per target storage system	7
Maximum number of migration projects per *source* storage system	1
Maximum number of migration jobs that can run concurrently	10
Maximum number of volumes per migration job	500
Maximum number of hosts per migration job	100

Table 4 Restrictions

Item	Restrictions
Data direct mapping attribute	To create a TrueCopy or Universal Replicator pair in the target volume by enabling the data direct mapping attribute, the microcode version of the storage system of the secondary site must be 80-03-2X-XX/XX or later (VSP G1000) or 83-03-0X-XX/XX or later (VSP G200, G400, G600, G800).
Host mode and host mode option of host groups	The source and target storage systems must use the same host mode and host mode options for host groups connected to the server. If the host mode of the host group for the source storage system is HP-UX, you do not need to add the migration target host group number to the virtual storage machine. If the host mode of the host group for the migration-source storage system is HP-UX, you do not need to add the host group number of the migration target to the virtual storage machine. (If you add a host group number, it will not be used.)
Security authentication function (FCSP Authentication)	Do not set the security authentication function (FCSP Authentication) for the port of target storage system, or you may not be able to log in from the server.
Volume formatting and shredding	You cannot format or shred the mapping volumes on which you are migrating the data in the target storage system.
SCSI-2 Reserve and SCSI-3 Persistent Reserve commands and target volume cache mode	When the server issues SCSI-2 Reserve or SCSI-3 Persistent Reserve commands and the cache mode of the target volume is set to *cache through*: • Do not change the number of external storage path definitions between the target and source storage systems. • The Reserve or Persistent Group Reserve information is *not* displayed on the LUN Management window of the target storage system. Instead, check the information in the LUN Management window of the SVP of the source storage system. When the mode is set to anything other than cache through, the information is displayed in the LUN Management window of the target storage system. If more than one path is set between the

Item	Restrictions
	source and target storage systems, only one of these paths is displayed in the KEY field.

Restrictions on the number of PGR Keys

A PGR Key is used when the SCSI-3 Persistent Reserve command of the SCSI standard is executed. When a USP V/VM is configured as a source storage system, you must set the number of PGR Keys per port to be less than or equal to 128. In a Microsoft Failover Cluster (MSFC) configuration using Windows Server 2008 or Windows Server 2008 R2, you must calculate the number of PGR Keys for each port as described here.

How to calculate the number of PGR Keys

If the LU is the Cluster Shared Volume (CSV) which can be configured by Hyper-V and MSFC in Windows Server 2008 R2, you can calculate the number of PGR Key by the following calculation formula, because all nodes register a different PGR Key for each LU:

```
Number of PGR Keys per port = number of connecting nodes × number of LUs ≤ 128
```

If the LU is a MSFC configuration LU of Windows Server 2008 or Windows Server 2008 R2, you can calculate the number of PGR Keys by the following formula, because the number of PGR Keys becomes two for the one LU when a failover is caused by server failure:

```
Number of PGR Keys per port = number of LUs + 32 ≤ 128
```

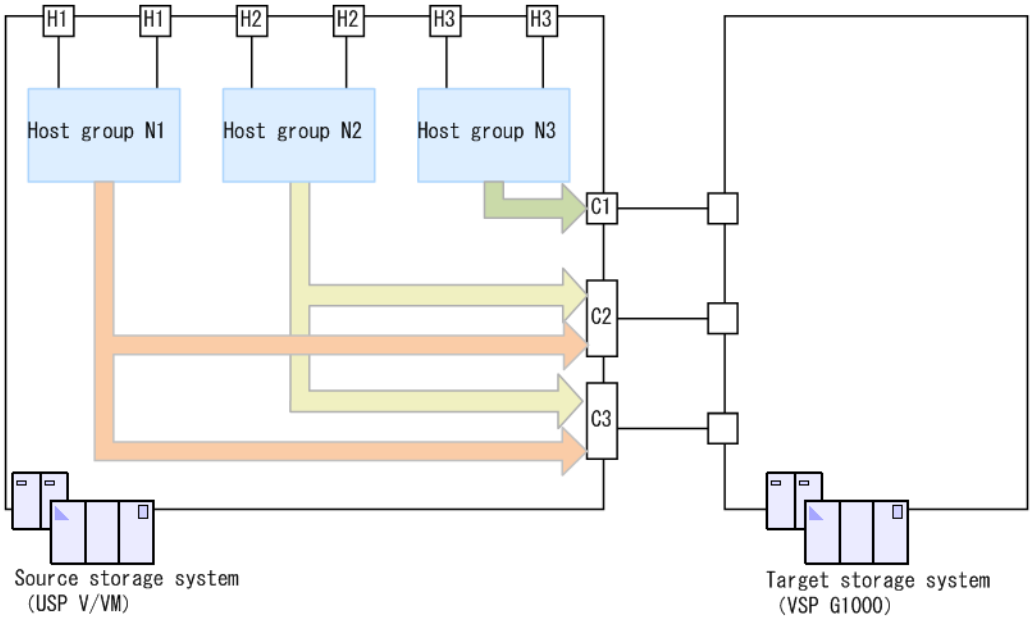
For server cluster configurations other than above, the number of PGR Keys is roughly equal to the number of nodes:

```
Number of PGR Keys per port ≈ number of connecting nodes ≤ 128
```

Confirm the number of PGR Keys is less than or equal to 128 in the migration storage system (USP V/VM).

Configuration example

The following figure shows the configuration example of the migration source storage system (USP V/VM) using the PGR Key.



Because the maximum number of PGR Keys is 128 per port, you must configure the system within 128 for the each host group, even if multiple host groups are assigned to the ports (like the C2 and C3 port in the figure).

Migration of existing ShadowImage copy pairs

The HCS nondisruptive migration workflow supports the migration of existing ShadowImage copy pairs. This is accomplished by migrating configuration definition files (also known as *HORCM* or *config* files) to the target storage system. Because the workflow replicates the copy pair configurations on the target storage system before migrating the data, the pair configurations are inherited when you move the data to the target storage system.

Note: Non-ShadowImage copy pairs are not supported by the HCS nondisruptive migration workflow. Other copy pair types (such as Universal Replicator) must be set up manually after the migration process is complete. See Migration of copy types not supported by the HCS nondisruptive migration workflow on page 41 for more information.

Requirements

The following requirements apply to the contents of configuration definition files:

- Files must be in HORCM_LDEV format. (This is the default format used by Replication Manager.) If your configuration definition files are in another format (such as HORCM_LDEVG), you must convert them manually before they can be used in a migration project. When creating a project, you are presented with a list of configuration definition files. Invalid files are

marked as non-migratable. In addition, all the source storage system configuration definition files are copied to a backup location. For details, see Creating a migration project on page 58.

- All volumes must be ShadowImage.
- No virtual command devices are permitted.
- All copy pairs must belong to the source storage system.
- All copy pairs must have entities.
- All copy pairs must have the same copy direction within a copy group.

Restrictions

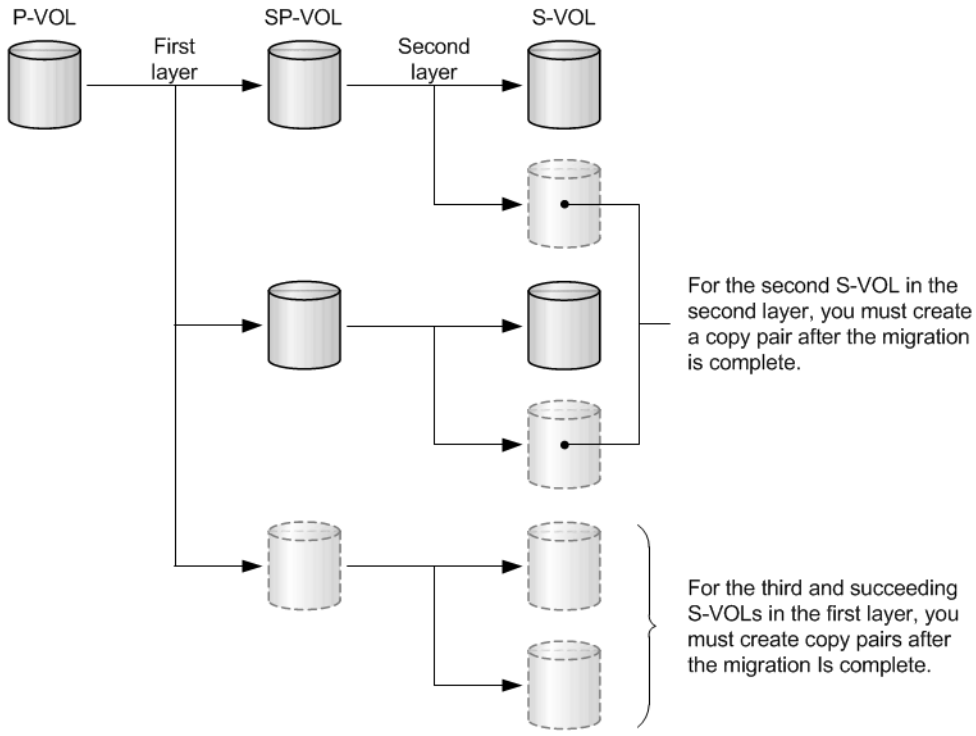
The following restrictions apply to copy pair operations and configurations:

- From the time you create a migration project until the project completes, do not perform any copy pair operations on the source storage system that are not part of the migration workflow.
- If any existing Replication Manager tasks are scheduled to change the status of a copy pair that is part of your planned migration, be sure and cancel such tasks before starting the migration.
- Migrating the copy pair configuration migrates only the primary volumes; the secondary volumes are re-established as part of the workflow.
- If any copy pairs use the same primary volume, define the copy pairs in separate copy groups.

ShadowImage multi-target and cascade configurations

The HCS nondisruptive migration workflow only supports a subset of possible multi-target and cascade configurations. For extended configurations like the ones described in this topic, you must create the additional copy pairs separately after the migration is complete:

- The third and succeeding secondary volumes in the first layer
- The second secondary volume in the second layer



Restrictions on copy pair operations during migration

There are certain restrictions on copy pair operations during data migration. (After the migration is complete, these restrictions no longer apply.)

The following table correlates the availability of ShadowImage pair operations with the status of the Volume Migration pair.

Table 5 Volume Migration status and ShadowImage operations

Volume Migration pair status during data migration	Availability of ShadowImage pair operation					
	Create pair	Split pair	Resync pair (forward)	Resync pair (reverse)	Suspend pair	Delete pair
SMPL	Yes	Yes	Yes	No	Yes	Yes
SMPL(PD)	No	Yes	No	No	Yes	Yes
COPY	No	No	No	No	Yes	Yes
PSUS	No	Yes	No	No	Yes	Yes
PSUE	No	Yes	No	No	Yes	Yes

The following table correlates the availability of Volume Migration pair operations with the status of the ShadowImage pair.

Table 6 Volume Migration pair operations and ShadowImage pair status

Status of ShadowImage pairs	Availability of Volume Migration pair operations during data migration
SMPL	Yes
SMPL(PD)	Yes
COPY(PD)/COPY	Yes
PAIR	Yes
PSUS	Yes
COPY(RS)/COPY	Yes
PSUE	Yes
COPY(SP)/COPY	No
PSUS(SP)/PSUS	No

Restrictions on other copy pair types

TrueCopy and Universal Replicator pair operations are also restricted during volume migration. The following table correlates the availability of TrueCopy and Universal Replicator operations with the status of the Volume Migration pair.

Table 7 Volume Migration status and remote copy operations

Volume Migration pair status during data migration	Availability of TrueCopy/Universal Replicator operation				
	Create pair	Split pair (suspend)	Resync pair (forward)	Resync pair (reverse)	Delete pair
SMPL	Yes	Yes	Yes	No	Yes
SMPL(PD)	No	Yes	No	No	Yes
COPY	No	Yes	No	No	Yes
PSUS	No	Yes	No	No	Yes
PSUE	No	Yes	No	No	Yes

As shown in following table, there are no restrictions on Volume Migration operations due to the status of the TrueCopy or Universal Replicator pair.

Table 8 Volume Migration operations and copy pair status

TrueCopy/Universal Replicator pair status	Availability of Volume Migration operation during data migration
SMPL	Yes
COPY	Yes
PAIR	Yes
PSUS	Yes

TrueCopy/Universal Replicator pair status	Availability of Volume Migration operation during data migration
PSUS (PFUS)	Yes

Migration of copy types not supported by the HCS nondisruptive migration workflow

ShadowImage volumes are the only copy type currently supported by the HCS nondisruptive migration workflow. Other copy types must be configured manually after the data migration process is complete.

TrueCopy volumes

You can migrate the data of the primary volumes of TrueCopy pairs. However, you cannot migrate TrueCopy pair configurations using the HCS nondisruptive migration workflow. Instead, migrate the primary volumes using the nondisruptive migration procedure. When the migration is complete, you can create the TrueCopy pairs in the target storage system manually using Replication Manager.

When migrating TrueCopy, the pair status is not retained. Because you are creating the pair after the primary volume data is copied from the source storage system to the target storage system, the pair status at the completion of data migration is PAIR. Also, differential information between the primary and secondary volumes is not retained.

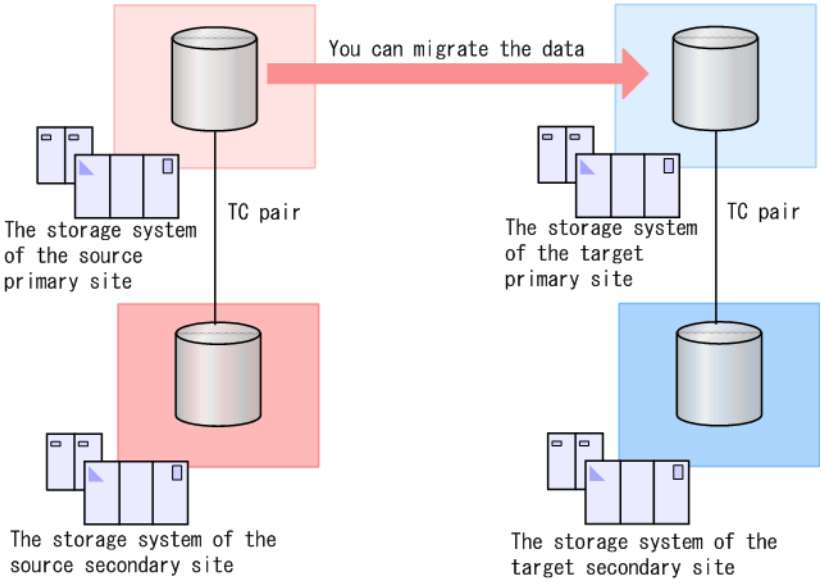
After specifying the consistency group number of the source storage system for the target storage system, and then creating a TrueCopy pair in the target storage system, you can migrate data by consistency group. However, consistency cannot be maintained during data migration.

Note: A service engagement is recommended to migrate TrueCopy pair configurations.

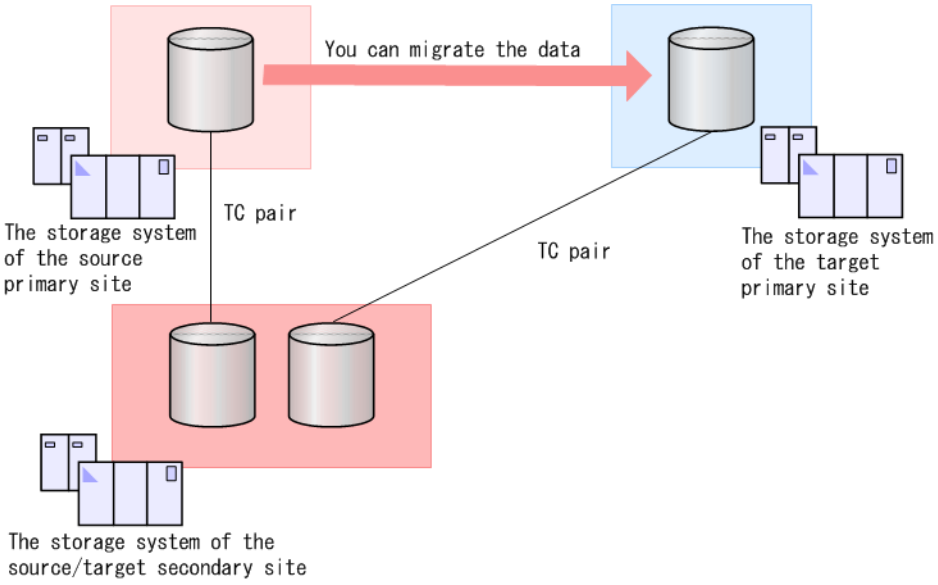
The path from the secondary site server to the storage system of the target secondary site must be disabled during data migration.

Migratable configurations

The primary volume data is copied from the source storage system to the target storage system, and then a TrueCopy pair is created in the target storage system. Therefore, data duplication can be maintained during migration.

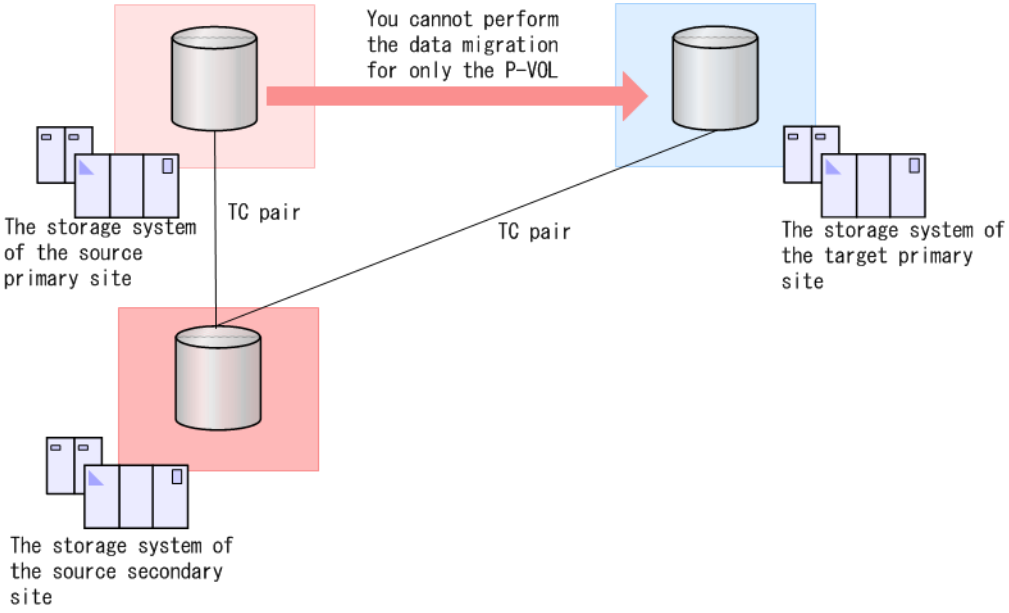


You can create the target secondary volumes in the storage system of the source secondary volumes.



Non-migratable configurations

You cannot migrate data for only the primary volume (P-VOL) or only the secondary volume.



Universal Replicator volumes

You can migrate the data of the primary volumes of Universal Replicator pairs. However, you cannot migrate Universal Replicator pair configurations using the HCS nondisruptive migration workflow. Instead, migrate the primary volumes using the nondisruptive migration procedure. When the migration is complete, you can create the Universal Replicator pairs in the target storage system manually using Replication Manager.

Note: A service engagement is recommended to migrate Universal Replicator pair configurations.

When migrating Universal Replicator volumes, the pair status is not retained. Because you are creating the pair after the primary volume data is copied from the source storage system to the target storage system, the pair status at the completion of data migration is PAIR. Also, differential information between the primary volume and the second volumes is not retained.

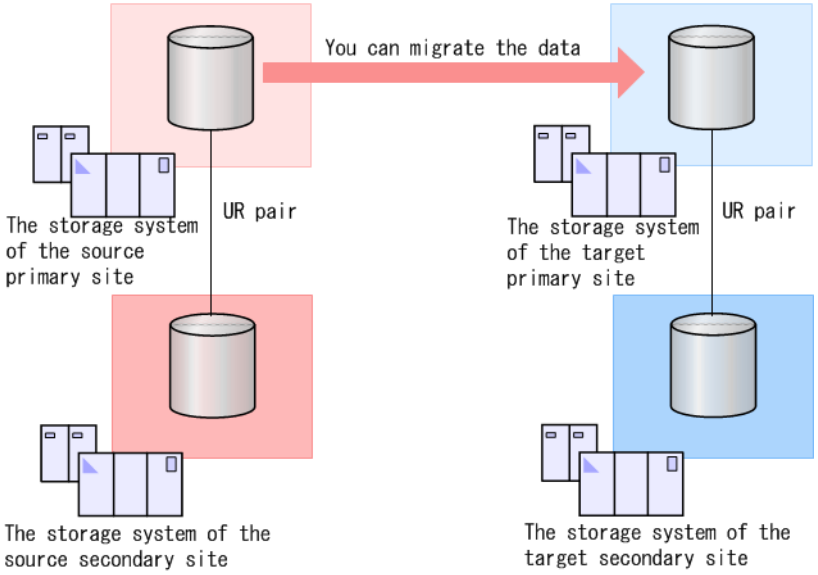
After specifying the consistency group number of the source storage system for the target storage system and then creating a Universal Replicator pair in the target storage system, you can migrate data by consistency group. However, consistency cannot be maintained during data migration.

The path from the secondary site server to the storage system of the target secondary site must be disabled during data migration.

Migratable configurations

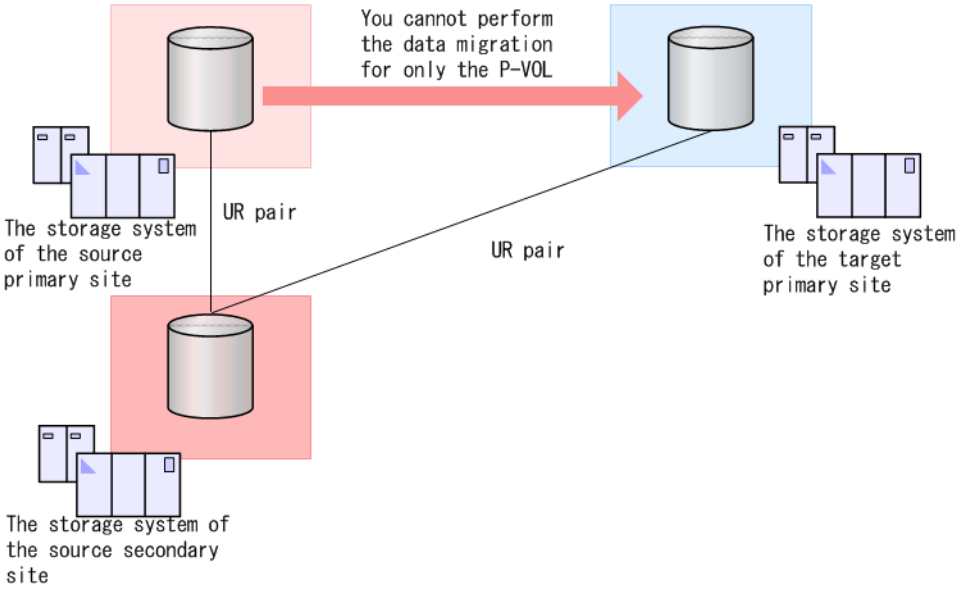
The primary volume data is copied from the source storage system to the target storage system, and then a Universal Replicator pair is created in the

target storage system. Therefore, data duplication can be maintained during migration.



Non-migratable configurations

You cannot migrate data for only the primary volume (P-VOL) or only the secondary volume.

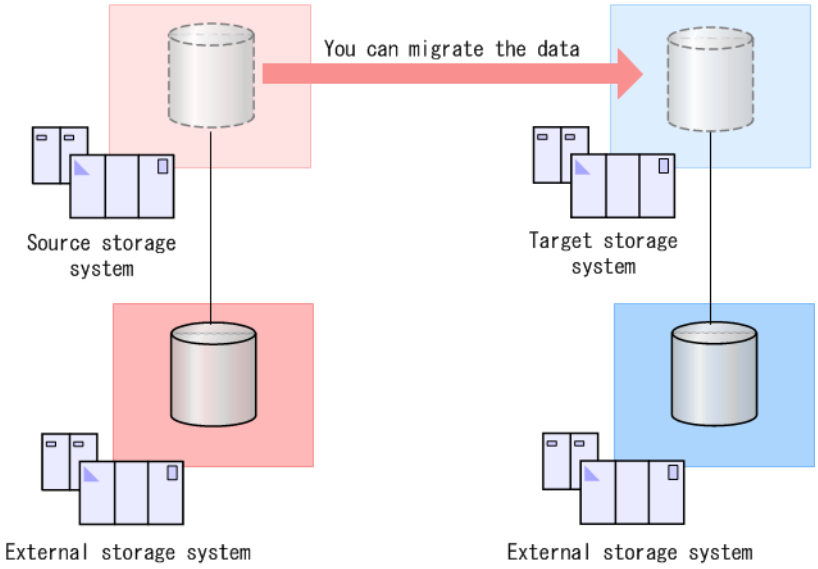


External volumes

Nondisruptive migration supports the migration of external volumes of the source storage system.

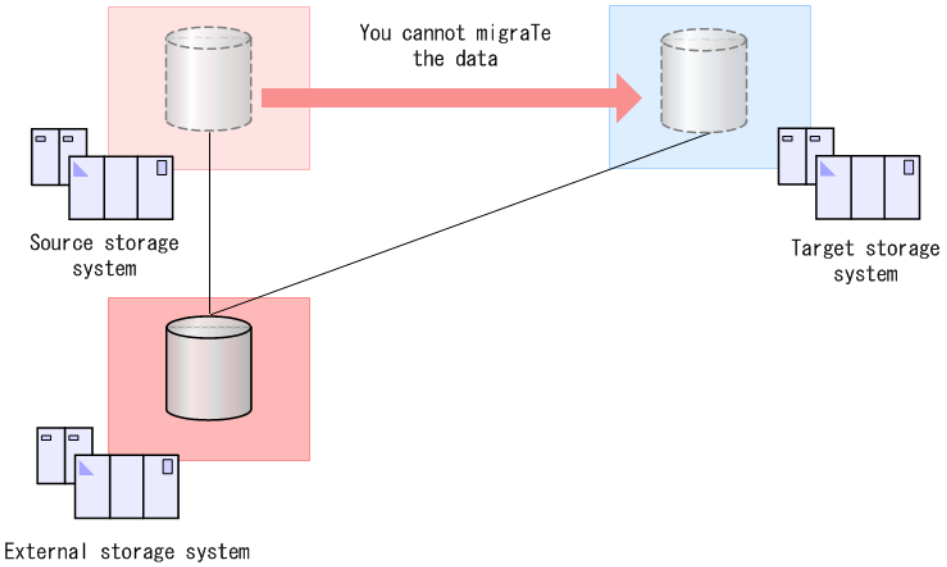
Migratable configurations

The following figure shows the supported configuration for migrating external volumes.



Non-migratable configurations

If the source storage system and the target storage system share the same external storage system, you cannot migrate the data. This configuration, shown in the following figure, is not supported.



3

Planning your migration

This chapter describes important planning considerations for a migration. The information in this chapter is general and does not account for the many variations in migration environments. Be sure and read Choosing a nondisruptive migration solution on page 15 for important information about service engagements.

We strongly recommend the nondisruptive migration planning service offered by Hitachi Data Systems Global Solution Services (GSS).

- ☐ Planning considerations
- ☐ Nondisruptive migration and system performance

Planning considerations

The first stage of a nondisruptive migration project is to create a migration plan based on the source storage system configuration and your performance goals. Coordinate the plan development with data network administrators and host administrators or the administrator of the pair management server. The following table includes key points to consider.

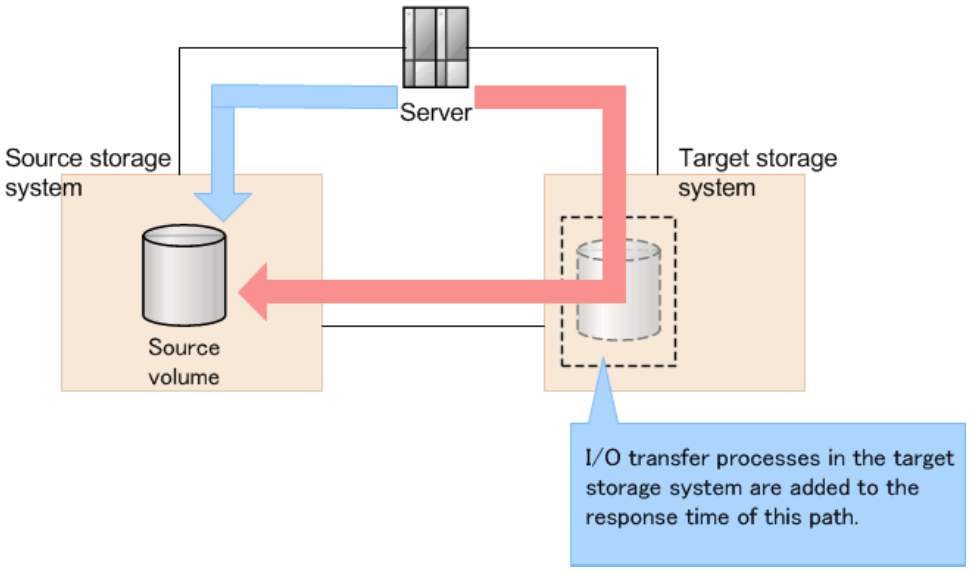
Item	Description
Resources on the target storage system	Consider capacity, performance, and reliability when designing the configurations of the parity groups and DP pools to which volumes and copy pair configurations can be migrated. Determine the target parity group or DP pool for each volume or ShadowImage secondary volumes. The capacity of a target volume for data migration is the same as the source volume (not just the space currently used). Be careful not to exceed the free capacity of the DP pool of the target storage system.
Assigning source volumes to migration jobs	You can choose the volumes for a migration job by host, logical group, or individually. This may seem simple in theory, but in practice it is the most crucial decision you will make as part of the migration process. An effective migration requires absolute consistency. For example: • If the server is in a cluster, the entire cluster must be migrated at the same time. • All LUNs on a server must be migrated at the same time. • If a server has multiple HBAs, they must be migrated in the same job.
Scheduling	Migration may take a long time depending on the number of volumes to be processed. Estimate how long the migration will take (in accordance with your I/O response time and throughput goals) to determine when to migrate, how much data to migrate, and the order in which to migrate the volumes.
Overall operation time for migration	To estimate the total time required for the data migration, you should account for the following: • Setting cables between the source and target storage systems and between the target storage system and the host • Installing and configuring the target storage system, including microcode and program product licenses • Creating the copy pairs in the target storage system • Creating the Volume Migration pairs in the target storage system
I/O response and throughput	As part of migration planning, decide the acceptable response time and throughput. Host I/O response time increases during migration operations. For details, see Nondisruptive migration and system performance on page 49.
Cache load status of the source storage system	Verify that data migration can be done under an acceptable system load. Ideally, the migration should be carried out during periods of low I/O activity to avoid issues with write cache pending.
Server configuration	Confirm the server configuration for setting alternate paths to the target storage system: • OS: type, version • Multipath software: type, version, multipath setting information • Cluster software: type, version • Hardware: model, CPU • HBA: model, driver, firmware, WWN • Disks: list of disks and settings

Item	Description
Copy pair configuration	If you are planning to migrate data of local or remote copy pairs in the source storage system, make sure that the configuration is supported by nondisruptive migration. In addition, there are restrictions on copy pair operations during migration. For details, see Migration of existing ShadowImage copy pairs on page 37.
Access to migrated volumes during migration	During migration, all access to a volume must be through paths to the virtualized volume on the target storage system. The source volume must be unallocated from all paths on the source storage system other than the external or bidirectional ports of the target system. Access from other ports, host groups, or servers to the target storage system volume (such as for clusters, failover, or backup) must be taken into consideration.
Volume replication	Because only the P-VOLs and the pair configuration are migrated, the S-VOLs on the source storage system remain at the point in time that the migration completes, while the S-VOLs created on the target system pick up at that point. Requirements for access to historical Point in Time copies should be considered. There are also limitations to S-VOL configurations that can be migrated. For details, see ShadowImage multi-target and cascade configurations on page 38
External volume configuration	If you are planning to migrate data of external volumes in the source storage system, make sure that the configuration is supported by nondisruptive migration. For details, see External volumes on page 44.

Nondisruptive migration and system performance

This topic explains how data migration operations affect server I/O performance.

Once the source volume has been virtualized, the I/O response time for the path becomes the sum of the response time for source storage system I/O operations (blue line) and the transfer processing time within the target storage system (red line).



4

Preparing the migration environment

Before host volumes and copy pair configurations can be migrated to the target storage system, migration projects are created, storage resources are prepared, and then migration jobs are created to manage the migration workflow.

- ☐ Understanding migration projects and jobs
- ☐ Navigating migration projects and jobs
- ☐ Preparing storage resources for migration
- ☐ Creating a migration project
- ☐ Creating a migration job
- ☐ Creating a DP pool

Understanding migration projects and jobs

Migration projects and jobs define the scope of nondisruptive migration work to be performed for a source and target storage system. You can create migration projects and jobs (units of work) for up to seven source storage systems connected to one target storage system.

A *migration project* consists of a single target storage system paired with a single source storage system by using the Create Migration Project wizard. The migration project you create functions as a container for migration jobs.

A *migration job* consists of the volumes and copy pair configurations to be migrated to the target storage system. You select copy pair configurations, hosts, logical groups, or manually selected volumes when you create a migration job. One or more migration jobs can be created for each migration project.

Because migrating a large number of volumes simultaneously is time-consuming and creates a heavy I/O workload, dividing a migration project into one or more migration jobs helps control the I/O load on both the source and target storage systems.

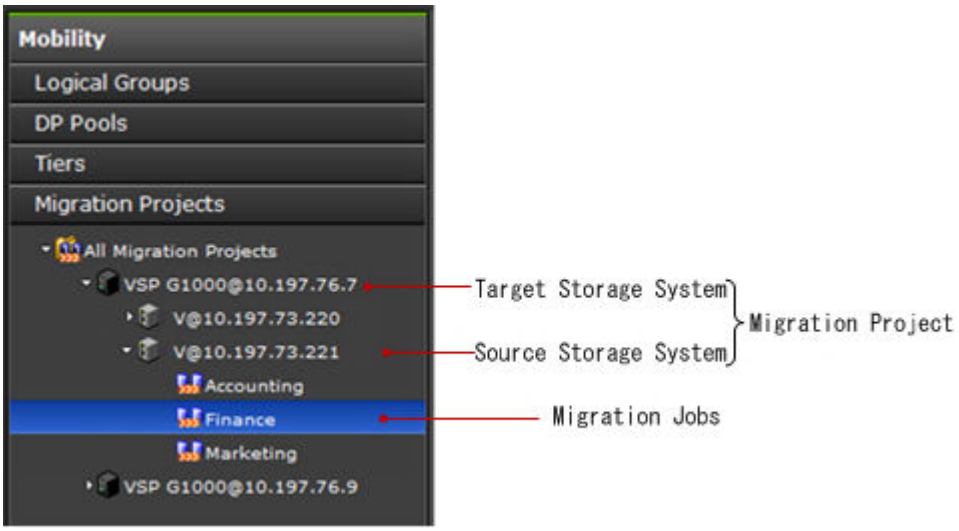
Migration projects and migration jobs appear on the Mobility tab, in the navigation pane under Migration Projects.

Note: If storage systems are not listed in Migration Projects, target storage systems are not yet registered. If, when you expand the tree for a registered target storage system, source storage systems are not listed, create a migration project for the target storage system and add a source storage system.

Navigating migration projects and jobs

The migration user interface is flexible and provides various methods for performing migration tasks.

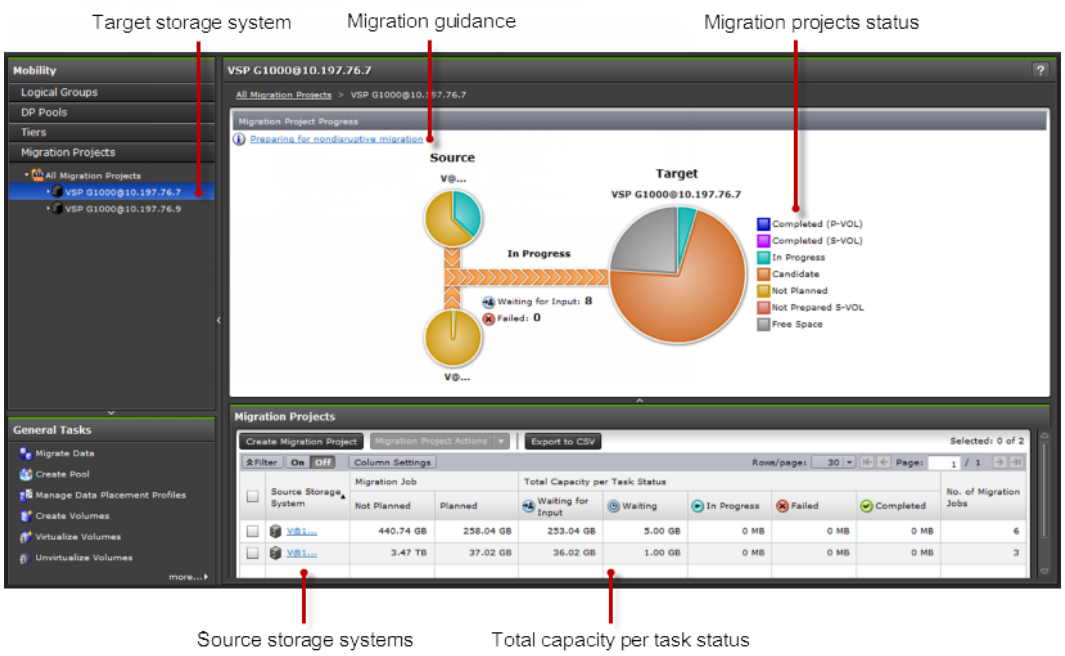
On the Mobility tab, when you select Migration Projects and then expand the tree, one or more target storage systems are listed.



- Each target storage system can be paired with up to seven (for consolidation purposes) nested source storage systems. This pairing comprises a migration project.
- For each source storage system in the tree, one or more nested migration jobs are listed.

When you select a target storage system from the navigation pane:

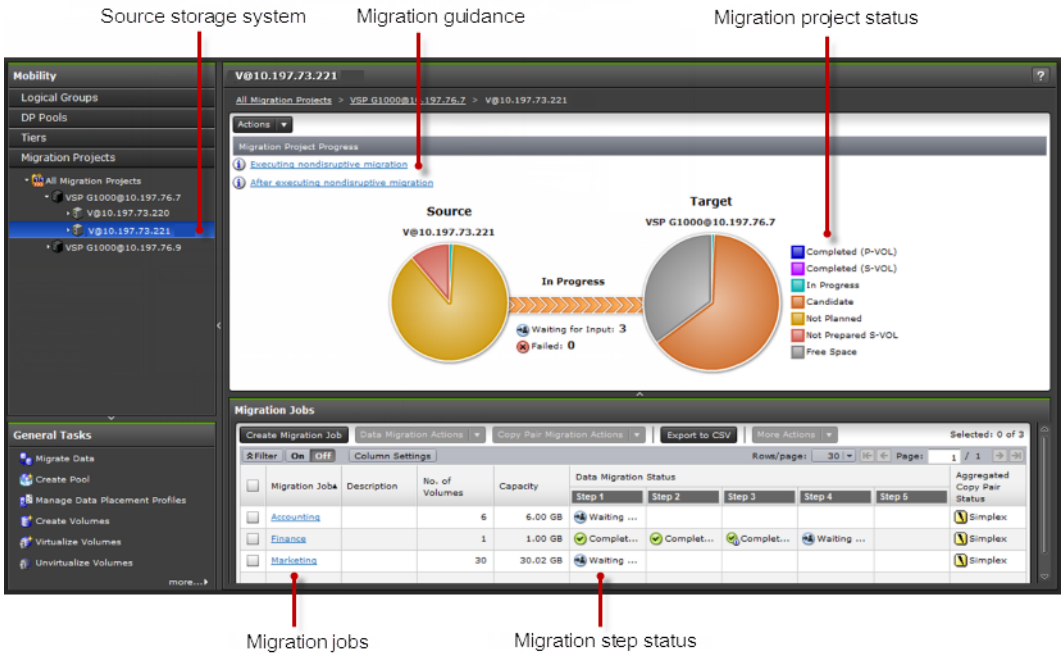
- Up to seven source storage systems (migration projects) are listed in the source storage systems list in the application pane. Migration project progress for all migration projects and for the entire target storage system is shown with color-coded pie charts labeled by status categories, which include corresponding volume capacity related to the status category. Using a mouse, hover over the pie-charts to see the status category name and related capacity metric, for example, the available free space on the target storage system, or the volume capacity that has been migrated.



- You click links in the Migration Project Progress pane to display migration guidance.
- In the Migration Projects pane, in the table of source storage systems, you can view the overall migration job status (Total Capacity per Task Status).

When you select a source storage system from the navigation pane:

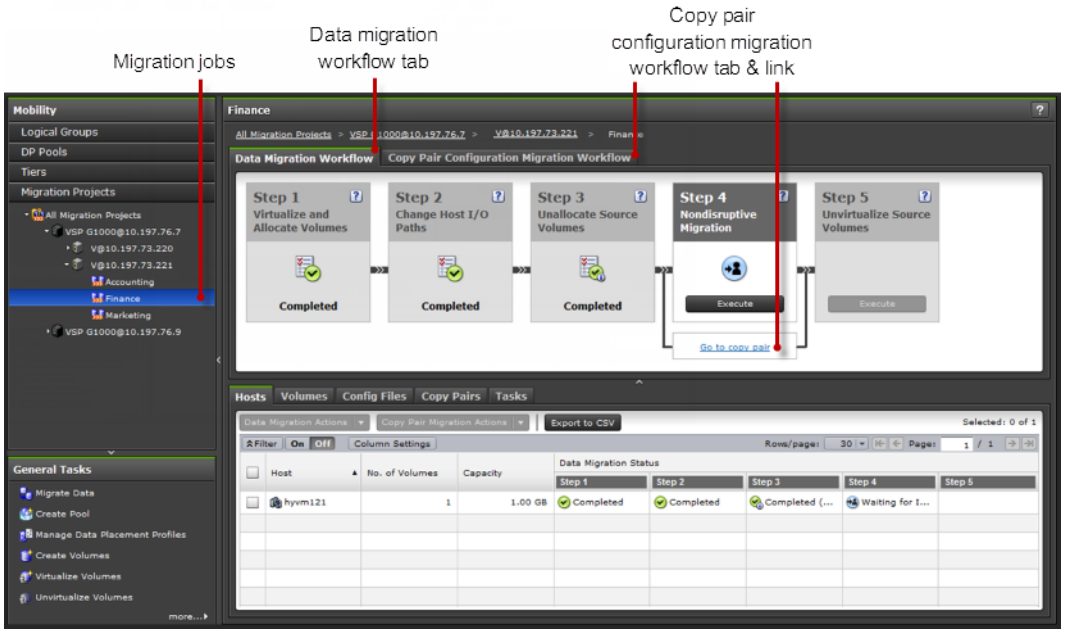
- In the Migration Project Progress pane, you can see the migration project progress and status for a single migration project (the selected source and target storage system pair).

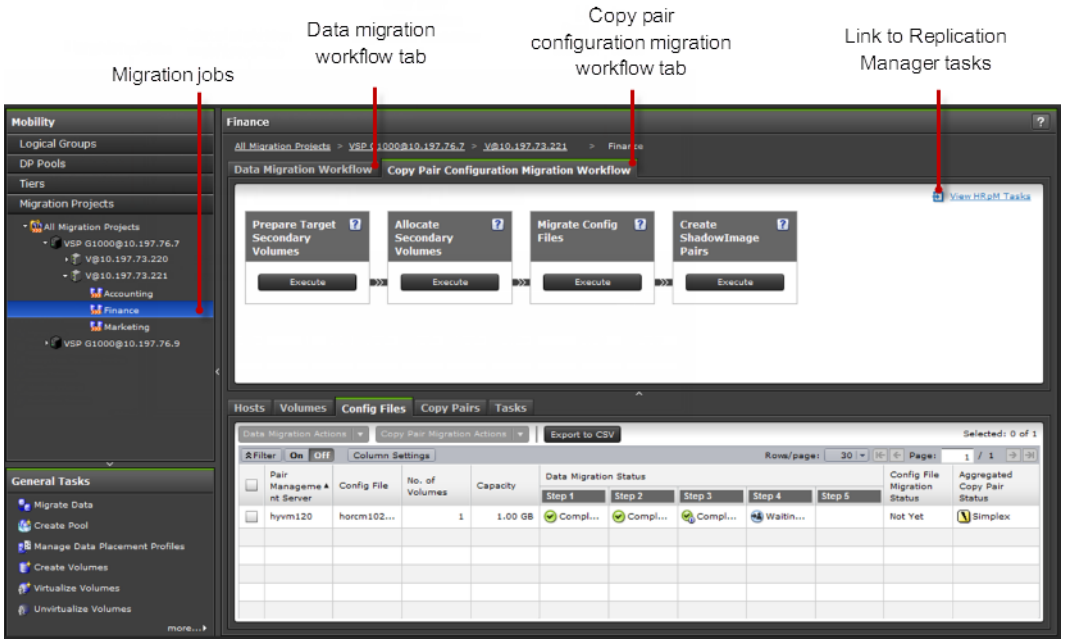


- You can click links in the Migration Project Progress pane to display guidance. Use the Actions menu to access migration project tasks.
- In the Migration Jobs section, you can create migration jobs. You can view or click links for all migration jobs for the migration project. You can view the progress and status of each migration job, including the volume count, total capacity to be migrated, and the status of each step in the migration job.

When you select a migration job from the navigation pane, or click the link for a migration job from the Migration Jobs list, GUI windows guide you through the steps in the workflow:

- Migration workflow tabs display for data migration and copy pair configuration steps. If you are migrating copy pair configurations as part of your migration project, a copy pair link is provided as a reminder of where the copy pair workflow is inserted into the data migration workflow. If a step is not complete, a button for performing the step is activated.





- In the bottom pane, tabs are available for viewing a migration job by Hosts, Volumes, Config Files (configuration definition files), and Copy Pairs (volumes belonging to a copy pair). Use Column Settings to configure the displayed information for each tab. The Tasks tab provides convenient access to job-specific migration tasks, and provides the Manually Change Task Status button to assist in recovering a stalled migration job.

Note: You can also click the Tasks & Alerts tab to review migration tasks.

Preparing storage resources for migration

Before you can begin the migration, you must prepare the storage resources and create a migration project.

Before you begin

- Install the nondisruptive migration license on the target storage system.
- Create a migration plan for each source and target storage system to be paired.
- Register the target storage system in HCS.

Procedure

1. On the **Mobility** tab, select **Migration Projects**.
2. Expand the tree and select a target storage system.
3. Select the target system under **All Migration Projects**. The **Preparation** screen includes steps that prompt you to perform the necessary tasks.
4. Perform the tasks described in Step 1, including adding storage systems and hosts, and (if migrating existing copy pairs) creating and allocating a command device (**Allocate Volumes**). This includes the following:
   - Register a host (pair management server) that manages the configuration definition files in HCS, and refresh the storage system.
   - When the target storage system is VSP G1000, VSP G1500, or VSP F1500, set the port for data migration.
   - Create the target storage system command device and allocate it to the pair management server.
   - Create the command device in the resource group (meta_resource) on the target storage system whose resource group ID is 0.
   - To connect the command device, use a port that is different from the one that manages the migration target volume that is used for nondisruptive migration.
   - Disable user authentication for the command device.
   - Change instances of HORCM_LDEVG to HORCM_LDEV. You cannot migrate configuration definition files in which HORCM_LDEVG is defined. The list of available configuration definition files will not include any configuration definition files in which HORCM_LDEVG is defined.
5. Start the Create Migration Project wizard (Step 2).
6. Create the necessary DP pools (Step 3).

7. Select the source storage system from the Migration Projects table at the bottom of the screen (Step 4) and proceed with the migration.

Related tasks

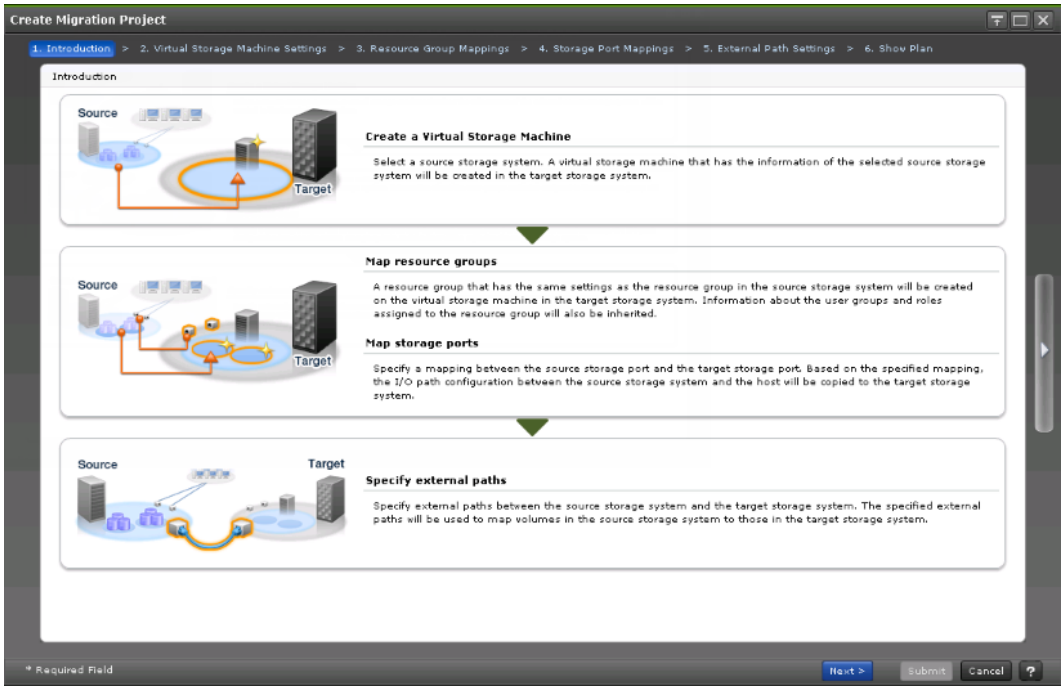
- Creating a migration project on page 58
- Creating a DP pool on page 61

Creating a migration project

Use the Create Migration Project wizard to pair target and source storage systems, which make up a migration project.

Procedure

1. On the **Mobility** tab, select **Migration Projects**.
2. Expand the tree and select a target storage system.
3. Click **Create Migration Project** to launch the Create Migration Project wizard.



4. Review the **Introduction** page, and then click **Next**.
5. On the **Virtual Storage Machine Settings** page:
   a. Select a source storage system.
   b. Accept the displayed virtual storage machine name, or enter a valid virtual storage machine name.
   c. (Optional) Select the **Migrate SI Pair Configuration** option to enable migration of copy pair configurations.
   If you select this option, do not make any changes to the configuration definition files until the migration is complete.

Note:

- Valid configuration definition files are indicated by **Yes** in the **Can the Copy Pair be Migrated** column. If **No** appears in this column for one or more of the configuration definition files you want to migrate, click **Cancel**, fix the configuration definition files, refresh hosts and the storage system, and then create the migration project again.
- When you finish creating the migration project, all source storage system configuration definition files are copied to the following locations, whether or not configuration definition files are valid:

  For Windows:

  Device-Manager-agent-installation-folder\agent\config\migration\backup

  For UNIX:

  Device-Manager-agent-installation-directory/agent/config/migration/backup

6. Click **Next**.
7. On the **Resource Group Mappings** page, click **Next**.
8. On the **Storage Port Mappings** page, specify the mapping between the source and target storage ports, and then click **Next**.
   You can verify the port details for each selected target storage port in the **Port Details** table.
9. On the **External Path Settings** page, configure the external paths between the port of the source storage system and the externalor bidirectional port of the target storage system. Click **Increase Priority** or **Decrease Priority** to adjust the priority of the path. Click **Edit External Paths** to verify the external path configuration, to edit external paths using the topographical map or selection table, or to clear external path settings. When you are finished, click **Next**.
10. On the **Show Plan** page, confirm that the information in the plan summary and plan details are correct. If changes are required, click **Back**.
11. (Optional) Update the task name and provide a description.
12. (Optional) Expand **Schedule** to specify the task schedule.

    You can schedule the task to run immediately or later. The default setting is **Now**. If the task is scheduled to run immediately, you can select **View task status** to monitor the task after it is submitted.
13. Click **Submit.**
    If the task is scheduled to run immediately, the process begins.
14. (Optional) Check the progress and result of the task on the **Tasks & Alerts** tab. Click the task name to view details of the task.

Result

The migration project is created, and the source storage system is displayed in the Migration Projects tree.

Related concepts

- About the migration project model on page 28

Related tasks

- Preparing storage resources for migration on page 57
- Deleting a migration project on page 86
- Creating a migration job on page 60

Creating a migration job

A migration job consists of source volumes (which might be copy pair P-VOLs) to be migrated to the target storage system. The volumes are selected by specifying one or more hosts or logical groups, by manually selecting volumes, or by specifying configuration definition files containing copy pair information.

Before you begin

A migration project must exist for the source and target storage systems.

Procedure

1. On the **Mobility** tab, select **Migration Projects**.
2. Expand the tree and select a source storage system.
3. Click **Create Migration Job**.
4. Specify a name and description for the migration job.
5. Specify volumes by selecting one of the following options:

Option	Description
Config Files	Select **Config Files** when migrating copy pair configurations. This option is available only if you enabled migration of copy pair configurations when you created the migration project. If you select configuration definition files that define secondary volumes, also select the configuration definition files that define the corresponding primary volumes.
Hosts	Select **Hosts**, and then click **Select a Host** or **Select Hosts** to select multiple hosts.

Option	Description
Logical Group	Select **Logical Group**, and then click **Select a Logical Group**.
Manual	Select **Manual**, and then click **Add Volumes** in the Selected Volumes table to select source volumes for migration.

6. (Optional) Update the task name and provide a description.
7. (Optional) Select **View task status** to monitor the task after it is submitted.
8. Click **Submit**.

Result

In the migration projects list, the new migration job appears for the source storage system.

Related concepts

- About the migration project model on page 28

Creating a DP pool

You can create an HDP or HDT pool, which provides more efficient use of physical storage for virtual volumes that are allocated to hosts from the DP pool. DP pool performance can be improved if you use the entire capacity of a parity group for a single DP pool.

If target pool capacity is not already available, you can create pools and volumes on the target storage system for the migration of data and copy pair configurations. The HCS nondisruptive migration will create new volumes from existing pools or can be directed to use existing volumes.

Before you begin

- Register the target storage system.
- When defining an external LDEV tier rank, externally connect a storage system that has multiple performance levels.
- The RAID level and drive specifications in parity groups should be consistent with your performance goals.
- Parity groups must have volumes to be added to a pool.

Note: For HDT pools:

if different drive types and/or RAID levels are mixed in a single tier, they will all be considered equal for data placement regardless of page access frequency. As a result, I/O performance will be dependent on the drive type characteristics and RAID level on which any given page resides.

For HDP pools:

If different drive types and/or RAID levels are mixed in an HDP pool, I/O performance will be dependent on the drive type characteristics and RAID level on which any given page resides.

Procedure

1. On the **Resources** tab, expand the storage system, list existing **DP Pools**, and click **Create Pool**.
2. In the **Create Pool** dialog box, specify a pool name, and optionally select **Reflect this pool name to the storage system**.
3. To configure an HDP pool, select a **Pool Type** of **HDP** and configure the following:
   a. In the **Additional Parity Groups** table, click **Add Parity Groups**.
   b. (Optional) Select 'Allow to mix different drive types/speeds, chip types, RAID levels or volume locations' to allow combining resources with different characteristics.
   c. Select one or more parity groups, and click **Add to Pool** and then **Close**. The **Pool Summary** information is updated.
   d. (Optional) Click **Advanced Options** to configure Pool ID, Used Threshold, Subscription Thresholds, and DP volume protection options, as needed.
   e. Go to step 7.
4. To configure an HDT pool, select a **Pool Type** of **HDT**, and then in the **Additional Parity Groups** table, choose **Standard** or **Mixed** mode to disallow or allow combining resources with different characteristics. For **Mixed** mode, go to step 6.
5. For a **Standard** mode HDT pool, do the following:
   a. Click **+** to add a new tier.
   b. In the **Add New Tier** dialog box, select a volume to configure Tier 1, and click **Select**. The **Tier Configuration** table in **Pool Summary** is updated.
   c. Click **Add Parity Groups**, select the parity group, click **Add to Pool**, and click **Close**. Select an available parity group that best meets your performance or capacity needs (Tier 1 for best performance, Tier 2 for next best performance, and Tier 3 for capacity).
   d. (Optional) Click **+** to add Tier 2 and Tier 3, configure the tiers based on your performance and capacity needs using the choices in **Add New Tier** dialog box. The Tier Configuration table in Pool Summary is updated.



Tip: To delete an existing tier, click **X** in the **Tier** tab.

e. (Optional) Click **Advanced Options** to configure Pool ID, Used Threshold, Subscription Thresholds, and DP volume protection options, as needed.
f. Click **HDT Options**, and configure the tier management options as needed.
g. Go to step 7.

6. For a **Mixed** mode HDT pool, do the following:
   a. Click **Add Parity Groups**.

   Note: There are two parity group tab choices from which you can select: **Internal Parity Groups** and **External Parity Groups** (the **Internal Parity Groups** tab is set by default). If you select the **External Parity Groups** tab and select one or more parity groups, this enables the **External LDEV Tier Rank** menu from which you must choose a ranking for the tier.

   b. For mixed mode in the **Internal Parity Groups** tab or the **External Parity Groups** tab, select parity groups that you want to add to the HDT pool, click **Add to Pool**, and click **Close**. The Tier Configuration table in Pool Summary shows the new tier configuration status for each tier.
   c. (Optional) Click **Advanced Options** to configure Pool ID, Used Threshold, Subscription Thresholds, and DP volume protection options, as needed.
   d. Click **HDT Options**, and configure the tier management options as needed.
7. Click **Show Plan** and confirm that the information in the plan summary is correct. If changes are required, click **Back**.
8. (Optional) Update the task name and provide a description.
9. (Optional) Expand **Schedule** to specify the task schedule. You can schedule the task to run immediately or later. The default setting is **Now**.
10. Click **Submit**. If the task is to run immediately, the task begins.
11. You can check the progress and the result of the task on the **Tasks & Alerts** tab. Click on the task name to view details of the task.

Result

Created pools are added to the target storage system DP Pools list.

5

Performing the migration

This chapter includes a step-by-step breakdown of the wizard-based workflows for migrating volumes and existing ShadowImage copy pairs. Although these wizards take you through the entire process, you can also use these procedures to execute a specific step when necessary.

- ☐ Migrating volumes to the target storage system
- ☐ Migrating copy pair configurations to the target storage system

Migrating volumes to the target storage system

Volume and copy pair configuration migrations follow a standard workflow. The status of each step in the workflow is displayed as each step is performed so that you can track the progress of the migration. When all steps are completed for all volumes in the migration job, the migration job is complete. When all migration jobs are completed, the migration project is complete.

Step 1: Virtualize and Allocate Volumes

To migrate data, you must virtualize source volumes and allocate them to the target storage system.

Note: After you start the migration job (Step 1), we recommend that you complete the data migration without canceling it. (If you cancel an ongoing data migration to restore operations to the migration source storage system, you might need to manually execute the CLI.)

Before you begin

- A migration job must exist for the migration project.
- Verify that the target host is not registered in host groups that have different host modes or host mode options.
- Verify that if the target host is already registered in a host group of the target storage system, that the WWNs of the host group of the target storage system and corresponding host group of the source storage system are the same.

Procedure

1. On the **Mobility** tab, select **Migration Projects**.
2. Expand the tree for a source storage system, and select a migration job.
3. On the **Data Migration Workflow** tab, click **Execute** for **Step 1: Virtualize and Allocate Volumes**.

   Note: To resume a step for one or more migration job resources, for example, resources with a failed step task or sub-task, select the resources, and from the **Data Migration Actions** menu, select the step to resume.

4. On the **Virtualize Volumes Setting** page, verify the source and target storage systems and the migration job name.
5. (Optional) Change the parity group start number setting.

   For example, even though parity groups are automatically numbered starting from 1, you can add another source storage system to a target

storage system and select a start number to easily differentiate the source of the parity groups.

6. (Optional) Change the cache logical partition (CLPR) to be used for a migration.
7. (Optional) Specify the initial number of the LDEV ID for the volumes to be added to the virtual storage machine.
8. Verify the external path information, and then click **Next**.
9. On the **Allocate Volumes Setting** page, click the **Volume Path** tab, and confirm the volume path mapping between source and target volumes.
10. Click the **Host Group** tab and click the provided links to verify host group mapping and other information, such as the scope of **LUN Security** and that the **Host Group Attributes** have not changed for the source and target.
11. Click **Edit Host Group Setting** to verify or change the host group name and the resource group for the host group.
12. Click **Next.**
13. On the **Show Plan** page, verify the plan summary and plan details, optionally add a task name and description, and then click **Submit**.
14. Confirm this task is **Completed** for the migration job.

Result

Source volumes are virtualized and allocated to hosts in the target storage system.

Related tasks

- Step 2: Change host I/O paths on page 67

Step 2: Change host I/O paths

To redirect host I/O to the target storage system, host I/O paths must be online for the target storage system and offline for the source storage system.

Before you begin

Volumes must be virtualized and allocated.

Note: The following information applies to steps 4 and 6 of this procedure. The **Change Host I/O Paths** window only displays information about path changes. To change paths, you must use path management software or change zoning settings.

Note: If the LUN paths of source storage systems are left online and you proceed to the next step, data might be lost. For the target hosts, make sure that the LUN paths of all of the source storage systems are offline, and then submit the task.

Procedure

1. On the **Mobility** tab, select **Migration Projects**.
2. Expand the tree for a source storage system, and select a migration job.
3. On the **Data Migration Workflow** tab, click **Execute** for **Step 2: Change Host I/O Paths**.

   Note: To resume performing a step on one or more migration job resources, for example, resources with a failed step task or sub-task, select the resources, and from the **Data Migration Actions** menu, select the step to resume.

4. In the **Change Host I/O Paths** window, carefully review the **Step 1** instructions for bringing the host I/O path of the target volume online.

   To help you review and make the necessary changes, click **Export to CSV** to create a file that you can reference for the target LUN path information.
5. In **Step 2**, verify the target LUN path information, and then select the check box labeled **I have confirmed that all target LUN paths are online**.
6. Review the **Step 3** instructions for taking the host I/O path of the source volume offline. To help you review the source LUN path information, click **Export to CSV** to create a file that you can reference.
7. In **Step 4**, verify the source LUN path information, and then select the check box labeled **I have confirmed that all source LUN paths are offline**.
8. (Optional) Update the task name and provide a description.
9. Click **OK** to submit the task.
10. Confirm this task is **Completed** for the migration job.

Result

Host I/O paths are online to the target storage system and offline for the source storage system.

Related tasks

- Step 1: Virtualize and Allocate Volumes on page 66
- Step 3: Unallocate source volumes on page 68

Step 3: Unallocate source volumes

Delete the source storage system LUN paths for hosts with migration source volumes, and change the cache mode on the target storage system.

Before you begin

Host I/O paths must be online for the target storage system and offline for the source storage system.

Procedure

1. On the **Mobility** tab, select **Migration Projects**.
2. Expand the tree for a source storage system, and select a migration job.
3. On the **Data Migration Workflow** tab, click **Execute** for **Step 3: Unallocate Source Volumes**.

   Note: To resume performing a step on one or more migration job resources, for example, resources with a failed step task or sub-task, select the resources, and from the **Data Migration Actions** menu, select the step to resume.

4. Verify the source LUN path information.

   The target storage system cache mode is automatically changed from Through to Write Sync to forward write I/O to the source storage system volume.
5. (Optional) Update the task name and provide a description.
6. (Optional) Expand **Schedule** to specify the task schedule.

   You can schedule the task to run immediately or later. The default setting is **Now**. If the task is scheduled to run immediately, you can select **View task status** to monitor the task after it is submitted.
7. Click **Submit.**
   If the task is scheduled to run immediately, the process begins.
8. Confirm this task is **Completed** for the migration job.

Result

Source volumes are unallocated from the host, the cache mode is set to Write Sync, and host I/O continues to update the source volume.

Next steps

If you are migrating copy pair configurations, follow the copy pair configuration migration workflow before continuing to Step 4: Nondisruptive Migration. Alternatively, you can perform the copy pair configuration migration workflow after nondisruptive migration (step 4) is complete for the P-VOL, but before you unvirtualize the source volumes (step 5).

Related tasks

- Step 2: Change host I/O paths on page 67
- Step 4: Nondisruptive migration on page 69
- Preparing target secondary volumes on page 72

Step 4: Nondisruptive migration

Migrate source volume data to the target volume for data migration.

Note: To maintain copy pair redundancy during volume migration (recommended), complete the copy pair configuration migration workflow before performing nondisruptive migration (step 4). Alternatively, you can perform the copy pair configuration migration workflow after nondisruptive migration (step 4) is complete for the P-VOL, but before unvirtualizing source volumes (step 5).

Before you begin

Source volumes must be unallocated.

Procedure

1. On the **Mobility** tab, select **Migration Projects**.
2. Expand the tree for a source storage system, and select a migration job.
3. On the **Data Migration Workflow** tab, click **Execute** for **Step 4: Nondisruptive Migration**.

   Note: To resume performing a step on one or more migration job resources (such as resources with a failed step task or sub-task),select the resources, and from the **Data Migration Actions** menu, select the step to resume.

4. Verify the source and target storage systems and migration job name.
   The estimated migration time is shown for the migration job.
5. Click **Set Target Volumes for Data Migration** to specify a specific DP pool or parity group for the target volume for data migration, and then select either **Create new volumes** or **Use existing volumes**. Click **OK**.
6. (Optional) Select **Zero Page Reclaim** to reclaim capacity after migration. This option is enabled by default. Zero page reclaim can take a long time. The estimated time is shown next to the check box. If you clear the check box, you can perform zero page reclaim after the migration job completes.
7. (Optional) Select the option to send email notification to a specified email address when the data migration completes.

   Note: Email notifications for Tiered Storage Manager events must be set up in advance. For more information see the *Hitachi Command Suite Administrator Guide.*

8. (Optional) Update the task name and provide a description.
9. (Optional) Expand **Schedule** to specify the task schedule.
   You can schedule the task to run immediately or later. The default setting is **Now**. If the task is scheduled to run immediately, you can select **View task status** to monitor the task after it is submitted.
10. Click **Submit.**

If the task is scheduled to run immediately, the process begins.

11. Confirm this task is **Completed** for the migration job.

Result

Source volume data is migrated to target volumes for data migration.

Note: If the migration task status is "In progress" and the migration status of each volume remains at 99%, go to the Edit Local Replica Options window in Device Manager - Storage Navigator, disable the Nondisruptive Migration Data Consistency option, and then continue operation.

Related tasks

- Step 3: Unallocate source volumes on page 68
- Step 5: Unvirtualize source volumes on page 71

Step 5: Unvirtualize source volumes

Unvirtualize source storage system volumes in the target storage system.

Before you begin

- The migration of the data must be completed.
- Copy pair configuration migration workflow steps (started after step 3 or step 4) must be completed.
- If the source volume is a ShadowImage copy pair volume, delete the source storage system copy pair before you unvirtualize the volume.

Procedure

1. On the **Mobility** tab, select **Migration Projects**.
2. Expand the tree for a source storage system, and select a migration job.
3. On the **Data Migration Workflow** tab, click **Execute** for **Step 5: Unvirtualize Source Volumes**.

   Note: To resume performing a step on one or more migration job resources, for example, resources with a failed step task or sub-task, select the resources, and from the **Data Migration Actions** menu, select the step to resume.

4. Verify that the Plan Summary information is correct.
5. Verify the list of source volumes to unvirtualize and their corresponding internal volume and parity group information.
6. Verify the external paths to be unallocated.
7. (Optional) Update the task name and provide a description.
8. (Optional) Expand **Schedule** to specify the task schedule.

You can schedule the task to run immediately or later. The default setting is **Now**. If the task is scheduled to run immediately, you can select **View task status** to monitor the task after it is submitted.

9. Click **Submit.**
   If the task is scheduled to run immediately, the process begins.
10. Confirm this task is **Completed** for the migration job.

Result

Source volumes are unvirtualized and the migration job is completed.

Migrating copy pair configurations to the target storage system

Copy pair configurations can be migrated from the source storage system to the target storage system using the copy pair configuration migration workflow. Copy pair redundancy can be maintained throughout the migration process. Configuration definition files are backed up, and are inherited by the target storage system for reestablishing copy pairs.

Preparing target secondary volumes

Create S-VOLs on the target storage system. The source S-VOL ID becomes the virtual LDEV ID of target storage system S-VOLs.

Before you begin

- Source volumes must be unallocated.
- A target storage system command device must be created and allocated to the pair management server.
- The option to migrate copy pair configurations was selected when the migration project was created.

Procedure

1. On the **Mobility** tab, select **Migration Projects**.
2. Expand the tree for a source storage system, and select a migration job.
3. Verify that steps 1 through step 3 on the **Data Migration Workflow** tab are completed, and then click the **Go to copy pair** link.
4. On the **Copy Pair Configuration Migration Workflow** tab, click **Execute** for **Prepare Target Secondary Volumes**.
5. On the **Create Target Secondary Volumes** page, select the S-VOL, and then click **Set Target Secondary Volumes** to specify a specific DP Pool or Parity Group for the target S-VOL, and then select **Create new volumes** or **Use existing volumes**. If necessary, specify the initial number of the LDEV ID for the volumes to be created on the virtual storage machine, and then click **OK**.

6. In the **Target Pools/Parity Groups Information** area, review the capacity changes for DP pools or parity groups.
7. Repeat steps 5 and 6 for each displayed source and target S-VOL pair, and then click **Next**.
8. On the **Set Paths for Target Secondary Volumes** page, compare the LUN path between the source secondary volume and the backup server with the corresponding LUN path setting of the target storage system. On the **Volumes** tab, you can see which backup server is allocated to each volume. On the **Host Groups** tab, you can compare the host group settings. As required, edit the names of the host groups created on the target storage system and the resource groups in which the host groups will be created. Enter the necessary settings, and then click **Next**.
9. Review the plan, and then click **Submit**.
10. Confirm this task is completed.

Result

Target storage system secondary volumes are prepared.

Related tasks

- Step 3: Unallocate source volumes on page 68
- Allocating target secondary volumes on page 73

Allocating target secondary volumes

Delete the backup server paths for source storage system S-VOLs, and then establish backup server paths for target storage system S-VOLs.

Before you begin

- Source volumes must be unallocated.
- The target storage system secondary volumes are prepared.
- Stop the backup script that is running on the backup server.

Procedure

1. On the **Mobility** tab, select **Migration Projects**.
2. Expand the tree for a source storage system, and select a migration job.
3. On the **Copy Pair Configuration Migration Workflow** tab, click **Execute** for **Allocate Secondary Volumes**.
4. Note the host group information for the source and target storage systems, which will assist you when you are changing the backup server paths from the source storage system to the target storage system.
5. Delete the source storage system backup server WWN:
   a. Launch **Element Manager** to run the native management tool for the source storage system to delete the backup server WWN from the host group of the source storage system.
   b. Verify that the backup server WWN has been deleted from the host group of the source storage system.

6. Add the backup server WWN to the target storage system:
   a. On the **Resources** tab, for the target storage system, select **Ports/ Host Groups/iSCSI Targets** and add the backup server WWN to the host group of the target storage system.
   b. Verify that the backup server WWN has been added to the host group of the target storage system.

Result

Backup server paths for source storage system S-VOLs are deleted, and backup server paths for target storage system S-VOLs are created.

Related tasks

- Step 3: Unallocate source volumes on page 68
- Migrating configuration definition files on page 74

Migrating configuration definition files

For the migration job, selected configuration definition files can be migrated for use on the target storage system.

Before you begin

- Source volumes must be unallocated.
- Target secondary volumes must be allocated.

Procedure

1. On the **Mobility** tab, select **Migration Projects**.
2. Expand the tree for a source storage system, and select a migration job.
3. On the **Copy Pair Configuration Migration Workflow** tab, click **Migrate Config Files**.
4. Click **Add/Remove Config Files**.

> **Note:** The configuration definition file to be migrated must be specified in HORCM_LDEV format. Files in which HORCM_LDEVG is defined cannot be migrated and does not appear in the list.

5. Click **Add** and **Remove** to populate the list of configuration definition files to be migrated, and then click **OK**.
6. (Optional) Update the task name and provide a description.
7. (Optional) Expand **Schedule** to specify the task schedule.
   You can schedule the task to run immediately or later. The default setting is **Now**. If the task is scheduled to run immediately, you can select **View task status** to monitor the task after it is submitted.
8. Click **Submit.**
   If the task is scheduled to run immediately, the process begins.
9. Confirm this task is **Completed** for the migration job.

Result

Configuration definition files are migrated for use on the target storage system. HORCM instances for the migrated configuration definition files are restarted. If a HORCM instance is running on the source storage system, the configuration definition file is migrated to the target storage system.

Related tasks

- Step 3: Unallocate source volumes on page 68
- Creating copy pairs on the target storage system on page 75

Creating copy pairs on the target storage system

Create ShadowImage pairs on the target storage system based on migrated configuration definition files.

Before you begin

- Source volumes must be unallocated.
- Migration of configuration definition files must be completed.

Procedure

1. On the **Mobility** tab, select **Migration Projects**.
2. Expand the tree for a source storage system, and select a migration job.
3. On the **Copy Pair Configuration Migration Workflow** tab, click **Execute** for **Create ShadowImage Pairs**.
4. In the **Create ShadowImage Pairs** dialog box, select the copy group you want.
5. Click **Create Copy Pairs**.
6. In the Replication Manager **Change Pair Status Wizard**, on the **Select Copy Pairs** page, select the copy pair you want and click **Next**.
7. On the **Select Pair Operation** page, review the copy pair information and click **Next**.
8. On the **Set Schedule** page, select **Execute on Schedule** to schedule the task for a specific date and time, or select **Execute Immediately**, and then click **Next**.

   Note: You cannot edit the created task. If you want to reschedule the task, delete it and create a new task.

9. On the **Confirm** page, verify the copy pair settings, select the check box labeled **Yes. I have confirmed the above information and wish to change pair status**, and then click **Confirm**.
10. On the **Finish** page, confirm the task and then click **Finish**. The task is registered as a Replication Manager task.
11. To verify the status of the Replication Manager task:

a. On the **Copy Pair Configuration Migration Workflow** tab, click **View HRpM Tasks** to display the Replication Manager task list.
b. Open the **Create ShadowImage Pairs** dialog box and check **Status**.

Result

Copy pairs are created on the target storage system.

Next steps

Restart the backup script of the backup server for the target storage system if necessary.

Related tasks

- Step 3: Unallocate source volumes on page 68
- Step 4: Nondisruptive migration on page 69

6

Managing migration projects and jobs

After migration projects and jobs are initially created, there are a variety of tasks related to the management and maintenance of migration projects and jobs until they are completed.

This chapter describes these tasks and when they should be performed.

- ☐ Tracking migration project status
- ☐ Tracking migration job status
- ☐ Editing a migration project
- ☐ Changing the status of a failed task
- ☐ Editing a migration job
- ☐ Editing virtual storage machines
- ☐ Canceling a migration job
- ☐ Canceling a volume from a migration job
- ☐ Deleting a migration project

Tracking migration project status

The progress of migration projects is tracked and displayed graphically.

The following aggregated status information from migration jobs is displayed:

- The total capacity of volumes for a migration project.
  - You can estimate the time required to complete the migration project by reviewing the remaining capacity and up-to-date elapsed time for migrations.
  - You can determine if you need to add physical storage capacity, or create additional DP pools, by comparing the data capacity to be migrated against the free capacity of the target storage system.
- The completion state of migration jobs, which provides a snapshot of remaining migration activity for project completion.

Before you begin

A migration project with migration jobs must exist.

Procedure

1. On the **Mobility** tab, select **Migration Projects**.
2. Expand the tree and select a target storage system.
3. Track project status. In the **Migration Project Progress** window, categories (by capacity) are displayed in a pie chart format (using a variety of colors) for both source and target storage systems. Use your mouse to hover over the pie chart slices to review the name of the category and related statistics. The following table describes the color-coded pie chart categories and other status information:

Pie chart category	Storage system	Description
Completed	Source and Target	The total capacity of the volumes whose data migration is complete, meaning that the (nondisruptive migration) step of the data migration workflow is complete.
Completed (P-VOL)	Source and Target	If you are migrating copy pair configurations, the total capacity of the source storage system primary volumes whose data migration to the target storage system is complete.
Completed (S-VOL)	Target	The total capacity of volumes that are created for secondary volumes in the target storage system.
In Progress	Source and Target	The total capacity of the source storage system volumes that are registered in a migration job and whose data migration to the target storage system is not yet completed. Tasks in this category include those that are in the **Waiting for Action** (waiting for user input to continue the migration job) or **Failed** (waiting for recovery of a stalled migration job) status.

Pie chart category	Storage system	Description
Candidate	Target	The total capacity of the volumes that are in the source storage system and are not registered in a migration job. If you migrate copy pair configurations, the total capacity of the volumes for secondary volumes created in the target storage system is included.
Not Planned	Source	The logical capacity of the volumes that are in the source storage system and are not registered in a migration job.
Not Prepared S-VOL	Source	The total capacity of the secondary volumes of the copy pairs in the source storage system minus the total capacity of secondary volumes in the target storage system.
Free Space	Target	The total value of the free capacity in the target storage system minus the total capacity of the volumes in the In Progress or Candidate categories in the source storage system.

If free space warnings display, you might need to adjust target storage resources that are available for migration. Migration jobs that have the Waiting for Action status need to be continued, and stalled (Failed status) migration jobs need to be investigated and resumed.

Tracking migration job status

The status of migration jobs (and steps within the jobs) is displayed for each migration job.

Before you begin

Migration jobs must exist within a migration project.

Procedure

1. On the **Mobility** tab, select **Migration Projects**.
2. Expand the tree and select a source storage system.
3. In the **Migration Jobs** list, review the **Data Migration Status** column for one or more listed migration jobs.

   Data migration status values are:

Status	Description
Waiting for Action	Waiting for you to take action.
Waiting	Scheduled task.
In Progress	Running task.
Completed	Successful task.
Failed	Unsuccessful step or substep in the task. You must determine the cause and perform recovery steps.

Status	Description
Waiting for Action (Manually recover)	Waiting for you to take action to recover from a previously failed step or substep in a task. This status indicates that the recovery process involves reverting to a previous state, before the failed task occurred. You set this status as part of the recovery process, and then resume the task to complete the step.
Completed (Manually recover)	You have resolved an issue that caused a failed state. You set this status as part of the recovery process to clear the failure and allow the migration to proceed.

4. To review detailed migration job status, select a migration job from the tree, or click a migration job link.
5. Check the status of migration steps by clicking the **Hosts**, **Volumes**, **Config Files**, or **Copy Pairs** tabs.



Tip: The Volumes tab provides links for Source and Target volumes, and for each step status, providing direct access to volume details and task status information. Column Settings is configurable for relating volumes to a variety of resources, such as host or virtualized information used for migration.

6. Click the **Tasks** tab to see all migration job related tasks, or click the **Tasks & Alerts** tab, and then click **HCS Tasks** to see all migration tasks for all migration jobs.

Related tasks

- Tracking migration project status on page 78

Related references

- Troubleshooting a migration job on page 94

Editing a migration project

After a migration project is created, and before performing data migration, you can edit migration project information.

You can edit the following migration project information:

- Settings for resource groups that are created in the virtual storage machine of the target storage system
- Settings that define the mapping between source and target storage ports
- Settings that define the external paths between the ports of the source storage system and the external or bidirectional ports of the target storage system

Procedure

1. On the **Mobility** tab, select **Migration Projects**.

2. Expand the tree and select a target storage system.
3. In the **Migration Projects** list, select a migration project.
4. From the **Migration Project Actions** menu, choose one of the following options:

Option	Description
Edit Resource Group Mapping	Select the resource groups on the target storage system to map to the resource groups on the source storage system, and then click **OK**. You can verify the new resource group mapping by opening the **Edit Resource Group Mapping** dialog box again. **Tip**: If you change the mapping to the resource groups on the target storage system, the information about the user groups and roles that are assigned to the resource groups on the source storage system are not inherited. Edit the resource group mapping, and then assign resource groups and roles to the user groups on the target storage system.
Edit Port Mapping	Select the ports of the target storage system to map to the ports of the source storage system, or change the destination of ports that are already mapped, and then click **OK**. You can verify the new I/O path mapping by opening the **Edit Port Mapping** dialog box again.
Edit External Path Setting	Specify paths in accordance with the displayed instructions, and then click Submit. The submitted plan is registered as a task. Check the task results in the Tasks & Alerts tab. You can verify the new external path mapping by opening the **Edit External Path Setting** dialog box again.

Result

Resource group mapping, port mapping, and external path settings are updated for the migration project.

Related concepts

- About the migration project model on page 28

Related tasks

- Preparing storage resources for migration on page 57
- Creating a migration project on page 58

Related references

- Troubleshooting the creation of a migration project on page 93

Changing the status of a failed task

If a task fails, after recovery actions have been performed, change the status of the failed task to continue the migration job.

Before you begin

Correct the issue that is causing the failed task or subtask.

Caution: If you do not correct the issue that is causing a failed task or sub-task for a migration step before you change the status of the failed step to Waiting for Action (Manually recover) or Completed (Manually recover) in the Manually Change Task Status dialog box, the step cannot be resumed by using the GUI.

You must cancel (delete) affected volumes from the migration job, return them to the state before the task ran, and then create a new migration job for the volumes.

For information about how to recover from conditions that cause a failed status at the migration job step or sub-step level, see Troubleshooting a migration job on page 94. In certain cases, it may be preferable to start the migration over from the beginning as described in Backing out of a migration on page 102.

Procedure

1. On the **Mobility** tab, select **Migration Projects**.
2. Expand the tree, and select the migration job with the failed task.
3. On the **Volumes** or **Tasks** tab, do one of the following:
   - On the **Volumes** tab, select the volume for which recovery has been performed, and then from the **More Actions** menu, select **Manually Change Task Status**.
   - On the **Volumes** or **Tasks** tab, locate the task for which recovery has been performed, click the **Failed** status link, review task details, and click **Manually Change Task Status**.
4. On the **Manually Change Task Status** dialog box, verify the displayed information, and then select the **Status Change** check box to confirm that recovery has been performed.
5. From the **Select a Status** list, select one of the following:
   - **Waiting for Action (Manually recover)**: Resumes the task from the step during which the task failed.
   - **Completed (Manually recover)**: Resumes the task from the next step.
6. (Optional) Update the task name and provide a description.

7. (Optional) Select **View task status** to monitor the task after it is submitted.
8. Click **Submit**, and verify the status change for the migration step.

Result

The migration job step status is changed, and you can resume the migration job.

Related tasks

- Tracking migration job status on page 79

Related references

- Troubleshooting a migration job on page 94
- Backing out of a migration on page 102

Editing a migration job

You can change the name or description of a migration job.

Tip: If you want to migrate more volumes, create a new migration job. If you want to stop volume migration, you can cancel a migration job, or delete (cancel) volumes from a migration job.

Procedure

1. On the **Mobility** tab, select **Migration Projects**.
2. Expand the tree for a source storage system, and select a migration job.
3. From the **More Actions** menu, select **Edit Migration Job**.
4. Change the migration job name or description and click **OK**.
5. Verify the results by reviewing the migration job name and description in the **Migration Jobs** list.

Result

The migration job is updated.

Related tasks

- Creating a migration job on page 60

Related references

- Troubleshooting a migration job on page 94

Editing virtual storage machines

You can add resources or remove resources from a virtual storage machine. You can also change the name of the virtual storage machine.

To support global-active device pairs, edit the virtual storage machine to add secondary storage system resources to a default or user-defined virtual storage machine on the primary storage system to provide a single view of the primary and secondary storage system resources.

Before you begin

From the host, unallocate volumes that are related to resources that belong to the virtual storage machine you are removing.

Procedure

1. On the **Administration** tab, select **Virtual Storage Machine**, select a virtual storage machine in the list, and then click **Edit Virtual Storage Machine**.
2. Verify the **Name** and **Virtual Model and Serial No.** of the virtual storage machine that you are modifying. If you are setting up a global-active device pair, verify that the virtual storage machine is on the primary storage system.
3. Add or remove resources, such as parity groups or LDEV IDs, for the virtual storage machine. If you are setting up a global-active device pair, click **Add Storage Systems**, select the secondary storage system, and then click **OK**. Then add secondary storage system resources, such as **Parity Groups**, **LDEV IDs**, **Storage Ports**, and **Host Group/iSCSI Target Numbers** to the virtual storage machine.
4. Enter an optional task description, select whether you want to view the progress of the task when the task completes, and then click **Submit**.
5. (Optional) Check the progress and result of the task on the **Tasks & Alerts** tab. Click the task name to view details of the task.

Result

The selected virtual storage machine is edited and can be verified in the list of virtual storage machines. If you are creating a global-active device pair, you have a single view of the primary and secondary storage system resources.

Canceling a migration job

You can cancel a migration job that has not been started, meaning no migration activity has occurred. After you cancel a migration job, its volumes can be specified as migration source volumes in another migration job.

You can also cancel a migration job in progress. However, to use the deleted volumes of migration jobs for other migration jobs, you must manually recover the volumes of the cancelled migration jobs.

Procedure

1. On the **Mobility** tab, select **Migration Projects**.
2. Select a source storage system.
3. From the **Migration Jobs** list, select one or more migration jobs.
4. From the **More Actions** menu, select **Cancel Migration Jobs**.
5. Verify the displayed information, select the check box to confirm that you have reviewed and understand the plan, and then click **Submit**.
6. Confirm that the job is cancelled by reviewing the migration jobs list again.

Result

The migration job is cancelled.

Related tasks

- Creating a migration job on page 60

Related references

- Troubleshooting a migration job on page 94

Canceling a volume from a migration job

You can delete individual volumes from a migration job, unless migration for the volume is already complete. Deleted volumes can be specified as migration source volumes in another migration job.

Procedure

1. On the **Mobility** tab, select **Migration Projects**.
2. Expand the tree for a source storage system, and select a migration job.
3. On the **Volumes** tab, select the volumes to delete.
4. From the **More Actions** menu, choose **Cancel Migration Volumes**.
5. Verify the displayed information, select the check box to confirm you have reviewed and understand the plan, and then click **Submit**.
6. Confirm the volume deletions by selecting the migration job again.

Result

The selected volumes are deleted from the migration job.

Related tasks

- Creating a migration job on page 60
- Editing a migration job on page 83

Related references

- Troubleshooting a migration job on page 94

Deleting a migration project

You can delete a migration project that has no active tasks. You might want to delete a migration project after the migration is complete or if the migration fails and you want to try again by creating another migration project. This procedure deletes the settings associated with the migration project. It does not delete the individual tasks in the project.

Before you begin

Verify that there are no tasks that are active for the migration jobs in the migration project.

Procedure

1. On the **Mobility** tab, select **Migration Projects**.
2. Expand the tree and select a target storage system.
3. In the **Migration Projects** list, select a migration project.
4. From the **Migration Project Actions** menu, select **Delete Migration Project**.
5. Verify that the plan is correct, and then click **Submit**.
   The plan is registered as a task.
6. Check the task results in the **Tasks & Alerts** tab.

Result

The migration project is deleted.

Related concepts

- About the migration project model on page 28

Related tasks

- Creating a migration project on page 58

Related references

- Troubleshooting the creation of a migration project on page 93

7

Completing the migration

This chapter includes procedures to be followed after our migration is complete. These tasks are not part of the HCS nondisruptive migration workflow, but are functions of Hitachi Command Suite. The procedures for each task are documented in the *Hitachi Command Suite User Guide*.

- ☐ Removing the source storage system from Hitachi Command Suite
- ☐ Optimizing the target storage configuration
- ☐ Reclaiming zero pages for target volumes

Removing the source storage system from Hitachi Command Suite

After a migration project is complete, and you have completed post-migration tasks such as volume shredding and deletion, you can remove (unregister) the source storage system from HCS.

You might want to remove a source storage system from HCS, for example, because the storage system is being decommissioned and physically removed, or it is being redeployed.

Optimizing the target storage configuration

Migration adds host I/O load to the target storage system. You can tune the performance of the target storage system and configure settings that were not automatically migrated.

Performance tuning tasks can include:

- Setting the cache of the target storage system
- Tuning MP blade performance for the newly added host I/O loads
- Adding I/O paths for the host
- Configuring tier profiles for HDT volumes

Configuration setting tasks include:

- Configuring copy pairs and logical groups
- Configuring volume information, such as filter, label, and search values

Reclaiming zero pages for target volumes

You can use Hitachi Command Suite to reclaim zero pages for target volumes that were created using DP pools. You can reclaim zero pages if migration jobs are complete, but the zero page reclaim option was not specified.

Zero page reclaim looks for allocated but unused DP pool pages, and reclaims the empty pages for later allocation to DP volumes that require expansion.

8

Troubleshooting

This chapter describes how to troubleshoot the HCS nondisruptive migration workflow.

- ☐ How to use this chapter
- ☐ About tasks and action tables
- ☐ Troubleshooting the creation of a migration project
- ☐ Troubleshooting a migration job
- ☐ Backing out of a migration
- ☐ Obtaining input for Device Manager CLI commands
- ☐ Device Manager CLI examples
- ☐ Relationship between GUI and CLI output items

How to use this chapter

There are two ways to address a migration failure:

- Fix the problem that caused the migration project or migration job to fail and use the HCS nondisruptive migration workflow to resume the migration.
- Back out of the migration and return operations to the source storage system (or back out far enough to continue the migration from an earlier step).

This chapter consists of three main procedures:

- Troubleshooting the creation of a migration project on page 93
- Troubleshooting a migration job on page 94
- Backing out of a migration on page 102



Note: For a failed migration job, you should first attempt to restart the current task by using the Restart Task button. If this is unsuccessful, you can then proceed with the detailed troubleshooting procedure.

These procedures explain the operations necessary to move forward (or backward) in the migration process. Each procedure uses a series of *action tables* that explain the operations that must be performed manually (whether by using the GUI or command line) . About tasks and action tables on page 91 explains the relationship between steps, tasks, and subtasks and how to use the action tables.

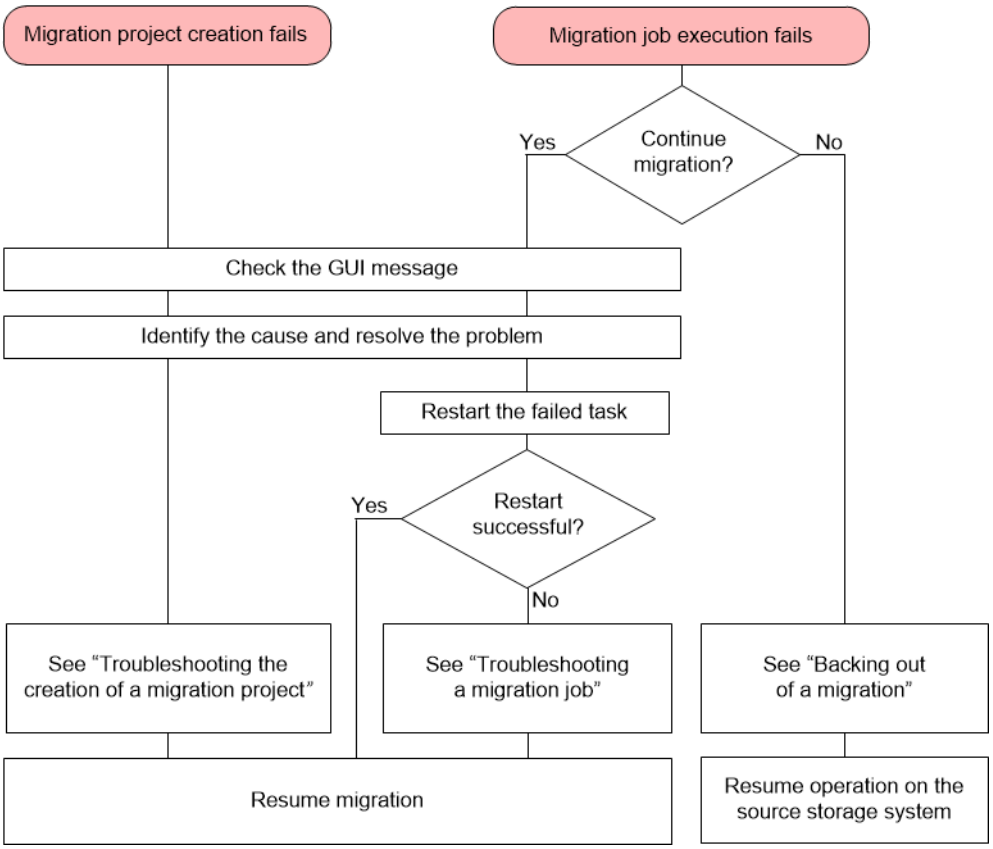


Figure 1 Master troubleshooting workflow

About tasks and action tables

Under normal circumstances, when a migration job fails, you can simply resolve the problem that caused the failure and restart the task using the Restart Task button in the **Task Detail** dialog. If the task fails to restart, you will need to intervene manually as described in Troubleshooting a migration job on page 94 so that you can continue the migration process.

For example, in following diagram, the third subtask of Step 3 has failed. After fixing the error that caused the failure, you can continue the migration either by undoing each of the subtasks and start over from Step 3, or by completing the third subtask and continuing with Step 4.

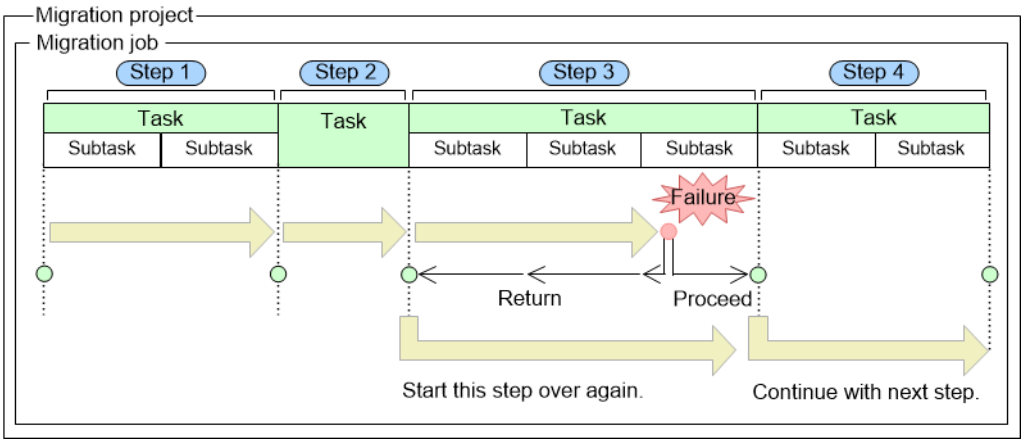


Figure 2 Example of failed migration task

Note: Depending on the nature of the task, it may not be possible to complete a failed subtask. In such as case, repeating the entire step is the only option.

To aid you in this process, this guide includes a series of *action* tables. An action table contains all the tasks and subtasks associated with a step in the migration workflow.

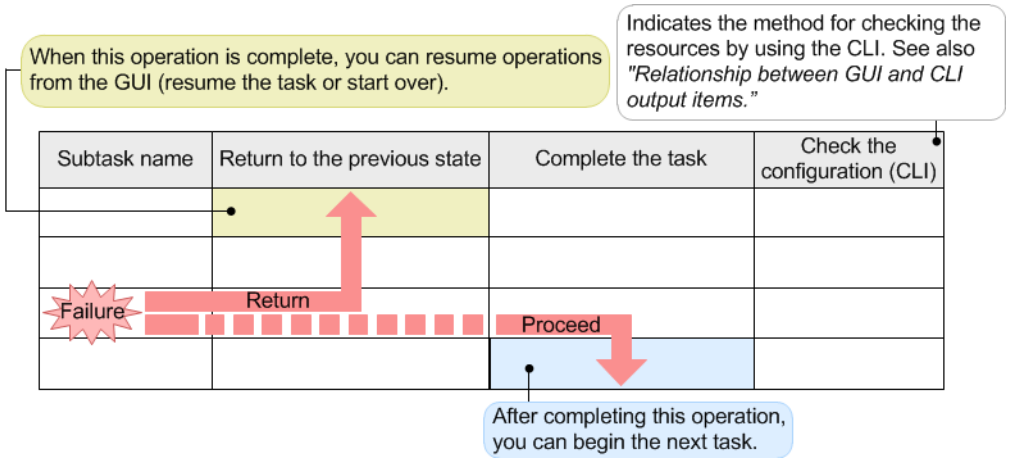


Figure 3 Using action tables

The first column contains the operations necessary to move backward (to the previous state) and the second to move forward (and complete the task). The third column consists of commands you can execute verify that the actions you have taken have been successful.

To troubleshoot a failed migration job, locate the task or subtask that failed in the table. To return to the previous state, perform the operations above the failed task by starting from the row immediately above and working upward. When completing the task, perform the operations immediately below, working downward.

The same action tables are used to a different end in Backing out of a migration on page 102, with a separate workflow that can be used to reverse the entire migration process.

Troubleshooting the creation of a migration project

This topic describes how to recover from a failed task during the creation of a migration project.

1. On the **Tasks & Alerts** tab, click the link for the failed task to display the **Task Details** window.
2. Identify the cause of the failure reported by the error message in the **Task Information** table and take the appropriate action.
3. Check the names of the failed subtasks in the **Task Status Detail** table.
4. If one or more of the failed subtasks is listed in Completing a failed migration project on page 93, you can complete the failed project by following that procedure. Otherwise, follow the steps in Re-creating the migration project on page 93.

Re-creating the migration project

Follow these steps:

1. If you are migrating a copy pair configuration and the **Save Config Files** subtask was successful, follow the instructions in Restoring the configuration definition file on page 94 before proceeding.
2. Delete the failed project as described in Deleting a migration project on page 86.
3. Create a new project as described in Creating a migration project on page 58.

Completing a failed migration project

The subtasks listed in the following table can be completed by changing the options listed in the second column.

Table 9 Subtasks for Create Migration Project

Subtask name	Option in Editing a migration project on page 80
Map resource groups	**Edit Resource Group Mapping**
Map storage ports Mappings	**Edit Port Mapping**
Specify external paths	**Edit External Path Setting**

When you are finished, you can open the revised migration project and start over.

Restoring the configuration definition file

Backup copies of your configuration definition files are stored on the pair management server so that you can use them to re-create the migration project after resolving the cause of the failure. To restore a configuration definition file, copy the backup file to the appropriate destination.

Note: Copy only the configuration definition file that is associated with the failed task. Do not delete files from the backup folders.

- To obtain the names of the pair management server and the configuration definition file, check the **Task Details** window.
- The backup folder on the pair management server is in the following location:
  For Windows:
  Device-Manager-agent-installation-folder\agent\config\migration\backup
  For UNIX:
  Device-Manager-agent-installation-directory/agent/config/migration/backup
- The destination for the copied files differs depending on the Device Manager agent settings:
  - The default location of the configuration definition files:
    For Windows: the `System` folder (indicated by the environment parameter `%windir%`)
    For UNIX: the `/etc` directory
  - If the default storage location of the configuration definition file was changed during setup, the location is stored in the `server.agent.rm.horcmSource` property of the Device Manager agent.

Troubleshooting a migration job

This topic describes the measures to take when a task fails during a migration job.

Note: After branching to an action table in step 9, be sure and return to step 10 when you are finished.

1. On the **Tasks & Alerts** tab, click the link for the failed task to display the **Task Details** window.
2. Identify the cause of the failure reported by the error message in the **Task Information** table and take the appropriate action.
3. On the **Mobility** tab, select **Target Storage Systems**.
4. Expand the tree, and then select the migration job corresponding to the failed task.

5. On the **Tasks** tab, click the link for the failed task to display the **Task Details** window.
6. Check the name of the failed subtask in the **Task Status Detail** table. (If the task does not have subtasks, the table does not appear.)
7. On the **Storage Systems** tab, select the storage system and click **Refresh Storage System**.
8. Go to the **Resources** tab and check the status of the volumes associated with the failed subtask. (For example, the task may have failed but the operation to change the volume status may have succeeded anyway.)
9. Take the action(s) described for the failed step and subtask:

   Note: The action tables include Device Manager CLI commands that are abbreviated for reference and cannot be executed as shown. Click on the **Example** links in the tables for samples of complete commands. In addition, some commands require input that must be gathered from the GUI or other sources. See Obtaining input for Device Manager CLI commands on page 108 for more information.

   - When a migration job fails at Step 1: Virtualize and Allocate Volumes on page 96
   - When a migration job fails at Step 2: Change Host I/O Paths on page 97
   - When a migration job fails at Step 3: Unallocate Source Volumes on page 98
   - When migrating a copy pair configuration fails on page 98
   - When a migration job fails at Step 4: Nondisruptive Migration on page 100
   - When a migration job fails at Step 5: Unvirtualize Source Volumes on page 101

10. Confirm the status using the commands in the "Check the configuration (CLI)" column of the action tables, or by using the GUI. (For example, when migrating a copy pair configuration, you can check the results on the **Copy Pairs** tab.)
11. Update the status of the failed task as described in Changing the status of a failed task on page 82.

    Note: For a copy pair configuration migration task, you do not need to update the task status.

12. From the **Data Migration Actions** menu, select the appropriate step to execute or repeat.

When a migration job fails at Step 1: Virtualize and Allocate Volumes

This topic describes the action to be taken when a task fails in Step 1 of a migration job.

Table 10 Actions for Virtualize and Allocate Volumes

Subtask name	Return to the previous state	Complete the task	Check the configuration (CLI)
Add LDEV ID	No action necessary.	N/A — return to previous state.	N/A
Add Host Group Number			

Set External Paths	Delete the LUN path set for volume virtualization on the source storage system using the **DeleteLun** command.
	
	Required parameter:
	
	`deletionoption=force`
	
	Example: DeleteLun (deletionoption=force) [1] on page 113
			GetStorageArray
			`subtarget=LogicalUnit`
			`lusubinfo=Path`
			
			Example: GetStorageArray (subtarget=LogicalUnit lusubinfo=Path) [1] on page 119.

Add Virtual ID	Delete the reserved virtual information on the target storage system using the **ModifyVLDEV** command.
	
	Required parameter:
	
	`vldevoperation=unmapvid`
	
	Example: ModifyVLDEV (vldevoperation=unmapvid) on page 125
			`GetStorageArray`
			`subtarget=VResourcePartitionUnit`
			`vrpusubinfo=VLDEV`
			
			Example: GetStorageArray (subtarget=VResourcePartitionUnit vrpusubinfo=VLDEV) on page 123

Virtualize Source Volumes	Delete the external volume on the target storage system using the **DeleteExternalArrayGroup** command. **Example**: DeleteExternalArrayGroup on page 112		**GetStorageArray** `subtarget=ArrayGroup` **Example**: GetStorageArray (subtarget=ArrayGroup) [1] on page 115

Allocate Target Volumes	No action necessary.	Add the host group to the target storage system port with the **AddHostStorageDomain** command.
		
		Example: AddHostStorageDomain on page 109
		
		Note: When data is being migrated from multiple storage systems
			GetStorageArray
			`subtarget=Port`
			`portsubinfo=HostStorageDomain`
			
			Example: GetStorageArray (subtarget=Port portsubinfo=HostStorageDomain) on page 122

Subtask name	Return to the previous state	Complete the task	Check the configuration (CLI)
		and the target storage port is shared, specify a value of 88 for the `hostmodeoption` parameter. (This value can be specified when the `hostmode` parameter is set to `HP`).	
		Add the WWN of the host to the host group of the target storage system port using the **`AddWWNForHostStorageDomain`** command. **Example**: AddWWNForHostStorageDomain on page 111.	To check the WWN of the host: **`GetHost`** **Example**: GetHost on page 114 To check the WWN contained in the host group: **`GetStorageArray`** `subtarget=HostStorageDomain hsdsubinfo=WWN` **Example**: GetStorageArray (subtarget=HostStorageDomain hsdsubinfo=WWN) on page 117
	Cancel the allocated target volume using the **`DeleteLun`** command. **Example**: DeleteLun on page 113	Allocate the target volume using the **`AddLun`** command. **Example**: AddLun [2] on page 111	**`GetStorageArray`** `subtarget=LogicalUnit lusubinfo=Path` **Examples**: GetStorageArray (subtarget=LogicalUnit lusubinfo=Path) [3] on page 121
Add Label of Target Volume	No action necessary.	Set the label of the target volume using the **`AddLabel`** command. **Example**: AddLabel on page 110	**`GetStorageArray`** `subtarget=LogicalUnit lusubinfo=LDEV` **Example**: GetStorageArray (subtarget=LogicalUnit lusubinfo=LDEV) on page 118

When a migration job fails at Step 2: Change Host I/O Paths

This topic describes the action to be taken when a task fails in Step 2 of a migration job.

Table 11 Actions for Change Host I/O Paths

Task name	Return to the previous state	Complete the task	Check the configuration (CLI)
Change Host I/O Paths	Check the error message in **Task Details** on the GUI, and then remove the cause of the error.		N/A

When a migration job fails at Step 3: Unallocate Source Volumes

This topic describes the action to be taken when a task fails in Step 3 of a migration job.

Table 12 Actions for Unallocate Source Volumes

Subtask name	Return to the previous state	Complete the task	Check the configuration (CLI)

Delete LUN Paths	Set the LUN path for the source storage system from the host using the **AddLun** command.
	
	Example: AddLun [1] on page 110
		Delete the LUN path from the host to the source storage system using the **DeleteLun** command.
		
		Required parameter:
		`deletionoption=force`
		
		Example: DeleteLun (deletionoption=force) [2] on page 113
			GetHost
			`hostname=host-name`
			`subtarget=LogicalUnit`
			`lusubinfo=Path`
			`pathsubinfo=HostInfo`
			
			Example: GetHost (subtarget=LogicalUnit) on page 114

Change Cache Mode	Change the cache mode on the target storage system to "cache through" using the **ModifyExternalArrayGroup** command. Required parameter: `cachemode=through` **Example**: ModifyExternalArrayGroup on page 124	Change the cache mode to "write sync" on the target storage system using the **ModifyExternalArrayGroup** command. Required parameter: `cachemode=writesync` **Example**: ModifyExternalArrayGroup on page 124	**GetStorageArray** `subtarget=ArrayGroup` **Example:** GetStorageArray (subtarget=ArrayGroup) [2] on page 116

When migrating a copy pair configuration fails

This topic describes the action to be taken when a task for migrating a copy pair configuration fails.

You can resume the migration operation in the GUI for each step by returning to the state before the step was executed, or by completing the step:

- Table 13 Actions for Prepare Target Secondary Volumes on page 99
- Table 14 Actions for Allocate Secondary Volumes on page 100
- Table 15 Actions for Migrate Config Files on page 100
- Table 16 Actions for Create ShadowImage Pairs on page 100

Note: If there is a subtask completed in a step, you cannot restart the task from the point where the step has failed. In this case, you can resume the migration in the GUI by restarting the task after returning to the state before the step was executed, or by completing the step.

Table 13 Actions for Prepare Target Secondary Volumes

Subtask name	Return to the previous state	Complete the step	Check the configuration (CLI)
Add LDEV ID Add Host Group Number	No action necessary.	N/A — return to previous state.	N/A
Add Virtual ID	Delete the virtual information reserved on the target storage system using the **ModifyVLDEV** command. Required parameter: `vldevoperation=unmapvid` **Example**: ModifyVLDEV (vldevoperation=unmapvid) on page 125		**GetStorageArray** `subtarget=VResourcePartitionUnit vrpusubinfo=VLDEV` **Example**: GetStorageArray (subtarget=VResourcePartitionUnit vrpusubinfo=VLDEV) on page 123
Create Target Secondary Volumes	Delete the volume on the target storage system. (If you are using an existing volume as the secondary volume, this is not necessary.) • For a DP volume, use the **DeleteVirtualVolume** command. **Example**: DeleteVirtualVolume on page 113 • For non-DP volumes, use the **DeleteLogicalUnit** command. **Example**: DeleteLogicalUnit on page 112		**GetStorageArray** `subtarget=LogicalUnit` **Example:** GetStorageArray (subtarget=LogicalUnit lusubinfo=Path) [4] on page 122
Update Secondary Volume Relationship Information	No action necessary.		None
Set Paths for Target Secondary Volumes	Delete the host group on the target storage system using the **DeleteHostStorageDomain** command. **Example**: DeleteHostStorageDomain on page 112		**GetStorageArray** `subtarget=HostStorageDomain` **Example**: GetStorageArray (subtarget=HostStorageDomain) on page 117

Subtask name	Return to the previous state	Complete the step	Check the configuration (CLI)
Add Label of Target Secondary Volume	No action necessary.	Set the label of the target volume using the **AddLabel** command. **Example**: AddLabel on page 110	**GetStorageArray** subtarget=LogicalUnit lusubinfo=LDEV **Example**: GetStorageArray (subtarget=LogicalUnit lusubinfo=LDEV) on page 118

Table 14 Actions for Allocate Secondary Volumes

Task name	Return to the previous state	Complete the task	Check the configuration (CLI)
Allocate Secondary Volumes Step	Troubleshoot the cause according to the error message displayed, then perform the steps for resetting the backup server WWN described in Allocating target secondary volumes on page 73.		None

Table 15 Actions for Migrate Config Files

Subtask name	Return to the previous state	Complete the task	Check the configuration (CLI)
Migrate Config Files	Check the error message, remove the cause of the failure, and then restart the task.	N/A — return to previous state.	None
Restart the Instance of CCI to be Migrated			

Table 16 Actions for Create ShadowImage Pairs

Task name	Return to the previous state	Complete the task	Check the configuration (CLI)
Create ShadowImage Pairs	Check the error message in Replication Manager, and then remove the cause of the failure.		None

When a migration job fails at Step 4: Nondisruptive Migration

This topic describes the action to be taken when a task fails in Step 4 of a migration job.

Table 17 Actions for Nondisruptive Migration

Subtask name	Return to the previous state	Complete the task	Check the configuration (CLI)
Create Volumes	Delete the volume on the target storage system. (If you are using an existing volume, this is not necessary.) • For a DP volume, use the **DeleteVirtualVolume** command. **Example**: DeleteVirtualVolume on page 113 • For non-DP volumes, use the **DeleteLogicalUnit** command. **Example**: DeleteLogicalUnit on page 112	N/A — return to previous state.	**GetStorageArray** subtarget=LogicalUnit **Example:** GetStorageArray (subtarget=LogicalUnit lusubinfo=Path) [4] on page 122
Migrate Data	No action necessary.		None
Zero Page Reclaim			

When a migration job fails at Step 5: Unvirtualize Source Volumes

This topic describes the action to be taken when a task fails in Step 5 of a migration job.

Table 18 Actions for Unvirtualize Source Volumes

Subtask name	Return to the previous state	Complete the task	Check the configuration (CLI)
Unvirtualize Source Volumes	Proceed to the state where the task is completed, because this step is to be performed after data migration is complete.	Delete the external volume on the target storage system using the **DeleteExternalArrayGroup** command. **Example**: DeleteExternalArrayGroup on page 112	**GetStorageArray** subtarget=ArrayGroup **Example**: GetStorageArray (subtarget=ArrayGroup) [1] on page 115
Unallocate External Paths		Delete the LUN path set for volume virtualization using the **DeleteLun** command. Required parameter: deletionoption=force **Example**: DeleteLun (deletionoption=force) [1] on page 113	**GetStorageArray** subtarget=LogicalUnit lusubinfo=Path **Example**: GetStorageArray (subtarget=LogicalUnit lusubinfo=Path) [2] on page 120

If you change the status of a task without addressing the underlying problem

If you accidentally change the data migration status by clicking **Waiting for Action (Manually recover)** or **Completed (Manually recover)** in the **Manually Change Task Status** dialog box, the operation cannot be resumed from the GUI. For the affected volume, follow these steps:

1. Delete the volume from the migration job as described in Canceling a volume from a migration job on page 85.
2. Follow the procedures described in Backing out of a migration on page 102.
3. Create a new job (and select the same volume) as described in Creating a migration job on page 60.
4. Start the migration over at Step 1: Virtualize and Allocate Volumes on page 66.

Migration job fails with KAIC08564-E error message

When migrating configuration definition files, select the files that define both the primary and secondary volumes. Neglecting to do this may cause the **Migrate Config Files** task to fail with the error KAIC08564-E.

If this error occurs, follow these steps:

1. Create a new migration job that includes the configuration definition files for the missing primary volumes.
2. Execute the following volume migration workflow steps:
   - Step 1: Virtualize and Allocate Volumes
   - Step 2: Change Host I/O Paths
   - Step 3: Unallocate source volumes
3. Execute the following copy pair migration workflow steps:
   - Prepare Target Secondary Volumes
   - Allocate Secondary Volumes
4. Restart the failed **Migrate Config Files** task.

Backing out of a migration

This topic describes how to back out a migration project so that you can resume from an earlier point, or restart the migration from the beginning.

Determine the last executed task (subtask)

Discover the last task (subtask) to determine where you should begin to back out of the migration.

1. On the **Mobility** tab, select **Migration Projects**.
2. Expand the tree, and then select the target migration job.
3. On the **Tasks** tab, check the name of the most recently executed task.

4. Click the link for the task to display the **Task Details** window.
5. Find the name of the most recently executed subtask in the **Task Status Detail** table.
   If the task does not have subtasks, the **Task Status Detail** table does not appear.

Check the volumes for which the operation is to be performed

Check the information about the volumes in the job.

1. From the list of volumes displayed by selecting the **Volumes** tab of the migration job, check the volumes included in the job.
2. Select the **Tasks** tab of the migration job to display the task list.
3. Click the link for the task to display the **Task Details** window.
4. Check the volumes for which the most recently executed task (subtask) has been executed and for which it has not been executed.

You can also check the volume information as follows:

1. On the **Storage Systems** tab, select the storage system and click **Refresh Storage System**.
2. Go to the **Resources** tab and check the status of the volumes associated with the failed subtask.

Note: Before backing out of a migration, do the following:

- Cancel any jobs containing volumes that have completed migration, or delete the volumes from the migration job.
- Refresh the source storage system and target storage system (in that order). On the **Storage Systems** tab, select the storage system and click **Refresh Storage System**.

Operations required for backing out

You can use the workflows in this topic to return to a previous state (a partial backout) or return to normal operations on the source storage system (a full backout). Note that these are *reverse* workflow diagrams; begin at the last step that executed and follow the direction of the arrows (upward).

The workflow tasks (subtasks) are coded as follows:

- Tasks that can be checked by using the GUI
- Tasks required to perform a partial backout (return to a previous state)

- Tasks that can be skipped if you are performing a full backout.
  Before starting the migration over, you must complete each of the skipped tasks in the order shown.

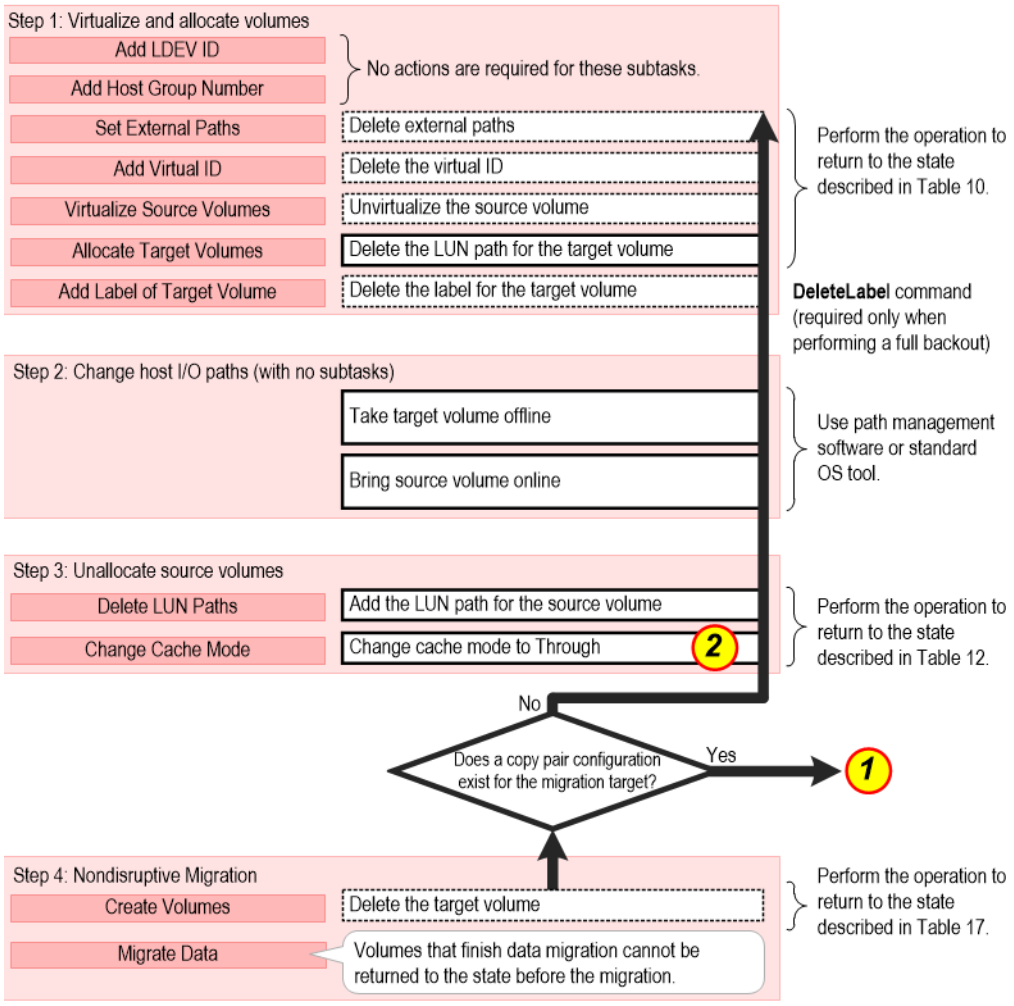


Figure 4 Workflow for backing out of a data migration

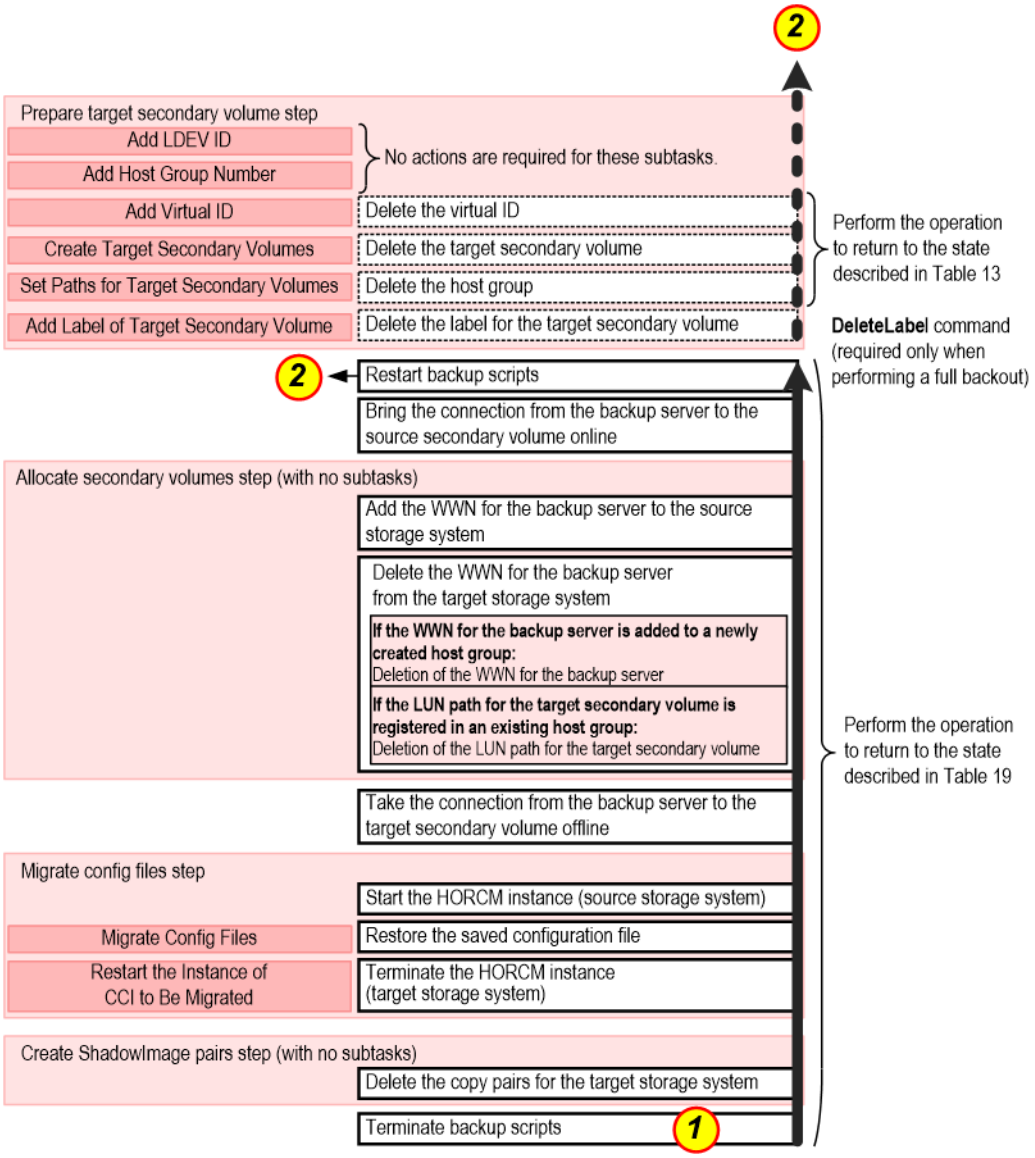


Figure 5 Workflow for backing out of a copy pair migration

Backing out while a copy pair configuration migration is in progress

If the migration of a copy pair configuration is still in progress and you need to back out of the migration, you can temporarily skip the steps that restart backup operations (from **Migrate Config Files** to **Prepare Target Secondary Volumes**):

1. Delete the copy pair for the target storage system in the **Create ShadowImage Pairs** step.
2. Go to **Change of cache mode to Through** and follow that step.
3. When all the intervening steps (including **Deletion of the LUN path for the target volume**) are finished, the backout is complete.

4. Perform any tasks you skipped (such as enabling the backup server). If you skip multiple operations, be certain to execute them in the order shown in the workflows.

Backout procedure

This procedure takes you backward through the migration procedure starting at Step 4. You should begin at the step where the migration stopped.

Step 4: Nondisruptive Migration

Return to the state before the **Create Volumes** task by deleting the target volume as described in When a migration job fails at Step 4: Nondisruptive Migration on page 100.



Note: If the **Nondisruptive Migration** step has been completed, you cannot back out of the migration (because you cannot switch back to the volumes on the source storage system).

Copy pair configuration migration task

Table 19 Actions to back out of copy pair configuration migration

Original task	Backout actions
N/A	Terminate the backup scripts.
Table 16 Actions for Create ShadowImage Pairs on page 100	Using Replication Manager, delete the copy pairs that were created on the target storage system.
Table 15 Actions for Migrate Config Files on page 100	1. Using CCI, terminate the HORCM instance related to the target storage system. 2. Copy the saved configuration definition file to the initial location. See Restoring the configuration definition file on page 94. 3. If necessary, on CCI, start the HORCM instance related to the source storage system.
N/A	Use path management software or standard OS tool to take the target secondary volume offline.
Table 14 Actions for Allocate Secondary Volumes on page 100	1. If the LUN path for the target secondary volume is registered in an existing host group, delete the LUN path using Storage Navigator. 2. If the WWN for the backup server has been added to a newly-created host group, delete the WWN for the backup server from the host group using Storage Navigator. 3. Add the WWN for the backup server to the source storage system using Storage Navigator.
N/A	1. Use path management software or standard OS tool to bring the source secondary volume online. 2. If you stopped any backup scripts, restart them now.
Table 13 Actions for Prepare Target	1. Check the configuration using the `GetStorageArray` command with these parameters:

Original task	Backout actions

Secondary Volumes on page 99	`subtarget=LogicalUnit`
	`lusubinfo=LDEV`
	
	Example: GetStorageArray (subtarget=LogicalUnit lusubinfo=LDEV) on page 118
	2. Delete the label for the target secondary volume using the **`DeleteLabel`** command.
	Example: DeleteLabel on page 112
	3. Delete the host group.
	This returns to the state before Set Paths for Target Secondary Volumes on page 99.
	4. Delete the target secondary volume.
	This returns to the state before Create Target Secondary Volumes on page 99.
	5. Delete the virtual ID.
	This returns to the state before Add Virtual ID on page 99.

Step 3: Unallocate Source Volumes

1. Change the cache mode to "cache through" (`through`).
   This corresponds to the operation to return to the state before Change Cache Mode on page 98.
2. Add the LUN path for the source volume.
   This corresponds to the operation to return to the state before Delete LUN Paths on page 98.

Step 2: Change Host I/O Paths

Using path management software or standard OS tool, follow these steps:

1. Bring the source volume online.
2. Take the target volume offline.

Step 1: Virtualize and Allocate Volumes

1. Check the configuration using the **`GetStorageArray`** command with these parameters:

   ```
   subtarget=LogicalUnit
   lusubinfo=LDEV
   ```

   Example: GetStorageArray (subtarget=LogicalUnit lusubinfo=LDEV) on page 118
2. Delete the label for the target volume using the **`DeleteLabel`** command.
   Example: DeleteLabel on page 112
3. Delete the LUN path for the target volume.
   This returns to the state before Allocate Target Volumes on page 96.
4. Unvirtualize the source volume.

This return to the states before Virtualize Source Volumes on page 96.

5. Delete the virtual ID.
   This returns to the state before Add Virtual ID on page 96.
6. Delete external paths.
   This returns to the state before Set External Paths on page 96.

Obtaining input for Device Manager CLI commands

The troubleshooting action tablesinclude Device Manager commands with parameter values that you can obtain from the following sources:

- Source storage system information (the model name and serial number)
  On the **Mobility** tab, click **Migration Projects** and expand the tree, and then select a source storage system. Obtain the necessary information from the **Migration Projects** list.
- Target storage system information (the model name and serial number)
  On the **Mobility** tab, click **Migration Projects**. Obtain the necessary information from the **Target Storage Systems** list.
- Virtual resource group ID (`vrpuid`)
  Obtain the name of the relevant resource group by using the GUI. Specify the name using the `vrpuname` parameter of the **`GetStorageArray`** command. The output includes the virtual resource group ID.
- Other information about volumes
  Check the information in **Task Details** or on the **Volumes** tab. For details about the data available from CSV files, the GUI, and the CLI, see Relationship between GUI and CLI output items on page 125.

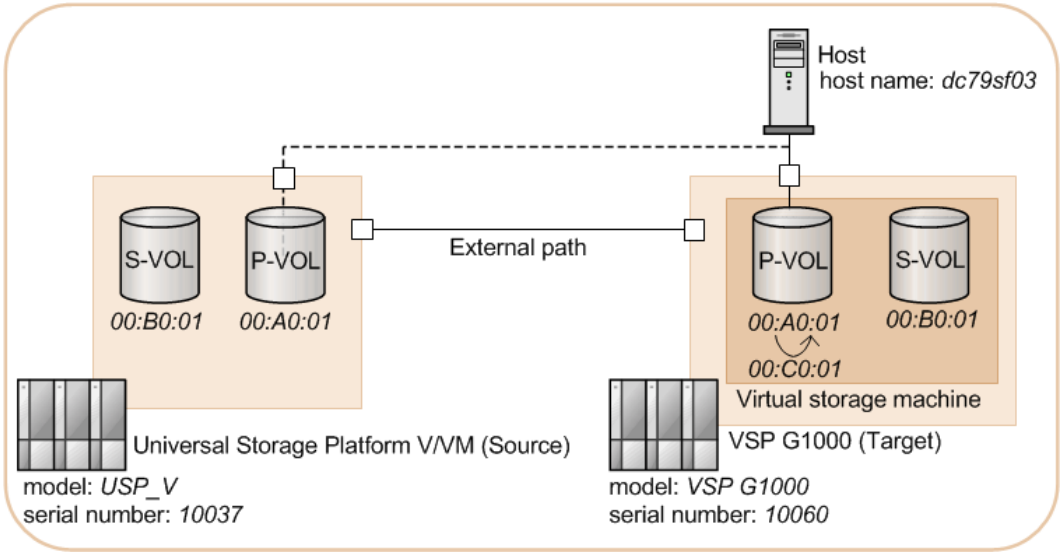
Note: For volumes that belong to a migration job, you can run Device Manager CLI commands only when the volumes have a migration status of **Failed** or **Completed**. You can check the **Volumes** tab to see whether a task succeeded or failed for each volume.

Device Manager CLI examples

This topic includes examples for the commands that appear in the troubleshooting action tables. Because the results generated by the commands are lengthy, the output is abridged. Commands that do not return information are marked **No output**.

The following figure depicts the configuration referenced by the example commands.

Tip: The examples in this topic assume a source-target combination of USP V/VM (`model=USP_V`) and VSP G1000 (`model=VSP G1000`) . You can use the `HiCommandCLI GetStorageArray` command (with no options) to obtain the `model` and `serialnum` values that are registered with the Device Manager server.



AddHostStorageDomain

```
HiCommandCLI AddHostStorageDomain -o "D:\logs
\AddHostStorageDomain.log" "model=VSP G1000" "serialnum=10060"
"portname=CL3-A" "nickname=huvm-ndm-dc79sf03"
```

Action

Adds the new host group to the port (`CL3-A`) of the target storage system (`VSP G1000`, SN: `10060`).

Note: If data is migrated from multiple storage systems, when the target storage port is shared, specify a value of `88` in the `hostmodeoption` parameter. This value can be specified when the host mode is set to `HP`.

Output

```
RESPONSE:
An instance of StorageArray
.
. (Attributes of StorageArray omitted)
.
  List of 1 HostStorageDomain elements:
    An instance of HostStorageDomain
      objectID=HSDOMAIN.R800.10060.1.4
      portID=1
      portName=CL3-A
      domainID=4
      hostMode=Standard
```

```
      displayName=CL3-A-4
      domainType=0
      nickname=huvm-ndm-dc79sf03
      resourcePartitionUnitID=1
      aluaPathPriority=Optimized
```

AddLabel

```
HiCommandCLI AddLabel -o "D:\logs\AddLabel.log" "model=VSP G1000"
"serialnum=10060" "devnums=00:A0:01" "label=myLabel"
```

Action

Adds the label to the target volume (`00:A0:01`, or `00:B0:01` for the S-VOL) on the target storage system (`VSP G1000`, SN: `10060`).

Output

```
RESPONSE:
An instance of ObjectLabel
  targetID=LDEV.R800.10060.40961
  label=myLabel
```

AddLun [1]

```
HiCommandCLI AddLun -o "D:\logs\AddLun.log" "model=USP_V"
"serialnum=10037" "portname=CL2-A" "domainnickname=huvm-ndm-
dc79sf03" "lun=263" "devnum=00:A0:01"
```

Action

Adds the LUN path between the volume (`00:A0:01`) and the host group (`portname=CL2-A`, `domainnickname=huvm-ndm-dc79sf03`) on the source storage system (`USP_V`, SN: `10037`). Check the target host group in the **Task Status Detail** window (**Information About Source Storage System LUN Paths To Be Deleted**).

Output

```
RESPONSE:
An instance of StorageArray
.
. (Attributes of StorageArray omitted)
.
  List of 1 Path elements:
    An instance of Path
      objectID=PATH.R600.10037.128.14.40961
      devNum=40,961
      displayDevNum=00:A0:01
      portID=128
      portName=CL2-A
      domainID=14
      scsiID=15
      LUN=263
      wwnSecurityValidity=true
```

AddLun [2]

```
HiCommandCLI AddLun -o "D:\logs\AddLun.log" "model=VSP G1000"
"serialnum=10060" "portname=CL3-A" "domainnickname=huvm-ndm-
dc79sf03" "lun=263" "devnum=00:A0:01"
```

Action

Adds the LUN path between the volume (`00:A0:01`) and the host group (`portname=CL3-A`, `domainnickname=huvm-ndm-dc79sf03`) on the target storage system (`VSP G1000`, SN: `10060`).

Output

```
RESPONSE:
An instance of StorageArray
.
. (Attributes of StorageArray omitted)
.
  List of 1 Path elements:
    An instance of Path
      objectID=PATH.R800.10060.1.4.40961
      name=hitachi
      devNum=40961
      displayDevNum=00:A0:01
      portID=1
      portName=CL3-A
      domainID=4
      scsiID=15
      LUN=263
      wwnSecurityValidity=true
```

AddWWNForHostStorageDomain

```
HiCommandCLI AddWWNForHostStorageDomain -o "D:\logs
\AddWWNForHostStorageDomain1.log" "serialnum=10060" "model=VSP
G1000" "portname=CL3-A" "domainnickname=huvm-ndm-dc79sf03"
"wwn=10.00.00.05.1E.8E.CA.42"
```

Action

Adds the WWN of the host to the added host group (`portname=CL3-A`, `domainnickname=huvm-ndm-dc79sf03`).

Output

```
RESPONSE:
An instance of StorageArray
.
. (Attributes of StorageArray omitted)
.
  List of 1 HostStorageDomain elements:
    An instance of HostStorageDomain
      objectID=HSDOMAIN.R800.10060.1.4
      portID=1
      portName=CL3-A
      domainID=4
```

```
hostMode=Standard
displayName=CL3-A-4
domainType=0
nickname=huvm-ndm-dc79sf03
resourcePartitionUnitID=1
aluaPathPriority=Optimized
List of 1 WWN elements:
  An instance of WWN
    WWN=10.00.00.05.1E.8E.CA.42
    nickname=
```

DeleteExternalArrayGroup

```
HiCommandCLI DeleteExternalArrayGroup -o "D:\logs
\DeleteExternalArrayGroup.log" "model=VSP G1000"
"serialnum=10060" "arraygroupnames=E20-2"
```

Action

Deletes the external parity group (`E20-2`) from the target storage system (`VSP G1000`, SN: `10060`).

No output

DeleteHostStorageDomain

```
HiCommandCLI DeleteHostStorageDomain -o "D:\logs
\DeleteHostStorageDomain.log" "model=VSP G1000" "serialnum=10060"
"portname=CL3-C" "domainnickname=HCMD1115"
```

Action

Deletes the host group (`portname=CL3-C`, `domainnickname=HCMD1115`).

No output

DeleteLabel

```
HiCommandCLI DeleteLabel -o "D:\logs\DeleteLabel.log" "model=VSP
G1000" "serialnum=10060" "devnums=00:A0:01"
```

Action

Deletes the label of the target volume (`00:A0:01`, or `00:B0:01` for the S-VOL) on the target storage system (`VSP G1000`, SN: `10060`).

No output

DeleteLogicalUnit

```
HiCommandCLI DeleteLogicalUnit -o "D:\logs\DeleteLogicalUnit.log"
"model=VSP G1000" "serialnum=10060" "devnum=00:C0:01"
```

Action

Deletes the normal volume (`00:C0:01`, or `00:B0:01` for the S-VOL) on the target storage system (`VSP G1000`, SN: `10060`).

No output

DeleteLun

```
HiCommandCLI DeleteLun -o "D:\logs\DeleteLun.log" "model=VSP
G1000" "serialnum=10060" "portname=CL3-A" "domain=4"
"devnum=00:A0:01"
```

Action

Deletes the LUN path to the volume (`00:A0:01`) and the host group (`portname=CL3-A, domain=4`).

No output

DeleteLun (deletionoption=force) [1]

```
HiCommandCLI DeleteLun -o "D:\logs\DeleteLun.log"
"serialnum=10037" "model=USP_V" "portname=CL3-A" "domain=17"
"devnum=00:A0:01" "deletionoption=force"
```

Action

Deletes the LUN path between the host group (`portname=CL3-A`, `domain=17`) of the external path and the source volume (`00:A0:01`).

No output

DeleteLun (deletionoption=force) [2]

```
HiCommandCLI DeleteLun -o "D:\logs\DeleteLun.log" "model=USP_V"
"serialnum=10037" "port=128" "domain=14" "devnum=00:A0:01"
"deletionoption=force"
```

Action

Deletes the LUN path between the source volume (`00:A0:01`) and the host group (`port=128, domain=14`).

No output

DeleteVirtualVolume

```
HiCommandCLI DeleteVirtualVolume -o "D:\logs
\DeleteVirtualVolume.log" "model=VSP G1000" "serialnum=10060"
"devnums=00:C0:01"
```

Action

Deletes the DP volume (00:C0:01, or 00:B0:01 for the S-VOL) on the target storage system (VSP G1000, SN: 10060).

No output

GetHost

```
HiCommandCLI GetHost -o "D:\logs\GetHost.log" "hostname=dc79sf03"
```

Action

Displays the information about the host (dc79sf03).

In the execution results, information about the resource is displayed in hierarchical structure for the Host and WWN instances.

Checks the WWN of the host.

Output

```
RESPONSE:
An instance of Host
  objectID=HOST.14
  name=dc79sf03
.
. (Omitted)
.
  List of 2 WWN elements:
    An instance of WWN
      WWN=10.00.00.05.1E.8E.CA.43
    An instance of WWN
      WWN=10.00.00.05.1E.8E.CA.42
```

GetHost (subtarget=LogicalUnit)

```
HiCommandCLI GetHost -o "D:\logs\GetHost_LogicalUnit.log"
"hostname=dc79sf03" "model=USP_V" "serialnum=10037"
"subtarget=LogicalUnit" "lusubinfo=Path" "pathsubinfo=HostInfo"
```

Action

Displays information about the paths set from the host (dc79sf03) to a volume on the source storage system (USP_V, SN: 10037).

In the execution results, information about the resource is displayed in hierarchical structure for the Host, LogicalUnit, and Path instances.

Checks the Path instance to verify information about the paths set to the source volume.

For example, if you want to delete a volume path, check the information required to identify the path. Also check the domain ID of the host storage domain.

If no path is defined for a volume, information about the volume (information under the `LogicalUnit` instance) is not displayed.

Output

```
RESPONSE:
An instance of Host
.
. (Attributes of Host omitted)
.
  List of 166 Lu elements:
.
. (Omitted)
.
    An instance of LogicalUnit
      objectID=LU.R600.10037.40961
      devNum=40,961
      displayName=00:A0:01
.
. (Omitted)
.
      List of 2 Path elements:
        An instance of Path
          objectID=PATH.R600.10037.128.14.40961
          devNum=40,961
          portID=128
          domainID=14
          scsiID=15
          LUN=263
          wwnSecurityValidity=true
        An instance of Path
          objectID=PATH.R600.10037.1.17.40961
          devNum=40,961
          portID=1
          domainID=17
          scsiID=15
          LUN=72
          wwnSecurityValidity=true
```

GetStorageArray (subtarget=ArrayGroup) [1]

```
HiCommandCLI GetStorageArray -o "D:\logs
\GetStorageArray_ArrayGroup.log" "model=VSP G1000"
"serialnum=10060" "subtarget=ArrayGroup" "arraygroupname=E20-2"
```

Action

Checks the parity group (`E20-2`) on the target storage system (`VSP G1000`, SN: `10060`).

In the execution results, information about the resource is displayed in hierarchical structure for the `StorageArray` and `ArrayGroup` instances.

Ensures that the parity group exists by referring to the information about the `ArrayGroup` instance.

Output

```
RESPONSE:
An instance of StorageArray
.
. (Attributes of StorageArray omitted)
.
  List of 1 ArrayGroup elements:
    An instance of ArrayGroup
      objectID=ARRAYGROUP.R800.10060.120.1
      chassis=120
      number=1
      displayName=E20-2
.
. (Omitted)
.
```

GetStorageArray (subtarget=ArrayGroup) [2]

```
HiCommandCLI GetStorageArray -o "D:\logs
\GetStorageArray_ArrayGroup.log" "subtarget=ArrayGroup"
"model=VSP G1000" "serialnum=10060" "arraygroupname=E20-2"
```

Action

Displays the parity group (`E20-2`) on the target storage system (`VSP G1000`, SN: `10060`).

In the execution results, information about the resource is displayed in hierarchical structure for the `StorageArray` and `ArrayGroup` instances.

Checks the value of the `volumeType` attribute under the `ArrayGroup` instance to verify the cache mode. If the cache mode is Write Sync (write synchronously), `24` is displayed. If it is Through, `40` is displayed.

Output

```
RESPONSE:
An instance of StorageArray
objectID=ARRAY.R800.10060
.
. (Attributes of StorageArray are omitted here)
.
  List of 1 ArrayGroup elements:
    An instance of ArrayGroup
      objectID=ARRAYGROUP.R800.10060.120.1
      chassis=120
      number=1
      displayName=E20-2
.
. (Omitted)
.
      volumeType=nn
.
. (Omitted)
.
```

GetStorageArray (subtarget=HostStorageDomain)

```
HiCommandCLI GetStorageArray -o "D:\logs
\GetStorageArray_HostStorageDomain.log"
"subtarget=HostStorageDomain" "model=VSP G1000" "serialnum=10060"
```

Action

Displays the list of host groups on the target storage system (`VSP G1000`, SN: `10060`).

In the execution results, information about the resource is displayed in hierarchical structure for the `StorageArray` and `HostStorageDomain` instances.

Checks the information about the host group by referring to the `HostStorageDomain` instance.

Output

```
RESPONSE:
An instance of StorageArray
.
. (Attributes of StorageArray omitted)
.
  List of 144 HostStorageDomain elements:
.
. (Omitted)
.
    An instance of HostStorageDomain
      objectID=HSDOMAIN.R800.10060.17.21
      portID=17
      portName=CL3-C
      domainID=21
      hostMode=Standard
      displayName=CL3-C-21
      domainType=0
      nickname=HCMD1115
      resourcePartitionUnitID=1
      aluaPathPriority=Optimized
```

GetStorageArray (subtarget=HostStorageDomain hsdsubinfo=WWN)

```
HiCommandCLI GetStorageArray -o "D:\logs
\GetStorageArray_HostStorageDomain.log"
"subtarget=HostStorageDomain" "model=VSP G1000" "serialnum=10060"
"portname=CL3-A" "domainnickname=huvm-ndm-dc79sf03"
"hsdsubinfo=wwn"
```

Action

Displays the WWN information of the host group (`portname=CL3-A`, `domainnickname=huvm-ndm-dc79sf03`) on the target storage system (`VSP G1000`, SN: `10060`).

In the execution results, information about the resource is displayed in hierarchical structure for the StorageArray, HostStorageDomain, and WWN instances.

Checks both the HostStorageDomain instance and the WWN instance under the HostStorageDomain instance.

If a WWN is not associated with the host group, WWN instances will not be displayed.

Output

```
RESPONSE:
An instance of StorageArray
.
. (Attributes of StorageArray omitted)
.
  List of 1 HostStorageDomain elements:
    An instance of HostStorageDomain
      objectID=HSDOMAIN.R800.10060.1.4
      portID=1
      portName=CL3-A
      domainID=4
      hostMode=Standard
      displayName=CL3-A-4
      domainType=0
      nickname=huvm-ndm-dc79sf03
      resourcePartitionUnitID=1
      aluaPathPriority=Optimized
```

GetStorageArray (subtarget=LogicalUnit lusubinfo=LDEV)

```
HiCommandCLI GetStorageArray -o "D:\logs
\GetStorageArray_LogicalUnit.log" "subtarget=LogicalUnit"
"model=VSP G1000" "serialnum=10060" "lusubinfo=LDEV"
"displayname=00:A0:01"
```

Action

Displays the information about the target volume (00:A0:01, or 00:B0:01 for the S-VOL) on the target storage system (VSP G1000, SN: 10060).

In the execution results, information about the resource is displayed in hierarchical structure for the StorageArray, LogicalUnit, LDEV and ObjectLabel instances.

Checks both the LDEV instance and the ObjectLabel instance under the LDEV instance.

If a label is not set for the volume, the ObjectLabel instance will not be displayed.

Output

```
RESPONSE:
An instance of StorageArray
```

```
.
. (Attributes of StorageArray omitted)
.
  List of 1 Lu elements:
    An instance of LogicalUnit
.
. (Attributes of LogicalUnit omitted)
.
      List of 1 Ldev elements:
        An instance of LDEV
          objectID=LDEV.R800.10060.40961
          devNum=40,961
          displayName=00:A0:01
.
. (Omitted)
.
          List of 1 ObjectLabel elements:
            An instance of ObjectLabel
              targetID=LDEV.R800.10060.40961
              label=myLabel
```

GetStorageArray (subtarget=LogicalUnit lusubinfo=Path) [1]

```
HiCommandCLI GetStorageArray -o "D:\logs
\GetStorageArray_LogicalUnit.log" "subtarget=LogicalUnit"
"model=USP_V" "serialnum=10037" "lusubinfo=Path"
"displayname=00:A0:01"
```

Action

Displays the path information of the volume (`00:A0:01`) in the source storage system (`USP_V`, SN: `10037`).

In the execution results, information about the resources are displayed in hierarchical structure for the `StorageArray`, `LogicalUnit`, and `Path` instances.

Checks the `Path` instance to verify the path information set for each volume.

At the **Set External Paths** stage, there are two paths: host and external. Check the external path in the **Task Status Detail** window (**External Path Information - Source Storage Port**). After deleting the LUN path, make sure that the deleted path is no longer displayed.

Output

```
RESPONSE:
An instance of StorageArray
.
. (Attributes of StorageArray omitted)
.
  List of 1 Lu elements:
    An instance of LogicalUnit
      objectID=LU.R600.10037.40961
      devNum=40,961
      displayName=00:A0:01
```

```
.
. (Omitted)
.
      List of 2 Path elements:
        An instance of Path
          objectID=PATH.R600.10037.1.17.40961
          devNum=40,961
          displayDevNum=00:A0:01
          portID=1
          portName=CL3-A
          domainID=17
          scsiID=15
          LUN=72
          wwnSecurityValidity=true
        An instance of Path
          objectID=PATH.R600.10037.128.14.40961
          devNum=40,961
          displayDevNum=00:A0:01
          portID=128
          portName=CL2-A
          domainID=14
          scsiID=15
          LUN=263
          wwnSecurityValidity=true
```

GetStorageArray (subtarget=LogicalUnit lusubinfo=Path) [2]

```
HiCommandCLI GetStorageArray -o "D:\logs
\GetStorageArray_LogicalUnit.log" "subtarget=LogicalUnit"
"model=USP_V" "serialnum=10037" "lusubinfo=Path"
"displayname=00:A0:01"
```

Action

Displays the path information of the source volume (`00:A0:01`) on the source storage system (`USP_V`, SN: `10037`).

In the execution results, information about the resources are displayed in hierarchical structure for the `StorageArray`, `LogicalUnit`, and `Path` instances.

Checks the `Path` instance to verify the path information set for each volume.

Output

```
RESPONSE:
An instance of StorageArray
.
. (Attributes of StorageArray omitted)
.
List of 1 Lu elements:
An instance of LogicalUnit
objectID=LU.R600.10037.40961
devNum=40,961
displayName=00:A0:01
.
. (Omitted)
```

```
.
An instance of Path
objectID=PATH.R600.10037.1.17.40961
devNum=40,961
displayDevNum=00:A0:01
portID=1
portName=CL3-A
domainID=17
scsiID=15
LUN=72
wwnSecurityValidity=true
```

GetStorageArray (subtarget=LogicalUnit lusubinfo=Path) [3]

```
HiCommandCLI GetStorageArray -o "D:\logs
\GetStorageArray_LogicalUnit.log" "subtarget=LogicalUnit"
"model=VSP G1000" "serialnum=10060" "lusubinfo=Path"
"displayname=00:A0:01"
```

Action

Displays the path information of the target volume (`00:A0:01`) on the target storage system (`VSP G1000`, SN: `10060`).

In the execution results, information about the resources are displayed in hierarchical structure for the `StorageArray`, `LogicalUnit`, and `Path` instances.

Checks the `Path` instance to verify the path information set for each volume.

For example, if you want to delete a volume path, check the information required to identify the path. If no path is defined for the volume, the Path instance is not displayed.

Output

```
RESPONSE:
An instance of StorageArray
.
. (Attributes of StorageArray omitted)
.
  List of 1 Lu elements:
    An instance of LogicalUnit
      objectID=LU.R800.10060.40961
      devNum=40,961
      displayName=00:A0:01
.
. (Omitted)
.
      List of 1 Path elements:
        An instance of Path
          objectID=PATH.R800.10060.1.4.40961
          devNum=40,961
          displayDevNum=00:A0:01
          portID=1
          portName=CL3-A
```

```
          domainID=4
          scsiID=15
          LUN=263
          wwnSecurityValidity=true
```

GetStorageArray (subtarget=LogicalUnit lusubinfo=Path) [4]

```
HiCommandCLI GetStorageArray -o "D:\logs
\GetStorageArray_LogicalUnit.log" "subtarget=LogicalUnit"
"model=VSP G1000" "serialnum=10060" "lusubinfo=Path"
"displayname=00:C0:01"
```

Action

Displays the information about the logical unit (`00:C0:01`, or `00:B0:01` for the S-VOL) on the target storage system (`VSP G1000`, SN: `10060`).

In the execution results, information about the resources are displayed in hierarchical structure for the `StorageArray` and `LogicalUnit` instances.

Checks the `LogicalUnit` instance to verify the volume information.

Output

```
RESPONSE:
An instance of StorageArray
.
. (Attributes of StorageArray omitted)
.
  List of 1 Lu elements:
    An instance of LogicalUnit
      objectID=LU.R800.10060.49153
      devNum=49,153
      displayName=00:C0:01
.
. (Omitted)
.
```

GetStorageArray (subtarget=Port portsubinfo=HostStorageDomain)

```
HiCommandCLI GetStorageArray -o "D:\logs
\GetStorageArray_Port.log" "subtarget=Port" "model=VSP G1000"
"serialnum=10060" "portname=CL3-A"
"portsubinfo=HostStorageDomain"
```

Action

Displays the list of host groups of the target port (`CL3-A`) on the target storage system (`VSP G1000`, SN: `10060`).

In the execution results, information about the resources are displayed in hierarchical structure for the `StorageArray`, `Port` and `HostStorageDomain` instances.

Checks the information about both the `Port` instance and `HostStorageDomain` instance under the `Port` instance.

Output

```
RESPONSE:
An instance of StorageArray
.
. (Attributes of StorageArray omitted)
.
  List of 1 Port elements:
    An instance of Port
      objectID=PORT.R800.10060.1
      portID=1
.
. (Omitted)
.
      displayName=CL3-A
.
. (Omitted)
.
      List of 13 HostStorageDomain elements:
.
. (Omitted)
.
```

GetStorageArray (subtarget=VResourcePartitionUnit vrpusubinfo=VLDEV)

```
HiCommandCLI GetStorageArray -o "D:\logs
\GetStorageArray_VResourcePartitionUnit.log"
"subtarget=VResourcePartitionUnit" "vrpusubinfo=VLDEV"
"vmodel=USP_V" "vserialnum=10037" "vdevnum=00:A0:01"
```

Action

Displays the `VResourcePartitionUnit` and VLDEV (`00:A0:01`, or `00:B0:01` for the S-VOL) of the virtual storage machine (`vmodel=USP_V`, `vserialnum=10037`) on the target storage system (`VSP G1000`, SN: `10060`).

In the execution results, information about the resources are displayed in hierarchical structure for the `StorageArray`, `VResourcePartitionUnit` and `VLDEV` instances.

Ensures that the virtual information is set to the volume by referring to the `VLDEV` instance.

Output

```
RESPONSE:
An instance of StorageArray
.
. (Attributes of StoageArray are omitted here)
.
  List of 6 VResourcePartitionUnit elements:
    An instance of VResourcePartitionUnit
.
```

```
. (Attributes of VResourcePartitionUnit are omitted here)
.
      List of 1 VLDEV elements:
        An instance of VLDEV
          objectID=VLDEV.R800.10060.1.40961
          resourcePartitionUnitID=1
          devNum=40,961
          vArrayType=R600
          vArrayFamily=R600
          vSerialNumber=10037
          vDevNum=40,962
          vEmulation=OPEN-V
          vSSID=31
          vLUSE=0
          vCVS=1
          operationMode=0
          hasSubstance=0
```

ModifyExternalArrayGroup

```
HiCommandCLI ModifyExternalArrayGroup -o "D:\logs
\ModifyExternalArrayGroup.log" "model=VSP G1000"
"serialnum=10060" "arraygroupname=E20-2" "cachemode=xxx"
```

Action

Changes the cache mode of the parity group (`E20-2`) on the target storage system (`VSP G1000`, SN: `10060`). Specify `writesync` or `through` for the `cachemode` parameter.

In the execution results, for the `volumeType` attribute of the `ArrayGroup` instance, if the cache mode is Write Sync (write synchronously), `24` is displayed. If it is Through, `40` is displayed.

Output

```
RESPONSE:
An instance of StorageArray
.
. (Attributes of StorageArray omitted)
.
  List of 1 ArrayGroup elements:
    An instance of ArrayGroup
.
. (Omitted)
.
      displayName=E20-2
.
. (Omitted)
.
      volumeType=nn
.
. (Omitted)
.
```

ModifyVLDEV (vldevoperation=unmapvid)

```
HiCommandCLI ModifyVLDEV -o "D:\logs\ModifyVLDEV.log"
"vldevoperation=unmapvid" "model=VSP G1000" "serialnum=10060"
"vrpuid=1" "devnum=00:A0:01"
```

Action

Deletes the virtual information of the target volume (`00:A0:01`, or `00:B0:01` for the S-VOL) in the `VResourcePartitionUnit` (`id=1`) on the target storage system (`VSP G1000`, SN: `10060`).

Output

```
RESPONSE:
An instance of StorageArray
.
. (Attributes of StorageArray omitted)
.
  List of 1 VResourcePartitionUnit elements:
    An instance of VResourcePartitionUnit
.
. (Attributes of VResourcePartitionUnit omitted)
.
      List of 1 VLDEV elements:
        An instance of VLDEV
          objectID=VLDEV.R800.10060.1.40961
          resourcePartitionUnitID=1
          devNum=40,961
          vArrayType=R600
          vArrayFamily=R600
          vSerialNumber=10037
          vDevNum=-1
          vEmulation=
          vSSID=-1
          vLUSE=-1
          vCVS=-1
          operationMode=0
          hasSubstance=0
```

Relationship between GUI and CLI output items

The following table shows the correspondence of items displayed on the **Volumes** tab, in CSV outputs, and in CLI attributes. Use this table to obtain the necessary information for command line attributes. For details about the CLI output items, see the *Hitachi Command Suite CLI Reference Guide*.

GUI display item	CSV output item	CLI attribute instance(attribute)
Source		
Volume	`Volume`	`LogicalUnit(devNum)`
Label	`Label`	`ObjectLabel(label)`

GUI display item	CSV output item	CLI attribute instance(attribute)
Capacity	Capacity	LogicalUnit(capacityInKB)
Block size	Block Size	LogicalUnit(numberOfLBAs)
Host	Host	Host(name)
Port	Port	Port(displayName)
Parity Group	Parity Group	ArrayGroup(displayName)
Pool	Pool	Pool(poolID)
Pool Name	Pool Name	Pool(name)
Resource Group	Resource Group	VResourcePartitionUnit(name)
Target		
Volume	Volume	LogicalUnit(V)
Label	Label	ObjectLabel(V)
Host	Host	Host(name)
Port	Port	Port(displayName)
Resource Group	Resource Group	VResourcePartitionUnit(name)
Virtual Storage Machine	Virtual Storage Machine	VStorageArray(name)
Virtual Model	Virtual Model	VStorageArray(vArrayType)
Virtual Serial No.	Virtual Serial No.	VStorageArray(vSerialNumber)
Virtual LDEV ID	Virtual LDEV ID	VLDEV(vDevNum)
Migration Target Volume		
Volume	Volume	LogicalUnit(devNum)
Label	Label	ObjectLabel(label)
Data Migration Status		
Step 1	Step 1	N/A
Step 2	Step 2	N/A
Step 3	Step 3	N/A
Step 4	Step 4	N/A
Step 5	Step 5	N/A



Note: Capacity values might be reported in different units depending on the source.

Glossary

A

alternate path

A secondary path (for example, port, target ID, or LUN) to a logical volume, in addition to the primary path, that is used as a backup in case the primary path fails.

C

cache logical partition (CLPR)

Virtual cache memory that is set up to be allocated to hosts that are in contention for cache memory. CLPRs can be used to segment storage system cache that is assigned to parity groups.

CLPR

See cache logical partition.

command device

A dedicated logical volume used to interface with the storage system. Can be shared by several hosts.

configuration definition file

A text file that defines the configuration, parameters, and options of Command Control Interface (CCI) operations. It also defines the connected hosts and the volumes and groups known to the CCI instance.

CSV

comma-separated values

D

DP

Hitachi Dynamic Provisioning. See *Dynamic Provisioning*.

DP-VOL

Dynamic Provisioning virtual volume. A virtual volume that has no memory space that is used by Dynamic Provisioning.

dynamic provisioning (DP)

Presents a virtual pool of shared capacity that is larger than the actual amount of physical storage available. Storage capacity can be allocated to an application without it actually being physically mapped until it is needed, so storage allocations can exceed the amount of storage that is physically installed.

For example, system administrators can deliver capacity on demand by provisioning storage from a virtual pool. This not only reduces administration costs by cutting the time to provision new storage, but also improves application availability by reducing the downtime needed for storage provisioning.

E

external path

A path from a storage port of a storage system to a volume on a connected external storage system.

external volume

A logical volume whose data resides on drives that are physically located in an externally connected storage system.

F

FCoE

Fibre Channel over Ethernet. An encapsulation of Fibre Channel frames over Ethernet networks. This allows Fibre Channel to use 10-gigabit Ethernet networks (or higher speeds) while preserving the Fibre Channel protocol.

H

HBA

See host bus adapter.

HDT

See Hitachi Dynamic Tiering.

Hitachi Dynamic Provisioning (HDP)

Functionality that allocates virtual volumes to a host and uses the physical capacity that is necessary according to the data write request.

Hitachi Dynamic Tiering (HDT)

Functionality that is used with Hitachi Dynamic Provisioning that places data in a hardware tier according to the I/O load. For example, a data area that has a high I/O load is placed in a high-speed hardware tier, and a data area that has a low I/O load is placed in a low-speed hardware tier.

host bus adapter (HBA)

One or more dedicated adapter cards that are installed in a host, have unique WWN addresses, and provide Fibre Channel I/O connectivity to storage systems, typically through Fibre Channel switches. Unlike general-purpose Ethernet adapters, which handle a multitude of network protocols, host bus adapters are dedicated to high-speed block transfers for optimized I/O performance.

host group

Custom grouping of hosts that segregates hosts in a meaningful way, for example, a group of hosts that is segregated by operating system. A host group can be shared with another virtual port or another physical port for alternate path support.

I

internal volume

A logical volume whose data resides on drives that are physically located within the storage system.

L

LDEV

See logical device.

logical device (LDEV)

An individual logical device (on multiple drives in a RAID configuration) in the storage system. An LDEV might or might not contain any data and might or miight not be defined to any hosts. Each LDEV has a unique identifier, or address, within the storage system. The identifier is composed of the logical disk controller (LDKC) number, control unit (CU) number, and LDEV number. The LDEV IDs within a storage system do not change.

An LDEV formatted for use by mainframe hosts is called a logical volume image (LVI). An LDEV formatted for use by open-system hosts is called a logical unit (LU).

logical unit (LU)

A volume, or LDEV, created in an open storage system, or configured for use by an open-systems host, for example, OPEN-V.

logical unit number (LUN)

A unique management number that identifies a logical unit (LU) in a storage system. A logical unit can be an end user, a file, a disk drive, a port, a host group that is assigned to a port, an application, or virtual partitions (or volumes) of a RAID set.

Logical unit numbers (LUNs) are used in SCSI protocols to differentiate disk drives in a common SCSI target device, such as a storage system. An open-systems host uses a LUN to access a particular LU.

LU

See logical unit.

LUN

See logical unit number.

M

management client

A computer used to operate a graphical user interface client or a command-line interface client.

O

OPEN-V

A logical unit (LU) of user-defined size for use by open-systems hosts.

P

pair status

Indicates the condition of a copy pair. A pair must have a specific status for specific operations. When a pair operation completes, the status of the pair changes to a different status determined by the type of operation.

parity group

See *RAID group*.

pool volume (pool-VOL)

A logical volume that is reserved for storing Copy-on-Write Snapshot data or Dynamic Provisioning write data.

primary volume (P-VOL)

In a volume pair, the source volume that is copied to another volume using the volume replication functionality of a storage system. The data on the P-VOL is duplicated synchronously or asynchronously on the secondary volume (S-VOL).

properties file

A file that defines aspects of the operating environment. The operating environment can be modified by changing the appropriate properties file.

PVOL (primary volume)

The source volume that is copied to another volume using the volume replication functionality of a storage system.

R

resource group

A collection of resources that are grouped by one or more system resource types.

S

S-VOL

See secondary volume.

secondary volume (S-VOL)

After a backup, the volume in a copy pair that is the copy of the original data on the primary volume (P-VOL). Recurring differential data updates keep the data in the S-VOL consistent with the data in the P-VOL.

shredding

Erasing the data on a volume by overwriting it with dummy data multiple times so that the original data cannot be restored.

T

tier

A user-friendly descriptor that summarizes the type of storage hardware on which a logical volume resides. Typical storage hardware characteristics that are referred to by a tier are: disk speed, disk capacity, disk type (for example, FC, SCSI), RAID level, storage system model, virtualization level (for example, internal vs. external), and pool type (if relevant). All volumes that share the characteristics summarized by the tier are annotated with that tier's name.

tiered storage

A layered structure of performance levels, or tiers, that matches data access requirements with the appropriate performance tiers.

U

unallocated volume

A volume (LDEV) for which no host paths are assigned.

user group

A collection of users who have access to the same resources and have the same permissions for those resources. Permissions for users are determined by the user groups to which they belong. Users and resource groups can be assigned to multiple user groups.

V

V-VOL

See *virtual volume*.

virtual storage machine

A virtual storage system that you create on a VSP G series or VSP F series storage system that allows multiple resource groups to be treated as a single device.

VSP

Hitachi Virtual Storage Platform

W

web client

An application that is used on a client machine to access a server on which management software is installed. A web client contains two parts: dynamic web pages and the web browser.

WWN

World wide name. A unique identifier for an open systems host. It is typically a node name that is a 64-bit address assigned to HBAs (host bus adapters) or storage system ports that define the endpoints of a Fibre Channel connection between storage and hosts for purposes of volume input/output.

WWN is essential for defining the SANtinel™ parameters because it determines whether the open systems host is to be allowed or denied access to a specified logical unit or a group of logical units.

Z

zero data

The number 0 (zero). A zero-formatting operation writes the number 0 (zero) to the entire disk area, overwriting the previous data, thereby safely and permanently destroying any previous data and removing it from the drive.

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MK-92RD8086-06